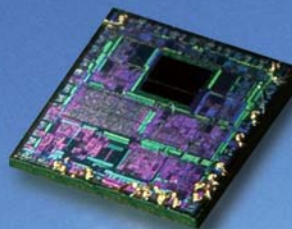


# The world standard CX-400 series Sensors that are environmentally and user friendly.

The total lineup of 148 models covers through the inclusion of a newly developed custom integrated circuit. This **CX-400** series upgrade achieves a significantly higher reliability in the same package as the older model.



Providing stable detection with low power consumption  
**Includes an analog CMOS  
processor ASIC**



## Strong

**Demonstrating stable detection,  
even in harsh environments**



The **CX-400** series incorporates an acrylic that strongly resists oils and coolant fluids, and a polycarbonate indicator cover that strongly resists ethanol. The **CX-400** series is also characterized by strong resistance to noise, reciprocal interference and cold environments.

### Resistant to oil and coolant liquids CX-41□/42□/49□

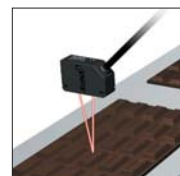
The lens material is made of a strong acrylic that resists the harmful effects of coolants. These sensors can be used with confidence even around metal processing machine that disperse oil mists.

Test Oil	JIS Standard	Product Name
Lubricant	-	Velocity Oil No. 3
Water-insoluble cutting oil	2-5	Daphnecut AS-30D
	2-11	Yushiron Oil No.2ac (Note)
Water-soluble cutting oil	W1-1	Yushiron Lubic HWC68 (Note)
	W2-1	Yushiroken S50N (Note)

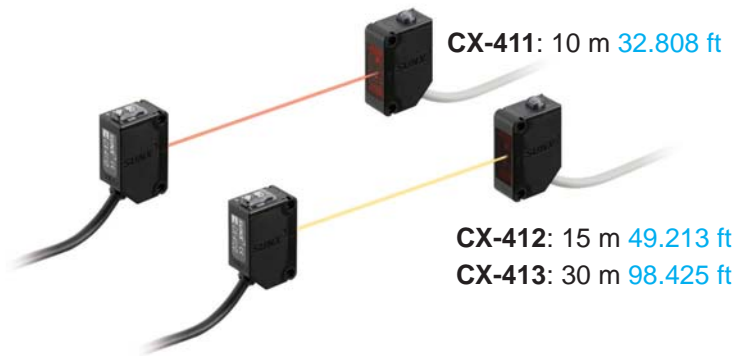
1,000 hours; Immersion (depth 0 m); Insulation resistance 20 MΩ/250 V  
Note: Yushiron and Yushiroken are registered trademarks of Yushiro Chemical Industry Co., Ltd.

### Strongly ethanol resistant CX-44□/48□

Incorporates a polycarbonate indicator cover that strongly resists ethanol. This makes it compatible with food processors that spray ethanol-based cleaning fluids.



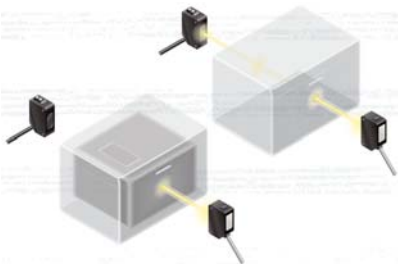
## Thru-beam type



### Strong infrared beam

CX-412/413

Remarkable penetrating ability enables applications such as package content detection come into practice. (Note)



Note: When sensing utilizing penetrating power, make sure to verify using the actual sensor.

### Strong in dust and dirt

CX-412/413

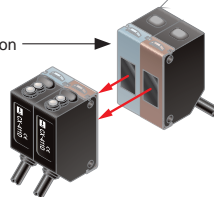
The infrared light source is strong in dust and dirt compared to the red beam type.

### Even the thru-beam type is strong at mutual interference

CX-411

Two CX-411 sensors, with their red beam light source, can be installed close together by inserting an interference prevention filter.

Interference prevention filter (Optional)

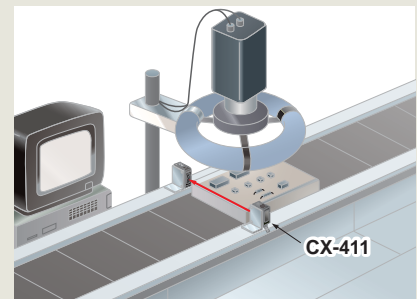


## Applications

- Detecting box collapsing within the rail of stacker crane

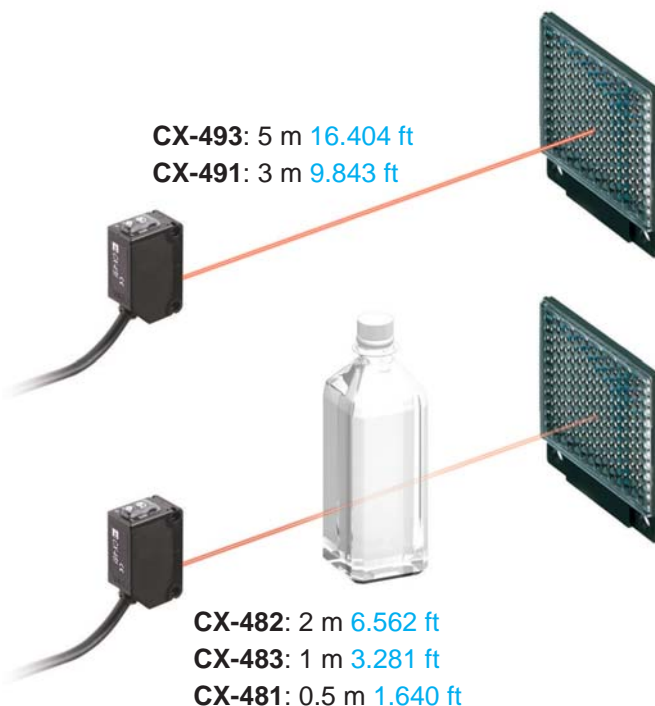


- Synchronizing sensor for image processing systems



## Retroreflective type

CX-493: 5 m 16.404 ft  
CX-491: 3 m 9.843 ft



For transparent object sensing

### Long sensing range of 5 m 16.404 ft

CX-493

A long 5 m 16.404 ft sensing range is possible with the red LED type that is easy to align with the beam axis. The sensors can be used for wide automatic door shutters.



### Retroreflective type with polarizing filters

CX-491

Built-in polarizing filters ensure stable sensing even on a mirror surface object.

### Strong against extraneous light and noise

CX-491

Hardly affected by extraneous lights or noises, these sensors provide stable sensing.

### Two sensors can be mounted close together

All models

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

## ORDER GUIDE

### Standard type

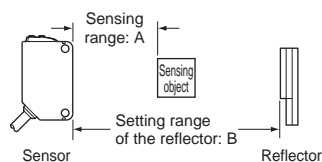
Type	Appearance	Sensing range	Model No. (Note 1)		Output operation	Emitting element
			NPN output	PNP output		
Thru-beam		10 m <b>32.808 ft</b>	<b>CX-411</b>	<b>CX-411-P</b>	Switchable either Light-ON or Dark-ON	Red LED
		15 m <b>49.213 ft</b>	<b>CX-412</b>	<b>CX-412-P</b>		Infrared LED
		30 m <b>98.425 ft</b>	<b>NEW CX-413</b>	<b>NEW CX-413-P</b>		
Retroreflective		3 m <b>9.843 ft</b> (Note 2)	<b>CX-491</b>	<b>CX-491-P</b>		Red LED
		5 m <b>16.404 ft</b> (Note 2)	<b>CX-493</b>	<b>CX-493-P</b>		
		50 to 500 mm <b>1.969 to 19.685 in</b> (Note 2)	<b>CX-481</b>	<b>CX-481-P</b>		Infrared LED
		50 to 1,000 mm <b>1.969 to 39.37 in</b> (Note 2)	<b>NEW CX-483</b>	<b>NEW CX-483-P</b>		
		0.1 to 2 m <b>0.328 to 6.562 ft</b> (Note 2)	<b>CX-482</b>	<b>CX-482-P</b>		
Diffuse reflective		100 mm <b>3.937 in</b>	<b>CX-424</b>	<b>CX-424-P</b>		Infrared LED
		300 mm <b>11.811 in</b>	<b>CX-421</b>	<b>CX-421-P</b>		
		800 mm <b>31.496 in</b>	<b>CX-422</b>	<b>CX-422-P</b>		
		70 to 300 mm <b>2.756 to 11.811 in</b>	<b>CX-423</b>	<b>CX-423-P</b>		Red LED
Adjustable range reflective		2 to 50 mm <b>0.079 to 1.969 in</b>	<b>CX-441</b>	<b>CX-441-P</b>		Red LED
		15 to 100 mm <b>0.591 to 3.937 in</b>	<b>CX-443</b>	<b>CX-443-P</b>		
		20 to 300 mm <b>0.787 to 11.811 in</b>	<b>CX-444</b>	<b>CX-444-P</b>		
		20 to 300 mm <b>0.787 to 11.811 in</b>	<b>CX-442</b>	<b>CX-442-P</b>		

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

Notes: 1) The model No. with "E" shown on the label affixed to the thru-beam type sensor is the emitter, "D" shown on the label is the receiver.

(e.g.) Emitter of **CX-411**: **CX-411E**, Receiver of **CX-411**: **CX-411D**

2) The sensing range of the retroreflective type sensor is specified for the **RF-230** reflector. The sensing range represents the actual sensing range of the sensor. The sensing ranges itemized in "A" of the table below may vary depending on the shape of sensing object. Be sure to check the operation with the actual sensing object.



