CY SERIES

Cylindrical Photoelectric Sensor **Amplifier Built-in**

Test input | PNP output type available | Light intensity monitor

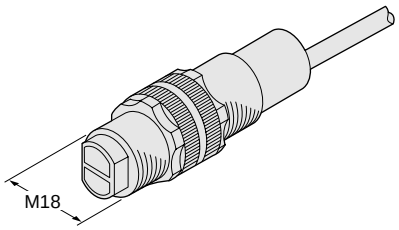
Cylindrical type easily mountable with M18 thread

Conforming to EMC Directive (AC supply type conforms to Low Voltage Directive, too.)

UL Recognition

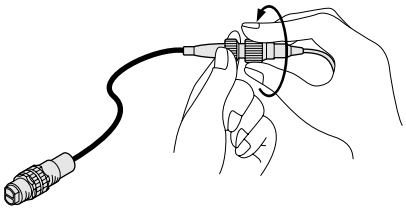
M18 thread

This sensor has an M18 thread size for convenient mounting.



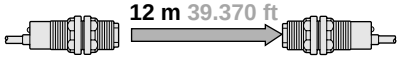
Easy to replace

A pigtailed type sensor with connector (**CY-□-J**), which is easy to replace, is also available.

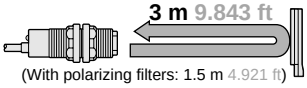


Long sensing range

Thru-beam type

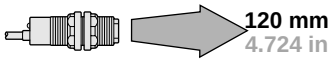


Retroreflective type



(With polarizing filters: 1.5 m 4.921 ft)

Diffuse reflective type



Wide product range

Supply voltage
① AC supply type (24 to 240 V AC)
② DC supply type (10 to 30 V DC)

Output
① NPN open-collector transistor
② PNP open-collector transistor
③ AC non-contact (thyristor) output

Connection
① Cable type
② Pigtailed type

A total of 32 models are available.

Environment resistant

Its IP67 construction can be hosed down with water. In addition, it has strong resistance against vibration since it is filled up with resin.
The connector also has IP67 protection.

Note: However, take care that if it is exposed to water splashes during operation, it may detect a water drop itself.

Convenient options

Side-view attachment (For thru-beam type sensors only)

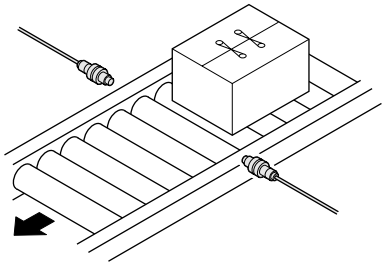
The beam is bent at a right angle with the side-view attachment.

Slit mask (For thru-beam type sensors only)

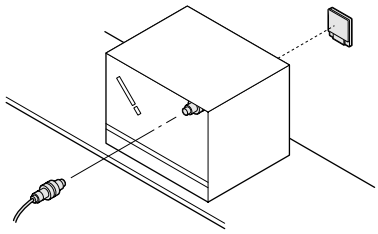
It is convenient for detecting small objects or enhancing the sensing accuracy.

APPLICATIONS

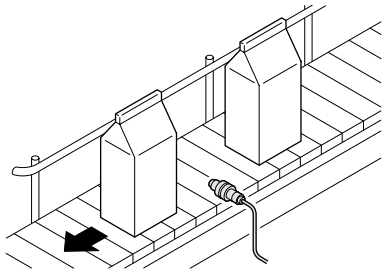
Sensing cardboard boxes



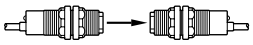
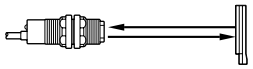
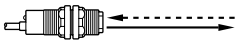
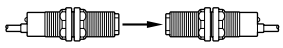
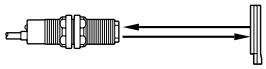
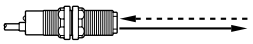
Sensing specular objects



Sensing milk packs



ORDER GUIDE

Type		Appearance	Sensing range	Model No.	Supply voltage	Output	Output operation
DC supply type	Thru-beam		12 m 39.370 ft	**CY-21**	10 to 30 V DC	NPN open-collector transistor	Selectable either Light-ON or Dark-ON by the control input
				CY-21-PN		PNP open-collector transistor	
	Retroreflective With polarizing filters		3 m 9.843 ft (Note)	**CY-27**		NPN open-collector transistor	
				CY-27-PN		PNP open-collector transistor	
			1.5 m 4.921 ft (Note)	**CY-29**		NPN open-collector transistor	
				CY-29-PN		PNP open-collector transistor	
	Diffuse reflective		120 mm 4.724 in	**CY-22**		NPN open-collector transistor	
				CY-22-PN		PNP open-collector transistor	
AC supply type	Thru-beam		12 m 39.370 ft	**CY-11A**	24 to 240 V AC ±10 %	AC non-contact (thyristor) output	Light-ON
				CY-11B			Dark-ON
	Retroreflective With polarizing filters		3 m 9.843 ft (Note)	**CY-17A**			Light-ON
				CY-17B			Dark-ON
			1.5 m 4.921 ft (Note)	**CY-19A**			Light-ON
				CY-19B			Dark-ON
	Diffuse reflective		120 mm 4.724 in	**CY-12A**			Light-ON
				CY-12B			Dark-ON

NOTE: Reflector is not supplied with the retroreflective type sensor. Please select the suitable reflector or reflective tape from the options.

