

CX-400 SERIES

New

Compact Photoelectric Sensor **Amplifier Built-in**



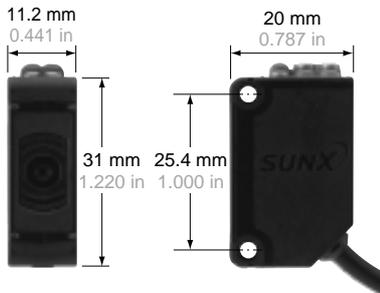
World standard sensors now available!



Amplifier Built-in

Compact size

The sensors are compact in size at W11.2 × H31 × D20 mm
W0.441 × H1.220 × D0.787 in.
The mounting pitch is also at the world standard size of 25.4 mm 1.000 in.



60 types for a wide variation

The thru-beam type, retroreflective type, diffuse reflective type (2 types), and narrow-view reflective type are made available for a total of 5 types. Each one of the above comes as either an NPN or a PNP output type enabling maximum compatibility to various applications and worksites.

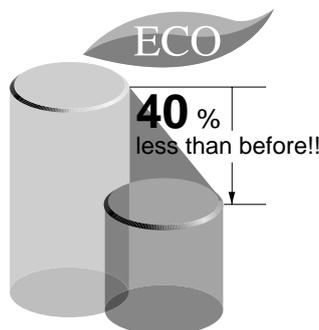
Type	Sensing range	Output	Connecting method	Cable length type
Thru-beam	10 m 32.808 ft	NPN PNP	Cable type M8 Plug-in connector type M12 Pigtailed type	0.5 m 1.640 ft 2 m 6.562 ft 5 m 16.404 ft
Retroreflective (with polarizing filters)	3 m 9.843 ft			
Diffuse reflective (long sensing range)	800 mm 9.843 in			
Diffuse reflective (short sensing range)	300 mm 11.811 in			
Narrow-view reflective	70 to 200 mm 2.756 to 7.874 in			

Strong against noise

The sensors are fully protected against electrical noise and extraneous light such as high frequency fluorescent light.

Environmentally friendly and low current consumption

These sensors consume only 60 % of the power of previous models, which contributes to preserving the environment.



Simple packaging method

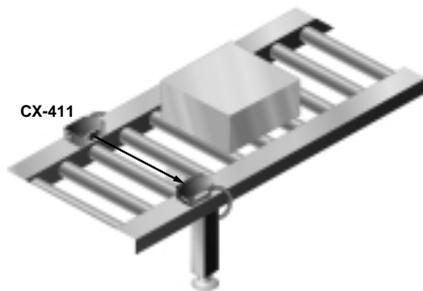
Based on environmental considerations, simplified packaging is adopted in order to use less natural resources. In addition, the bag is made from polyethylene which produces no toxic gases even when burned.



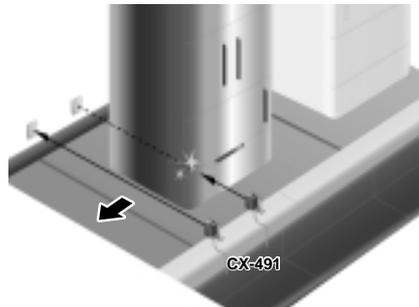
Polyethylene packaging bag

APPLICATIONS

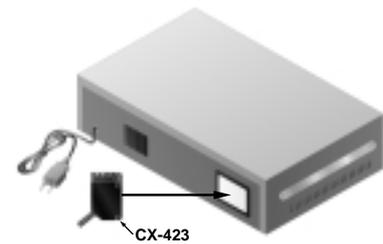
Detecting object on conveyor line



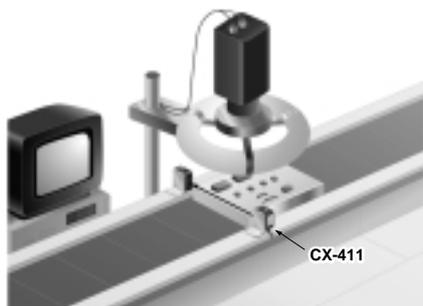
Sensing large electrical appliances



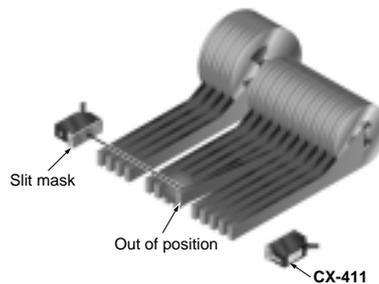
Detecting label



Synchronizing sensor for image processing systems



Detecting out of position tape feeder cassette

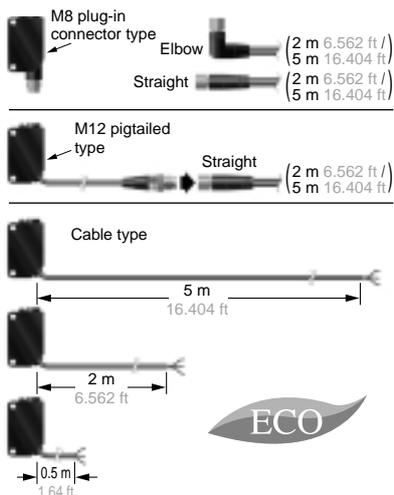


Detecting car on conveyor line



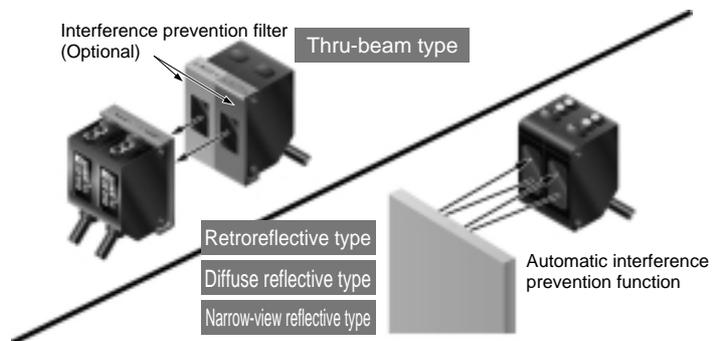
Waste reducing connector type

All models are available in M8 plug-in connector type and M12 pigtailed type. This contributes to less time spent in setting up. In addition, cable types are available with cable lengths of 0.5 m 1.640 ft, 2 m 6.562 ft and 5 m 16.404 ft. This results in less wastage.



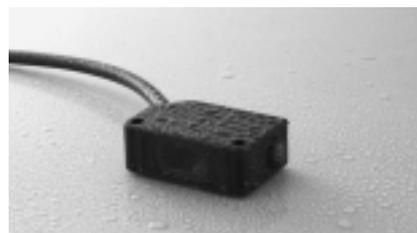
Two sensors can be mounted close together

The interference prevention function lets two sensors of any type to be mounted close together precisely.



Strong against coolant liquids

The enclosure material is made from PBT (polybutylene terephthalate) which is strongly resistant to coolants. These sensors can be used with confidence even around metal processing machinery that disperses oil mists. The protection mechanism also conforms to IP67 (IEC).

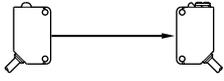
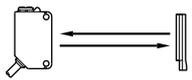
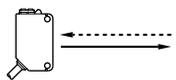
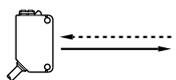


Stable performance even in cold regions

Stable performance can be maintained even in environments of -25°C -13°F .

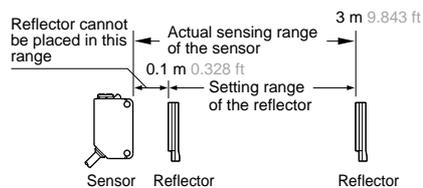
CX-400

ORDER GUIDE

Type	Appearance	Sensing range	Model No.	Output	Emitting element
Thru-beam			CX-411	NPN open-collector transistor	Red LED
			CX-411-P	PNP open-collector transistor	
Retroreflective with polarizing filters			CX-491	NPN open-collector transistor	Red LED
			CX-491-P	PNP open-collector transistor	
Diffuse reflective			CX-421	NPN open-collector transistor	Infrared LED
			CX-421-P	PNP open-collector transistor	
			CX-422	NPN open-collector transistor	
			CX-422-P	PNP open-collector transistor	
Narrow-view reflective			CX-423	NPN open-collector transistor	Red LED
			CX-423-P	PNP open-collector transistor	

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

Note: The sensing range of the retroreflective type sensor is specified for the **RF-230** reflector.
In addition, set the distance between the sensor and the reflector to 0.1 m 0.328 ft or more.



ORDER GUIDE

0.5 m 1.640 ft / 5 m 16.404 ft cable length type, M8 plug-in connector type, M12 pigtailed type

0.5 m 1.640 ft / 5 m 16.404 ft cable length type (standard: 2 m 6.562 ft), M8 plug-in connector type and M12 pigtailed type are available.

Type		Output	Standard	0.5 m 1.640 ft cable length type	5 m 16.404 ft cable length type	M8 plug-in connector type (Note)	M12 pigtailed type (Note)
Thru-beam		NPN output	CX-411	CX-411-C05	CX-411-C5	CX-411-Z	CX-411-J
		PNP output	CX-411-P	CX-411-P-C05	CX-411-P-C5	CX-411-P-Z	CX-411-P-J
Retroreflective with polarizing filters		NPN output	CX-491	CX-491-C05	CX-491-C5	CX-491-Z	CX-491-J
		PNP output	CX-491-P	CX-491-P-C05	CX-491-P-C5	CX-491-P-Z	CX-491-P-J
Diffuse reflective	Short sensing range	NPN output	CX-421	CX-421-C05	CX-421-C5	CX-421-Z	CX-421-J
		PNP output	CX-421-P	CX-421-P-C05	CX-421-P-C5	CX-421-P-Z	CX-421-P-J
	Long sensing range	NPN output	CX-422	CX-422-C05	CX-422-C5	CX-422-Z	CX-422-J
		PNP output	CX-422-P	CX-422-P-C05	CX-422-P-C5	CX-422-P-Z	CX-422-P-J
Narrow-view reflective		NPN output	CX-423	CX-423-C05	CX-423-C5	CX-423-Z	CX-423-J
		PNP output	CX-423-P	CX-423-P-C05	CX-423-P-C5	CX-423-P-Z	CX-423-P-J

Note : Please order the suitable mating cable separately for M8 plug-in connector type and M12 pigtailed type.

