

# Self-contained Photoelectric Sensors

## PZ2 Series

### Features

- World's smallest photoelectric sensors
- Excellent mirror surface detection
- IP-67 rated waterproof
- Sensors can operate side by side

### Detecting Distance

Thrubeam – 7,000 mm



Retro-reflective with Polarised filter – 2,500 mm



Diffuse-reflective – 100 to 600 mm



### Description

#### Greatly improved serviceability

Mounting the sensor body and routing the cable can be performed independently, reducing time and labour.

If replacing the sensor body with a new one because of damage, or if replacing the sensor body with a different model because of changes in specifications, you have only to replace the sensor body.



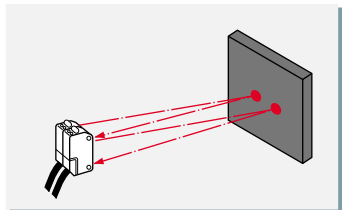
#### Highly durable metallic trimmer head

Unlike conventional resin head models, a metallic head cannot easily be defaced or cracked.



#### Side-by-side installation of two sensors

The PZ2-41(P), PZ2-42(P), and PZ2-61(P) can operate at alternate-frequencies, enabling two sensors to be mounted in close proximity.

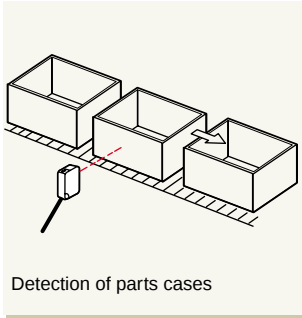
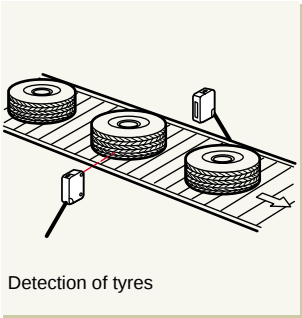
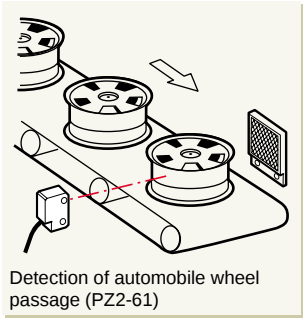
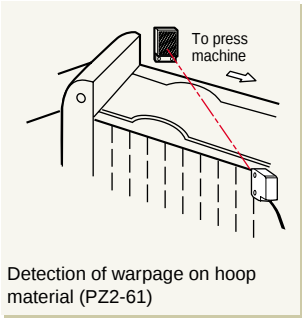


#### Newly developed P.R.O. function

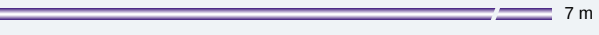
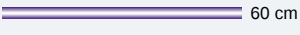
P.R.O. function: The PZ2-61's optical system is constructed so that the transmitter emits only the horizontal component of the light wave through the horizontal polarising filter and the receiver receives only the vertical component through the vertical polarising filter. This allows mirror-surfaced targets to be detected stably.



Applications



Selection Chart

| Type               |             | Detecting distance                                                                  |                                                                                            | Model             |
|--------------------|-------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-------------------|
| Thru-beam          | Long-range  |    |  7 m     | PZ2-51<br>PZ2-51P |
|                    | Polarized   |  |  2.5 m | PZ2-61<br>PZ2-61P |
| Diffuse-reflective | Long-range  |  |  60 cm | PZ2-41<br>PZ2-41P |
|                    | Short-range |  |  10 cm  | PZ2-42<br>PZ2-42P |

A-3 attachment kit (optional) specially designed for PZ2-51 and -51P thru-beam models

Slit plate only

| Slit width | Detecting distance | Target size |
|------------|--------------------|-------------|
| 0.5 mm     | 500 mm             | 0.5 x 5 mm  |
| 1 mm       | 800 mm             | 1 x 5 mm    |
| 2 mm       | 1500 mm            | 2 x 5 mm    |

Slit plate and polarizing filter

| Slit width | Detecting distance | Target size |
|------------|--------------------|-------------|
| 0.5 mm     | 200 mm             | 0.5 x 5 mm  |
| 1 mm       | 400 mm             | 1 x 5 mm    |
| 2 mm       | 700 mm             | 2 x 5 mm    |

Polarizing filter only

| Detecting distance | Target size |
|--------------------|-------------|
| 2500 mm            | 6 x 6 mm    |

Support Tool

These easy-to-use mounting tools are designed for use in harsh environments.