Note: The sensing range of the retroreflective type sensor is specified for the **RF-230** reflector (optional).

CY

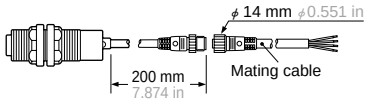
ORDER GUIDE

Pigtailed type

Pigtailed type is also available.

• Table of Model Nos.

Type			Standard	Pigtailed type (Note)
DC supply type	NPN output	Thru-beam	**CY-21**	**CY-21-J**
		Retroreflective	**CY-27**	**CY-27-J**
		With polarizing filters	**CY-29**	**CY-29-J**
		Diffuse reflective	**CY-22**	**CY-22-J**
	PNP output	Thru-beam	**CY-21-PN**	**CY-21-PN-J**
		Retroreflective	**CY-27-PN**	**CY-27-PN-J**
		With polarizing filters	**CY-29-PN**	**CY-29-PN-J**
		Diffuse reflective	**CY-22-PN**	**CY-22-PN-J**
AC supply type	Light-ON	Thru-beam	**CY-11A**	**CY-11A-J**
		Retroreflective	**CY-17A**	**CY-17A-J**
		With polarizing filters	**CY-19A**	**CY-19A-J**
		Diffuse reflective	**CY-12A**	**CY-12A-J**
	Dark-ON	Thru-beam	**CY-11B**	**CY-11B-J**
		Retroreflective	**CY-17B**	**CY-17B-J**
		With polarizing filters	**CY-19B**	**CY-19B-J**
		Diffuse reflective	**CY-12B**	**CY-12B-J**



Note: Please order the suitable mating cable separately.

• Mating cable

Type	Model No.	Description	
For DC supply type (Note 1)	**CN-22-C2**	Length: 2 m 6.562 ft	• For the emitter of the thru-beam type sensor (2-core) (Note 2)
	CN-22-C5	Length: 5 m 16.404 ft	
	CN-24-C2	Length: 2 m 6.562 ft	• For the receiver of the thru-beam type sensor, retroreflective type and diffuse reflective type sensors (4-core) (Note 2)
	CN-24-C5	Length: 5 m 16.404 ft	
For AC supply type (Note 1)	**CN-32-C2**	Length: 2 m 6.562 ft	• For the emitter of the thru-beam type sensor (2-core)
	CN-32-C5	Length: 5 m 16.404 ft	
	CN-33-C2	Length: 2 m 6.562 ft	• For the receiver of the thru-beam type sensor, retroreflective type and diffuse reflective type sensors (3-core)
	CN-33-C5	Length: 5 m 16.404 ft	

Notes: 1) The DC supply type mating cable and the AC supply type mating cable have different connector structure and so are not interchangeable.
2) To use the test input (emission halt input) use the 4-core **CN-24-C□**.

OPTIONS

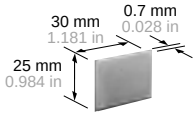
Designation	Model No.	Description		
Slit mask (For thru-beam type sensor only)	**OS-CYS**	Slit size 11.6 × 0.5 mm 0.457 × 0.020 in	Slit on emitter	• Sensing range: 3 m 9.843 ft • Min. sensing object: ϕ8 mm ϕ0.315 in
			Slit on receiver	• Sensing range: 2.5 m 8.202 ft • Min. sensing object: ϕ8 mm ϕ0.315 in
			Slit on both sides	• Sensing range: 0.8 m 2.625 ft • Min. sensing object: 10 × 0.7 mm 0.394 × 0.028 in
		Slit size 11.6 × 1.5 mm 0.457 × 0.059 in	Slit on emitter	• Sensing range: 5 m 16.404 ft • Min. sensing object: ϕ8 mm ϕ0.315 in
			Slit on receiver	• Sensing range: 4.5 m 14.764 ft • Min. sensing object: ϕ8 mm ϕ0.315 in
			Slit on both sides	• Sensing range: 2 m 6.562 ft • Min. sensing object: 10 × 2 mm 0.394 × 0.079 in
		Slit size 11.6 × 3 mm 0.457 × 0.118 in	Slit on emitter	• Sensing range: 7.5 m 24.606 ft • Min. sensing object: ϕ8 mm ϕ0.315 in
			Slit on receiver	• Sensing range: 7 m 22.966 ft • Min. sensing object: ϕ8 mm ϕ0.315 in
			Slit on both sides	• Sensing range: 4.5 m 14.764 ft • Min. sensing object: 10 × 3 mm 0.394 × 0.118 in
Side-view attachment (For thru-beam type sensor only)	**CY-SV1**	The beam is bent at a right angle by the attachments. • Sensing range (with attachment on both sides): 8 m 26.247 ft		
Reflector (For retroreflective type sensor only)	**RF-230**	• Sensing range: 3 m 9.843 ft [**CY-27**□ & **CY-17**□], 1.5 m 4.921 ft [**CY-29**□ & **CY-19**□]		
	RF-220	• Sensing range: 2 m 6.562 ft [**CY-27**□ & **CY-17**□], 1.2 m 3.937 ft [**CY-29**□ & **CY-19**□]		
	RF-210	• Sensing range: 1 m 3.281 ft [**CY-27**□ & **CY-17**□], 0.7 m 2.297 ft [**CY-29**□ & **CY-19**□]		
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 (For retroreflective type sensor only)	**RF-12**	• Sensing range: 0.7 m 2.297 ft [**CY-27**□ & **CY-17**□], 0.4 m 1.312 ft [**CY-29**□ & **CY-19**□]		
	RF-11	• Sensing range: 0.5 m 1.640 ft [**CY-27**□ & **CY-17**□]		
Sensor checker (Note)	**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.		

