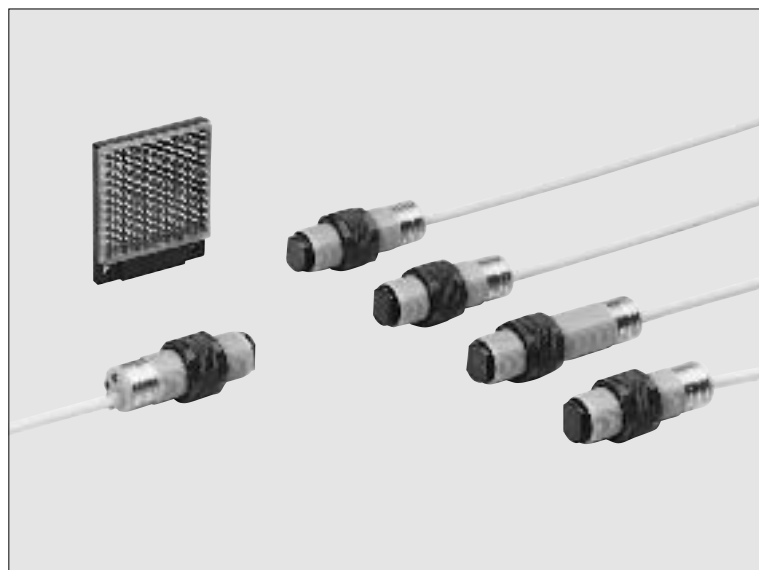


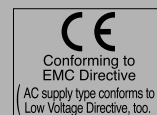
# CY SERIES

## Cylindrical Photoelectric Sensor

**Amplifier Built-in**

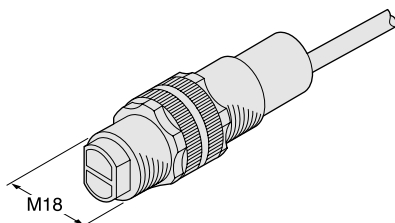


**Cylindrical type easily mountable with M18 thread**



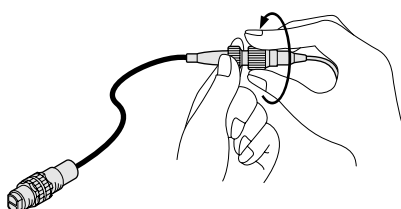
### M18 thread

This sensor has an M18 thread size for convenient mounting.



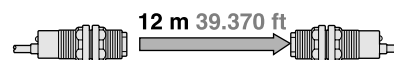
### Easy to replace

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

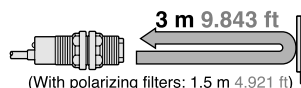


### Long sensing range

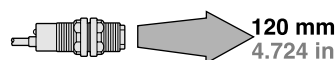
#### Thru-beam type



#### Retroreflective type



#### Diffuse reflective type



### Wide product range

#### Supply voltage

- ① AC supply type (24 to 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.



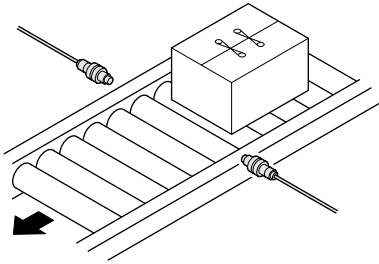
#### Slit mask (For thru-beam type sensors only)

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

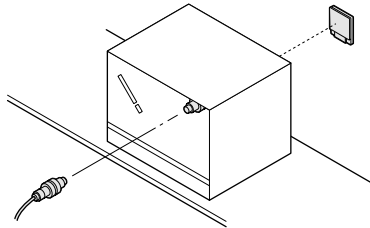


## APPLICATIONS

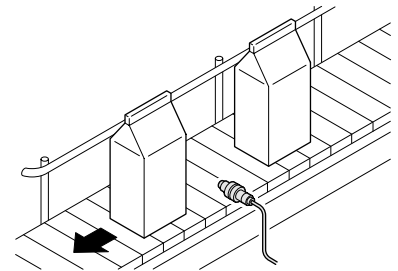
### Sensing cardboard boxes



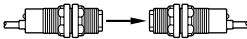
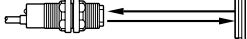
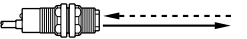
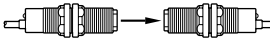
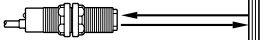
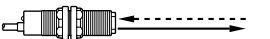
### Sensing specular objects



