PHOTOELECTRIC SENSORS

FX-D1/A1/M1
FX-13
FX-11A   Fiber Sensors
FZ-10
CX-20
CX-30   Amplifier Built-in Type
CX-RVM5/D100/MD300R
EX-10
EX-20

CX-30 SERIES

Amplifier Built-in Cost-effective & Compact Photoelectric Sensor
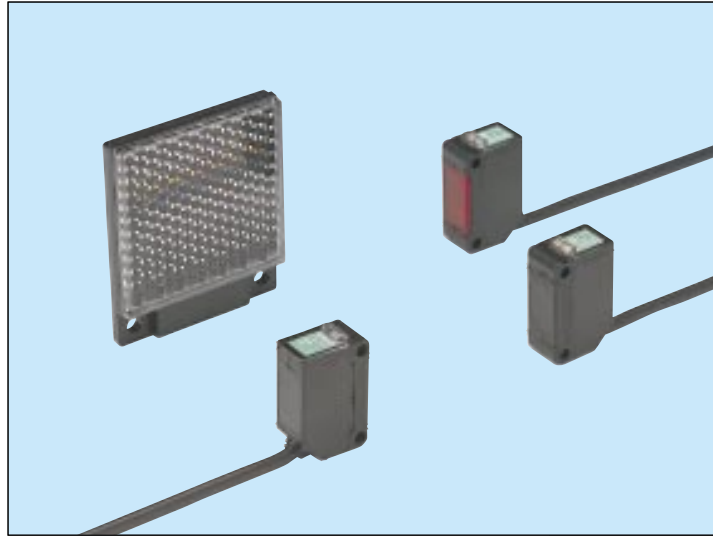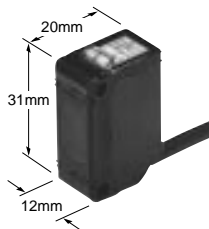
Basic Functions and Ease-of-use at a Low Price
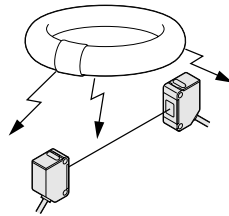
CE Marked
Conforming to EMC Directive

Compact Size

It is mountable in a tight space since the depth is only 20mm.

20mm
31mm
12mm

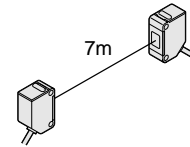### Insusceptible to High-frequency Fluorescent Light

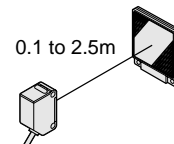Not affected by high-frequency fluorescent light even if it is similar to the sensor beam.

Cost-effective

It features basic functions and ease-of-use while maintaining a low price.
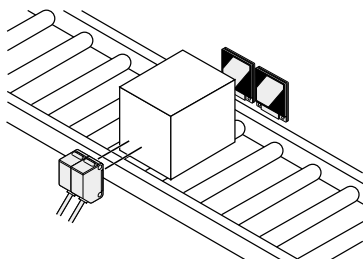
CX-31□ (Thru-beam type)

7m

CX-39□ (Retroreflective type sensor with polarizing filters)

0.1 to 2.5m

Two Sensors Mountable Together

The retroreflective type sensor with polarizing filters (**CX-39A** or **CX-39B**) incorporates an automatic interference prevention function. Hence, two sensors can be mounted close together.

Waterproof

The sensor can be hosed down because of its IP67 construction and the non-corrosive stainless steel mounting bracket.
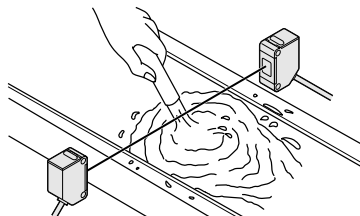
Note: However, take care that if it is exposed to water splashes during operation, it may detect a water drop itself.

Versatile Mounting

Select the bracket suitable for your installation from the range of optional mounting brackets.

SUNX

APPLICATIONS

Detecting contents of paper pouch
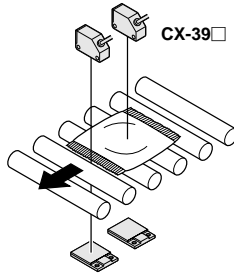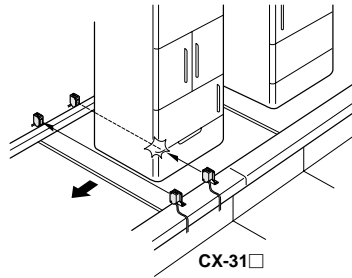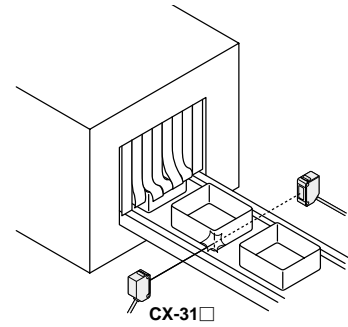
CX-39□

Detecting shiny home appliances

CX-31□

Detecting trays on washing line

CX-31□

ORDER GUIDE

Type			Appearance	Sensing range	Model No.	Emitting element
Thru-beam	Light-ON			7m	**CX-31A**	Infrared LED
	Dark-ON				**CX-31B**	
Retroreflective with polarizing filters	Light-ON			0.1 to 2.5m (Note 1)	**CX-39A**	Red LED
	Dark-ON				**CX-39B**	

NOTE: Mounting bracket is not supplied with the sensor. Please select from the range of optional sensor mounting brackets (five types).