Package without reflector

Package without reflector type is available.

Type		Output	Standard	0.5 m 1.640 ft cable length type	5 m 16.404 ft cable length type	M8 plug-in connector type (Note)	M12 pigtailed type (Note)
Retroreflective with polarizing filters without reflector		NPN output	CX-491-Y	CX-491-C05-Y	CX-491-C5-Y	CX-491-Z-Y	CX-491-J-Y
		PNP output	CX-491-P-Y	CX-491-P-C05-Y	CX-491-P-C5-Y	CX-491-P-Z-Y	CX-491-P-J-Y

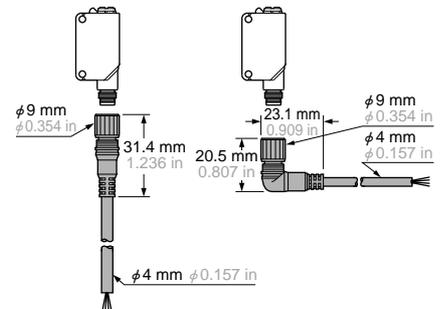
Note : Please order the suitable mating cable separately for M8 plug-in connector type and M12 pigtailed type.

• Mating cables (2 cables are required for the thru-beam type.)

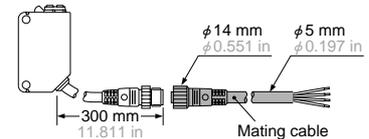
Type		Model No.	Cable length	Description
For M8 plug-in connector type	Straight	CN-24A-C2	2 m 6.562 ft	Can be used with all models
		CN-24A-C5	5 m 16.404 ft	
	Elbow	CN-24AL-C2	2 m 6.562 ft	
		CN-24AL-C5	5 m 16.404 ft	
For M12 pigtailed type	2-core	CN-22-C2	2 m 6.562 ft	For thru-beam type emitter (2-core)
		CN-22-C5	5 m 16.404 ft	
	4-core	CN-24-C2	2 m 6.562 ft	Can be used with all models
		CN-24-C5	5 m 16.404 ft	

• CN-24A-C2
CN-24A-C5

• CN-24AL-C2
CN-24AL-C5



• CN-22-C2, CN-22-C5
CN-24-C2, CN-24-C5



Accessory

- RF-230 (Reflector)



CX-400

OPTIONS

Designation	Model No.	Slit size	Sensing range		Min. sensing object	
			Slit on one side	Slit on both sides	Slit on one side	Slit on both sides
Round slit mask (For thru-beam type sensor only)	OS-CX-05	φ 0.5 mm φ 0.020 in	400 mm 15.748 in	20 mm 0.787 in	φ 12 mm φ 0.472 in	φ 0.5 mm φ 0.020 in
	OS-CX-1	φ 1 mm φ 0.039 in	900 mm 35.433 in	100 mm 3.937 in	φ 12 mm φ 0.472 in	φ 1 mm φ 0.039 in
	OS-CX-2	φ 2 mm φ 0.079 in	2 m 6.562 ft	400 mm 15.748 in	φ 12 mm φ 0.472 in	φ 2 mm φ 0.079 in
Rectangular slit mask (For thru-beam type sensor only)	OS-CX-05×6	0.5×6 mm 0.020×0.236 in	2 m 6.562 ft	400 mm 15.748 in	φ 12 mm φ 0.472 in	0.5×6 mm 0.020×0.236 in
	OS-CX-1×6	1×6 mm 0.039×0.236 in	3 m 9.843 ft	1 m 3.281 ft	φ 12 mm φ 0.472 in	1×6 mm 0.039×0.236 in
	OS-CX-2×6	2×6 mm 0.079×0.236 in	5 m 16.404 ft	2 m 6.562 ft	φ 12 mm φ 0.472 in	2×6 mm 0.079×0.236 in

Designation	Model No.	Sensing range	Min. sensing object
Interference prevention filter (For thru-beam type sensor only)	PF-CX4-V (Vertical)	5 m 16.404 ft (Note 1)	φ 12 mm φ 0.472 in (Note 1)
	PF-CX4-H (Horizontal)	5 m 16.404 ft (Note 1)	φ 12 mm φ 0.472 in (Note 1)
Reflector (For retro-reflective type sensor only)	RF-210	1 m 3.281 ft (Note 2)	φ 30 mm φ 1.181 in
	RF-220	1.5 m 4.921 ft (Note 2)	φ 35 mm φ 1.378 in

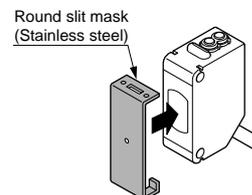
Notes: 1) Value when attached to both sides.

2) Set the distance between the sensor and the reflector to 0.1 m 0.328 ft or more.

Round slit mask

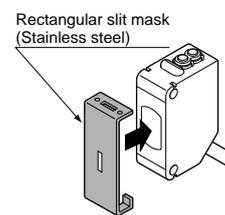
Fitted on the front face of the sensor with one-touch.

• OS-CX-□

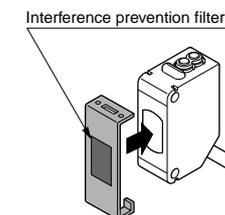
**Rectangular slit mask**

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

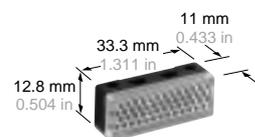
• OS-CX-□×6

**Interference prevention filter**

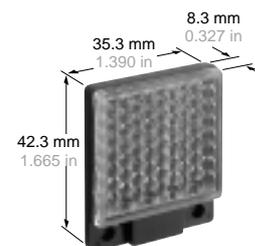
Two sets of thru-beam type sensors can be mounted close together.

• PF-CX4-V
• PF-CX4-H**Reflector**

• RF-210



• RF-220



OPTIONS

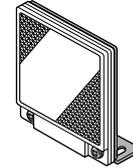
Designation	Model No.	Description	
Reflector mounting bracket	MS-RF21-1	Protective mounting bracket for RF-210 It protects the reflector from damage and maintains alignment.	
	MS-RF22	For RF-220	
	MS-RF23	For RF-230	
Reflective tape	RF-11	<ul style="list-style-type: none"> Sensing range: 0.5 m 1.640 ft (Note 3) 	<ul style="list-style-type: none"> Ambient temperature: -25 to +50 °C -13 to +122 °F Ambient humidity: 35 to 85 % RH
	RF-12	<ul style="list-style-type: none"> Sensing range: 0.7 m 2.297 ft (Note 4) 	Notes: 1) Keep the tape free from stress. If it is pressed too much, its capability may deteriorate. 2) Do not cut the tape. It will deteriorate the sensing performance.
Sensor mounting bracket (Note 1)	MS-CX2-1	Foot angled mounting bracket It can also be used for mounting RF-210 .	The thru-beam type sensor needs two brackets.
	MS-CX2-2	Foot biangled mounting bracket It can also be used for mounting RF-210 .	
	MS-CX2-4	Protective mounting bracket	
	MS-CX2-5	Back biangled mounting bracket	
	MS-CX-3	Back angled mounting bracket	
Universal sensor mounting stand (Note 2)	MS-AJ1	Horizontal mounting type	Basic assembly
	MS-AJ2	Vertical mounting type	Lateral arm assembly
	MS-AJ1-A	Horizontal mounting type	
	MS-AJ2-A	Vertical mounting type	Assembly for reflector
	MS-AJ1-M	Horizontal mounting type	
MS-AJ2-M	Vertical mounting type		
Sensor checker (Note 3)	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.	

Notes: 1) The plug-in connector type sensor does not allow use of some sensor mounting brackets because of the protrusion of the connector.
2) Refer to p.332~ for details of the universal sensor mounting stand.
3) Refer to p.414~ for details of the sensor checker **CHX-SC2**. Sensor mounting stand p.332.
4) Set the distance between the sensor and the reflective tape to 0.1 m 0.328 ft or more.

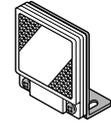
Reflector mounting bracket

• **MS-RF23**

• **MS-RF22**

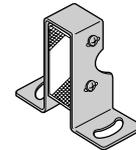


Two M4 (length 10 mm 0.394 in) screws with washers are attached.



Two M3 (length 8 mm 0.315 in) screws with washers are attached.

• **MS-RF21-1**



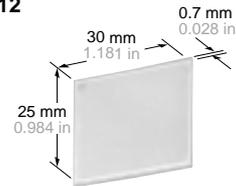
Two M3 (length 12 mm 0.472 in) screws with washers are attached.

Reflective tape

• **RF-11**



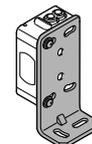
• **RF-12**



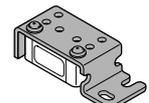
Sensor mounting bracket

• **MS-CX2-1**

• **MS-CX2-2**



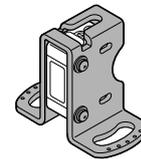
Two M3 (length 12 mm 0.472 in) screws with washers are attached.



