Panasonic
INDUSTRY

Amplifier Built-in

Ultra-compact Laser Sensor
Ultra-minute/slim/compact Photoelectric Sensor

EX SERIES

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

(Actual size: W8 × H14 × D3 mm
W0.315 × H0.551 × D0.118 in)

EX-Z SERIES

EX-L200 SERIES

EX-10 SERIES Ver.2

EX-20 SERIES Ver.2

EX-30 SERIES Ver.2

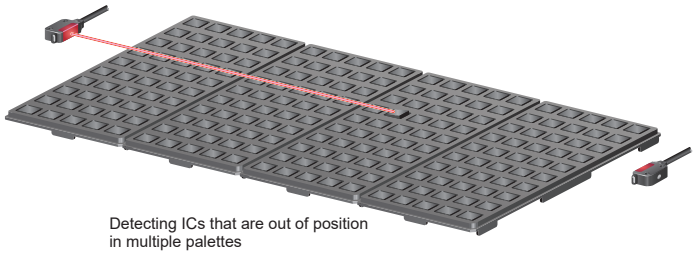
2024.7

EX-L200 SERIES

Ultra-compact Laser Sensor Amplifier Built-in

CE | UKCA | FDA Conforming to FDA regulations | GB Conforming to GB 7247.1

Refer to our website for cautions and dimensions, etc.



Detecting ICs that are out of position in multiple palettes

Same mounting pitch as ultra-compact photoelectric sensor

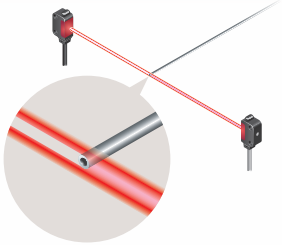
EX-L200 series has the same mounting pitch as ultra-compact photoelectric sensor **EX-20** series so that the time taken in designing is saved.

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 ø0.01 mm ø0.0004 in.



Detecting tip of very thin pipe

Model No. (Minute object detection type)	Minimum sensing object (Typical)	Repeatabillty (Typical)
EX-L211 (Thru-beam type)	**ø0.3 mm ø0.012 in**	**0.01 mm 0.0004 in or less**
EX-L221 (Spot reflective type)	**ø0.01 mm ø0.0004 in**	**0.02 mm 0.0008 in or less**

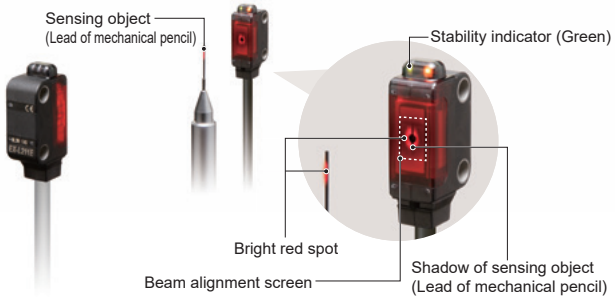
* Typical values when the sensitivity adjuster is optimally adjusted.

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.

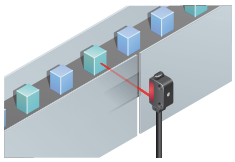


Stable convergent distance sensing

Spot type (**EX-L261**)

For sensing unevenly-colored workpieces

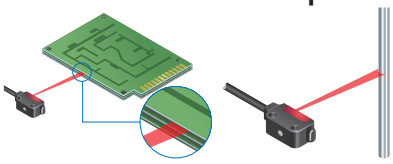
Due to convergent distance sensing, the background has very little effect, enabling stable sensing. Able to reliably sense unevenly-colored workpieces.



