LASER SENSORS

MICRO PHOTOELECTRIC

AREA SENSORS LIGHT CURTAINS / SAFFTY COMPONENTS PRESSURE / FLOW SENSORS INDUCTIVE PROXIMITY SENSORS

SIMPLE WIRE-SAVING UNITS

MEASUREMENT

STATIC ELECTRICITY DEVICES LASER MARKERS

HUMAN MACHINE

ENERGY CONSUMPTION

FA COMPONENTS

MACHINE VISION SYSTEMS

UV CURING SYSTEMS

INTERFACES

COMPONENTS

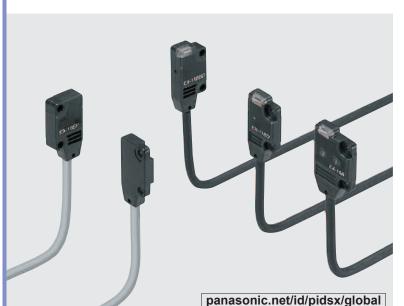
PLC

# Ultra-slim Photoelectric Sensor Amplifier Built-in

# **SERIES Ver.2**

FIBER SENSORS Related Information

- General terms and conditions...... F-7
- Glossary of terms / General precautions .....P.1455~ / P.1458~
- Sensor selection guide......P.271~
- Korea's S-mark...... P.1506











# 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 x H14.5 x 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.









Power Supply Built-in

CX-400 CY-100 EX-10 EX-20 EX-30 EX-40 CX-440 EQ-30 EQ-500 MQ-W RX-LS200 RX

# A wide variety of narrow-beam type! Light diffusion is approx. 1/2 of standard type. Less interference with no slit,

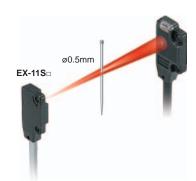
The pitch of installation is 1/2 of conventional models, so that the close-installation is possible. No cost is necessary to purchase or install

narrow-pitch can be set.



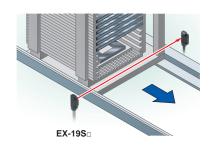
Possible to sense a minute object less than Ø0.5 mm Ø0.039 in with no slit.

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



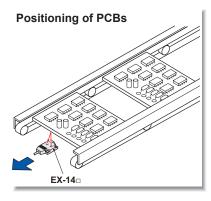
Long sensing range of 1 m 3.281 ft with narrow beam

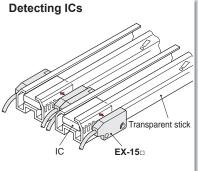
A long 1 m 3.281 ft sensing range is possible with narrow beam.

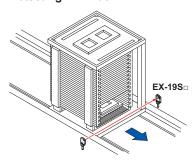


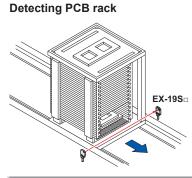
RT-610

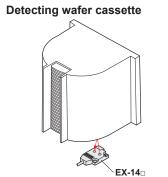
# **APPLICATIONS**

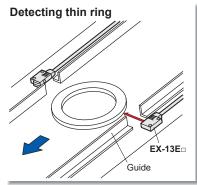


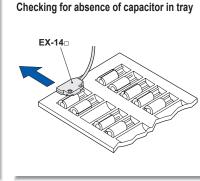












FIBER SENSORS

LASER SENSORS

MICRO PHOTOELECTRIC SENSORS

AREA SENSORS

LIGHT CURTAINS SAFETY COMPONENTS PRESSURE / FLOW SENSORS INDUCTIVE PROXIMITY SENSORS

PARTICULAR USE SENSORS

SENSOR OPTIONS

SIMPLE WIRE-SAVING UNITS

WIRE-SAVING SYSTEMS

MEASUREMENT SENSORS

STATIC ELECTRICITY PREVENTION DEVICES

LASER MARKERS

PLC

HUMAN MACHINE INTERFACES

ENERGY CONSUMPTION

FA COMPONENTS

MACHINE VISION SYSTEMS

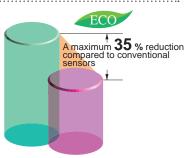
UV CURING SYSTEMS

# **BASIC PERFORMANCE**

# Electric power saving \*

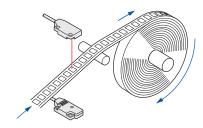
The **EX-10** series achieves reductions in power consumption of up to 65 %. These sensors contribute to environmental friendliness.

\* Effective from production in October 2010.



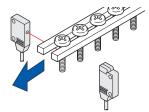
# High-speed response time: 0.5 ms

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



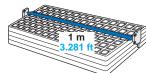
# Minimum sensing object: ø1 mm ø0.039 in EX-11(E)□, EX-15(E)□

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.

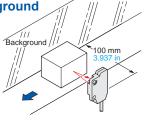


EX-14□

# **Background suppression**

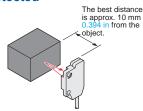
# Hardly affected by background

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.



Selection Guide
Amplifier Built-in
Power Supply Built-in
Amplifier- separated

CX-400 CY-100

EX-10 EX-20

EX-30

EX-40 CX-440

**EQ-30** 

EQ-500 MQ-W

**RX-LS200** 

RT-610

RX

# 315

FIBER SENSORS

LASER SENSORS

PHOTOELECTRIC SENSORS

MICRO PHOTOELECTRIC SENSORS

> AREA SENSORS

LIGHT CURTAINS/
SAFETY
COMPONENTS
PRESSURE /
FLOW
SENSORS
INDUCTIVE
PROXIMITY
SENSORS

PARTICULAR USE SENSORS

> SENSOR OPTIONS

SIMPLE WIRE-SAVING UNITS

WIRE-SAVING SYSTEMS

MEASUREMENT SENSORS

STATIC ELECTRICITY PREVENTION DEVICES

> LASER MARKERS

> > PLC

HUMAN MACHINE INTERFACES

ENERGY CONSUMPTION VISUALIZATION COMPONENTS

FA COMPONENTS

MACHINE VISION SYSTEMS

UV CURING SYSTEMS

Amplifier

CX-400

CY-100

EX-10

EX-20

EX-30

CX-440

**EQ-30** 

EQ-500

MQ-W

RX

RT-610

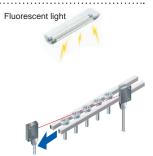
RX-LS200

# **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 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.

# Bending durability

EX-□-R

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

# **MOUNTING / SIZE**

# Mountable with M3 screws

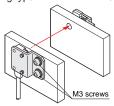
Non-corrosive stainless steel type sensor mounting bracket is also available.