### Sensing milk packs



## ORDER GUIDE

| Type           | Appearance         | Sensing range                                                                                              | Model No. | Supply voltage           | Output                            | Output operation                                           |
|----------------|--------------------|------------------------------------------------------------------------------------------------------------|-----------|--------------------------|-----------------------------------|------------------------------------------------------------|
| DC supply type | Thru-beam          |  12 m<br>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    |  3 m<br>9.843 ft (Note) | CY-27     |                          | NPN open-collector transistor     |                                                            |
|                |                    |                                                                                                            | CY-27-PN  |                          | PNP open-collector transistor     |                                                            |
|                |                    |                                                                                                            | CY-29     |                          | NPN open-collector transistor     |                                                            |
|                |                    |                                                                                                            | CY-29-PN  |                          | PNP open-collector transistor     |                                                            |
|                | Diffuse reflective |  120 mm<br>4.724 in     | CY-22     |                          | NPN open-collector transistor     |                                                            |
|                |                    |                                                                                                            | CY-22-PN  |                          | PNP open-collector transistor     |                                                            |
| AC supply type | Thru-beam          |  12 m<br>39.370 ft      | CY-11A    | 24 to 240 V AC<br>± 10 % | AC non-contact (thyristor) output | Light-ON                                                   |
|                |                    |                                                                                                            | CY-11B    |                          |                                   | Dark-ON                                                    |
|                | Retroreflective    |  3 m<br>9.843 ft (Note) | CY-17A    |                          |                                   | Light-ON                                                   |
|                |                    |                                                                                                            | CY-17B    |                          |                                   | Dark-ON                                                    |
|                |                    |                                                                                                            | CY-19A    |                          |                                   | Light-ON                                                   |
|                |                    |                                                                                                            | CY-19B    |                          |                                   | Dark-ON                                                    |
|                | Diffuse reflective |  120 mm<br>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).

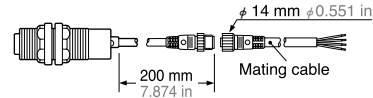
## ORDER GUIDE

### Pigtailed type

Pigtailed type is also available.

#### • Table of Model Nos.

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



Note: Please order the suitable mating cable separately.

