Ultra-compact Photoelectric Sensor Amplifier Built-in SERIES Ver.2

General terms and conditions...... F-3



SENSOR SIMPLE WIRE-SAVING UNITS WIRE-SAVING SYSTEMS

MEASUREMENT SENSORS

STATIC CONTROL DEVICES LASER MARKERS

PLC

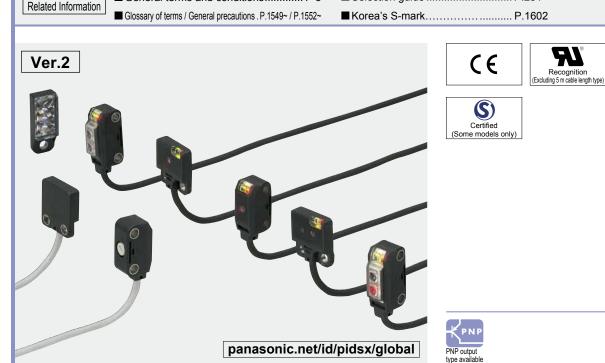
ENERGY MANAGEMENT

HUMAN MACHINE INTERFACES

FA COMPONENTS

MACHINE VISION SYSTEMS

UV CURING SYSTEMS



Miniature-sized and still mountable with M3 screws

Miniaturization by using single chip optical IC

The beam-receiving photodiode and the A/D conversion circuit have been fabricated on a single chip optical IC (full custom). Hence, in spite of its miniature size, it has a performance and reliability which is equal to or better than the conventional product.



Incorporates a sensitivity adjuster even in this size

The sensor incorporates a sensitivity adjuster in spite of its miniature size. It is convenient when you need fine adjustment. Further, the receiver of the thru-beam, side sensing type sensor incorporates an operation mode switch which can change the output operation.

Selection guide P.231~



BASIC PERFORMANCE



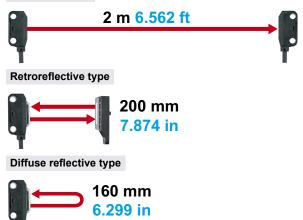
EX-Z
CX-400
CY-100
EX-10
EX-20
EX-30
EX-40
CX-440
EQ-30
EQ-500
MQ-W
RX-LS200
RX
RT-610

Long sensing range

The EX-20 series achieves long distance sensing [thru-beam type: 2 m 6.562 ft, retroreflective type: 200 mm 7.874 in (when using the attached reflector), diffuse reflective type: 160 mm 6.299 in], despite its miniature size.

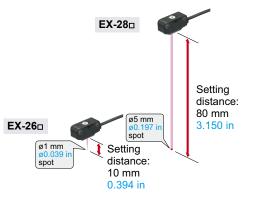
Hence, it is usable even on a wide conveyor.

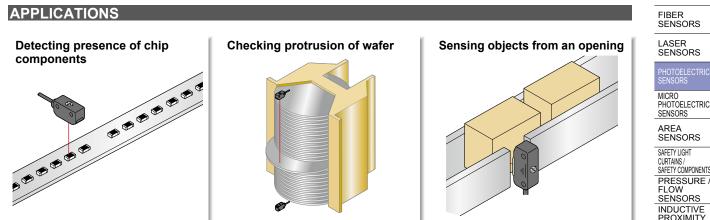
Thru-beam type



Clear beam spot using red LED dot light source

The emission area of a dot light source is smaller than that of a conventional LED flat light source, and it is possible to design a high power, narrow beam. Since a red LED dot light source is used, the red beam spot is clear even at a far place, so that alignment and confirmation of sensing position is easy. Further, since the thru-beam type, too, incorporates a visible narrow beam, it can also reliably detect small parts, such as, chip components, lead frames, etc.

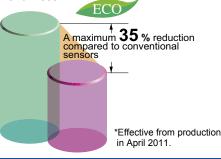




BASIC PERFORMANCE

Electric power saving*

The EX-20 series achieves reductions in power consumption of up to 65 %. These sensors contribute to environmental friendliness.



ENVIRONMENTAL RESISTANCE

Waterproof IP67 (IEC)

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.

Incorporated an inverter countermeasure circuit*

The EX-20 series become significantly stronger against inverter light and other extraneous light.

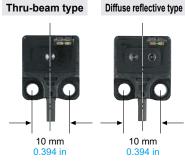
*Effective from production in April 2011.

MOUNTING

Identical size

Front sensing type of

thru-beam type and diffuse reflective type sensors have identical appearance. Moreover, since the mounting holes are symmetrical with respect to the beam axis center, the design becomes easy.



Mounting section reinforced

It can be tightened with M3 screws. Moreover, metal inserts have been provided in the mounting holes so that the product is not damaged even in case of excess tightening.

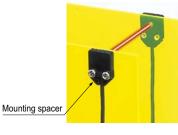
Side sensing type

Front sensing type



Mounting spacer for front sensing type is available

Mounting of the front sensing type is possible from the rear side by using the mounting spacer.



Slit mask is available

ø0.5 mm ø0.020 in round slit mask and 0.5 × 3 mm 0.020×0.118 in rectangular slit mask are available for both side sensing type and front sensing type sensors.

CURTAINS / SAFETY COMPONENTS PRESSURE / SENSORS INDUCTIVE PROXIMITY SENSORS

PARTICULAR USE SENSORS

SENSOR OPTIONS

SIMPLE WIRE-SAVING UNITS WIRE-SAVING

SYSTEMS

MEASUREMENT SENSORS STATIC CONTROL

DEVICES LASER MARKERS

PLC

HUMAN MACHINE INTERFACES ENERGY

MANAGEMENT SOLUTIONS FA COMPONENTS

MACHINE VISION SYSTEMS **UV CURING** SYSTEMS

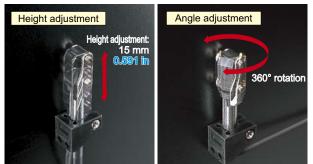
Selection Guide Amplille Built-in Power Supply Built-in Amplifier separated

EX-Z
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

OPTIONS

Universal sensor mounting bracket is available

Universal sensor mounting bracket MS-EXL2-4 (for EX-22/23/26/28/29) and MS-EX20-5 (for EX-23 only) which can freely adjust the height and the angle of the sensor is available.



EQ-30

EQ-500

MQ-W

RX-LS200

RT-610

RX

FUNCTIONS

Bright 2-color indicator

A bright 2-color indicator has been incorporated in all types. (Orange LED: Operation indicator, Green LED: Stability indicator)

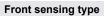
VARIETIES

Two types for suitable mounting

Two types, side sensing type and front sensing type sensors are available. Select depending on the place of mounting.