Note 1: The sensing range of the retroreflective type sensor is specified for the **RF-230** reflector.
Further, the sensing range is the possible setting range for the reflector.
The sensor can detect an object less than 0.1m away.

Reflector cannot be placed in this range
Actual sensing range of the sensor
0.1m
Setting range of the reflector
2.5m
Sensor Reflector Reflector
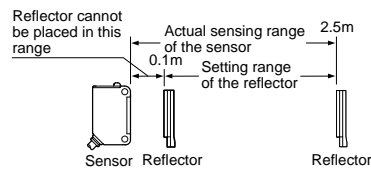
Package without reflector
CX-39A and **CX-39B** are available without the reflector **RF-230**. When ordering this type, add suffix '**-Y**' to the model No.
Model No.: **CX-39A-Y**, **CX-39B-Y**.

CX-30

OPTIONS

FX-D1/A1/M1
FX-13
FX-11A
FZ-10
CX-20
CX-30
CX-RVM5/D100/ND300R
EX-10
EX-20
Fiber Sensors
Amplifier Built-in Type

Designation	Model No.	Description	
Round slit mask (For thru-beam type sensor only)	**OS-CX-05** (Slit size φ0.5mm)	Slit on one side	• Sensing range: 300mm • Min. sensing object: φ12mm
		Slit on both sides	• Sensing range: 15mm • Min. sensing object: φ0.5mm
	OS-CX-1 (Slit size φ1mm)	Slit on one side	• Sensing range: 650mm • Min. sensing object: φ12mm
		Slit on both sides	• Sensing range: 70mm • Min. sensing object: φ1mm
	OS-CX-2 (Slit size φ2mm)	Slit on one side	• Sensing range: 1.4m • Min. sensing object: φ12mm
		Slit on both sides	• Sensing range: 300mm • Min. sensing object: φ2mm
Rectangular slit mask (For thru-beam type sensor only)	**OS-CX-05×6** (Slit size 0.5×6mm)	Slit on one side	• Sensing range: 1.4m • Min. sensing object: φ12mm
		Slit on both sides	• Sensing range: 300mm • Min. sensing object: 0.5×6mm
	OS-CX-1×6 (Slit size 1×6mm)	Slit on one side	• Sensing range: 2m • Min. sensing object: φ12mm
		Slit on both sides	• Sensing range: 700mm • Min. sensing object: 1×6mm
	OS-CX-2×6 (Slit size 2×6mm)	Slit on one side	• Sensing range: 3.5m • Min. sensing object: φ12mm
		Slit on both sides	• Sensing range: 1.4m • Min. sensing object: 2×6mm
Reflector (For retro-reflective type sensor only)	**RF-210**	• Sensing range: 0.1 to 0.8m • Min. sensing object: φ30mm	
	RF-220	• Sensing range: 0.1 to 1.2m • Min. sensing object: φ35mm	
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**	• Ambient temperature: −25 to +50℃ • Ambient humidity: 35 to 85% RH Notes: i) Keep the tape free from stress. If it is pressed too much, the capability may deteriorate. ii) Do not cut the tape. It will deteriorate the sensing performance.	• Sensing range: 0.1 to 0.4m • Min. sensing object: φ30mm
	RF-12		• Sensing range: 0.1 to 0.6m • Min. sensing object: φ30mm

Round slit mask

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

Round slit mask (Stainless steel)
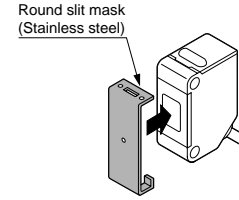
Rectangular slit mask

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

Rectangular slit mask (Stainless steel)

Reflector
• **RF-210**   • **RF-220**

33.3mm   11mm   35.3mm   8.3mm
12.8mm   42.3mm

Reflective tape
• **RF-11**   • **RF-12**

30mm   0.7mm   30mm   0.7mm
8mm   25mm
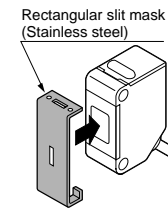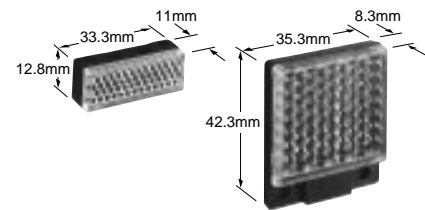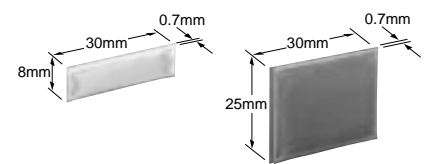
Reflector mounting bracket
• **MS-RF23**   • **MS-RF22**
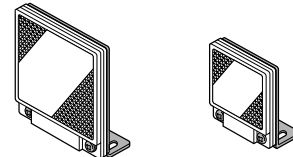
Two M4 (length 10mm) screws with washers are attached.

