

EX-30 SERIES Ver.2

Related Information

■ General terms and conditions..... F-17

■ Sensor selection guide..... P.283~

■ Glossary of terms..... P.1359~

■ General precautions P.1405

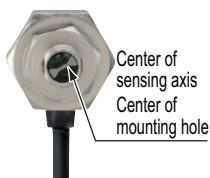
Ver.2

The next-generation new form series

A new alternative to fiber sensors

Simpler design

All you need to do is to make a $\varnothing 4$ mm $\varnothing 0.157$ in hole where you would like to stop or check the object ($\varnothing 6$ mm $\varnothing 0.236$ 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

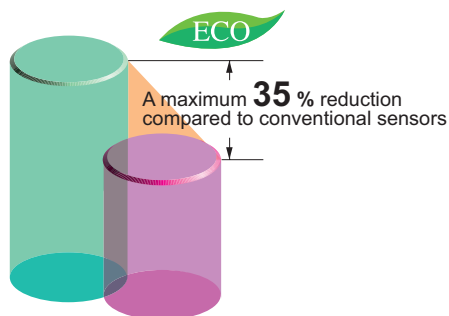
The **EX-30** series solves all of the difficulties associated with fiber sensors, such as:

- 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.



*Effective from production in April 2011.

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 conforms to the EMC Directive and obtains the UL Recognition. (excluding 5 m **16.405 ft** cable length type) Moreover, PNP output type which is much in demand in Europe, is also available.

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.

FIBER
SENSORSLASER
SENSORSPHOTOELECTRIC
SENSORSMICRO
PHOTOELECTRIC
SENSORSAREA
SENSORSLIGHT
CURTAINSPRESSURE /
FLOW
SENSORSINDUCTIVE
PROXIMITY
SENSORSPARTICULAR
USE SENSORSSENSOR
OPTIONSSIMPLE
WIRE-SAVING
UNITSWIRE-SAVING
SYSTEMSMEASUREMENT
SENSORSSTATIC CONTROL
DEVICES

ENDOSCOPE

LASER
MARKERSPLC /
TERMINALSHUMAN MACHINE
INTERFACESENERGY CONSUMPTION
VISUALIZATION
COMPONENTS

FA COMPONENTS

MACHINE VISION
SYSTEMSUV CURING
SYSTEMSSelection
GuideAmplifier
Built-inPower Supply
Built-inAmplifier-
separated

CX-400

EX-10

EX-20

EX-30

EX-40

CX-440

EQ-30

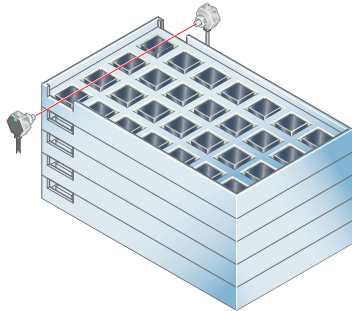
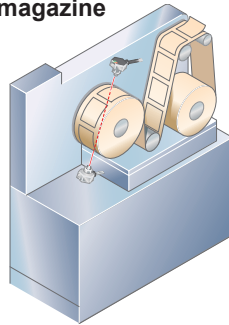
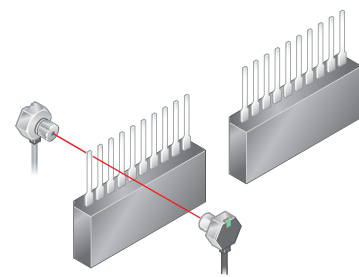
EQ-500

MQ-W

RX-LS200

RX

RT-610

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)**① Operation mode switch**

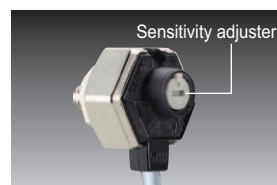
Switching between light-ON and dark-ON operating modes is possible with a single model.



Receiver

② Sensitivity adjuster

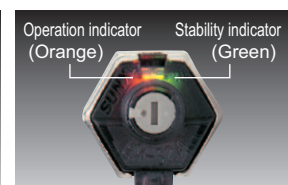
It is convenient when you need fine adjustment.



Emitter

③ Bright 2-color indicator

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



Receiver

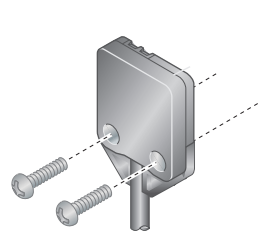
MOUNTING / SIZE**Can be installed in the same way as standard fibers**

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.