Note: Refer to p.414～ for details on the sensor checker **CHX-SC2**.

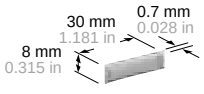
Slit mask
• **OS-CYS**

Side-view attachment
• **CY-SV1**

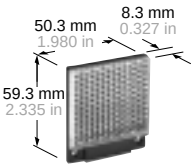
Reflective tape
• **RF-12**



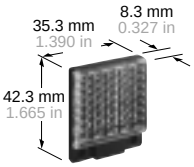
• **RF-11**



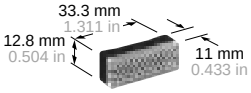
Reflector
• **RF-230**



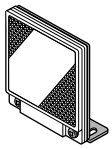
• **RF-220**



• **RF-210**



Reflector mounting bracket
• **MS-RF23**

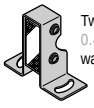


Two M4 (length 10 mm 0.394 in) screws with washers are attached.

• **MS-RF22**

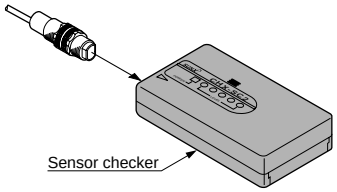
Two M3 (length 8 mm 0.315 in) screws with washers are attached.

• **MS-RF21-1**



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

Sensor checker
• **CHX-SC2**



CY

SPECIFICATIONS

DC supply type

Item \ Type		Thru-beam	Retroreflective	Retroreflective with polarizing filters	Diffuse reflective
Model No.	NPN output type	**CY-21**	**CY-27**	**CY-29**	**CY-22**
	PNP output type	**CY-21-PN**	**CY-27-PN**	**CY-29-PN**	**CY-22-PN**
Sensing range		12 m 39.370 ft	3 m 9.843 ft (Note 1)	1.5 m 4.921 ft (Note 1)	120 mm 4.724 in (Note 2)
Sensing object		ϕ8 mm ϕ0.315 in or more opaque object	ϕ50 mm ϕ1.969 in or more opaque or translucent object (Note 1)	ϕ50 mm ϕ1.969 in or more opaque, translucent or specular object (Note 1)	Opaque, translucent or transparent object
Hysteresis		———			15 % or less of operation distance
Repeatability (perpendicular to sensing axis)		0.1 mm 0.004 in or less			0.3 mm 0.012 in or less
Supply voltage		10 to 30 V DC Ripple P-P 10 % or less			
Current consumption		Emitter: 20 mA or less Receiver: 25 mA or less	25 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: 1.5 V or less (at 100 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: 1.5 V or less (at 100 mA source current)	
	Utilization category	DC-12 or DC-13			
	Output operation	Selectable either Light-ON or Dark-ON by the control input			
	Short-circuit protection	Incorporated			
Response time		2 ms or less			
Test input (emission halt) function		Incorporated	———		
Operation indicator		Red LED (lights up when the output is ON)			
Emission indicator		Red LED (lights up during beam emission)	———		
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 50081-2, EN 50082-2, 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/s² acceleration (50 G approx.) in X, Y and Z directions for three times each			
Emitting element		Infrared LED (modulated)		Red LED (modulated)	Infrared LED (modulated)
Material		Enclosure: PBT, Lens: Polycarbonate		Enclosure: PBT, Front cover: Acrylic	
Cable		0.34 mm² 4-core (thru-beam type emitter: 3-core) cabtyre cable, 2 m 6.562 ft long			
Cable extension		Extension up to total 100 m 328.084 ft is possible with 0.34 mm², or more, cable (thru-beam type: both emitter and receiver).			
Weight		Emitter: 90 g approx. Receiver: 100 g approx.	100 g approx.		
Accessories		Nut: 4 pcs.	Nut: 2 pcs.		

NOTE: Reflector is not supplied with the retroreflective type sensor. Please select the suitable reflector or reflective tape from the options.

Notes: 1) The sensing range and the sensing object of the retroreflective type sensor are specified for the **RF-230** reflector (optional).
2) The sensing range of the diffuse reflective type sensor is specified for white non-glossy paper (200 × 200 mm 7.874 × 7.874 in) as the object.

