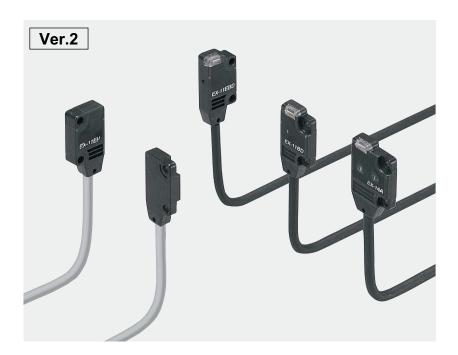


Amplifier Built-in

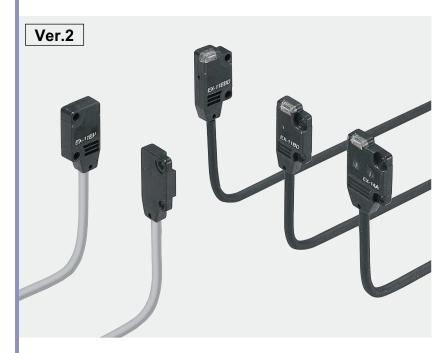
Ultra-slim Photoelectric Sensor

EX-10 SERIES Ver.2



Ultra-slim Photoelectric Sensor Amplifier Built-in

SERIES Ver.2











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.





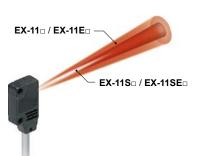






Less interference with no slit. narrow-pitch can be set.

The pitch of installation is 1/2 of conventional models, so that the close-installation is possible. No cost is necessary to purchase or install a slit.

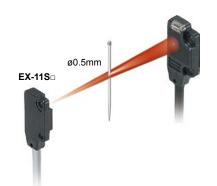


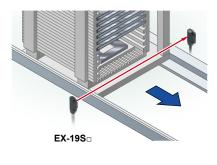
Possible to sense a minute object less than $\emptyset 0.5$ mm $\emptyset 0.039$ in with no slit.

The series is applicable to sense a minute object without any cost.

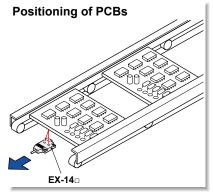
Long sensing range of 1 m 3.281 ft with narrow beam

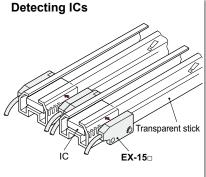
A long 1 m 3.281 ft sensing range is possible with narrow beam.

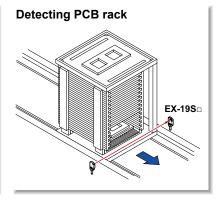


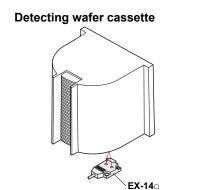


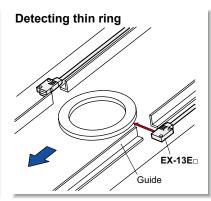
APPLICATIONS

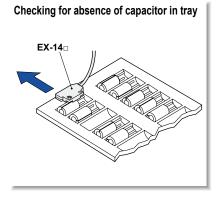










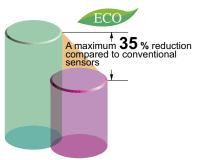


BASIC PERFORMANCE

Electric power saving *

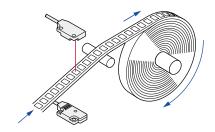
The **EX-10** series achieves reductions in power consumption of up to 65 %. These sensors contribute to environmental friendliness.

* Effective from production in October 2010.



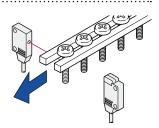
High-speed response time: 0.5 ms

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



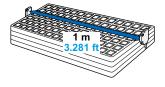
Minimum sensing object: ø1 mm ø0.039 in EX-11(E), EX-15(E)

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(E)□

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.

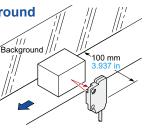


EX-14□

Background suppression

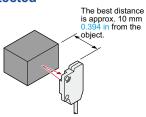
Hardly affected by background

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

Incorporated an inverter countermeasure circuit *

The EX-10 series become significantly stronger against inverter light and other extraneous light.

* Effective from production in October 2010.



Waterproof IP67

The sensors features an IP67 rating to allow their use in process lines where water is used or splashed. Rust-resistant stainless steel sensor mounting brackets are available.

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

Bending durability

EX-□-R

Bending-resistant cable type **EX-**□-**R** is available. It is most suitable for moving parts, such as robot arm, etc.

MOUNTING / SIZE

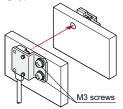
Mountable with M3 screws

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

[Cold rolled carbon steel (SPCC)]

MS-EX10-11

[Stainless steel (SUS304)] mounting bracket for the front sensing type



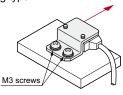
the narrow beam type (EX-uSu).

Note: Sensor mounting brackets can not be used for

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

MS-EX10-12

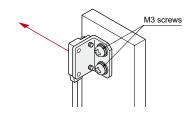
[Stainless steel (SUS304)] mounting bracket for the side sensing type



• 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.

FUNCTIONS

Bright 2-color indicator

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



OTHERS

October 2010.

Less resources used *

Based on environmental considerations, simplified packaging is used in order to reduce waste. In addition, the bag is made from polyethylene which produces no toxic gases even when burned.

