

## EX-10 SERIES

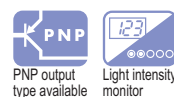
## Related Information

■ General terms and conditions..... P.1

■ Sensor selection guide..... P.11~ / P.229~

■ Glossary of terms / General precautions..... P.983~ / P.986~

■ Korea's S-mark..... P.1034~

SUNX website <http://www.sunx.com>

## Amplifier built-in extraordinarily small and slim size

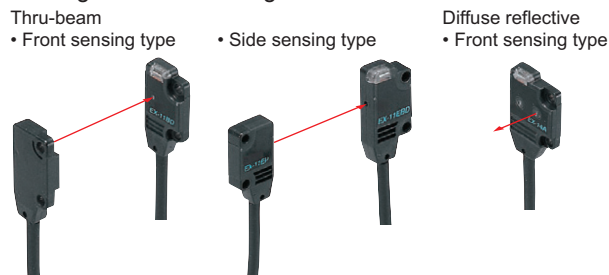
## Smallest body, just 3.5 mm 0.138 in thick

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).



## Flexible mounting

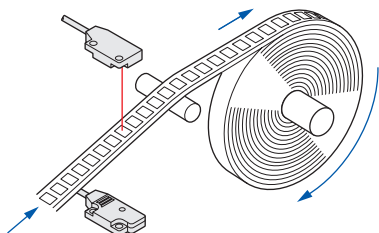
The diffuse reflective type sensor is front sensing and is so thin that it gives an impression of being just pasted on the mounting base. The thru-beam type is available as front sensing type, as well as, side sensing type, allowing flexible mounting.



## BASIC PERFORMANCE

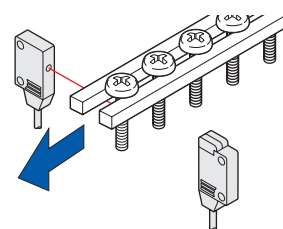
## High-speed response time: 0.5 ms

The sensor is suitable for detecting small and high-speed traveling objects.



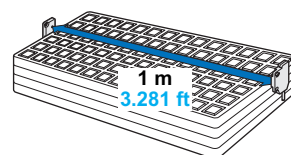
## Minimum sensing object: ø1 mm ø0.039 in EX-11(E)□, EX-15(E)□

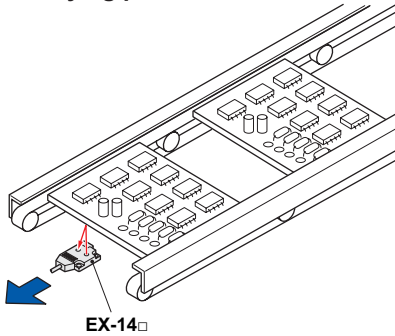
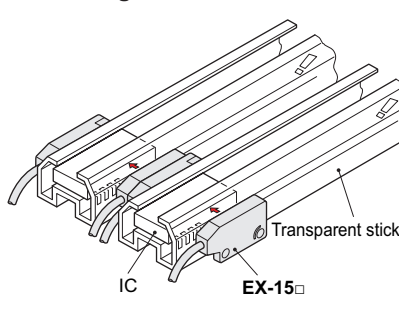
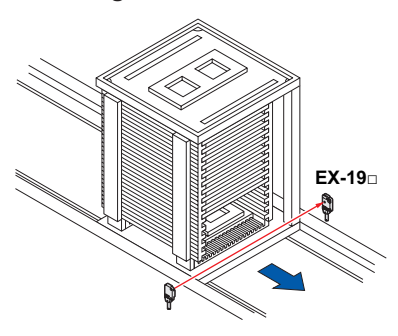
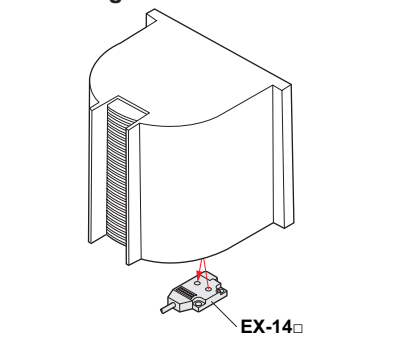
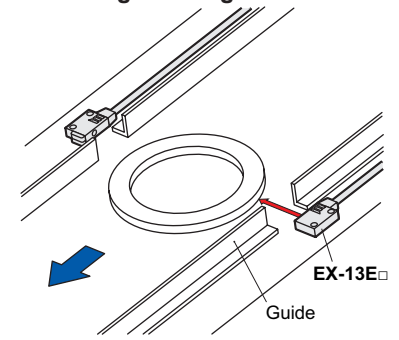
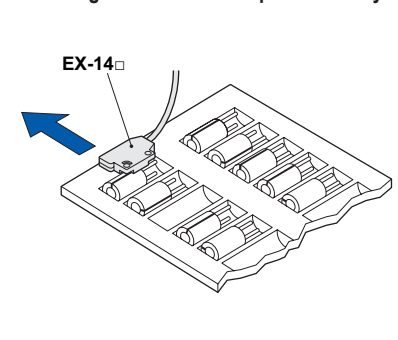
EX-11□, EX-11E□, EX-15 and EX-15E are incorporated with ø1 mm ø0.039 in slit masks so that ø1 mm ø0.039 in, or more, object can be detected. Hence, they are suitable for precise positioning or small parts detection.



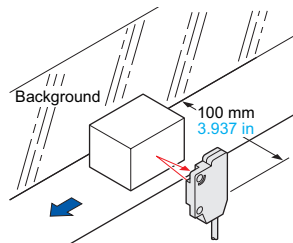
## Long sensing range: 1 m 3.281 ft EX-19□

A sensing range of 1 m 3.281 ft has been realized with a slim size of just 3.5 mm 0.138 in. It can be used to detect even wide IC trays.

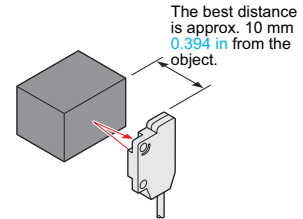


ORDER GUIDE  
P.258~SPECIFICATIONS  
P.260I/O CIRCUIT DIAGRAMS  
P.261~SENSING CHARACTERISTICS  
P.262~PRECAUTIONS FOR PROPER USE  
P.264DIMENSIONS  
P.265~**APPLICATIONS****Verifying position of PCBs****Detecting ICs****Detecting PCB rack****Detecting wafer cassette****Detecting thin ring****Checking for absence of capacitor in tray****BASIC PERFORMANCE****Background suppression****EX-14□****Hardly affected by background**

Even a specular background separated by 100 mm **3.937 in**, or more, is not detected. (However, the background should be directly opposite. A spherical or curved background may be detected.)

**Black object reliably detected**

It can reliably detect dark color objects since it is convergent reflective type.

**ENVIRONMENTAL RESISTANCE****Waterproof**

The sensor can be hosed down because of its IP67 construction and the non-corrosive stainless steel mounting bracket.

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

**Ten times durable****EX-□-R**

Flexible cable on **EX-□-R** is 10 times as durable as conventional model. It is most suitable for moving parts, such as robot arm, etc.

**FUNCTIONS****Bright 2-color indicator**

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



2-color indicator  
(Red: Operation indicator)  
(Green: Stability indicator)

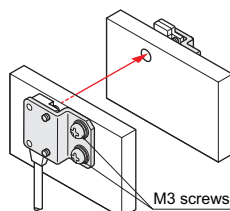
FIBER  
SENSORSLASER  
SENSORSPHOTOELECTRIC  
SENSORSMICRO  
PHOTOELECTRIC  
SENSORSAREA  
SENSORSSAFETY  
COMPONENTSPRESSURE  
SENSORSINDUCTIVE  
PROXIMITY  
SENSORSPARTICULAR  
USE SENSORSSENSOR  
OPTIONSWIRE-SAVING  
SYSTEMSMEASUREMENT  
SENSORSSTATIC CONTROL  
DEVICESLASER  
MARKERSSelection  
GuideAmplifier  
Built-in**CX-400****EX-10****EX-20****EX-30****EX-40****EQ-30****EQ-500****MQ-W****RX-LS200****RX****CY****PX-2****RT-610**Power Supply  
Built-in**NX5****VF**Amplifier-  
separated**SU-7 / SH****SS-A5 / SH**Other  
Products

FIBER  
SENSORSLASER  
SENSORSPHOTOELECTRIC  
SENSORSMICRO  
PHOTOELECTRIC  
SENSORSAREA  
SENSORSSAFETY  
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Built-in**NX5****VF**Amplifier-  
separated**SU-7 / SH****SS-A5 / SH**Other  
Products**MOUNTING / SIZE****Mountable with M3 screws**

Non-corrosive stainless steel type mounting bracket is also available.