• MS-EX10-1

[Cold rolled carbon steel (SPCC)]

# MS-EX10-11

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

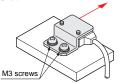


Note: Sensor mounting brackets can not be used for the narrow beam type (**EX**-□**S**□).

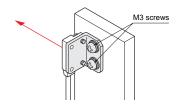
• MS-EX10-2 [Cold rolled carbon steel (SPCC)]

### 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.

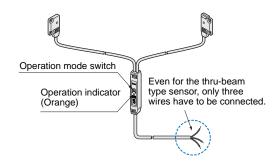


# **VARIETIES**

# Operation mode switch

EX-15<sub>0</sub>/17<sub>0</sub>

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.



# **OTHERS**

# 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.



\* Effective from production in October 2010.

# **ORDER GUIDE**

Type		rn 0	Annogranos	Sonoing rongs	Model N	Model No.(Note 2)		Output	SENSORS
	туре		Appearance	Sensing range	NPN output	PNP output	operation	Output	PHOTO- ELECTRIC SENSORS
				150 mm 5.906 in	EX-11A	EX-11A-PN	Light-ON		
				150 mm 5.906 m	EX-11B	EX-11B-PN	Dark-ON		MICRO PHOTO- ELECTRIC SENSORS
				500 mm	EX-13A	EX-13A-PN	Light-ON		AREA SENSORS
		ng	m fi	19.685 in	EX-13B	EX-13B-PN	Dark-ON		
		sensi		( 1 m	EX-19A	EX-19A-PN	Light-ON		LIGHT CURTAINS / SAFETY COMPONENTS
		Front sensing		)) 3.281 ft	EX-19B	EX-19B-PN	Dark-ON		PRESSURE / FLOW SENSORS
		n mode bifurcation	W W	150 mm 5.906 in	EX-15	EX-15 -PN	Switchable either		INDUCTIVE PROXIMITY SENSORS
	Thru-beam	F With operation mode switch on the bifurcation		500 mm 19.685 in	EX-17	EX-17-PN	Light-ON or Dark-ON		PARTICULAR USE SENSORS
be	-pru-b				EX-11EA	EX-11EA-PN	Light-ON	NPN open- collector	SENSOR OPTIONS
Standard Type	È			150 mm 5.906 in	EX-11EB	EX-11EB-PN	Dark-ON	transistor	
anda				500 mm	EX-13EA	EX-13EA-PN	Light-ON	or PNP open- collector transistor	SIMPLE WIRE-SAVING UNITS
Sţ		D		19.685 in	EX-13EB	EX-13EB-PN	Dark-ON		WIRE-SAVING SYSTEMS
		Side sensing		(/1 m	EX-19EA	EX-19EA-PN	Light-ON		MEASURE- MENT SENSORS
		de s		3.281 ft	EX-19EB	EX-19EB-PN	Dark-ON		SENSORS
		Si n mode oifurcation	LJ LJ	150 mm 5.906 in	EX-15E		Switchable either		STATIC ELECTRICITY PREVENTION DEVICES
		With operation mode switch on the bifurcation		500 mm 19.685 in	EX-17E		Light-ON or Dark-ON		LASER MARKERS ————————————————————————————————————
	t reflective eam type)			2 to 25 mm 0.079 to 0.984 in (Note 1)	EX-14A	EX-14A-PN	Light-ON		HUMAN MACHINE INTERFACES
	Convergent reflective (Diffused beam type)	Front sensing		(Convergent point: 10 mm 0.394 in)	EX-14B	EX-14B-PN	Dark-ON		ENERGY CONSUMPTION VISUALIZATION COMPONENTS
				150 mm 5 000 in	EX-11SA	EX-11SA-PN	Light-ON		FA COMPONENTS
		Front sensing		150 mm 5.906 in	EX-11SB	EX-11SB-PN	Dark-ON		MACHINE VISION SYSTEMS
				500 mm	EX-13SA	EX-13SA-PN	Light-ON		
type	_			19.685 in	EX-13SB	EX-13SB-PN	Dark-ON	NPN open- collector transistor	UV CURING SYSTEMS
Narrow beam type	Thru-beam	Ē		(1 m	EX-19SA	EX-19SA-PN	Light-ON		
ow b	-hru-			3.281 ft	EX-19SB	EX-19SB-PN	Dark-ON	or PNP open-	
Narr		D <sub>1</sub>		450 mm 5 000 in	EX-11SEA	EX-11SEA-PN	Light-ON	collector transistor	
		Side sensing		150 mm 5.906 in	EX-11SEB	EX-11SEB-PN	Dark-ON		Selection
		ide s		500 mm	EX-13SEA	EX-13SEA-PN	Light-ON		Amplifier Built-in
		ιΩ	U T	19.685 in	EX-13SEB	EX-13SEB-PN	Dark-ON		Built-in Power Supply Built-in
NC	TE.	Mountin	a bracket is not sur	nlied with the sensor Please selec	t from the rar	age of ontions	l concor mou	nting brackets	Amplifier-

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.

## Flexible cable type

Flexible cable type is also available for NPN output type. (excluding narrow beam type EX-DSD and sensor with operation mode switch on the bifurcation

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 narrow beam type EX- $\square$ S $\square$  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**".