#### • Mating cable

| Type                           | Model No.       | Description           |                                                                                                                             |
|--------------------------------|-----------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------|
| For DC supply type<br>(Note 1) | <b>CN-22-C2</b> | Length: 2 m 6.562 ft  | • For the emitter of the thru-beam type sensor (2-core) (Note 2)                                                            |
|                                | <b>CN-22-C5</b> | Length: 5 m 16.404 ft |                                                                                                                             |
|                                | <b>CN-24-C2</b> | 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) |
|                                | <b>CN-24-C5</b> | Length: 5 m 16.404 ft |                                                                                                                             |
| For AC supply type<br>(Note 1) | <b>CN-32-C2</b> | Length: 2 m 6.562 ft  | • For the emitter of the thru-beam type sensor (2-core)                                                                     |
|                                | <b>CN-32-C5</b> | Length: 5 m 16.404 ft |                                                                                                                             |
|                                | <b>CN-33-C2</b> | Length: 2 m 6.562 ft  | • For the receiver of the thru-beam type sensor, retroreflective type and diffuse reflective type sensors (3-core)          |
|                                | <b>CN-33-C5</b> | 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<br>(For thru-beam<br>type sensor only)             | <b>OS-CYS</b>    | Slit size<br>11.6 × 0.5 mm<br>0.457 × 0.020 in                                                                                                  | Slit on emitter • Sensing range: 3 m 9.843 ft<br>• Min. sensing object: $\phi 8$ mm $\phi 0.315$ in       |
|                                                              |                  |                                                                                                                                                 | Slit on receiver • Sensing range: 2.5 m 8.202 ft<br>• Min. sensing object: $\phi 8$ mm $\phi 0.315$ in    |
|                                                              |                  |                                                                                                                                                 | Slit on both sides • Sensing range: 0.8 m 2.625 ft<br>• Min. sensing object: 10 × 0.7 mm 0.394 × 0.028 in |
|                                                              |                  | Slit size<br>11.6 × 1.5 mm<br>0.457 × 0.059 in                                                                                                  | Slit on emitter • Sensing range: 5 m 16.404 ft<br>• Min. sensing object: $\phi 8$ mm $\phi 0.315$ in      |
|                                                              |                  |                                                                                                                                                 | Slit on receiver • Sensing range: 4.5 m 14.764 ft<br>• Min. sensing object: $\phi 8$ mm $\phi 0.315$ in   |
|                                                              |                  |                                                                                                                                                 | Slit on both sides • Sensing range: 2 m 6.562 ft<br>• Min. sensing object: 10 × 2 mm 0.394 × 0.079 in     |
|                                                              |                  | Slit size<br>11.6 × 3 mm<br>0.457 × 0.118 in                                                                                                    | Slit on emitter • Sensing range: 7.5 m 24.606 ft<br>• Min. sensing object: $\phi 8$ mm $\phi 0.315$ in    |
|                                                              |                  |                                                                                                                                                 | Slit on receiver • Sensing range: 7 m 22.966 ft<br>• Min. sensing object: $\phi 8$ mm $\phi 0.315$ in     |
|                                                              |                  |                                                                                                                                                 | Slit on both sides • Sensing range: 4.5 m 14.764 ft<br>• Min. sensing object: 10 × 3 mm 0.394 × 0.118 in  |
| Side-view attachment<br>(For thru-beam<br>type sensor only)  | <b>CY-SV1</b>    | The beam is bent at a right angle by the attachments.<br>• Sensing range (with attachment on both sides): 8 m 26.247 ft                         |                                                                                                           |
| Reflector<br>(For retroreflective<br>type sensor only)       | <b>RF-230</b>    | • Sensing range: 3 m 9.843 ft [CY-27□ & CY-17□], 1.5 m 4.921 ft [CY-29□ & CY-19□]                                                               |                                                                                                           |
|                                                              | <b>RF-220</b>    | • Sensing range: 2 m 6.562 ft [CY-27□ & CY-17□], 1.2 m 3.937 ft [CY-29□ & CY-19□]                                                               |                                                                                                           |
|                                                              | <b>RF-210</b>    | • Sensing range: 1 m 3.281 ft [CY-27□ & CY-17□], 0.7 m 2.297 ft [CY-29□ & CY-19□]                                                               |                                                                                                           |
| Reflector<br>mounting bracket                                | <b>MS-RF21-1</b> | Protective mounting bracket for <b>RF-210</b><br>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<br>(For retroreflective<br>type sensor only) | <b>RF-12</b>     | • Sensing range: 0.7 m 2.297 ft [CY-27□ & CY-17□], 0.4 m 1.312 ft [CY-29□ & CY-19□]                                                             |                                                                                                           |
|                                                              | <b>RF-11</b>     | • Sensing range: 0.5 m 1.640 ft [CY-27□ & CY-17□]                                                                                               |                                                                                                           |
| Sensor checker<br>(Note)                                     | <b>CHX-SC2</b>   | It is useful for beam alignment of thru-beam type sensors.<br>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**



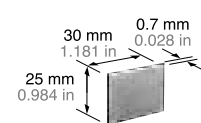
### Side-view attachment

• **CY-SV1**

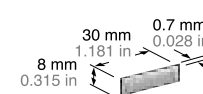


### Reflective tape

• **RF-12**

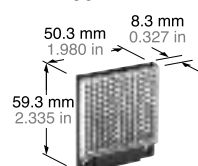


• **RF-11**

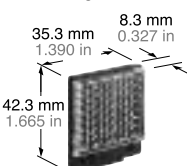


### Reflector

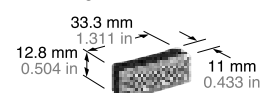
• **RF-230**



• **RF-220**

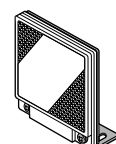


• **RF-210**



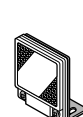
### Reflector mounting bracket

• **MS-RF23**



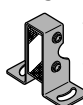
Two M4 (length 10 mm 0.394 in) screws with washers are attached.