S-P12 Protective cover

Protective cover with mounting bracket. Thickness: 3.0 mm (Stainless steel).



S-P01 Free adjuster

Free-adjustable height and angle. Both vertical and horizontal mountings are available.



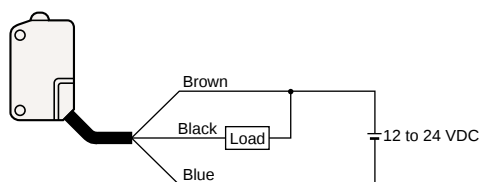
## Specifications

| Type                                   |     | Thrubeam                                                              | Retro-reflective                                            | Diffuse-reflective                    |                                       |
|----------------------------------------|-----|-----------------------------------------------------------------------|-------------------------------------------------------------|---------------------------------------|---------------------------------------|
|                                        |     |                                                                       | Polarized                                                   | Long-range                            | Short-range                           |
| Model                                  | NPN | PZ2-51                                                                | PZ2-61                                                      | PZ2-41                                | PZ2-42                                |
|                                        | PNP | PZ2-51P                                                               | PZ2-61P                                                     | PZ2-41P                               | PZ2-42P                               |
| Detecting distance                     |     | 7000 mm                                                               | 2500 mm (with R-2)                                          | 600 mm (200 x 200 mm white mat paper) | 100 mm (100 x 100 mm white mat paper) |
| Detectable object                      |     | Opaque materials (8 x 8 mm min.)                                      | Opaque materials (30 x 30 mm min.)                          | Transparent and opaque materials      | Transparent and opaque materials      |
| Hysteresis                             |     | —                                                                     | —                                                           | 20% max. of detecting distance        |                                       |
| Response time                          |     | 1.5 ms max.                                                           | 1 ms max. (2 ms in alternate frequency mode <sup>1)</sup> ) |                                       |                                       |
| Light source                           |     | Visible red LED                                                       |                                                             |                                       |                                       |
| Sensitivity adjustment                 |     | 1-turn trimmer (240° )                                                |                                                             |                                       |                                       |
| Operation mode                         |     | LIGHT-ON/DARK-ON (switch selectable)                                  |                                                             |                                       |                                       |
| Indicators                             |     | Output and power <sup>2)</sup> : Red LED, Stable operation: Green LED |                                                             |                                       |                                       |
| Control output                         |     | NPN or PNP: 100 mA (40 V) max., Residual voltage: 1 V max.            |                                                             |                                       |                                       |
| Protection circuit                     |     | Reversed polarity, overcurrent protection, surge absorber             |                                                             |                                       |                                       |
| Power supply                           |     | 12 to 24 VDC ±10%                                                     | 12 to 24 VDC ±10%                                           | 12 to 24 VDC ±10%                     | 12 to 24 VDC ±10%                     |
| Current consumption                    |     | T: 20 mA max.<br>R: 25 mA max.                                        | 35 mA max.                                                  | 35 mA max.                            | 35 mA max.                            |
| Enclosure rating                       |     | IP-67                                                                 | IP-67                                                       | IP-67                                 | IP-67                                 |
| Ambient light                          |     | Incandescent lamp: 5,000 lux max., Sunlight: 20,000 lux max.          |                                                             |                                       |                                       |
| Ambient temperature                    |     | -20 to +55°C                                                          | -20 to +55°C                                                | -20 to +55°C                          | -20 to +55°C                          |
| Housing                                |     | Glass-fibre reinforced resin                                          | Glass-fibre reinforced resin                                | Glass-fibre reinforced resin          | Glass-fibre reinforced resin          |
| Weight (including 2-m connector cable) |     | Transmitter/receiver: Approx. 50 g each                               | Approx. 50 g                                                | Approx. 50 g                          | Approx. 50 g                          |

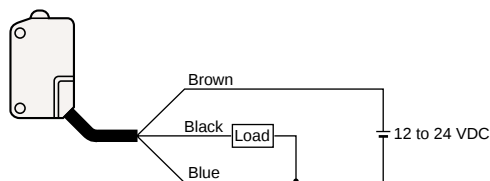
1. The different-frequency type has "D" at the end of the model No. PZ2-41D(P)/42D(P)/61D only.  
2. The power indicator is equipped with the PZ2-51 only.

