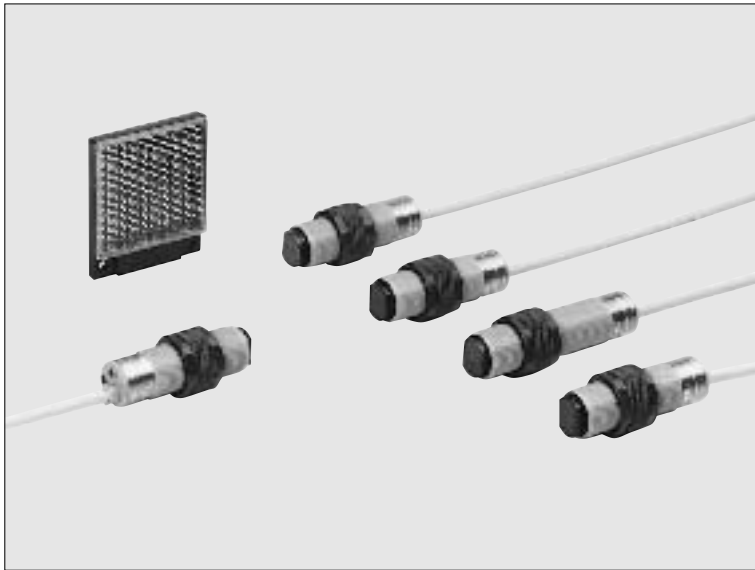


# CY SERIES

## Amplifier Built-in Cylindrical Photoelectric Sensor



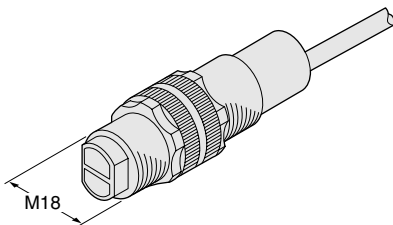
**Cylindrical Type Easily Mountable with M18 Thread**

**CE Marked**

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

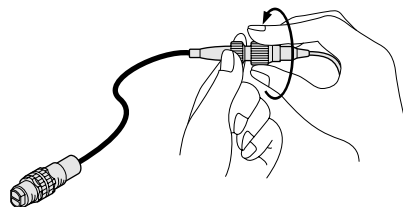
### M18 Thread

This sensor has an M18 thread size for convenient mounting.



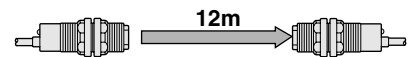
### Easy to Replace

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

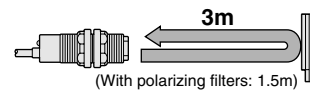


### Long Sensing Range

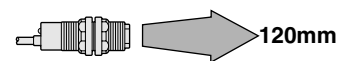
#### Thru-beam type



#### Retroreflective type



#### Diffuse reflective type



### Wide Product Range

#### Supply voltage

- ① AC supply type (24 to 240V AC)
- ② DC supply type (10 to 30V 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.



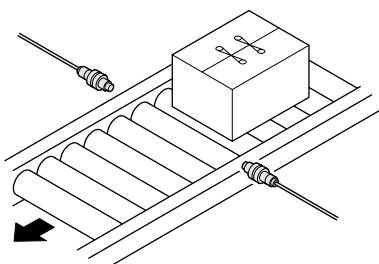
#### Slit mask (For thru-beam type sensors only)

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

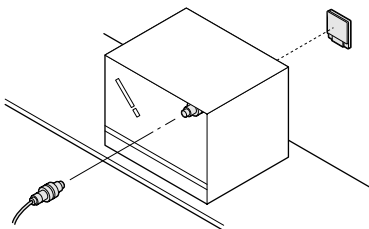


## APPLICATIONS

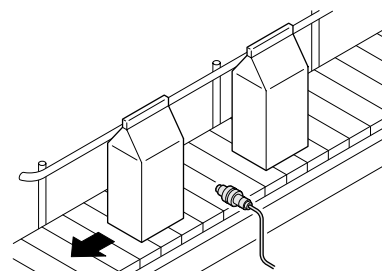
### Sensing cardboard boxes



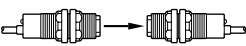
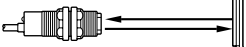
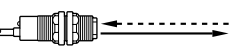
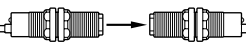
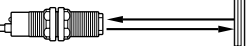
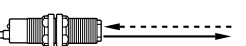
### Sensing specular objects