Side sensing type







(With sensitivity adjuster)

(Without sensitivity adjuster)

ORDER GUIDE

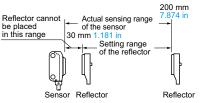
SENSOR OPTIONS SIMPLE WRE-SAVING		Туре		Appearance	Appearance Sensing range		Output	Output operation	
UNITS			Ē			EX-21A	NPN open-collector transistor		
/IRE-SAVING SYSTEMS	ensir		sensing		1 m	EX-21A-PN	PNP open-collector transistor	- Light-ON	
EASURE-	8			μî μ	3.281 ft	EX-21B	NPN open-collector transistor		
MENT SENSORS STATIC		- רובים	Ĕ	6 6		EX-21B-PN	PNP open-collector transistor	– Dark-ON	
EVICES	с Ч Н		sensing		2 m	EX-23	NPN open-collector transistor	Switchable either	
LASER RKERS			Side se		6.562 ft	EX-23-PN	PNP open-collector transistor	 Light-ON or Dark-ON 	
HUMAN	(ע	Ð			EX-29A	NPN open-collector transistor		
ACHINE	1004		sensing		30 to 200 mm	EX-29A-PN	PNP open-collector transistor	Light-ON	
ENERGY		עפווסופוופרוואפ	Side se	L L	1.181 to 7.874 in (Note 1)	EX-29B	NPN open-collector transistor	D. I. O.I.	
DLUTIONS	ć		N	ů l		EX-29B-PN	PNP open-collector transistor	- Dark-ON	
PONENTS	, it	יוגם	g	67	5 to 160 mm 0.197 to 6.299 in (Note 2)	EX-22A	NPN open-collector transistor		
CHINE /ISION STEMS	100		sensing	▲		EX-22A-PN	PNP open-collector transistor	– Light-ON	
UV	0	א	Side s			EX-22B	NPN open-collector transistor	Dark ON	
URING STEMS	14 12		Si	Ŭ		EX-22B-PN	PNP open-collector transistor	- Dark-ON	
		type	бĽ			EX-24A	NPN open-collector transistor		
	é	Diffused beam type	sensing		2 to 25 mm 0.079 to 0.984 in (Convergent point: 10 mm 0.394 in)	EX-24A-PN	PNP open-collector transistor	Light-ON	
ection	lecti∨	sed t	Front s	ļļ		EX-24B	NPN open-collector transistor	– Dark-ON	
Guide nplifier Built-in	nt ref	Diffu	Ŀ	لما	()	EX-24B-PN	PNP open-collector transistor	Dark-ON	
Built-in er Supply Built-in	rger	type	p	(C)		EX-26A	NPN open-collector transistor	Light ON	
nplifier-	Convergent reflective	Small spot beam type	sensing	The second	6 to 14 mm	EX-26A-PN	PNP open-collector transistor	– Light-ON	
arated	0	l spot	Side s		0.236 to 0.551 in (Convergent point: 10 mm 0.394 in)	EX-26B	NPN open-collector transistor	- Dark-ON	
EX-Z			S	ŭ		EX-26B-PN	PNP open-collector transistor	Daik-ON	
-400	ective	am type	Ę			EX-28A	NPN open-collector transistor	Light-ON	
′-100	w refle	spot bea	ensir	spotbea	ensir	45 to 115 mm EX-28A-PN	PNP open-collector transistor	Light-ON	
X-10	Narrow-view reflective	ong distance spot beam type Side sensing			1.772 to 4.528 in	EX-28B	NPN open-collector transistor	- Dark-ON	
X-20	Narro	is U				EX-28B-PN	PNP open-collector transistor		
X-30 X-40	NOTE: Mounting bracket is not supplied with the sensor. Please select from the range of optional sensor mounting brackets (four types) or universal sensor mounting bracket. (Refer to p.297)								
X-440	Notes	· 1) T	he se	nsing range of the retro	eflective type sensor is specified for	the RF-200 reflecto	nr		

Notes: 1) The sensing range of the retroreflective type sensor is specified for the RF-200 reflector. Further, the sensing range is the possible setting range for the reflector. The sensor can detect an object less than 30 mm 1.181 in away.

However, if the reflector is set 100 mm 3.937 in or less away, the sensing object should be opaque.

2) In case of using this product at a sensing range of 50 mm 1.969 in or less, take care that the sensitivity adjustment range becomes extremely narrow.

3) 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.



ORDER GUIDE

Package without reflector

Retroreflective type is also available without the reflector **RF-200**. When ordering this type, suffix "-Y" to the model No. (e.g.) Without reflector type of **EX-29A-PN** is "**EX-29A-PN-Y**".

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 (including package without reflector of retroreflective type sensor). When ordering this type, suffix "-C5" to the model No. (e.g.) 5 m 16.404 ft cable length type of EX-29A-Y is "EX-29A-Y-C5".

Accessory

• RF-200 (Reflector)