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

• **MS-RF21-1**
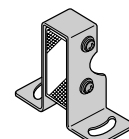
Two M3 (length 12mm) screws with washers are attached.

OPTIONS

| Designation	Model No.	Description
Sensor mounting bracket	**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 Flat mounting saves height. It can also be used for mounting **RF-210**. (The thru-beam type sensor needs two brackets.)
	MS-CX2-4	Protective mounting bracket It protects the sensor from damage and maintains alignment. (The thru-beam type sensor needs two brackets.)
	MS-CX2-5	Back biangled mounting bracket Suitable for sensing from bottom of conveyors, etc. (The thru-beam type sensor needs two brackets.)
	MS-CX-3	Back angled mounting bracket (The thru-beam type sensor needs two brackets.)
Universal sensor mounting stand (Note1)	**MS-AJ**	Basic assembly
	MS-AJ-A	Lateral arm assembly
	MS-AJ-M	Assembly for reflector
Sensor checker (Note 2)	**CHX-SC2**	It is useful for beam alignment of thru-beam type sensors. The optimum receiver position is given by indicators, as well as, an audio signal.

Notes: 1) Refer to P.310～ for details of the universal sensor mounting stand.
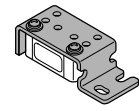2) Refer to P.378～ for details of the sensor checker **CHX-SC2**.
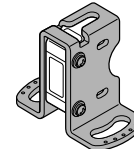
Sensor mounting bracket
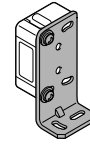
• **MS-CX2-1**

Two M3 (length 12mm) screws with washers are attached.
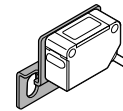
• **MS-CX2-2**

Two M3 (length 12mm) screws with washers are attached.
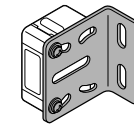
• **MS-CX2-4**

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

• **MS-CX2-5**

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

• **MS-CX-3**

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

Universal sensor mounting stand

• **MS-AJ**

Swivel: 360° rotation
45°
45°
Elevation angle ± 45°
Height adjustment: 150mm approx.
Mounting holes for M6 screw

• **MS-AJ-A**

With the lateral arm, the sensor can sense from above a production line.

Swivel: 360° rotation
360° rotation
45° 45° angle adjustment
Height adjustment: 150mm approx.
Mounting holes for M6 screw

• **MS-AJ-M**

Swivel: 360° rotation
45°
45°
Elevation angle ± 45°
Height adjustment: 150mm approx.
Mounting holes for M6 screw