### Sensing milk packs



## ORDER GUIDE

Type	Appearance	Sensing range	Model No.	Supply voltage	Output	Output operation			
DC supply type	Thru-beam		12m	CY-21	10 to 30V DC	NPN open-collector transistor	Selectable either Light-ON or Dark-ON by the control input		
				CY-21-PN		PNP open-collector transistor			
	Retroreflective		3m (Note 1)	CY-27		NPN open-collector transistor			
				CY-27-PN		PNP open-collector transistor			
				With polarizing filters		1.5m (Note 1)		CY-29	NPN open-collector transistor
								CY-29-PN	PNP open-collector transistor
Diffuse reflective		120mm	CY-22	NPN open-collector transistor					
			CY-22-PN	PNP open-collector transistor					
AC supply type	Thru-beam		12m	CY-11A	24 to 240V AC ± 10%	AC non-contact (thyristor) output	Light-ON		
				CY-11B			Dark-ON		
	Retroreflective		3m (Note 1)	CY-17A			Light-ON		
				CY-17B			Dark-ON		
				With polarizing filters			1.5m (Note 1)	CY-19A	Light-ON
								CY-19B	Dark-ON
	Diffuse reflective		120mm	CY-12A			Light-ON		
				CY-12B			Dark-ON		

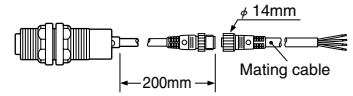
**NOTE: Reflector is not supplied with the retroreflective type sensor. Please select the suitable reflector or reflective tape from the options.**

Note 1: The sensing range of the retroreflective type sensor is specified for the RF-230 reflector (optional).

## ORDER GUIDE

### Pigtailed type

Pigtailed sensors are available. When ordering this type, add suffix '-J' to the model No. Please order the suitable mating cable separately.  
(e.g.) The pigtailed type of **CY-22-PN** is '**CY-22-PN-J**'.



#### • Mating cable

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

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, use the 4-core **CN-24-C**.

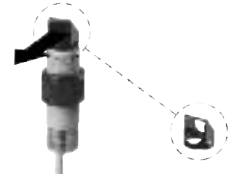
## OPTIONS

Designation	Model No.	Description	
Slit mask (For thru-beam type sensor only)	<b>OS-CYS</b>	Slit size 11.6 × 0.5mm	Slit on emitter • Sensing range: 3m • Min. sensing object: $\phi$ 8mm
			Slit on receiver • Sensing range: 2.5m • Min. sensing object: $\phi$ 8mm
			Slit on both sides • Sensing range: 0.8m • Min. sensing object: 10 × 0.7mm
		Slit size 11.6 × 1.5mm	Slit on emitter • Sensing range: 5m • Min. sensing object: $\phi$ 8mm
			Slit on receiver • Sensing range: 4.5m • Min. sensing object: $\phi$ 8mm
			Slit on both sides • Sensing range: 2m • Min. sensing object: 10 × 2mm
		Slit size 11.6 × 3mm	Slit on emitter • Sensing range: 7.5m • Min. sensing object: $\phi$ 8mm
			Slit on receiver • Sensing range: 7m • Min. sensing object: $\phi$ 8mm
			Slit on both sides • Sensing range: 4.5m • Min. sensing object: 10 × 3mm
Side-view attachment (For thru-beam type sensor only)	<b>CY-SV1</b>	• The beam is bent at a right angle by the attachments. • Sensing range (with slit on both sides): 8m	
Reflector (For retroreflective type sensor only)	<b>RF-230</b>	• Sensing range: 3m [CY-27□ & CY-17□], 1.5m [CY-29□ & CY-19□]	
	<b>RF-220</b>	• Sensing range: 2m [CY-27□ & CY-17□], 1.2m [CY-29□ & CY-19□]	
	<b>RF-210</b>	• Sensing range: 1m [CY-27□ & CY-17□], 0.7m [CY-29□ & CY-19□]	
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 (For retroreflective type sensor only)	<b>RF-12</b>	• Sensing range: 0.7m [CY-27□ & CY-17□], 0.4m [CY-29□ & CY-19□]	
	<b>RF-11</b>	• Sensing range: 0.5m [CY-27□ & CY-17□]	
Sensor checker (Note)	<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.	

### Slit mask

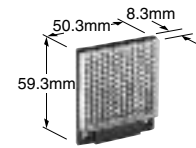


### Side-view attachment

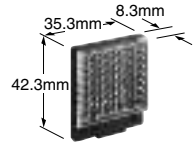


### Reflector

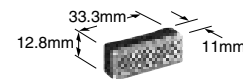
#### • RF-230



#### • RF-220

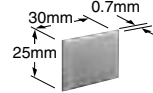


#### • RF-210

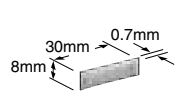


### Reflective tape

#### • RF-12

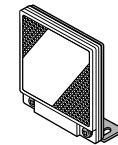


#### • RF-11



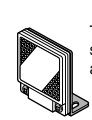
### Reflector mounting bracket

#### • MS-RF23



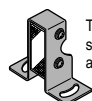
Two M4 (length 10mm) screws with washers are attached.