• **MS-RF22**



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

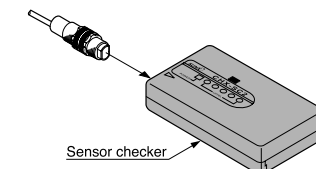
• **MS-RF21-1**



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

### Sensor checker

• **CHX-SC2**



## SPECIFICATIONS

## DC supply type

| Item                                          | Type                     |                                                                                                | Thru-beam                                                                                                                                                                                                                                                                | Retroreflective                                                |                                                                          | Diffuse reflective                                                                                                                                                                                                                                                           |  |  |
|-----------------------------------------------|--------------------------|------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|--------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
|                                               | Model No.                | NPN output type                                                                                | CY-21                                                                                                                                                                                                                                                                    | CY-27                                                          | With polarizing filters                                                  | 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<br>Receiver: 25 mA or less                                                                                                                                                                                                                        | 25 mA or less                                                  |                                                                          |                                                                                                                                                                                                                                                                              |  |  |
| Output                                        |                          |                                                                                                | <NPN output type><br>NPN open-collector transistor <ul style="list-style-type: none"><li>• Maximum sink current: 100 mA</li><li>• Applied voltage: 30 V DC or less (between output and 0 V)</li><li>• Residual voltage: 1.5 V or less (at 100 mA sink current)</li></ul> |                                                                |                                                                          | <PNP output type><br>PNP open-collector transistor <ul style="list-style-type: none"><li>• Maximum source current: 100 mA</li><li>• Applied voltage: 30 V DC or less (between output and + V)</li><li>• Residual voltage: 1.5 V or less (at 100 mA source current)</li></ul> |  |  |
|                                               |                          |                                                                                                | 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/s <sup>2</sup> 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 mm <sup>2</sup> 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 mm <sup>2</sup> , or more, cable (thru-beam type: both emitter and receiver).                                                                                                                               |                                                                |                                                                          |                                                                                                                                                                                                                                                                              |  |  |
| Weight                                        |                          |                                                                                                | Emitter: 90 g approx.<br>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                                          | Model No.                | Type                                                                                                                                                                        | Thru-beam                                                                                                          | Retroreflective                                                            |                                           | Diffuse reflective |
|-----------------------------------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-------------------------------------------|--------------------|
|                                               |                          |                                                                                                                                                                             |                                                                                                                    |                                                                            | With polarizing filters                   |                    |
|                                               |                          | 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                                |                          | ϕ 8 mm ϕ 0.315 in or more opaque object                                                                                                                                     | ϕ 50 mm ϕ 1.969 in or more opaque or translucent object (Note 1)                                                   | ϕ 50 mm ϕ 1.969 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<br>Receiver: 2.5 VA or less                                                                                                                         | 2.7 VA or less                                                                                                     |                                                                            |                                           |                    |
| Output                                        |                          | AC non-contact (thyristor) output<br>• Load current: 5 to 200 mA<br>• Applied voltage: 24 to 240 V AC ± 10 %<br>• 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.<br>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.**

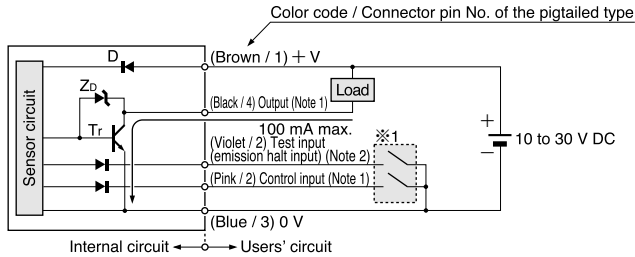
Notes: 1) The sensing range and the sensing object of the retroreflective type sensor are specified for the **RF-230** reflector (optional).

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.

## I/O CIRCUIT AND WIRING DIAGRAMS

### NPN output type

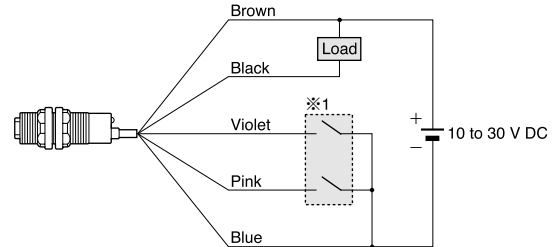
#### I/O circuit diagram



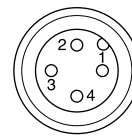
- Notes: 1) The emitter of the thru-beam type sensor does not incorporate the output and the control input. When the mating cable is connected to the pigtailed type, the color of the control input wire is white.
- 2) Test input (emission halt input) is incorporated only on the emitter of the thru-beam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