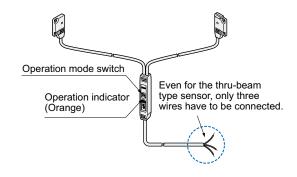


VARIETIES

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

т.						Model N	o.(Note 2)	Output				
	Туре			Appearance	Sensing range	NPN output	PNP output	operation	Output			
					450 5000	EX-11A	EX-11A-PN	Light-ON				
					150 mm 5.906 in	EX-11B	EX-11B-PN	Dark-ON				
					500 mm	EX-13A	EX-13A-PN	Light-ON				
		Б		m fil	19.685 in	EX-13B	EX-13B-PN	Dark-ON				
		Front sensing		[1 m	EX-19A	EX-19A-PN	Light-ON				
					3.281 ft	EX-19B	EX-19B-PN	Dark-ON				
		ᇤ	n mode bifurcation	U U	150 mm 5.906 in	EX-15	EX-15 -PN	Switchable either				
	Thru-beam		With operation mode switch on the bifurcation		500 mm 19.685 in	EX-17	EX-17-PN	Light-ON or Dark-ON				
/be	hru-t				450 5000	EX-11EA	EX-11EA-PN	Light-ON	NPN open- collector			
Standard type	_				150 mm 5.906 in	EX-11EB	EX-11EB-PN	Dark-ON	transistor or			
tanda					500 mm	EX-13EA	EX-13EA-PN	Light-ON	PNP open- collector			
S		D D			19.685 in	EX-13EB	EX-13EB-PN	Dark-ON	transistor			
		Side sensing			(/ 1 m	EX-19EA	EX-19EA-PN	Light-ON				
		ide)) 3.281 ft	EX-19EB	EX-19EB-PN	Dark-ON				
		05	n mode bifurcation	W W	150 mm 5.906 in	EX-15E ——		Switchable either				
			With operation mode switch on the bifurcation		500 mm 19.685 in	EX-17E		Light-ON or Dark-ON				
	Convergent reflective (Diffused beam type) Front sensing		Di lie		2 to 25 mm 0.079 to 0.984 in (Note 1	EX-14A	EX-14A-PN	Light-ON				
	Converge (Diffused	(Diffused		H	(Convergent point: 10 mm 0.394 in)	EX-14B	EX-14B-PN	Dark-ON				
					150 mm 5.906 in	EX-11SA	EX-11SA-PN	Light-ON				
		5	<u> </u>		100 mm 0.000 m	EX-11SB	EX-11SB-PN	Dark-ON				
a .		Front sensing			500 mm	EX-13SA	EX-13SA-PN	Light-ON				
type	٦				19.685 in	EX-13SB	EX-13SB-PN	Dark-ON	NPN open- collector			
eam	-bear	ù		Ld Ld		EX-19SA	EX-19SA-PN	Light-ON	transistor			
Narrow beam type	Thru-beam				3.281 ft	EX-19SB	EX-19SB-PN	Dark-ON	PNP open-			
Narı		5	20		150 mm 5.906 in	EX-11SEA	EX-11SEA-PN	Light-ON	collector transistor			
		100	<u> </u>		100 mm 0.000 m	EX-11SEB	EX-11SEB-PN	Dark-ON				
		Side sensing			500 mm	EX-13SEA	EX-13SEA-PN	Light-ON				
				ليا ليا	19.685 in	EX-13SEB	EX-13SEB-PN	Dark-ON				

NOTE: Mounting bracket is not supplied with the sensor. Please select from the range of optional sensor mounting brackets (MS-EX10-□). Sensor mounting brackets (MS-EX10-□) can not be used for the narrow beam type (EX-□S□).

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 "P" shown on the label affixed to the thru-beam type sensor is the emitter, "D" shown on the label is the receiver.

Bending-resistant cable type

Bending-resistant cable type is also available for NPN output type. (excluding narrow beam type EX-uSu and sensor with operation mode switch on the

bifurcation EX-15□/17□) When ordering this type, suffix "-R" to the model No. (e.g.) Bending-resistant 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 narrow beam type **EX-**□**S**□ and bending-resistant 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

NOTE: Sensor mounting brackets can not be used for the narrow beam type (**EX-**□**S**□).

Designation	Model No.	Description				
	MS-EX10-1	nunting bracket for the front sensing type sensor [Cold rolled carbon steel (SPCC)] he thru-beam type sensor needs two brackets.)				
	MS-EX10-2	Mounting bracket for the side sensing type sensor [Cold rolled carbon steel (SPCC (The thru-beam type sensor needs two brackets.)				
Sensor mounting	MS-EX10-3	L-shaped mounting bracket sensor [Cold rolled carbon steel (SPCC)] (The thru-beam type sensor needs two brackets.)				
bracket (Note 1)	MS-EX10-11	Mounting bracket for the front sensing type sensor [Stainless steel (SUS304)] (The thru-beam type sensor needs two brackets.)				
	MS-EX10-12	Mounting bracket for the side sensing type sensor [Stainless steel (SUS304)] (The thru-beam type sensor needs two brackets.)				
	MS-EX10-13	L-shaped mounting bracket [Stainless steel (SUS304)] (The thru-beam type sensor needs two brackets.)				
	OS-EX10-12	• Sensing range: 600 mm 23.622 in [EX-19□] Slit on one side • Sensing range: 600 mm 23.622 in [EX-19□] 250 mm 9.843 in [EX-13□, EX-17□] • Min. sensing object: ø2 mm ø0.079 in				
	(Slit size ø1.2 mm ø0.047 in)	• Sensing range: 400 mm 15.748 in [EX-19□] Slit on both sides • Sensing range: 400 mm 15.748 in [EX-19□] 200 mm 7.874 in [EX-13□, EX-17□] • Min. sensing object: Ø1.2 mm Ø0.047 in				
Slit mask	OS-EX10-15	• Sensing range: 800 mm 31.496 in [EX-19□] Slit on one side 350 mm 13.780 in [EX-13□] • Min. sensing object: ø2 mm ø0.079 in				
	(Slit size Ø1.5 mm Ø0.059 in)	• Sensing range: 500 mm 19.685 in [EX-19□] Slit on both sides • Sensing range: 500 mm 19.685 in [EX-19□] 300 mm 11.811 in [EX-13□] • Min. sensing object: ø1.5 mm ø0.059 in				
	OS-EX10E-12 (Slit size Ø1.2 mm Ø0.047 in)	Sensing range: 400 mm 15.748 in [EX-19E□] (Note 2) 250 mm 9.843 in [EX-13E□, EX-17E□] Min. sensing object: ø2 mm ø0.079 in				
	(Siit Size Ø 1.2 min Ø0.047 m)	Slit on both sides • Sensing range: 200 mm 7.874 in [EX-13E \square , EX-17E \square] • Min. sensing object: Ø1.2 mm Ø0.047 in				
Sensor checker	CHX-SC2	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	MS-M2	Mounting screws with washers (50 pcs. lot). It can mount securely as it is spring washer attached.				

Notes: 1) Can not be used for the narrow beam type (EX-□S□).

2) Since EX-19E□ has a built-in ø1 mm ø 0.039 in slit in the emitter, be sure to mount it in the receiver.

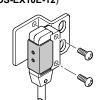
Slit mask

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





Example of mounting (OS-EX10E-12)



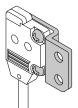
Sensor checker

• CHX-SC2

Sensor checker

Tighten along with the sensor mounting bracket.

Sensor mounting bracket • MS-EX10-1 • MS-EX10-11

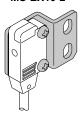


Material: Cold rolled carbon steel (SPCC) (Uni-chrome plated) Two M2 (length 4 mm 0.157 in) pan head screws are attached.

Material: Stainless steel (SUS304)

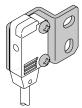
Two M2 (length 4 mm 0.157 in) pan head screws [stainless steel (SUS304)] are

• 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.

