

Amplifier Built-in in this size! Furthermore High Precision!

world smallest*

* Based on research conducted by our company as of January 2012



EX-L200 SERIES

Ultrathin



EX-10 SERIES Ver.2

Mountable with M3 screws



EX-20 SERIES Ver.2

Single-point tightening



EX-30 SERIES Ver.2

EX-L200 SERIES

Ultra-compact Laser Sensor **Amplifier Built-in**



Conforming to
EMC Directive



Conforming to
FDA regulations

Refer to our general catalog or website for cautions and dimensions, etc.

Detecting ICs that are out of position in multiple palettes

Same mounting pitch as ultra-compact photoelectric sensor

EX-L200 series has the same mounting pitch as ultra-compact photoelectric sensor EX-20 series so that the time taken in designing is saved.

EX-20 series

EX-L200 series
* Thru-beam type: 13 mm 0.512 in
Reflective type: 16 mm 0.630 in

Mounting pitch*

Thru-beam type (EX-L211, EX-L212)

Minute object detection type (EX-L211) Sensing range: 1 m 3.281 ft

The beam is purposely widened to have a lower beam density and little beam spread so that when detecting minute objects, even a slight change in the light received intensity will not be missed.

Spot size: 6 × 4 mm 0.236 × 0.157 in approx.

(Visual reference value at a sensing distance of 1 m 3.281 ft)

Long sensing range type (EX-L212) Sensing range: 3 m 9.843 ft

A long range detection of 3 m 9.843 ft is achieved. High precision detection with minimum beam spread is possible even in a long range.

Spot size: 8 × 5.5 mm 0.315 × 0.217 in approx.

(Visual reference value at a sensing distance of 1 m 3.281 ft)

Spot reflective type (EX-L221)

Minute object detection type

Sensing range: 45 mm to 300 mm 1.772 in to 11.811 in

Highly precise sensing with minimum 0.01 mm 0.0004 in diameter. Many applications are possible due to the 300 mm 11.811 in long sensing range.

Spot size: ø1 mm ø0.039 in

(Visual reference value at a sensing distance of 300 mm 11.811 in)

Reflective type (EX-L291)

Long sensing range type Sensing range: 4 m 13.123 ft

Achieving ease of installation and 4 m 13.123 ft long sensing range.

Spot size: 6 × 4 mm 0.236 × 0.157 in approx.

(Visual reference value at a sensing distance of 1 m 3.281 ft)

Convergent reflective type (EX-L261, EX-L262) **NEW**

Spot type (EX-L261) Sensing range: 20 mm to 50 mm 0.787 in to 1.969 in

Highly precise sensing with minimum 0.01 mm 0.0004 in diameter.

Not affected by the background, and able to reliably sense unevenly-colored workpieces.

Spot size: ø1 mm ø0.039 in

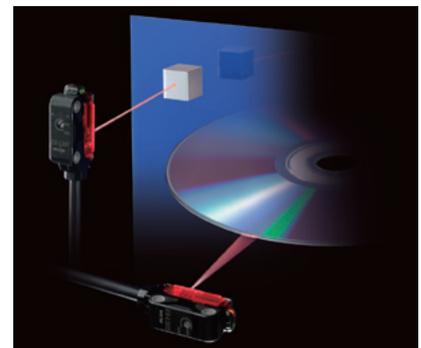
(Visual reference value at a sensing distance of 50 mm 1.969 in)

Line spot type (EX-L262) Sensing range: 20 mm to 70 mm 0.787 in to 2.756 in

Able to sense thin, glossy or curved-surface workpieces due to line beam.

Spot size: 1 × 5 mm 0.039 × 0.197 in approx.

(Visual reference value at a sensing distance of 50 mm 1.969 in)



Introducing world smallest* amplifier built-in laser sensor

Due to the customized IC and optical design, high precision detection is fulfilled in a world smallest size with directivity and visibility achievable only by laser.

The laser adopted is Class 1 (JIS / IEC / FDA) laser that is safe to use, so that there is no need to separate the areas of sensor usage.