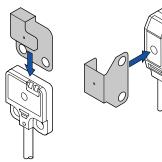
OPTIONS

Designation		Model No.	Description			
e	For front sensing type	OS-EX20-05 / Slit size ø0.5 mm \	Slit on one side • Sensing range: 200 mm 7.874 in • Min. sensing object: ø2.6 mm ø0.102 in			
Round slit mask For thru-beam type sensor only		$\left(\begin{array}{c} \text{Slit size $0.5 mm}\\ 0.020 \text{ in} \end{array}\right)$	Slit on both sides • Sensing range: 40 mm 1.575 in • Min. sensing object: ø0.5 mm ø0.020 in			
Round slit mask For thru-beam t sensor only	For side sensing type	OS-EX20E-05 / Slit size ø0.5 mm \	Slit on one side • Sensing range: 350 mm 13.780 in • Min. sensing object: ø3 mm ø0.118 in			
Rou (For ser	For side se	$\left(\begin{array}{c} \sin \sin \sin 2\theta & \theta & 0.5 \\ 0.020 & \sin \end{array}\right)$	Slit on both sides • Sensing range: 70 mm 2.756 in • Min. sensing object: ø0.5mm ø0.020 in			
ask	For front sensing type	OS-EX20-05×3 / Slit size 0.5 × 3 mm \	Slit on one side • Sensing range: 600 mm 23.622 in • Min. sensing object: ø2.6 mm ø0.102 in			
Rectangular slit mask For thru-beam type sensor only		$\left(\begin{array}{c} \sin \sin \sin 2\theta & 0.5 \times 3 \\ 0.020 \times 0.118 \\ \sin \end{array}\right)$	Slit on both sides • Sensing range: 300 mm 11.811 in • Min. sensing object: 0.5 × 3 mm 0.020 × 0.118 in			
ectangular : ⁻ or thru-bea sensor only	For side sensing type	OS-EX20E-05×3	Slit on one side • Sensing range: 800 mm 31.496 in • Min. sensing object: ø3 mm ø0.118 in			
Rec For	For side se	$\left(\begin{array}{c} \text{Slit size } 0.5 \times 3 \text{ mm} \\ 0.020 \times 0.118 \text{ in} \end{array}\right)$	Slit on both sides • Sensing range: 400 mm 15.748 in • Min. sensing object: 0.5 × 3 mm 0.020 × 0.118 in			
Reflector (For retroreflective type sensor only)		RF-210	 Sensing range: 50 to 400 mm 1.969 to 15.748 in Min. sensing object: ø30 mm ø1.181 in 			
Reflector mounting bracket		MS-RF21-1	Protective mounting bracket for RF-210 It protects the reflector from damage and maintains alignment.			
Reflective tape (For retroreflective) (type sensor only)		RF-11	 Ambient temperature: -25 to +50 °C -13 to +122 °F Ambient humidity: 35 to 85 % RH Notes Keep the tape free from stress. If it is 			
		RF-12	 Veep the tape nee nonstress. In its pressed too much, its capability may deteriorate. Do not cut the tape. It will deteriorate the sensing performance. Sensing range: 60 to 280 mm 2.362 to 11.024 in 			

Round slit mask

Fitted on the front face of the sensor with one-touch.

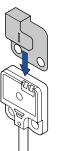
• OS-EX20-05 • OS-EX20E-05

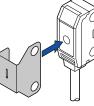


Rectangular slit mask

Fitted on the front face of the sensor with one-touch.

• OS-EX20-05×3 • OS-EX20E-05×3





Reflector mounting bracket

0.7 mm 0.028 in

• MS-RF21-1 11 mm

• RF-12

25 mm

J

30 mm

1.181

Reflective tape

• RF-11 0.7 mm 30 mm 0. 1.181 in -8 mm

Reflector

• RF-210

12.8 mm 0.504

33.3 mm

RT-610

6





SENSOR OPTIONS

SIMPLE WIRE-SAVING UNITS

WIRE-SAVING SYSTEMS MEASURE-MENT SENSORS

STATIC CONTROL DEVICES

LASER MARKERS PLC

HUMAN MACHINE INTERFACES ENERGY MANAGEMENT SOLUTIONS

FA COMPONENTS MACHINE VISION SYSTEMS

UV CURING SYSTEMS

Selection Guide Power Supply Built-in Amplifier-separate

EX-Z

OPTIONS

FIBER SENSORS

		·				
Designation	Model No.	Description				
	MS-EX20-1	Back angled mounting bracket for front sensing type sensor (The thru-beam type sensor needs two brackets.)				
Sensor mounting	MS-EX20-2	Foot angled mounting bracket for side sensing type sensor (The thru-beam type sensor needs two brackets.)				
bracket	MS-EX20-3	L-shaped mounting bracket for front sensing type sensor (The thru-beam type sensor needs two brackets.)				
-	MS-EX20-4	Back angled mounting bracket for side sensing type sensor (The thru-beam type sensor needs two brackets.)				
Universal sensor	MS-EXL2-4	For EX-22 /23 /26 / EX-28 /29	It can adjust the height and the angle of the sensor.			
mounting bracket (Note 1)	MS-EX20-5	For EX-23 □ only	(The thru-beam type sensor needs two brackets.)			
Mounting spacer (For front sensing type sensor only)	MS-EX20-FS	It is used when mounting the front sensing type from the rear side (One set consists of 10 pcs.)				
Sensor checker (Note 2) CHX-SC2 It is useful for beam alignment of thru-beam type sensors. The optim receiver position is given by indicators, as well as an audio signal.						

Sensor mounting bracket

• MS-EX20-2

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C

• MS-EX20-4

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Material: Stainless steel (SUS304)

Two M3 (length 5 mm 0.197 in) pan head screws [stainless Two M3 (length 14 mm 0.551 in) screws with washers [stainless steel (SUS304)] are attached. steel (SUS304)] are attached.

• MS-EX20-3



Material: LJ Stainless steel (SUS304) Material: Stainless steel (SUS304) Two M3 (length 5 mm 0.197 in) pan head screws [stainless steel (SUS304)] are attached.

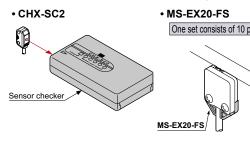
Two M3 (length 14 mm 0.551 in) screws with washers [stainless steel (SUS304)] are attached.

Material: Stainless steel (SUS304)

Notes: 1) Note that the axis position of EX-23 is different when replacing the mounting bracket MS-EX20-5 with MS-EXL2-4.

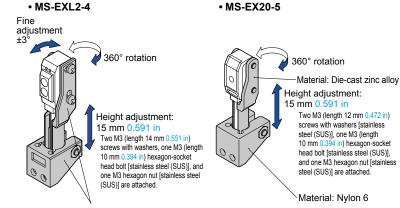
2) Refer to p.959~ for the sensor checker CHX-SC2.

Sensor checker



Mounting spacer One set consists of 10 pcs.

Universal sensor mounting bracket



Material: Die-cast zinc alloy

Selection Guide Amplifie Built-ir Power Supply Built-in Amplifier-separated EX-Z CX-400 CY-100 EX-10