#### • MS-RF22



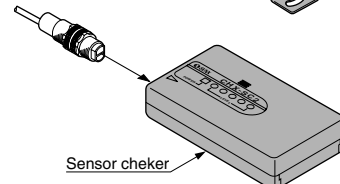
Two M3 (length 8mm) screws with washers are attached.

#### • MS-RF21-1



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

### Sensor checker



## SPECIFICATIONS

### DC supply type

Item	Model No.	Type	Retroreflective			Diffuse reflective
			Thru-beam		With polarizing filters	
			NPN output type	CY-21	CY-27	CY-29
PNP output type	CY-21-PN	CY-27-PN	CY-29-PN	CY-22-PN		
Sensing range			12m	3m (Note 1)	1.5m (Note 1)	120mm (Note 2)
Sensing object			φ 8mm or more opaque object	φ 50mm or more opaque or translucent object (Note 1)	φ 50mm 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)			0.1mm or less			0.3mm or less
Supply voltage			10 to 30V DC Ripple P-P 10% or less			
Current consumption			Emitter: 20mA or less Receiver: 25mA or less	25mA or less		
Output			<NPN output type> 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)		<PNP output type> PNP open-collector transistor • Maximum source current: 100mA • Applied voltage: 30V DC or less (between output and + V) • Residual voltage: 1.5V or less (at 100mA 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			2ms or less			
Test input 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 (No dew condensation or icing allowed), Storage: - 30 to + 70°C			
	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		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 <sup>2</sup> acceleration (50G 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			0.34mm <sup>2</sup> 4-core (thru-beam type emitter: 3-core) cabtyre cable, 2m long			
Cable extension			Extension up to total 100m is possible with 0.34mm <sup>2</sup> , or more, cable (thru-beam type: both emitter and receiver).			
Weight			Emitter: 90g approx. Receiver: 100g approx.	100g approx.		
Accessories			Nut: 4 Nos.	Nut: 2 Nos.		

**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 × 200mm) as the object.

## SPECIFICATIONS

### AC supply type

Item	Model No.	Type	Retroreflective			Diffuse reflective
			Thru-beam	With polarizing filters		
		Light-ON	<b>CY-11A</b>	<b>CY-17A</b>	<b>CY-19A</b>	<b>CY-12A</b>
		Dark-ON	<b>CY-11B</b>	<b>CY-17B</b>	<b>CY-19B</b>	<b>CY-12B</b>
Sensing range			12m	3m (Note 1)	1.5m (Note 1)	120mm (Note 2)
Sensing object			φ 8mm or more opaque object	φ 50mm or more opaque or translucent object (Note 1)	φ 50mm 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)			0.1mm or less			0.3mm or less
Supply voltage			24 to 240V AC ± 10%			
Power consumption			Emitter: 1.5VA or less Receiver: 2.5VA or less	2.7VA or less		
Output			AC non-contact (thyristor) output • Load current: 5 to 200mA • Applied voltage: 24 to 240V AC ± 10% • Residual voltage: 4V AC or less (at 200mA load current)			
Response time			20ms 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	Protection		IP67 (IEC)			
	Ambient temperature		- 25 to + 55°C (No dew condensation or icing allowed), Storage: - 30 to + 70°C			
	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		Emission: EN50081-2, Immunity: EN50082-2			
	Voltage withstandability		1,500V AC for one min. between all supply terminals connected together and enclosure			
	Insulation resistance		20MΩ, or more, with 500V 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 <sup>2</sup> acceleration (50G 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			0.34mm <sup>2</sup> 3-core (thru-beam type emitter: 2-core) cabtyre cable, 2m long			
Cable extension			Extension up to total 100m is possible with 0.34mm <sup>2</sup> , or more, cable (thru-beam type: both emitter and receiver).			
Weight			Emitter: 90g approx. Receiver: 100g approx.	100g approx.		
Accessories			Nut: 4 Nos.	Nut: 2 Nos.		

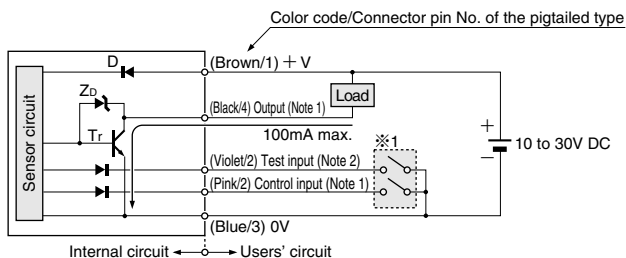
**NOTE: Reflector is not supplied with the retroreflective type sensor. Please select the suitable reflector or reflective tape from the options.**

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 × 200mm) as the object.