Line spot type (**EX-L262**)

For sensing thin, glossy or curved-surface workpieces

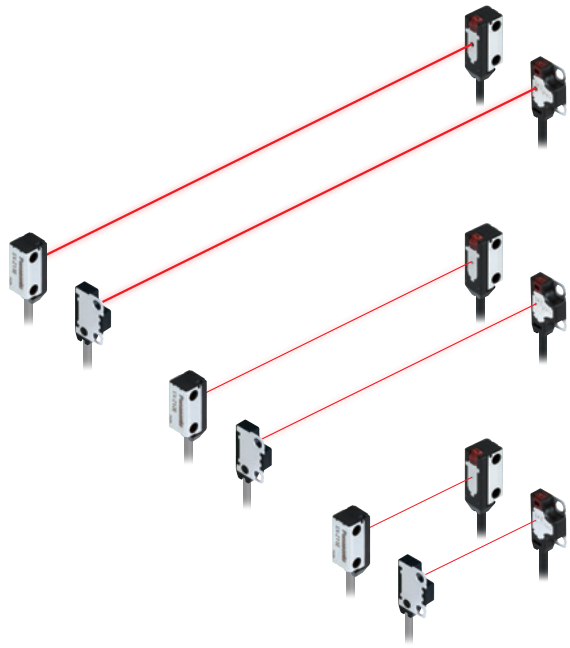
Able to sense glossy or curved-surface workpieces, such as PCB and metallic pipes, due to a wide line laser beam.



EX-Z SERIES

Ultra-minute Photoelectric Sensor Amplifier Built-in

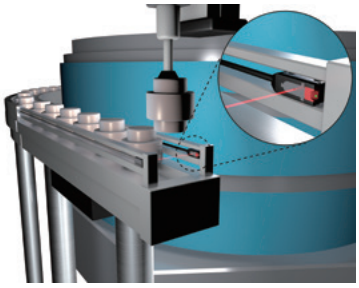
Refer to our website for cautions and dimensions, etc.



World-class smallness*

Can be used in narrow spaces where it has been impossible to install before, and can be replaced with a fiber sensor.

* Among photoelectric sensors with built-in amplifier, as of March 2024 in-company survey



Detection of parts in parts feeder

World's smallest class*

* Among photoelectric sensors with built-in amplifier, as of March 2024 in-company survey

Unit volume ratio reduced by about 50%*

* As compared to EX-10 series

The ultra-thin 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.

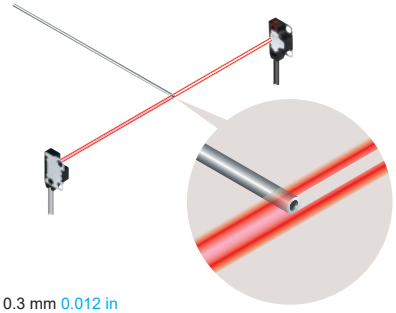
Front sensing type	Side sensing type
Approx. 50% smaller in volume ratio than EX-10	Approx. 35% smaller in volume ratio than EX-10
EX-Z1□F□	**EX-Z1□**
W8 × H14 × D3 mm W0.315 × H0.551 × D0.118 in	W5.5 × H15.9 × D6.5 mm W0.217 × H0.626 × D0.256 in

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 without using an optional slit.

Built-in slit
EX-Z11□
Slit diameter: 0.3 mm 0.012 in



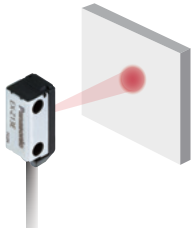
Sensing of end of thin pipe

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.