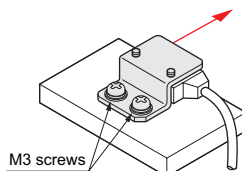
- **MS-EX10-1**  
[Cold rolled carbon steel (SPCC)]

**MS-EX10-11**  
[Stainless steel (SUS304)]  
(mounting bracket for the front)  
(sensing type)



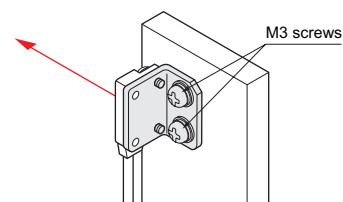
- **MS-EX10-2**  
[Cold rolled carbon steel (SPCC)]

**MS-EX10-12**  
[Stainless steel (SUS304)]  
(mounting bracket for the side)  
(sensing type)



- **MS-EX10-3**  
[Cold rolled carbon steel (SPCC)]

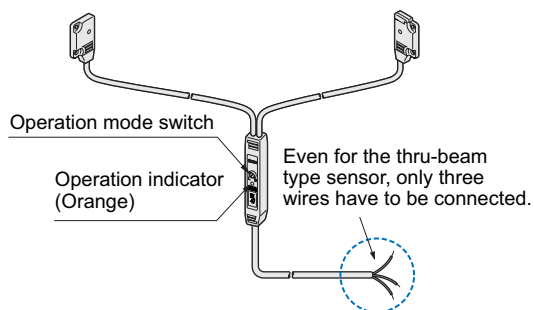
**MS-EX10-13**  
[Stainless steel (SUS304)]  
(L-shaped mounting bracket)

**Red beam makes beam alignment easy**

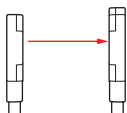
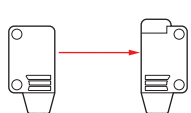

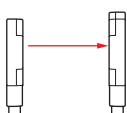
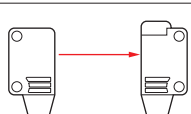

The red LED beam projected from the emitter helps you to align the sensor heads.

**VARIETIES****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.



**ORDER GUIDE**

Type		Appearance	Sensing range	Model No. (Note 2)	Output operation	Output	
NPN output	Thru-beam	Front sensing		150 mm 5.906 in	EX-11A	Light-ON	NPN open-collector transistor
				EX-11B	Dark-ON		
				500 mm 19.685 in	EX-13A	Light-ON	
		EX-13B		Dark-ON			
		1 m 3.281 ft		EX-19A	Light-ON		
		EX-19B		Dark-ON			
		150 mm 5.906 in		EX-15	Switchable either Light-ON or Dark-ON		
		500 mm 19.685 in		EX-17			
		500 mm 19.685 in		EX-17W			
	Side sensing		150 mm 5.906 in	EX-11EA	Light-ON		
			500 mm 19.685 in	EX-11EB	Dark-ON		
			EX-13EA	Light-ON			
	EX-13EB	Dark-ON					
	150 mm 5.906 in	EX-15E	Switchable either Light-ON or Dark-ON				
	500 mm 19.685 in	EX-17E					
Convergent reflective (Diffused beam type)	Front sensing		2 to 25 mm 0.079 to 0.984 in (Note 1) (Convergent point: 10 mm 0.394 in)	EX-14A	Light-ON		
			EX-14B	Dark-ON			
PNP output	Thru-beam	Front sensing		150 mm 5.906 in	EX-11A-PN	Light-ON	PNP open-collector transistor
				EX-11B-PN	Dark-ON		
				500 mm 19.685 in	EX-13A-PN	Light-ON	
		EX-13B-PN		Dark-ON			
		1 m 3.281 ft		EX-19A-PN	Light-ON		
		EX-19B-PN		Dark-ON			
	Side sensing		150 mm 5.906 in	EX-11EA-PN	Light-ON		
			EX-11EB-PN	Dark-ON			
			500 mm 19.685 in	EX-13EA-PN	Light-ON		
			EX-13EB-PN	Dark-ON			
Convergent reflective (Diffused beam type)	Front sensing		2 to 25 mm 0.079 to 0.984 in (Note 1) (Convergent point: 10 mm 0.394 in)	EX-14A-PN	Light-ON		
			EX-14B-PN	Dark-ON			

**NOTE:** Mounting bracket is not supplied with the sensor. Please select from the range of optional sensor mounting brackets (six types).

- Notes: 1) The sensor does not detect even a specular background if it is separated by 100 mm **3.937 in** or more. (However, the background should be directly opposite. A spherical or curved background may be detected.)  
 2) The model No. with suffix "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-11A**: **EX-11P**, Receiver of **EX-11A**: **EX-11AD**

FIBER SENSORS

LASER SENSORS

PHOTO-ELECTRIC SENSORS

MICRO PHOTO-ELECTRIC SENSORS

AREA SENSORS

SAFETY COMPONENTS

PRESSURE SENSORS

INDUCTIVE PROXIMITY SENSORS

PARTICULAR USE SENSORS

SENSOR OPTIONS

WIRE- SAVING SYSTEMS

MEASURE- MENT SENSORS

STATIC CONTROL DEVICES

LASER MARKERS

Selection Guide

Amplifier Built-in

**CX-400****EX-10****EX-20****EX-30****EX-40****EQ-30****EQ-500****MQ-W****RX-LS200****RX****CY****PX-2****RT-610**

Power Supply Built-in

**NX5****VF**

Amplifier-separated

**SU-7 / SH****SS-A5 / SH**

Other Products

## ORDER GUIDE

### Flexible cable type

Flexible cable type is also available for NPN output type. (excluding sensor with operation mode switch on the bifurcation **EX-15□/17□** and series connection type **EX-17W**.)

When ordering this type, suffix "-R" to the model No.  
(e.g.) Flexible cable type of **EX-11A** is "**EX-11A-R**".

### 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 series connection type **EX-17W** and flexible cable type.)

When ordering this type, suffix "-C5" to the model No.

(e.g.) 5 m **16.404 ft** cable length type of **EX-11A** is "**EX-11A-C5**".

## OPTIONS

Designation	Model No.	Description
Sensor mounting bracket	<b>MS-EX10-1</b>	Mounting bracket for the front sensing type sensor [Cold rolled carbon steel (SPCC)] (The thru-beam type sensor needs two brackets.)
	<b>MS-EX10-2</b>	Mounting bracket for the side sensing type sensor [Cold rolled carbon steel (SPCC)] (The thru-beam type sensor needs two brackets.)
	<b>MS-EX10-3</b>	L-shaped mounting bracket sensor [Cold rolled carbon steel (SPCC)] (The thru-beam type sensor needs two brackets.)
	<b>MS-EX10-11</b>	Mounting bracket for the front sensing type sensor [Stainless steel (SUS304)] (The thru-beam type sensor needs two brackets.)
	<b>MS-EX10-12</b>	Mounting bracket for the side sensing type sensor [Stainless steel (SUS304)] (The thru-beam type sensor needs two brackets.)
	<b>MS-EX10-13</b>	L-shaped mounting bracket [Stainless steel (SUS304)] (The thru-beam type sensor needs two brackets.)
Slit mask	<b>OS-EX10-12</b> (Slit size ø1.2 mm ø0.047 in)	Slit on one side <ul style="list-style-type: none"> <li>Sensing range: 600 mm <b>23.622 in</b> [EX-19□]</li> <li>250 mm <b>9.843 in</b> [EX-13□, EX-17□]</li> <li>Min. sensing object: ø2 mm ø0.079 in</li> </ul>
		Slit on both sides <ul style="list-style-type: none"> <li>Sensing range: 400 mm <b>15.748 in</b> [EX-19□]</li> <li>200 mm <b>7.874 in</b> [EX-13□, EX-17□]</li> <li>Min. sensing object: ø1.2 mm ø0.047 in</li> </ul>
	<b>OS-EX10-15</b> (Slit size ø1.5 mm ø0.059 in)	Slit on one side <ul style="list-style-type: none"> <li>Sensing range: 800 mm <b>31.496 in</b> [EX-19□]</li> <li>350 mm <b>13.780 in</b> [EX-13□]</li> <li>Min. sensing object: ø2 mm ø0.079 in</li> </ul>
		Slit on both sides <ul style="list-style-type: none"> <li>Sensing range: 500 mm <b>19.685 in</b> [EX-19□]</li> <li>300 mm <b>11.811 in</b> [EX-13□]</li> <li>Min. sensing object: ø1.5 mm ø0.059 in</li> </ul>
	<b>OS-EX10E-12</b> (Slit size ø1.2 mm ø0.047 in)	Slit on one side <ul style="list-style-type: none"> <li>Sensing range: 250 mm <b>9.843 in</b> [EX-13E□, EX-17E□]</li> <li>Min. sensing object: ø2 mm ø0.079 in</li> </ul>
		Slit on both sides <ul style="list-style-type: none"> <li>Sensing range: 200 mm <b>7.874 in</b> [EX-13E□, EX-17E□]</li> <li>Min. sensing object: ø1.2 mm ø0.047 in</li> </ul>
Sensor checker (Note)	<b>CHX-SC2</b>	It is useful for beam alignment of thru-beam type sensors. The optimum receiver position is given by indicators, as well as an audio signal.
Mounting screw	<b>MS-M2</b>	Mounting screws with washers (50 pcs. lot). It can mount securely as it is spring washer attached.

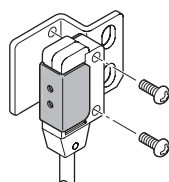
Note: Refer to p.800 for details of the sensor checker **CHX-SC2**.

### Slit mask

- **OS-EX10-12**
- **OS-EX10-15**



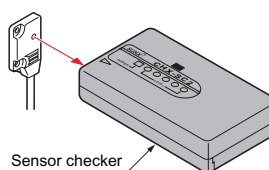
Example of mounting  
(**OS-EX10E-12**)



Tighten along with the sensor mounting bracket.