> EX-30 EX-40 CX-440 EQ-30 EQ-500 MQ-W RX-LS200 RX RT-610

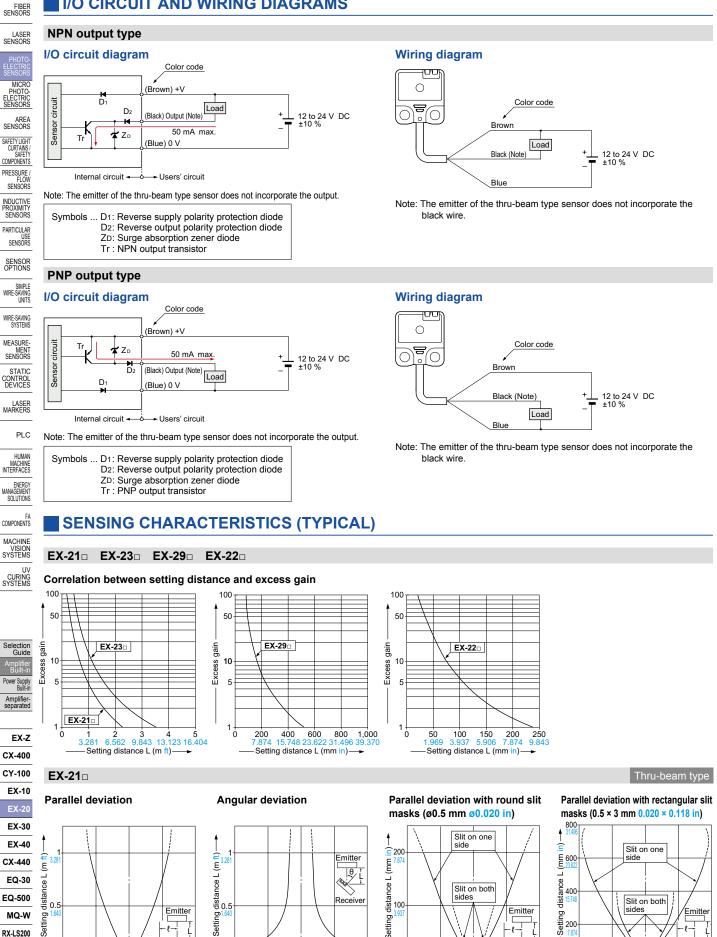
CURING SYSTEMS

SPECIFICATIONS

Type Thrubeam Recording circle Diffuse release Diffuse release Diffuse transmip State sample Diffuse transmip State sample Diffuse transmip State sample Diffuse transmip State sample Diffuse transmip Diffuse transmip <thdiffuse th="" transmip<=""> Diffuse transmip</thdiffuse>	<u> </u>							-				
Note In Errort sensing Side sensing Front sensing Side sensing Front sensing Side sensing </td <td>\bigwedge</td> <td></td> <td></td> <td colspan="2">Thru-beam</td> <td>Retroreflective</td> <td>Diffuse reflective</td> <td colspan="2">Convergent reflective</td> <td colspan="2">Narrow-view reflective</td>	\bigwedge			Thru-beam		Retroreflective	Diffuse reflective	Convergent reflective		Narrow-view reflective		
Nock In Light-ON EX-21A(-PN) EX-23(-PN) EX-23(-PN)<			Туре							Long distance spot beam typ		
Item (Note 2) Dark-ON EX-28B (-PN)				Front sensing	Side sensing	Side sensing	Side sensing	Front sensing	Side sensing	Side sensing		
Control Description Description EVELOP(=N,V) Description Sensing range 1 m 2 m 30 to 20 mm 50 to 50 mm 0.007 20 zmm 0.007 50 to 50 mm 0.007 20 zmm 0.007 4 mercedule with an explored mercedul	/	1	Light-ON	EX-21A(-PN)		EX-29A(-PN)	EX-22A(-PN)	EX-24A(-PN)	EX-26A(-PN)	EX-28A(-PN)		
Sensing range 1.m 3.2011 2.m 6.62 ft 30 to 200 mm 1.0 m 0.37 ft 2.10 tim 0.020 mm 0.0 perturbative mit bits in place 0.0 perturbative mi	tem	(Note 2)	Dark-ON	EX-21B(-PN)	(Note 3)	EX-29B(-PN)	EX-22B(-PN)	EX-24B(-PN)	EX-26B(-PN)	EX-28B(-PN)		
and bit 200 mm 30 to 200 mm bit 200	En	narking direc	ctive compliance		I	EMC	Directive, RoHS Di	rective	1	r		
ensing object speceability spec	ens	sing range				1.181 to 7.874 in	to 6.299 in (Note 5) with white non-glossy paper (200 × 200 mm)	0.984 in (Conv. point: 10 mm 0.394 in) with white non-glossy paper (50 × 50	(Corv. point: 10 mm 0.394 in) with white non-glossy paper (50 × 50 mm 1.969 × 1.969 in), spot diameter ø1 mm ø0.039 in	45 to 115 mm 1.772 to 4.528 i with white non-glossy paper (100 × 100 mm 3.937 × 3.937 in), spo diameter ø5 mm ø0.197 in with setting distance 80 mm 3.150 in		
Total 1.534 + 1.544 + 1.554 + 1.544 + 1.554 + 1.544 + 1.554 + 1.544 + 1.554 + 1.544 + 1.554 + 1.544 + 1.554 + 1.544 + 1.554 + 1	Sens	sing object		opaque object Setting distance between emitter and	opaque object Setting distance between emitter and	more opaque or tran slucent object	translucent or transparent object	ø0.004 in copper wire (Setting distance:)	ø0.004 in copper wire (Setting distance:)	Opaque, translucent or transparent object (Note 6 / Min. ø1 mm ø0.039 in copper wire at setting distance 80 mm 3.150 in		
Perpetability 0.05 mm 0.05 mm 0.02 in or less 0.5 mm 0.01 mm <td>Hvst</td> <td>eresis</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Hvst	eresis										
Output Output<	-					0.5 mm		1	,,			
Current consumption Entler: 10 mA or less 13 mA or less 15 mA or less Output *NPN output type>* *NPN output type>* * </td <td></td> <td></td> <td>o sensing axis)</td> <td>0.05 mm 0.0</td> <td>002 in or less</td> <td></td> <td></td> <td></td> <td></td> <td>0.012 in or less</td>			o sensing axis)	0.05 mm 0.0	002 in or less					0.012 in or less		
APPN output type> APPN output type> PNP oper-collector transition Poper-collector transition	Supp	oly voltage				12 to 24 V DC	C ±10 % Ripple P-	P 10 % or less				
Dutput NPN open-collector transistor PNP open-collector transistor Maximum sink current: 50 mA Applied voltage: 30 V DC or less (tektween output and 0 V) Applied voltage: 30 V DC or less (tektween output and 0 V) Adminum source current: 50 mA Applied voltage: 30 V DC or less (tektween output and 0 V) Itilization category DC-12 or DC-13 Maximum source current: 50 mA Applied voltage: 30 V DC or less (tektween output and 0 V) Short-circuit protection Itilization category DC-12 or DC-13 DC-13 Stability indicator Orange LED (lights up when the output is ON) (thru-beam type: located on the receiver) Stability indicator Green LED (light sup when the output is ON) (thru-beam type: located on the receiver) Stability indicator Green LED (light sup when the output is ON) (thru-beam type: located on the receiver) Stability indicator Green LED (light sup under stable light received condition or stable dark condition or stable dark condition or stable dark condition Operation mode switch Laaded on the receiver Continuously variable adjuster Continuously variable adjuster Protection	Curre	ent consum	ption	Emitter: 10 mA or less,	Receiver: 10 mA or less		13 mA	or less		15 mA or less		
Utilization category Protection Residual voltage: 3V or Co to ress (cativeen output and voltage: 3V or Los (at the mass source current) Utilization category DC-12 or DC-13 Short-circuit protection Incorporated Response time 0.5 ms or less Operation indicator Orrange LED (lights up when the output is ON) (thru-beam type: located on the receiver) Stability indicator Green LED (lights up when the output is ON) (thru-beam type: located on the receiver) Stability indicator Continuously variable adjuster Continuously variable adjuster Continuously variable adjuster Continuously variable adjuster Continuously variable adjuster Protection IP67 (IEC) Mabient tumidity 35 to 85 % RH, Storage: 35 to 85 % RH Ambient tamperature	Dutn	out		NPN open-colle • Maximum	ector transistor sink current: 50 m		PNP •	open-collector trai Maximum source	current: 50 mA			