SPECIFICATIONS

AC supply type

Item \ Type		Thru-beam	Retroreflective	Retroreflective with polarizing filters	Diffuse reflective
Model No.	Light-ON	**CY-11A**	**CY-17A**	**CY-19A**	**CY-12A**
	Dark-ON	**CY-11B**	**CY-17B**	**CY-19B**	**CY-12B**
Sensing range		12 m 39.370 ft	3 m 9.843 ft (Note 1)	1.5 m 4.921 ft (Note 1)	120 mm 4.724 in (Note 2)
Sensing object		ϕ8 mm ϕ0.315 in or more opaque object	ϕ50 mm ϕ1.969 in or more opaque or translucent object (Note 1)	ϕ50 mm ϕ1.969 in or more opaque, translucent or specular object (Note 1)	Opaque, translucent or transparent object
Hysteresis		———			15 % or less of operation distance
Repeatability (perpendicular to sensing axis)		0.1 mm 0.004 in or less			0.3 mm 0.012 in or less
Supply voltage		24 to 240 V AC ± 10 %			
Power consumption		Emitter: 1.5 VA or less Receiver: 2.5 VA or less	2.7 VA or less		
Output		AC non-contact (thyristor) output • Load current: 5 to 200 mA • Applied voltage: 24 to 240 V AC ± 10 % • Residual voltage: 4 V AC or less (at 200 mA load current)			
Response time		20 ms or less			
Operation indicator		Red LED (lights up when the output is ON), incorporated on the receiver for the thru-beam type sensor			
Power indicator		Red LED (lights up when the power is ON), incorporated on the emitter	———		
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 50081-2, EN 50082-2, EN 60947-5-2			
	Voltage withstandability	1,500 V AC for one min. between all supply terminals connected together and enclosure			
	Insulation resistance	20 MΩ, or more, with 500 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/s² acceleration (50 G approx.) in X, Y and Z directions for three times each			
Emitting element		Infrared LED (modulated)		Red LED (modulated)	Infrared LED (modulated)
Material		Enclosure: PBT, Lens: Polycarbonate		Enclosure: PBT, Front cover: Acrylic	
Cable		0.34 mm² 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 0.34 mm², or more, cable (thru-beam type: both emitter and receiver).			
Weight		Emitter: 90 g approx. Receiver: 100 g approx.	100 g approx.		
Accessories		Nut: 4 pcs.	Nut: 2 pcs.		

NOTE: Reflector is not supplied with the retroreflective type sensor. Please select the suitable reflector or reflective tape from the options.

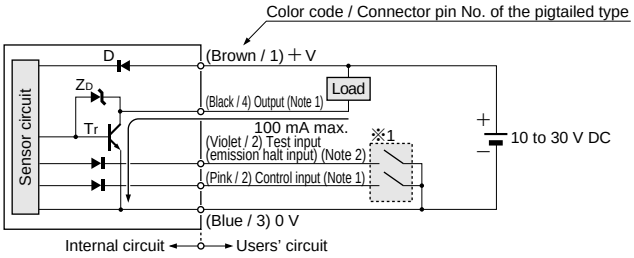
Notes: 1) The sensing range and the sensing object of the retroreflective type sensor are specified for the **RF-230** reflector (optional).
2) The sensing range of the diffuse reflective type sensor is specified for white non-glossy paper (200 × 200 mm 7.874 × 7.874 in) as the object.

CY

I/O CIRCUIT AND WIRING DIAGRAMS

NPN output type

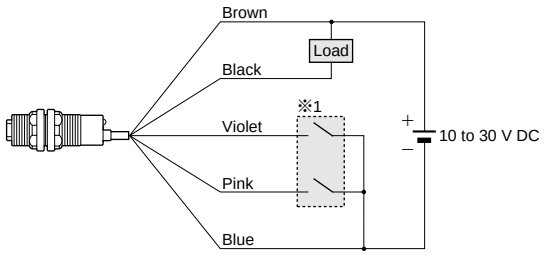
I/O circuit diagram



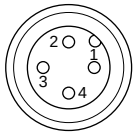
Notes: 1) The emitter of the thru-beam type sensor does not incorporate the output and the control input. When the mating cable is connected to the pigtailed type, the color of the control input wire is white.
2) Test input (emission halt input) is incorporated only on the emitter of the thru-beam type sensor. When the mating cable is connected to the pigtailed type, its color is white.

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

Wiring diagram



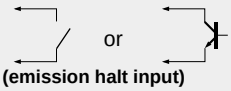
Connector pin position (Pigtailed type)



1: + V
2: Test input (emission halt input) or control input
3: 0 V
4: Output or not connected

※1

Non-voltage contact or
NPN open-collector transistor

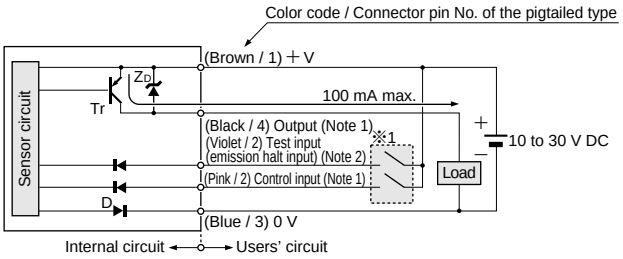


- **Test input (emission halt input)**
  Low (0 to 2.5 V): Emission halt
  High (6 to 30 V or open): Emission
- **Control input**
  Low (0 to 1.5 V): Dark-ON
  High (6 to 30 V, or open): Light-ON

Note: If opening the input cable, make sure to insulate it.

PNP output type

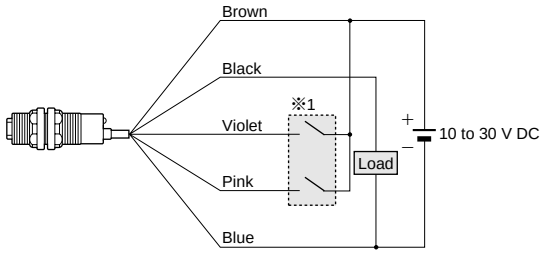
I/O circuit diagram



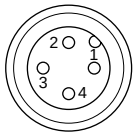
Notes: 1) The emitter of the thru-beam type sensor does not incorporate the output and the control input. When the mating cable is connected to the pigtailed type, the color of the control input wire is white.
2) Test input (emission halt input) is incorporated only on the emitter of the thru-beam type sensor. When the mating cable is connected to the pigtailed type, its color is white.