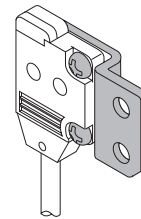
### Sensor checker

- **CHX-SC2**



### Sensor mounting bracket

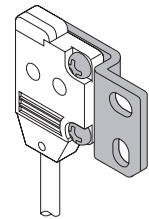
- **MS-EX10-1**



Material: Cold rolled carbon steel (SPCC)  
(Uni-chrome plated)

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

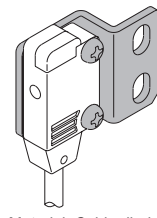
- **MS-EX10-11**



Material: Stainless steel (SUS304)

Two M2 (length 4 mm **0.157 in**) pan head screws [stainless steel (SUS304)] are attached.

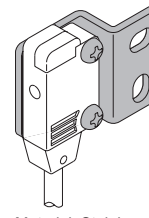
- **MS-EX10-2**



Material: Cold rolled carbon steel (SPCC)  
(Uni-chrome plated)

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

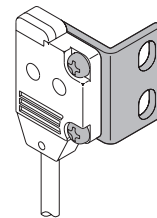
- **MS-EX10-12**



Material: Stainless steel (SUS304)

Two M2 (length 8 mm **0.315 in**) pan head screws [stainless steel (SUS304)] are attached.

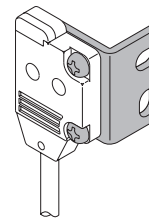
- **MS-EX10-3**



Material: Cold rolled carbon steel (SPCC)  
(Uni-chrome plated)

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-EX10-13**



Material: Stainless steel (SUS304)

Two M2 (length 4 mm **0.157 in**) pan head screws [stainless steel (SUS304)] and two M2 (length 8 mm **0.315 in**) pan head screws [stainless steel (SUS304)] are attached.

## SPECIFICATIONS

Item	Type		Thru-beam					Convergent reflective (Diffused beam type)	Thru-beam · with operation mode switch on bifurcation					
			Front sensing	Side sensing	Front sensing	Side sensing	Front sensing	Front sensing	Front sensing	Side sensing	Front sensing	Side sensing		
	Model No. (Note 2)	Light-ON	EX-11A(-PN)	EX-11EA(-PN)	EX-13A(-PN)	EX-13EA(-PN)	EX-19A(-PN)	EX-14A(-PN)	EX-15 (Note 3)	EX-15E (Note 3)	EX-17(W) (Note 3, 4)	EX-17E (Note 3)		
		Dark-ON	EX-11B(-PN)	EX-11EB(-PN)	EX-13B(-PN)	EX-13EB(-PN)	EX-19B(-PN)	EX-14B(-PN)						
Sensing range			150 mm 5.906 in		500 mm 19.685 in		1 m 3.281 ft	2 to 25 mm 0.079 to 0.984 in (Note 5) (Conv. point: 10 mm 0.394 in)	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 5.906 in)		ø2 mm ø0.079 in opaque object (Completely beam interrupted object) (Setting distance between emitter and receiver: 500 mm 19.685 in)		ø2 mm ø0.079 in opaque object (Completely beam interrupted object) (Setting distance between emitter and receiver: 1 m 3.281 ft)	ø0.1 mm ø0.004 in copper wire (Completely beam interrupted object) (Setting distance: 10 mm 0.394 in)	ø1 mm ø0.039 in opaque object (Completely beam interrupted object) (Setting distance between emitter and receiver: 150 mm 5.906 in)		ø2 mm ø0.079 in opaque object (Completely beam interrupted object) (Setting distance between emitter and receiver: 500 mm 19.685 in)			
Hysteresis			—————					15 % or less of operation distance (Note 5)	—————					
Repeatability (perpendicular to sensing axis)			0.05 mm 0.002 in or less					0.1 mm 0.004 in or less	0.05 mm 0.002 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: 15 mA or less					20 mA or less	30 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: 1 V or less (at 50 mA sink current) 0.4 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: 1 V or less (at 50 mA source current) 0.4 V or less (at 16 mA source current)			NPN open-collector transistor • Maximum sink current: 100 mA • Applied voltage: 30 V DC or less (between output and 0 V) • Residual voltage (Note 6): 1.5 V or less (at 100 mA sink current) 0.4 V or less (at 16 mA sink current)						
			Utilization category			DC-12 or DC-13					—————			
			Short-circuit protection			Incorporated								
Response time			0.5 ms or less (Note 7)											
Operation indicator			Red LED (lights up when the output is ON)					Orange LED (lights up when the output is ON), located on the bifurcation						
Incident beam indicator			—————					Red LED (lights up under light received condition), located on the receiver						
Stability indicator			Green LED (lights up under stable light received condition or stable dark condition)					Green LED (lights up under stable light received condition or stable dark condition), located on the receiver						
Environmental resistance	Pollution degree		3 (Industrial environment)					—————						
	Protection		IP67 (IEC) (Refer to p.984 for details of standards.)											
	Ambient temperature		-25 to +55 °C -13 to +131 °F (EX-17W: -25 to +50 °C -13 to +122 °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 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 for three times each												
Emitting element			Red LED (Peak emission wavelength: 680 nm 0.027 mil, modulated)											
Material			Enclosure: Polyethylene terephthalate Lens: Polyallylate					Enclosure: Polyethylene terephthalate Lens: Polyallylate, Bifurcation: Polyallylate						
Cable (Note 8)			0.1 mm² 3-core (thru-beam type emitter: 2-core) cabtyre cable, 2 m 6.562 ft long					0.2 mm² 3-core cabtyre cable, 2 m 6.562 ft long (beyond bifurcation; from emitter / receiver to bifurcation: 0.5 m 1.640 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: emitter and receiver).					Extension up to total 100 m 328.084 ft is possible with 0.3 mm², or more, cable.						
Weight			Net weight (each emitter and receiver): 20 g approx., Gross weight: 60 g approx.					Net weight: 20 g approx. Gross weight: 40 g approx.	Net weight: 55 g approx., Gross weight: 80 g approx.					
Accessories			Mounting screws: 1 set					Mounting screws: 1 set	Mounting screws: 1 set, Adjusting screwdriver: 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) Model Nos. having the suffix **"-PN"** are PNP output type.

3) Either Light-ON or Dark-ON can be selected by the operation mode switch (located on the bifurcation).

4) Model No. having the suffix **"W"** is series connection type.

5) The sensing range and the hysteresis of convergent reflective type sensor are specified for white non-glossy paper (50 × 50 mm **1.969 × 1.969 in**) as the object.

6) Consider the output residual voltage due to the series connection when supplying power to the **EX-17W**.

7) The maximum response time of the **EX-17W** is 50 ms with two units in series connection.

8) The flexible cable type (model Nos. having suffix **"-R"**) has a 0.1 mm<sup>2</sup> 3-core (thru-beam type emitter: 2-core) flexible cabtyre cable, 2 m **6.562 ft** long.

FIBER SENSORS

LASER SENSORS

PHOTO-ELECTRIC SENSORS

MICRO PHOTO-ELECTRIC SENSORS

AREA SENSORS

SAFETY COMPONENTS

PRESSURE SENSORS

INDUCTIVE PROXIMITY SENSORS

PARTICULAR USE SENSORS

SENSOR OPTIONS

WIRE- SAVING SYSTEMS

MEASURE- MENT SENSORS

STATIC CONTROL DEVICES

LASER MARKERS

Selection Guide

Amplifier Built-in

**CX-400****EX-10****EX-20****EX-30****EX-40****EQ-30****EQ-500****MQ-W****RX-LS200****RX****CY****PX-2****RT-610**

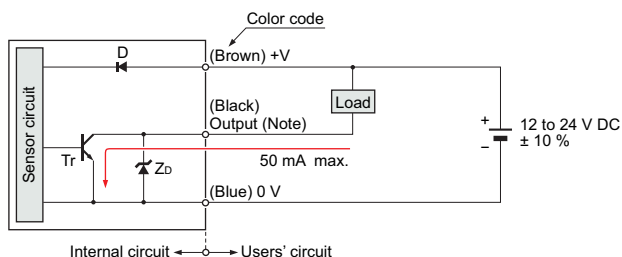
Power Supply Built-in

**NX5****VF**

Amplifier-separated

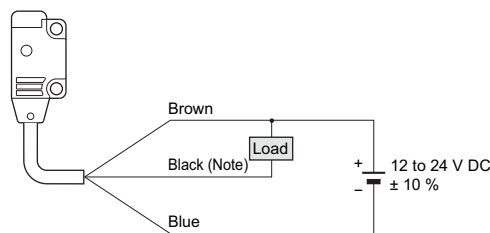
**SU-7 / SH****SS-A5 / SH**

Other Products

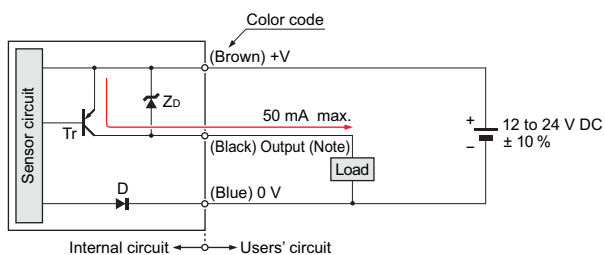
**I/O CIRCUIT AND WIRING DIAGRAMS****EX-11□ EX-13□ EX-19□ EX-14□****NPN output type****I/O circuit diagram**

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

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

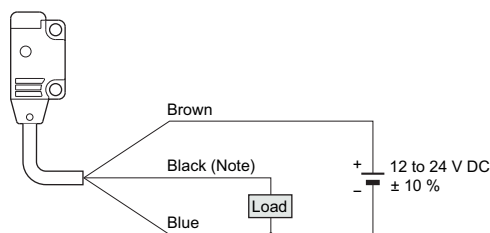
**Wiring diagram**

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

**EX-11□-PN EX-13□-PN EX-19□-PN EX-14□-PN****PNP output type****I/O circuit diagram**

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

Symbols ... D : Reverse supply 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.