Short-circuit pretection Incorporated Response time 0.5 ms or less Operation indicator Orange LED (lights up when the output is ON) (thru-beam type: located on the receiver) Stability indicator Green LED (lights up when the output is ON) (thru-beam type: located on the receiver) Stability indicator Green LED (lights up when the output is ON) (thru-beam type: located on the receiver) Sensitivity adjuster Continuously variable adjuster Continuously variable adjuster Operation mode switch Located on the receiver Continuously variable adjuster Continuously variable adjuster Protection Incompositivity adjuster Continuously variable adjuster Continuously variable adjuster Mabient humidity Sto 55 % C -13 to +131 °F (No dew condensation or icing allowed), Storage: -30 to +70 °C -22 to +158 °F Ambient humidity 3 to 55 % RH, Storage: 35 to 65 % RH Ambient humidity 1,000 V AC for one min. between all supply terminals connected together and enclosure Insulation resistance 20 MQ, or more, with 250 V DC megger between all supply terminals connected together and enclosure Insulation resistance 10 to 500 Hz frequency, 3 mm 0.118 in double amplitude (20 G m.x.) in X, Y and Z directions three times each Entiting element Red LED (m	outp				Residual voltage: 2 V or less (at 50 mA sink current) Residual voltage: 2 V or less (at 50 mA source current)							
Response time 0.5 ms or less Operation indicator Orange LED (lights up when the output is ON) (thru-beam type: located on the receiver) Stability indicator OrenLED (lights up under stable light receiver condition or stable dark condition Stability adjuster Output estable dark condition Operation mode switch Continuously variable adjuster Continuously variable adjuster Pollution degree 3 (Industrial environment) Continuously variable adjuster Protection IE67 (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 temperature -25 to +55 °C -13 to +131 °F (No dew condensation or icing allowed), Storage: -30 to +70 °C -22 to +158 °F Mabient temperature -25 to +55 °C -13 to +131 °F (No dew condensation or icing allowed), Storage: -30 to +70 °C -22 to +158 °F Mabient temperature -25 to +55 °C -13 to +131 °F (No dew condensation or icing allowed), Storage: -30 to +70 °C -22 to +158 °F Mabient temperature -25 to +55 °C -13 to +131 °F (No dew condensation or icing allowed), Storage: -30 to +70 °C -22 to +158 °F Mabient temperature -25 to +55 °C -13 to +131 °F (No dew condensation or icing allowed), Storage: -30 to +70 °C -22 to +158 °F Mabient temperature -25 to +55 °C -13 to +131 °F (No		Utilization	category				DC-12 or DC-13					
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Stability indicator Green LED (lights up under stable light received condition or stable dark condition, located on the receiver Green LED (lights up under stable light received condition or stable dark condition, located on the receiver Sensitivity adjuster Continuously variable adjuster Continuously variable adjuster Continuously variable adjuster Operation mode switch Located on the receiver 3 (Industrial environment) Continuously variable adjuster Pollution degree 3 (Industrial environment) IP67 (IEC) Protection IP67 (IEC) Ambient temperature -25 to +55 °C -13 to +131 °F (No dew condensation or inging allowed), Storage: -30 to +70 °C -22 to +158 °F Ambient themidity 35 to 85 % RH, Storage: 35 to 85 % RH Ambient temperature -25 to +55 °C -13 to +131 °F (No dew condensation or inging allowed), Storage: -30 to +70 °C -22 to +158 °F Insulation resistance 10 to 500 rL/2 Frequency, 3 mm 0.118 in double amplitude (20 G max.) in X, Y and Z directions for two hours each Shock resistance 500 m/s² acceleration (50 G approx.) in X, Y and Z directions three times each 640 nm 0.025 mil 660 nm 0.027 mil 680 nm 0.027 mil 680 nm 0.027 mil 660 nm 0.026 mil 680 nm 0.027 mil 680 nm 0.027 mil 680 nm 0.026 mil 650 nm 0.026 mil 680 nm 0.027 mil 680 nm 0.027 mil 680 nm 0.026 mil 650 nm 0.026 mil 680 nm 0.027 mil 680 nm 0.027 mil 680 nm 0.026 mil 680 nm 0.027 mil 680 nm 0.027 mil 680 nm 0.026 mil 650 nm 0.026 mil 680 nm 0.027 mil 680 nm 0.027 mil 680 nm 0.026 mil	Resp	oonse time		0.5 ms or less								
Statulity indicator or stable dat/contion, located on the receiver Continuously variable adjuster Continuously variable adjuster Continuously variable adjuster Sensitivity adjuster	Oper	ation indica	ator	Orange LED (lights up when the output is ON) (thru-beam type: located on the receiver)								
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Accessories <u>1 pc.</u> Adjusting screwdriver: 1 pc. Adjusting screwdriver: 1	/Veig	int					Net weight: 20 g	approx., Gross we	ight: 45 g approx.			
 I pt. Pulsuing scentility in pt. Pulsuing scentility in pt.<	Acce	essories							Adjusting scre	ewdriver: 1 pc.		
sensor can detect an object less than 30 mm 1.181 in away. However, if the reflector is set 100 mm 3.937 in or less away, the sensing object should be opaque. 5) In case of using this product at a sensing range of 50 mm 1.969 in or less, take care that the	otes	ambier 2) Model 3) Either L 4) The se RF-200 sensor 100 mr	nt temperature of Nos. having the Light-ON or Dark-O ensing range and or reflector. Furth r can detect an of m 3.937 in or les	of +23 °C +73.4 °F. suffix "- PN " are PN ON can be selected b d the sensing object her, the sensing rar object less than 30 as away, the sensir	been specified pre- NP output type. y the operation mode t of the retroreflect nge is the possible mm 1.181 in away ng object should be	ecisely, the condition e switch (located on the tive type sensor are setting range for the the However, if the re- e opaque.	he receiver). e specified for the reflector. The effector is set	be placed in this range	of the sensor 30 mm 1.181 in Setting range of the reflect	ge		

6) Make sure to confirm detection with an actual sensor before use.





