Threaded Miniature Photoelectric Sensor Amplifier Built-in

EX-30 SERIES Ver.2

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

PNP output type available

The next-generation new form series
A new alternative to fiber sensors

Simpler design

All you need to do is to make a ø4 mm ø0.157 in hole where you would like to stop or check the object (ø6 mm ø0.236 in hole for reflective type). Furthermore, the center of the sensing axis is the same as the center of the mounting hole, which makes it much easier to set the sensing position.

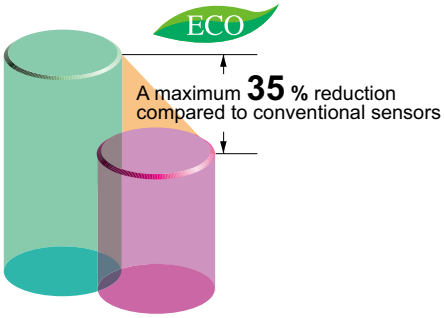
New design solves all weak points of fiber sensors

The **EX-30** series solves all of the difficulties associated with fiber sensors, such as:
- Difficulty finding a suitable place for the amplifier
- Fragility of the fiber
- Extra space needed because of difficulty in bending the fiber
- The nuisance of having to use a protective tube to prevent fiber breakage

BASIC PERFORMANCE

Electric power saving

The **EX-30** series achieves reductions in power consumption of up to 65 %. These sensors contribute to environmental friendliness.

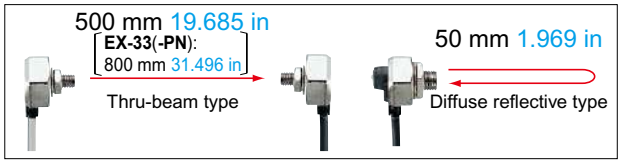


High response speed of 0.5 ms

The same high response speed of 0.5 ms as fiber sensor amplifiers is provided, making these sensors ideal for sensing small objects, counting objects that are moving quickly and positioning items such as circuit boards.

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.]

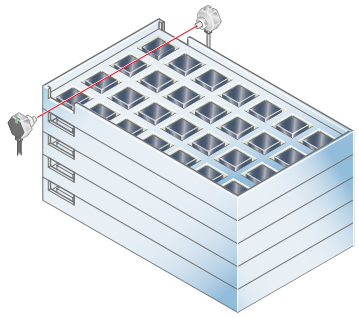


Globally usable

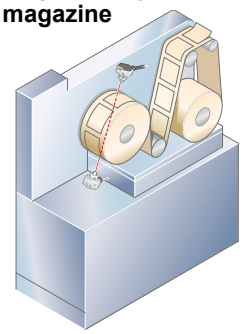
It complies with the EMC Directive for CE Marking requirements and the EMC Regurations for UKCA Marking requirements and obtains the UL Recognition. (excluding **EX-33**(**-PN**) and 5 m 16.405 ft cable length type)
Moreover, PNP output type which is much in demand in Europe, is also available.

APPLICATIONS

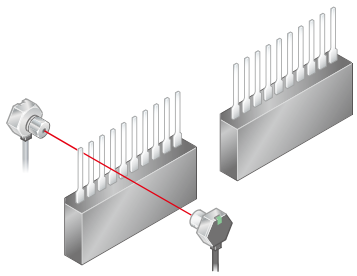
Detecting IC height



Detecting quantity of labels in label magazine



Checking IC pins (using slit masks)



VARIETIES

New thru-beam types now feature operation mode switch and sensitivity adjuster! EX-33(-PN)

EX-33(-PN)

❶ Operation mode switch

Switching between light-ON and dark-ON operating modes is possible with a single model.

Receiver

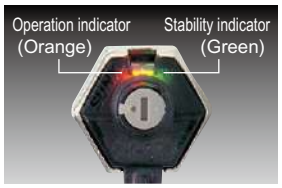
❷ Sensitivity adjuster

It is convenient when you need fine adjustment.