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

#### Wiring diagram

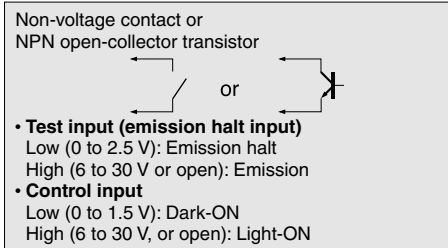


#### Connector pin position (Pigtailed type)



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

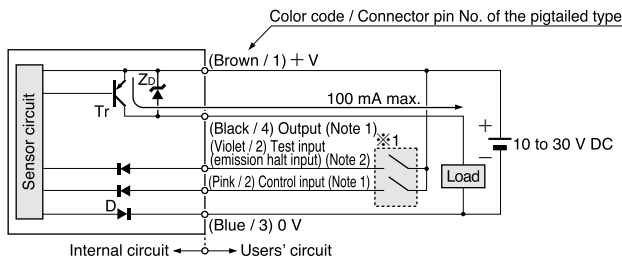
※1



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

### PNP output type

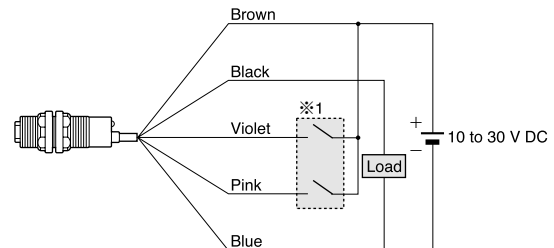
#### I/O circuit diagram



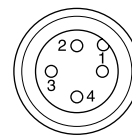
- Notes: 1) The emitter of the thru-beam type sensor does not incorporate the output and the control input. When the mating cable is connected to the pigtailed type, the color of the control input wire is white.
- 2) Test input (emission halt input) is incorporated only on the emitter of the thru-beam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

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

#### Wiring diagram

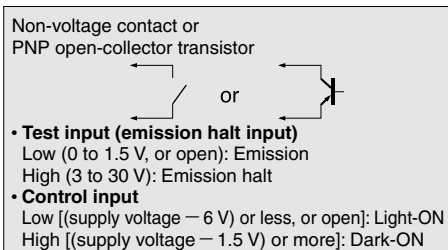


#### Connector pin position (Pigtailed type)



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

※1



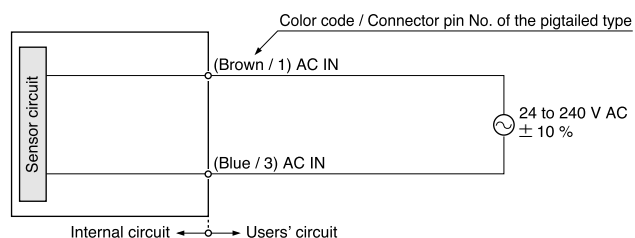
Note: If opening the input cable, make sure to insulate it.