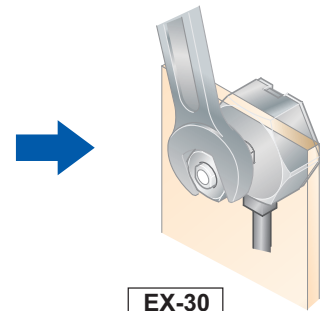
M4 ▶
Thru-beam type
(Reflective type: M6)

**Single-point tightening cuts down on installation work by half**

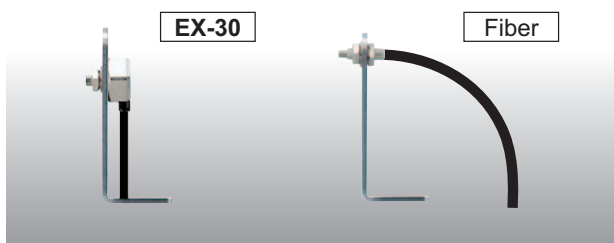
Conventional photoelectric sensors required four (for thru-beam type) or two (for reflective type) mounting holes and screws to be used. However, the **EX-30** series is installed with a single screw, thus cutting down on installation work by half.



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.

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USE SENSORSSENSOR
OPTIONSSIMPLE
WIRE-SAVING
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COMPONENTS

FA COMPONENTS

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SYSTEMSUV CURING
SYSTEMSSelection
GuideAmplifier
Built-in
Power Supply
Built-in
Amplifier-
separated**CX-400****EX-10****EX-20****EX-30****EX-40****CX-440****EQ-30****EQ-500****MQ-W****RX-LS200****RX****RT-610**

FIBER
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DEVICES

ENDOSCOPE

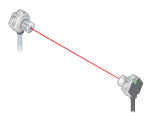
LASER
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VISUALIZATION
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FA COMPONENTS

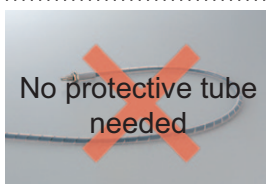
MACHINE VISION
SYSTEMSUV CURING
SYSTEMSSelection
GuideAmplifier
Built-inPower Supply
Built-inAmplifier-
separated**CX-400****EX-10****EX-20****EX-30****EX-40****CX-440****EQ-30****EQ-500****MQ-W****RX-LS200****RX****RT-610****ENVIRONMENTAL RESISTANCE****Incorporated an inverter countermeasure circuit**

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

*Effective from production in April 2011.

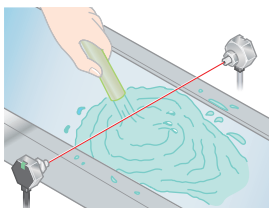
**No protective tube needed**

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 sensor can be hosed down because of its IP67 construction.

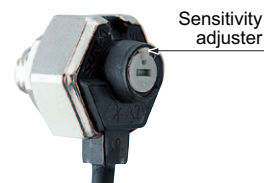
Note: However, take care that if it is exposed to water splashes during operation, it may detect a water drop itself.

**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.

**ORDER GUIDE**

Type	Appearance	Sensing range	Model No. (Note)	Output	Output operation
Thru-beam			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			EX-33	NPN open-collector transistor	Switchable either Light-ON or Dark-ON
			EX-33-PN	PNP open-collector transistor	
Diffuse reflective			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.
(e.g.) Emitter of **EX-31A**: **EX-31P**, Receiver of **EX-31A**: **EX-31AD**

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**".

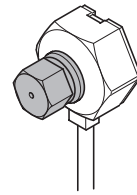
OPTIONS

Designation	Model No.	Description
Slit mask (For thru-beam type sensor only)	OS-EX30-1 (Slit size $\phi 1$ mm) $\phi 0.039$ in	<ul style="list-style-type: none"> Slit on one side <ul style="list-style-type: none"> Sensing range: 200 mm 7.874 in [EX-31□(-PN)] 320 mm 12.598 in [EX-33(-PN)] Min. sensing object: $\phi 2$ mm $\phi 0.079$ in Slit on both sides <ul style="list-style-type: none"> Sensing range: 150 mm 5.906 in [EX-31□(-PN)] 240 mm 9.449 in [EX-33(-PN)] Min. sensing object: $\phi 1$ mm $\phi 0.039$ 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

Type		Thru-beam			Diffuse reflective		
		With operation mode switch					
Item	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 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 at the light-receiving face					
	EMC	EN 60947-5-2					
	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 (20 G max.) in X, Y and Z directions for two hours each					
	Shock resistance	500 m/s ² acceleration (50 G approx.) in X, Y and Z directions for 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 mm ² 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 mm ² , 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.