Selection Guide

Amplifier Built-in

**CX-400****EX-10****EX-20****EX-30****EX-40****EQ-30****EQ-500****MQ-W****RX-LS200****RX****CY****PX-2****RT-610**

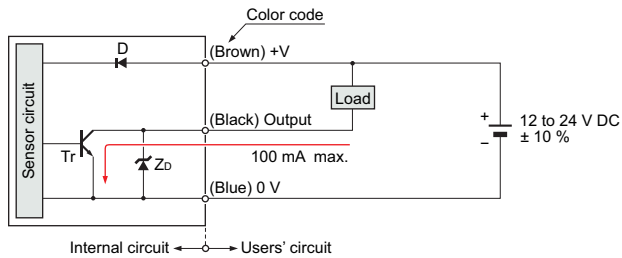
Power Supply Built-in

**NX5****VF**

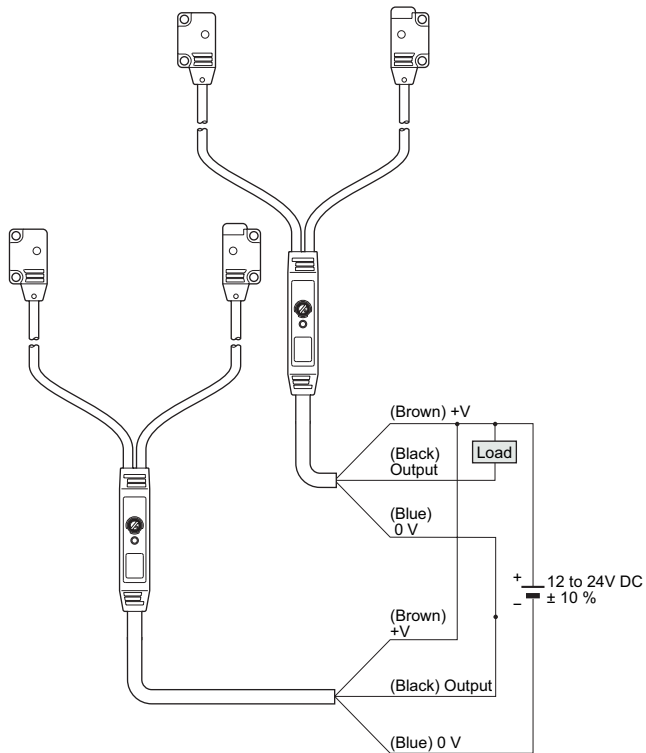
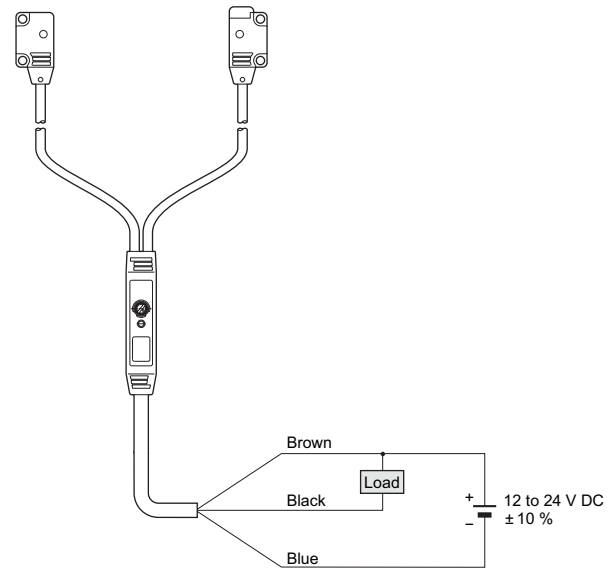
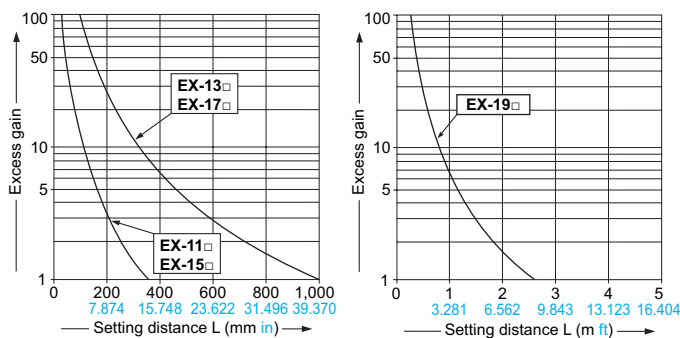
Amplifier-separated