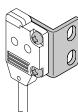
• MS-EX10-12



Material: Stainless steel (SUS304)

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

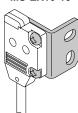
• MS-EX10-3



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

Front sensing Side sensing sens			Туре	Thru-beam standard type									
Note 2 Dark-ON EX-11B(-PN) EX-11B(-PN) EX-13B(-PN) EX-13B(-PN) EX-13B(-PN) EX-19B(-PN) EX-19B(-PN)			•	Front sensing	Side sensing	Front sensing	Side sensing	Front sensing	Side sensing				
Note 2) Dark-ON EX-118 (PN) EX-118 (PN) EX-138 (PN) EX-138 (PN) EX-19		Model No.	Light-ON	EX-11A(-PN)	EX-11EA(-PN)	EX-13A(-PN)	EX-13EA(-PN)	EX-19A(-PN)	EX-19EA(-PN)				
EMC Directive, RoHS Directive Sensing range 150 mm \$ 906 in 500 mm \$ 18.65 in 500 mm \$ 18.65 in 1 m \$ 281 ft 2 mm \$ 0.039 in opaque object (Completely beam interrupted object) (Setting distance between emitter and receiver: 150 mm \$ 5906 in Whysteresis Repetability (seperatular beams) Utilization category Short-incult protection Response time Operation indicator Circen LED (lights up under stable light received or condensation or stable dark condition) Stability indicator (lights up under stable light received object) (lights up under stable light receiver) Ambient tumnisty Ambient temperature 20 MQ, or more, with \$500 CC condensation of to keep temperature 10 to 500 Mg * 890 KP * 10 ft condensation of the light-receiving face Wittstance and source and enclosure Though the process of the light-receiving face Work Replication of the light-receiving face Stability indicator Emergency Stability indicator Circen LED (lights up under stable light received condition or stable dark condition) Stability indicator Circen LED (lights up under stable light received condition or stable dark condition) Ambient tumnished Ambient tumnished	Item	(Note 2)	Dark-ON	EX-11B(-PN)	EX-11EB(-PN)	EX-13B(-PN)	EX-13EB(-PN)	EX-19B(-PN)	EX-19EB(-PN)				
All min so 0.39 in opaque object (Completely beam interrupted object) (Completely beam interrupted object) (Completely beam interrupted object) (Setting distance between emitter and receiver: 150 mm 5.986 in) Hysteresis Reseatability (propodular to sensing asis) Output Out		`	tive compliance			EMC Directive,	RoHS Directive						
Min. sensing object Completely bearn interrupted object Completely bearn interrupted object Setting distance between emitter and receiver: 150 mm 5.906 in Setting distance between emitter and receiver: 150 mm 5.906 in Setting distance between emitter and receiver: 11 m 3.281 ft Setting distance between emitter and receiver: 11 m 3.281 ft Setting distance between emitter and receiver: 11 m 3.281 ft Setting distance between emitter and receiver: 11 m 3.281 ft Setting distance between emitter and receiver: 11 m 3.281 ft Setting distance between emitter and receiver: 11 m 3.281 ft Setting distance between emitter and receiver: 11 m 3.281 ft Setting distance between emitter and receiver: 10 m A or less Setting distance between emitter and receiver: 10 m A or less Setting distance between emitter and receiver: 10 m A or less Setting distance between emitter and receiver: 10 m A or less Setting distance	Sens	sing range		150 mm	5.906 in	500 mm	19.685 in	1 m 3	3.281 ft				
Repetability (perpendiodar to sensing axis) 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 APPN output type>	Min.	sensing obj	ect	(Completely beam Setting d between and rece	interrupted object) istance emitter iver:	(Completely beam interrupted object) Setting distance between emitter and receiver: 500 mm 19.685 in Opaque object (Completely beam interrupted object) Setting distance between emitter and receiver:							
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 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) - Maximum source 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) - Maximum source current: 50 mA - Applied voltage: 30 V DC or less (between output and 4 V) - Residual voltage: 2 V or less (at 50 mA source current) - Maximum source current: 50 mA - Applied voltage: 30 V DC or less (between output and 4 V) - Residual voltage: 2 V or less (at 50 mA source current) - Maximum source current: 50 mA - Applied voltage: 30 V DC or less (between output and 4 V) - Residual voltage: 2 V or less (at 50 mA source current) - Maximum source current: 50 mA - Applied voltage: 30 V DC or less (between output and 4 V) - Residual voltage: 30 V DC or less (at 50 mA source current) - Maximum source current: 50 mA - Applied voltage: 30 V DC or less (at 50 mA source current) - Residual voltage: 30 V DC or less (at 50 mA source current) - Residual voltage: 30 V DC or less (at 16 mA source current) - Residual voltage: 30 V DC or less (at 16 mA source current) - Residual voltage: 30 V DC or less (at 16 mA source current) - Residual voltage: 30 V DC or less (at 16 mA source current) - Residual voltage: 30 V DC or less (at 16 mA source current) - Residual voltage: 30 V DC or less (at 16 mA source current) - Residual voltage: 30 V DC or less (at 16 mA source current) - Residual voltage: 30 V DC or less (at 16 mA source current) - Residual voltage: 30 V DC or less (at 16 mA source current) - Residual voltage: 30 V DC or less (at 16 mA source current) - Residual voltage: 30 V DC or less (at 16 mA source current) - Residual voltage: 30 V DC or less (at 16 mA source current) - Residual voltage: 30 V DC or less (at 16 mA source current) - Residual	Hyst	eresis											
Current consumption Emitter: 10 mA or less, Receiver: 10 mA or less ANPN output type> NPN open-collector transistor - Maximum sink current: 50 mA - Applied voltage: 30 v D Cor less (between output and 0 v) - Residual voltage: 20 v or less (at 50 mA sink current) Utilization category Short-circuit protection Response time Operation indicator Operation indicator Operation indicator Operation indicator Cilights up under stable light received condition or stable dark condition) Stability indicator Weight Pollution degree Protection Ambient temperature Ambient humidity 1 0 0 V AC for one min. between all supply terminals connected together and enclosure Vibration resistance Shock resistance Find the pass of th	Repea	atability (perpendi	cular to sensing axis)			0.05 mm 0.0	002 in or less		_				