## I/O CIRCUIT AND WIRING DIAGRAMS

### NPN output type

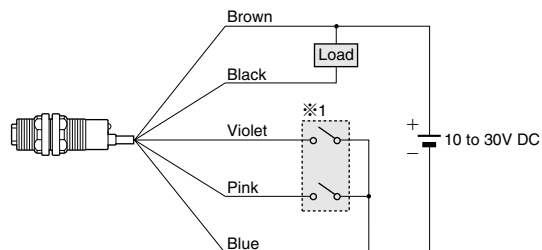
#### I/O circuit diagram



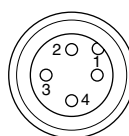
- Notes: 1) The emitter of the thru-beam type sensor does not incorporate the output and the control input. When the mating cable is connected to the pigtailed type, the color of the control input wire is white.
- 2) Incorporated only on the emitter of the thru-beam type sensor. When the mating cable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

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

#### Wiring diagram

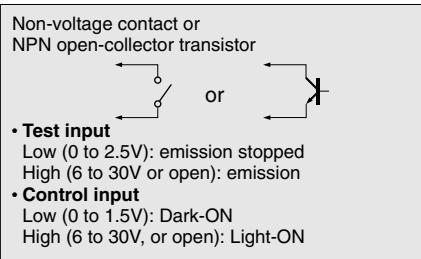


#### Connector pin position (Pigtailed type)



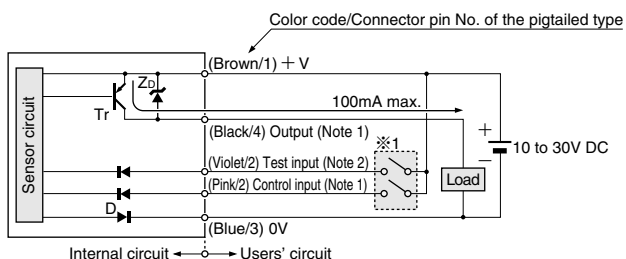
- 1: +V
- 2: Test input or control input
- 3: 0V
- 4: Output or not connected

※1



### PNP output type

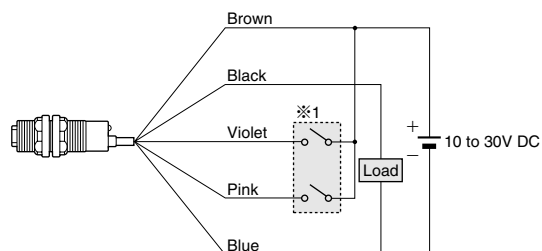
#### I/O circuit diagram



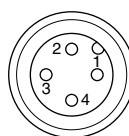
- Notes: 1) The emitter of the thru-beam type sensor does not incorporate the output and the control input. When the mating cable is connected to the pigtailed type, the color of the control input wire is white.
- 2) Incorporated only on the emitter of the thru-beam type sensor. When the mating cable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