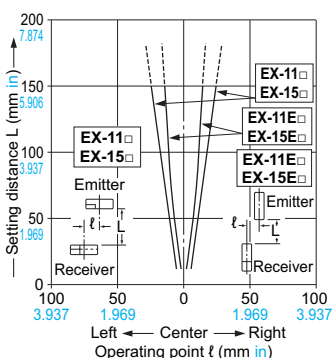
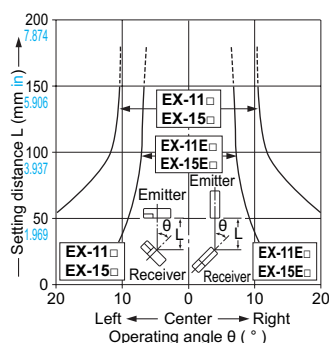
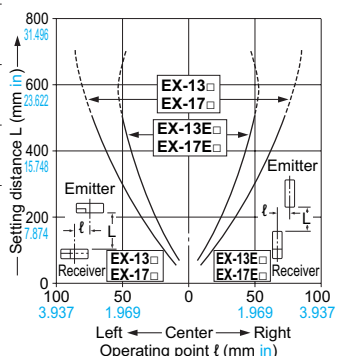
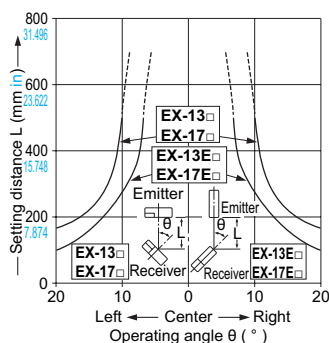
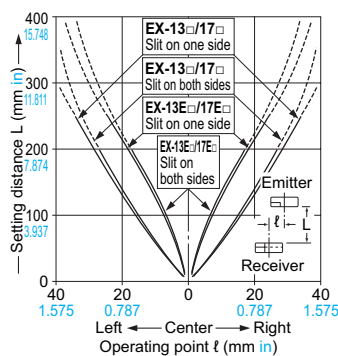
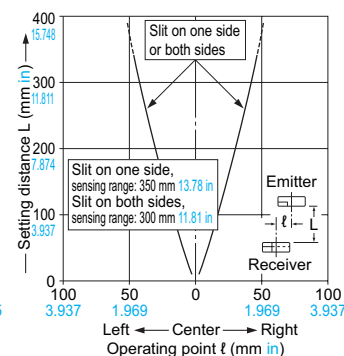
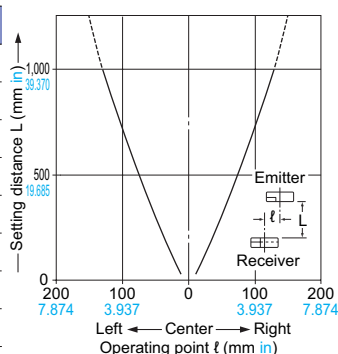
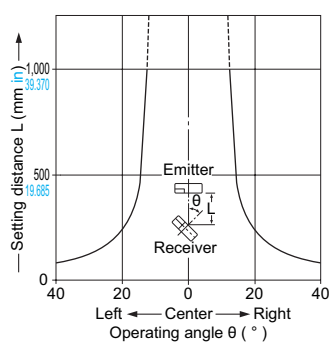
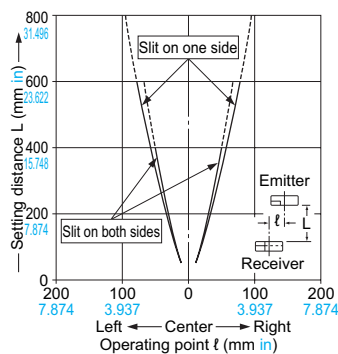
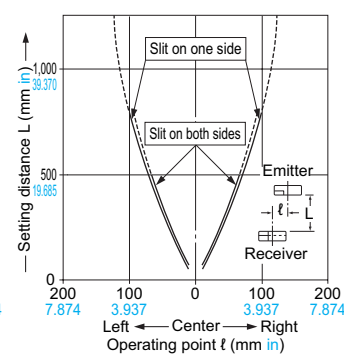
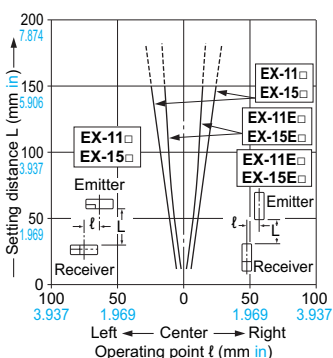
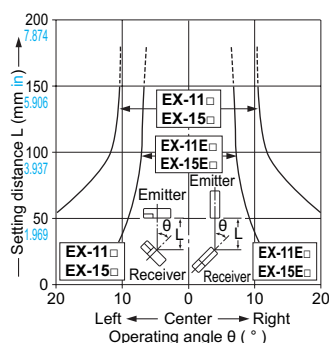
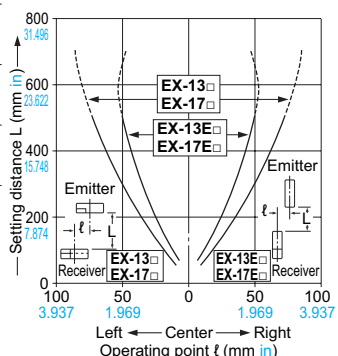
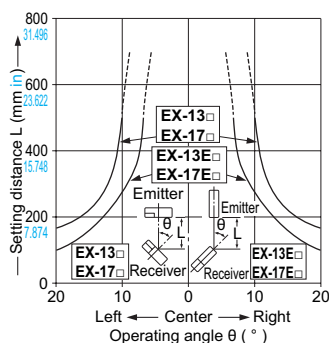
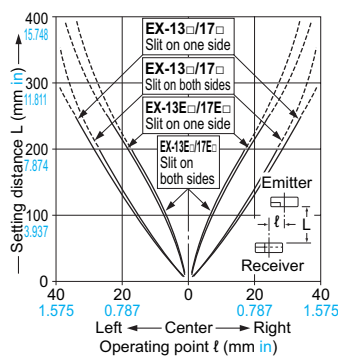
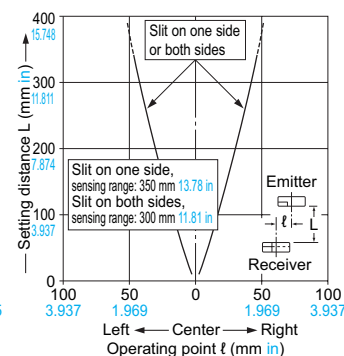
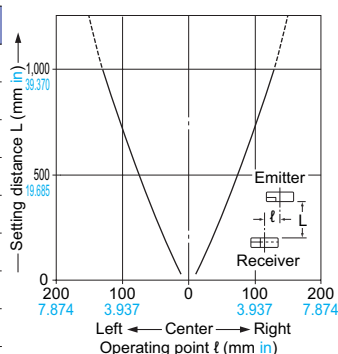
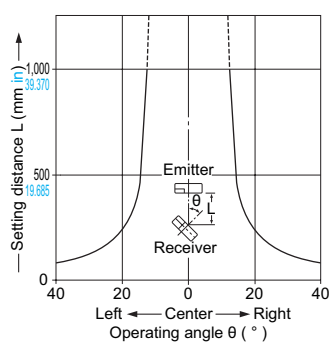
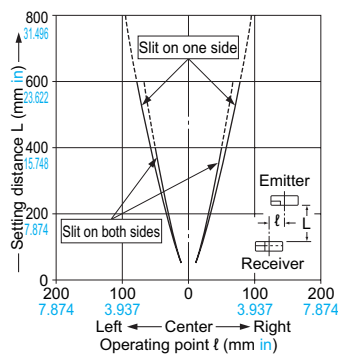
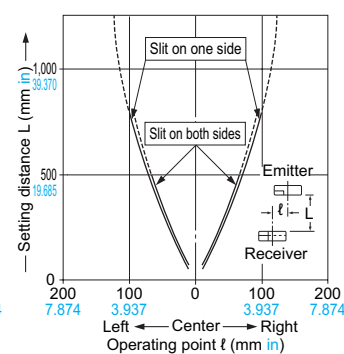
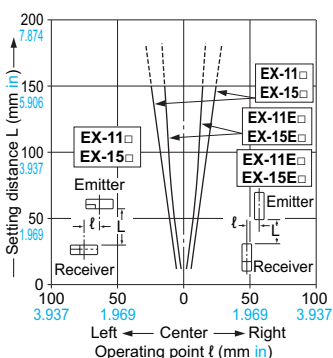
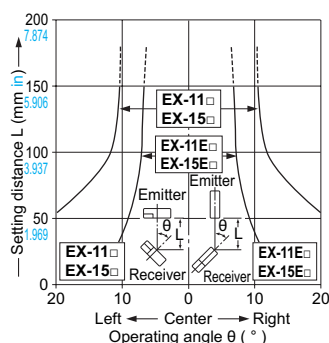
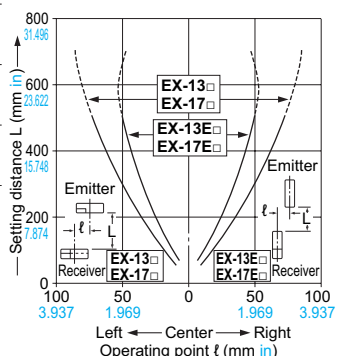
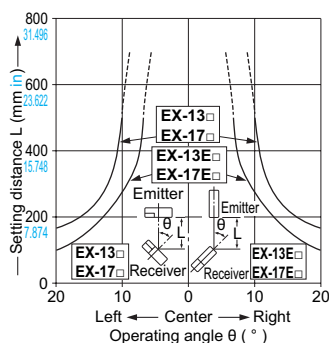
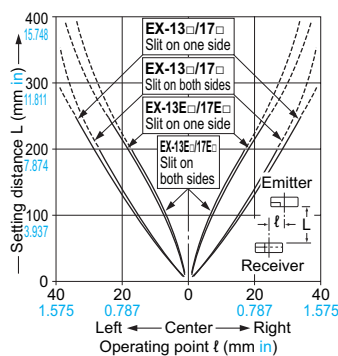
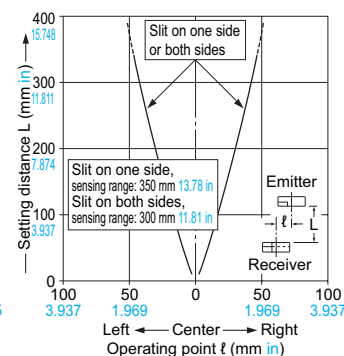
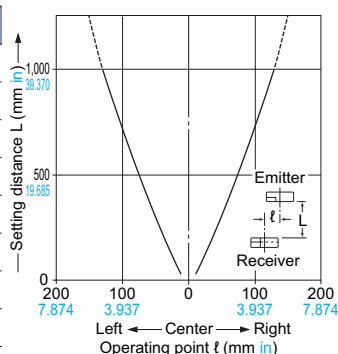
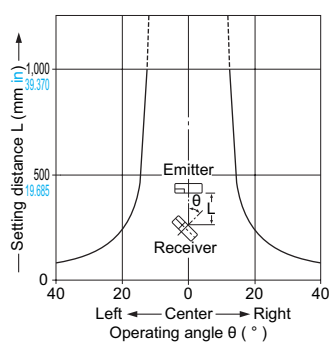
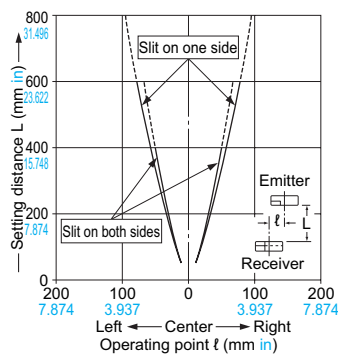
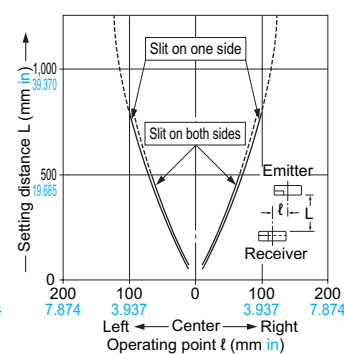
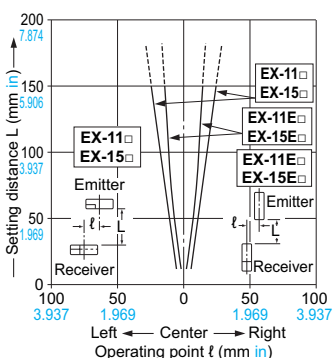
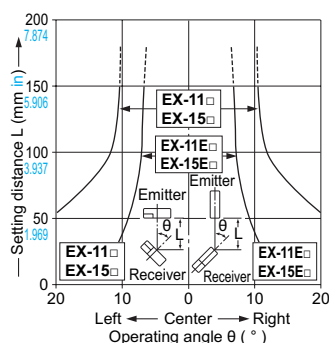
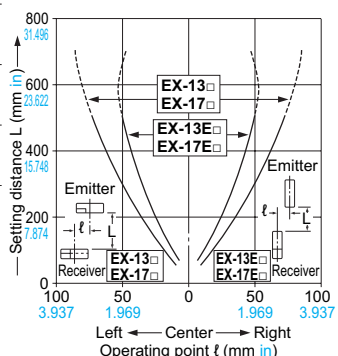
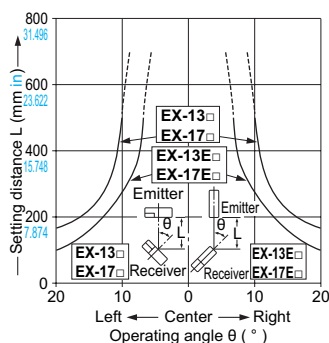
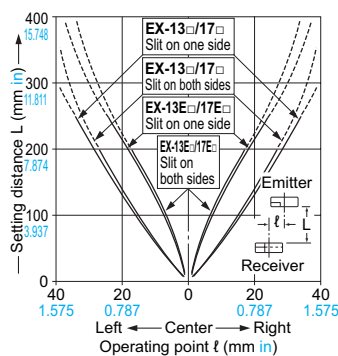
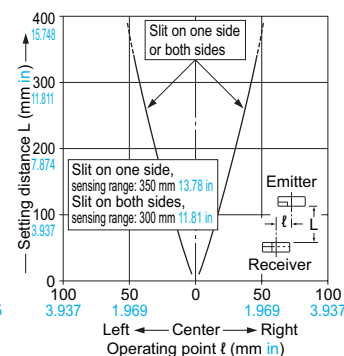
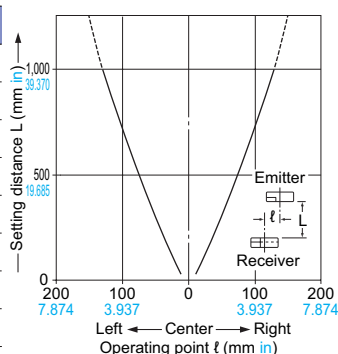
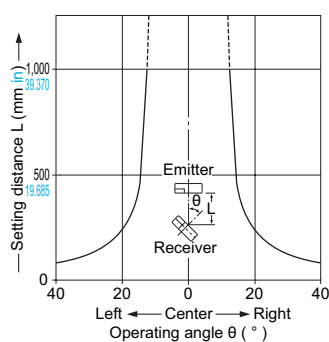
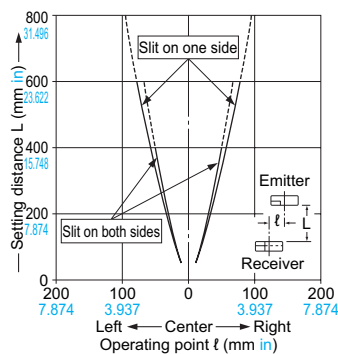
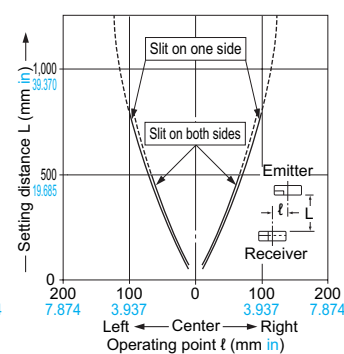
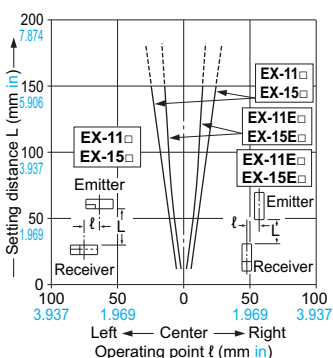
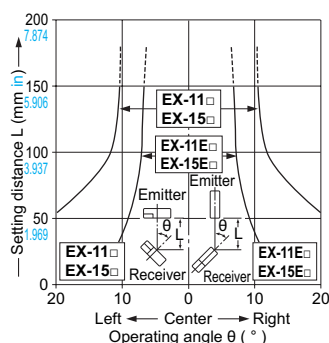
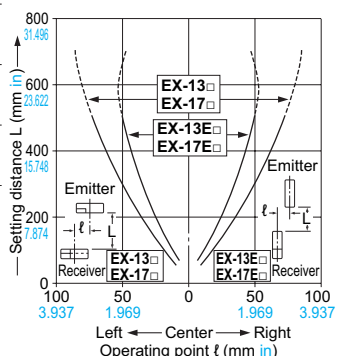
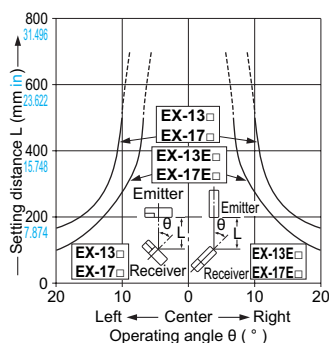
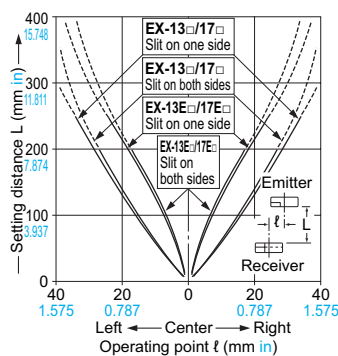
**SU-7 / SH****SS-A5 / SH**