	<b>CX-491</b> □	<b>CX-493</b> □	<b>CX-481</b> □	<b>CX-483</b> □	<b>CX-482</b> □
A	0 to 3 m <b>0 to 9.843 ft</b>	0 to 5 m <b>0 to 16.404 ft</b>	50 to 500 mm <b>1.969 to 19.685 in</b>	50 to 1,000 mm <b>1.969 to 39.37 in</b>	0.1 to 2 m <b>0.328 to 6.562 ft</b>
B	0.1 to 3 m <b>0.328 to 9.843 ft</b>	0.1 to 5 m <b>0.328 to 16.404 ft</b>	100 to 500 mm <b>3.937 to 19.685 in</b>	100 to 1,000 mm <b>3.937 to 39.37 in</b>	0.8 to 2 m <b>2.625 to 6.562 ft</b>

## ORDER GUIDE

**NEW**

**Basic type** (Without operation mode switch and sensitivity adjuster. Cable is 0.5 m 0.02 in long)

Type	Appearance	Sensing range	Model No.(Note 1)		Output operation	Emitting element
			NPN output	PNP output		
Thru-beam Long sensing range		10 m 32.808 ft	CX-411A-C05	CX-411A-P-C05	Light-ON	Red LED
			CX-411B-C05	CX-411B-P-C05	Dark-ON	
		15 m 49.213 ft	CX-412A-C05	CX-412A-P-C05	Light-ON	Infrared LED
			CX-412B-C05	CX-412B-P-C05	Dark-ON	
Retroreflective With polarizing filters	 Optional (Note 2)	3 m 9.843 ft (Note 3)	CX-491A-C05-Y	CX-491A-P-C05-Y	Light-ON	Red LED
			CX-491B-C05-Y	CX-491B-P-C05-Y	Dark-ON	

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

Notes: 1) The model No. with "E" shown on the label affixed to the thru-beam type sensor is the emitter, "D" shown on the label is the receiver.  
(e.g.) Emitter of CX-411A-C05: CX-411E, Receiver of CX-411A-C05: CX-411AD

2) The reflector is sold separately.

3) The sensing range of the retroreflective type sensor is specified for the RF-230 (optional) reflector. The sensing range represents the actual sensing range of the sensor. The sensing ranges itemized in "A" of the table below may vary depending on the shape of sensing object. Be sure to check the operation with the actual sensing object.

		CX-491□	
A	0 to 3 m 0 to 9.843 ft		
B	0.1 to 3 m 0.328 to 9.843 ft		

## ORDER GUIDE

### 0.5 m 1.640 ft / 5 m 16.4 ft cable length types

0.5 m 1.640 ft / 5 m 16.404 ft cable length types (standard: 2 m 6.562 ft, basic: 0.5 m 1.640 in) are also available.

When ordering this type, suffix “-C05” for the 0.5 m 1.640 ft cable length type, “-C5” for the 5 m 16.404 ft cable length type to the model No. (Excluding CX-44□ and basic type.)

(e.g.) 0.5 m 1.640 ft cable length type of CX-411-P is “CX-411-P-C05”

5 m 16.404 ft cable length type of CX-411-P is “CX-411-P-C5”

### M8 plug-in connector type, M12 pigtailed type

M8 plug-in connector type and M12 pigtailed type are also available.

When ordering this type, suffix “-Z” for the M8 connector type, “-J” for the M12 pigtailed type to the model No.

(Please note that M12 pigtailed type is not available for CX-44□. Excluding basic type.)

(e.g.) M8 connector type of CX-411-P is “CX-411-P-Z”

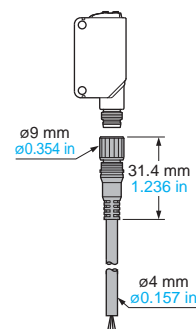
M12 pigtailed type of CX-411-P is “CX-411-P-J”

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

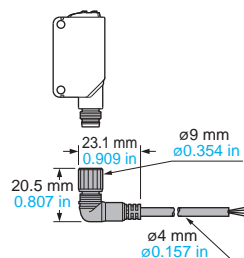
Type		Model No.	Cable length	Description
For M8 plug-in connector type	Straight	CN-24A-C2	2 m 6.562 ft	Can be used with all models
		CN-24A-C5	5 m 16.404 ft	
	Elbow	CN-24AL-C2	2 m 6.562 ft	
		CN-24AL-C5	5 m 16.404 ft	
For M12 pigtailed type	2-core	CN-22-C2	2 m 6.562 ft	For thru-beam type emitter (2-core)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

#### Mating cables

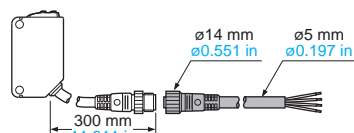
- CN-24A-C2  
CN-24A-C5



- CN-24AL-C2  
CN-24AL-C5



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



### Package without reflector

NPN output type: CX-491-Y

PNP output type: CX-491-P-Y

### Accessory

- RF-230 (Reflector)

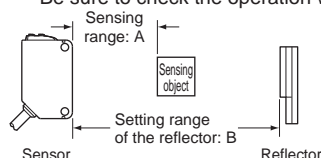


## OPTIONS

Designation	Model No.		Slit size	Sensing range		Min. sensing object	
	Slit mask	Sensor		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	CX-411□	ø0.5 mm ø0.020 in	400 mm 15.748 in	20 mm 0.787 in	ø12 mm ø0.472 in	ø0.5 mm ø0.020 in
		CX-412□		600 mm 23.622 in	30 mm 1.181 in		
		CX-413□		1,200 mm 47.242 in	60 mm 2.362 in		
	OS-CX-1	CX-411□	ø1 mm ø0.039 in	900 mm 35.433 in	100 mm 3.937 in	ø12 mm ø0.472 in	ø1 mm ø0.039 in
		CX-412□		1.35 m 4.429 ft	150 mm 5.906 in		ø1.5 mm ø0.059 in
		CX-413□		2.7 m 8.857 ft	300 mm 11.811 in		
	OS-CX-2	CX-411□	ø2 mm ø0.079 in	2 m 6.562 ft	400 mm 15.748 in	ø12 mm ø0.472 in	ø2 mm ø0.079 in
		CX-412□		3 m 9.843 ft	600 mm 23.622 in		ø3 mm ø0.118 in
		CX-413□		6 m 19.685 ft	1,200 mm 47.242 in		
Rectangular slit mask (For thru-beam type sensor only)	OS-CX-05x6	CX-411□	0.5x6 mm 0.020x0.236 in	2 m 6.562 ft	400 mm 15.748 in	ø12 mm ø0.472 in	0.5x6 mm 0.020x0.236 in
		CX-412□		3 m 9.843 ft	600 mm 23.622 in		
		CX-413□		6 m 19.685 ft	1,200 mm 47.242 in		
	OS-CX-1x6	CX-411□	1x6 mm 0.039x0.236 in	3 m 9.843 ft	1 m 3.281 ft	ø12 mm ø0.472 in	1x6 mm 0.039x0.236 in
		CX-412□		4.5 m 14.764 ft	1.5 m 4.921 ft		
		CX-413□		9 m 29.528 ft	3 m 9.843 ft		
	OS-CX-2x6	CX-411□	2x6 mm 0.079x0.236 in	5 m 16.404 ft	2 m 6.562 ft	ø12 mm ø0.472 in	2x6 mm 0.079x0.236 in
		CX-412□		7.5 m 24.606 ft	3 m 9.843 ft		
		CX-413□		15 m 49.213 ft	6 m 19.685 ft		

Designation	Model No.	Sensing range	Min. sensing object
Interference prevention filter (For CX-411□ only)	PF-CX4-V (Vertical, Silver) 2 pcs. per set	5 m 16.404 ft (Note 1)	ø12 mm ø0.472 in (Note 1)
	PF-CX4-H (Horizontal, Light brown) 2 pcs. per set		
Reflector (For retro-reflective type sensor only)	RF-210	CX-491□ 1 m 3.281 ft (Note 2)	ø30 mm ø1.181 in
		CX-493□ 1.5 m 4.921 ft (Note 2)	
		CX-481□ —	
		CX-483□ 0.1 to 0.3 m 0.328 to 0.984 ft (Note 2)	
	RF-220	CX-482□ 0.1 to 0.6 m 0.328 to 1.969 ft (Note 2)	ø35 mm ø1.378 in
		CX-491□ 1.5 m 4.921 ft (Note 2)	
		CX-493□ 3 m 9.843 ft (Note 2)	
		CX-481□ 50 to 300 mm 1.969 to 11.811 ft (Note 2)	
		CX-483□ 0.1 to 0.7 m 0.328 to 2.297 ft (Note 2)	
		CX-482□ 0.1 to 1.3 m 0.328 to 4.265 ft (Note 2)	
	RF-230 (Note 3)	CX-491□-Y 3 m 9.843 ft (Note 2)	ø50 mm ø1.969 in

Notes: 1) Value when attached on both sides.  
 2) Set the distance between the CX-491□/493□ and the reflector to 0.1 m 0.328 ft or more.  
 However, see the table below for CX-48□.  
 The sensing range "A" may vary depending on the shape of sensing object.  
 Be sure to check the operation with the actual sensing object.

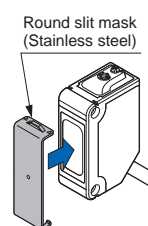


Model No.		A	B
Sensor	Reflector		
CX-481□	RF-220	50 to 300 mm 1.969 to 11.811 in	100 to 300 mm 3.937 to 11.811 in
	RF-230	0.1 to 0.7 m 0.328 to 2.297 ft	0.2 to 0.7 m 0.656 to 2.297 ft
CX-483□	RF-210	0.1 to 0.3 m 0.328 to 0.984 ft	0.1 to 0.3 m 0.328 to 0.984 ft
	RF-230	0.05 to 1 m 0.164 to 3.281 ft	0.1 to 1 m 0.328 to 3.281 ft
CX-482□	RF-220	0.1 to 1.3 m 0.328 to 4.265 ft	0.5 to 1.3 m 1.640 to 4.265 ft
	RF-210	0.1 to 0.6 m 0.328 to 1.969 ft	0.3 to 0.6 m 0.984 to 1.969 ft

3) RF-230 is attached to the retroreflective type sensor other than the basic type.