FIBER SENSORS

LASER

separated

CX-400 CY-100

EX-10 EX-20

EX-30 EX-40

CX-440 EQ-30 EQ-500

MQ-W RX-LS200 RX

RT-610

FIBER SENSORS

# **OPTIONS**

LASER SENSORS

CURTAINS / SAFETY COMPONENTS

PARTICULAR

SENSOR OPTIONS SIMPLE WIRE-SAVING UNITS

WIRE-SAVING SYSTEMS

STATIC ELECTRICITY PREVENTION DEVICES

LASER MARKERS

COMPONENTS MACHINE VISION SYSTEMS CURING SYSTEMS

AREA SENSORS

PRESSURE SENSORS

SENSORS

MEASURE-MENT SENSORS

PLC

HUMAN MACHINE INTERFACES

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

Designation	Model No.	Description					
	MS-EX10-1	Mounting bracket for the front sensing type sensor [Cold rolled carbon steel (SPCC)] (The 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 • 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 • Sensing range: 800 mm 31.496 in [EX-19□] 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 on one side  • Sensing range: 250 mm 9.843 in [EX-13E $\square$ , EX-17E $\square$ ]  • Min. sensing object: ø2 mm ø0.079 in					
	(Slit size ø1.2 mm ø0.047 in)	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 (Note 2)	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) Refer to p.980 for details of the sensor checker CHX-SC2.

# Slit mask

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



• OS-EX10E-12

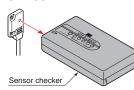


Tighten along with the sensor mounting bracket.

Example of mounting

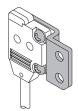
# Sensor checker

• CHX-SC2



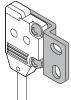
# Sensor mounting bracket

# • MS-EX10-1



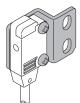
Material: Cold rolled carbon steel (SPCC) (Uni-chrome plated) Two M2 (length 4 mm 0.157 in) pan head screws are attached.

# • MS-EX10-11



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

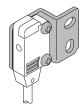
• MS-EX10-2



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

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

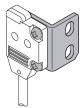
## • MS-EX10-12



Material: Stainless steel (SUS304) Two M2 (length 8 mm

0.315 in) pan head screws [stainless steel (SUS304)] are attached.

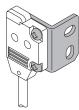
# • MS-EX10-3



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.



CY-100 EX-10 EX-20 FX-30 EX-40 CX-440 EQ-30 EQ-500 MQ-W

RX-LS200 RX RT-610

# **SPECIFICATIONS**

Type			Thru-beam-standard type									
	\\		Front sensing	Side sensing	Front sensing	Side sensing	Front sensing	Side sensing				
	Model No. Light-ON		EX-11A(-PN)	EX-11EA(-PN)	EX-13A(-PN)	EX-13EA(-PN)	EX-19A(-PN)	EX-19EA(-PN)				
Item	(Note 2)	Dark-ON	EX-11B(-PN)	EX-11EB(-PN)	EX-13B(-PN)	EX-13EB(-PN)	EX-19B(-PN)	EX-19EB(-PN)				
	sing range		150 mm	5.906 in	500 mm	19.685 in	1 m 3	.281 ft				
Min. sensing object				emitter ver:	ø2 mm ø0.079 i (Completely beam Setting di between e and recei 500 mm 1	stance emitter ver:	opaque / Complet					
Hyst	eresis											
Repea	tability (perpend	icular to sensing axis)			0.05 mm 0.0	02 in or less						
Supp	oly voltage			12	to 24 V DC ±10 %	Ripple P-P 10 % or le	ss					
Curr	ent consum	ption		Er	nitter: 10 mA or less,	Receiver: 10 mA or le	ss					
Output			<npn output="" type=""> NPN open-collector transistor <ul> <li>Maximum sink current: 50 mA</li> <li>Applied voltage: 30 V DC or less (between output and 0 V)</li> <li>Residual voltage: 2 V or less (at 50 mA sink current)</li> <li>1 V or less (at 16 mA sink current)</li> <li>1 V or less (at 16 mA source current)</li> </ul> *PNP output type&gt; <ul> <li>Maximum source current: 50 mA</li> <li>Applied voltage: 30 V DC or less (between output and +V)</li> <li>Residual voltage: 2 V or less (at 50 mA source current)</li> <li>1 V or less (at 16 mA source current)</li> </ul></npn>									
Utilization category			DC-12 or DC-13									
Short-circuit protection			Incorporated									
Res	oonse time		0.5 ms or less									
Operation indicator		itor	Orange LED (lights up when the output is ON)									
Incident beam indicator					<u> </u>							
Stability indicator		r	Green LED (lights up under stable light received condition or stable dark condition)									
Pollution degree		egree			3 (Industrial	environment)						
	Protection				IP67	(IEC)						
nce	Ambient te	mperature	-25 to +55	°C -13 to +131 °F (No	dew condensation or	r icing allowed), Stora	ge: -30 to +70 °C -2	2 to +158 °F				
sista	Ambient h	umidity	35 to 85 % RH, Storage: 35 to 85 % RH									
Environmental resistance	Ambient ill	uminance	Incandescent light: 3,000 tx at the light-receiving face									
nent	EMC			EN 60947-5-2								
ironr	Voltage wi	thstandability	1,000 V AC for one min. between all supply terminals connected together and enclosure									
Env	Insulation	resistance	20 M $\Omega$ , 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 (EX-19E□: 624 nm 0.025 mil), modulated)										
Material		Enclosure: Polyethylene terephthalate Lens: Polyalylate										
Cable (Note 5)			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.									
Accessories			Mounting screws: 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 flexible cable type (model Nos. having suffix "-R") has a 0.1 mm² 3-core (thru-beam type emitter: 2-core) flexible cabtyre cable, 2 m 6.562 ft long.