Emitter

❸ Bright 2-color indicator

A bright 2-color indicator has been incorporated in all types.

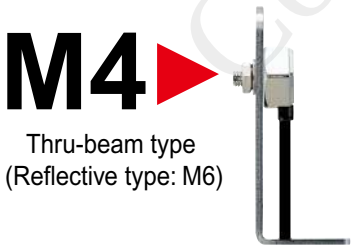


Receiver

MOUNTING / SIZE

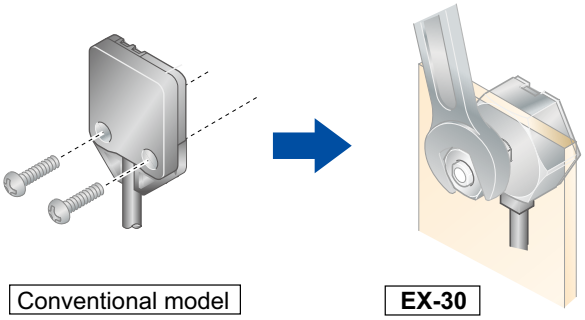
Can be installed in the same way as standard fibers

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



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.

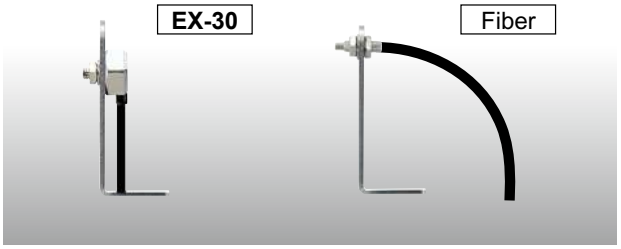


Conventional model

EX-30

Takes up very little space

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



ENVIRONMENTAL RESISTANCE

Incorporated an inverter countermeasure circuit

The **EX-30** series become significantly stronger against inverter light and other extraneous light.

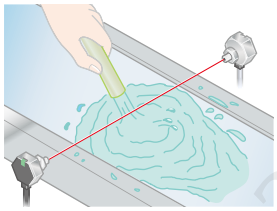
No protective tube needed

The **EX-30** series has high bending strength, so that the protective tube used to protect conventional fiber from breakage is not needed. This also adds up to excellent cost performance.

Waterproof IP67 (IEC)

The sensors features an IP67 rating to allow their use in process lines where water is used or splashed.

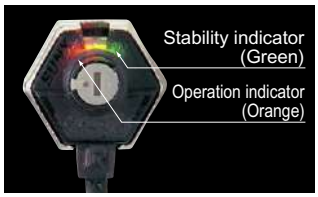
Note: If water splashes on the sensor during sensing operation, it may sense water as an object.



FUNCTIONS

Bright 2-color indicator

A bright 2-color indicator is incorporated in all types.



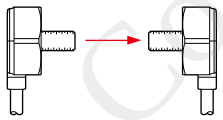
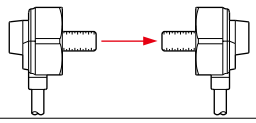
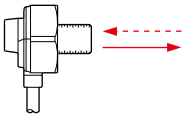
OPERABILITY

Incorporates a sensitivity adjuster (Excluding EX-31□)

The sensor incorporates a sensitivity adjuster. It is convenient when you need fine adjustment.

*This photo is a reflective type.

ORDER GUIDE

Type	Appearance	Sensing range	Model No. (Note)	Output	Output operation
Thru-beam		500 mm 19.685 in	**EX-31A**	NPN open-collector transistor	Light-ON
			EX-31B		Dark-ON
			EX-31A-PN	PNP open-collector transistor	Light-ON
			EX-31B-PN		Dark-ON
With operation mode switch		800 mm 31.496 in	**EX-33**	NPN open-collector transistor	Switchable either Light-ON or Dark-ON
			EX-33-PN	PNP open-collector transistor	
Diffuse reflective		50 mm 1.969 in	**EX-32A**	NPN open-collector transistor	Light-ON
			EX-32B		Dark-ON
			EX-32A-PN	PNP open-collector transistor	Light-ON
			EX-32B-PN		Dark-ON

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

5 m 16.404 ft cable length type

5 m 16.404 ft cable length type(standard: 2 m 6.562 ft) is also available for NPN output type [excluding **EX-33**(**-PN**)].
When ordering this type, suffix "**-C5**" to the model No.
(e.g.) 5 m 16.404 ft cable length type of **EX-31A** is "**EX-31A-C5**".