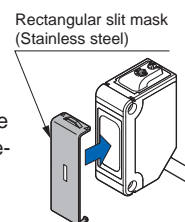
### Round slit mask

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



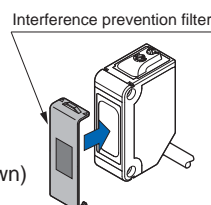
### Rectangular slit mask

- OS-CX-□x6  
Fitted on the front face of the sensor with one-touch.



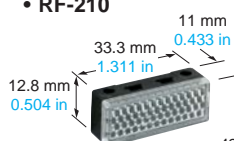
### Interference prevention filter

- PF-CX4-V  
(Vertical, Silver)
  - PF-CX4-H  
(Horizontal, Light brown)
- Two sets of CX-411□ can be mounted close together.

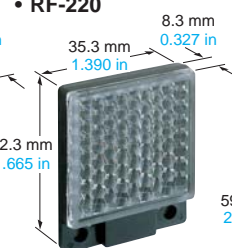


### Reflector

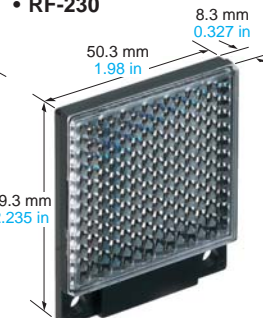
- RF-210



- RF-220



- RF-230

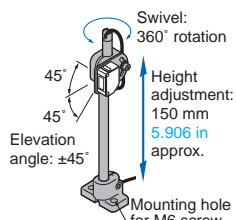


Designation	Model No.	Description
Reflector mounting bracket	<b>MS-RF21-1</b>	Protective mounting bracket for <b>RF-210</b> It protects the reflector from damage and maintains alignment.
	<b>MS-RF22</b>	For <b>RF-220</b>
	<b>MS-RF23</b>	For <b>RF-230</b>
Reflective tape	<b>RF-11</b>	<ul style="list-style-type: none"> <li>Sensing range (Note 4): 0.5 m <b>1.640 ft</b> [CX-491□] 0.8 m <b>2.625 ft</b> [CX-493□]</li> <li>Ambient temperature: -25 to +50 °C -13 to +122 °F</li> <li>Ambient humidity: 35 to 85 % RH</li> </ul>
	<b>RF-12</b>	<ul style="list-style-type: none"> <li>Sensing range (Note 4): 0.7 m <b>2.297 ft</b> [CX-491□] 1.2 m <b>3.937 ft</b> [CX-493□] 0.1 to 0.6 m 0.328 to 1.969 ft [CX-482□]</li> <li>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.</li> </ul>
	<b>RF-13</b>	<ul style="list-style-type: none"> <li>Sensing range (Note 5): 0.5 m <b>1.640 ft</b> [CX-491□]</li> <li>Ambient temperature: -25 to +55 °C -13 to +131 °F</li> <li>Ambient humidity: 35 to 85 % RH</li> </ul>
Sensor mounting bracket (Note 1)	<b>MS-CX2-1</b>	Foot angled mounting bracket It can also be used for mounting <b>RF-210</b> .
	<b>MS-CX2-2</b>	Foot biangled mounting bracket It can also be used for mounting <b>RF-210</b> .
	<b>MS-CX2-4</b>	Protective mounting bracket
	<b>MS-CX2-5</b>	Back biangled mounting bracket
	<b>MS-CX-3</b>	Back angled mounting bracket
Universal sensor mounting stand (Note 2)	<b>MS-AJ1</b>	Horizontal mounting type
	<b>MS-AJ2</b>	Vertical mounting type
	<b>MS-AJ1-A</b>	Horizontal mounting type
	<b>MS-AJ2-A</b>	Vertical mounting type
	<b>MS-AJ1-M</b>	Horizontal mounting type
Sensor checker (Note 3)	<b>CHX-SC2</b>	It is useful for beam alignment of thru-beam type sensors. The optimum receiver position is given by indicators, as well as an audio signal.

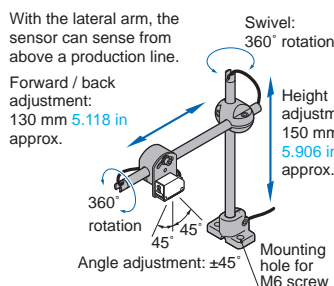
- Notes: 1) The plug-in connector type sensor does not allow use of some sensor mounting brackets because of the protrusion of the connector.  
2) Refer to the general catalog for details of the universal sensor mounting stand.  
3) Refer to the general catalog for details of the sensor checker **CHX-SC2**.  
4) Set the distance between the sensor and the reflective tape to 0.1 m **0.328 ft** [CX-482□]: 0.4 m **1.312 ft** or more.  
5) Set the distance between the sensor and the reflective tape to 0.2 m **0.656 ft** or more.

## Universal sensor mounting stand

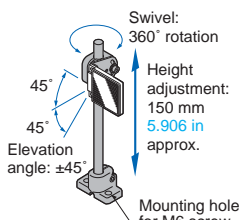
### • MS-AJ1



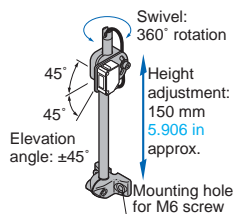
### • MS-AJ1-A



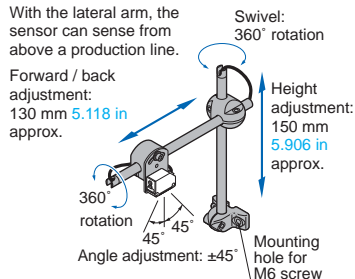
### • MS-AJ1-M



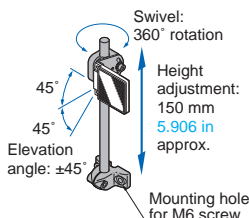
### • MS-AJ2



### • MS-AJ2-A

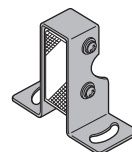


### • MS-AJ2-M



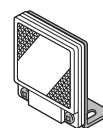
## Reflector mounting bracket

### • MS-RF21-1



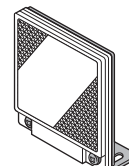
Two M3 (length 12 mm **0.472 in**) screws with washers are attached.

### • MS-RF22



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

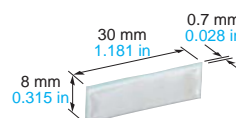
### • MS-RF23



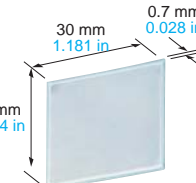
Two M4 (length 10 mm **0.394 in**) screws with washers are attached.

## Reflective tape

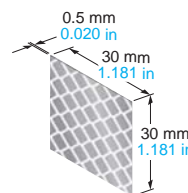
### • RF-11



### • RF-12

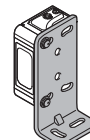


### • RF-13



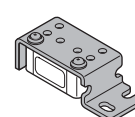
## Sensor mounting bracket

### • MS-CX2-1



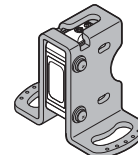
Two M3 (length 12 mm **0.472 in**) screws with washers are attached.

### • MS-CX2-2



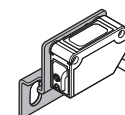
Two M3 (length 12 mm **0.472 in**) screws with washers are attached.

### • MS-CX2-4



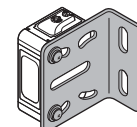
Two M3 (length 14 mm **0.551 in**) screws with washers are attached.

### • MS-CX2-5



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

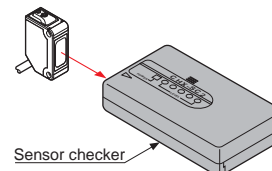
### • MS-CX-3



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

## Sensor checker

### • CHX-SC2



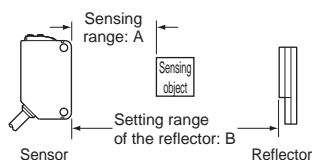
## SPECIFICATIONS

### Standard type

Item	Model No.	Type	Thru-beam			Retroreflective					Diffuse reflective				Narrow-view
			Long sensing range			With polarizing filters	Long sensing range	For transparent object sensing							
			NPN output	CX-411	CX-412	CX-413	CX-491	CX-493	CX-481	CX-483	CX-482	CX-424	CX-421	CX-422	CX-423
PNP output	CX-411-P	CX-412-P	CX-413-P	CX-491-P	CX-493-P	CX-481-P	CX-483-P	CX-482-P	CX-424-P	CX-421-P	CX-422-P	CX-423-P			
Sensing range		10 m 32.808 ft	15 m 49.213 ft	30m 98.425 ft	3 m 9.843 ft (Note 2)	5 m 16.404 ft (Note 2)	50 to 500 mm 1.969 to 19.685 in (Note 2)	50 to 1,000mm 1.969 to 39.37 in (Note 2)	0.1 to 2 m 0.328 to 6.562 ft (Note 2)	100 mm 3.937 in (Note 3)	300 mm 11.811 in (Note 3)	800 mm 31.496 in (Note 3)	70 to 200 mm 2.756 to 7.874 in (Note 3)		
Sensing object		ø12 mm ø0.472 in or more opaque object (Note 4)			ø50 mm ø1.969 in or more opaque, translucent or specular object (Note 2, 5)	ø50 mm ø1.969 in or more opaque or translucent object (Note 2, 5)	ø50 mm ø1.969 in or more transparent, translucent or opaque object (Note 2, 5)			Opaque, translucent or transparent object (Note 5)			Opaque, translucent or transparent object (Note 5) (Min. sensing object ø1.5 mm ø0.020 in copper wire)		
Hysteresis											15 % or less of operation distance (Note 3)				
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: 15 mA or less Receiver: 10 mA or less	Emitter: 20 mA or less Receiver: 10 mA or less	Emitter: 25 mA or less Receiver: 10 mA or less	13 mA or less	10 mA or less				13 mA or less		15 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: 2 V or less (at 100 mA sink current) 1 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: 2 V or less (at 100 mA source current) 1 V or less (at 16 mA source current)													
Output operation		Switchable either Light-ON or Dark-ON													
Short-circuit protection		Incorporated													
Response time		1 ms or less		2 ms or less		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	Protection		IP67 (IEC)												
	Ambient temperature		-25 to +55 °C -13 to +131 °F (No dew condensation or icing allowed), Storage: -30 to +70 °C -22 to +158 °F												
	Ambient humidity		35 to 85 % RH, Storage: 35 to 85 % RH												
	Ambient illuminance		Incandescent light: 3,000 lx at the light-receiving face												
	Voltage withstandability		1,000 V AC for one min. between all supply terminals connected together and enclosure												
	Insulation resistance		20 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure												
	Vibration resistance		10 to 500 Hz frequency, 1.5 mm 0.059 in double amplitude (10 G max.) in X, Y and Z directions for two hours each												
	Shock resistance		500 m/s <sup>2</sup> acceleration (50 G approx.) in X, Y and Z directions for three times each												
Emitting element (modulated)		Red LED	Infrared LED		Red LED		Infrared LED		Infrared LED		Red LED				
Peak emission wavelength		680 nm 0.027 mil	870 nm 0.034 mil	850 nm 0.033 mil	680 nm 0.027 mil	650 nm 0.026 mil	870 nm 0.034 mil			860 nm 0.033 mil		645 nm 0.025 mil			
Material		Enclosure: PBT (Polybutylene terephthalate), Lens: Acrylic (CX-48□: Polycarbonate), Indicator cover: Acrylic (CX-48□: Polycarbonate)													
Cable		0.2 mm <sup>2</sup> 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 <sup>2</sup> , or more, cable (thru-beam type: both emitter and receiver)													
Weight	Net	Emitter: 45 g approx., Receiver: 50 g approx.				50 g approx.									
	Gross	100 g approx.				80 g approx.				60 g approx.					
Accessories						RF-230 (Reflector): 1 pc.									