FIBER SENSORS

LASER SENSORS

AREA SENSORS

LIGHT CURTAINS / SAFETY COMPONENTS PRESSURE / FLOW SENSORS

INDUCTIVE PROXIMITY SENSORS PARTICULAR USE SENSORS

SENSOR OPTIONS

SIMPLE WIRE-SAVING UNITS

WIRE-SAVING SYSTEMS

MEASURE-MENT SENSORS

STATIC ELECTRICITY PREVENTION DEVICES

LASER MARKERS PLC

HUMAN MACHINE INTERFACES

ENERGY CONSUMPTION VISUALIZATION COMPONENTS

FA COMPONENTS

MACHINE VISION SYSTEMS

UV CURING SYSTEMS

Selection Guide

CX-400 CY-100

EX-10 EX-20

EX-30 EX-40

CX-440 EQ-30

EQ-500 MQ-W RX-LS200

RX RT-610 FIBER SENSORS

# **SPECIFICATIONS**

LASER SENSORS

PHOTO-ELECTRIC SENSORS

MICRO PHOTO-ELECTRIC SENSORS

AREA SENSORS

LIGHT
CURTAINS/
SAFETY
COMPONENTS

PRESSURE/
FLOW
SENSORS

INDUCTIVE
PROXIMITY
SENSORS

PARTICULAR
USE
SENSORS

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OPTIONS

SIMPLE
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SENSORS

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ELECTRICITY
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DEVICES