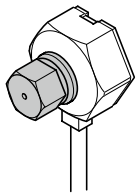
OPTIONS

Designation	Model No.	Description	
Slit mask (For thru-beam type sensor only)	**OS-EX30-1** (Slit size ø1 mm ø0.039 in)	Slit on one side	• Sensing range: 200 mm 7.874 in [**EX-31**□(**-PN**)] 320 mm 12.598 in [**EX-33**(**-PN**)] • Min. sensing object: ø2 mm ø0.079 in
		Slit on both sides	• Sensing range: 150 mm 5.906 in [**EX-31**□(**-PN**)] 240 mm 9.449 in [**EX-33**(**-PN**)] • Min. sensing object: ø1 mm ø0.039 in

Note: One slit and two spacers are provided per set. Two sets are required when installing on both sides.

Slit mask

• **OS-EX30-1**



Apply the optional slit mask when detecting small objects or for increasing the accuracy of sensing position.
However, the sensing range is reduced when the slit mask is mounted.

SPECIFICATIONS

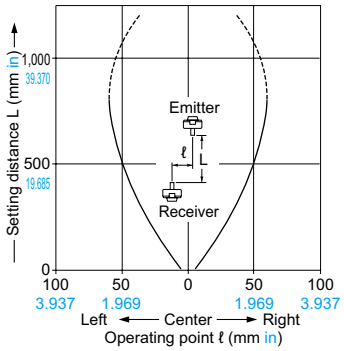
Item \ Type		Thru-beam		With operation mode switch	Diffuse reflective	
Model No.	NPN output	**EX-31A**	**EX-31B**	**EX-33**	**EX-32A**	**EX-32B**
	PNP output	**EX-31A-PN**	**EX-31B-PN**	**EX-33-PN**	**EX-32A-PN**	**EX-32B-PN**
Applicable regulations and certifications		CE Marking (EMC Directive, RoHS Directive), UKCA Marking (EMC Regulations, RoHS Regulations), UL Recognition certification [Excluding EX-33(-PN), 5 m cable length type]				
Sensing range		500 mm 19.685 in		800 mm 31.496 in	50 mm 1.969 in (Note 2)	
Sensing object		ø2 mm ø0.079 in or more opaque object (Completely beam interrupted objects)			Opaque, translucent or transparent object (Note 3)	
Hysteresis		—			15 % or less of operation distance (Note 2)	
Repeatability (perpendicular to sensing axis)		0.05 mm 0.002 in or less			0.5 mm 0.020 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			13 mA or less	
Output		<NPN output type> NPN open-collector transistor • Maximum sink current: 50 mA • Applied voltage: 30 V DC or less (between output and 0 V) • Residual voltage: 2 V or less (at 50 mA sink current) 1 V or less (at 16 mA sink current)			<PNP output type> PNP open-collector transistor • Maximum source current: 50 mA • Applied voltage: 30 V DC or less (between output and +V) • Residual voltage: 2 V or less (at 50 mA source current) 1 V or less (at 16 mA source current)	
Utilization category		DC-12 or DC-13				
Output operation		Light-ON	Dark-ON	Switchable either Light-ON or Dark-ON	Light-ON	Dark-ON
Short-circuit protection		Incorporated				
Response time		0.5 ms or less				
Operation indicator		Orange LED (lights up when the output is ON) (incorporated on the receiver for thru-beam type)				
Stability indicator		Green LED (lights up under stable light received condition or stable dark condition, incorporated on the receiver)			Green LED (lights up under stable light received condition or stable dark condition)	
Sensitivity adjuster		—		Continuously variable adjuster		
Environmental resistance	Pollution degree	3 (Industrial environment)				
	Protection	IP67 (IEC)				
	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				
	Ambient humidity	35 to 85 % RH, Storage: 35 to 85 % RH				
	Ambient illuminance	Incandescent light: 3,000 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 0.118 in double amplitude (20 G max.) 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 three times each				
Emitting element		Red LED (modulated)				
Material		Enclosure: Die-cast zinc (Nickel plated), Lens: Polycarbonate [**EX-32**□(**-PN**): Acrylic], Enclosure cover: Polycarbonate				
Cable		0.1 mm² 3-core (thru-beam type sensor emitter: 2-core) cabtyre cable, 2 m 6.562 ft long				
Cable extension		Extension up to total 50 m 164.042 ft is possible with 0.3 mm², or more, cable (thru-beam type: both emitter and receiver).				
Weight		Net weight (each emitter and receiver): 20 g approx. Gross weight: 65 g approx.			Net weight: 20 g approx., Gross weight: 45 g approx.	
Accessories		Nut: 2 pcs., Toothed lock washer: 2 pcs.			Nut: 1 pc., Toothed lock washer: 1 pc.	