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C +73.4 °F.

2) The sensing range and the sensing object of the retroreflective type sensor are specified for the RF-230 reflector. The sensing range represents the actual sensing range of the sensor. The sensing ranges itemized in "A" of the table below may vary depending on the shape of sensing object. Be sure to check the operation with the actual sensing object.



	CX-491□	CX-493□	CX-481□	CX-483□	CX-482□
A	0 to 3 m 0 to 9.843 ft	0 to 5 m 0 to 16.404 ft	50 to 500 mm 1.969 to 19.685 in	50 to 1,000 mm 1.969 to 39.37 in	0.1 to 2 m 0.328 to 6.562 ft
B	0.1 to 3 m 0.328 to 9.843 ft	0.1 to 5 m 0.328 to 16.404 ft	100 to 500 mm 3.937 to 19.685 in	100 to 1,000 mm 3.937 to 39.37 in	0.8 to 2 m 2.625 to 6.562 ft

3) The sensing range and hysteresis of the diffuse reflective type sensor are specified for white non-glossy paper (200 x 200 mm 7.874 x 7.874 in) as the object.

4) If slit masks (optional) are fitted, an object of ø0.5 mm ø0.020 in (using round slit mask) can be detected.

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

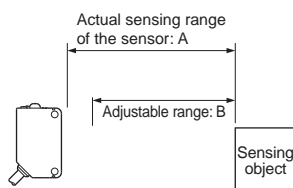
## SPECIFICATIONS

### Standard type

		Type	Adjustable range reflective			
			Small spot			
Item	Model No.	NPN output	CX-441	CX-443	CX-444	CX-442
		PNP output	CX-441-P	CX-443-P	CX-444-P	CX-442-P
Adjustable range (Note 2)			20 to 50 mm 0.787 to 1.969 in		20 to 100 mm 0.787 to 3.937 in	40 to 300 mm 1.575 to 11.811 in
Sensing range (with white non-glossy paper)			2 to 50 mm 0.079 to 1.969 in		15 to 100 mm 0.591 to 3.937 in	20 to 300 mm 0.787 to 11.811 in
Hysteresis (with white non-glossy paper)			2 % or less of operation distance			5 % or less of operation distance
Repeatability			Along sensing axis: 1 mm 0.039 in or less, Perpendicular to sensing axis: 0.2 mm 0.008 in or less (with white non-glossy paper)			
Supply voltage			12 to 24 V DC ±10 % Ripple P-P 10 % or less			
Current consumption			25 mA or less			
Output			<NPN output type> NPN open-collector transistor <ul style="list-style-type: none"><li>Maximum sink current: 100 mA</li><li>Applied voltage: 30 V DC or less (between output and 0 V)</li><li>Residual voltage: 2 V or less (at 100 mA sink current) 1 V or less (at 16 mA sink current)</li></ul>		<PNP output type> PNP open-collector transistor <ul style="list-style-type: none"><li>Maximum source current: 100 mA</li><li>Applied voltage: 30 V DC or less (between output and +V)</li><li>Residual voltage: 2 V or less (at 100 mA source current) 1 V or less (at 16 mA source current)</li></ul>	
			Output operation		Switchable either Detection-ON or Detection-OFF	
			Short-circuit protection		Incorporated	
Response time			1 ms or less			
Operation indicator			Orange LED (lights up when the output is ON)			
Stability indicator			Green LED (lights up under stable operating condition) (Note 3)			
Distance adjuster			5-turn mechanical adjuster			
Sensing mode			BGS / FGS functions Switchable with wiring of sensing mode selection input			
Automatic interference prevention function (Note 4)			Incorporated			
Environmental resistance	Protection		IP67 (IEC)			
	Ambient temperature		-25 to +55 °C -13 to +131 °F (No dew condensation or icing allowed), Storage: -30 to +70 °C -22 to +158 °F			
	Ambient humidity		35 to 85 % RH, Storage: 35 to 85 % RH			
	Ambient illuminance		Incandescent light: 3,000 lx at the light-receiving face			
	Voltage withstandability		1,000 V AC for one min. between all supply terminals connected together and enclosure			
	Insulation resistance		20 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure			
	Vibration resistance		10 to 500 Hz frequency, 3 mm 0.118 in double amplitude in X, Y and Z directions for two hours each			
	Shock resistance		500 m/s <sup>2</sup> acceleration (50 G approx.) in X, Y and Z directions for three times each			
Emitting element			Red LED (Peak emission wavelength: 650 nm 25.591 in, modulated)			
Spot diameter			ø2 mm ø0.079 in approx. (at 50 mm 1.969 in distance)	ø6.5 mm ø0.256 in approx. (at 50 mm 1.969 in distance)	ø9 mm ø0.354 in approx. (at 100 mm 3.937 in distance)	□15 mm □0.591 in approx. (at 300 mm 11.811 in distance)
Material			Enclosure: PBT (Polybutylene terephthalate), Lens: Polycarbonate, Indicator cover: Polycarbonate			
Cable			0.2 mm <sup>2</sup> 4-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 <sup>2</sup> , or more, cable.			
Weight			Net weight: 55 g approx., Gross weight: 65 g approx.			

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C **+73.4 °F**.

2) The adjustable range stands for the maximum sensing range which can be set with the distance adjuster. The sensor can detect an object 2 mm **0.079 in** [CX-444(-P): 15 mm **0.591 in**, CX-442(-P): 20 mm **0.787 in**], or more, away.



	CX-441□/443□	CX-444□	CX-442□
A	2 to 50 mm <b>0.079 to 1.969 in</b>	15 to 100 mm <b>0.591 to 3.937 in</b>	20 to 300 mm <b>0.787 to 11.811 in</b>
B	20 to 50 mm <b>0.787 to 1.969 in</b>	20 to 100 mm <b>0.787 to 3.937 in</b>	40 to 300 mm <b>1.575 to 11.811 in</b>

3) Refer to the manual or the general catalog for operation of the stability indicator.

4) Note that detection may be unstable depending on the mounting conditions or the sensing object. In the state that this product is mounted, be sure to check the operation with the actual sensing object.

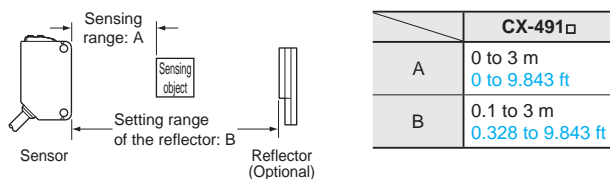
## SPECIFICATIONS

### Basic type

			Type	Thru-beam				Retroreflective	
						Long sensing range		With polarizing filters	
				Light-ON	Dark-ON	Light-ON	Dark-ON	Light-ON	Dark-ON
Item	Model No.	NPN output	CX-411A-C05	CX-411B-C05	CX-412A-C05	CX-412B-C05	CX-491A-C05-Y	CX-491B-C05-Y	
		PNP output	CX-411A-P-C05	CX-411B-P-C05	CX-412A-P-C05	CX-412B-P-C05	CX-491A-P-C05-Y	CX-491B-P-C05-Y	
Sensing range			10 m 32.808 ft		15 m 49.213 ft		3 m 9.843 ft (Note 2)		
Sensing object			ø12 mm ø0.472 in or more opaque object (Note 3)				ø50 mm ø1.969 in or more transparent/translucent or opaque object (Note 2, 4)		
Hysteresis			—						
Repeatability (perpendicular to sensing axis)			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: 15 mA or less Receiver: 10 mA or less		Emitter: 20 mA or less Receiver: 10 mA or less		13 mA or less		
Output			<NPN output type> NPN open-collector transistor <ul style="list-style-type: none"><li>• Maximum sink current: 100 mA</li><li>• Applied voltage: 30 V DC or less (between output and 0 V)</li><li>• Residual voltage: 2 V or less (at 100 mA sink current) 1 V or less (at 16 mA sink current)</li></ul>				<PNP output type> PNP open-collector transistor <ul style="list-style-type: none"><li>• Maximum source current: 100 mA</li><li>• Applied voltage: 30 V DC or less (between output and +V)</li><li>• Residual voltage: 2 V or less (at 100 mA source current) 1 V or less (at 16 mA source current)</li></ul>		
			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			—						
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	Protection		IP67 (IEC)						
	Ambient temperature		-25 to +55 °C -13 to +131 °F (No dew condensation or icing allowed), Storage: -30 to +70 °C -22 to +158 °F						
	Ambient humidity		35 to 85 % RH, Storage: 35 to 85 % RH						
	Ambient illuminance		Incandescent light: 3,000 lx at the light-receiving face						
	Voltage withstandability		1,000 V AC for one min. between all supply terminals connected together and enclosure						
	Insulation resistance		20 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure						
	Vibration resistance		10 to 500 Hz frequency, 1.5 mm 0.059 in double amplitude (10 G max.) in X, Y and Z directions for two hours each						
	Shock resistance		500 m/s <sup>2</sup> acceleration (50 G approx.) in X, Y and Z directions for three times each						
Emitting element (modulated)			Red LED		Infrared LED		Red LED		
Peak emission wavelength			680 nm 0.027 mil		870 nm 0.034 mil		680 nm 0.027 mil		
Material			Enclosure: PBT (Polybutylene terephthalate), Lens: Acrylic, Indicator cover: Acrylic						
Cable			0.2 mm <sup>2</sup> 3-core (thru-beam type emitter: 2-core) cabtyre cable, 0.5 m 1.640 ft long						
Cable extension			Extension up to total 100 m 328.084 ft is possible with 0.3 mm <sup>2</sup> , or more, cable (thru-beam type: both emitter and receiver)						
Weight	Net		Emitter: 20 g approx., Receiver: 20 g approx.				20 g approx.		
	Gross		50 g approx.				30 g approx.		