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HUMAN MACHINE INTERFACES ENERGY CONSUMPTION VISUALIZATION

COMPONENTS

FA
COMPONENTS

MACHINE
VISION
SYSTEMS

UV
CURING

Selection Guide Amplifier Built-in Power Supply Built-in Amplifierseparated

CX-400
CY-100
EX-10
EX-20
EX-30
EX-40
CX-440
EQ-30
EQ-500
MQ-W
RX-LS200

RX

RT-610

First sensing   Side sensing	_				Thru-beam · narrow beam type					Thru-beam · with operation mode switch on bifurcation			
Model No. Light-On Exiss,PNI Exist,PNI Exist,P		Type		Front sensing				(Diffused beam type)				Side sensing	
	//	Model No	Light-ON	· ·					•				
Sensing range  150 mm 5.506 in  500 mm 19.685 in  1 m 3.281 in 2081 in	\			, ,	. ,	( /	. ,	, ,	, ,	- 1			
Min. sensing object    Complete   Sension and Complete   Complete				150 mm	150 mm 5.906 in 500 mm 19.685 in 1 m 3.281 ft lu		to 0.984 in (Note 4)	150 mm	5.906 in	500 mm 19.685 in			
Regeatability (expendicular to sensing asis)  O.05 mm 0.002 in or less  O.05 mm 0.002 in or less	Min. sensing object		ø0.002 in opaque object (Completely beam interrupted object)	(Completely beam interrupted object) (Completely beam interrupted object) (Note 5)		in copper wire (Setting distance: \	(Completely beam interrupted object)   Setting distance   Setting dist		interrupted object) istance emitter ver:				
Supply voltage    Current consumption	Hyst	eresis											
Current consumption   Emitter: 10 mA or less, Receiver: 10 mA or less   13 mA or less   13 mA or less   25 m	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	002 in or less	
Compared to the process of the content of the con	Supp	oly voltage					12 to 24 V	DC ±10 %	Ripple P-P 1	0 % or less			
NPN open-collector transistor   - Maximum sink current: 10 mA   - Agrider voltage: 30 VID or less (between output and 01)   - Residual voltage: 20 VID or	Curr	ent consum	ption	Emi	tter: 10 mA or	less, Receiv	ver: 10 mA or	less	13 mA or less		25 mA	or less	
Short-circuit protection   Short-circuit protection   Short-circuit protection   Short-circuit protection   Of sample LED (lights up when the output is ON)   Orange LED (lights up when the output is ON)   Orange LED (lights up when the output is ON)   Orange LED (lights up when the output is ON)   Orange 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)   Orange LED (lights up under stable light received condition or stable dark condition), located on the receiver   Orange LED (lights up under stable light received condition or stable dark condition), located on the receiver   Orange LED (lights up under stable light received condition or stable dark condition), located on the receiver   Orange LED (lights up under stable light received condition or stable dark condition), located on the receiver   Orange LED (lights up under stable light received condition or stable dark condition), located on the receiver   Orange LED (lights up under stable light received condition or stable dark condition), located on the receiver   Orange LED (lights up under stable light received condition or stable dark condition), located on the receiver   Orange LED (lights up under stable light received condition or stable dark condition), located on the receiver   Orange LED (lights up under stable light received condition or stable dark condition), located on the receiver   Orange LED (lights up under stable light received condition or stable dark condition), located on the receiver   Orange LED (lights up under light received condition or stable dark condition), located on the receiver   Orange LED (lights up under light received condition or stable dark condition, located on the receiver   Orange LED (lights up under light received condition or stable dark condition, located on the receiver   Orange LED (lights up under light received condition or stable dark condition, located condition or stable da	Output			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)  Residual voltage: 2 V or less (at 50 mA sink current)					50 mA tween output and +V) 0 mA source current)	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)			
Response time   Quantities		Utilization category		DC-12 or DC-13									
Operation indicator  Orange 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  Green LED  (lights up under stable light received condition or stable dark condition) and the receiver condition or stable dark condition), located on the receiver  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 illuminance  ENC  EN 60947-5-2  EN 60947-5-2  Incandescent light: 3,000 & at the light-receiving face  ENC  EN 60947-5-2  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 to 500 Hz frequency, 3 mm 0.118 in amplitude in X, Y and Z directions for two hours each  Shock resistance  Emitting element  Red LED (Peak emission wavelength: 650 mm 0.026 mil, modulated)  Red LED (Feak emission wavelength: 680 mm 0.027 mil, modulated)  Red LED (Peak emission wavelength: 680 mm 0.027 mil, modulated)  Enclosure: Polyethylene terephthalate  Lens: Polyatylate, Bifurcation: Polyatylate  Cable (Note 6)  2. m 6.562 ft long (beyond bifurcation; from emitter / receiver to bifurcation of m 1.640 ft long)  Cable extension  Net weight (each emitter and receiver): 20 g approx.,  Gross weight: 50 g approx.  Net weight: 55 g approx., Gross weight: 80 g approx.		Short-circu	it protection					Incorp	orated				
Red LED (lights up under light received condition), located on the receiver	Resp	oonse time		0.5 ms or less									
Stability indicator   Creen LED (lights up under stable light received condition or stable dark condition)   Creen LED (lights up under stable light received condition or stable dark condition), located on the receiver	Ope	ration indica	ator	Orange LED (lights up when the output is ON)						Orange LED (lights up when the output is ON), located on the bifurcation			
Pollution degree   3 (Industrial environment)   IP67 (IEC)	Incid	lent beam ir	ndicator										d condition),
Protection    Protection   Pro	Stability indicator		or						condition)	condition or			
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		Pollution d	egree		3 (Industrial environment)								
EMC   EN 60947-5-2   EMC   State with the trial   Enclosure with 250 V DC megger 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   20 MΩ, or more, with 250 V DC megger 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   20 MΩ, or more, with 250 V DC megger 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   20 MΩ, or more, with 250 V DC megger 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   20 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure   20 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure   20 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure   20 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure   20 MΩ, or more, able   20 MΩ, or more, cable, vibration in X, Y and Z directions for two hours each   20 MΩ MR and Z directions for two hours each   20 MΩ MR and Z directions for two hours each   20 MΩ m 0.027 mil, modulated   20 MΩ m 0.026 mil, modulated   20 MΩ m 0.026 mil, modulated   20 MΩ m 0.02		Protection		IP67 (IEC)									
EMC   EN 60947-5-2   EMC   State with the trial   Enclosure with 250 V DC megger 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   20 MΩ, or more, with 250 V DC megger 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   20 MΩ, or more, with 250 V DC megger 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   20 MΩ, or more, with 250 V DC megger 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   20 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure   20 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure   20 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure   20 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure   20 MΩ, or more, able   20 MΩ, or more, cable, vibration in X, Y and Z directions for two hours each   20 MΩ MR and Z directions for two hours each   20 MΩ MR and Z directions for two hours each   20 MΩ m 0.027 mil, modulated   20 MΩ m 0.026 mil, modulated   20 MΩ m 0.026 mil, modulated   20 MΩ m 0.02	nce	Ambient te	emperature	-25 to +55 °C −13 to +131 °F (No dew condensation or icing allowed), Storage: -30 to +70 °C −22 to +158 °F									
EMC   EN 60947-5-2   EMC   State with the trial   Enclosure with 250 V DC megger 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   20 MΩ, or more, with 250 V DC megger 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   20 MΩ, or more, with 250 V DC megger 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   20 MΩ, or more, with 250 V DC megger 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   20 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure   20 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure   20 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure   20 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure   20 MΩ, or more, able   20 MΩ, or more, cable, vibration in X, Y and Z directions for two hours each   20 MΩ MR and Z directions for two hours each   20 MΩ MR and Z directions for two hours each   20 MΩ m 0.027 mil, modulated   20 MΩ m 0.026 mil, modulated   20 MΩ m 0.026 mil, modulated   20 MΩ m 0.02	sista	Ambient h	umidity	35 to 85 % RH, Storage: 35 to 85 % RH									
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: 650 nm 0.026 mil, modulated)  Red LED (Peak emission wavelength: 680 nm 0.027 mil, modulated)  Enclosure: Polyethylene terephthalate	tal re	Ambient ill	uminance	Incandescent light: 3,000 tx at the light-receiving face									
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: 650 nm 0.026 mil, modulated)  Red LED (Peak emission wavelength: 680 nm 0.027 mil, modulated)  Enclosure: Polyethylene terephthalate	men	EMC		EN 60947-5-2									
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: 650 nm 0.026 mil, modulated)  Red LED (Peak emission wavelength: 680 nm 0.027 mil, modulated)  Enclosure: Polyethylene terephthalate	viror	Voltage wi	thstandability	1,000 V AC for one min. between all supply terminals connected together and enclosure									
Shock resistance  500 m/s² acceleration (50 G approx.) in X, Y and Z directions for three times each  Red LED (Peak emission wavelength: 650 nm 0.026 mil, modulated)  Red LED (Peak emission wavelength: 680 nm 0.027 mil, modulated)  Red LED (Peak emission wavelength: 680 nm 0.027 mil, modulated)  Enclosure: Polyethylene terephthalate	E	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: 650 nm 0.026 mil, modulated)  Red LED (Peak emission wavelength: 680 nm 0.027 mil, modulated)  Enclosure: Polyethylene terephthalate		Vibration r	esistance	10 to 500 Hz frequency, 3 mm 0.118 in amplitude in X, Y and Z directions for two hours each									
Enclosure: Polyethylene terephthalate Lens: Polyalylate  Cable (Note 6)  Cable extension  Extension up to total 50 m 164 ft is possible with 0.3 mm², or more, cable.  Net weight  Net weight  Enclosure: Polyethylene terephthalate Lens: Polyalylate, Bifurcation: Polyalylate  0.2 mm² 3-core cablyre cable, 2 m 6.562 ft long (beyond bifurcation; from emitter / receiver to bifurcation; 0.5 m 1.640 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).  Extension up to total 100 m 328 ft is possible with 0.3 mm², or more, cable.  Net weight (each emitter and receiver): 20 g approx., Gross weight: 50 g approx., Gross weight: 50 g approx.,  Net weight: 55 g approx., Gross weight: 80 g approx.	Shock resistance		500 m/s² acceleration (50 G approx.) in X, Y and Z directions for three times each										
Lens: Polyalylate  Lens: Polyalylate  Lens: Polyalylate, Éifurcation: Polyalylate  Cable (Note 6)  0.1 mm² 3-core (thru-beam type emitter: 2-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 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., Gross weight: 50 g approx.  Net weight 40 gaprox.  Net weight: 55 g approx., Gross weight: 80 g approx.	Emitting element		Red LED (Peak emission wavelength: 650 nm 0.026 mil, modulated)  Red LED (Peak emission wavelength: 680 nm 0.027 mil, modulated)								modulated)		
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.  Net weight 40 g approx.  Net weight: 55 g approx., Gross weight: 80 g approx.	Material												
Weight Net weight (each emitter and receiver): 20 g approx., Gross weight: 50 g approx.  Net weight 20 g approx.  Net weight 20 g approx.  Net weight: 55 g approx., Gross weight: 80 g approx.	Cable (Note 6)							cable,					
Gross weight: 50 g approx.	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). Extension up to total 100 m 328 ft is possible with 0.3 mm², or more, cable						m², or more, cable.				
Accessories Mounting screws: 1 set Mounting screws: 1 set, Adjusting screwdriver: 1 pc.	Weig	ght								80 g approx.			
	Acce	essories			Mour	nting screws:	1 set		Mounting screws: 1 set	Mounting sci	rews: 1 set, A	djusting screv	vdriver: 1 pc.