* Based on research conducted by our company as of January 2012

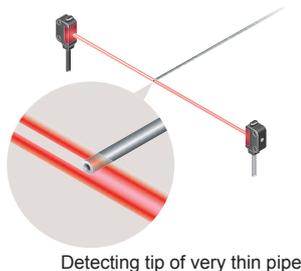


Highly accurate detection

Minute object detection type (EX-L211, EX-L221)

Suitable for positioning and minute object detection

A repeatability of 0.02 mm **0.0008 in** or less at a range of from 100 to 200 mm **3.937 to 7.874 in** makes this type best suitable for positioning applications (EX-L221). Moreover, it boasts a top-class detection precision in the compact laser sensor category with the gold wire of $\phi 0.01$ mm **$\phi 0.0004$ in**.



Detecting tip of very thin pipe

Model No. (Minute object detection type)	Minimum sensing object (Typical)	Repeatability (Typical)
EX-L211 (Thru-beam type)	$\phi 0.3$ mm $\phi 0.012$ in	0.01 mm 0.0004 in or less
EX-L221 (Reflective type)	$\phi 0.01$ mm $\phi 0.0004$ in	0.02 mm 0.0008 in or less

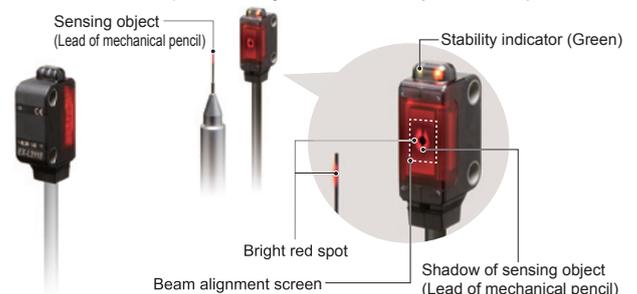
* Typical values when the sensitivity adjuster is optimally adjusted.

Easy beam-axis alignment

Thru-beam type (EX-L211, EX-L212)

Visual positioning is easy due to silhouetting a sensing object against a receiver.

Visually confirm the optimal receiver position, adjusting the beam axis by aligning the objects while watching the red spot on the beam alignment screen. The diagram on the right shows an example with the lead of a mechanical pencil being detected through visual adjustment.

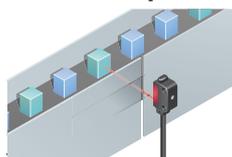


Stable convergent distance sensing

Spot type (EX-L261)

For sensing unevenly-colored workpieces

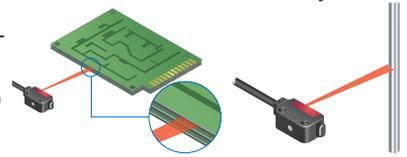
Due to convergent distance sensing, the background has very little effect, enabling stable sensing. Able to reliably sense unevenly-colored workpieces.



Line spot type (EX-L262)

For sensing thin, glossy or curved-surface workpieces

Able to sense glossy or curved-surface workpieces, such as PCB and metallic pipes, due to a wide line laser beam.