Couput C	Supp	ply voltage			12	2 to 24 V DC ±10 %	Ripple P-P 10 % or le	ss					
NPN open-collector transistor	Curr	ent consum	ption		Er	mitter: 10 mA or less,	Receiver: 10 mA or le	ss					
Short-circuit protection Incorporated	Outp	out		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 source current) 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)									
Response time Operation indicator Orange LED (lights up when the output is ON) Incident beam indicator Stability indicator Pollution degree Protection Ambient temperature Ambient illuminance Incandescent light: 3,000 tx or less at the light-receiving face Voltage withstandability Indicator Orange LED (lights up under stable light received condition or stable dark condition) Protection IP67 (IEC) Ambient temperature Ambient humidity Incandescent light: 3,000 tx or less at the light-receiving face Voltage withstandability Insulation resistance Voltage withstandability Indicator Orange LED (lights up when the output is ON) Incident beam indicator Green LED (lights up under stable light received condition or stable dark condition) IP67 (IEC) Ambient temperature 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 tx or less at the light-receiving face Voltage withstandability 1,000 V AC for one min. between all supply terminals connected together and enclosure Vibration 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 in X, Y and Z directions for two hours each Shock resistance Foom Ms² acceleration (50 G approx.) in X, Y and Z directions three times each Red LED [Peak emission wavelength: 680 nm 0.027 mil (EX-19Ec: 624 nm 0.025 mil), modulated] Enclosure: Polyethylene terephthalate, Lens: Polyalylate Cable (Note 3) O.1 mm² 3-core (thru-beam type emitter: 2-core) cabltyre cable, 2 m 6.562 ft long Extension up to total 50 m 164 ft is possible with 0.3 mm², or more, cable (thru-beam type: emitter and receiver). Weight Net weight (each emitter and receiver): 20 g approx., Gross weight: 50 g approx.		Utilization of	category	DC-12 or DC-13									
Operation indicator Orange LED (lights up when the output is ON) Incident beam indicator Stability indicator Orange LED (lights up under stable light received condition or stable dark condition) Pollution degree 3 (Industrial environment) Protection 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 tx or less at the light-receiving face Voltage withstandability 1,000 V AC for one min. between all supply terminals connected together and enclosure Vibration resistance 20 MQ, or more, with 250 V DC megger between all supply terminals connected together and enclosure Vibration resistance To 500 m/s² acceleration (50 G approx.) in X, Y and Z directions for two hours each Shock resistance Red LED [Peak emission wavelength: 680 nm 0.027 mil (EX-19Ec: 624 nm 0.025 mil), modulated] Material Enclosure: Polyethylene terepthalate, Lens: Polyalylate Cable (Note 3) O.1 mm² 3-core (thru-beam type emitter: 2-core) cabtyre cable, 2 m 6.562 ft long Extension up to total 50 m 164 ft is possible with 0.3 mm², or more, cable (thru-beam type: emitter and receiver). Weight Net weight (each emitter and receiver): 20 g approx., Gross weight: 50 g approx.		Short-circu	it protection	Incorporated									
Pollution degree 3 (Industrial environment)	Res	ponse time		0.5 ms or less									
Pollution degree 3 (Industrial environment)	Ope	ration indica	tor	Orange LED (lights up when the output is ON)									
Pollution degree 3 (Industrial environment)	Incid	lent beam in	dicator										
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 tx 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 in X, Y and Z directions for two hours each Shock resistance Emitting element Red LED [Peak emission wavelength: 680 nm 0.027 mil (EX-19E□: 624 nm 0.025 mil), modulated] Enclosure: Polyethylene terephthalate, Lens: Polyalylate Cable (Note 3) Cable extension Extension up to total 50 m 164 ft is possible with 0.3 mm², or more, cable (thru-beam type: emitter and receiver). Net weight (each emitter and receiver): 20 g approx., Gross weight: 50 g approx.	Stab	ility indicato	r		(lights up und			lark condition)					
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 tx or less at the light-receiving face Voltage withstandability 1,000 V AC for one min. between all supply terminals connected together and enclosure Voltage withstandability 10 to 500 Hz frequency, 3 mm 0.118 in double amplitude in X, Y and Z directions for two hours each Shock resistance Emitting element Red LED [Peak emission wavelength: 680 nm 0.027 mil (EX-19E□: 624 nm 0.025 mil), modulated] Enclosure: Polyethylene terephthalate, Lens: Polyalylate Cable (Note 3) Cable extension Extension up to total 50 m 164 ft is possible with 0.3 mm², or more, cable (thru-beam type: emitter and receiver). Net weight (each emitter and receiver): 20 g approx., Gross weight: 50 g approx.		Pollution d	egree			3 (Industrial	environment)						
Vibration resistance 10 to 500 Hz frequency, 3 mm 0.118 in double amplitude in X, Y and Z directions for two hours each 500 m/s² acceleration (50 G approx.) in X, Y and Z directions three times each Emitting element Red LED [Peak emission wavelength: 680 nm 0.027 mil (EX-19Ea: 624 nm 0.025 mil), modulated] Material Enclosure: Polyethylene terephthalate, Lens: Polyalylate Cable (Note 3) 0.1 mm² 3-core (thru-beam type emitter: 2-core) cabtyre cable, 2 m 6.562 ft long Cable extension Extension up to total 50 m 164 ft is possible with 0.3 mm², or more, cable (thru-beam type: emitter and receiver). Weight Net weight (each emitter and receiver): 20 g approx., Gross weight: 50 g approx.	φ	Protection		IP67 (IEC)									