Sensor checker

Sensor checker

FX-D1/A1/M1

FX-13

FX-11A

Fiber Sensors

FZ-10

CX-20

CX-30

CX-RVM5/D100/MD300R

EX-10

EX-20

Amplifier Built-in Type

PHOTOELECTRIC SENSORS

FX-D1/A1/M1

FX-13

FX-11A

FZ-10

CX-20

CX-30

CX-RVM5/D100/MD300R

EX-10

EX-20

Fiber Sensors

Amplifier Built-in Type

CX-30

SPECIFICATIONS

Item \ Type	Thru-beam		Retroreflective with polarizing filters	
Model No.	**CX-31A**	**CX-31B**	**CX-39A**	**CX-39B**
Sensing range	7m		0.1 to 2.5m (Note 1)	
Sensing object	ϕ12mm or more opaque object (Note 2)		ϕ50mm or more opaque, translucent or specular object (Note 1)	
Repeatability (perpendicular to sensing axis)	0.5mm or less			
Supply voltage	12 to 24V DC $\pm$10% Ripple P-P 10% or less			
Current consumption	Emitter: 35mA or less, Receiver: 25mA or less		30mA or less	
Output	NPN open-collector transistor • Maximum sink current: 100mA • Applied voltage: 30V DC or less (between output and 0V) • Residual voltage: 1.5V or less (at 100mA sink current) 0.4V or less (at 16mA sink current)			
Utilization category	DC-12 or DC-13			
Output operation	Light-ON	Dark-ON	Light-ON	Dark-ON
Short-circuit protection	Incorporated			
Response time	1ms or less			
Operation indicator	Red LED (lights up when the output is ON)			
Stability indicator	Green LED (lights up under stable light received condition or stable dark condition)			
Power indicator	Red LED (lights up when the power is ON)		—	
Automatic interference prevention function	—		Two units of sensors can be mounted closely.	
Environmental resistance — Pollution degree	3 (Industrial environment)			
Protection	IP67 (IEC)			
Ambient temperature	$-$25 to $+$55℃ (No dew condensation or icing allowed), Storage: $-$30 to $+$70℃			
Ambient humidity	35 to 85% RH, Storage: 35 to 85% RH			
Ambient illuminance	Sunlight: 10,000ℓx at the light-receiving face, Incandescent light: 3,000ℓx at the light-receiving face			
EMC	Emission: EN50081-2, Immunity: EN50082-2			
Voltage withstandability	1,000V AC for one min. between all supply terminals connected together and enclosure			
Insulation resistance	20MΩ, or more, with 250V DC megger between all supply terminals connected together and enclosure			
Vibration resistance	10 to 500Hz frequency, 1.5mm amplitude (10G max.) in X, Y and Z directions for two hours each			
Shock resistance	500m/s^2 acceleration (50G approx.) in X, Y and Z directions for three times each			
Emitting element	Infrared LED (modulated)		Red LED (modulated)	
Material	Enclosure: Polycarbonate, Lens: Polycarbonate, Indicator cover: Polycarbonate, Front cover: Polycarbonate (retroreflective type: Acrylic)			
Cable	0.2mm^2 3-core (thru-beam type emitter: 2-core) oil resistant cabtyre cable, 1m long			
Cable extension	Extension up to total 100m is possible with 0.3mm^2, or more, cable (thru-beam type: both emitter and receiver).			
Weight	Emitter: 23g approx., Receiver: 25g approx.		25g approx.	
Accessory	—		**RF-230** (Reflector): 1No.	

Notes: 1) The sensing range and the sensing object of the retroreflective type sensor are specified for the **RF-230** reflector. Further, the sensing range is the possible setting range for the reflector. The sensor can detect an object less than 0.1m away.
2) If slit masks (optional) are fitted, an object of ϕ0.5mm (using round slit masks) can be detected.

Reflector cannot be placed in this range
Actual sensing range of the sensor
2.5m
0.1m
Setting range of the reflector
Sensor Reflector
Reflector

SUNX
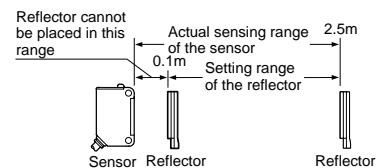
I/O CIRCUIT AND WIRING DIAGRAMS

I/O circuit diagram

Color code

D

(Brown) +V

Load

(Black)
Sensing output (Note)
100mA max.

Tr

Z_D

(Blue) 0V

12 to 24V DC
± 10%

Sensor circuit

Internal circuit ←──→ Users' circuit
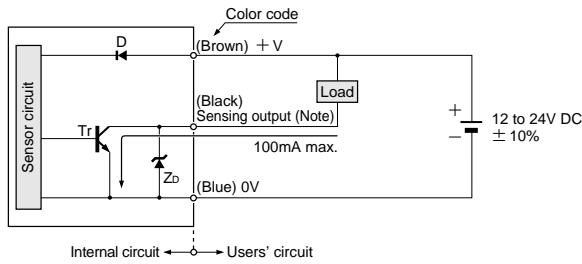
Note: The emitter of the thru-beam type sensor does not incorporate the sensing output.

Wiring diagram

Brown

Black
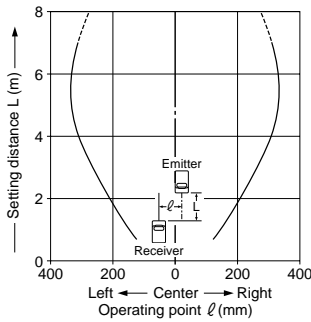
Load

Blue

12 to 24V DC
± 10%
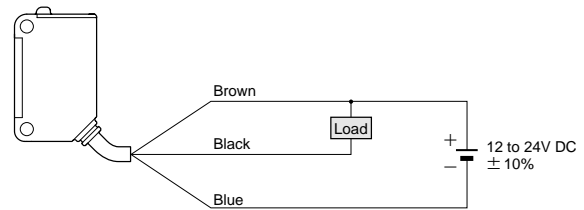
Symbols ... D: Reverse supply polarity protection diode
Z_D: Surge absorption zener diode
Tr : NPN output transistor
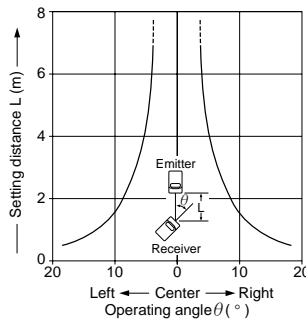
SENSING CHARACTERISTICS (TYPICAL)
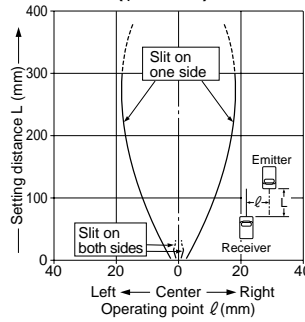
CX-31A / CX-31B — Thru-beam type
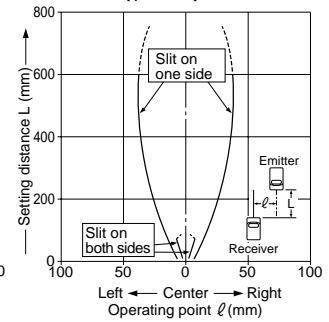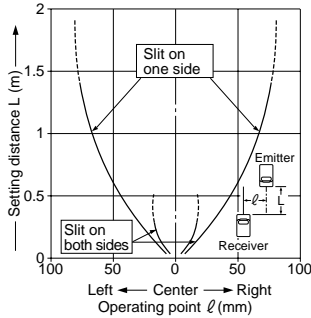
Parallel deviation