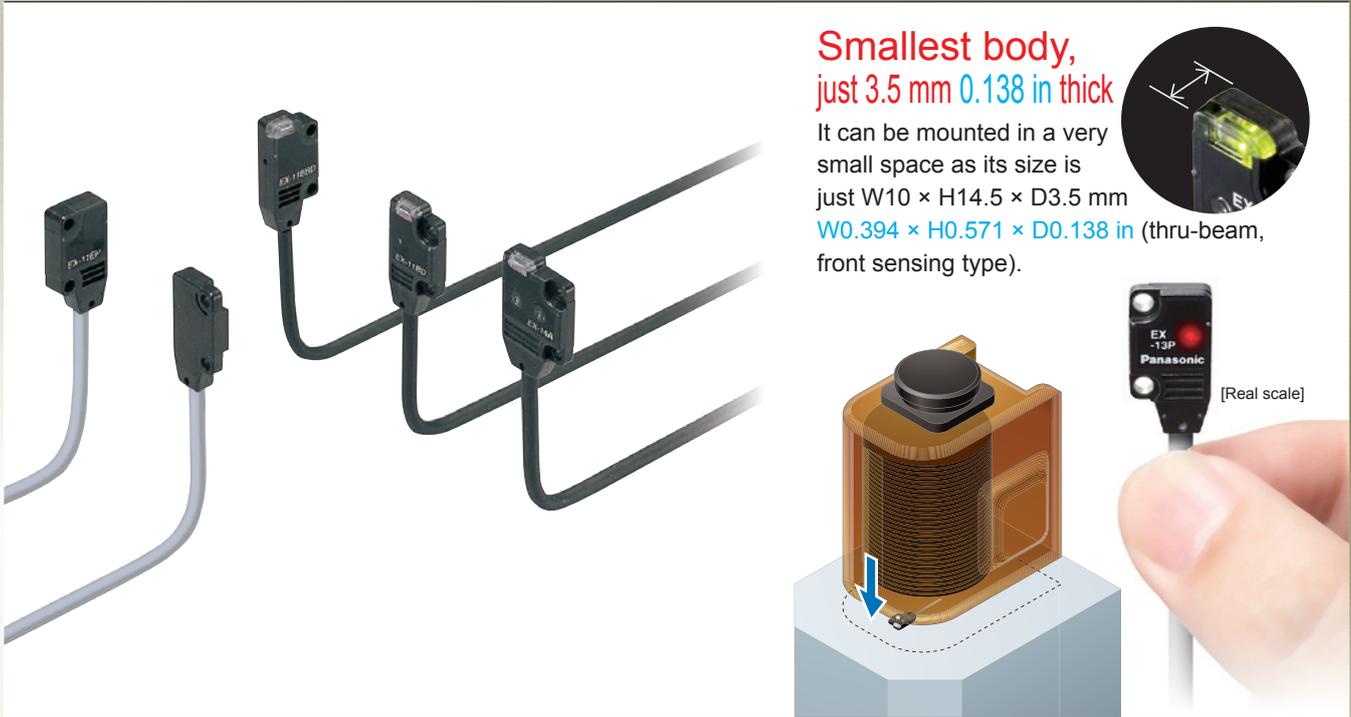


EX-10 SERIES Ver.2

Ultra-slim Photoelectric Sensor Amplifier Built-in

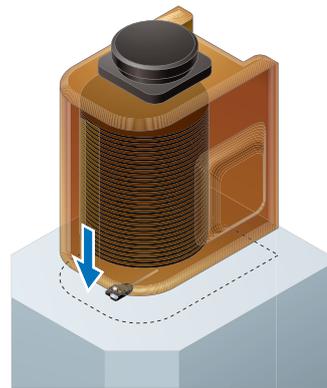
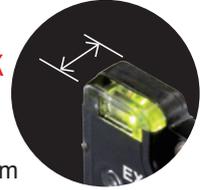


Refer to our general catalog or website for cautions and dimensions, etc.



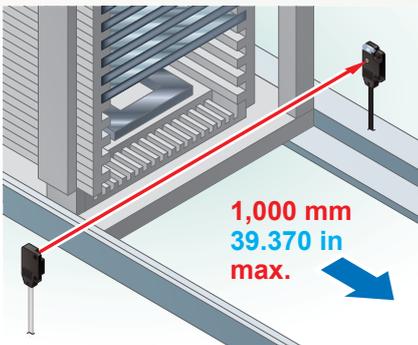
**Smallest body,
just 3.5 mm 0.138 in thick**

It can be mounted in a very small space as its size is just W10 × H14.5 × D3.5 mm W0.394 × H0.571 × D0.138 in (thru-beam, front sensing type).



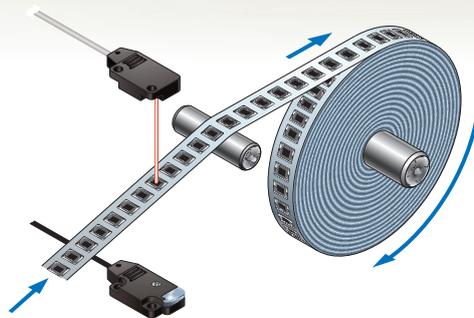
Long-range sensing even with compact size

(EX-19□)



Long-range sensing is possible, even with an ultra-slim body that is 3.5 mm 0.138 in thin.

High-speed response time: 0.5 ms



The sensor is suitable for detecting small and highspeed traveling objects.