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CX-400

EX-10

EX-20

EX-30

EX-40

CX-440

EQ-30

EQ-500

MQ-W

RX-LS200

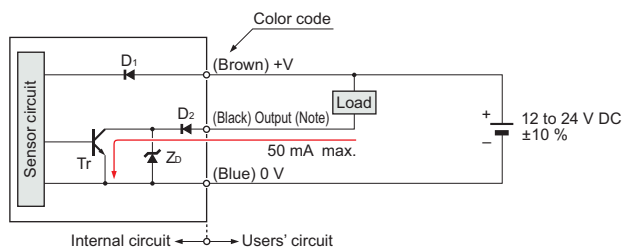
RX

RT-610

I/O CIRCUIT AND WIRING DIAGRAMS

NPN output type

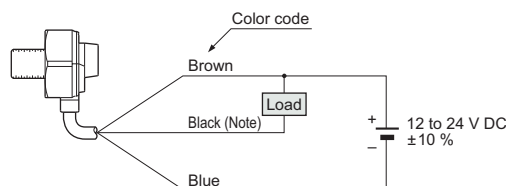
I/O circuit diagram



Note: The emitter of the thru-beam type sensor 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

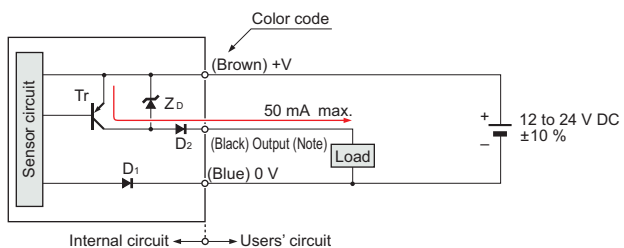
Wiring diagram



Note: The emitter of the thru-beam type sensor does not incorporate the black wire.

PNP output type

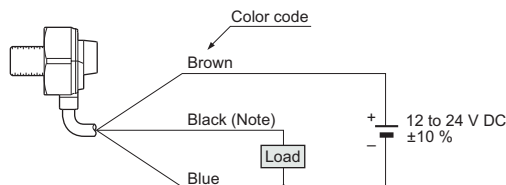
I/O circuit diagram



Note: The emitter of the thru-beam type sensor does not incorporate the output.

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

Wiring diagram



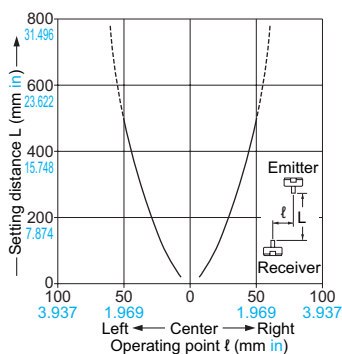
Note: The emitter of the thru-beam type sensor does not incorporate the black wire.

SENSING CHARACTERISTICS (TYPICAL)