## I/O CIRCUIT AND WIRING DIAGRAMS

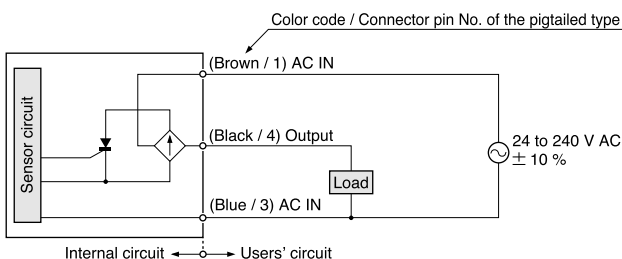
AC non-contact  
output type

## I/O circuit diagrams

## Emitter of thru-beam type sensor

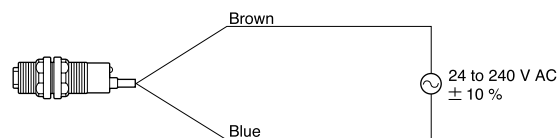


## Receiver of thru-beam type sensor, retroreflective &amp; diffuse reflective type sensors

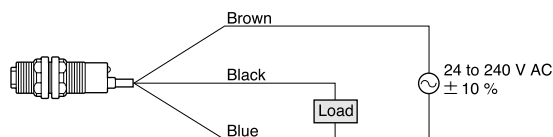


## Wiring diagrams

## Emitter of thru-beam type sensor

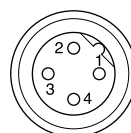


## Receiver of thru-beam type sensor, retroreflective &amp; diffuse reflective type sensors

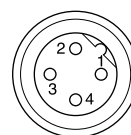


## Connector pin position (Pigtailed type)

## Emitter of thru-beam type sensor



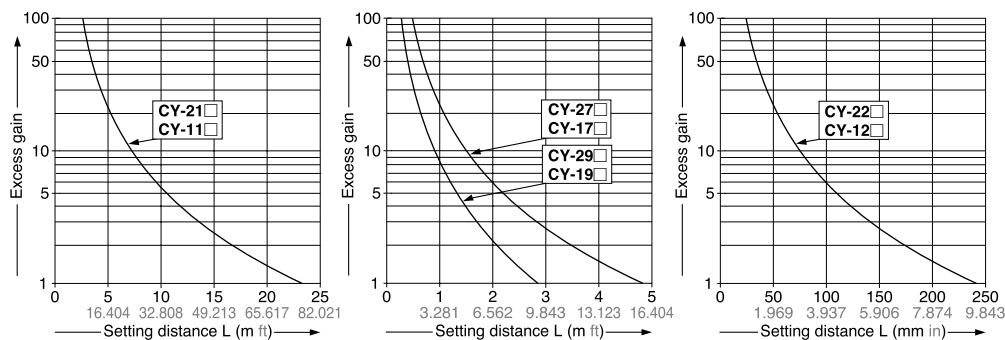
## Receiver of thru-beam type sensor, retroreflective &amp; diffuse reflective type sensors