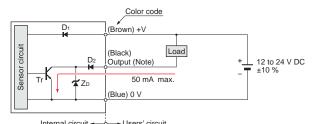
- 2) Model Nos. having the suffix "-PN" are PNP output type.
- 3) Either Light-ON or Dark-ON can be selected by the operation mode switch.
- 4) The sensing range and the hysteresis of convergent reflective type sensor are specified for white non-glossy paper  $(50 \times 50 \text{ mm } 1.969 \times 1.969 \text{ in})$  as the object.
- 5) The min. sensing objects are specified in case the emitter / reciever sensing range is to set the maximum.
- 6) The 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.

# I/O CIRCUIT AND WIRING DIAGRAMS

### EX-11<sub>0</sub> EX-11S<sub>0</sub> EX-13<sub>0</sub> EX-13S<sub>0</sub> EX-19<sub>0</sub> EX-19S<sub>0</sub> EX-14□

NPN output type

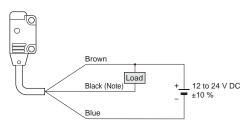
# I/O circuit diagram



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.

FIBER SENSORS

LASER SENSORS

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MEASURE-MENT SENSORS

STATIC ELECTRICITY PREVENTION DEVICES

LASER MARKERS

PLC

MACHINE INTERFACES

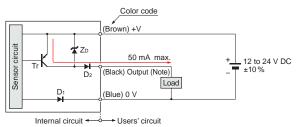
ENERGY CONSUMPTION VISUALIZATION COMPONENTS

FA COMPONENTS MACHINE VISION SYSTEMS

UV CURING SYSTEMS

# EX-11<sub>0</sub>-PN EX-11<sub>0</sub>-PN EX-13<sub>0</sub>-PN EX-13<sub>0</sub>-PN EX-19<sub>0</sub>-PN EX-19<sub>0</sub>-PN EX-14<sub>0</sub>-PN

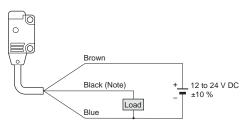
# I/O circuit diagram



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

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

# Wiring diagram



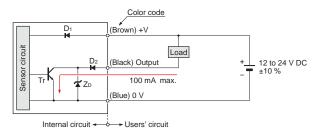
Note: The emitter of the thru-beam type sensor does not incorporate the black wire.

# EX-15<sub>0</sub> EX-15E<sub>0</sub> EX-17<sub>0</sub> EX-17E<sub>0</sub>

NPN output type

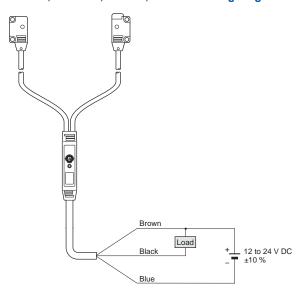
PNP output type

# 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



Selection Guide CX-400

CY-100 EX-10

EX-20 EX-30 EX-40 CX-440 EQ-30 EQ-500 MQ-W RX-LS200

RT-610

RX

Ramco Innovations

### **SENSING CHARACTERISTICS (TYPICAL)** FIBER SENSORS LASER SENSORS \*Optical properties of side sensing types (EX-□E□) EX-11<sub>0</sub> EX-11E<sub>0</sub> EX-15<sub>0</sub> EX-15E<sub>0</sub> Thru-beam type 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. 200 200 Beam from Emitter 1 Emitter 2 <u>=</u>150 150 EX-15 AREA SENSORS EX-11 E may be caught by Receiver 2. FX-11F EX-15 distance I 3.937 දු 100 EX-11E EX-15 SAFETY COMPONENTS EX-15E EX-15E Emitte PRESSURE / FLOW SENSORS Emitter Emitte Setting ( 50 ¥Ę. 50 There is no problem when sensors are installed in 曲. FX-11 Receive Receiver EX-15E EX-15 parallel 0 <del>|</del> 20 Receiver 0 H (although the distance 50 50 100 10 Ó 10 Receiver 2 PARTICULAR Center between sensors should be Right ► Right SENSORS Operating angle x 2 or more). Operating point (mm in) SENSOR OPTIONS **EX-17E**<sub>□</sub> SIMPLE WIRE-SAVING UNITS 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) WIRE-SAVING SYSTEMS EX-13 /17 MEASURE-MENT SENSORS or both sides E 300 EX-13 /17 STATIC ELECTRICITY PREVENTION DEVICES €300 <u>=</u>600 EX-13 600 EX-13E /17E Slit on one sid EX-17 EX-13 EX-13E EX-17 <u>ම</u> 200 EX-13E /17E <u>8</u>200 8 400 4 400 8 400 LASER MARKERS Emitte Slit on one side, sensing range: 350 mm 1 Slit on both sides, sensing range: 300 mm 1 EX-17E Emitter Émitter Emitte Setting 200 £100 PLC <u>\_</u>200 . ф **★** ф -HUMAN Receive EX-17 Receiver EX-17 EX-17E 0 <del>|</del> 100 MACHINE INTERFACES 0 <del>|</del> 40 1.57 0+ 100 50 Ó 50 10 ò 10 20 Ó 20 50 50 100 ENERGY CONSUMPTION VISUALIZATION COMPONENTS Center ► Right Left ← Center → Rig Operating point (mm in) ► Right Center ► Right -Center → Right Left <del>◄</del> Operating angle Operating point (mm in) Operating point (mm in) COMPONENTS Thru-beam type EX-19□ VISION SYSTEMS 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) CURING SYSTEMS Slit on one side Slit on one side 600 mm) Setting distance L (mm Slit on both sides <u>ප</u>ු400 distance Setting distance Selection Guide 500 mitte 500 500 Emitte 由. Ф ф. ф. |--Slit on both sides Power Supply Built-in **—** ₩-Receiver Receiver 200 7.874 200 0 <del>↓</del> 200 100 Ó 100 100 100 200 100 100 200 0 Center - Right - Center ► Right Center ► Right Right Operating angle Operating point (mm in) CX-400 Operating point (mm in) Operating point (mm in) CY-100 **EX-19E**□ Thru-beam type EX-11S<sub>□</sub>/EX-11SE<sub>□</sub> Thru-beam type EX-13S<sub>□</sub>/EX-13SE<sub>□</sub> Thru-beam type EX-19S□ Thru-beam type EX-10 Parallel deviation Parallel deviation Parallel deviation Parallel deviation EX-20 200 EX-30 EX-40 <u>=</u>1,000 1,000 (mm mm) mm) mm) EX-11S EX-11SE EX-13S EX-13SE□ CX-440 Setting distance L EQ-30 distance Setting distance 100 400 EX-13SE distar EX-11S EX-13S FQ-500 EX-11SE Emitter Emitte Emitter Emitter 1<u>|</u> rh Emitte MQ-W 中. 200 --| e |-- L -| l i- [ -| ℓ İ-- | RX-I S200 **a** Receiv ₩-Receive ₲-Receiver Receiver RX Receiver Receiver 0 ↓ 200 100 0 <del>|</del> 200 100 100 50 50 50 100 100 RT-610 Center ► Right -Right Left ◄ Center ► Right Center Center ► Right Operating point & (mm i Operating point & (mm in) Operating point & (mm in) Operating point ℓ (mm i