Angular deviation

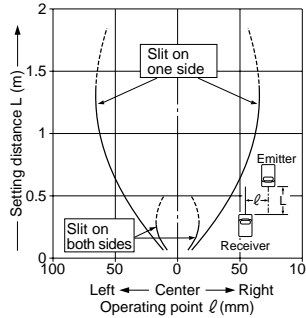**Parallel deviation with round slit masks (ϕ0.5mm)**

Parallel deviation with round slit masks (ϕ1mm)

Parallel deviation with round slit masks (ϕ2mm)

Parallel deviation with rectangular slit masks (0.5 × 6mm)

Parallel deviation with rectangular slit masks (1 × 6mm)
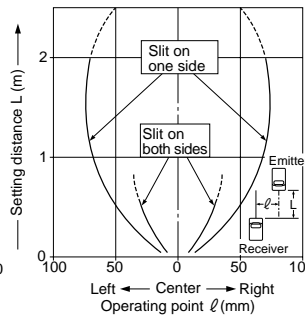
Parallel deviation with rectangular slit masks (2 × 6mm)
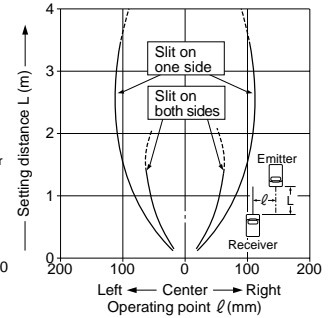
CX-39A / CX-39B — Retroreflective type

Parallel deviation

Angular deviation

All models

Correlation between setting distance and excess gain
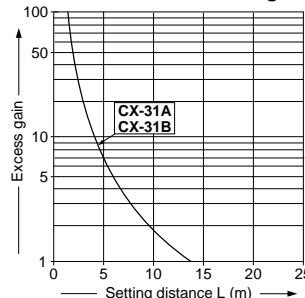
Fiber Sensors

FX-D1/A1/M1
FX-13
FX-11A
FZ-10
CX-20

Amplifier Built-in Type

CX-30
CX-RVM5/D100/MD300R
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SUNX

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CX-30

FX-D1/A1/M1
FX-13
FX-11A   Fiber Sensors
FZ-10
CX-20
CX-30
CX-RVM5/D100/MD300R   Amplifier Built-in Type
EX-10
EX-20

PRECAUTIONS FOR PROPER USE

Refer to P.820～ 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.
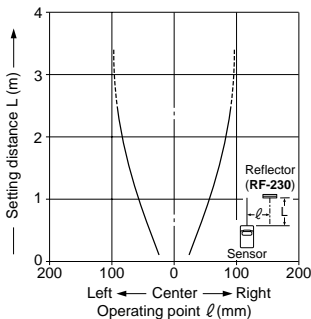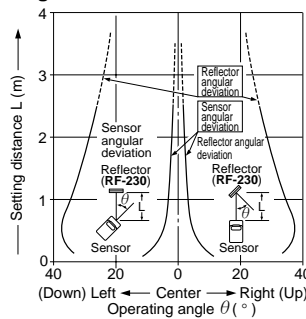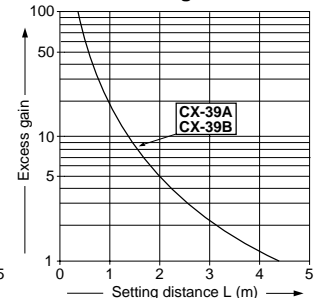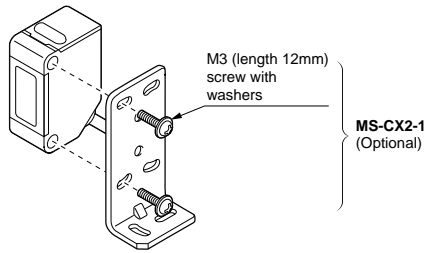
Mounting

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

M3 (length 12mm) screw with washers

MS-CX2-1 (Optional)

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 (glossy) label or wrapping paper

Steps

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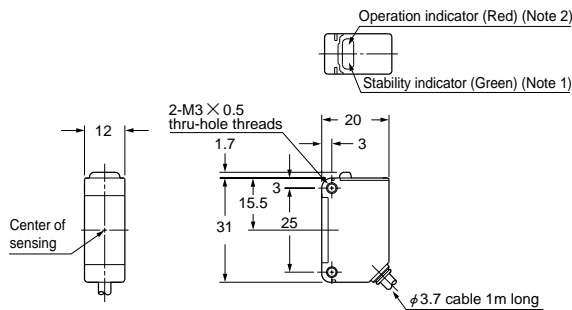• Increase the distance between the sensor and the sensing object.