## SENSING CHARACTERISTICS (TYPICAL)

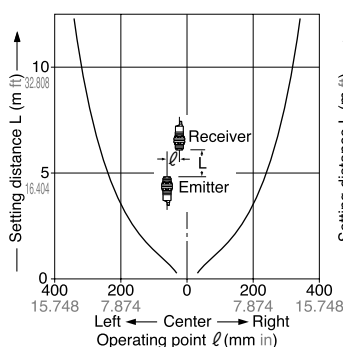
## All models

## Correlation between setting distance and excess gain

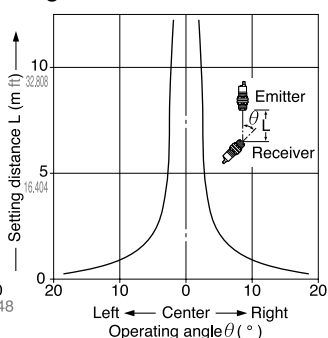
CY-21  
CY-11

Thru-beam type

## Parallel deviation

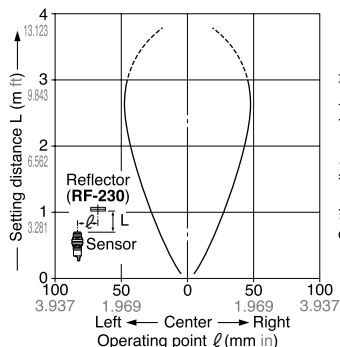


## Angular deviation

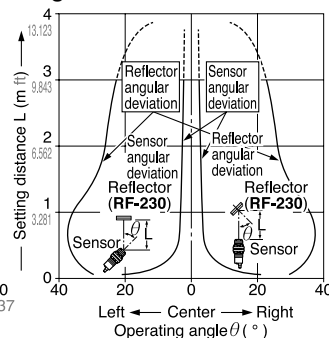
CY-27  
CY-17

Retroreflective type

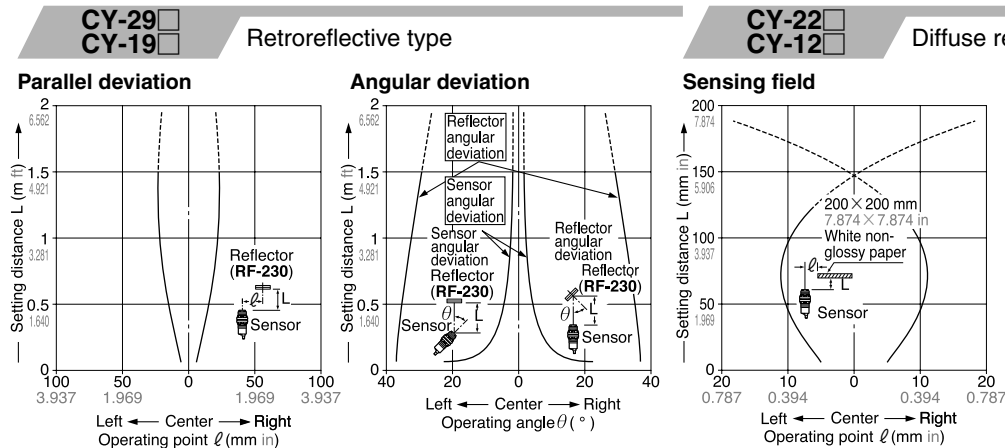
## Parallel deviation



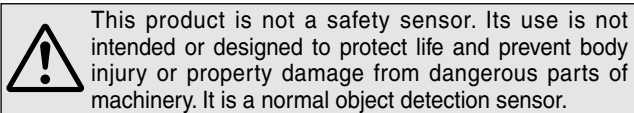
## Angular deviation



## SENSING CHARACTERISTICS (TYPICAL)

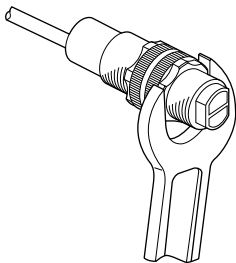


## PRECAUTIONS FOR PROPER USE



### 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

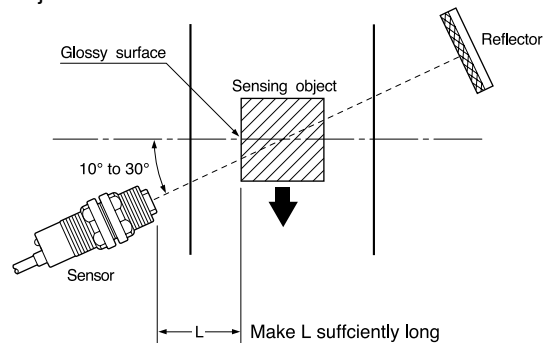
#### Steps

- 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.

- 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

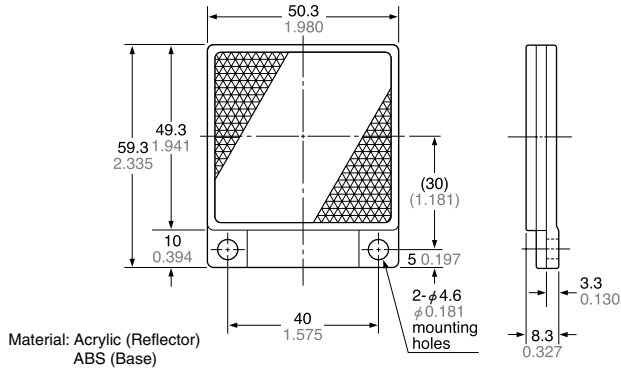
- Do not use during the initial transient time (50 ms) after the power supply is switched on.



## DIMENSIONS (Unit: mm in)

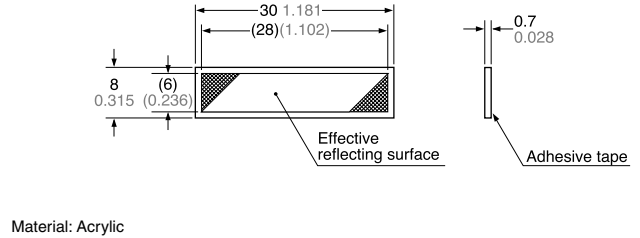
### RF-230

Reflector (Optional)



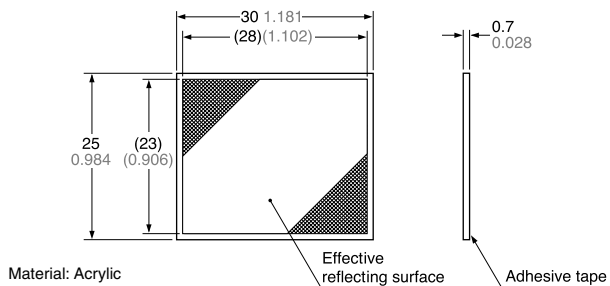
### RF-11

Reflective tape (Optional)