50 50 Ó l eft 🔫 - Center -- Right Operating point { (mm in)

RX-LS200

RT-610

RX

0

100

3 937

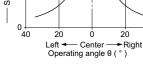
- 8 --

100

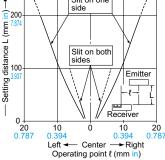
3 937

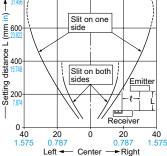
n com

Receive



40





Operating point { (mm in)

LASER SENSORS

MICRO PHOTO-ELECTRIC SENSORS

AREA SENSORS

SAFETY LIGHT CURTAINS / SAFETY COMPONENTS

PRESSURE / FLOW SENSORS

INDUCTIVE PROXIMITY SENSORS

PARTICULAR USE SENSORS

SENSOR OPTIONS

40 1.57

SENSING CHARACTERISTICS (TYPICAL)

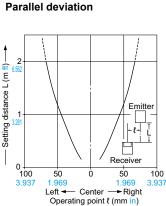
EX-23

EX-29

distance L (mm in) - 100: 100: 100: 100: 100:

Setting of

Parallel deviation



2 Setting distance L (m ft) Emitte 1 tê Ŕ Receive 0↓ 100 50 Ó 50 Center Right Left Operating point θ (°)

Angular deviation

Sensor angular

deviation

Sensor

¢,

Senso

20

Left

angular deviation

Refle (RF-200

Ĺ

Setting distance L (mm in)

0∔ 40

Reflector

(RF-200)

E

8-

20

0.787

enso

10

-Right

Reflector

deviation

Reflector angular deviation

Reflecto

ЪĻ

20

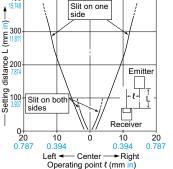
Right

Ó

ft ← Center → Rig Operating angle θ (°)

Angular deviation

Parallel deviation with round slit masks (ø0.5 mm ø0.020 in) 400





Parallel deviation with rectangular slit

Thru-beam type

20 0.787 20 0.787 Ó Left ← Center → Righ Operating point ℓ (mm in) + Right

0 40 1.575

Retroreflective type

Diffuse reflective type

SIMPLE WIRE-SAVING UNITS

WIRE-SAVING SYSTEMS

MEASURE-MENT SENSORS

STATIC CONTROL DEVICES

LASER MARKERS

PLC

HUMAN MACHINE INTERFACES

ENERGY MANAGEMENT SOLUTIONS FA COMPONENTS

MACHINE VISION SYSTEMS

UV CURING SYSTEMS

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

EX-Z CX-400 CY-100 EX-10 EX-30 EX-40 CX-440 EQ-30 EQ-500 MQ-W RX-LS200 RX RT-610

EX-22

EX-24□

Sensing fields

0↓ 20 78

0.787

10

Left +

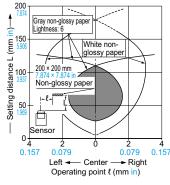
0

Ó

Operating point { (mm in)

Center

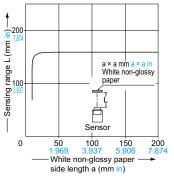
Sensing field



Correlation between sensing object size and sensing range

40

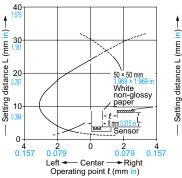
100



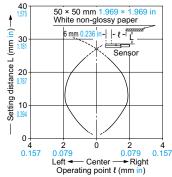
As the sensing object size becomes smaller than the standard size (white non-glossy paper 200 × 200 mm 7.874 × 7.874 in), the sensing range shortens, as shown in the left graph.

Convergent reflective type

· Horizontal (left and right) direction



· Vertical (up and down) direction



LASER SENSORS

MICRO PHOTO-ELECTRIC SENSORS

AREA SENSORS

SAFETY LIGHT CURTAINS SAFETY

COMPONENTS

PRESSURE / FLOW

INDUCTIVE PROXIMITY SENSORS

PARTICULAR

USE

SENSOR

SIMPLE WIRE-SAVING UNITS

WIRE-SAVING SYSTEMS

MEASURE-MENT SENSORS

LASER MARKERS

HUMAN

MACHINE

ENERGY MANAGEMENT

SOLUTIONS

MACHINE

EX-Z CX-400

CY-100

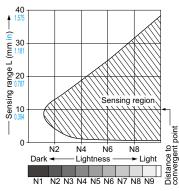
SENSORS

SENSING CHARACTERISTICS (TYPICAL)

point

EX-24

Correlation between lightness and sensing range

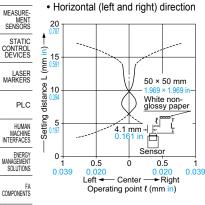


The sensing region (typical) is represented by oblique lines in the left figure. However, the sensitivity should be set with enough margin because of slight variation in products.

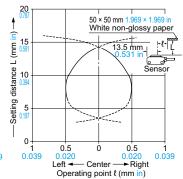
Lightness shown on the left may differ slightly from the actual object condition.

EX-26□

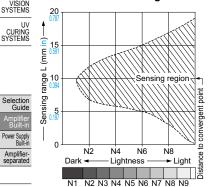
Sensing fields

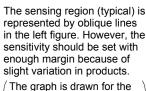


· Vertical (up and down) direction



Correlation between lightness and sensing range





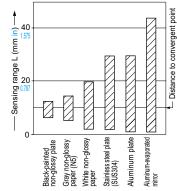
maximum sensitivity setting.

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

200

Correlation between sensing object size and sensing range

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



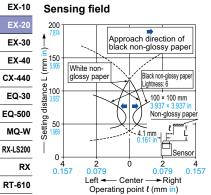
respective material. However, there Further, if there is a reflective object shown in the left graph, or adjust

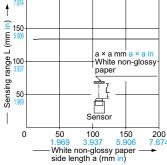
The graph is drawn for the maximum sensitivity setting.