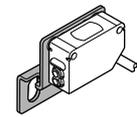
Two M3 (length 12 mm 0.472 in) screws with washers are attached.

• **MS-CX2-4**

• **MS-CX2-5**

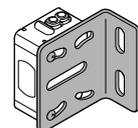


Two M3 (length 14 mm 0.551 in) screws with washers are attached.



Two M3 (length 12 mm 0.472 in) screws with washers are attached.

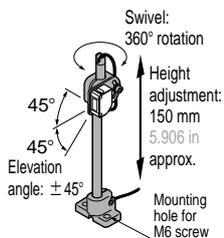
• **MS-CX-3**



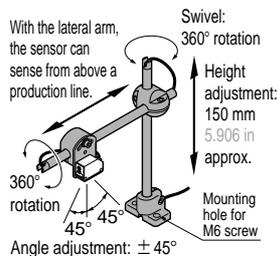
Two M3 (length 12 mm 0.472 in) screws with washers are attached.

Universal sensor mounting stand

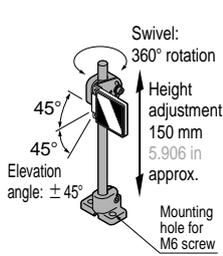
• **MS-AJ1**



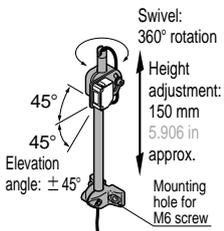
• **MS-AJ1-A**



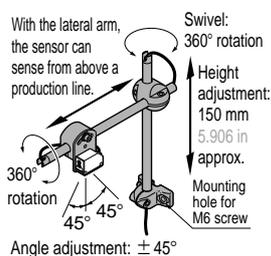
• **MS-AJ1-M**



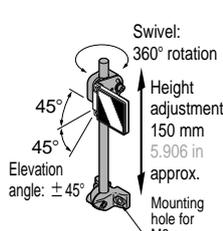
• **MS-AJ2**



• **MS-AJ2-A**

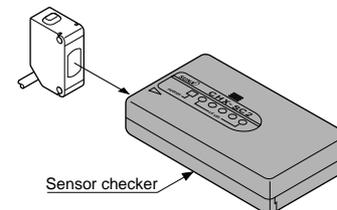


• **MS-AJ2-M**



Sensor checker

• **CHX-SC2**



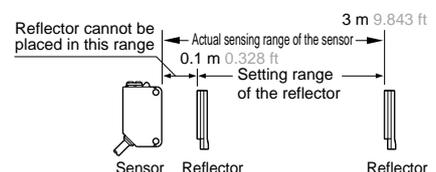
Two M3 (length 12 mm 0.472 in) screws with washers are attached.

CX-400

SPECIFICATIONS

Item	Model No. Type	Retroreflective		Diffuse reflective		Narrow-view reflective
		Thru-beam	With polarizing filters	Short sensing range	Long sensing range	
		NPN output type	CX-491	CX-421	CX-422	
	PNP output type	CX-411-P	CX-491-P	CX-421-P	CX-422-P	CX-423-P
Sensing range		10 m 32.808 ft	3 m 9.843 ft (Note 1)	300 mm 11.811 in (Note 2)	800 mm 31.496 in (Note 2)	70 to 200 mm 2.756 to 7.874 in (Note 2)
Sensing object		φ 12 mm φ 0.472 in or more opaque object (Note 3)	φ 50 mm φ 1.969 in or more opaque, translucent or specular object	Opaque, translucent or transparent object		Opaque, translucent or transparent object (Min. sensing object: φ 0.5 mm φ 0.020 in copper wire)
Hysteresis		15 % or less of operation distance				
Repeatability (perpendicular to sensing axis)		0.5 mm 0.020 in or less		1 mm 0.039 in or less		0.5 mm 0.020 in or less
Supply voltage		12 to 24 V DC ± 10 % Ripple P-P 10 % or less				
Current consumption		Emitter: 20 mA or less Receiver: 20 mA or less	20 mA or less	25 mA or less		20 mA or less
Output		<NPN output type> NPN open-collector transistor • Maximum sink current: 100 mA • Applied voltage: 30 V DC or less (between output and 0 V) • Residual voltage: 1 V or less (at 100 mA sink current) 0.4 V or less (at 16 mA sink current)		<PNP output type> PNP open-collector transistor • Maximum source current: 100 mA • Applied voltage: 30 V DC or less (between output and + V) • Residual voltage: 1 V or less (at 100 mA source current) 0.4 V or less (at 16 mA source current)		
Utilization category		DC-12 or DC-13				
Output operation		Switchable either Light-ON or Dark-ON				
Short-circuit protection		Incorporated				
Response time		1 ms or less				
Operation indicator		Orange LED (lights up when the output is ON)(incorporated on the receiver for thru-beam type)				
Stability indicator		Green LED (lights up under stable light received condition or stable dark condition)(incorporated on the receiver for thru-beam type)				
Power indicator		Green LED (lights up when the power is ON) (incorporated on the emitter)				
Sensitivity adjuster		Continuously variable adjuster (incorporated on the receiver for thru-beam type)				
Automatic interference prevention function		Two units of sensors can be mounted close together with interference prevention filters. (Sensing range: 5 m 16.404 ft)	Incorporated (Two units of sensors can be mounted close together.)			
Environmental resistance	Pollution degree	3 (Industrial environment)				
	Protection	IP67 (IEC)				
	Ambient temperature	- 25 to + 55 °C - 13 to + 131 °F (No dew condensation or icing allowed), Storage: - 30 to + 70 °C - 22 to + 158 °F				
	Ambient humidity	35 to 85 % RH, Storage: 35 to 85 % RH				
	Ambient illuminance	Sunlight: 10,000 lx at the light-receiving face, Incandescent light: 3,000 lx at the light-receiving face				
	EMC	EN 60947-5-2				
	Voltage withstandability	1,000 V AC for one min. between all supply terminals connected together and enclosure				
	Insulation resistance	20 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure				
	Vibration resistance	10 to 500 Hz frequency, 1.5 mm 0.059 in amplitude (10 G max.) in X, Y and Z directions for two hours each				
Shock resistance	500 m/s ² acceleration (50 G approx.) in X, Y and Z directions for three times each					
Emitting element		Red LED (modulated)		Infrared LED (modulated)		Red LED (modulated)
Material		Enclosure: PBT (polybutylene terephthalate), Lens: acrylic, Front cover: acrylic				
Cable		0.2 mm ² 3-core (thru-beam type emitter: 2-core) cabtyre cable, 2 m 6.562 ft long				
Cable extension		Extension up to total 100 m 328.084 ft is possible with 0.3 mm ² , or more, cable (thru-beam type: both emitter and receiver)				
Weight		50 g approx. (Emitter of thru-beam type: 45 g approx.)				
Accessories			RF-230 (Reflector): 1 pc.			

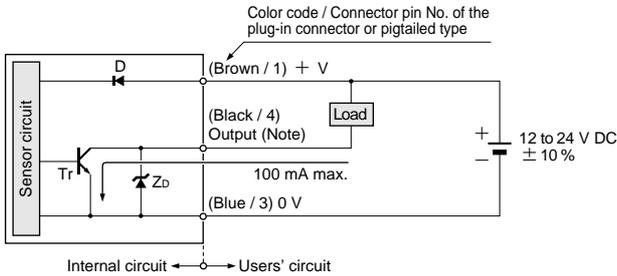
- Notes: 1) The sensing range and the sensing object of the retroreflective type sensor are specified for the **RF-230** reflector. In addition, set the distance between the sensor and the reflector to 0.1 m 0.328 ft or more.
 2) The sensing range of the diffuse reflective type sensor and narrow-view reflective type sensor are specified for white non-glossy paper (200 × 200 mm 7.874 × 7.874 in) as the object.
 3) If slit masks (optional) are fitted, an object of φ 0.5 mm φ 0.020 in (using round slit mask) can be detected.



I/O CIRCUIT AND WIRING DIAGRAMS

NPN output type

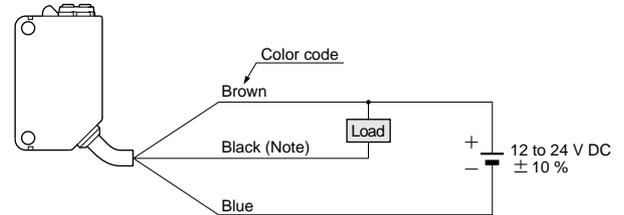
I/O circuit diagram



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

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

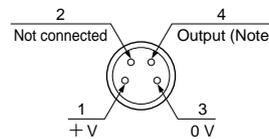
Wiring diagram



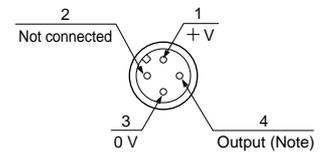
Note: The emitter of the thru-beam type sensor does not incorporate the black lead wire.