## Connections

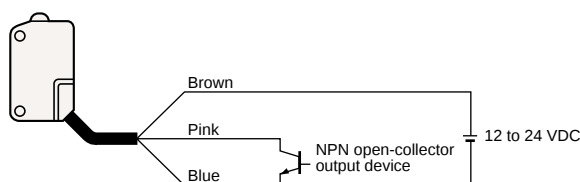
### NPN



### PNP



### Using the light emission stop input (Transmitter of PZ2-51)



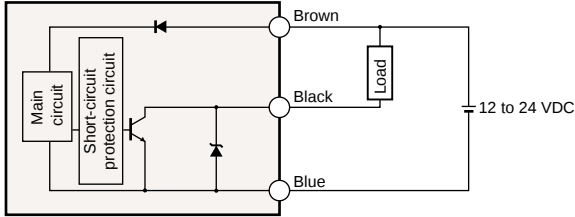
#### [Note]

Signals from equipment with a PNP output cannot be input.  
When not using the light emission stop input, cut the root of the pink wire or connect it with the brown wire.

Input/Output Circuits

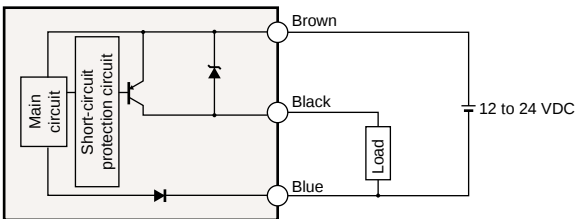
NPN

PZ2-61/41/42, PZ2-51 (Receiver)

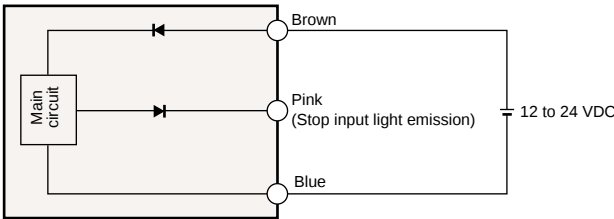


PNP

PZ2-61P/62P/41P/42P, PZ2-51P (Receiver)



PZ2-51/51P (Transmitter)



Adjustment

Switching between LIGHT-ON and DARK-ON modes

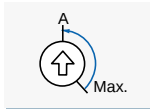
Set the operation mode selector switch to “L” (right) to select the LIGHT-ON mode (L.ON), while set the switch to “D” (left) to select the DARK-ON mode (D.ON).

Thrubeam

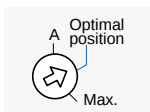
DARK-ON mode



1. With no target, turn the trimmer to “Max.”. With the receiver in place, move the transmitter up/down and right/left. Set it at the midpoint of the range where the green LED is lit. Mount the transmitter and perform adjustment in the same way.



2. Turn the trimmer counterclockwise from Max. until the green LED turns off. – Point A



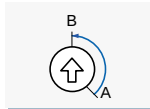
3. Set the trimmer midway between point A and Max. Confirm sensor operation.

Reflective

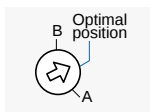
LIGHT-ON mode (When DARK-ON mode is specified, refer to words in parentheses.)



1. With no target, turn the trimmer until the red LED lights (turns off). – Point A  
If the LED does not light (turn off) with the trimmer at max., use max. as point A.