Bright 2-color indicator



A convenient 2-color indicator has been incorporated in the miniature body.

Operation mode switch

(EX-15□/17□)

Thru-beam type sensor incorporated with an operation mode switch on the bifurcation is also available. It helps you to test the operability before start-up.

Increased bending durability

(EX-□-R)

A flexible cable type with greatly improved bending durability compared to previous types is available. It is ideal for moving parts such as robot arms.

EX-20 SERIES Ver.2

Ultra-compact Photoelectric Sensor Amplifier Built-in



Refer to our general catalog or website for cautions and dimensions, etc.



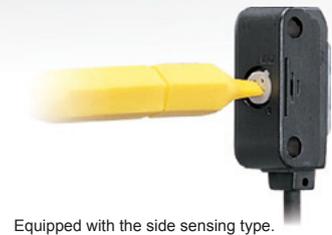
Mountable with M3 screws & Incorporates a sensitivity adjuster even in this size

Mountable with M3 screws

Metal sleeve inserts have been provided in the mounting holes so that the product is not damaged even in case of excess tightening.

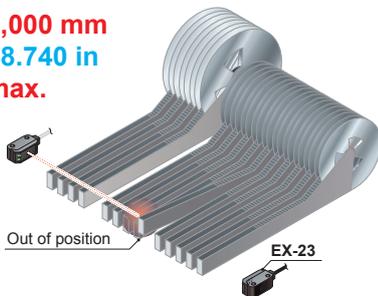


Incorporates a sensitivity adjuster



Long sensing range

2,000 mm
78.740 in
max.



The EX-20 series achieves long distance sensing [thru-beam type: 2 m **6.562 ft**, retroreflective type: 200 mm **7.874 in** (when using the attached reflector), diffuse reflective type: 160 mm **6.299 in**], despite its miniature size. Hence, it is usable even on a wide conveyor.

Miniaturization by using single chip optical IC

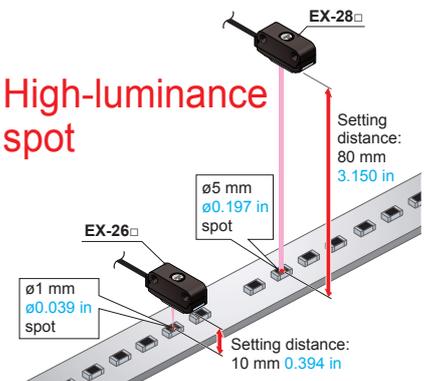


Miniaturization

The beam-receiving photodiode and the A/D conversion circuit have been fabricated on a single chip optical IC (full custom). Hence, in spite of its miniature size, it has a performance and reliability which is equal to or better than the conventional product.