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

#### Wiring diagram

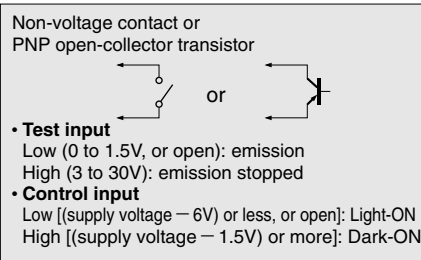


#### Connector pin position (Pigtailed type)



- 1: +V
- 2: Test input or control input
- 3: 0V
- 4: Output or not connected

※1

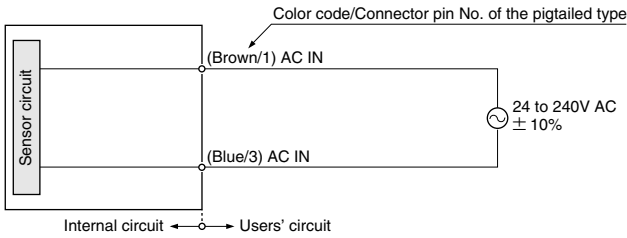


## I/O CIRCUIT AND WIRING DIAGRAMS

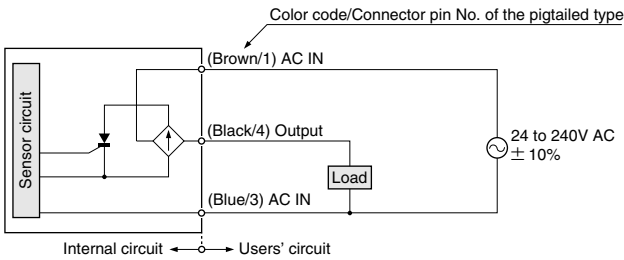
### AC non-contact output type

#### I/O circuit diagrams

##### Emitter of thru-beam type sensor

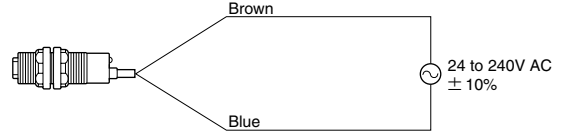


##### Receiver of thru-beam type sensor, retroreflective & diffuse reflective type sensors

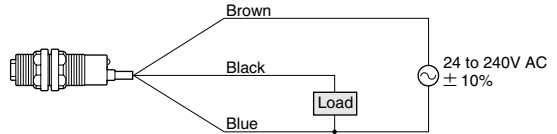


#### Wiring diagrams

##### Emitter of thru-beam type sensor

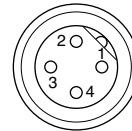


##### Receiver of thru-beam type sensor, retroreflective & diffuse reflective type sensors



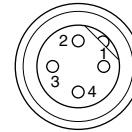
#### Connector pin position (Pigtailed type)

##### 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

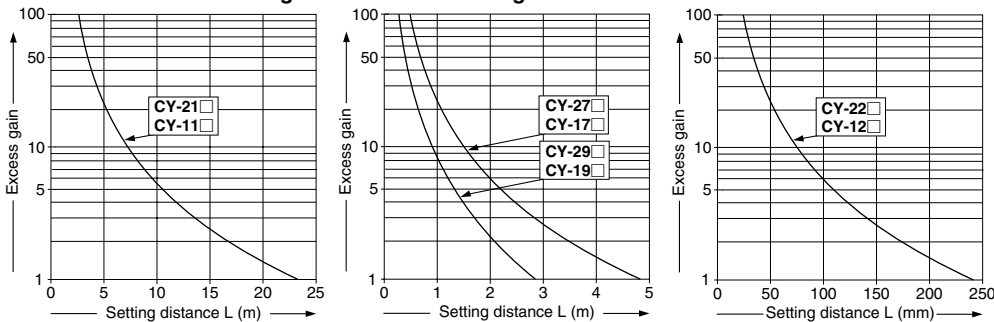


- 1: AC IN
- 2: Not connected
- 3: AC IN
- 4: Output

## SENSING CHARACTERISTICS (TYPICAL)

### All models

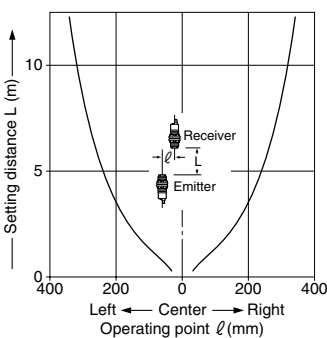
#### Correlation between setting distance and excess gain