### RF-12

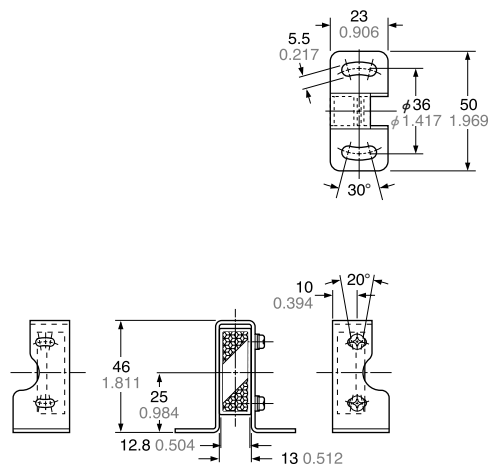
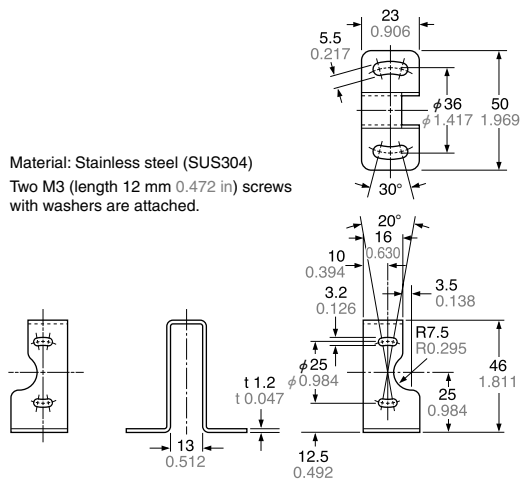
Reflective tape (Optional)



### MS-RF21-1

Reflector mounting bracket for RF-210 (Optional)

#### Assembly dimensions

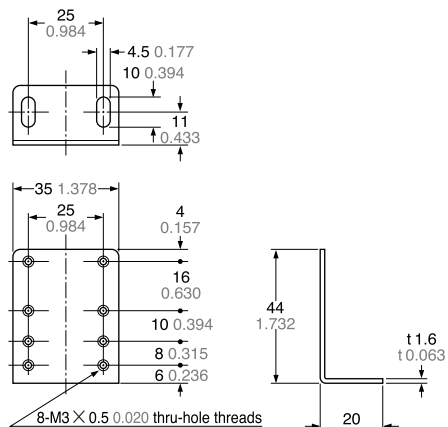


## DIMENSIONS (Unit: mm in)

### MS-RF22

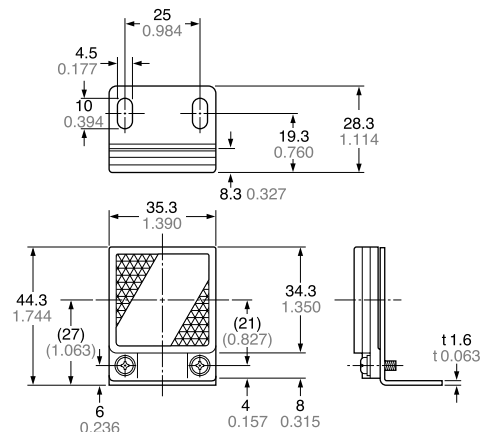
Reflector mounting bracket for RF-220 (Optional)

#### Assembly dimensions



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

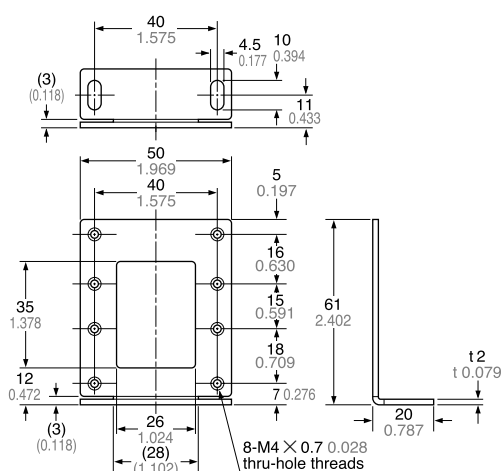
Two M3 (length 8 mm 0.315 in) screws with washers are attached.



### 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.