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C **+73.4 °F**.

2) The sensing range and the sensing object of the retroreflective type sensor are specified for the **RF-230** reflector (optional). The sensing range represents the actual sensing range of the sensor. The sensing ranges itemized in "A" of the table below may vary depending on the shape of sensing object. Be sure to check the operation with the actual sensing object.



3) If slit masks (optional) are fitted, an object of ø0.5 mm **ø0.020 in** (using round slit mask) can be detected.

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



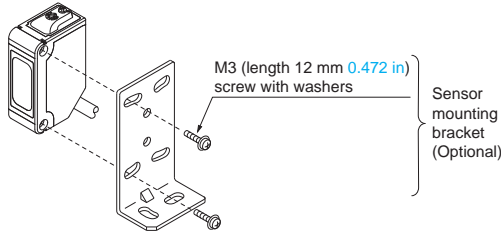
## PRECAUTIONS FOR PROPER USE



- 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 applicable in each region or country.

### Mounting

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



### 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 mm<sup>2</sup>, 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

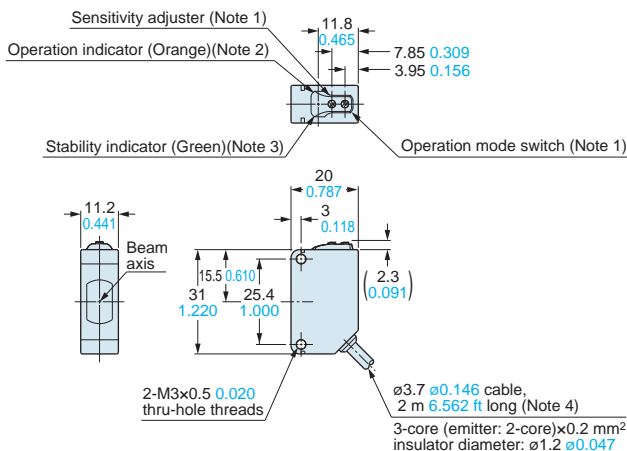
- This product has been developed / produced for industrial use only.
- Do not use during the initial transient time (50 ms) after the power supply is switched on.
- Take care that the sensor is not directly exposed to fluorescent light from a rapid-starter lamp or a high frequency lighting device, as it may affect the sensing performance.
- This sensor is suitable for indoor use only.
- Do not use this sensor in places having excessive vapor, dust, etc., or where it may come in direct contact with water or corrosive gas.
- Take care that the sensor does not come in direct contact with water, oil, grease or organic solvents, such as, thinner, etc.
- This sensor cannot be used in an environment containing inflammable or explosive gases.
- Never disassemble or modify the sensor.

## DIMENSIONS (Unit: mm in)

The CAD data in the dimensions can be downloaded from the website:  
[panasonic-electric-works.net/sunx](http://panasonic-electric-works.net/sunx)

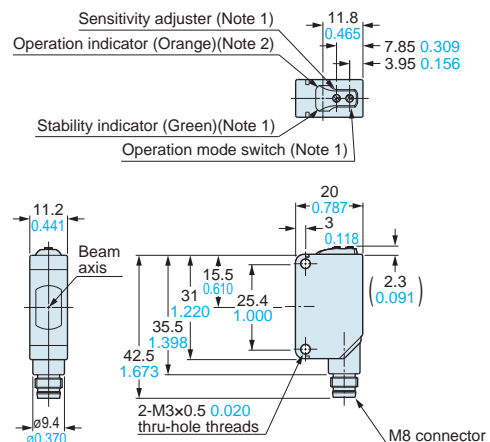
### CX-41□

Sensor



### CX-41□-Z

Sensor

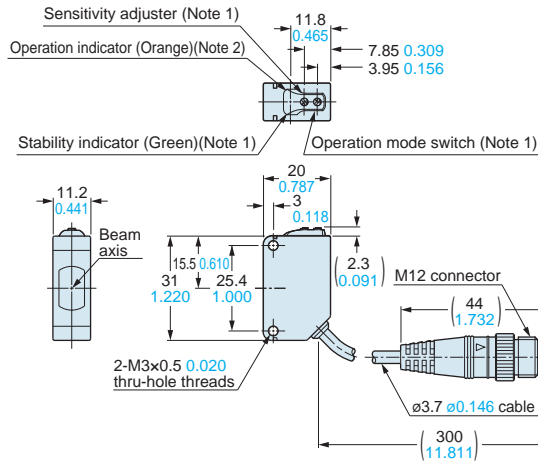


## DIMENSIONS (Unit: mm in)

The CAD data in the dimensions can be downloaded from the website:  
panasonic-electric-works.net/sunx

### CX-41□-J

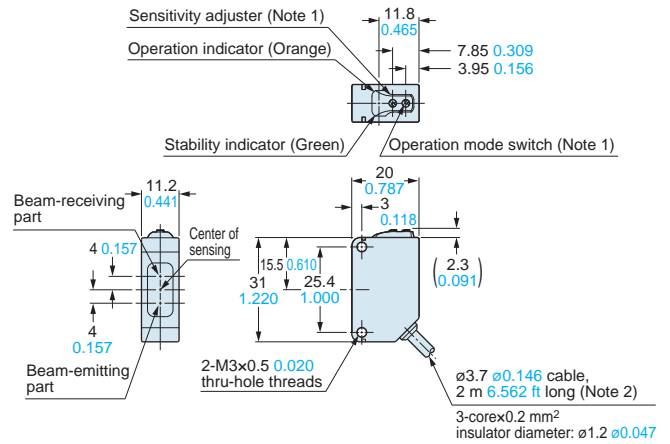
Sensor



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

### CX-49□ CX-48□ CX-42□

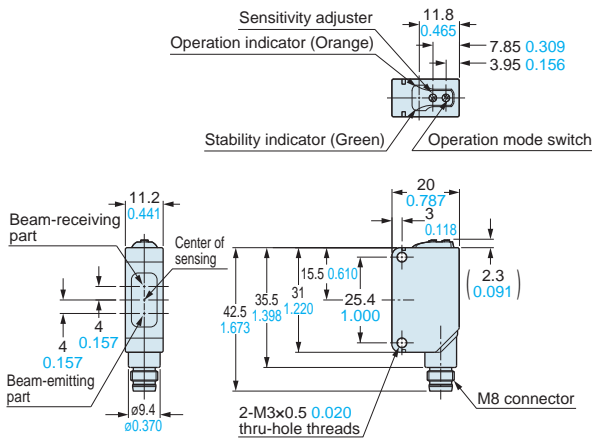
Sensor



Notes: 1) Not incorporated on the Basic type sensors.  
2) Basic type: 0.5 m 1.640 ft long.