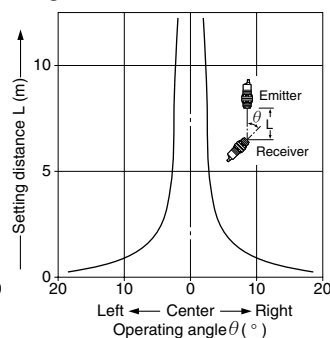
CY-21  
CY-11

Thru-beam type

#### Parallel deviation



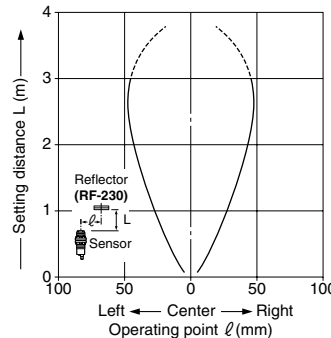
#### Angular deviation



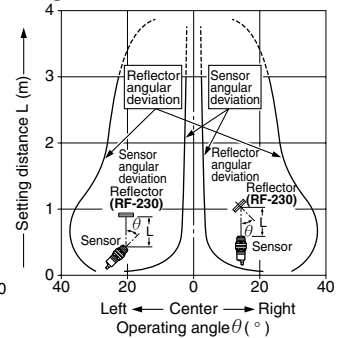
CY-27  
CY-17

Retroreflective type

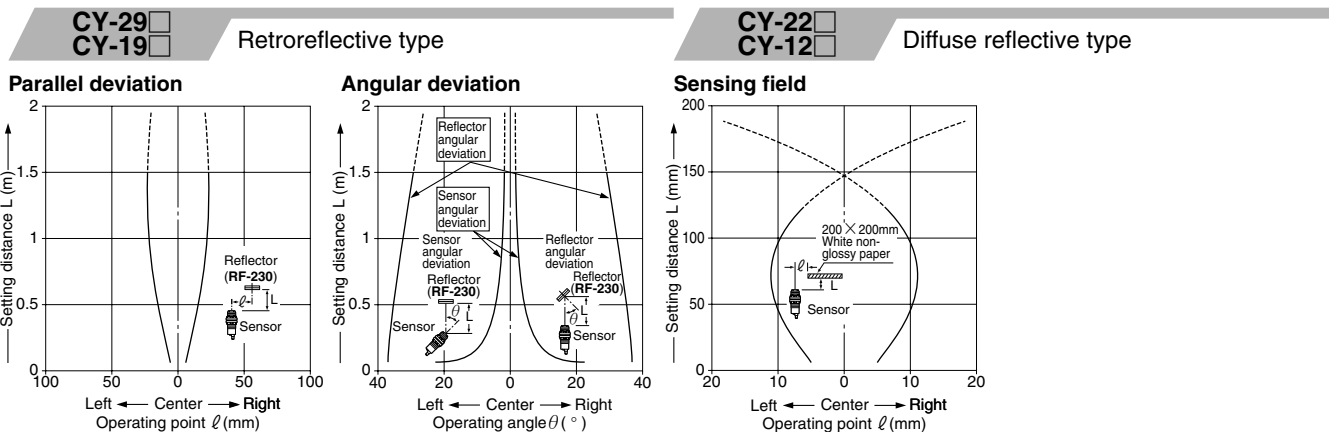
#### Parallel deviation



#### Angular deviation



## SENSING CHARACTERISTICS (TYPICAL)

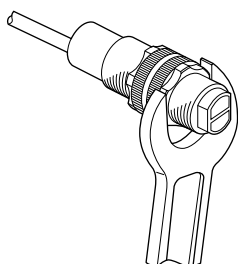


## PRECAUTIONS FOR PROPER USE

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 2N·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

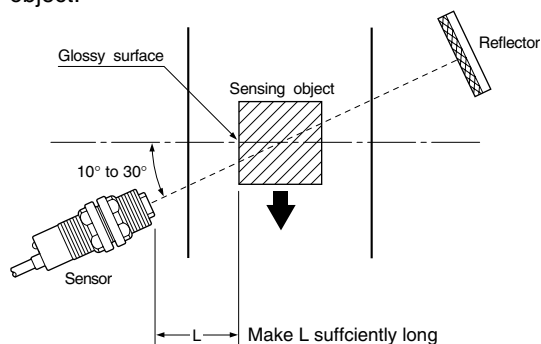
- Can wrapped by clear film
- Aluminum sheet covered by plastic film
- Gold or silver color (glossy) label or wrapping paper

#### 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.
  - Make L, shown in the diagram, sufficiently long.
  - 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

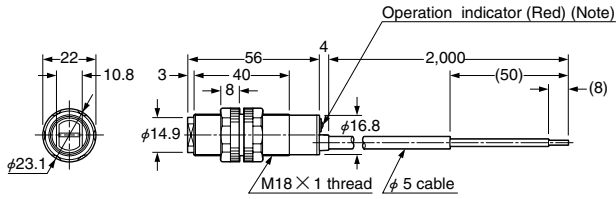
- Do not use during the initial transient time (50ms) after the power supply is switched on.