Other Products

**I/O CIRCUIT AND WIRING DIAGRAMS****EX-15□ EX-15E□ EX-17□ EX-17E□ EX-17W****NPN output type****I/O circuit diagram**

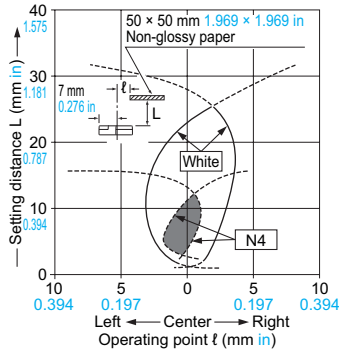
Symbols ... D : Reverse supply polarity protection diode  
Zd : Surge absorption zener diode  
Tr : NPN output transistor

**EX-17W series connection wiring diagram****EX-15□, EX-15E□, EX-17□, EX-17E□ wiring diagram****SENSING CHARACTERISTICS (TYPICAL)****All models****Thru-beam type****Correlation between setting distance and excess gain**FIBER  
SENSORSLASER  
SENSORSPHOTO-  
ELECTRIC  
SENSORSMICRO  
PHOTO-  
ELECTRIC  
SENSORSAREA  
SENSORSSAFETY  
COMPONENTSPRESSURE  
SENSORSINDUCTIVE  
PROXIMITY  
SENSORSPARTICULAR  
USE  
SENSORSSENSOR  
OPTIONSWIRE-  
SAVING  
SYSTEMSMEASURE-  
MENT  
SENSORSSTATIC  
CONTROL  
DEVICESLASER  
MARKERSSelection  
GuideAmplifier  
Built-in**CX-400****EX-10****EX-20****EX-30****EX-40****EQ-30****EQ-500****MQ-W****RX-LS200****RX****CY****PX-2****RT-610**Power Supply  
Built-in**NX5****VF**Amplifier-  
separated**SU-7 / SH****SS-A5 / SH**Other  
Products

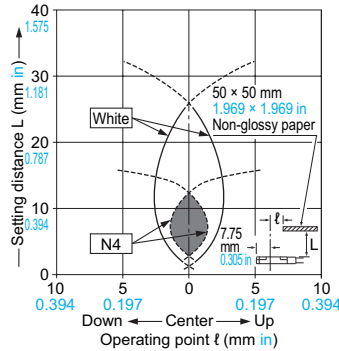
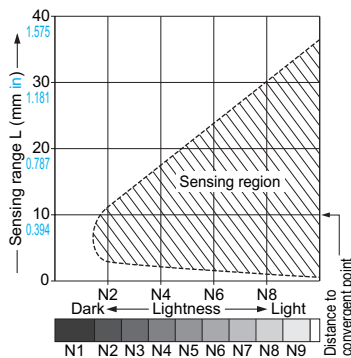
**SENSING CHARACTERISTICS (TYPICAL)****EX-11□ EX-11E□ EX-15□ EX-15E□****Thru-beam type****Parallel deviation****Angular deviation****EX-13□ EX-13E□ EX-17□ EX-17E□****Thru-beam type****Parallel deviation****Angular deviation****Parallel deviation with slit masks (ø1.2 mm ø0.047 in)****Parallel deviation with slit masks (ø1.5 mm ø0.059 in)****EX-19□****Thru-beam type****Parallel deviation****Angular deviation****Parallel deviation with slit masks (ø1.2 mm ø0.047 in)****Parallel deviation with slit masks (ø1.5 mm ø0.059 in)****SENSING CHARACTERISTICS (TYPICAL)****EX-11□ EX-11E□ EX-15□ EX-15E□****Thru-beam type****Parallel deviation****Angular deviation****EX-13□ EX-13E□ EX-17□ EX-17E□****Thru-beam type****Parallel deviation****Angular deviation****Parallel deviation with slit masks (ø1.2 mm ø0.047 in)****Parallel deviation with slit masks (ø1.5 mm ø0.059 in)****EX-19□****Thru-beam type****Parallel deviation****Angular deviation****Parallel deviation with slit masks (ø1.2 mm ø0.047 in)****Parallel deviation with slit masks (ø1.5 mm ø0.059 in)****SENSING CHARACTERISTICS (TYPICAL)****EX-11□ EX-11E□ EX-15□ EX-15E□****Thru-beam type****Parallel deviation****Angular deviation****EX-13□ EX-13E□ EX-17□ EX-17E□****Thru-beam type****Parallel deviation****Angular deviation****Parallel deviation with slit masks (ø1.2 mm ø0.047 in)****Parallel deviation with slit masks (ø1.5 mm ø0.059 in)****EX-19□****Thru-beam type****Parallel deviation****Angular deviation****Parallel deviation with slit masks (ø1.2 mm ø0.047 in)****Parallel deviation with slit masks (ø1.5 mm ø0.059 in)****SENSING CHARACTERISTICS (TYPICAL)****EX-11□ EX-11E□ EX-15□ EX-15E□****Thru-beam type****Parallel deviation****Angular deviation****EX-13□ EX-13E□ EX-17□ EX-17E□****Thru-beam type****Parallel deviation****Angular deviation****Parallel deviation with slit masks (ø1.2 mm ø0.047 in)****Parallel deviation with slit masks (ø1.5 mm ø0.059 in)****EX-19□****Thru-beam type****Parallel deviation****Angular deviation****Parallel deviation with slit masks (ø1.2 mm ø0.047 in)****Parallel deviation with slit masks (ø1.5 mm ø0.059 in)****SENSING CHARACTERISTICS (TYPICAL)****EX-11□ EX-11E□ EX-15□ EX-15E□****Thru-beam type****Parallel deviation****Angular deviation****EX-13□ EX-13E□ EX-17□ EX-17E□****Thru-beam type****Parallel deviation****Angular deviation****Parallel deviation with slit masks (ø1.2 mm ø0.047 in)**