Clearly visible spotlight

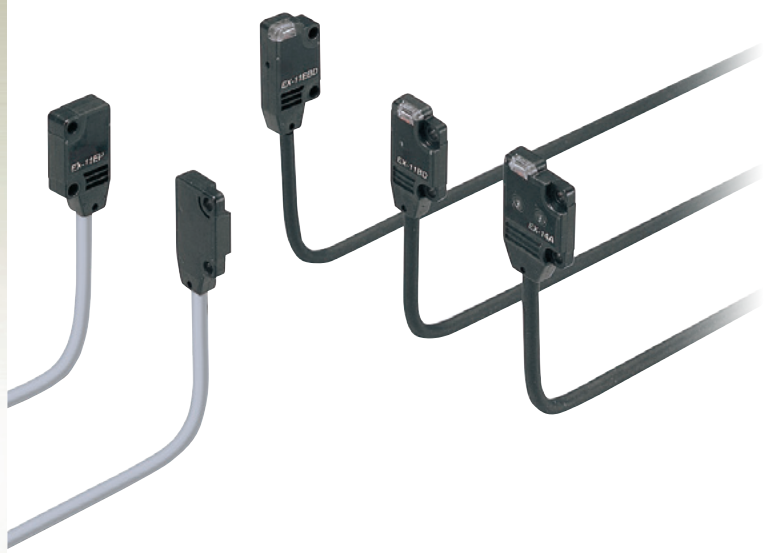


EX-10 SERIES Ver.2 Ultra-slim Photoelectric Sensor Amplifier Built-in

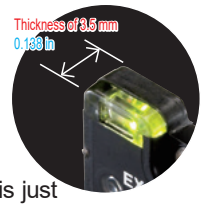
CE (Excluding EX-15□/17□) | UKCA (Excluding EX-15□/17□) | Recognition (Excluding some models) | ISO 13849-1: 2015 (Category 1 PLc) compliant (Excluding EX-15□/17□)

Refer to our website for cautions and dimensions, etc.

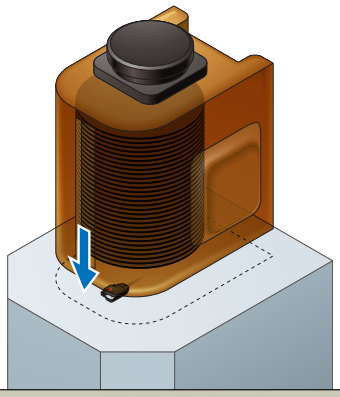
* When using for safety applications, refer to the User's Manual.



Convergent reflective type with a thickness of 3.5 mm 0.138 in

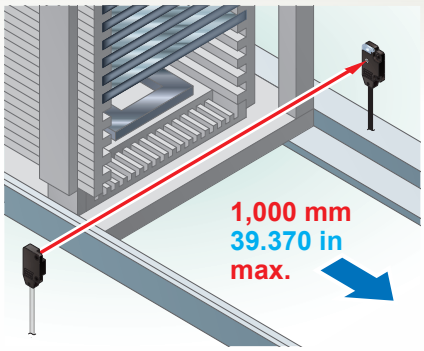


It can be mounted in a very small space as its size is just W10 × H14.5 × D3.5 mm W0.394 × H0.571 × D0.138 in (Convergent reflective type).



Long-range sensing even with compact size

(EX-19□)

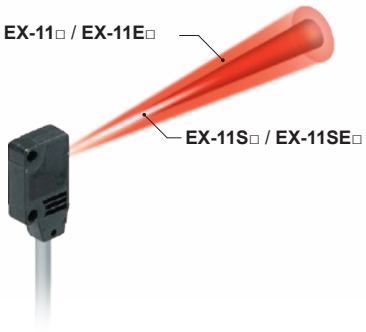


Long-range sensing is possible, even with an ultra-slim body that is 3.5 mm 0.138 in thin.

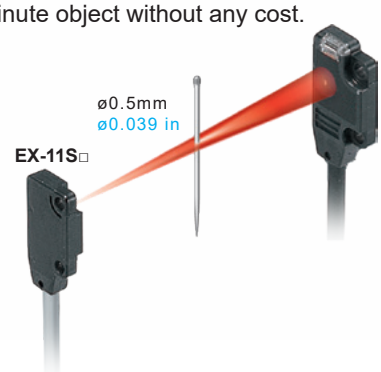
A wide variety of narrow-beam type! Light diffusion is approx. 1/2 of standard type

(EX-□S□)

Less interference with no slit, narrow-pitch can be set. The pitch of installation is 1/2 of conventional models, so that the close-installation is possible. No cost is necessary to purchase or install a slit.



Possible to sense a minute object less than ø0.5 mm ø0.039 in with no slit. The series is applicable to sense a minute object without any cost.



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.