Narrow-view reflective type

Sensing field

EX-28

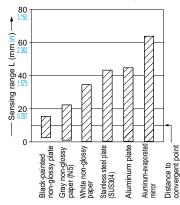




As the sensing object size becomes smaller than the standard size (white non-glossy paper 100 × 100 mm 3.937×3.937 in), the sensing range shortens, as shown in the left graph.

Convergent reflective type

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.

Convergent reflective type

The bars in the graph indicate the sensing range (typical) for the is a slight variation in the sensing range depending on the product. (conveyor, etc.) in the background of the sensing object, since it affects the sensing, separate it by more than twice the sensing range

the sensitivity adjuster.

LASER SENSORS

MICRO PHOTO-ELECTRI SENSOR

AREA SENSORS

SAFETY LIGH

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

CONTROL

LASER MARKERS

PLC

HUMAN MACHINE INTERFACES ENERGY MANAGEMENT

SOLUTIONS FA COMPONENTS

MACHINE

VISION SYSTEMS

PRECAUTIONS FOR PROPER USE

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

 In case of using sensing devices for personnel protection, use products which meet laws and standards, such as OSHA, ANSI or IEC etc., for personnel protection

Mounting

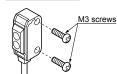
 Mount using M3 screws. The tightening torque should be 0.5 N·m or less.

applicable in each region or country.



Side sensing





M3 pan head screws (Note)

Note: When mounting the front sensing type sensor, use M3 pan head screws without washers etc.

• When mounting the front sensing type from the backside, fit the mounting spacer (MS-EX20-FS) and fix with screws.

Mounting method

1) Fit the mounting spacer on the sensor.



② Align the mounting holes of the mounting spacer and the sensor and mount with M3 screws. The tightening torque should be 0.5 N·m or less.



Sensitivity adjustment (side sensing type only)

Step	Sensitivity adjuster	Description
1	MAX	Turn the sensitivity adjuster fully counterclockwise to the minimum sensitivity position (• mark).
2	A	In the light received condition, turn the sensitivity adjuster slowly clockwise and confirm the point \textcircled{A} where the sensor enters the "Light" state operation.
3	B A	In the dark condition, turn the sensitivity adjuster further clockwise until the sensor enters the "Light" state operation and then bring it back to confirm point (B) where the sensor just returns to the "Dark" state operation. (If the sensor does not enter the "Light" state operation even when the sensitivity adjuster is turned fully clockwise, this extreme position is point (B).
4	Optimum position B MAX B B B C D D D D D D D D D D D D D	The position at the middle of points (A) and (B) is the optimum sensing position.

Notes: 1) Use the attached adjusting screwdriver to turn the adjuster slowly. Turning with excessive strength will damage the adjuster.

 In case of using EX-22 at a sensing distance of 50 mm 1.969 in or less. take care that the sensitivity adjustment range becomes extremely narrow.

Operation mode switch (EX-23 only)

Switch position	Description
Ċ	Light-ON mode is obtained when the operation mode switch (located on the receiver) is turned fully clockwise (L side).
(C)	Dark-ON mode is obtained when the operation mode switch (located on the receiver) is turned fully counterclockwise (D side).

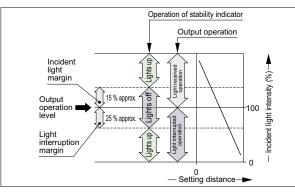
Note: Operation mode switch should be turned fully till it stops.

Refer to p.1552~ for general precautions. FIBER SENSORS

Stability indicator

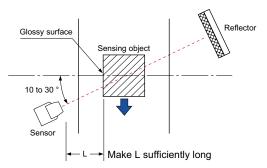
. The stability indicator (green) lights up when the incident light intensity has sufficient margin with respect to the operation level.

If the incident light intensity level is such that the stability indicator lights up, stable sensing can be done without the light received operation and the light interrupted operation being affected by a change in ambient temperature or supply voltage.



Glossy object sensing (EX-29)

· Please take care of the following points when detecting materials having a gloss.



Wiring

· Excess bending of the cable or stress applied to the cable may disconnect the internal lead wire.

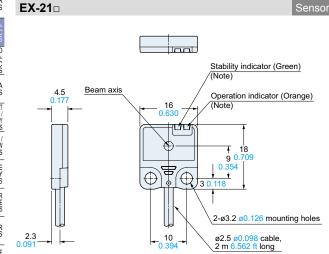
Others

- · Do not use during the initial transient time (50 ms) after the power supply is switched on.
- · If sensors are mounted close together and the ambient temperature is near the maximum rated value, provide for enough heat radiation / ventilation.
- · If a reflective object is present in the background, the sensing of EX-28 may be affected. When setting the sensor, make sure to confirm that the reflective object has no effect. In case the reflective object affects the sensing, take measures such as removing the reflective object or coloring it in black, etc.

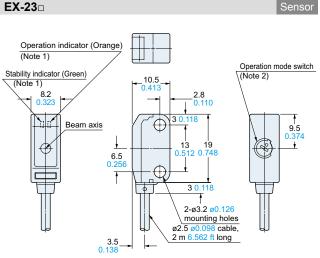
Amplifier

DIMENSIONS (Unit: mm in)

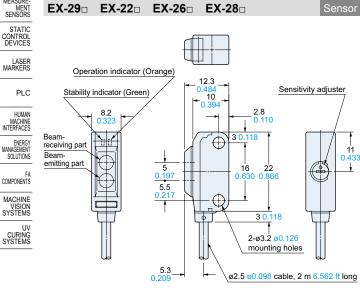
Note: Not incorporated on the emitter.



The CAD data can be downloaded from our website.