Spots can be seen clearly

High-luminance spot



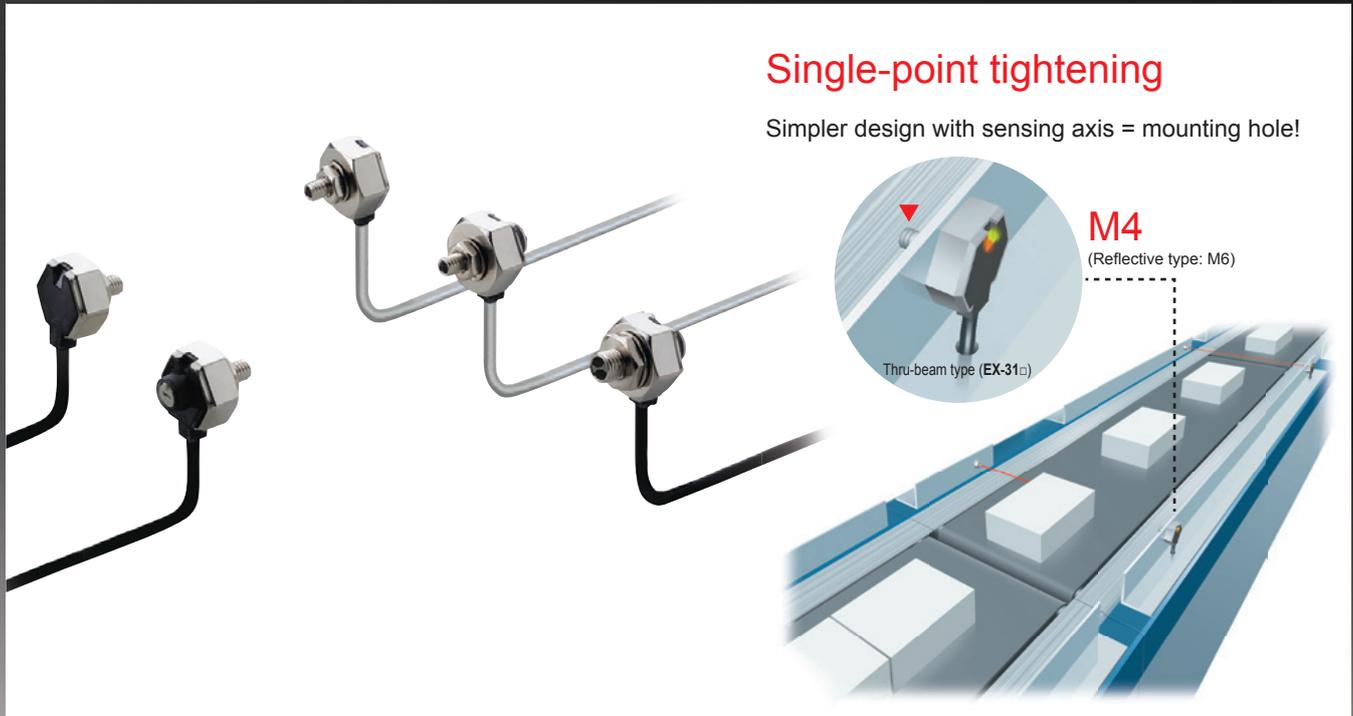
A red LED dot light source is used to cast a red spot beam so that the sensing position can be checked easily.

EX-30 SERIES Ver.2

Threaded Miniature Photoelectric Sensor **Amplifier Built-in**

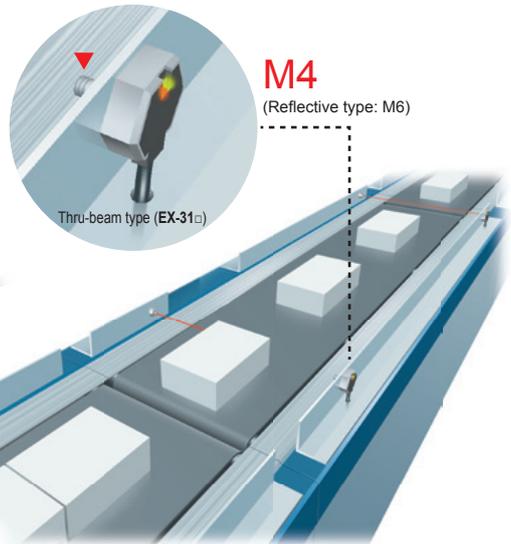


Refer to our general catalog or website for cautions and dimensions, etc.



Single-point tightening

Simpler design with sensing axis = mounting hole!



M4
(Reflective type: M6)

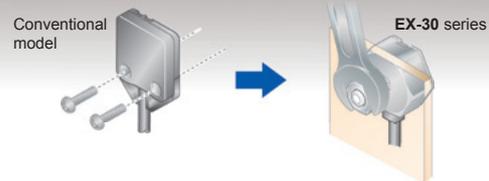
Thru-beam type (EX-31)

Long sensing range



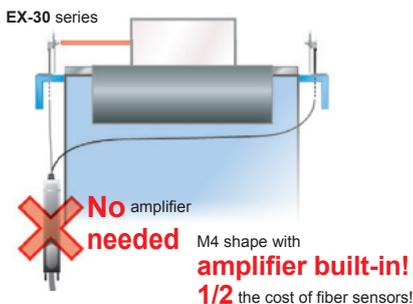
The EX-30 series achieves long distance sensing [thru-beam type: 500 mm 19.685 in (EX-33(-PN): 800 mm 31.496 in), reflective type: 50 mm 1.969 in.]

Single-point tightening cuts down on installation work by half



Conventional photoelectric sensors required four (for thru-beam type) or two (for reflective type) mounting holes and screws to be used. However, the EX-30 series is installed with a single screw, thus cutting down on installation work by half.