**SENSING CHARACTERISTICS (TYPICAL)****EX-14□****Convergent reflective type****Sensing fields**

## • Horizontal (left and right) direction

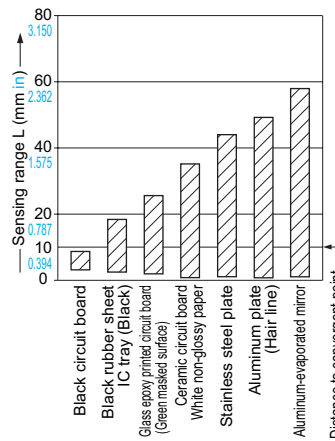


## • Vertical (up and down) direction

**Correlation between lightness and sensing range**

The sensing region (typical) is represented by oblique lines in the left figure. However, the sensitivity should be set with enough margin because of slight variation in products.

(Lightness shown on the left may differ slightly from the actual object condition.)

**Correlation between material (50 × 50 mm 1.969 × 1.969 in) and sensing range**

The bars in the graph indicate the sensing range (typical) for the respective material. However, there is a slight variation in the sensing range depending on the product. Further, if there is a reflective object (conveyor, etc.) in the background of the sensing object, since it affects the sensing, separate it by more than twice the sensing range shown in the left graph.

**PRECAUTIONS FOR PROPER USE**

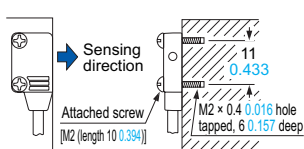
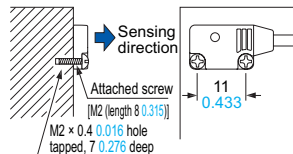
Refer to p.986~ for general precautions.



- 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.

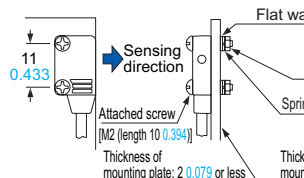
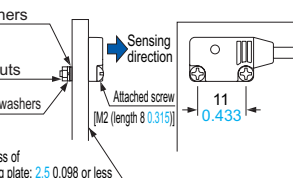
**Mounting**

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

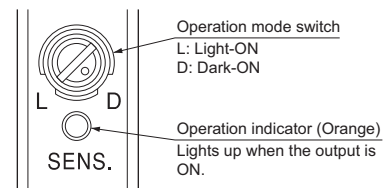
**Side sensing****Front sensing**

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.

**Operation mode switch (EX-15□, EX-15E□, EX-17□ and EX-17E□ only)**

Switch position	Description
L	Light-ON mode is set when the switch is turned fully clockwise (L side).
D	Dark-ON mode is set when the switch is turned fully counterclockwise (D side).

**Others**

- Do not use during the initial transient time (50 ms) (EX-15□, EX-15E□, EX-17□, EX-17E□: 100 ms) after the power supply is switched on.
- Excess bending of the cable or stress applied to the cable may disconnect the internal lead wire.

FIBER SENSORS

LASER SENSORS

PHOTO-ELECTRIC SENSORS

MICRO PHOTO-ELECTRIC SENSORS

AREA SENSORS

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Selection Guide

Amplifier Built-in

CX-400

EX-10

EX-20

EX-30

EX-40

EQ-30

EQ-500

MQ-W

RX-LS200

RX

CY

PX-2

RT-610

Power Supply Built-in

NX5

VF

Amplifier-separated

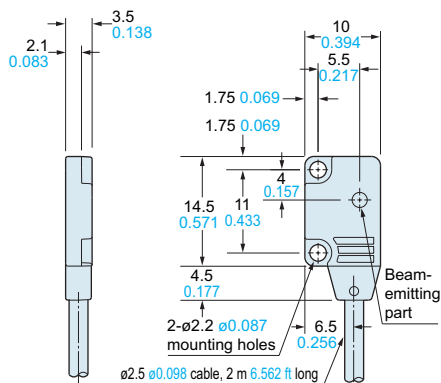
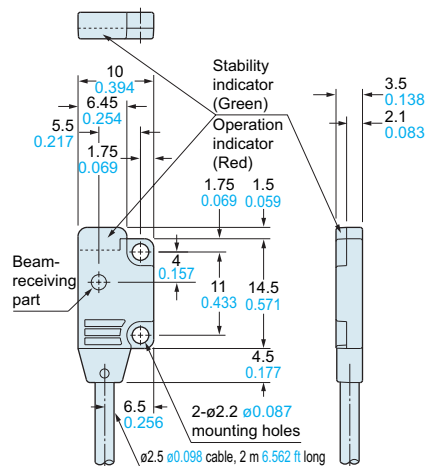
SU-7 / SH

SS-A5 / SH

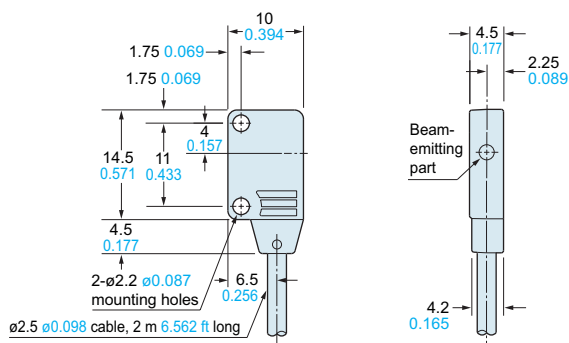
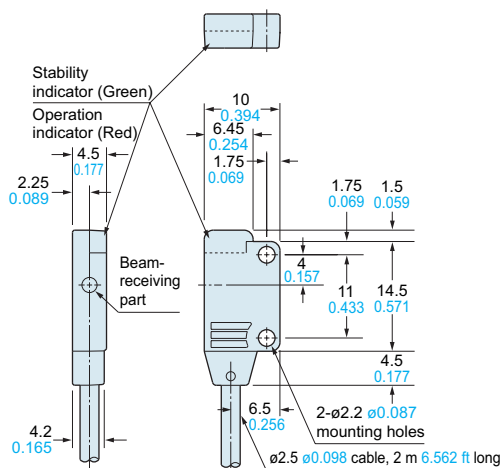
Other Products

**DIMENSIONS (Unit: mm in)**The CAD data in the dimensions can be downloaded from the SUNX website: <http://www.sunx.com>FIBER  
SENSORSLASER  
SENSORSPHOTO-  
ELECTRIC  
SENSORSMICRO  
PHOTO-  
ELECTRIC  
SENSORSAREA  
SENSORSSAFETY  
COMPONENTSPRESSURE  
SENSORSINDUCTIVE  
PROXIMITY  
SENSORSPARTICULAR  
USE  
SENSORSSENSOR  
OPTIONSWIRE-  
SAVING  
SYSTEMSMEASURE-  
MENT  
SENSORSSTATIC  
CONTROL  
DEVICESLASER  
MARKERS**EX-11A□ EX-11B□ EX-13A□ EX-13B□ EX-19A□ EX-19B□**