Others

• Do not use during the initial transient time (50ms) after the power supply is switched on.

DIMENSIONS (Unit: mm)

**CX-31A CX-31B
CX-39A CX-39B** Sensor

Operation indicator (Red) (Note 2)

Stability indicator (Green) (Note 1)

2-M3 × 0.5 thru-hole threads

12

1.7

3

20

15.5

3

25

31

Center of sensing

φ3.7 cable 1m long

Notes: 1) Not incorporated on the emitter of the thru-beam type sensor.
2) It is the power indicator (red) on the emitter of the thru-beam type sensor.

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

50.3

49.3

59.3

(30)

10

5

40

2-φ4.6 mounting holes

3.3

8.3
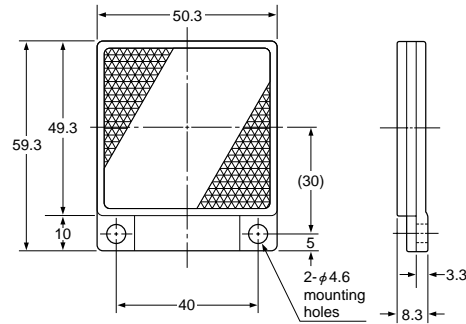
Matelial: Acrylic (Reflector)
ABS (Base)

RF-220 Reflector (Optional)

35.3

34.3

42.3

(21)

8

4

25

2-φ3.6 mounting holes

3.3

8.3
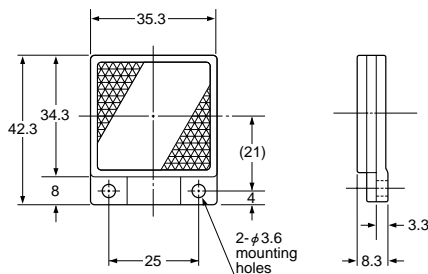
Matelial: Acrylic (Reflector)
ABS (Base)

RF-210 Reflector (Optional)

33.3

12.8

Reflector

M3 nut mounting holes (for mounting at the back)

11

Base

3.2

2-φ3.4 thru-holes (for mounting at the side)

25

10

2-φ3.4 holes 6 deep (for mounting at the back)

2-M3 nut mounting holes (for mounting at the side)
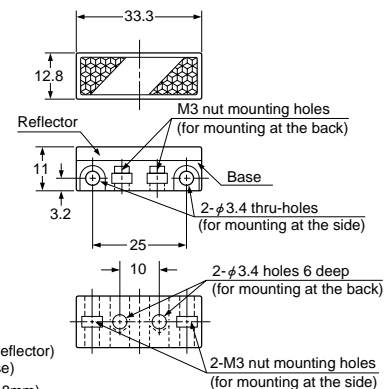
Matelial: Acrylic (Reflector)
ABS (Base)
Two M3 (length 8mm) screws with wathers and two nuts are attached.

⊗SUNX

DIMENSIONS (Unit: mm)

RF-11 — Reflective tape (Optional)

30
(28)

8 (6)

0.7

Effective reflecting surface

Adhesive tape

Matelial: Acrylic

RF-12 — Reflective tape (Optional)

30
(28)

0.7

25 (23)

Effective reflecting surface

Adhesive tape

Matelial: Acrylic

MS-CX2-1 — Sensor mounting bracket (Optional)

Assembly dimensions

5 12
3.4 3
14 R12 14°
8
3.4

22
15
7°
3.2
2-φ3.4 holes (for **RF-210**)
42.5 25 R25 10
12.5 20

t 1.2

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

3.4 14 26
14° R12
3.3
12 5

12
Center of sensing
31
25
9.5

22
0.5
7°
25
42.5
12.5 t 1.2

MS-CX2-2 — Sensor mounting bracket (Optional)

Assembly dimensions

14 7
7.8

15.8
22
14
8-φ3.4 holes
36 55
10 25
4.5 23
15.5
14° R12
7
4.5 12 5

4
4.5
7.8

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

15.8 (3.6)
7.8
Center of sensing
36 55
28
14° R12
4.5 7
4.5 12 5

22
14
25
4.5
15.5
7

4
4.5 7.8

Fiber Sensors
FX-D1/A1/M1
FX-13
FX-11A
FZ-10

Amplifier Built-in Type
CX-20
CX-30
CX-RVM5/D100/ND300R
EX-10
EX-20

CX-30

FX-D1/A1/M1

FX-13

FX-11A

FZ-10

CX-20

CX-30

CX-RVM5/D100/MD300R

EX-10

EX-20

Fiber Sensors

Amplifier Built-in Type

DIMENSIONS (Unit: mm)