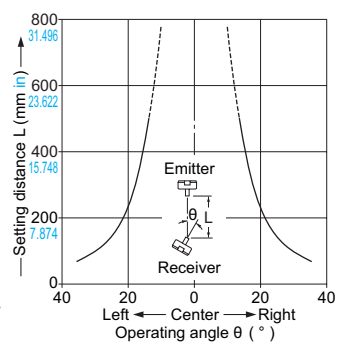
EX-31□ EX-31□-PN

Thru-beam type

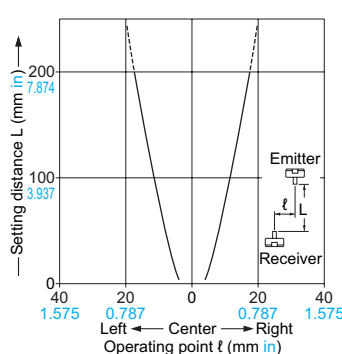
Parallel deviation



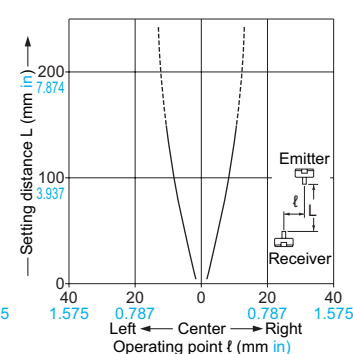
Angular deviation



Parallel deviation with slit mask on one side

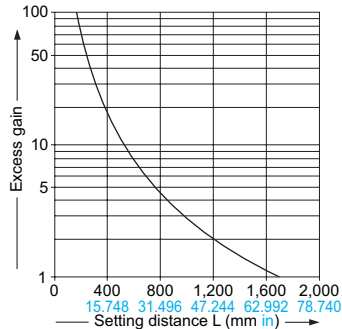


Parallel deviation with slit masks on both sides



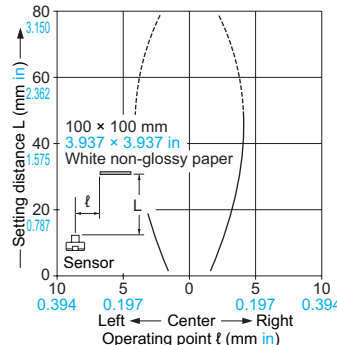
EX-31□ EX-31□-PN Thru-beam type

Correlation between setting distance and excess gain

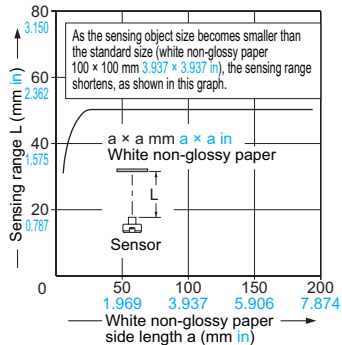


EX-32□ EX-32□-PN

Sensing field

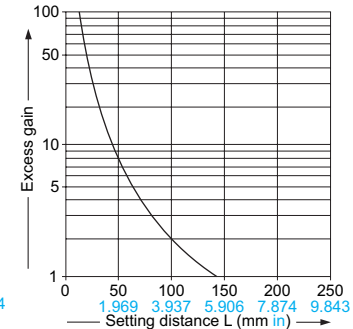


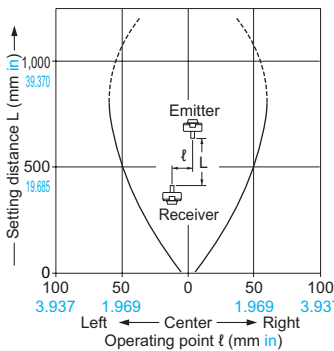
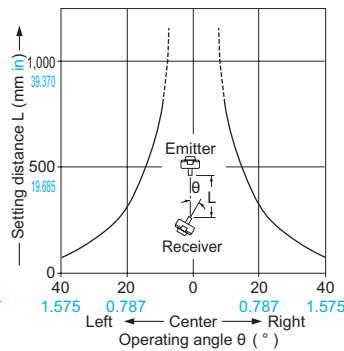
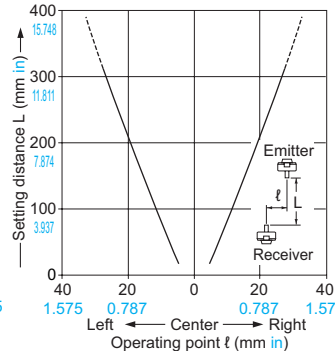
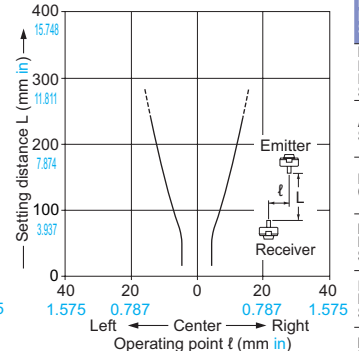
Correlation between sensing object size and sensing range



Diffuse reflective type

Correlation between setting distance and excess gain



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**

Refer to General precautions.

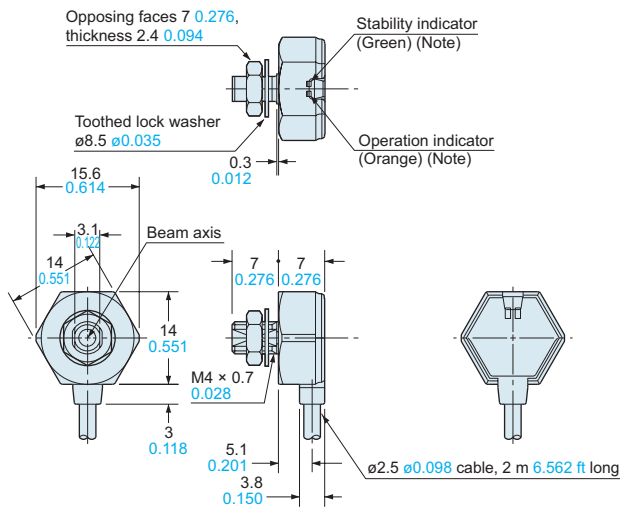


- Never use this product as a sensing device for personnel protection.
- In case of using sensing devices for personnel protection, use products which meet laws and standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.