Connector pin position

M8 plug-in connector type



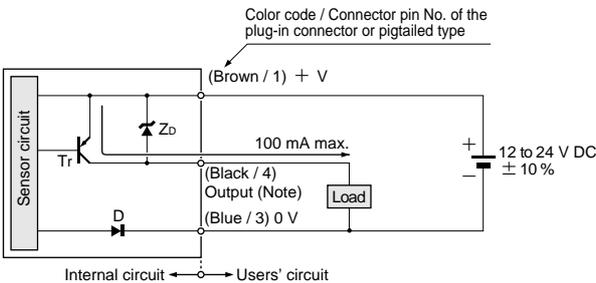
M12 pigtailed type



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

PNP output type

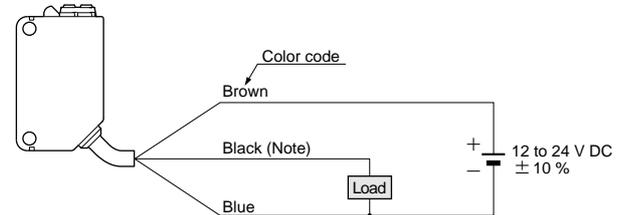
I/O circuit diagram



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

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

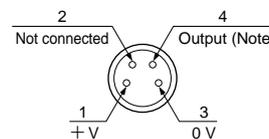
Wiring diagram



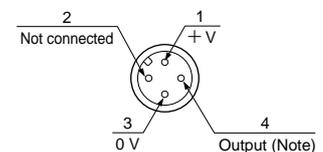
Note: The emitter of the thru-beam type sensor does not incorporate the black lead wire.

Connector pin position

M8 plug-in connector type



M12 pigtailed type



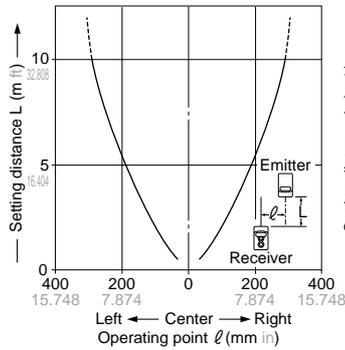
Note: The emitter of the thru-beam type sensor does not incorporate the output.

CX-400

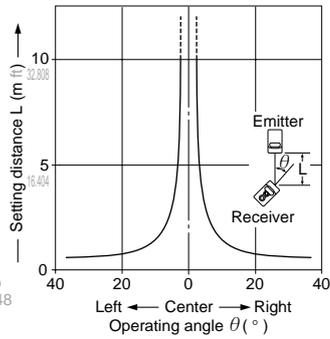
SENSING CHARACTERISTICS (TYPICAL)

CX-411 Thru-beam type

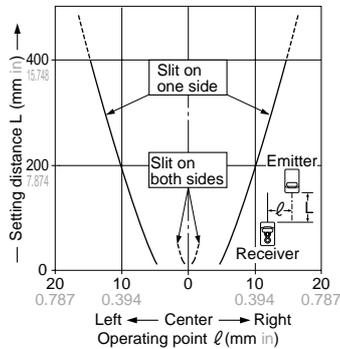
Parallel deviation



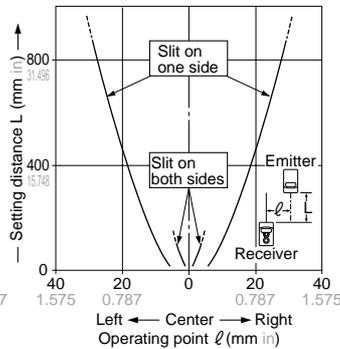
Angular deviation



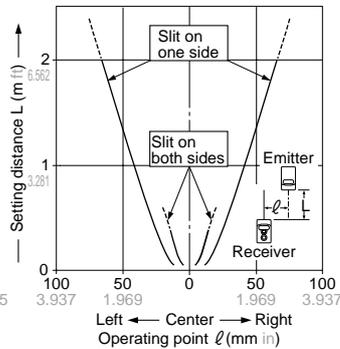
Parallel deviation with round slit masks ($\phi 0.5 \text{ mm } \phi 0.020 \text{ in}$)



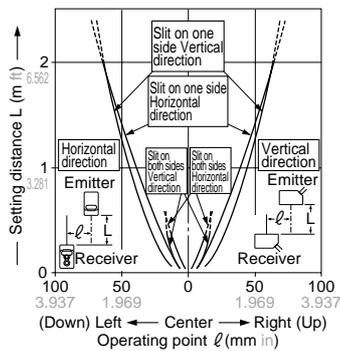
Parallel deviation with round slit masks ($\phi 1 \text{ mm } \phi 0.039 \text{ in}$)



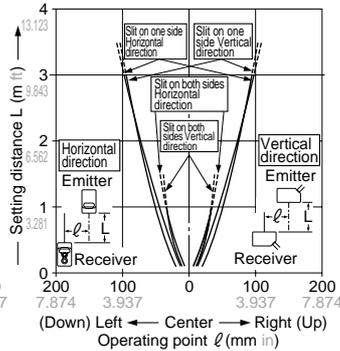
Parallel deviation with round slit masks ($\phi 2 \text{ mm } \phi 0.079 \text{ in}$)



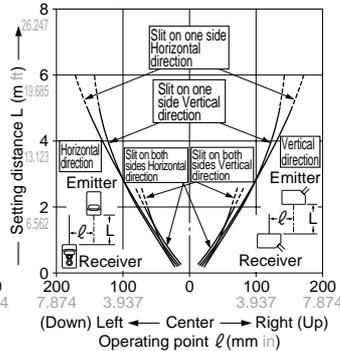
Parallel deviation with rectangular slit masks ($0.5 \times 6 \text{ mm } 0.020 \times 0.236 \text{ in}$)



Parallel deviation with rectangular slit masks ($1 \times 6 \text{ mm } 0.039 \times 0.236 \text{ in}$)

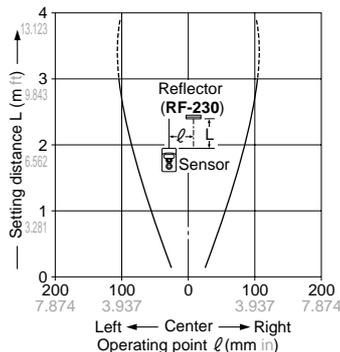


Parallel deviation with rectangular slit masks ($2 \times 6 \text{ mm } 0.079 \times 0.236 \text{ in}$)

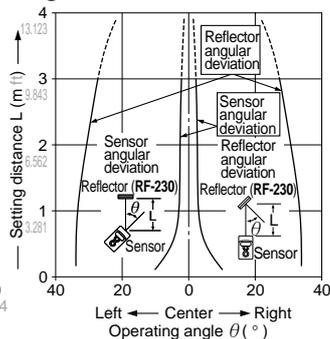


CX-491 Retroreflective type

Parallel deviation



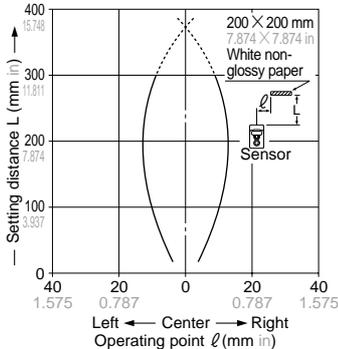
Angular deviation



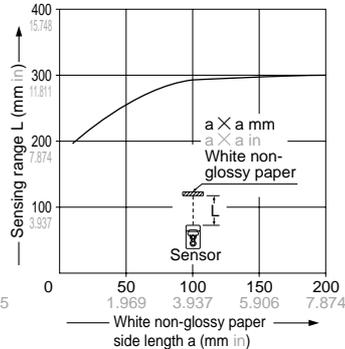
SENSING CHARACTERISTICS (TYPICAL)

CX-421 □ Diffuse reflective type

Sensing field



Correlation between sensing object size and sensing range

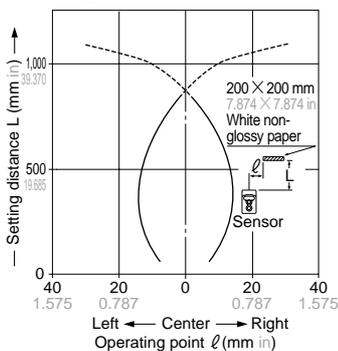


As the sensing object size becomes smaller than the standard size (white non-glossy paper 200 × 200 mm 7.874 × 7.874 in), the sensing range shortens, as shown in the left graph.

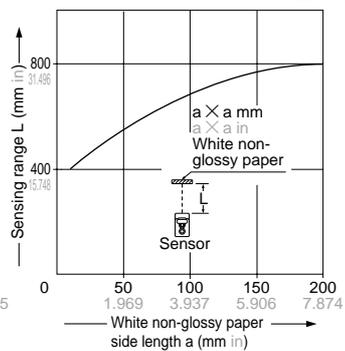
(For plotting the left graph, the sensitivity has been set such that a 200 × 200 mm 7.874 × 7.874 in white non-glossy paper is just detectable at a distance of 300 mm 11.811 in.)

CX-422 □ Diffuse reflective type

Sensing field



Correlation between sensing object size and sensing range

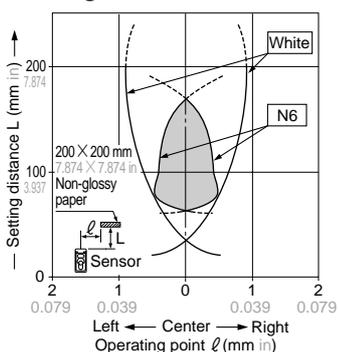


As the sensing object size becomes smaller than the standard size (white non-glossy paper 200 × 200 mm 7.874 × 7.874 in), the sensing range shortens, as shown in the left graph.

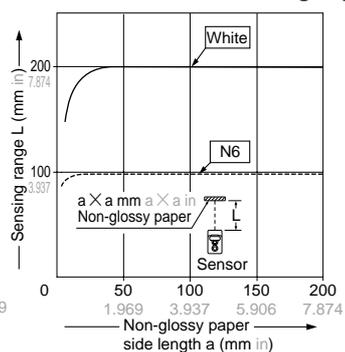
(For plotting the left graph, the sensitivity has been set such that a 200 × 200 mm 7.874 × 7.874 in white non-glossy paper is just detectable at a distance of 800 mm 31.496 in.)