Can be installed in the same way as standard fibers



The EX-30 series can be screwmounted (M4 for thru-beam type, M6 for reflective type) in the same way as standard fibers. This means that they can be inserted into production lines in exactly the same way as conventional high-priced fiber sensors.

Unbreakable



A cabtyre cable is used, so that the sensor cable will not break like fibers.

Takes up very little space



Unlike fibers, bending radius is not a problem, so that the sensor can be securely installed alongside conveyors.

SPECIFICATIONS

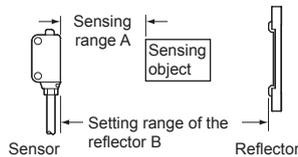
Common specification

Supply voltage	12 to 24 V DC $\pm 10\%$ Ripple P-P 10 % or less
Output	NPN open-collector transistor or PNP open-collector transistor
Response time	0.5 ms or less
Protection	IP67 (IEC)

EX-L200 series

Item	Model No.	Type	Thru-beam		Retroreflective	Spot reflective	Convergent reflective	
			Minute object detection	Long sensing range	Long sensing range	Minute object detection	Spot	Line spot
			NPN output	EX-L211	EX-L212	EX-L291	EX-L221	EX-L261
PNP output	EX-L211-P	EX-L212-P	EX-L291-P	EX-L221-P	EX-L261-P	EX-L262-P		
Sensing range			1 m 3.281 ft	3 m 9.843 ft	4 m 13.123 ft (Note 1)	45 to 300 mm 1.772 to 11.811 in (Note 2)	20 to 50 mm 0.787 to 1.969 in (Conv. point: 22 mm 0.866 in) (Note 2)	20 to 70 mm 0.787 to 2.756 in (Conv. point: 22 mm 0.866 in) (Note 2)
Emission spot size (Typical)			Approx. 6 × 4 mm 0.236 × 0.157 in (vertical × horizontal) (at a sensing distance of 1 m)	Approx. 8 × 5.5 mm 0.315 × 0.217 in (vertical × horizontal) (at a sensing distance of 1 m) (Note 3)	Approx. 6 × 4 mm 0.236 × 0.157 in (vertical × horizontal) (at a sensing distance of 1 m) (Note 3)	$\phi 1$ mm $\phi 0.039$ in or less (at a sensing distance of 300 mm)	$\phi 1$ mm $\phi 0.039$ in (at a sensing distance of 50 mm)	Approx. 5 × 1 mm 0.197 × 0.039 in (vertical × horizontal) (at a sensing distance of 50 mm)
Sensing object			Opaque object of $\phi 2$ mm $\phi 0.079$ in or more	Opaque object of $\phi 3$ mm $\phi 0.118$ in or more	Opaque, translucent object of $\phi 25$ mm $\phi 0.984$ in or more	Opaque, translucent or transparent object		
Sensitivity adjuster			Continuously variable adjuster (receiver)	—	—	Continuously variable adjuster		
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					

Notes: 1) The sensing range is the value for **RF-330** reflector. The sensing range represents the actual sensing range of the sensor. The sensing ranges itemized in "A" of the table below may vary depending on the shape of sensing object. Be sure to check the operation with the actual sensing object.



	RF-330 (Accessory)		RF-210 (Optional)	
	With PF-EXL2-1 polarizing filters		With PF-EXL2-1 polarizing filters	
A	0 to 4 m 0 to 13.123 ft	0 to 4 m 0 to 13.123 ft	0 to 1.8 m 0 to 5.906 ft	0 to 1.2 m 0 to 3.937 ft
B	0.2 to 4 m 0.656 to 13.123 ft	0.4 to 4 m 1.312 to 13.123 ft *1	0.16 to 1.8 m 0.525 to 5.906 ft	0.25 to 1.2 m 0.820 to 3.937 ft *1

*1 When positioning the reflector nearby, the angular characteristic become more narrow. Adjust the angle of a sensor or reflector.