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

Wiring diagram



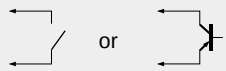
Connector pin position (Pigtailed type)



1: + V
2: Test input (emission halt input) or control input
3: 0 V
4: Output or not connected

※1

Non-voltage contact or
PNP open-collector transistor



- **Test input (emission halt input)**
  Low (0 to 1.5 V, or open): Emission
  High (3 to 30 V): Emission halt
- **Control input**
  Low [(supply voltage − 6 V) or less, or open]: Light-ON
  High [(supply voltage − 1.5 V) or more]: Dark-ON

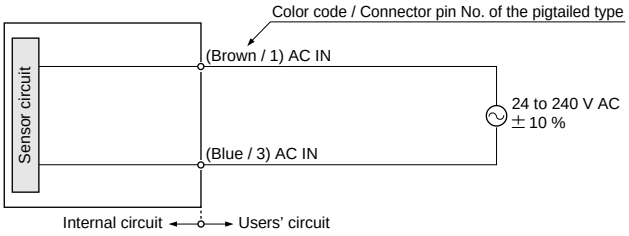
Note: If opening the input cable, make sure to insulate it.

I/O CIRCUIT AND WIRING DIAGRAMS

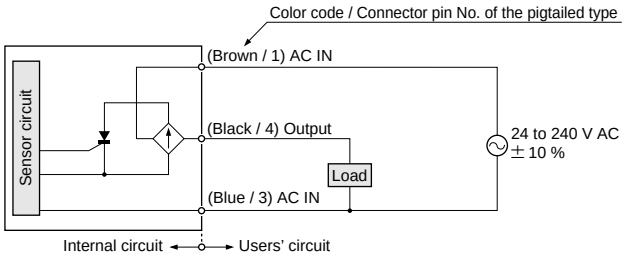
AC non-contact output type

I/O circuit diagrams

Emitter of thru-beam type sensor

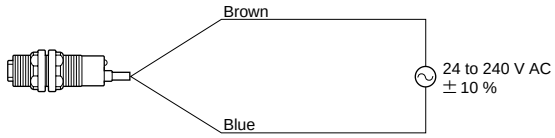


Receiver of thru-beam type sensor, retroreflective & diffuse reflective type sensors

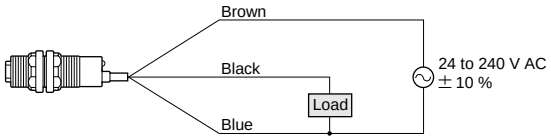


Wiring diagrams

Emitter of thru-beam type sensor

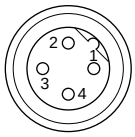


Receiver of thru-beam type sensor, retroreflective & diffuse reflective type sensors



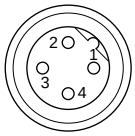
Connector pin position (Pigtailed type)

Emitter of thru-beam type sensor



1: AC IN
2: Not connected
3: AC IN
4: Not connected

Receiver of thru-beam type sensor, retroreflective & diffuse reflective type sensors

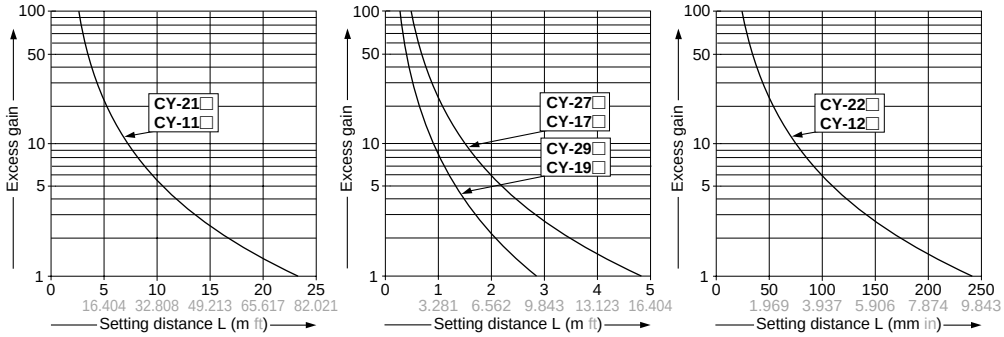


1: AC IN
2: Not connected
3: AC IN
4: Output

SENSING CHARACTERISTICS (TYPICAL)