MS-CX2-4 — Sensor mounting bracket (Optional)

Assembly dimensions
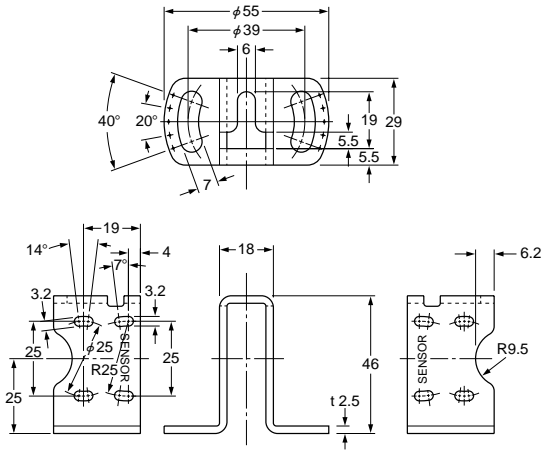
Matelial: Stainless steel (SUS304)
Two M3 (length 14mm) screws
with washers are attached.
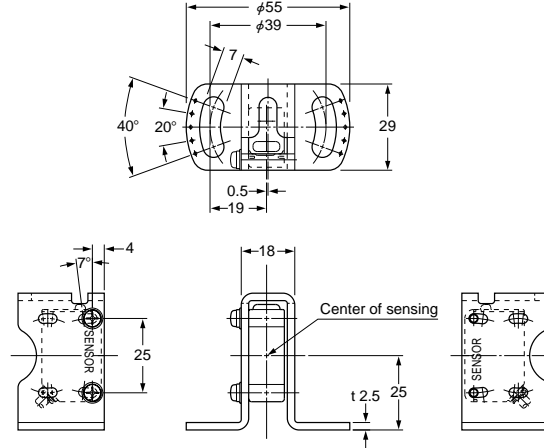
MS-CX2-5 — Sensor mounting bracket (Optional)

Assembly dimensions
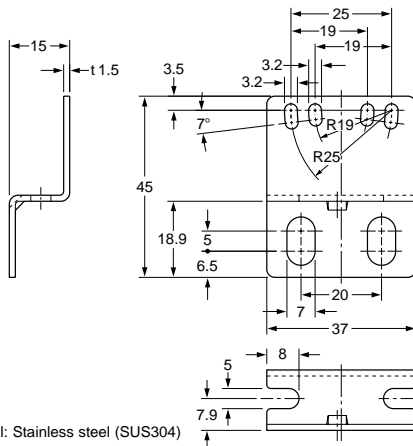
Matelial: Stainless steel (SUS304)
Two M3 (length 12mm) screws
with washers are attached.
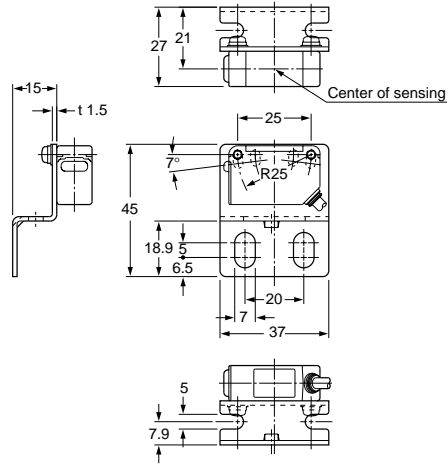
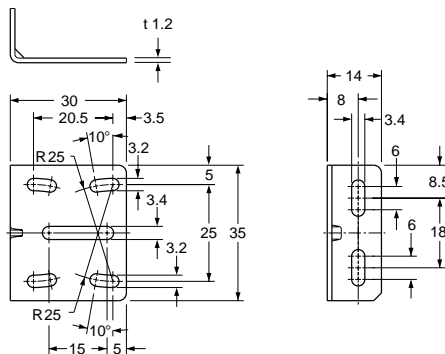### MS-CX-3 — Sensor mounting bracket (Optional)

Assembly dimensions

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

SUNX
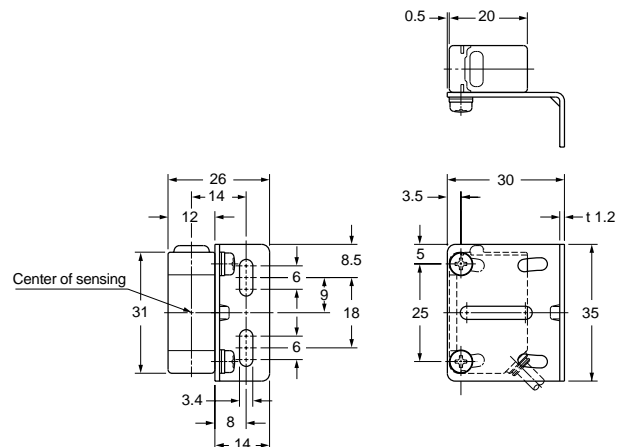
DIMENSIONS (Unit: mm)