- The sensing range is specified for white non-glossy paper (100 × 100 mm **3.937 × 3.937 in**) as the object.
- EX-L212**: In the case sensing distance is 3 m **9.843 ft**, the emission spot size is H 17 × W 11 mm **H 0.669 × W 0.433 in** (visual reference value).
- EX-L291**: In the case sensing distance is 4 m **13.123 ft**, the emission spot size is H 18 × W 10 mm **H 0.709 × W 0.394 in** (visual reference value).

EX-10 series (Model Nos. having the suffix "-PN" are PNP output type.)

Item	Model No.	Type	Thru-beam					Convergent reflective	Thru-beam			
			Front sensing	Side sensing	Front sensing	Side sensing	Front sensing	Diffused beam type	Operation mode switch on bifurcation			
			EX-11A(-PN)	EX-11EA(-PN)	EX-13A(-PN)	EX-13EA(-PN)	EX-19A(-PN)	EX-14A(-PN)	EX-15 (Note 1)	EX-15E (Note 1)	EX-17 (Note 1)	EX-17E (Note 1)
Sensing range			150 mm 5.906 in	500 mm 19.685 in	500 mm 19.685 in	1 m 3.281 ft	2 to 25 mm 0.079 to 0.984 in (Note 2) (Conv. point: 10 mm 0.394 in)	150 mm 5.906 in	500 mm 19.685 in			
Min. sensing object			$\phi 1$ mm $\phi 0.039$ in opaque object (Setting distance between emitter and receiver: 150 mm)	$\phi 2$ mm $\phi 0.079$ in opaque object (Setting distance between emitter and receiver: 500 mm (EX-19 : 1 m))	$\phi 2$ mm $\phi 0.079$ in opaque object (Setting distance between emitter and receiver: 500 mm (EX-19 : 1 m))	$\phi 0.1$ mm $\phi 0.004$ in copper wire (Setting distance: 10 mm)	$\phi 1$ mm $\phi 0.039$ in opaque object (Setting distance between emitter and receiver: 150 mm)	$\phi 2$ mm $\phi 0.079$ in opaque object (Setting distance between emitter and receiver: 500 mm)				
Ambient temperature			-25 to +55 °C -13 to + 131 °F (No dew condensation or icing allowed), Storage: -30 to +70 °C -22 to +158 °F									

- Notes: 1) Either Light-ON or Dark-ON can be selected by the operation mode switch.
2) The sensing range is specified for white non-glossy paper (50 × 50 mm **1.969 × 1.969 in**) as the object.

EX-20 series (Model Nos. having the suffix "-PN" are PNP output type.)

Item	Model No.	Type	Thru-beam		Retroreflective	Diffuse reflective	Convergent reflective		Narrow-view reflective
			Front sensing	Side sensing	Side sensing	Side sensing	Diffused beam type	Small spot beam type	Long distance spot beam type
			EX-21A(-PN)	EX-23(-PN)	EX-29A(-PN)	EX-22A(-PN)	EX-24A(-PN)	EX-26A(-PN)	EX-28A(-PN)
Dark-ON	EX-21B(-PN)	(Selectable by operation mode switch)	EX-29B(-PN)	EX-22B(-PN)	EX-24B(-PN)	EX-26B(-PN)	EX-28B(-PN)		
Sensing range			1 m 3.281 ft	2 m 6.562 ft	30 to 200 mm 1.181 to 7.874 in (Specified for the RF-200 reflector)	5 to 160 mm 0.197 to 6.299 in with white non-glossy paper (200 × 200 mm)	2 to 25 mm 0.079 to 0.984 in (Conv. point: 10 mm 0.394 in) with white non-glossy paper (50 × 50 mm)	6 to 14 mm 0.236 to 0.551 in (Conv. point: 10 mm 0.394 in) with white non-glossy paper (50 × 50 mm), spot diameter $\phi 1$ mm with setting distance 10 mm	45 to 115 mm 1.772 to 4.528 in with white non-glossy paper (100 × 100 mm), spot diameter $\phi 5$ mm with setting distance 80 mm
Sensing object			Min. $\phi 2.6$ mm $\phi 0.102$ in opaque object (Note)	Min. $\phi 3$ mm $\phi 0.118$ in opaque object (Note)	$\phi 15$ mm $\phi 0.591$ in or more opaque or translucent object	Opaque, translucent or transparent object	Min. $\phi 0.1$ mm $\phi 0.004$ in copper wire (Setting distance: 10 mm 0.394 in)	Opaque, translucent or transparent object* (Min. $\phi 1$ mm copper wire at setting distance 80 mm)	
Sensitivity adjuster			—	Continuously variable adjuster			—	Continuously variable adjuster	
Ambient temperature			-25 to +55 °C -13 to + 131 °F (No dew condensation or icing allowed), Storage: -30 to +70 °C -22 to +158 °F						