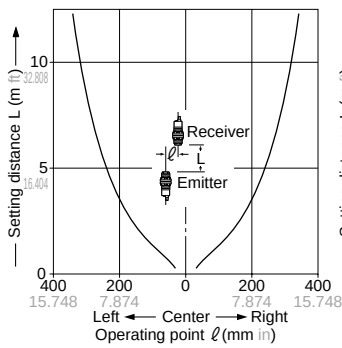
All models

Correlation between setting distance and excess gain

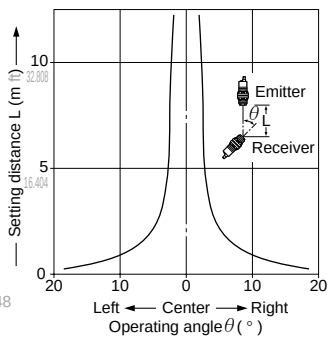


CY-21□ CY-11□ Thru-beam type

Parallel deviation

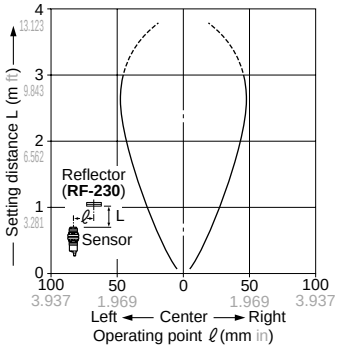


Angular deviation

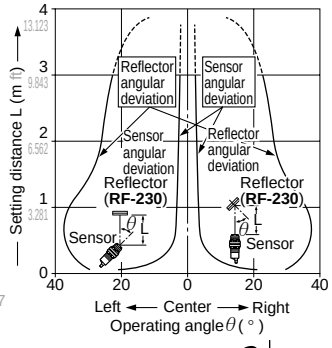


CY-27□ CY-17□ Retroreflective type

Parallel deviation



Angular deviation

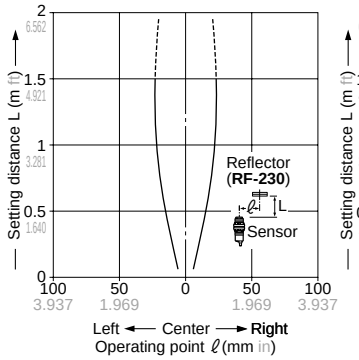


CY

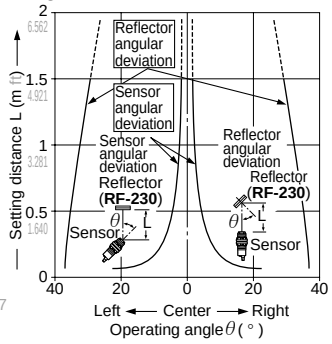
SENSING CHARACTERISTICS (TYPICAL)

CY-29□ CY-19□ Retroreflective type

Parallel deviation

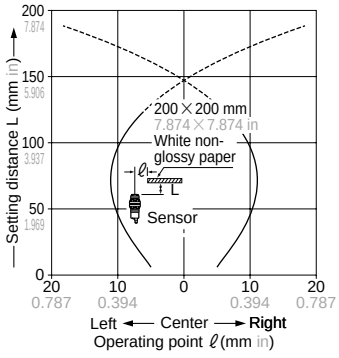


Angular deviation



CY-22□ CY-12□ Diffuse reflective type

Sensing field



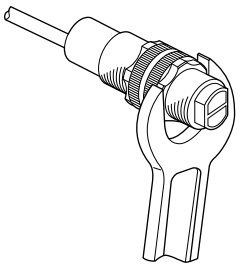
PRECAUTIONS FOR PROPER USE

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 2 N·m or less.



Retroreflective type sensor with polarizing filters (CY-29□ and CY-19□)

• 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

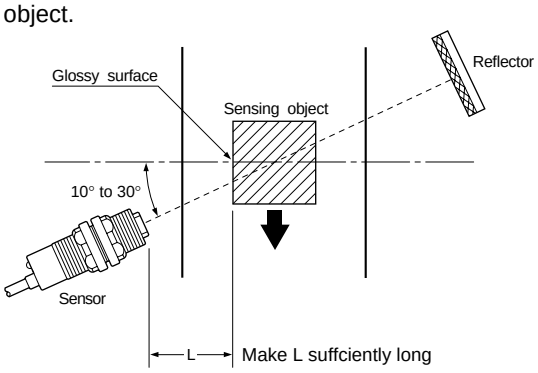
Steps

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

Retroreflective type sensor (CY-27□ and CY-17□)

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

① Make L, shown in the diagram, sufficiently long.
② Install at an angle of 10 to 30 degrees to the sensing object.



※**CY-29**□ and **CY-19**□ do not need the above adjustment.

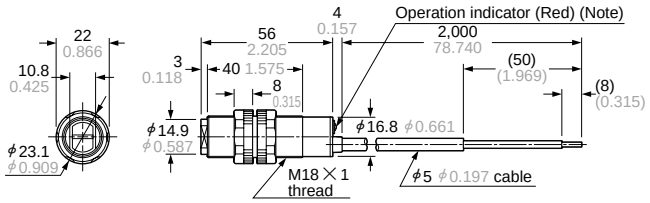
Others

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

DIMENSIONS (Unit: mm in)

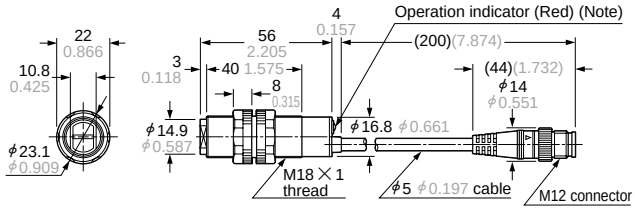
The CAD data in the dimensions can be downloaded from the SUNX website: http://www.sunx.co.jp/

CY-21□ CY-27□ CY-22□ Sensor



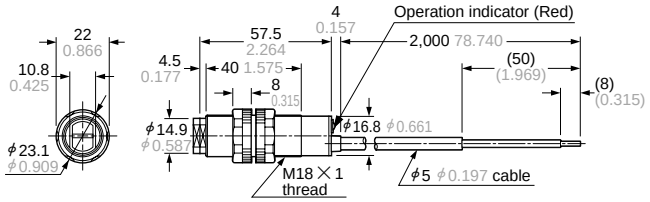
Note: It is the emitting indicator (red) on the emitter of the thru-beam type sensor.