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



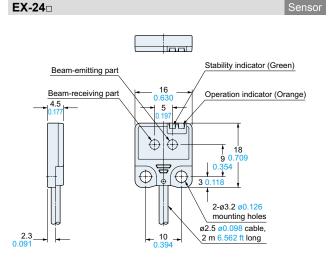
1.5 0.059

. ø2.3

13

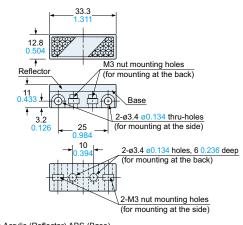
0.512

3.5 0.138

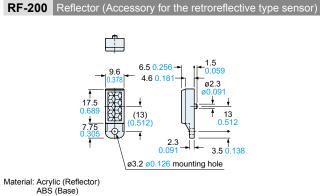


RF-210

Reflector (Optional)



Material: Acrylic (Reflector) ABS (Base) Two M3 (length 8 mm 0.315 in) screws with washers and two nuts are attached



EQ-500 MQ-W RX-LS200

RX RT-610

Selection Guide

Amplifie Built-ir Power Supply Built-in

Amplifier-separated

EX-Z

CX-400

CY-100

EX-10

EX-30

EX-40 CX-440

EQ-30

DIMENSIONS (Unit: mm in) The CAD data can be downloaded from our website. FIBER SENSORS LASER SENSORS **RF-11** Reflective tape (Optional) **RF-12** Reflective tape (Optional) 30 1.181 0.7 MICRO PHOTO-ELECTRIC SENSORS (28)<mark>(1.102)</mark> -30 1.181 0.7 (28)(1.102) AREA SENSORS 25 (23) 0.984 (0.906 SAFETY LIGHT CURTAINS / SAFETY COMPONENTS 8 0.31 t ↑ (6) (0.236) Effective PRESSURE / FLOW SENSORS reflecting surface Adhesive tape Effective Material: Acrylic INDUCTIVE PROXIMITY SENSORS reflecting surface Adhesive tape Material: Flexible polyvinyl chloride PARTICULAR USE SENSORS MS-RF21-1 Reflector mounting bracket for **RF-210** (Optional) SENSOR OPTIONS Assembly dimensions SIMPLE WIRE-SAVING UNITS 5.5 WIRE-SAVING SYSTEMS ø36 50 MEASURE-MENT SENSORS ø36 50 STATIC CONTROL DEVICES 30 30 LASER MARKERS 10 0.39 3.2 3.5 0 138 10_ 0.394 PLC 0 R7.5 HUMAN MACHINE INTERFACES ø25 盘 46 1.98 25 ENERGY MANAGEMENT SOLUTIONS **∳** 25 12.5 0.492 雔 0 13. ł t 1.2 t 0.047 0.512 FA COMPONENTS 12.8 0.504 -13 0.512 Material: Stainless steel (SUS304) MACHINE Two M3 (length 12 mm 0.472 in) VISION SYSTEMS screws with washers are attached. UV CURING SYSTEMS MS-EX20-1 Sensor mounting bracket (Optional) **Assembly dimensions** t 1.5 t 0.059 10.5 Selection Guide Mounting drawing with EX-21 Amplifi Built-in (1.2) 5 0.197 t 1.5 Power Supply Built-in 10.5 0.413 Amplifier-separated rin 1 29.5 (6.5)(0.256) 50 t 1 10 4.5 0.17 29.5 EX-Z 4-M3 × 0.5 0.020 161 16 30 3.2 5 CX-400 0.6 Ò Ð € CY-100 12 3.2 2 0. EX-10 \bigoplus Ð Ð **'**{} \oplus ŧ 9 10.5 19 1.5 0.354 0.413 0.744 Beam-receiving 0 079 EX-30 part ♠ A EX-40 Material: Stainless steel (SUS304) 2 0.079 Two M3 (length 5 mm 0.197 in) pan head screws [stainless steel (SUS304)] are attached. CX-440 Ш EQ-30 10

RX RT-610

EQ-500 MQ-W RX-LS200

3-M3 × 0.5

ł

Material: Stainless steel (SUS304)

Two M3 (length 14 mm 0.551 in) screws with washers [stainless steel

(SUS304)] are attached.

2.5

2.5 0.098

16

2.5

0.630

2

12.5

0 4 9 2

t 0.0

t 1.5

3.5 0.138

3.2 0.126

7.5 0.29

14.5

3.2

3 16 0.118 0.63

0

DIMENSIONS (Unit: mm in)

16

14°

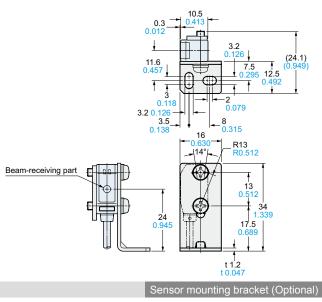
ŒÐ

The CAD data can be downloaded from our website.

Sensor mounting bracket (Optional)

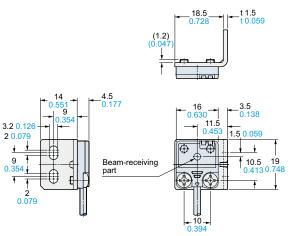
Assembly dimensions

Mounting drawing with the receiver of EX-23 -



Assembly dimensions

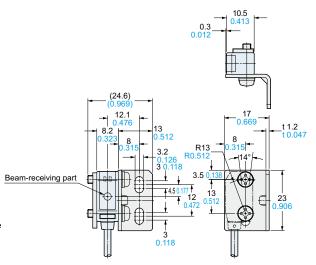
Mounting drawing with the receiver of EX-21

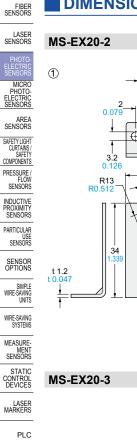


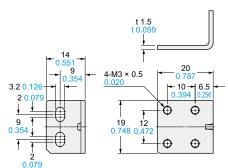
Sensor mounting bracket (Optional)



Mounting drawing with the receiver of EX-23 -







Material: Stainless steel (SUS304) Two M3 (length 5 mm 0.197 in) pan head screws [stainless steel (SUS304)] are attached.

Amplifier Built-in Power Supply EX-Z CX-400 CY-100 EX-10 EX-10 EX-20 EX-30 EX-40 CX-440 EQ-30 EQ-500 MQ-W RX-LS200 RX

RT-610

HUMAN MACHINE INTERFACES

ENERGY MANAGEMEN

SOLUTIONS

FA COMPONENTS

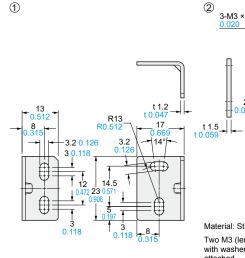
MACHINE

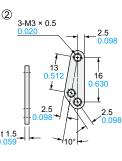
VISION SYSTEMS

CURING SYSTEMS

Selection Guide

MS-EX20-4





Material: Stainless steel (SUS304) Two M3 (length 14 mm 0.551 in) screws with washers [stainless steel (SUS304)] are attached.

DIMENSIONS (Unit: mm in)

The CAD data can be downloaded from our website. FIBER SENSORS