CX-423 □ Narrow-view reflective type

Sensing field



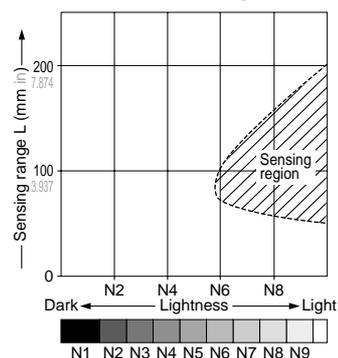
Correlation between sensing object size and sensing range



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.

(For plotting the left graph, the sensitivity has been set such that a 200 × 200 mm 7.874 × 7.874 in white non-glossy paper is just detectable at a distance of 200 mm 7.874 in.)

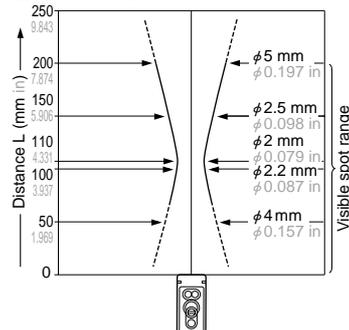
Correlation between lightness and sensing range



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

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

Emitted beam



CX-400

PRECAUTIONS FOR PROPER USE

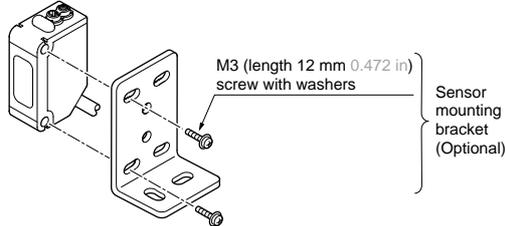
Refer to p.1135~ for general precautions.



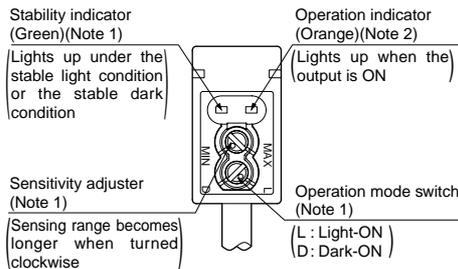
This product is not a safety sensor. Its use is not intended or designed to protect life and prevent body injury or property damage from dangerous parts of machinery. It is a normal object detection sensor.

Mounting

- The tightening torque should be 0.5 N·m or less.

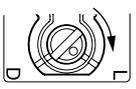
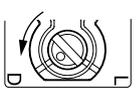


Functional description



- Notes: 1) Not incorporated on the thru-beam type sensor emitter.
 2) It is the power indicator (Green LED)(lights up when the power is ON) for the thru-beam type sensor emitter.

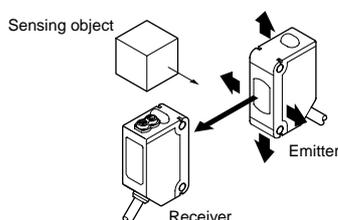
Operation mode switch

Operation mode switch	Description
	Light-ON mode is obtained when the operation mode switch (located on the receiver for the thru-beam type) is turned fully clockwise (L side).
	Dark-ON mode is obtained when the operation mode switch (located on the receiver for the thru-beam type) is turned fully counterclockwise (D side)

Beam alignment

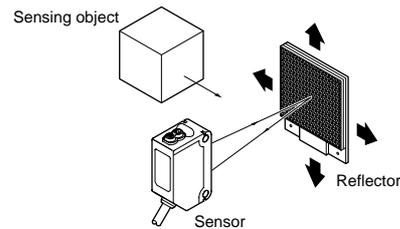
Thru-beam type sensor

- Set the operation mode switch to the Light-ON mode position (L side).
- Placing the emitter and the receiver face to face along a straight line, move the emitter in the up, down, left and right directions, in order to determine the range of the light received condition with the help of the operation indicator (orange). Then, set the emitter at the center of this range.
- Similarly, adjust for up, down, left and right angular movement of the emitter.
- Further, perform the angular adjustment for the receiver also.
- Check that the stability indicator (green) lights up.
- Choose the operation mode, Light-ON or Dark-ON, as per your requirement, with the operation mode switch.



Retroreflective type sensor

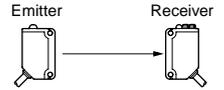
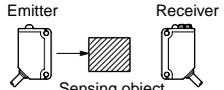
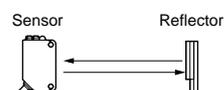
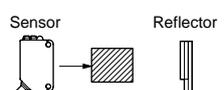
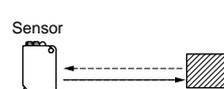
- Set the operation mode switch to the Light-ON mode position (L side).
- Placing the sensor and the reflector face to face along a straight line, move the reflector in the up, down, left and right directions, in order to determine the range of the light received condition with the help of the operation indicator (orange). Then, set the reflector at the center of this range.
- Similarly, adjust for up, down, left and right angular movement of the reflector.
- Further, perform the angular adjustment for the sensor also.
- Check that the stability indicator (green) lights up.
- Choose the operation mode, Light-ON or Dark-ON, as per your requirement, with the operation mode switch.



Sensitivity adjustment

Step	Sensitivity adjuster	Description
①		Turn the sensitivity adjuster fully counterclockwise to the minimum sensitivity position, MIN.
②		In the light received condition, turn the sensitivity adjuster slowly clockwise and confirm the point A where the sensor enters the 'Light' state operation.
③		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, the position is point B.)
④		The position at the middle of point A and B is the optimum sensing position.

Note : Use the 'minus' adjusting screwdriver (please arrange separately) to turn the adjuster slowly. Turning with excessive strength will cause damage to the adjuster.

	Light received condition	Dark condition
Thru-beam type		
Retroreflective type		
Diffuse reflective type and Narrow-view reflective type		

PRECAUTIONS FOR PROPER USE

Refer to p.1135~ for general precautions.

Relation between output and indicators

In case of Light-ON			Sensing condition	In case of Dark-ON		
Stability indicator (Green LED)	Operation indicator (Orange LED)	Output		Output	Operation indicator (Orange LED)	Stability indicator (Green LED)
○	○	ON	Stable light receiving	OFF	●	○
●			Unstable light receiving			●
○	●	OFF	Unstable dark receiving	ON	○	○
			Stable dark receiving			○

○: lights up ●: lights off

Retroreflective type sensor with polarizing filters

- If a shiny object is covered or wrapped with a transparent film, such as those described below, the retroreflective type sensor with polarizing filters may not be able to detect it. In that case, follow the steps given below.

Example of sensing objects

- Can wrapped by clear film
- Aluminum sheet covered by plastic film
- Gold or silver color (specular) label or wrapping paper

Steps

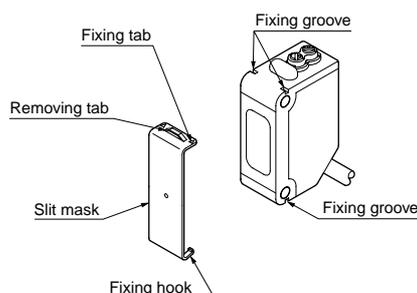
1. Tilt the sensor with respect to the sensing object while fitting.
2. Reduce the sensitivity.
3. Increase the distance between the sensor and the sensing object.

Slit mask (Optional) (Exclusively for thru-beam type sensor)

- With the slit mask (OS-CX-□), the sensor can detect a small object. However, the sensing range is reduced when the slit mask is mounted.

How to mount

1. Insert the fixing hook into the fixing groove.
2. Then, pressing the slit mask against the main unit, insert the fixing tab into the fixing groove.

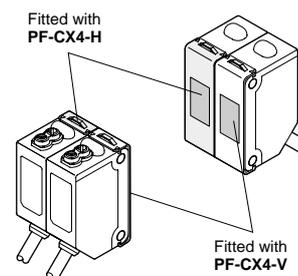


How to remove

1. Insert a screwdriver into the removing tab.
2. Pull forward while lifting the removing tab.

Interference prevention filter (Optional) (Exclusively for thru-beam type sensor)

- By mounting interference prevention filters (PF-CX4-□), two sets of CX-411□ can be mounted close together. However, the sensing range is reduced when the interference prevention filter is mounted.
- The filters can be mounted by the same method as for the slit masks.
- The two sets of sensors should be fitted with different types of interference prevention filters. Interference prevention does not work if the filters are mounted for emitters only, receivers only or if the same model No. of the interference prevention filters are mounted on both set of sensors.



Wiring

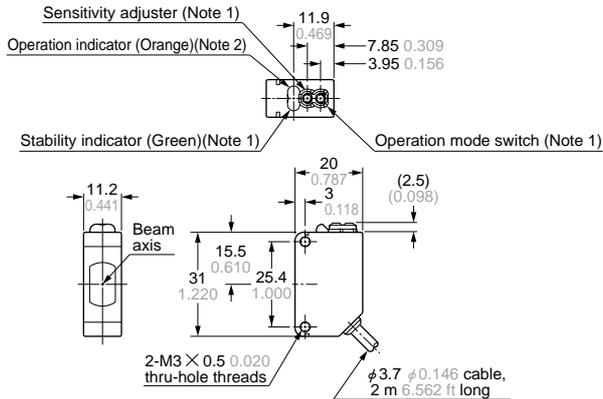
- Make sure that the power supply is off while wiring.
- Take care that wrong wiring will damage the sensor.
- Verify that the supply voltage variation is within the rating.
- If power is supplied from a commercial switching regulator, ensure that the frame ground (F.G.) terminal of the power supply is connected to an actual ground.
- In case noise generating equipment (switching regulator, inverter motor, etc.) is used in the vicinity of this product, connect the frame ground (F.G.) terminal of the equipment to an actual ground.
- Do not run the wires together with high-voltage lines or power lines or put them in the same raceway. This can cause malfunction due to induction.
- Extension up to total 100 m 328.084 ft (thru-beam type: both emitter and receiver) is possible with 0.3 mm², or more, cable. However, in order to reduce noise, make the wiring as short as possible.
- Make sure that stress by forcible bend or pulling is not applied directly to the sensor cable joint.