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C +73.4 °F.
2) The sensing range and the hysteresis are specified for white non-glossy paper (100 × 100 mm 3.937 × 3.937 in) as the object.
3) Make sure to confirm detection with an actual sensor before use.

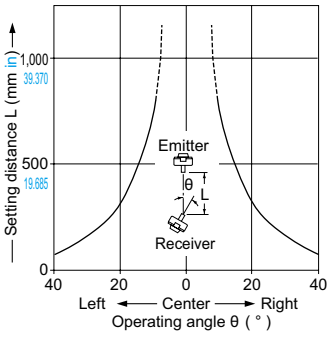
SENSING CHARACTERISTICS (TYPICAL)

EX-33 EX-33-PN — Thru-beam type

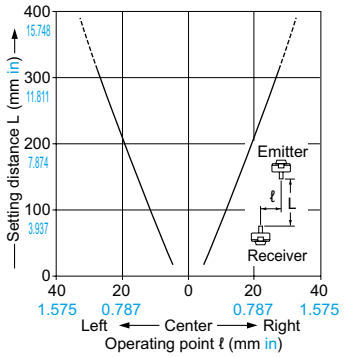
Parallel deviation



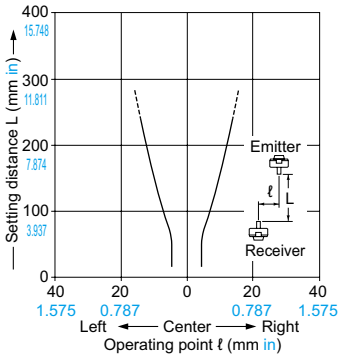
Angular deviation



Parallel deviation with slit mask on one side



Parallel deviation with slit masks on both sides



PRECAUTIONS FOR PROPER USE

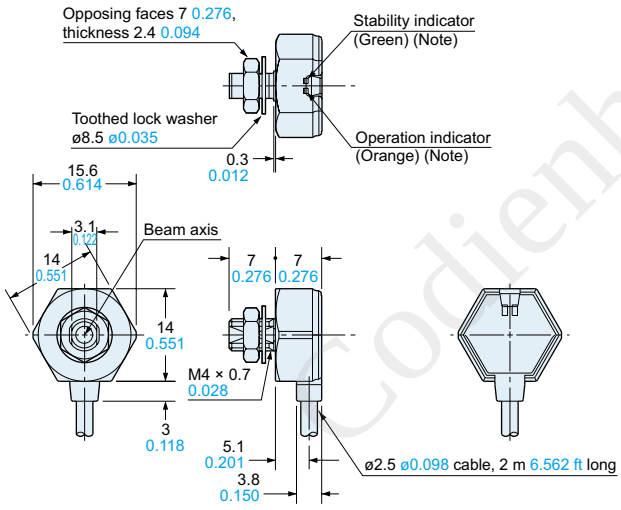
- Never use this product as a sensing device for personnel protection.
- In case of using sensing devices for personnel protection, use products which meet laws and standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.