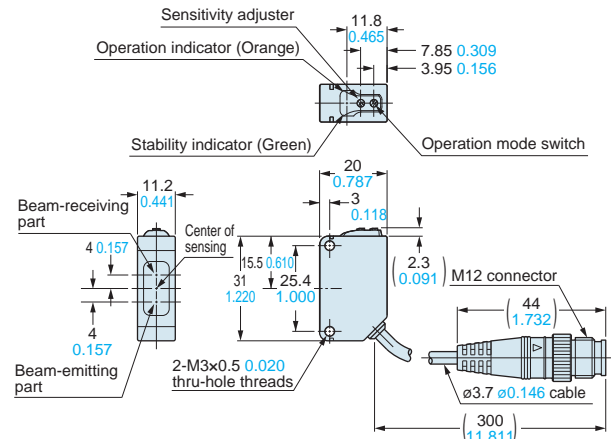
### CX-49□-Z CX-48□-Z CX-42□-Z

Sensor



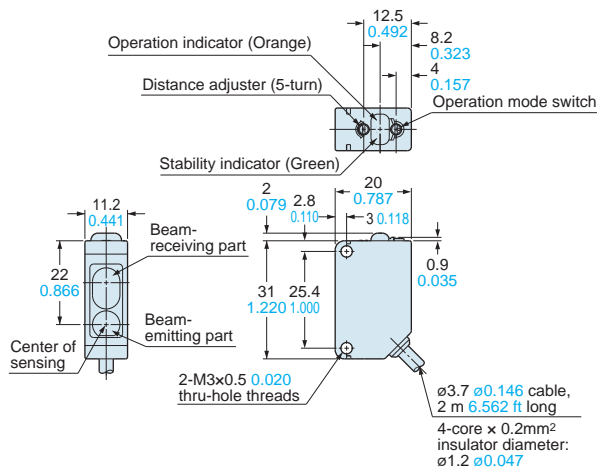
### CX-49□-J CX-48□-J CX-42□-J

Sensor



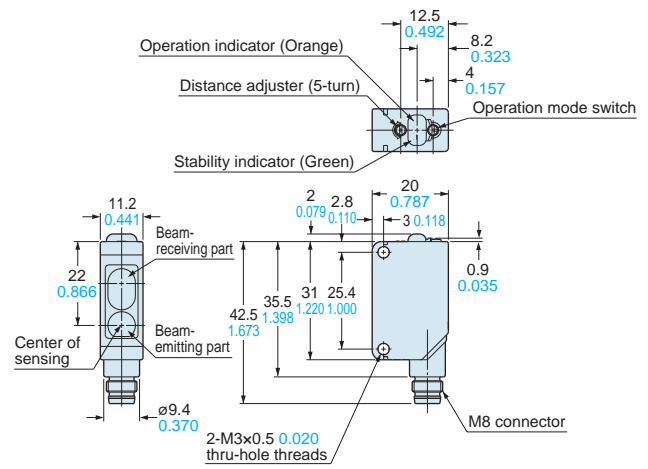
### CX-44□

Sensor



### CX-44□-Z

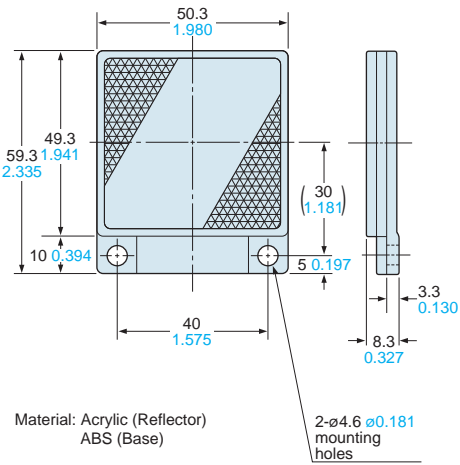
Sensor



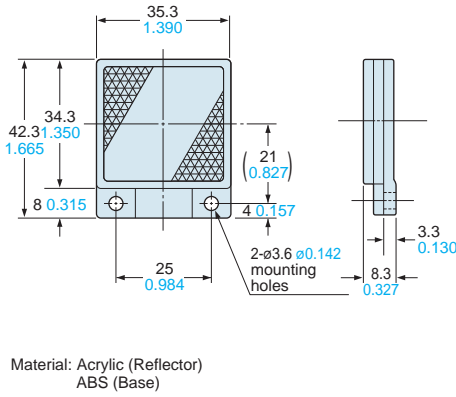
## DIMENSIONS (Unit: mm in)

The CAD data in the dimensions can be downloaded from the website:  
panasonic-electric-works.net/sunx

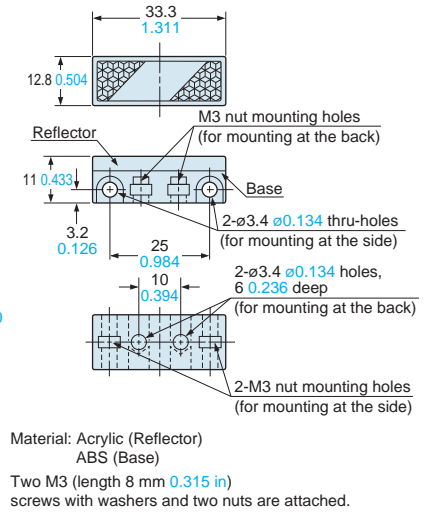
### RF-230 Reflector (Accessory for the retroreflective type sensor)



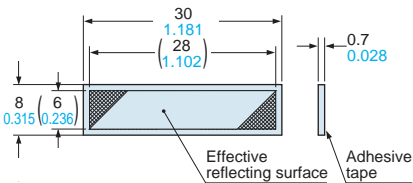
### RF-220 Reflector (Optional)



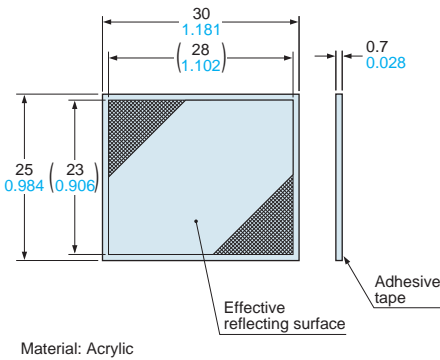
### RF-210 Reflector (Optional)



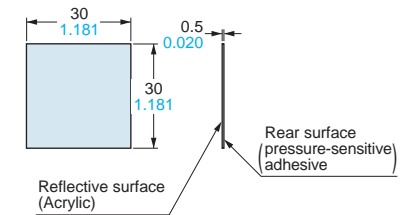
### RF-11 Reflective tape (Optional)



### RF-12 Reflective tape (Optional)



### RF-13 Reflective tape (Optional)

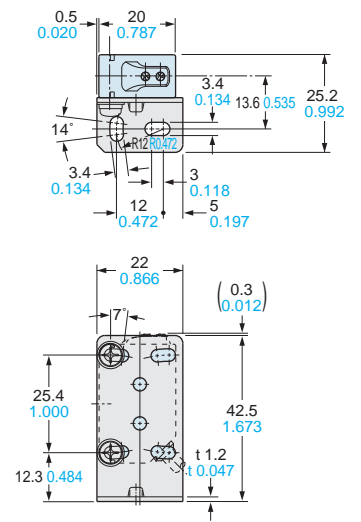
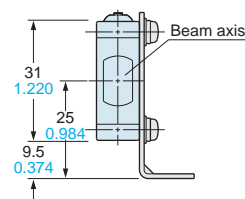
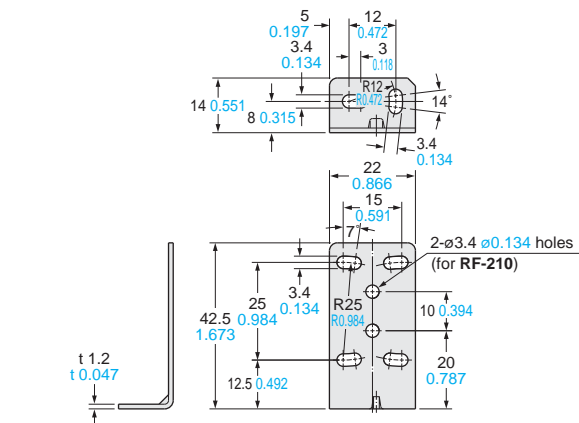


### MS-CX2-1

### Sensor mounting bracket (Optional)

#### Assembly dimensions

Mounting drawing with the receiver of CX-41□

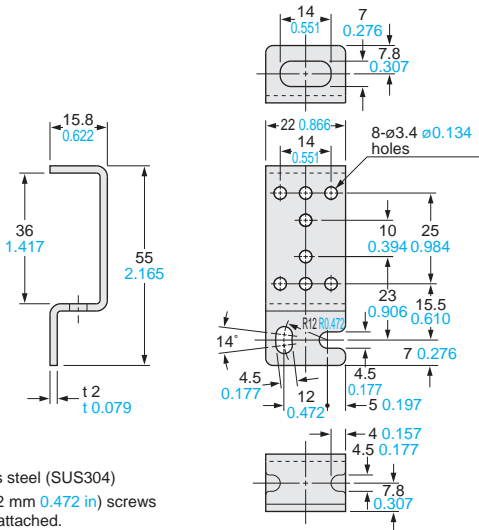


## ■ DIMENSIONS (Unit: mm in)

The CAD data in the dimensions can be downloaded from the website:  
[panasonic-electric-works.net/sunx](http://panasonic-electric-works.net/sunx)