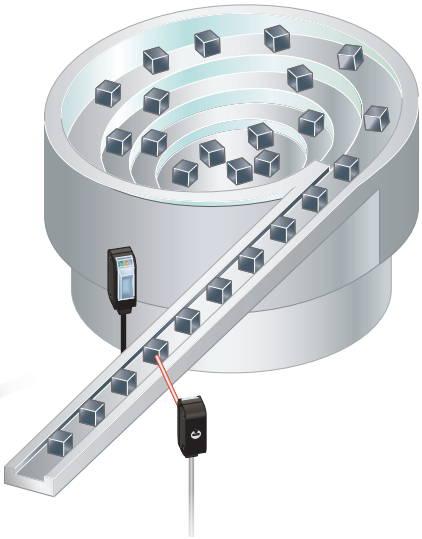
EX-20 SERIES Ver.2

Ultra-compact Photoelectric Sensor Amplifier Built-in

Recognition (Excluding 5 m cable length type)

Refer to our website for cautions and dimensions, etc.

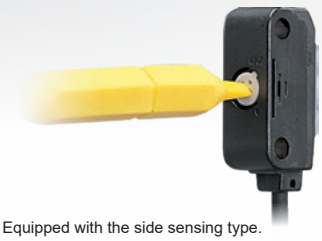
Mountable with **M3** screws & Incorporates a sensitivity adjuster even in this size



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.

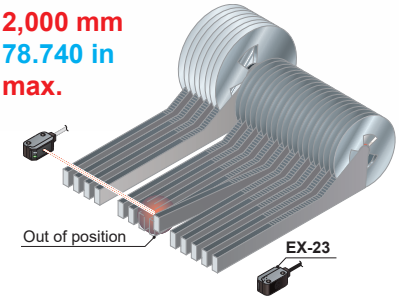
Incorporates a sensitivity adjuster



Equipped with the side sensing type.

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.

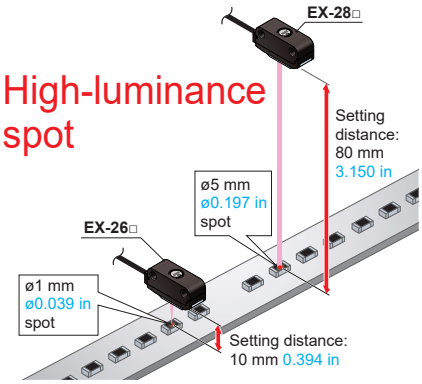
Miniaturization by using single chip optical IC

Miniaturzation

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



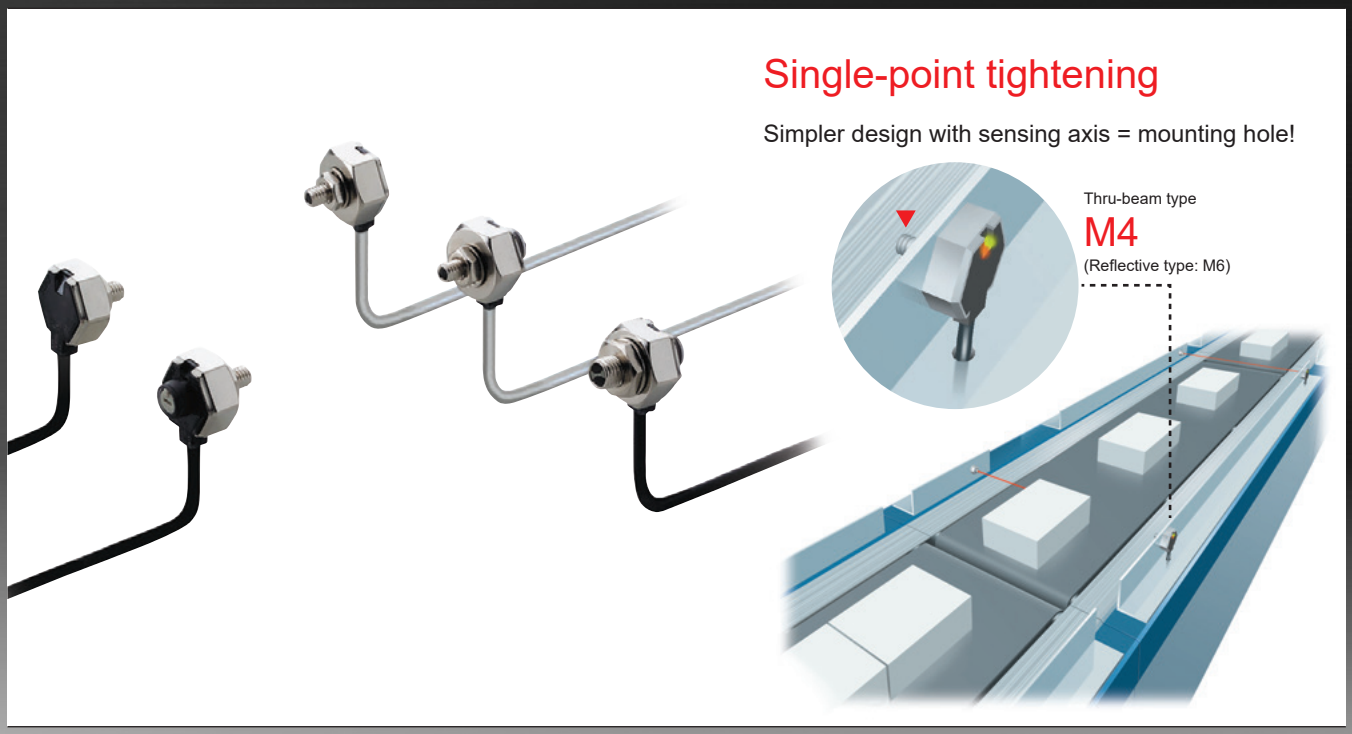
A red LED dot light source is used to cast a red spot beam so that the sensing position can be checked easily.