Vibration resistance 10 to 500 Hz frequency, 3 mm 0.118 in double amplitude in X, Y and Z directions for two hours each 500 m/s² acceleration (50 G approx.) in X, Y and Z directions three times each Emitting element Red LED [Peak emission wavelength: 680 nm 0.027 mil (EX-19Ea: 624 nm 0.025 mil), modulated] Material Enclosure: Polyethylene terephthalate, Lens: Polyalylate Cable (Note 3) 0.1 mm² 3-core (thru-beam type emitter: 2-core) cabtyre cable, 2 m 6.562 ft long Cable extension Extension up to total 50 m 164 ft is possible with 0.3 mm², or more, cable (thru-beam type: emitter and receiver). Weight Net weight (each emitter and receiver): 20 g approx., Gross weight: 50 g approx.	stanc	Ambient te	mperature	-25 to +55 °C −13 to +131 °F (No dew condensation or icing allowed), Storage: -30 to +70 °C -22 to +158 °F									
Vibration resistance 10 to 500 Hz frequency, 3 mm 0.118 in double amplitude in X, Y and Z directions for two hours each 500 m/s² acceleration (50 G approx.) in X, Y and Z directions three times each Emitting element Red LED [Peak emission wavelength: 680 nm 0.027 mil (EX-19Ea: 624 nm 0.025 mil), modulated] Material Enclosure: Polyethylene terephthalate, Lens: Polyalylate Cable (Note 3) 0.1 mm² 3-core (thru-beam type emitter: 2-core) cabtyre cable, 2 m 6.562 ft long Cable extension Extension up to total 50 m 164 ft is possible with 0.3 mm², or more, cable (thru-beam type: emitter and receiver). Weight Net weight (each emitter and receiver): 20 g approx., Gross weight: 50 g approx.	resi	Ambient humidity		35 to 85 % RH, Storage: 35 to 85 % RH									
Vibration resistance 10 to 500 Hz frequency, 3 mm 0.118 in double amplitude in X, Y and Z directions for two hours each 500 m/s² acceleration (50 G approx.) in X, Y and Z directions three times each Emitting element Red LED [Peak emission wavelength: 680 nm 0.027 mil (EX-19Ea: 624 nm 0.025 mil), modulated] Material Enclosure: Polyethylene terephthalate, Lens: Polyalylate Cable (Note 3) 0.1 mm² 3-core (thru-beam type emitter: 2-core) cabtyre cable, 2 m 6.562 ft long Cable extension Extension up to total 50 m 164 ft is possible with 0.3 mm², or more, cable (thru-beam type: emitter and receiver). Weight Net weight (each emitter and receiver): 20 g approx., Gross weight: 50 g approx.	ental	Ambient illuminance		Incandescent light: 3,000 & or less at the light-receiving face									
Vibration resistance 10 to 500 Hz frequency, 3 mm 0.118 in double amplitude in X, Y and Z directions for two hours each 500 m/s² acceleration (50 G approx.) in X, Y and Z directions three times each Emitting element Red LED [Peak emission wavelength: 680 nm 0.027 mil (EX-19Ea: 624 nm 0.025 mil), modulated] Material Enclosure: Polyethylene terephthalate, Lens: Polyalylate Cable (Note 3) 0.1 mm² 3-core (thru-beam type emitter: 2-core) cabtyre cable, 2 m 6.562 ft long Cable extension Extension up to total 50 m 164 ft is possible with 0.3 mm², or more, cable (thru-beam type: emitter and receiver). Weight Net weight (each emitter and receiver): 20 g approx., Gross weight: 50 g approx.	onme	Voltage wit	thstandability	1,000 V AC for one min. between all supply terminals connected together and enclosure									
Vibration resistance 10 to 500 Hz frequency, 3 mm 0.118 in double amplitude in X, Y and Z directions for two hours each 500 m/s² acceleration (50 G approx.) in X, Y and Z directions three times each Emitting element Red LED [Peak emission wavelength: 680 nm 0.027 mil (EX-19Ea: 624 nm 0.025 mil), modulated] Material Enclosure: Polyethylene terephthalate, Lens: Polyalylate Cable (Note 3) 0.1 mm² 3-core (thru-beam type emitter: 2-core) cabtyre cable, 2 m 6.562 ft long Cable extension Extension up to total 50 m 164 ft is possible with 0.3 mm², or more, cable (thru-beam type: emitter and receiver). Weight Net weight (each emitter and receiver): 20 g approx., Gross weight: 50 g approx.	invir	Insulation resistance		20 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure									
Emitting element Red LED [Peak emission wavelength: 680 nm 0.027 mil (EX-19En: 624 nm 0.025 mil), modulated] Material Enclosure: Polyethylene terephthalate, Lens: Polyalylate Cable (Note 3) 0.1 mm² 3-core (thru-beam type emitter: 2-core) cabtyre cable, 2 m 6.562 ft long Cable extension Extension up to total 50 m 164 ft is possible with 0.3 mm², or more, cable (thru-beam type: emitter and receiver). Weight Net weight (each emitter and receiver): 20 g approx., Gross weight: 50 g approx.	Ш	Vibration re	esistance	10 to 500 Hz frequency, 3 mm 0.118 in double amplitude in X, Y and Z directions for two hours each									
Material Enclosure: Polyethylene terephthalate, Lens: Polyalylate O.1 mm² 3-core (thru-beam type emitter: 2-core) cabtyre cable, 2 m 6.562 ft long Cable extension Extension up to total 50 m 164 ft is possible with 0.3 mm², or more, cable (thru-beam type: emitter and receiver). Weight Net weight (each emitter and receiver): 20 g approx., Gross weight: 50 g approx.		Shock resis	stance	500 m/s² acceleration (50 G approx.) in X, Y and Z directions three times each									
Cable (Note 3) 0.1 mm² 3-core (thru-beam type emitter: 2-core) cabtyre cable, 2 m 6.562 ft long Cable extension Extension up to total 50 m 164 ft is possible with 0.3 mm², or more, cable (thru-beam type: emitter and receiver). Weight Net weight (each emitter and receiver): 20 g approx., Gross weight: 50 g approx.	Emit	ting elemen	t	Red LED [Peak emission wavelength: 680 nm 0.027 mil (EX-19E: 624 nm 0.025 mil), modulated]									
Cable extension Extension up to total 50 m 164 ft is possible with 0.3 mm², or more, cable (thru-beam type: emitter and receiver). Weight Net weight (each emitter and receiver): 20 g approx., Gross weight: 50 g approx.	Mate	erial		Enclosure: Polyethylene terephthalate, Lens: Polyalylate									
Weight Net weight (each emitter and receiver): 20 g approx., Gross weight: 50 g approx.	Cabl	le (Note 3)		0.1 mm² 3-core (thru-beam type emitter: 2-core) cabtyre cable, 2 m 6.562 ft long									
	Cabl	le extension		Extension up	to total 50 m 164 ft is	possible with 0.3 mn	n², or more, cable (thru	u-beam type: emitter	and receiver).				
Accessories Mounting screws: 1 set	Weig	ght			Net weight (eac	h emitter and receive	r): 20 g approx., Gross	weight: 50 g approx					
	Acce	essories				Mounting s	crews: 1 set						