## MS-CX2-2

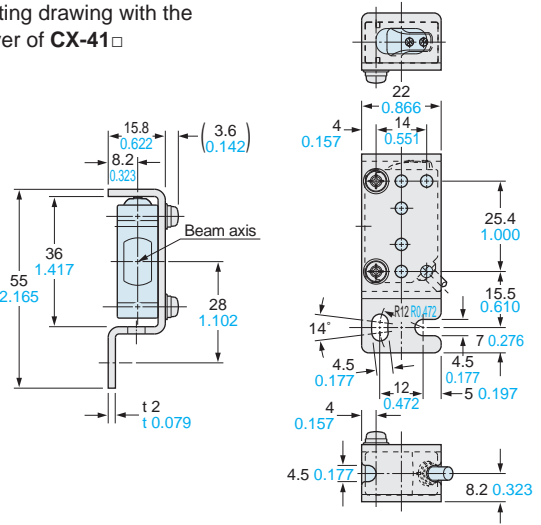
**Sensor mounting bracket (Optional)**



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

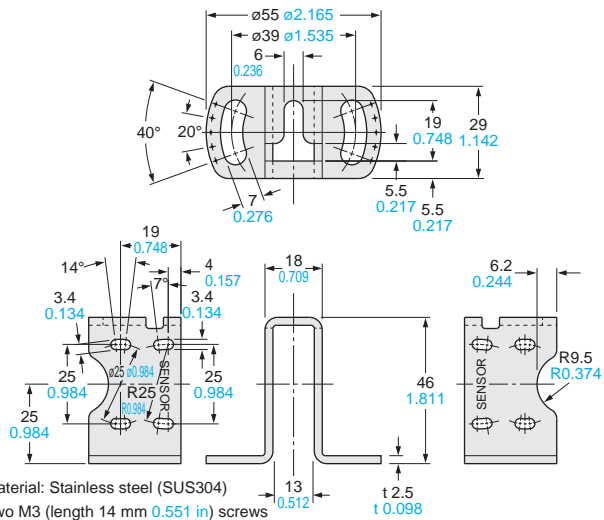
## Assembly dimensions

### Mounting drawing with the receiver of **CX-41**□



## MS-CX2-4

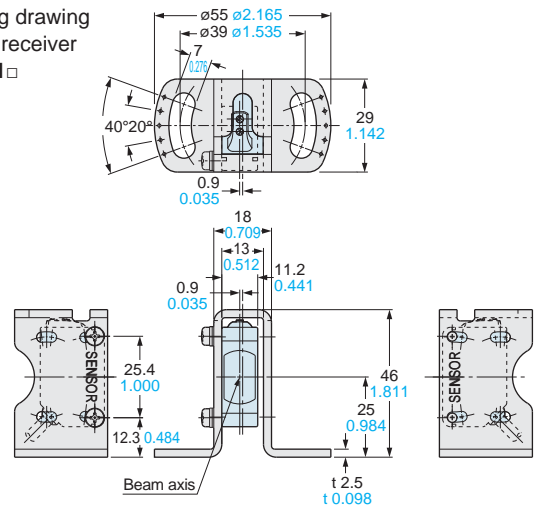
**Sensor mounting bracket (Optional)**



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

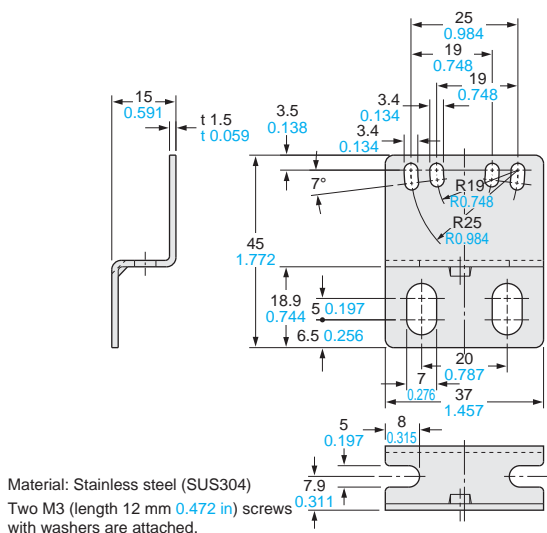
## Assembly dimensions

Mounting drawing  
with the receiver  
of **CX-41**□



## MS-CX2-5

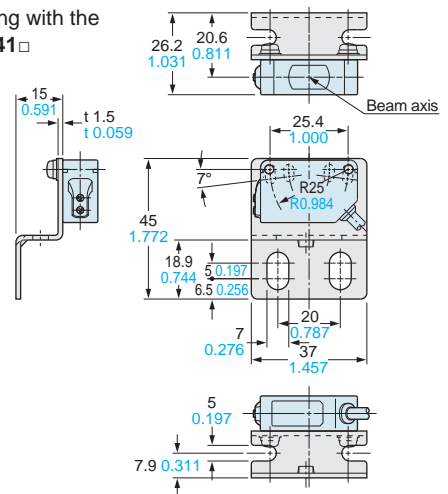
**Sensor mounting bracket (Optional)**



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

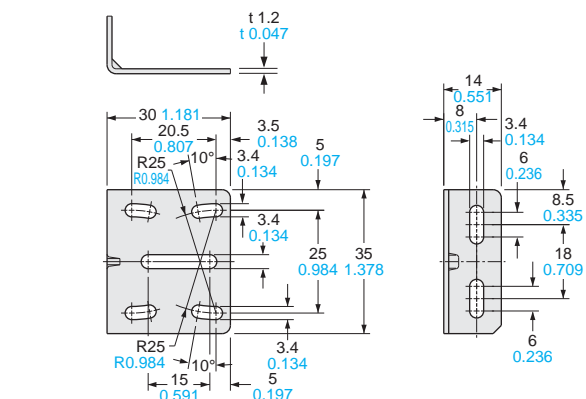
## Assembly dimensions

### Mounting drawing with the receiver of CX-41□



## MS-CX-3

## Sensor mounting bracket (Optional)

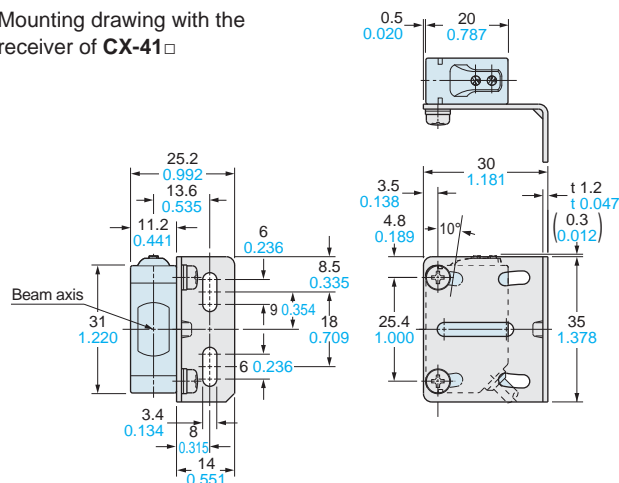


Material: Stainless steel (SUS304)

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

## Assembly dimensions

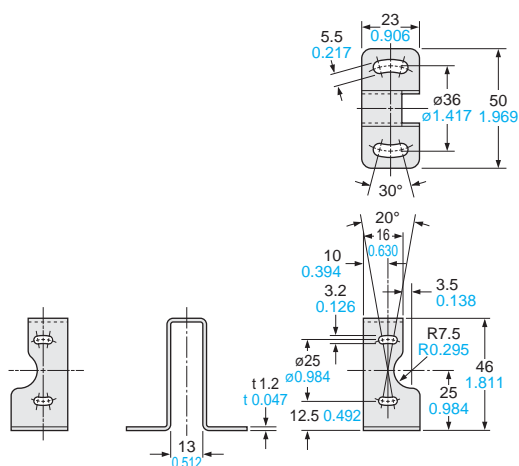
Mounting drawing with the receiver of CX-41□



## MS-RF21-1

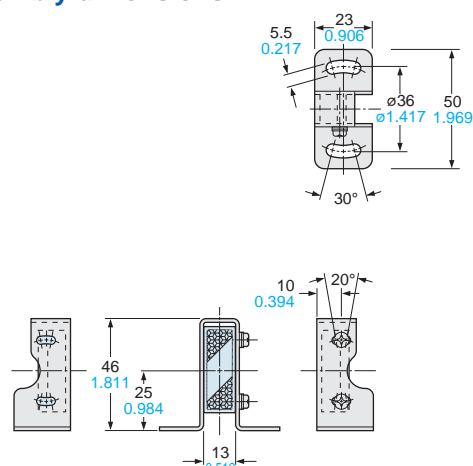
## Reflector mounting bracket for RF-210 (Optional)

## Assembly dimensions



Material: Stainless steel (SUS304)

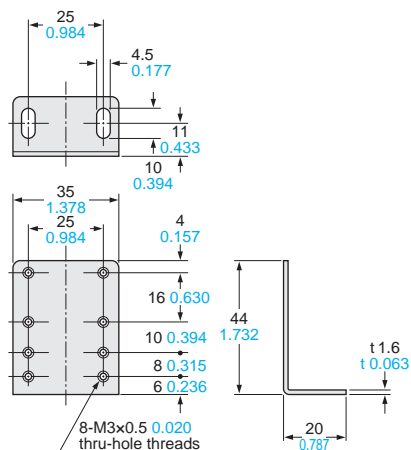
Two M3 (length 12 mm 0.472 in) screws with washers are attached.



## MS-RF22

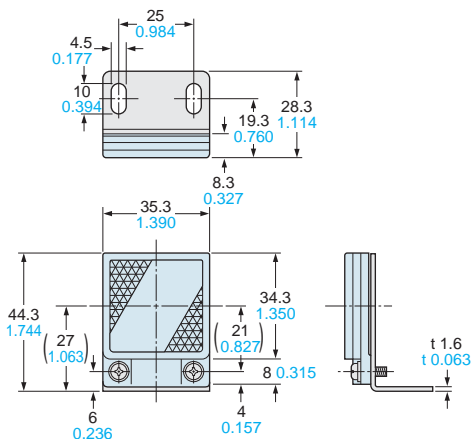
## Reflector mounting bracket for RF-220 (Optional)

## Assembly dimensions



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

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



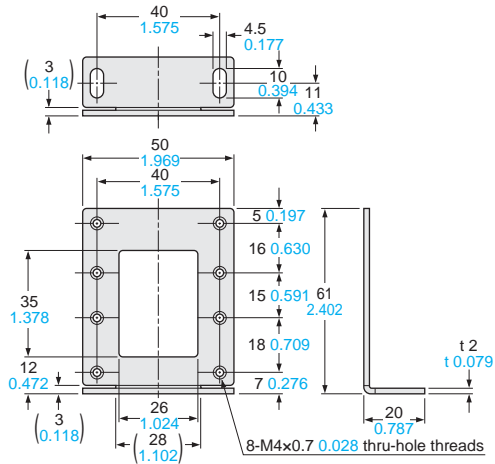
## ■ DIMENSIONS (Unit: mm in)

The CAD data in the dimensions can be downloaded from the website:  
[panasonic-electric-works.net/sunx](http://panasonic-electric-works.net/sunx)

## MS-RF23

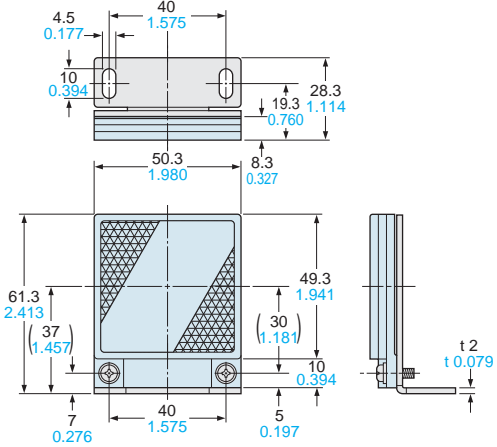
### Reflector mounting bracket for RF-230 (Optional)