Others

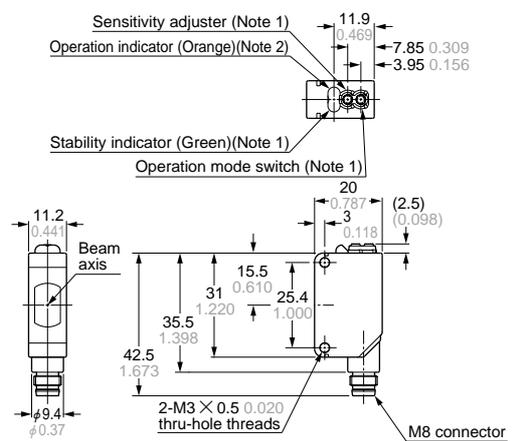
- Do not use during the initial transient time (50 ms) after the power supply is switched on.
- This sensor is suitable for indoor use only.
- Avoid dust, dirt, and steam.
- Take care that the sensor does not come in direct contact with water, oil, grease, or organic solvents, such as, thinner, etc.

CX-400

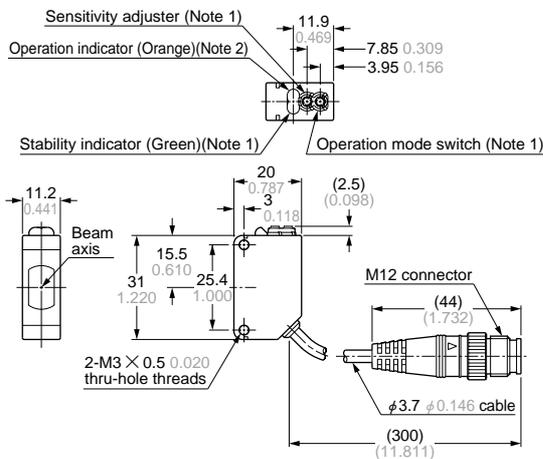
DIMENSIONS (Unit: mm in) The CAD data in the dimensions can be downloaded from the SUNX website: <http://www.sunx.co.jp/>

CX-411 Sensor

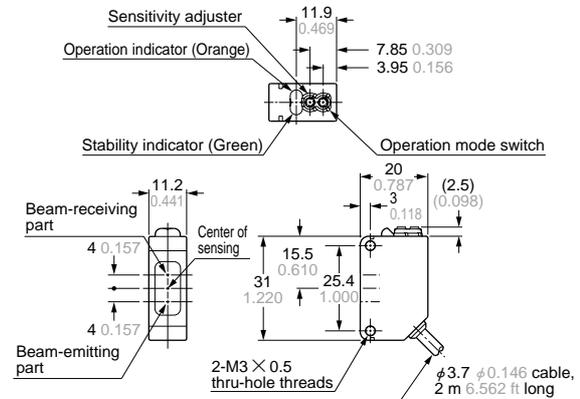
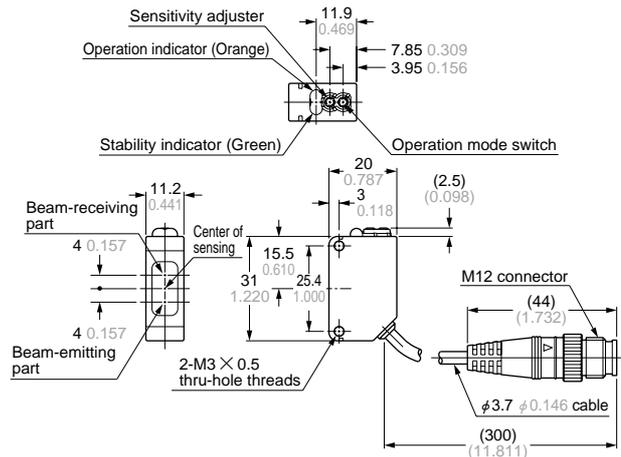
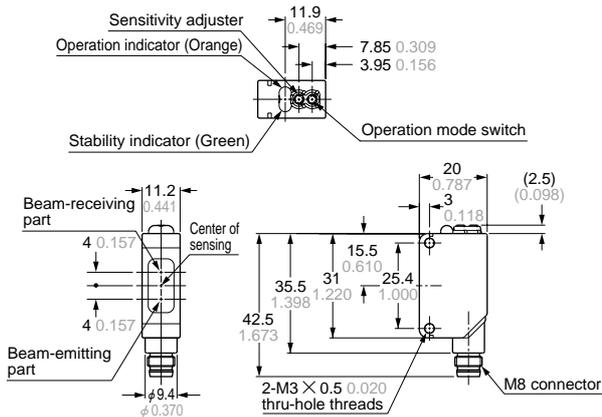
- Notes: 1) Not incorporated on the emitter.
2) It is the power indicator (green) on the emitter.

CX-411-Z Sensor

- Notes: 1) Not incorporated on the emitter.
2) It is the power indicator (green) on the emitter.

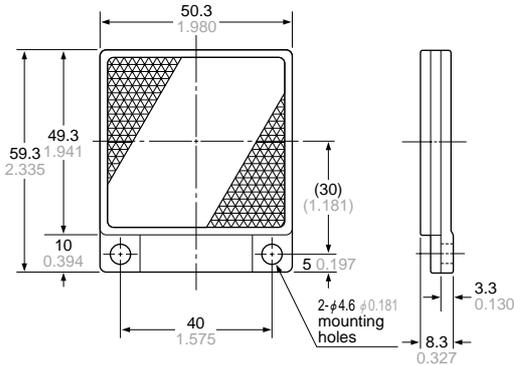
CX-411-J Sensor

- Notes: 1) Not incorporated on the emitter.
2) It is the power indicator (green) on the emitter.

CX-491 Sensor
CX-491/422 Sensor**CX-491-Z** Sensor
CX-491/422-Z Sensor

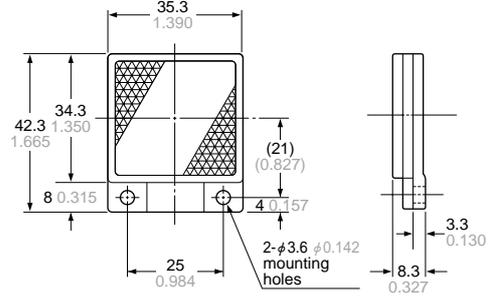
DIMENSIONS (Unit: mm in) The CAD data in the dimensions can be downloaded from the SUNX website: <http://www.sunx.co.jp/>

RF-230 Reflector (Accessory for the retroreflective type sensor)



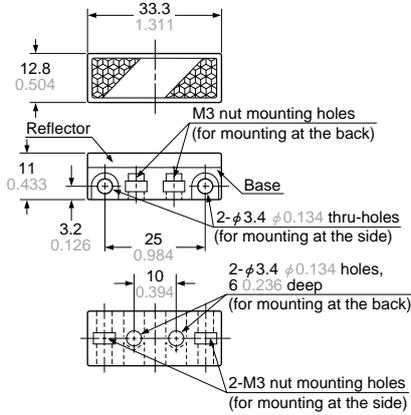
Material: Acrylic (Reflector)
ABS (Base)

RF-220 Reflector (Optional)



Material: Acrylic (Reflector)
ABS (Base)

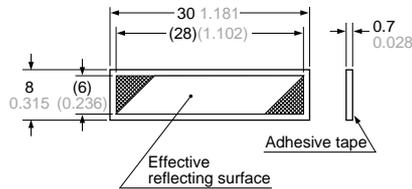
RF-210 Reflector (Optional)



Material: Acrylic (Reflector)
ABS (Base)

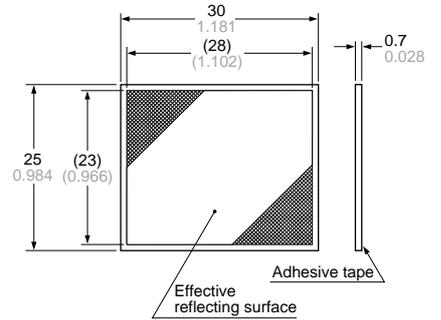
Two M3 (length 8 mm 0.315 in) screws with washers and two nuts are attached.