Got Questions? 1-800-280-6933 - nsales@ramcoi.com

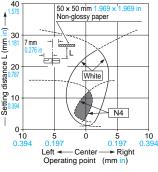
www.PanasonicSensors.com

# SENSING CHARACTERISTICS (TYPICAL)

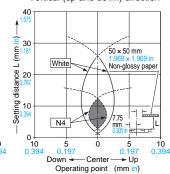
EX-14□ Convergent reflective type

# Sensing fields

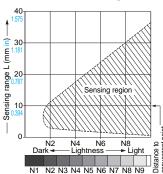
· Horizontal (left and right) direction



· Vertical (up and down) direction



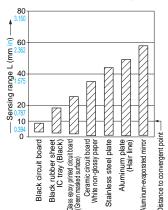
## Correlation between lightness and sensing range



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 x 50 mm 1.969 x 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.

AREA SENSORS

LIGHT CURTAINS / SAFETY COMPONENTS PRESSURE / FLOW SENSORS

PARTICULAR USE SENSORS

SENSOR OPTIONS

SIMPLE WIRE-SAVING UNITS

WIRE-SAVING SYSTEMS

MEASURE MENT SENSORS STATIC ELECTRI

PREVENT DEVICES LASER MARKERS

PLC

HUMAN MACHINE INTERFACES

ENERGY CONSUMPTION VISUALIZATION COMPONENTS

COMPONENTS

MACHINE VISION SYSTEMS

CURING SYSTEMS

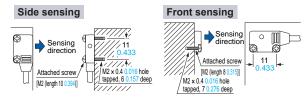
# PRECAUTIONS FOR PROPER USE

Refer to p.1458~ for general precautions.



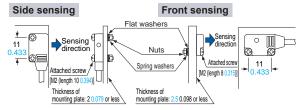
- · Never use this product as a sensing device for personnel protection.
- · In case of using sensing devices for personnel protection, use products which meet laws and standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.

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



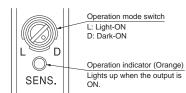
The tightening torque should be 0.2 N·m or less.

· 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-150, EX-15E0, EX-170 and EX-17E0 only)



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

Power Supply

CX-400 CY-100

EX-10

EX-20

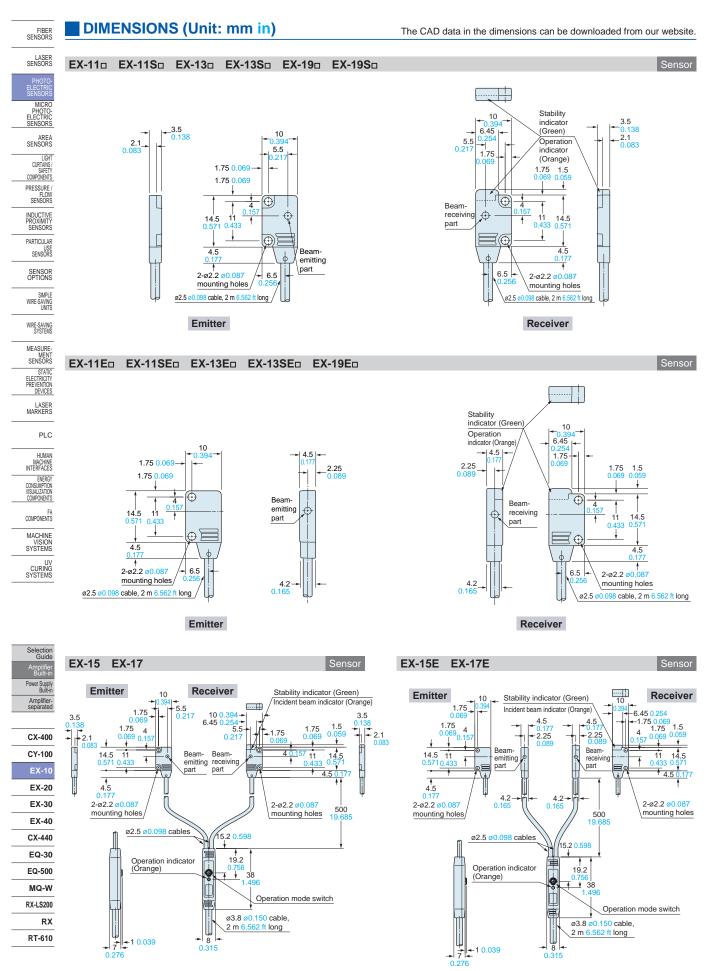
EX-30

EX-40 CX-440

EQ-30

EQ-500 MQ-W RX-LS200

RX RT-610



# DIMENSIONS (Unit: mm in)

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

FIBER SENSORS

LASER SENSORS

AREA SENSORS

LIGHT CURTAINS / SAFETY COMPONENTS PRESSURE / FLOW SENSORS

PARTICULAR USE SENSORS

SENSOR OPTIONS

SIMPLE WIRE-SAVING UNITS

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MEASURE-MENT SENSORS

LASER MARKERS

PLC

FA COMPONENTS

MACHINE VISION SYSTEMS

UV CURING SYSTEMS

Stability indicator (Green) 6.45 2.75 Operation indicator (Orange) 1 Beamreceiving part Beam-emitting part 8 2-ø2.2 ø0.087 mounting holes ø2.5 ø0.098 cable, 2 m 6.562 ft long