EX-30 SERIES Ver.2

Threaded Miniature Photoelectric Sensor Amplifier Built-in

Recognition
[Excluding **EX-33(-PN)**, 5 m cable length type]

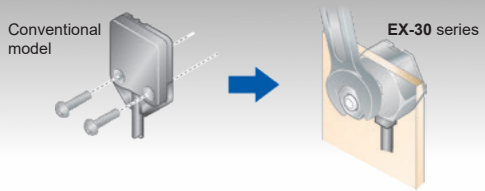
Refer to our website for cautions and dimensions, etc.



Long sensing range

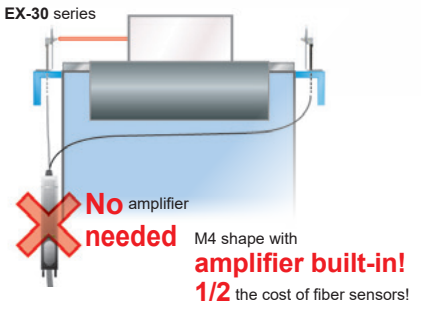
The **EX-30** series achieves long distance sensing [thru-beam type: 500 mm 19.685 in (**EX-33**(**-PN**): 800 mm 31.496 in), reflective type: 50 mm 1.969 in.]

Single-point tightening cuts down on installation work by half



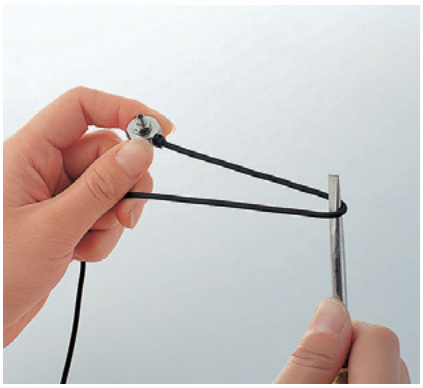
Conventional photoelectric sensors required four (for thru-beam type) or two (for reflective type) mounting holes and screws to be used. However, the **EX-30** series is installed with a single screw, thus cutting down on installation work by half.

Can be installed in the same way as standard fibers



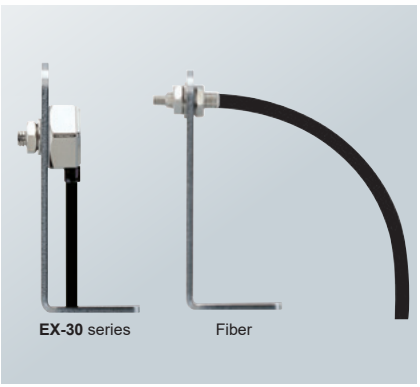
The **EX-30** series can be screwmounted (M4 for thru-beam type, M6 for reflective type) in the same way as standard fibers. This means that they can be inserted into production lines in exactly the same way as conventional high-priced fiber sensors.