CY-21□-J CY-27□-J CY-22□-J Sensor

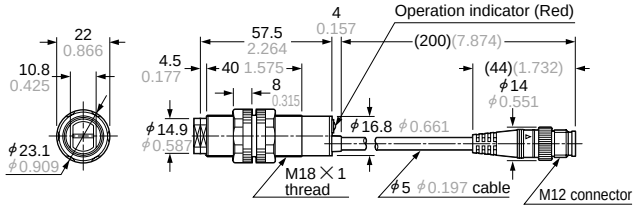


Note: It is the emitting indicator (red) on the emitter of the thru-beam type sensor.

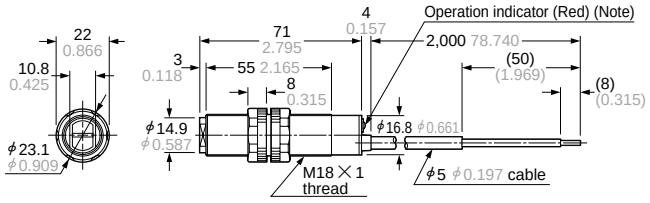
CY-29□ Sensor



CY-29□-J Sensor

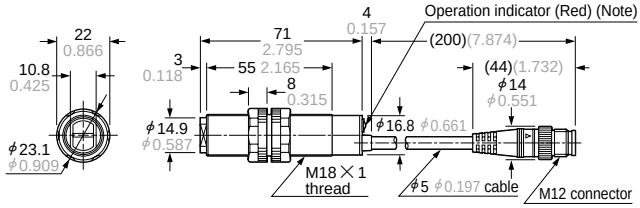


CY-11□ CY-17□ CY-12□ Sensor



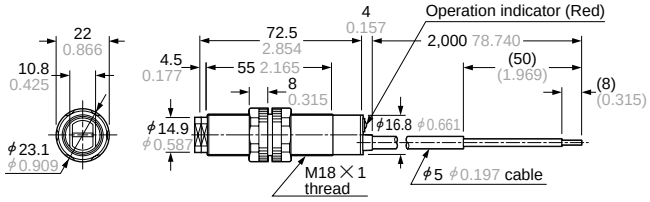
Note: It is the power indicator (red) on the emitter of the thru-beam type sensor.

CY-11□-J CY-17□-J CY-12□-J Sensor

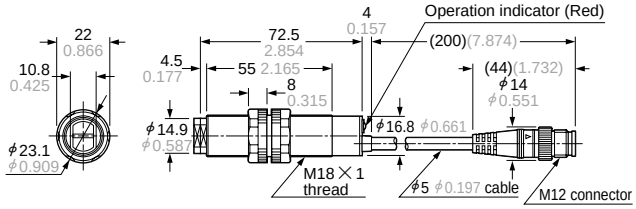


Note: It is the power indicator (red) on the emitter of the thru-beam type sensor.

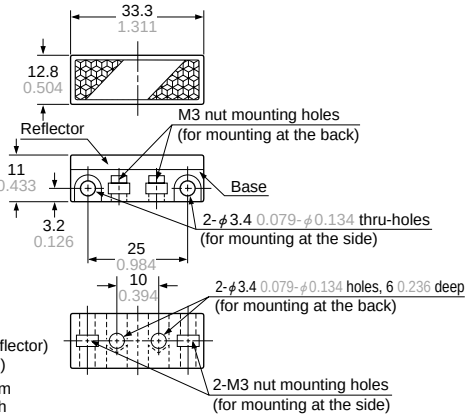
CY-19□ Sensor



CY-19□-J Sensor



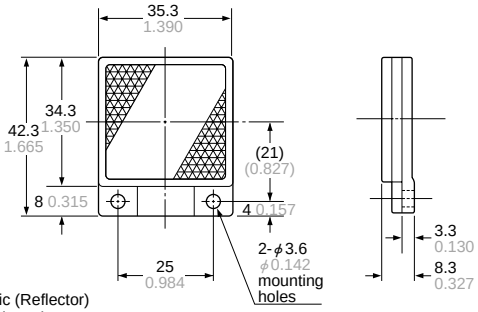
RF-210 Reflector (Optional)



Material: Acrylic (Reflector)
ABS (Base)

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

RF-220 Reflector (Optional)



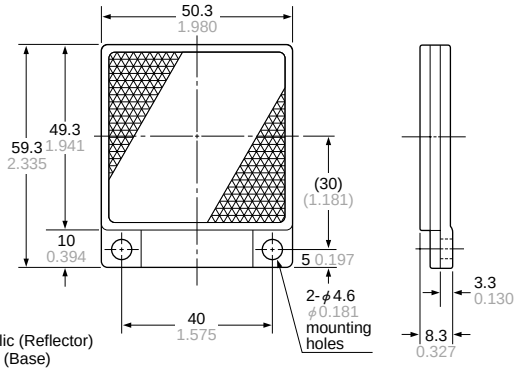
Material: Acrylic (Reflector)
ABS (Base)

CY

DIMENSIONS (Unit: mm in)

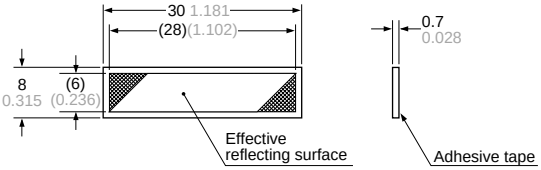
The CAD data in the dimensions can be downloaded from the SUNX website: http://www.sunx.co.jp/

RF-230 Reflector (Optional)