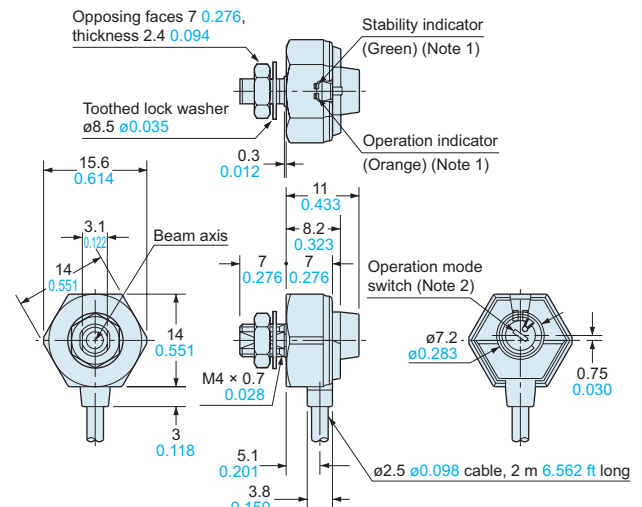
- Do not use during the initial transient time (50 ms) after the power supply is switched on.
- In case of using the sensor at a place where static electricity is generated, use a metal mounting plate. Also, ensure to ground the mounting plate.

DIMENSIONS (Unit: mm in)

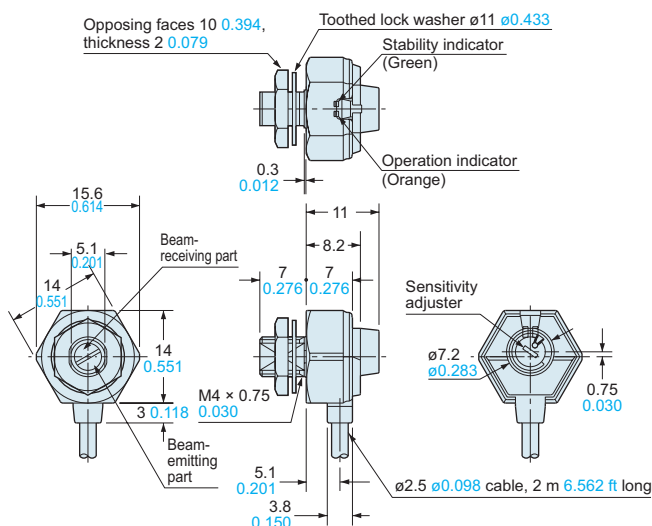
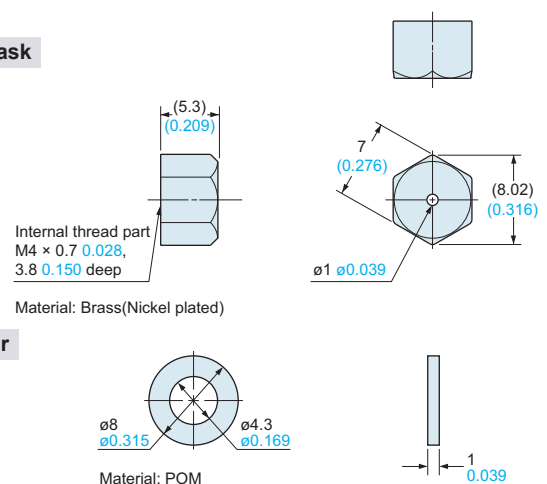
The CAD data in the dimensions can be downloaded from our website

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**FIBER
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SENSORSPHOTO-
ELECTRIC
SENSORSMICRO
PHOTO-
ELECTRIC
SENSORSAREA
SENSORSLIGHT
CURTAINSPRESSURE /
FLOW
SENSORSINDUCTIVE
PROXIMITY
SENSORSPARTICULAR
USE
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MENT
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CONTROL
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ENDSCOPE

LASER
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VISUALIZATION
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COMPONENTSMACHINE
VISION
SYSTEMSUV
CURING
SYSTEMSSelection
GuideAmplifier
Built-inPower Supply
Built-inAmplifier-
separated**CX-400****EX-10****EX-20****EX-30****EX-40****CX-440****EQ-30****EQ-500****MQ-W****RX-LS200****RX****RT-610**