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

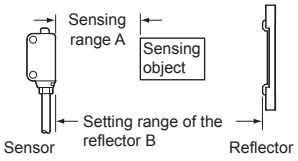
Supply voltage	12 to 24 V DC ±10 % Ripple P-P 10 % or less
Output	NPN open-collector transistor or PNP open-collector transistor
Response time	0.5 ms or less
Protection	IP67 (IEC)
Applicable regulations (Note)	CE Marking (EMC Directive, RoHS Directive), UKCA Marking (EMC Regulations, RoHS Regulations)

Note: Excluding **EX-15□/17□**

EX-L200 series (Ultra-compact Laser Sensor)

Item \ Type		Thru-beam		Retroreflective	Spot reflective	Convergent reflective	
		Minute object detection	Long sensing range	Long sensing range	Minute object detection	Spot	Line spot
Model No.	NPN output	**EX-L211**	**EX-L212**	**EX-L291**	**EX-L221**	**EX-L261**	**EX-L262**
	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) (Note 2)	20 to 70 mm 0.787 to 2.756 in (Conv. point: 22 mm) (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)	ø1 mm ø0.039 in or less (at a sensing distance of 300 mm) (Note 4)	ø1 mm ø0.039 in or less (at a sensing distance of 50 mm) (Note 4)	Approx. 5 × 1 mm 0.197 × 0.039 in (vertical × horizontal) (at a sensing distance of 50 mm)
Sensing object		Opaque object of ø2 mm ø0.079 in or more	Opaque object of ø3 mm ø0.118 in or more	Opaque, translucent object of ø25 mm ø0.984 in or more	Opaque, translucent or transparent object (Note 5)		
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 (Accesory)	With **PF-EXL2-1** polarizing filters	RF-210 (Optional)	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.

2) The sensing range is specified for white non-glossy papar (100 × 100 mm 3.937 × 3.937 in) as the object.
3) **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).
4) The beam diameter was defined as $1/e^2$ (approx. 13.5%) of the center light intensity.
5) Make sure to confirm detection with an actual sensor before use.

EX-10 series Ver. 2 (Ultra-compact Photoelectric Sensor) (Model Nos. having the suffix "**-PN**" are PNP output type.)

Item \ Type		Thru-beam·Standard						Thru-beam·Operation mode switch on bifurcation			
		Front sensing	Side sensing	Front sensing	Side sensing	Front sensing	Side sensing	Front sensing	Side sensing	Front sensing	Side sensing
Model No.	Light-ON	**EX-11A(-PN)**	**EX-11EA(-PN)**	**EX-13A(-PN)**	**EX-13EA(-PN)**	**EX-19A(-PN)**	**EX-19EA(-PN)**	**EX-15** (Note)	**EX-15E** (Note)	**EX-17** (Note)	**EX-17E** (Note)
	Dark-ON	**EX-11B(-PN)**	**EX-11EB(-PN)**	**EX-13B(-PN)**	**EX-13EB(-PN)**	**EX-19B(-PN)**	**EX-19EB(-PN)**				
Sensing range		150 mm 5.906 in		500 mm 19.685 in		1 m 3.281 ft		150 mm 5.906 in		500 mm 19.685 in	
Min. sensing object		ø1 mm ø0.039 in opaque object (Completely beam interrupted object) (Setting distance between emitter and receiver: 150 mm)		ø2 mm ø0.079 in opaque object (Completely beam interrupted object) (Setting distance between emitter and receiver: 500 mm (**EX-19**□: 1 m)				ø1 mm ø0.039 in opaque object (Completely beam interrupted object) (Setting distance between emitter and receiver: 150 mm)		ø2 mm ø0.079 in opaque object (Completely beam interrupted 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									

Note: Either Light-ON or Dark-ON can be selected by the operation mode switch.