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) The bending-resistant cable type (model Nos. having suffix "-R") has a 0.1 mm² 3-core (thru-beam type emitter: 2-core) bending-resistant cabtyre cable, 2 m 6.562 ft long.

SPECIFICATIONS

Туре			Thru-beam·narrow beam type					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.	Light-ON	EX-11SA(-PN)	EX-11SEA(-PN)	EX-13SA(-PN)	EX-13SEA(-PN)	EX-19SA(-PN)	EX-14A(-PN)	EX-15	EX-15E	EX-17	EX-17E	
Item\	(Note 2)	Dark-ON	EX-11SB(-PN)	EX-11SEB(-PN)	EX-13SB(-PN)	EX-13SEB(-PN)	EX-19SB(-PN)	EX-14B(-PN)	(Note 3)	(Note 3)	(Note 3)	(Note 3)	
CE m	narking direc	tive compliance		EN	AC Directive,	RoHS Direct	ive						
Sens	sing range		150 mm	150 mm 5.906 in 500 mm 19.685 in 1 m 3.281 ft to				2 to 25 mm 0.079 to 0.984 in (Note 4) (Conv. point: 10 mm 0.394 in)	150 mm 5.906 in 500 mm 19.685 in			19.685 in	
Min.	sensing ob	iect	ø0.5 mm ø0.002 in opaque object (Completely beam interrupted object) (Note 5) ø1 mm ø0.039 in opaque object (Completely beam interrupted object) (Note 5) ø2 mm ø0.079 in opaque object (Completely beam interrupted object) (Note 5)		Ø0.1 mm Ø0.004 in copper wire (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			interrupted object) istance emitter iver:				
Hyst	eresis							15 % or less of operation distance (Note 4)					
Repea	tability (perpend	icular to sensing axis)		0.05 r	nm 0.002 in (or less		0.1 mm 0.004 in or less		0.05 mm 0.0	02 in or less		
Supp	oly voltage					12 to 24 V	DC ±10 %	Ripple P-P 1	0 % or less				
Curre	ent consum	ption	Emi	tter: 10 mA o	r less, Receiv	ver: 10 mA or	less	13 mA or less	25 mA or less				
Outp	ut		NPN open • Maximum • Applied voltage	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) Residual voltage: 2 V or less (at 16 mA sourcent) 1 V or less (at 16 mA sourcent) Residual voltage: 2 V or less (at 16 mA sourcent) 1 V or less (at 16 mA sourcent) 						NPN open-collector transistor • Maximum sink current: 100 mA • Applied voltage: 30 V DC or less (between output and 0 V) • Residual voltage: 2 V or less (at 100 mA sink current) 1 V or less (at 16 mA sink current)			
	Utilization category		DC-12 or DC-13										
	Short-circu	it protection	Incorporated										
Resp	onse time		0.5 ms or less										
Oper	ration indica	itor	Orange LED (lights up when the output is ON) Orange LED (lights up when the output is ON), located on the bifurce							on the bifurcation			
Incid	ent beam ir	ndicator							Orange LED (lights up under light received condition), located on the receiver			eived	
Stab	ility indicato	or	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				
Pollution degree			3 (Industrial environment)										
o [Protection		IP67 (IEC)										
	Ambient te	mperature	-25 to +55 °C -13 to +131 °F (No dew condensation or icing allowed), Storage: -30 to +70 °C -22 to +158 °F										
resis	Ambient temperature Ambient humidity Ambient illuminance Voltage withstandability Insulation resistance		35 to 85 % RH, Storage: 35 to 85 % RH										
ntal	Ambient illuminance		Incandescent light: 3,000 ℓx or less at the light-receiving face										
nme	Voltage withstandability		1,000 V AC for one min. between all supply terminals connected together and enclosure										
nviro	Insulation	resistance		20 MΩ, or m	ore, with 250	nals connected together and enclosure							
ш	Vibration r	esistance	10 to 500 Hz frequency, 3 mm 0.118 in double amplitude in X, Y and Z directions for two hours each										
	Shock resi	stance	500 m/s² acceleration (50 G approx.) in X, Y and Z directions three times each										
Emit	ting elemen	t	Red LED (Peak emission wavelength: 650 nm 0.026 mil, modulated) Red LED (Peak emission wavelength: 680 nm 0.027 mil, modulated)								, modulated)		
Mate	erial		Enclosure: Polyethylene terephthalate Lens: Polyalylate						Enclosure: Polyethylene terephthalate Lens: Polyalylate, Bifurcation: Polyalylate				
	e (Note 6)			0.1 mm 2 3-core (thru-beam type emitter: 2-core) cabtyre cable, 2 m $6.562 \ \text{ft}$ 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)			
Cabl			Extension up to total 50 m 164 ft is possible with 0.3 mm², or more, cable (thru-beam type: emitter and receiver). Extension up to total 100 m 328 ft is possible with 0.3 mm², or more						m² ar mara aabla				
	e extension	l	Extension up to t	otal ou III 104 It is p	ossible with 0.3 mn	nis, or more, cable (i	nru-beam type: em	itter and receiver).	Extension up to to	Jiai 100 III 320 II 18	ossidie with U.3 mr	ir, or more, cable.	
			Net we		mitter and red	ceiver): 20 g a		Net weight: 20 g approx. Gross weight: 40 g approx.		55 g approx., (

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.
- 4) 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.
- 5) The min. sensing objects are specified in case the emitter / reciever sensing range is to set the maximum.

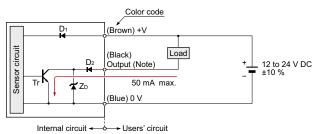
 6) The bending-resistant cable type (model Nos. having suffix "-R") has a 0.1 mm² 3-core (thru-beam type emitter: 2-core) bending-resistant cabtyre cable, 2 m 6.562 ft long.

I/O CIRCUIT AND WIRING DIAGRAMS

EX-110 EX-11S0 EX-130 EX-13S0 EX-190 EX-19S0 EX-14□

NPN output type

I/O circuit diagram

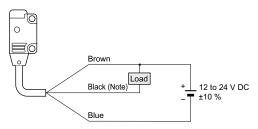


Note: The emitter of the thru-beam type sensor does not incorporate the output.

Symbols ... D1: Reverse supply polarity protection diode D2: Reverse output polarity protection diode

ZD: Surge absorption zener diode Tr : NPN output transistor

Wiring diagram

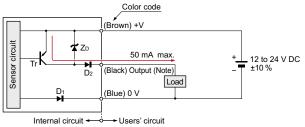


Note: The emitter of the thru-beam type sensor does not incorporate the black wire.

EX-11_□-PN EX-11_S_□-PN EX-13_S_□-PN EX-19_S_□-PN EX-19_S_□-PN EX-14_D-PN

PNP output type

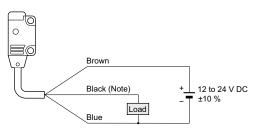
I/O circuit diagram



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

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

Wiring diagram

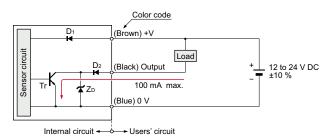


Note: The emitter of the thru-beam type sensor does not incorporate the black wire.