## Assembly dimensions



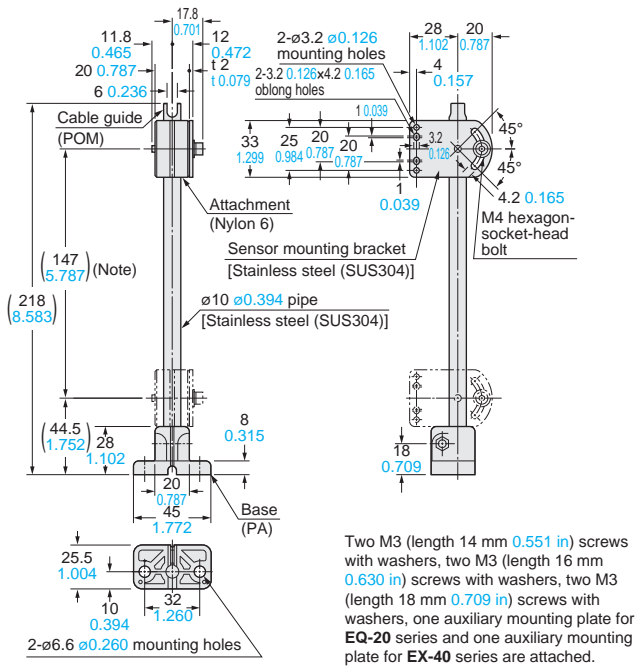
Material: Cold rolled carbon steel (SPCC)  
(Uni-chrome plated)

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



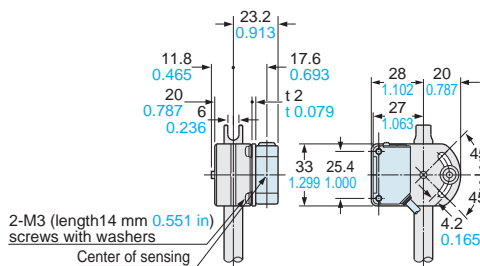
## MS-AJ1

**Universal sensor mounting stand (Optional)**



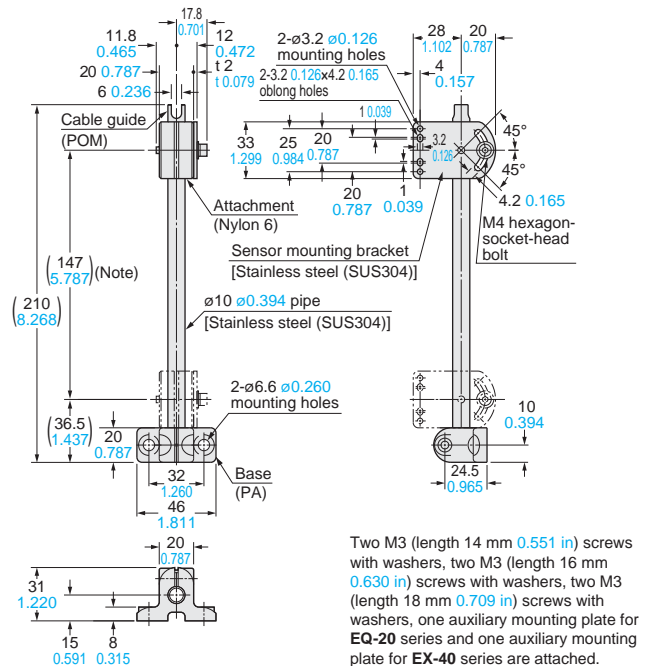
Note: The dimensions in the brackets indicate the adjustable range of the movable part.

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



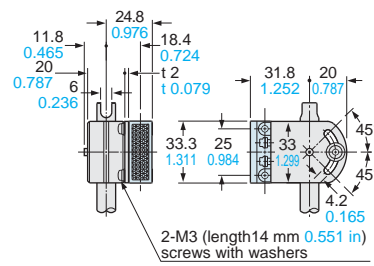
## MS-AJ2

**Universal sensor mounting stand (Optional)**



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

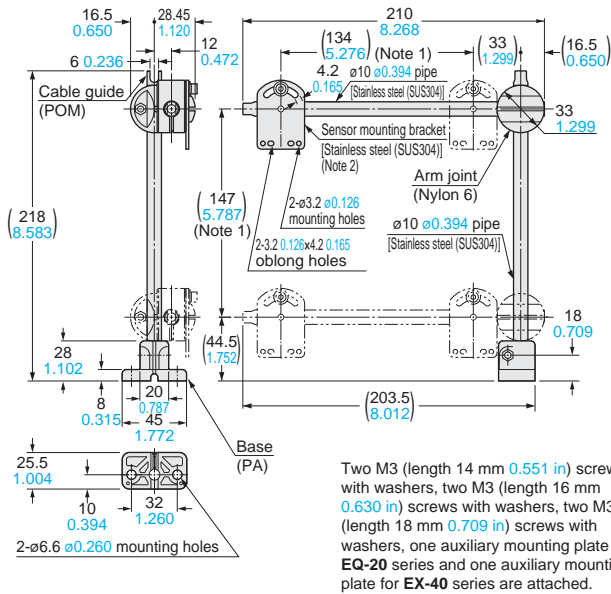
### Assembly dimensions with RF-210 (Reflector) (Mounting part only)



## DIMENSIONS (Unit: mm in)

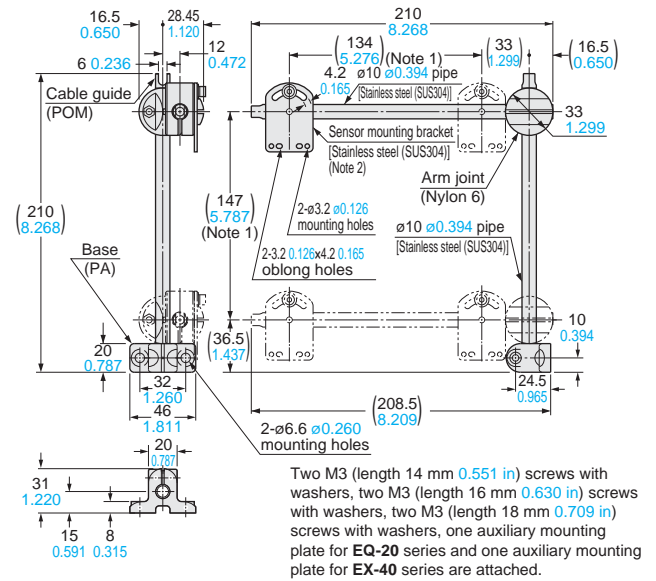
The CAD data in the dimensions can be downloaded from the website:  
panasonic-electric-works.net/sunx

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



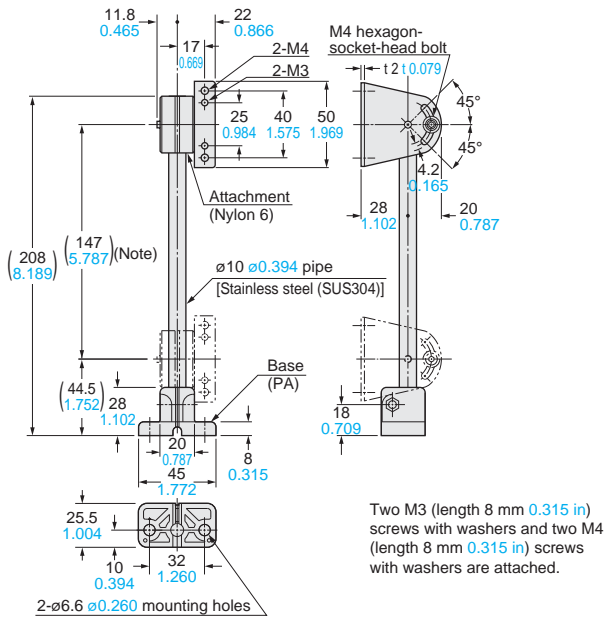
- Notes: 1) The dimensions in the brackets indicate the adjustable range of the movable part.  
2) Refer to **MS-AJ1 / MS-AJ2** for the assembly dimensions with the sensor mounting bracket, sensor or reflector.

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



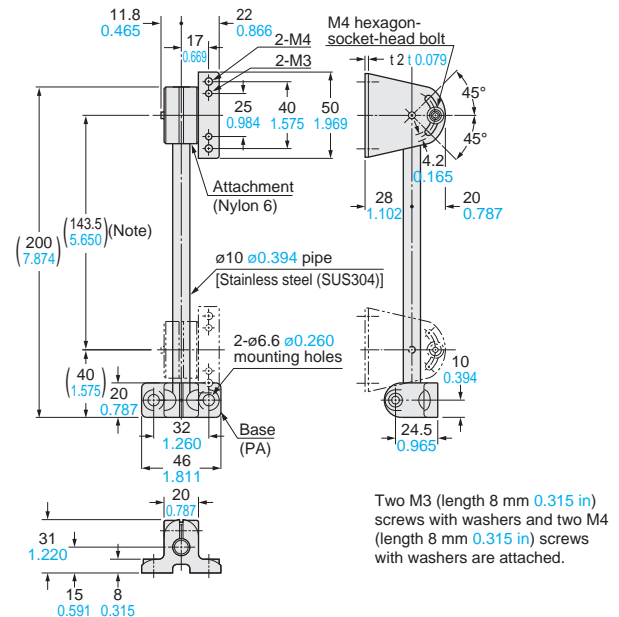
- Notes: 1) The dimensions in the brackets indicate the adjustable range of the movable part.  
2) Refer to **MS-AJ1 / MS-AJ2** for the assembly dimensions with the sensor mounting bracket, sensor or reflector.

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



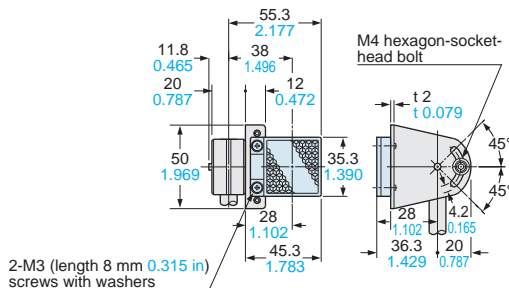
Note: The dimensions in the brackets indicate the adjustable range of the movable part.

### 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)