Item \ Type		Thru-beam·Narrow-beam					Convergent reflective (Diffused beam type)
		Front sensing	Side sensing	Front sensing	Side sensing	Front sensing	Front sensing
Model No.	Light-ON	**EX-11SA(-PN)**	**EX-11SEA(-PN)**	**EX-13SA(-PN)**	**EX-13SEA(-PN)**	**EX-19SA(-PN)**	**EX-14A(-PN)**
	Dark-ON	**EX-11SB(-PN)**	**EX-11SEB(-PN)**	**EX-13SB(-PN)**	**EX-13SEB(-PN)**	**EX-19SB(-PN)**	**EX-14B(-PN)**
Sensing range		150mm 5.906 in		500mm 19.685 in		1m 3.281 ft	2 to 25 mm 0.079 to 0.984 in (Note 2) (Conv. point: 10 mm)
Min. sensing object		ø0.5 mm ø0.020 in opaque object (Completely beam interrupted object) (Note 1)	ø1.0 mm ø0.039 in opaque object (Completely beam interrupted object) (Note 1)		ø2.0 mm ø0.079 in opaque object (Completely beam interrupted object) (Note 1)		ø0.1 mm ø0.004 in copper wire (Setting distance: 10 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.

SPECIFICATIONS

EX-Z series (Ultra-minute Photoelectric Sensor) (Model Nos. having the suffix "**-P**" are PNP output type and model Nos. having the "**-R**" are inflection resistant cable type.)

Item \ Type		Thru-beam					
		Front sensing	Side sensing	Front sensing	Side sensing	Front sensing	Side sensing
Model No.	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 range		50 mm 1.969 in		200 mm 7.874 in		500 mm 19.685 in	
Min. sensing object		ø0.3 mm ø0.012 in opaque object (Completely beam interrupted object) (Setting distance between emitter and receiver: 50 mm)		ø0.5 mm ø0.02 in opaque object (Completely beam interrupted object) (Setting distance between emitter and receiver: 200 mm)		ø1.0 mm ø0.039 in opaque object (Completely beam interrupted object) (Setting distance between emitter and receiver: 500 mm)	
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					

EX-20 series Ver. 2 (Ultra-slim Photoelectric Sensor) (Model Nos. having the suffix "**-PN**" are PNP output type.)

Item \ Type		Thru-beam		Retroreflective	Diffuse reflective	Convergent reflective		Narrow-view reflective
						Diffused beam	Small spot beam	Long distance spot beam
		Front sensing	Side sensing	Side sensing	Side sensing	Front sensing	Side sensing	Side sensing
Model No.	Light-ON	**EX-21A(-PN)**	**EX-23(-PN)** (Selectable by operation mode switch)	**EX-29A(-PN)**	**EX-22A(-PN)**	**EX-24A(-PN)**	**EX-26A(-PN)**	**EX-28A(-PN)**
	Dark-ON	**EX-21B(-PN)**		**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 (Note 1)	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) with white non-glossy paper (50 × 50 mm)	6 to 14 mm 0.236 to 0.551 in (Conv. point: 10 mm) with white non-glossy paper (50 × 50 mm), spot diameter ø1 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 ø5 mm with setting distance 80 mm
Sensing object		Min. ø2.6 mm ø0.102 in opaque object (Setting distance between emitter and receiver: 1 m)	Min. ø3 mm ø0.118 in opaque object (Setting distance between emitter and receiver: 2 m)	ø15 mm ø0.591 in or more opaque or translucent object (Note 1, 2)	Opaque, translucent or transparent object (Note 2)	Min. ø0.1 mm ø0.004 in copper wire (Setting distance: 10 mm)		Opaque, translucent or transparent object (Note 2) (Min. ø1 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						

Notes: 1) Specified for the **RF-200** reflector
2) Make sure to confirm detection with an actual sensor before use.

EX-30 series Ver. 2 (Threaded Miniature Photoelectric Sensor)

Item \ Type		Thru-beam		Thru-beam With operation mode switch	Diffuse reflective	
Model No.	NPN output	**EX-31A**	**EX-31B**	**EX-33**	**EX-32A**	**EX-32B**
	PNP output	**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.

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Specifications are subject to change without notice.
No. PCE-EXLINE-3
2024.7