## DIMENSIONS (Unit: mm)

**CY-21□ CY-27□**

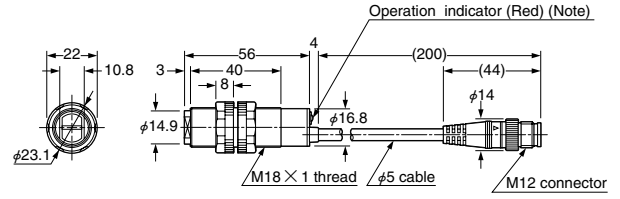
Sensor



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**

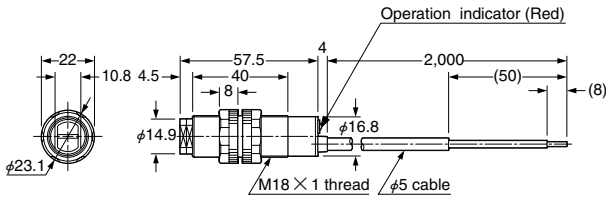
Sensor



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

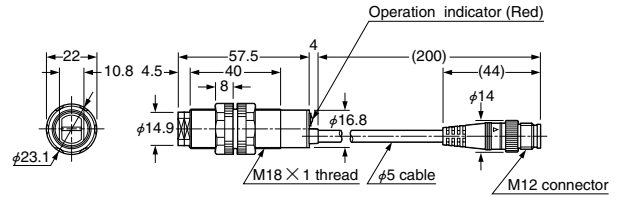
**CY-29□**

Sensor



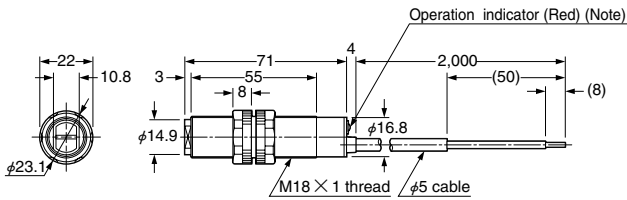
**CY-29□-J**

Sensor



**CY-11□ CY-17□**

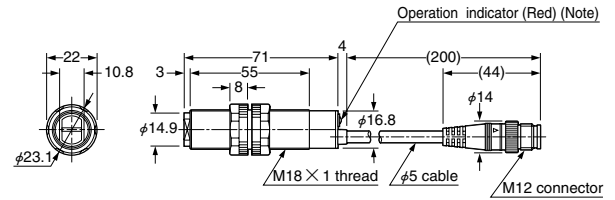
Sensor



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**

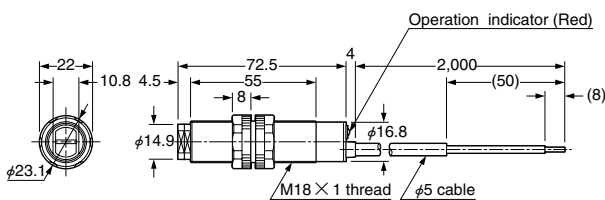
Sensor



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

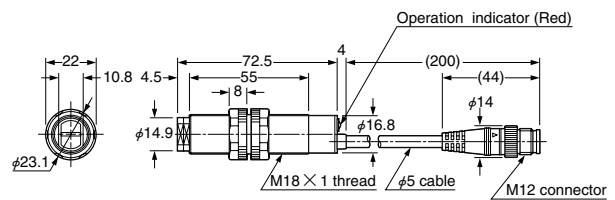
**CY-19□**

Sensor



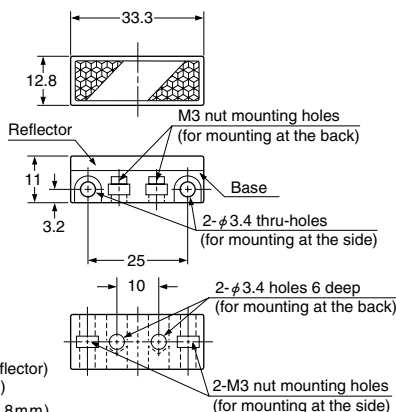
**CY-19□-J**

Sensor



**RF-210**

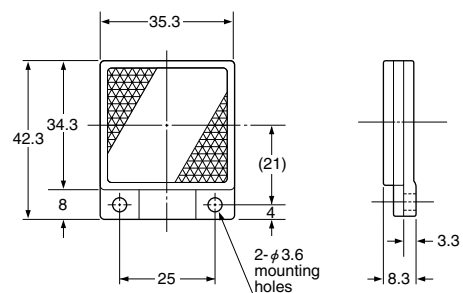
Reflector (Optional)



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

**RF-220**

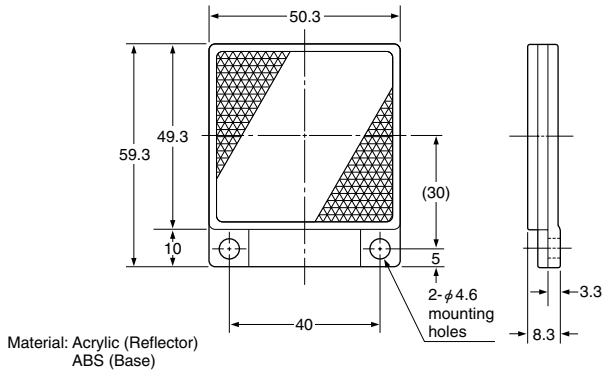
Reflector (Optional)



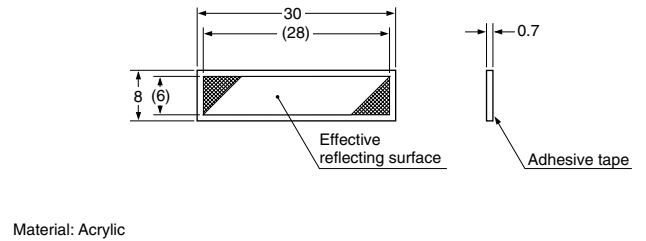
Material: Acrylic (Reflector)  
ABS (Base)