- This product has been developed / produced for industrial use only.
- This product is suitable for indoor use only.
- Do not use during the initial transient time (50 ms approx.) after the power supply is switched on.
- In case of using the sensor at a place where static electricity is generated, use a metal mounting plate. Also, ensure to ground the mounting plate.

The CAD data can be downloaded from our website.

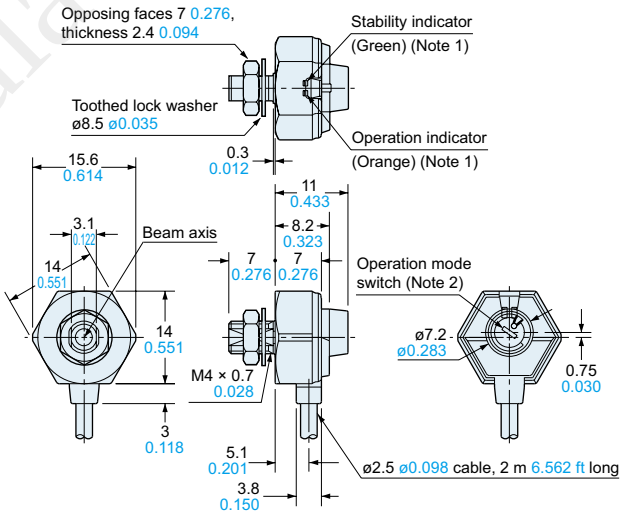
DIMENSIONS (Unit: mm in)

EX-31□ EX-31□-PN — Sensor



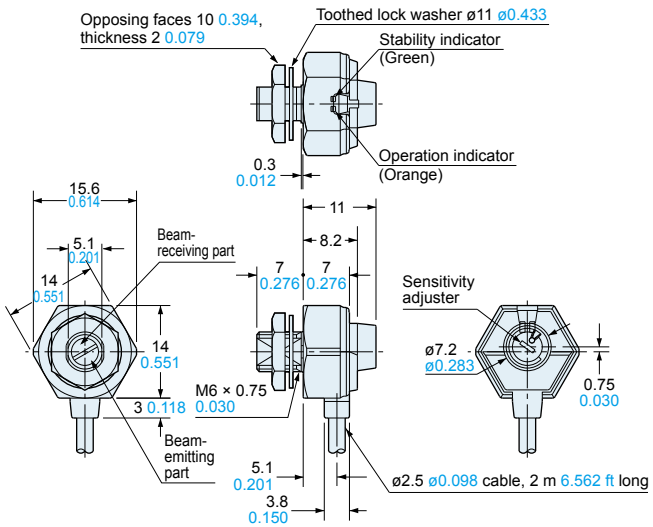
Note: Not incorporated on the emitter.

EX-33 EX-33-PN — Sensor



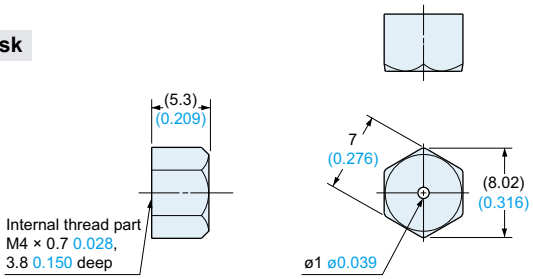
Notes: 1) Not incorporated on the emitter.
2) It is the sensitivity adjuster on the emitter.

EX-32□ EX-32□-PN — Sensor



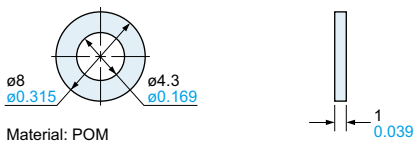
OS-EX30-1 — Slit mask (optional)

Slit mask



Material: Brass(Nickel plated)

Spacer



Material: POM