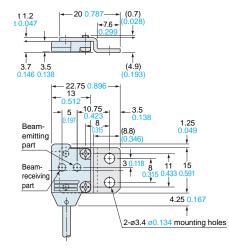
# MS-EX10-1

EX-14□

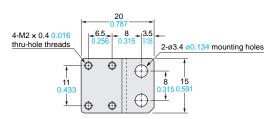
# Sensor mounting bracket (Optional)

# **Assembly dimensions**

Mounting drawing with EX-14



# 3.7 0.146



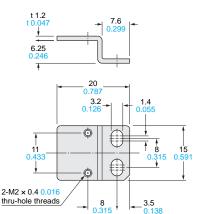
Material: Cold rolled carbon steel (SPCC)

(Uni-chrome plated)

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

# MS-EX10-2

# Sensor mounting bracket (Optional)

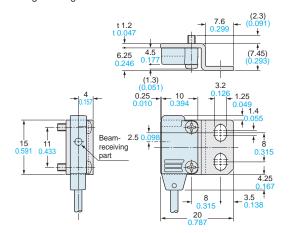


Material: Cold rolled carbon steel (SPCC) (Uni-chrome plated)

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

# **Assembly dimensions**

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



Amplifier separate

CX-400 CY-100 EX-10 EX-20 EX-30 EX-40 CX-440 EQ-30 EQ-500

MQ-W RX-LS200 RX RT-610

FIBER SENSORS

# DIMENSIONS (Unit: mm in)

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Sensor mounting bracket (Optional)

LASER SENSORS

PHOTO-ELECTRIC SENSORS MICRO PHOTO-ELECTRIC SENSORS

> AREA SENSORS LIGHT CURTAINS / SAFETY COMPONENTS PRESSURE / FLOW SENSORS

INDUCTIVE PROXIMITY SENSORS PARTICULAR USE SENSORS

SENSOR OPTIONS SIMPLE WIRE-SAVING UNITS

> WIRE-SAVING SYSTEMS

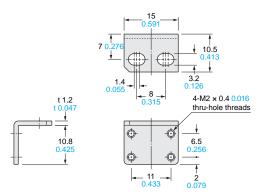
MEASURE-MENT SENSORS STATIC ELECTRICITY PREVENTION DEVICES

> PLC HUMAN MACHINE INTERFACES

> LASER MARKERS

ENERGY CONSUMPTION VISUALIZATION COMPONENTS FA COMPONENTS

MACHINE VISION SYSTEMS UV CURING SYSTEMS MS-EX10-3



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

3.7 0.146

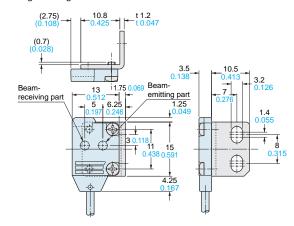
 $4-M2 \times 0.4 0.016$ 

thru-hole threads

Two M2 (length 4 mm  $0.157\,\mathrm{in}$ ) pan head screws and two M2 (length 8 mm  $0.315\,\mathrm{in}$ ) pan head screws are attached.

# Assembly dimensions

Mounting drawing with EX-14

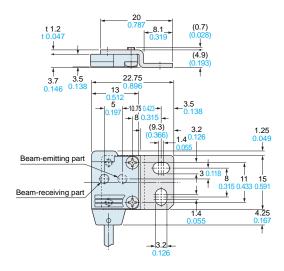


MS-EX10-11

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.

3 2

6.5

Φ

0

15

Amplifier Built-in Power Supply Built-in

CX-400 CY-100 EX-10

EX-20

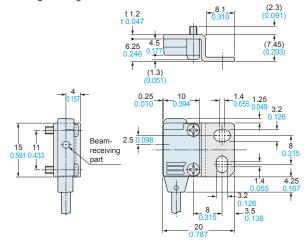
EX-40 CX-440 EQ-30

EQ-500 MQ-W RX-LS200

RX RT-610 MS-EX10-12



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



0.246 0.787 0.055 0.126 0.126

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

Sensor mounting bracket (Optional)

# DIMENSIONS (Unit: mm in)

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

Sensor mounting bracket (Optional)

FIBER SENSORS

LASER SENSORS

PHOTO-ELECTRIC SENSORS MICRO

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WIRE-SAVING SYSTEMS MEASURE-

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LASER MARKERS

PLC

HUMAN MACHINE INTERFACES ENERGY CONSUMPTION VISUALIZATION COMPONENTS

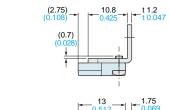
FA COMPONENTS

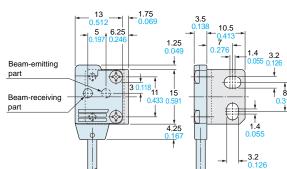
MACHINE VISION SYSTEMS

UV CURING SYSTEMS

# Assembly dimensions

Mounting drawing with EX-14





0.413 3.2 0.126 1.4 0.055 0.315 1.4 0.055 0.315 1.4 0.055 0.315 1.4 0.055 0.315 1.4 0.055 0.315 1.4 0.056 0.315 1.5 0.591 4-M2 × 0.4 0.016 thru-hole threads

Material: Stainless steel (SUS304)

MS-EX10-13

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.

Selection Guide Amplifier Built-in Power Supply Built-in Amplifierseparated

CX-400 CY-100

EX-10

EX-30 EX-40

CX-440 EQ-30

EQ-500 MQ-W

RX-LS200

RT-610