## DIMENSIONS (Unit: mm)

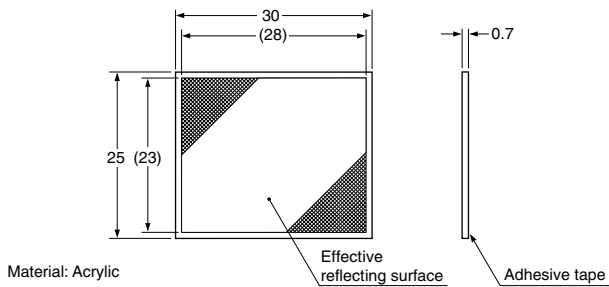
### RF-230 Reflector (Optional)



### RF-11 Reflective tape (Optional)

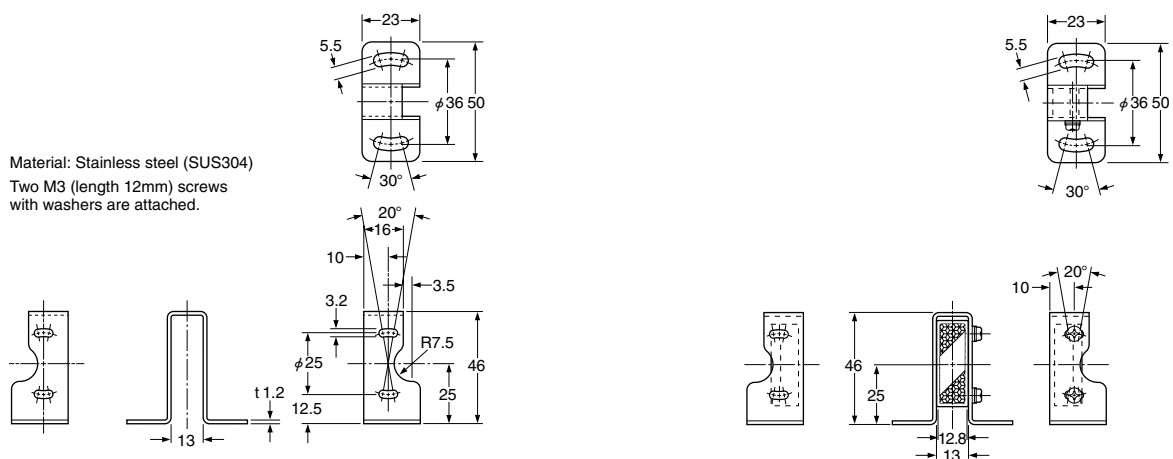


### RF-12 Reflective tape (Optional)



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

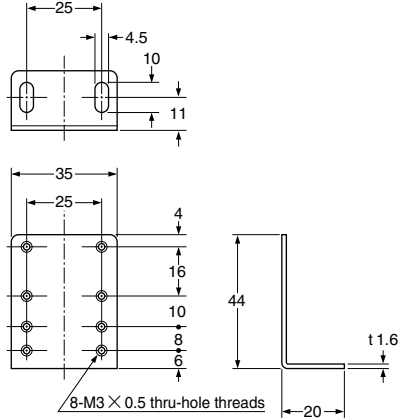
#### Assembly dimensions



## DIMENSIONS (Unit: mm)

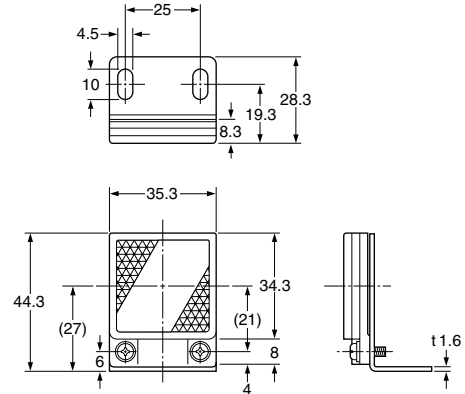
### MS-RF22 Reflector mounting bracket for RF-220 (Optional)

#### Assembly dimensions



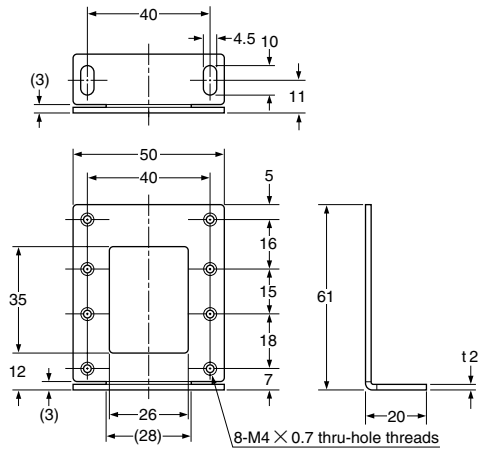
Material: Cold rolled carbon steel (SPCC)  
(Uni-chrome plated)

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



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

#### Assembly dimensions



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

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