MS-RF21-1   Reflector mounting bracket for **RF-210** (Optional)

Assembly dimensions

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

23
5.5
φ36 50
30°
20°
16
10
3.5
3.2
φ25
R7.5
46
25
12.5
t 1.2
13

5.5
23
φ36 50
30°
10
20°
46
25
12.8
13
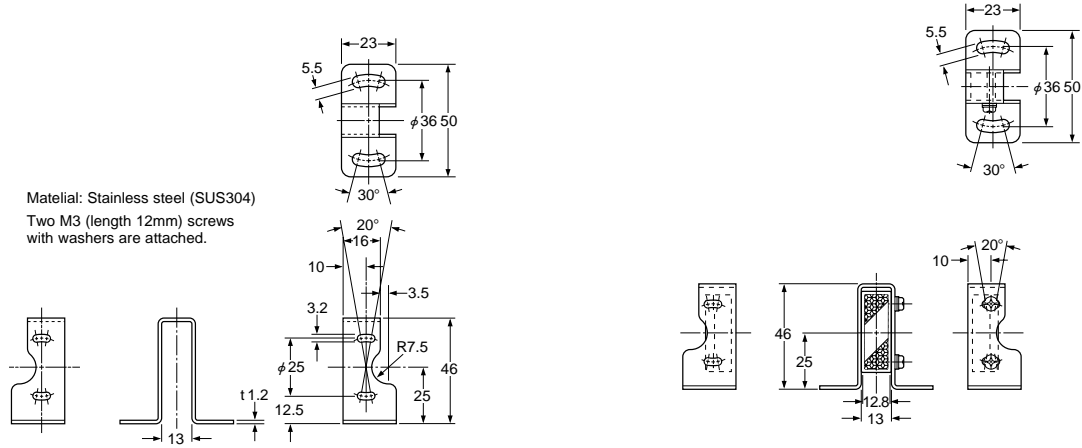
MS-RF22   Reflector mounting bracket for **RF-220** (Optional)

Assembly dimensions

25
4.5
10
11

35
25
4
16
10
8
6
44
t 1.6
20

8-M3 × 0.5 thru-hole threads

25
4.5
10
28.3
19.3
8.3

35.3
44.3
34.3
(27)
(21)
6
8
4
t 1.6

Matelial: Cold rolled carbon steel (SPCC)
(Uni-chrome plated)
Two M3 (length 8mm) screws with washers are attached.
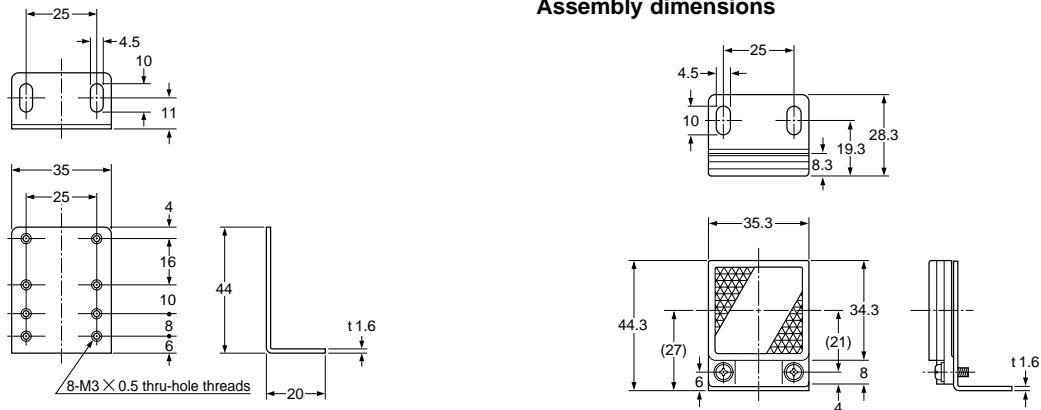
MS-RF23   Reflector mounting bracket for **RF-230** (Optional)

Assembly dimensions

40
4.5 10
(3)
11

50
40
5
16
15
18
35
61
12
7
t 2
(3)
26
(28)
20

8-M4 × 0.7 thru-hole threads

40
4.5
10
28.3
19.3
8.3

50.3
61.3
49.3
(37)
(30)
7
5
10
40
t 2

Matelial: Cold rolled carbon steel (SPCC)
(Uni-chrome plated)
Two M3 (length 10mm) screws with washers are attached.

Fiber Sensors

FX-D1/A1/M1
FX-13
FX-11A
FZ-10

Amplifier Built-in Type

CX-20
CX-30
CX-RVM5/D100/MD300R
EX-10
EX-20