RF-11 Reflective tape (Optional)



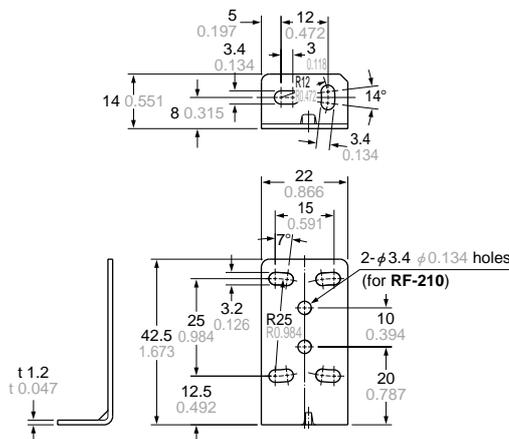
Material: Acrylic

RF-12 Reflective tape (Optional)



Material: Acrylic

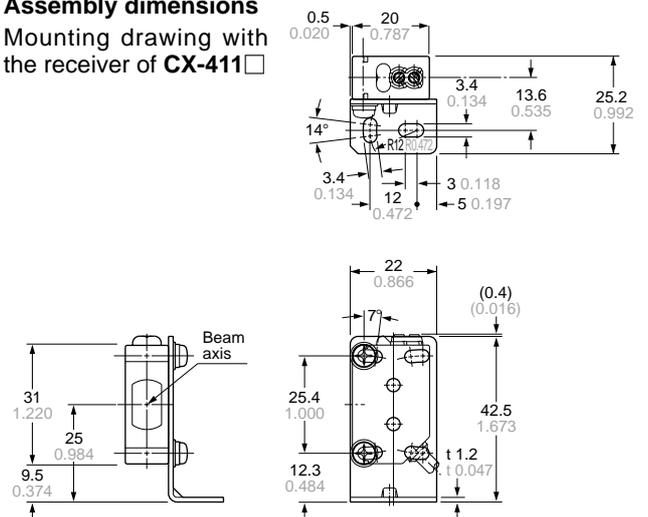
MS-CX2-1 Sensor mounting bracket (Optional)



Material: Stainless steel (SUS304)

Two M3 (length 12 mm 0.472 in) screws with washers are attached.

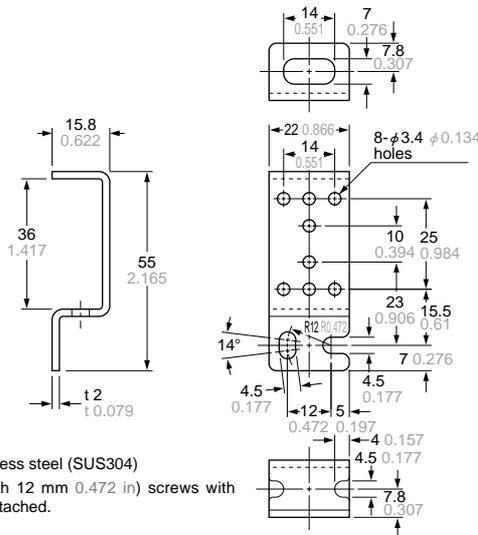
Assembly dimensions
Mounting drawing with the receiver of CX-411



CX-400

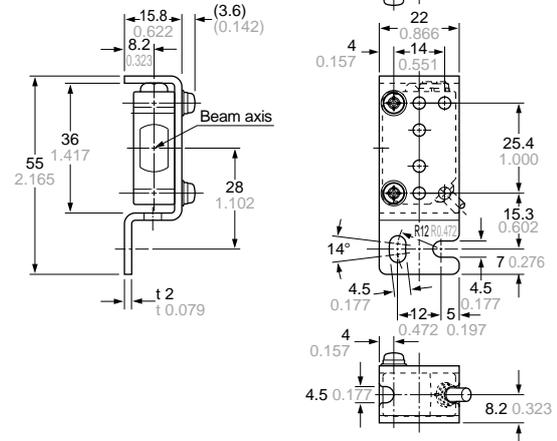
DIMENSIONS (Unit: mm in) The CAD data in the dimensions can be downloaded from the SUNX website: <http://www.sunx.co.jp/>

MS-CX2-2 Sensor mounting bracket (Optional)

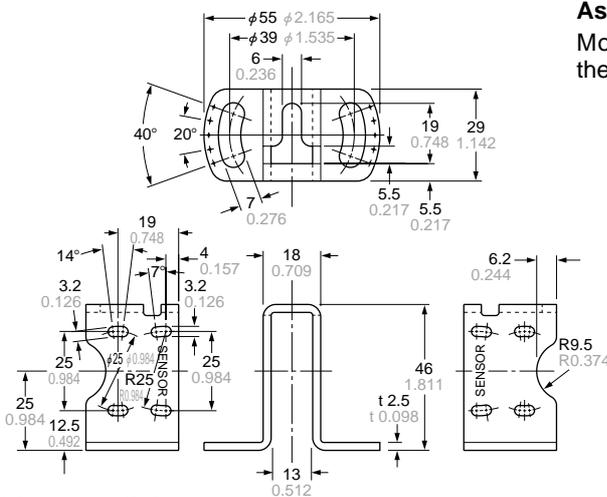


Material: Stainless steel (SUS304)
Two M3 (length 12 mm 0.472 in) screws with washers are attached.

Assembly dimensions Mounting drawing with the receiver of CX-411□

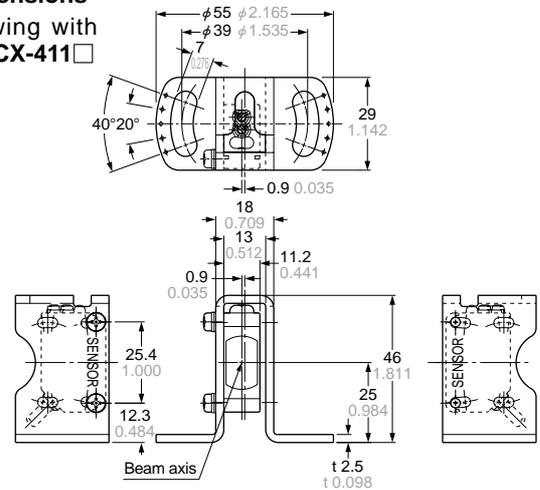


MS-CX2-4 Sensor mounting bracket (Optional)

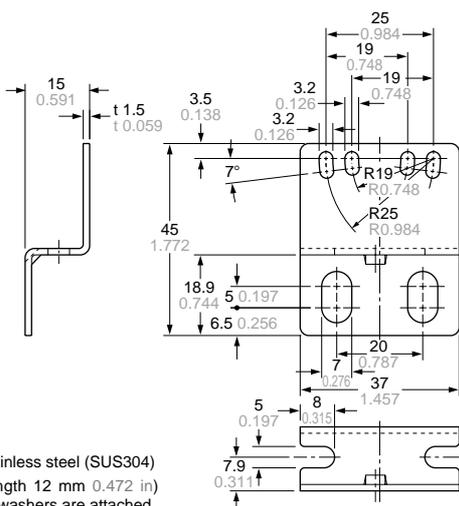


Material: Stainless steel (SUS304)
Two M3 (length 14 mm 0.551 in) screws with washers are attached.

Assembly dimensions Mounting drawing with the receiver of CX-411□

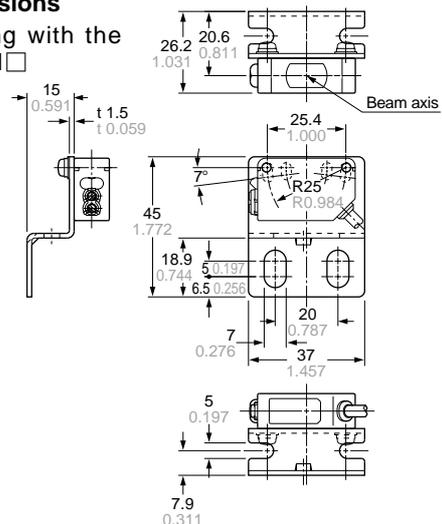


MS-CX2-5 Sensor mounting bracket (Optional)



Material: Stainless steel (SUS304)
Two M3 (length 12 mm 0.472 in) screws with washers are attached.

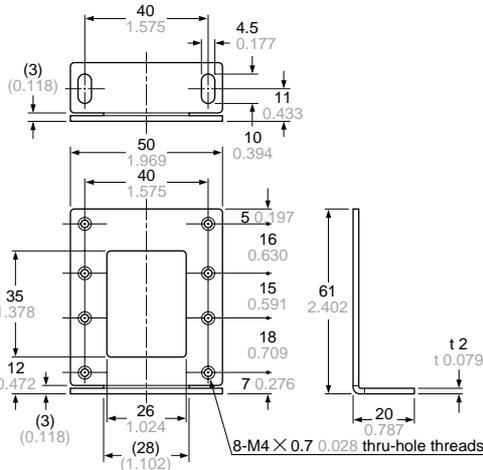
Assembly dimensions Mounting drawing with the receiver of CX-411□



CX-400

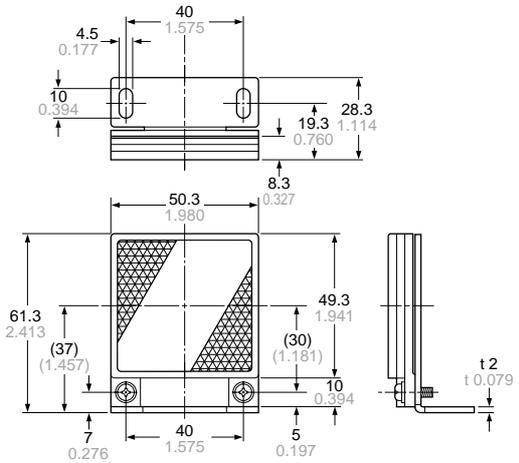
DIMENSIONS (Unit: mm in) The CAD data in the dimensions can be downloaded from the SUNX website: <http://www.sunx.co.jp/>

MS-RF23 Reflector mounting bracket for RF-230 (Optional)

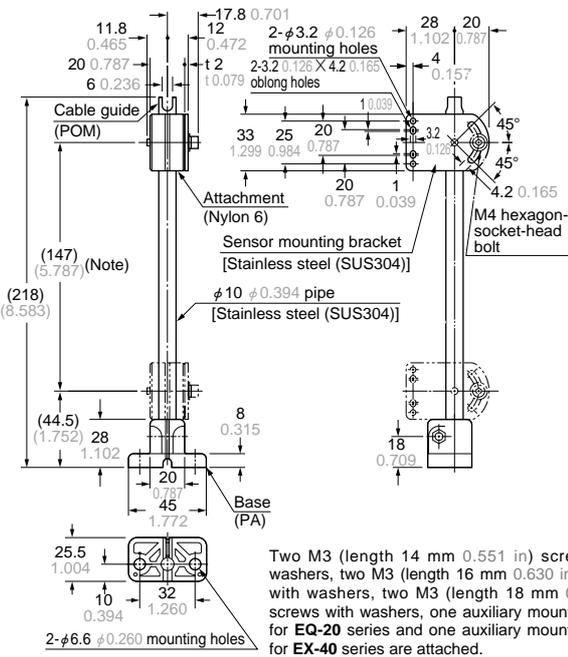


Material: Cold rolled carbon steel (SPCC)
(Uni-chrome plated)
Two M4 (length 10 mm 0.394 in) screws with washers are attached.