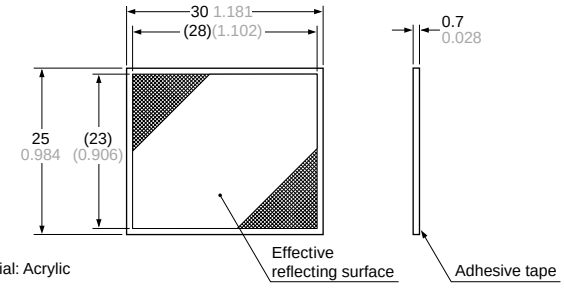
Material: Acrylic (Reflector)
ABS (Base)

RF-11 Reflective tape (Optional)



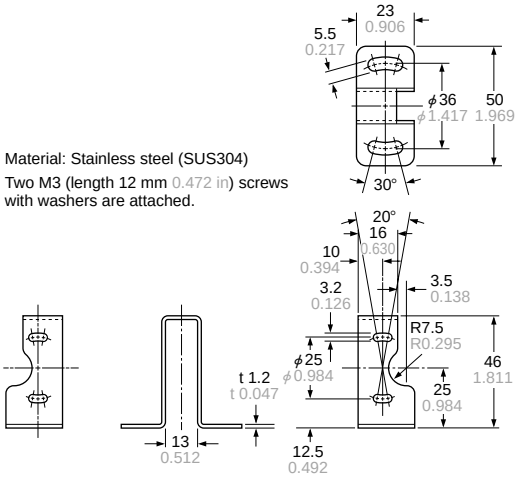
Material: Acrylic

RF-12 Reflective tape (Optional)



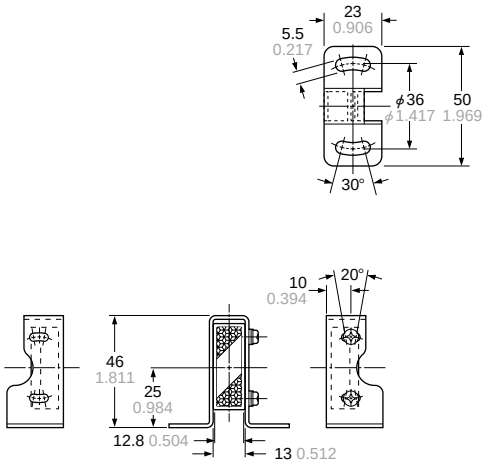
Material: Acrylic

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



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

Assembly dimensions

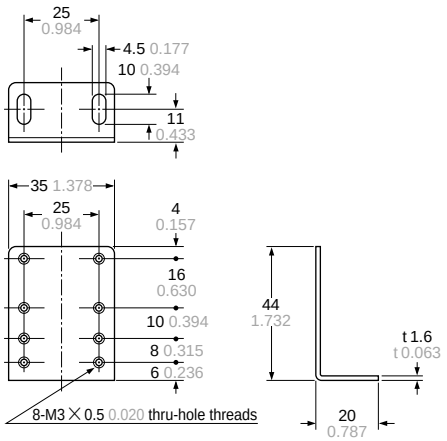


DIMENSIONS (Unit: mm in)

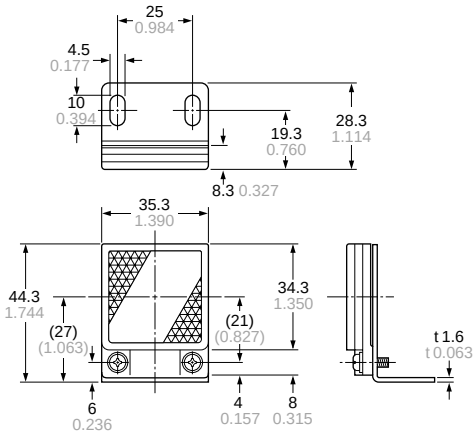
The CAD data in the dimensions can be downloaded from the SUNX website: http://www.sunx.co.jp/

MS-RF22

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



Assembly dimensions

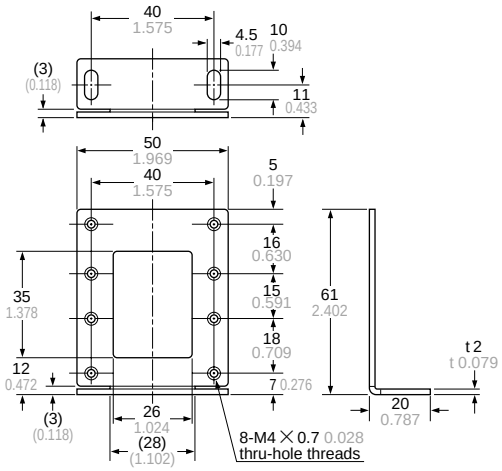


Material: Cold rolled carbon steel (SPCC)
(Uni-chrome plated)

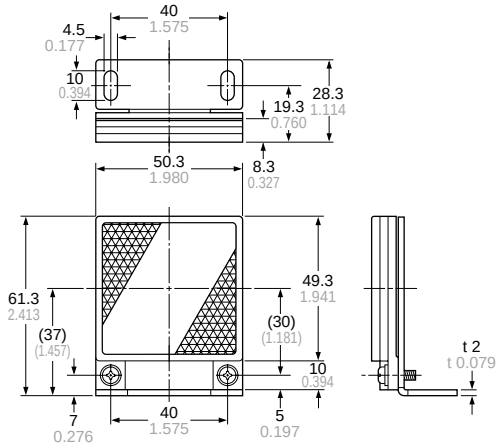
Two M3 (length 8 mm 0.315 in) screws with washers are attached.

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.