EX-150 EX-15E0 EX-170 EX-17E0

NPN output type

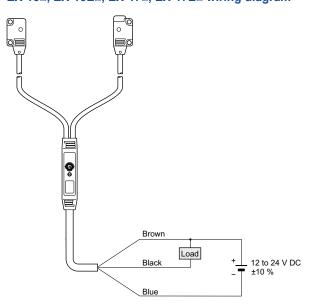
I/O circuit diagram



Symbols ..

- D1: Reverse supply polarity protection diode D2: Reverse output polarity protection diode
- ZD: Surge absorption zener diode
- Tr : NPN output transistor

EX-15, EX-15, EX-17, EX-17 wiring diagram



SENSING CHARACTERISTICS (TYPICAL)

EX-11₀ EX-11E₀ EX-15₀ *Optical properties of side sensing types (**EX-**□**E**□) **EX-15E** Due to the optical properties of side sensing types, note that sensing may be affected if multiple sensors are positioned in such a way that optical Parallel deviation **Angular deviation** axes intersect as shown in the diagram below. EX-11 EX-15□ Beam from Emitter 1 EX-11E 150 E5.906 Emitter 2 (mm in) 150 EX-11 may be caught by Receiver 2. EX-15□ 1 distance I EX-11En Setting distance EX-11 100 EX-11E Emitter √Receiver 2 EX-15E EX-15□ EX-15E Emitte Emitter Setting (**P** 50 50 There is no problem when --- l l i+sensors are installed in ■ -FY-11 FX-11F Receiver parallel Receiver 50 2 Receive **EX-15E** (although the distance 25 Ó 10 Emitter 2 Left Center Right between sensors should be Left ◄ Center → Right Operating angle θ (°) $\ell \times 2$ or more). Operating point ℓ (mm in) EX-13_□ EX-13_E EX-17_□ **EX-17E** Thru-beam type Parallel deviation **Angular deviation** Parallel deviation with slit Parallel deviation with slit masks (ø1.2 mm ø0.047 in) masks (ø1.5 mm ø0.059 in) 800 EX-13 / 17 or both sides .<u>=</u>300 E_{11,8}, FX-13-/17-300 E11.811 <u>=</u>600 600 E E EX-17) distance L 15.748 FX-13F) distance L 1 distance L Slit on one side Setting distance Local State of State o EX-17 EX-13En/17En distance 15.748 EX-13E Slit on Slit on one side EX-17E both sid , Emitter Emitter Emitte sensing range: 350 mm 1 Slit on both sides Emitte -| £ |-- [Setting 500 Settin Setting 3.937 Setting \Box × sensing range: 300 mm 200 . --| ℓ |--Receiver ₩. EX-13E - 1-1 Receiver EX-17E EX-17 Receiver EX-17E 0 ↓ 20 0+ 40 100 0 | 100 20 50 20 50 100 10 ò 50 50 10 - Center → Riaht - Right Operating angle θ (°) Left ◄ - Center Left ◄ Center → Right Operating point & (mm in) Operating point ℓ (mm in) Operating point (mm in) EX-19□ Thru-beam type Parallel deviation **Angular deviation** Parallel deviation with slit Parallel deviation with slit masks (ø1.2 mm ø0.047 in) masks (ø1.5 mm ø0.059 in) 800 Slit on one side Slit on one side <u>__1,000</u> Setting distance L (mm in) - (000') - (89'6) (2000') - (1000') (2000') 600 distance L (mm mm) Setting distance L (mm Slit on both sides distance distance distance Emitte mitte 500 500 Emitter ** -| li-. -|₹|-| Setting (Setting 200 7.874 -1 l i- 1 Slit on both sides ऻ = ₲. Receive Receiver Receiver 0 + 40 0 ↓ 200 0 ↓ 200 0 |--- 200 100 100 100 100 100 200 20 Ó 20 100 Center ► Right l eft -- Center ► Right Left ◄ - Center ► Right ► Right Operating angle θ (°) Operating point ℓ (mm in) Operating point & (mm in) Operating point & (mm in) EX-11\$\(\text{L}\) Thru-beam type EX-13S_□/EX-13SE_□ Thru-beam type **EX-19E**□ Thru-beam type EX-19S□ Thru-beam type Parallel deviation Parallel deviation Parallel deviation Parallel deviation EX-13S 1 000 150 mm. 600 L (mm E E E EX-11S EX-11SE EX-13SE Setting distance L distance Setting distance 100 400 EX-11S Emitter Emitter EX-11SE 500 Emitte Emitter 中. rh Emitte -18 i- L -| e İ--

200

Receive

50

25 0.984

- Right

ᡂ-

Receiver

EX-13S

25

EX-13SE

25 0.984

Ó

Center

Operating point & (mm in)

0 100 3.93

50

Left ◄

Ó

Center

Operating point & (mm in)

50

Right

Receiver

-- | l i-- |

25 0.984

Center

Operating point ℓ (mm

Left ◄

H-1

Receiver

0+ 50

Receive

Right

Center

Operating point & (mm in)

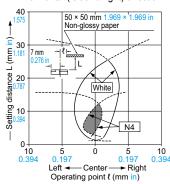
SENSING CHARACTERISTICS (TYPICAL)

EX-14

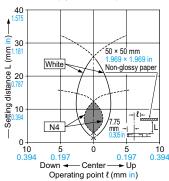
Convergent reflective type

Sensing fields

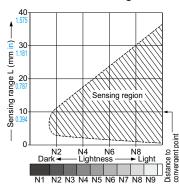
· Horizontal (left and right) direction



· Vertical (up and down) direction



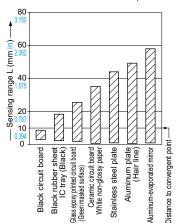
Correlation between lightness and sensing range



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

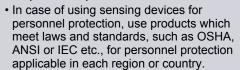


The bars in the graph indicate the sensing range (typical) for the respective material. However, there is a slight variation in the sensing range depending on the product. Further, if there is a reflective object (conveyor, etc.) in the background of the sensing object, since it affects the sensing,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

PRECAUTIONS FOR PROPER USE

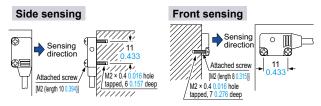


 Never use this product as a sensing device for personnel protection.



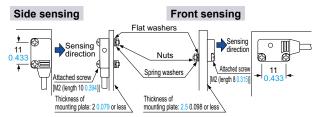
Mounting

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



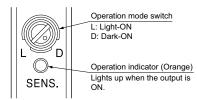
The tightening torque should be 0.2 N·m or less.

• In case of using attached screws and nuts (Unit: mm in)



The tightening torque should be 0.2 N·m or less.