Assembly dimensions

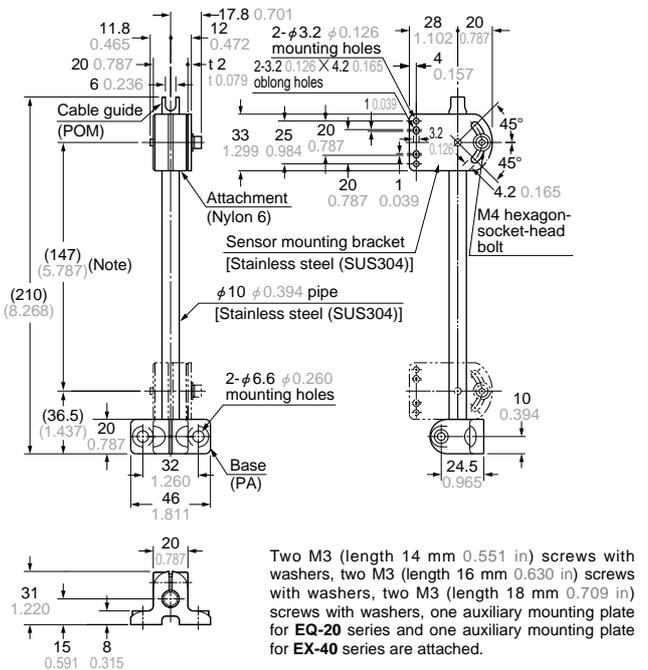


MS-AJ1 Universal sensor mounting stand (Optional)



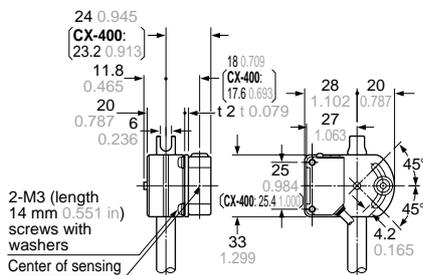
Note: The dimensions in the brackets indicate the adjustable range of the movable part.

MS-AJ2 Universal sensor mounting stand (Optional)

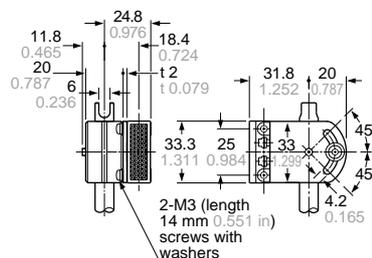


Note: The dimensions in the brackets indicate the adjustable range of the movable part.

Assembly dimensions with CX-400 series (Mounting part only)

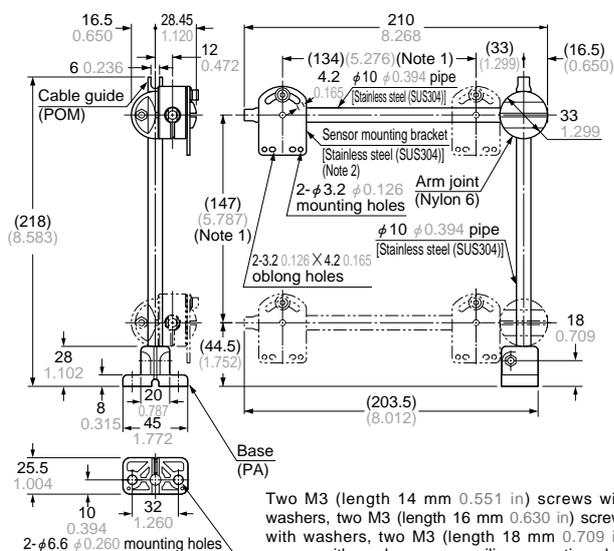


Assembly dimensions with RF-210 (Reflector) (Mounting part only)



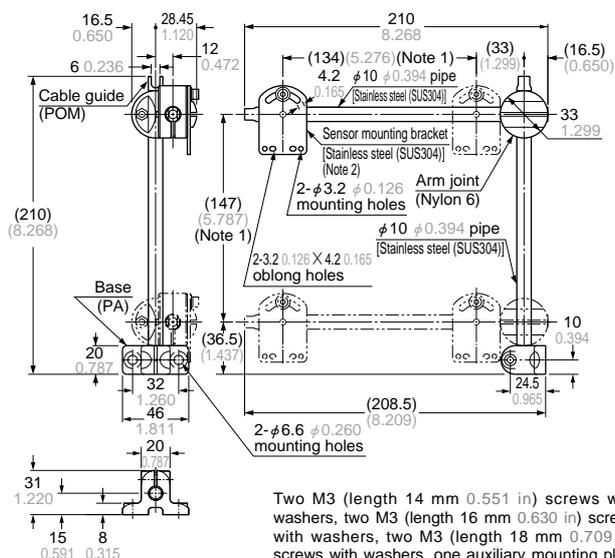
DIMENSIONS (Unit: mm in) The CAD data in the dimensions can be downloaded from the SUNX website: <http://www.sunx.co.jp/>

MS-AJ1-A Universal sensor mounting stand (Optional)



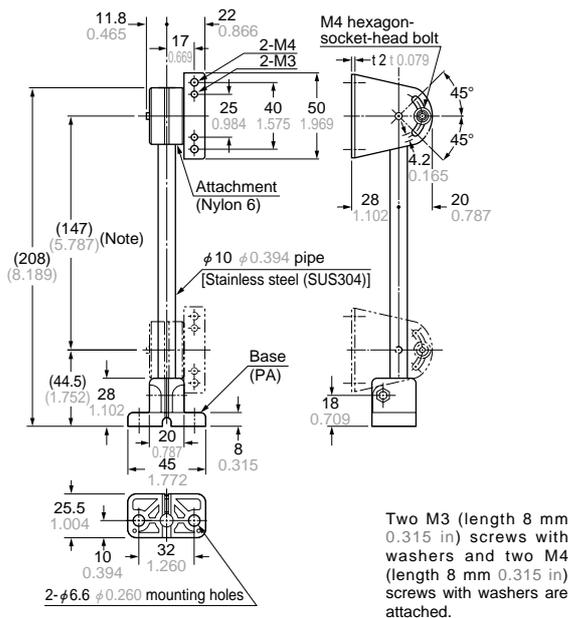
Notes: 1) The dimensions in the brackets indicate the adjustable range of the movable part.
2) Refer to MS-AJ1/AJ2 for the assembly dimensions with the sensor mounting bracket, sensor or reflector.

MS-AJ2-A Universal sensor mounting stand (Optional)



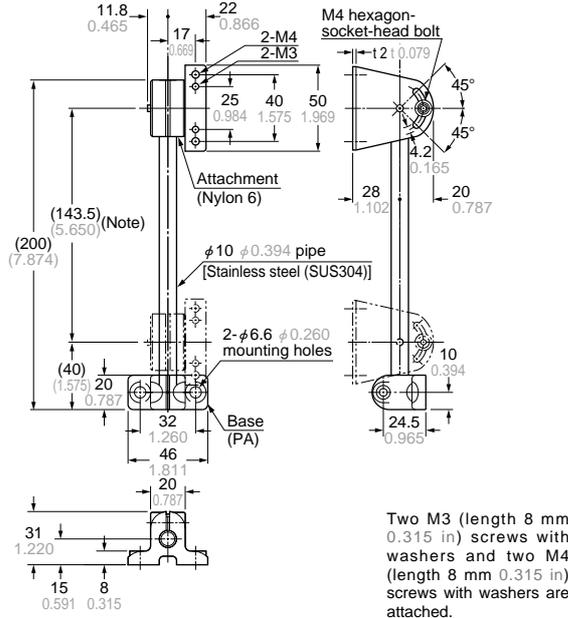
Notes: 1) The dimensions in the brackets indicate the adjustable range of the movable part.
2) Refer to MS-AJ1/AJ2 for the assembly dimensions with the sensor mounting bracket, sensor or reflector.

MS-AJ1-M Universal sensor mounting stand (Optional)



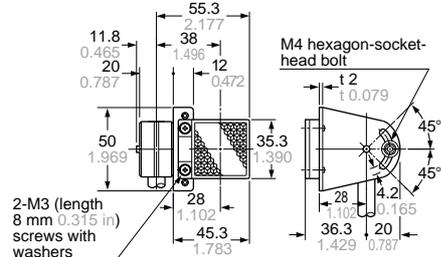
Note: The dimensions in the brackets indicate the adjustable range of the movable part.

MS-AJ2-M Universal sensor mounting stand (Optional)



Note: The dimensions in the brackets indicate the adjustable range of the movable part.

Assembly dimensions with RF-220 (Reflector) (Mounting part only)



Assembly dimensions with RF-230 (Reflector) (Mounting part only)