Note: Fully interrupted objects. [Setting distance **EX-21**: 1 m **3.281 ft**, **EX-23(-PN)**: 2 m **6.562 ft**]

* Make sure to confirm detection with an actual sensor before use.

SPECIFICATIONS

EX-30 series

Item	Model No.	Type	Thru-beam			Diffuse reflective	
			With operation mode switch			EX-32A	EX-32B
			NPN output	EX-31A	EX-31B		
			EX-31A-PN	EX-31B-PN	EX-33-PN	EX-32A-PN	EX-32B-PN
Sensing range		500 mm 19.685 in			800 mm 31.496 in	50 mm 1.969 in (Note 1)	
Sensing object		ø2 mm ø0.079 in or more opaque object (Completely beam interrupted objects)			Opaque, translucent or transparent object (Note 2)		
Sensitivity adjuster		—			Continuously variable adjuster		
Ambient temperature		-25 to +55 °C -13 to +131 °F (No dew condensation or icing allowed), Storage: -30 to +70 °C -22 to +158 °F					

Notes: 1) The sensing range is specified for white non-glossy paper (100 × 100 mm 3.937 × 3.937 in) as the object.
2) Make sure to confirm detection with an actual sensor before use.

EX-10/20/30 series upgraded

Sensor that are environmentally and user friendly!
Easy to see the indicator and improve the environmental resistance.

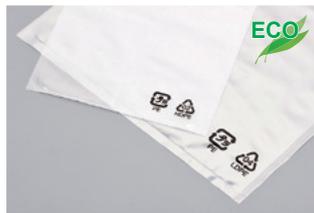
Electric power saving

The EX-10/20/30 series achieve an average 25 % (Maximum 35 %) reduction compared to conventional sensors in current consumption.

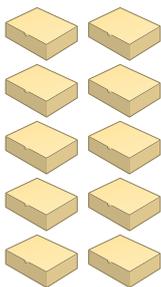
These sensors contribute to environmental friendliness.

Resource saving

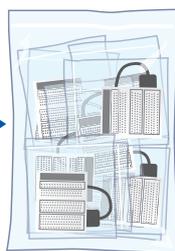
These sensors use very simple packaging to reduce waste. The bag is made of polyethylene and does not emit toxic gasses.



ECO package



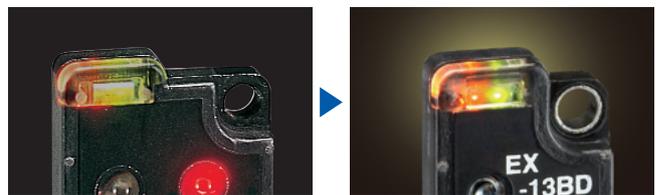
Previous models have been packed in box by unit.



Upgraded models are simple packaging (packed in plastic bag by 10 units).

Improvement in the luminance of indicator

Increase in brightness of the operation indicator and the stable indicator.



Previous model

Upgraded model

Easy to discriminate between an emitter and a receiver

Changed in cable color of the emitter (except for flexible cable type)

<p><Before> Same cable color for emitter and receiver</p> <p>Cable color of emitter: Black</p> <p>Cable color of receiver: Black</p>
<p><After> Use color-coded cable for emitter and receiver</p> <p>Cable color of emitter: Gray</p> <p>Cable color of receiver: Black</p>



Stronger inverse wiring connection protection

Avoid the trouble by mistaken wiring

Strengthening the output circuit inverse polarity protection prevents sensor damage caused by mistaken output or power supply wiring.

Stronger inverter countermeasures

Stronger noise resistance

By incorporating an inverter countermeasure circuit that appropriately shifts with peak wavelength, the sensor now resists high-frequency noise from high-voltage inverter motors and inverter lights more effectively.

Please contact

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