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



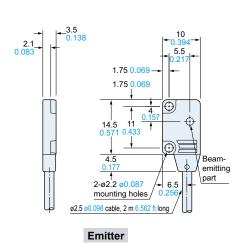
Switch position	Description						
L	Light-ON mode is set when the switch is turned fully clockwise (L side).						
LOD	Dark-ON mode is set when the switch is turned fully counterclockwise (D side).						

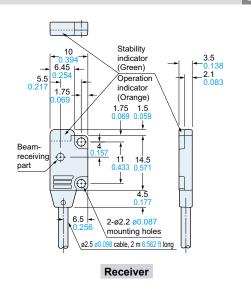
Others

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

The CAD data can be downloaded from our website.

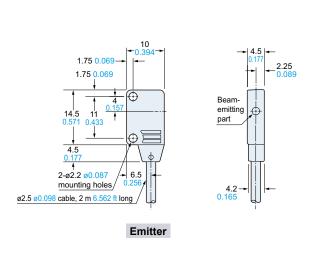
EX-110 EX-11S0 EX-130 EX-13S0 EX-190 EX-19S0

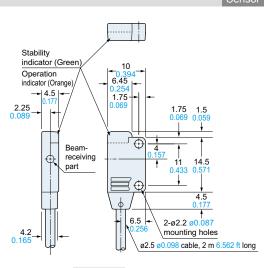




EX-11E0 EX-11SE0 EX-13E0 EX-13SE0 EX-19E0

Sensor

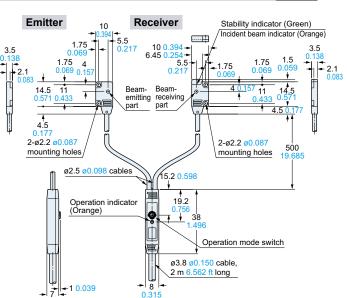


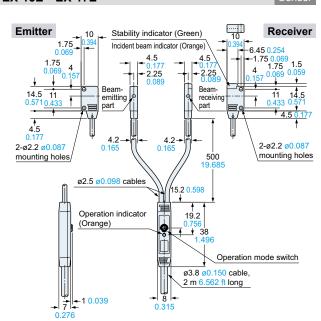


EX-15 EX-17

EX-15E EX-17E

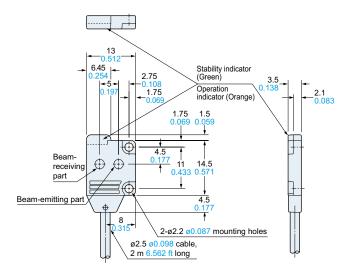
Receiver





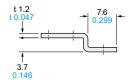
The CAD data can be downloaded from our website.

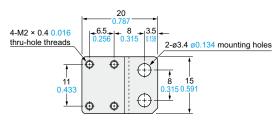
EX-14_□ Sensor



MS-EX10-1

Sensor mounting bracket (Optional)



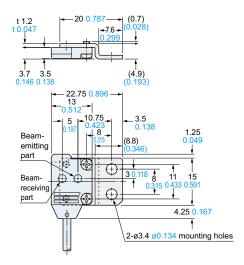


Material: Cold rolled carbon steel (SPCC) (Uni-chrome plated)

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

Assembly dimensions

Mounting drawing with **EX-14**□

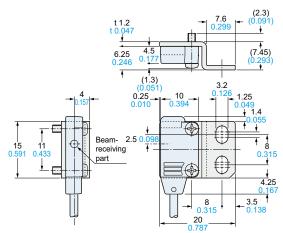


MS-EX10-2

Sensor mounting bracket (Optional)

Assembly dimensions

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



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

Two M2 (length 8 mm $0.315\ \text{in}$) pan head screws are attached.

thru-hole threads

The CAD data can be downloaded from our website.

MS-EX10-3

Sensor mounting bracket (Optional)

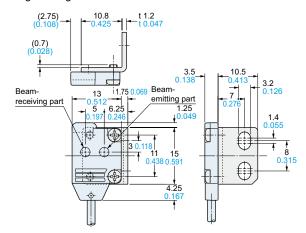
7 0.276 7 0.276 10.5 10.413 1.4 0.055 4-M2 × 0.4 0.016 thru-hole threads 10.8 0.425 0.256

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.

Assembly dimensions

Mounting drawing with EX-14□

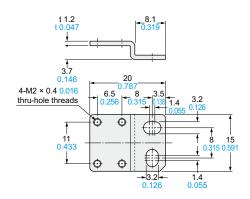


MS-EX10-11

Sensor mounting bracket (Optional)

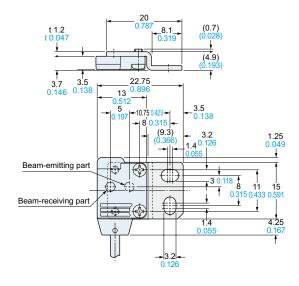
Assembly dimensions

Mounting drawing with EX-14□



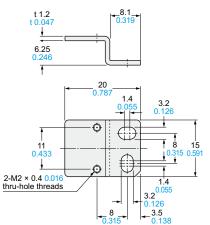
Material: Stainless steel (SUS304)

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



MS-EX10-12

Sensor mounting bracket (Optional)

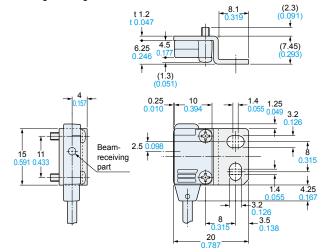


Material: Stainless steel (SUS304)

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

Assembly dimensions

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



The CAD data can be downloaded from our website.

MS-EX10-13

Sensor mounting bracket (Optional)

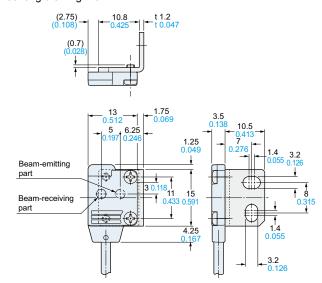
10.5 0.413 3.2 0.126 1.4 0.055 0.315 1.4 0.055 1.4 0.055 1.4 0.055 1.4 0.055 4-M2 × 0.4 0.016 thru-hole threads

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**□



Disclaimer

The applications described in the catalog are all intended for examples only. The purchase of our products described in the catalog shall not be regarded as granting of a license to use our products in the described applications. We do NOT warrant that we have obtained some intellectual properties, such as patent rights, with respect to such applications, or that the described applications may not infringe any intellectual property rights, such as patent rights, of a third party.



Panasonic Industry Co., Ltd.

Industrial Device Business Division 7-1-1, Morofuku, Daito-shi, Osaka 574-0044, Japan industrial.panasonic.com/ac/e/