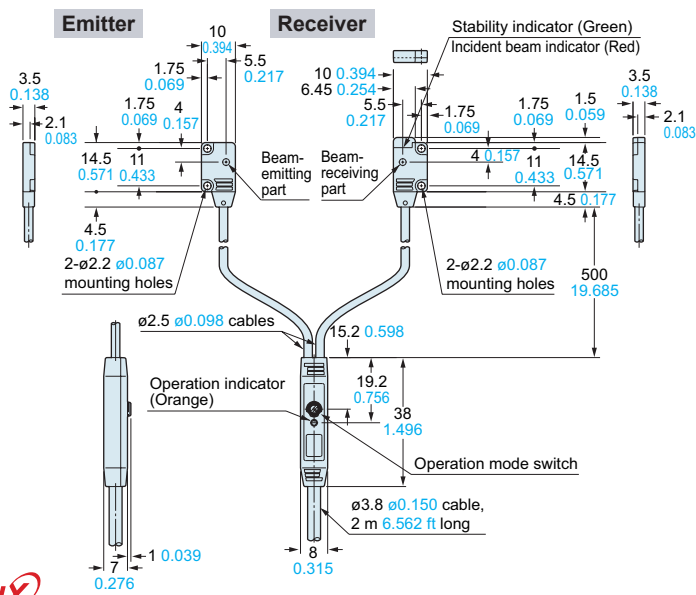
Sensor

**Emitter****Receiver****EX-11EA□ EX-11EB□ EX-13EA□ EX-13EB□**

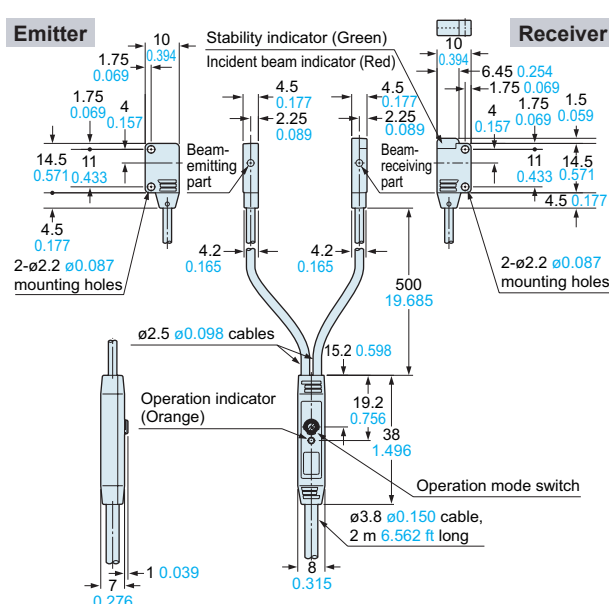
Sensor

**Emitter****Receiver****EX-15 EX-17(W)**

Sensor

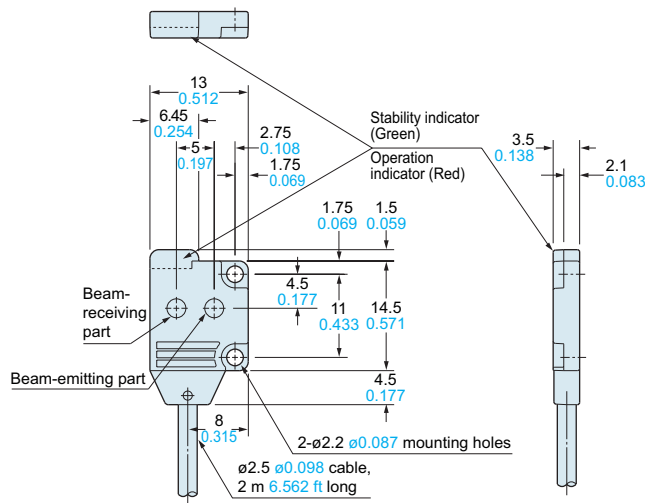
**EX-15E EX-17E**

Sensor

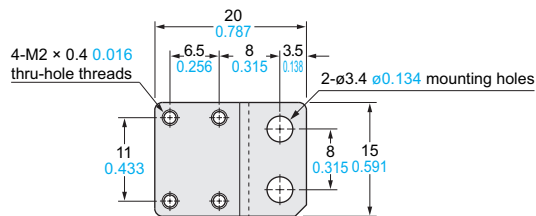
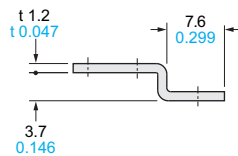


**DIMENSIONS (Unit: mm in)**The CAD data in the dimensions can be downloaded from the SUNX website: <http://www.sunx.com>**EX-14A□ EX-14B□**

Sensor

**MS-EX10-1**

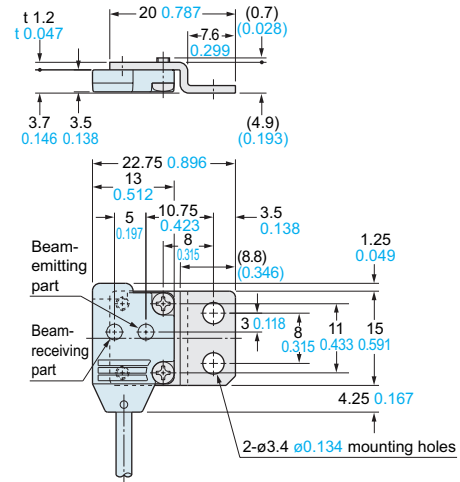
Sensor mounting bracket (Optional)

Material: Cold rolled carbon steel (SPCC)  
(Uni-chrome plated)

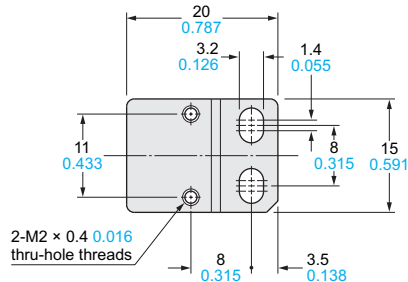
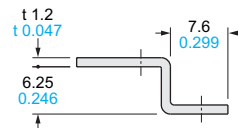
Two M2 (length 4 mm 0.157 in) pan head screws are attached.

**Assembly dimensions**

Mounting drawing with EX-14□

**MS-EX10-2**

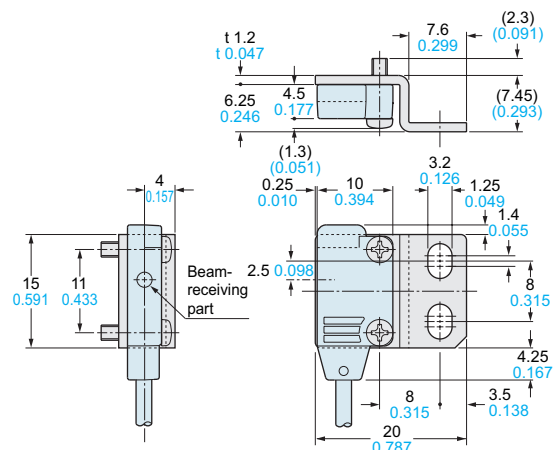
Sensor mounting bracket (Optional)

Material: Cold rolled carbon steel (SPCC)  
(Uni-chrome plated)

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

**Assembly dimensions**

Mounting drawing with EX-11E□ and EX-13E□



FIBER SENSORS

LASER SENSORS

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MICRO PHOTO-ELECTRIC SENSORS

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Amplifier Built-in

**CX-400****EX-10****EX-20****EX-30****EX-40****EQ-30****EQ-500****MQ-W****RX-LS200****RX****CY****PX-2****RT-610**

Power Supply Built-in

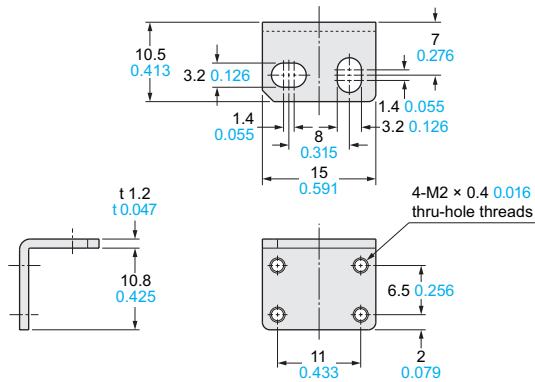
**NX5****VF**

Amplifier-separated

**SU-7 / SH****SS-A5 / SH**

Other Products



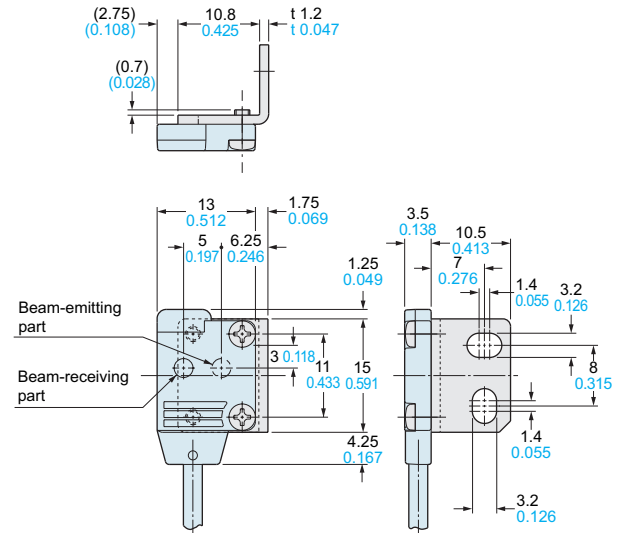
**DIMENSIONS (Unit: mm in)**The CAD data in the dimensions can be downloaded from the SUNX website: <http://www.sunx.com>**MS-EX10-13****Sensor mounting bracket (Optional)**

Material: Stainless steel (SUS304)

Two M2 (length 4 mm 0.157 in) pan head screws [stainless steel (SUS304)] and two M2 (length 8 mm 0.315 in) pan head screws [stainless steel (SUS304)] are attached.

**Assembly dimensions**

Mounting drawing with EX-14□

FIBER  
SENSORSLASER  
SENSORSPHOTO-  
ELECTRIC  
SENSORSMICRO  
PHOTO-  
ELECTRIC  
SENSORSAREA  
SENSORSSAFETY  
COMPONENTSPRESSURE  
SENSORSINDUCTIVE  
PROXIMITY  
SENSORSPARTICULAR  
USE  
SENSORSSENSOR  
OPTIONSWIRE-  
SAVING  
SYSTEMSMEASURE-  
MENT  
SENSORSSTATIC  
CONTROL  
DEVICESLASER  
MARKERS**Selection  
Guide**Amplifier  
Built-in**CX-400****EX-10****EX-20****EX-30****EX-40****EQ-30****EQ-500****MQ-W****RX-LS200****RX****CY****PX-2****RT-610**Power Supply  
Built-in**NX5****VF**Amplifier-  
separated**SU-7 / SH****SS-A5 / SH**Other  
Products