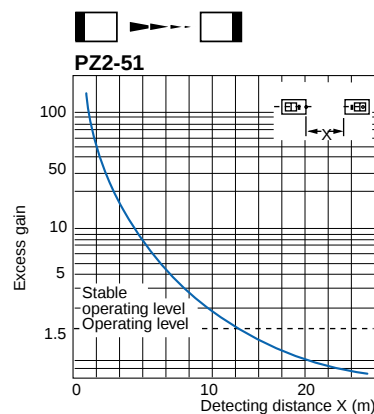
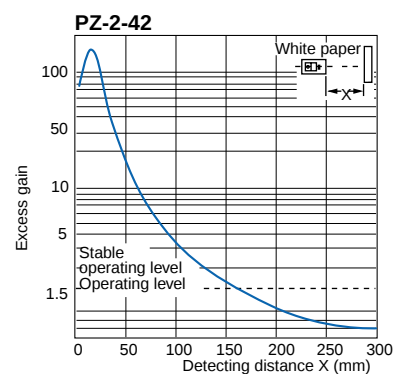
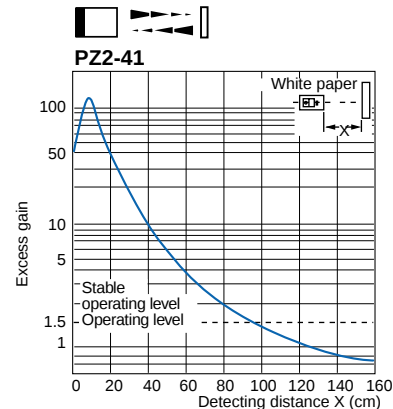
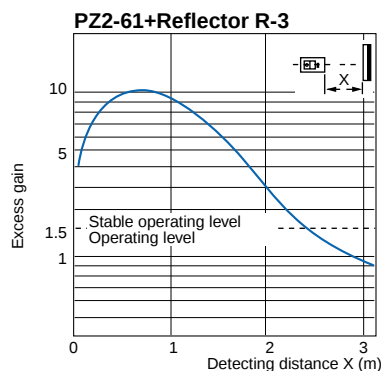
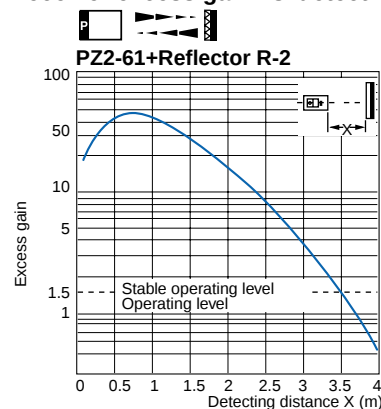
2. With the target in place, turn the trimmer counterclockwise until the green LED turns off. – Point B



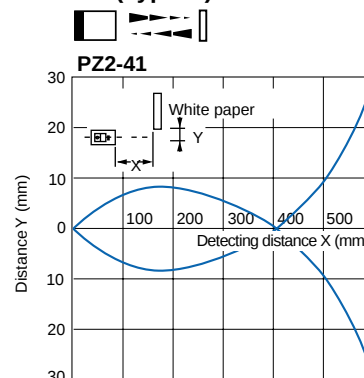
3. Set the trimmer midway between points A and B. Confirm sensor operation.

## Characteristics

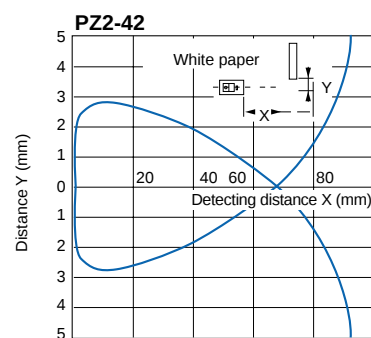
Receiver excess gain vs. detecting distance (Typical)



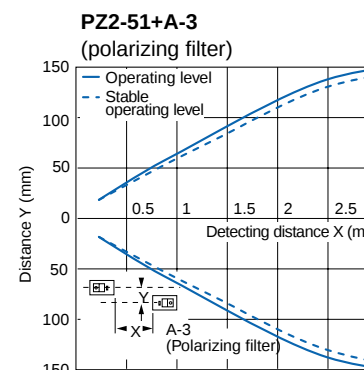
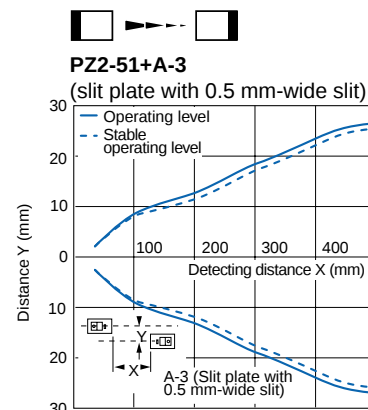
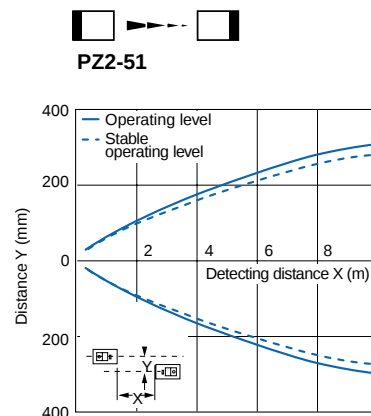
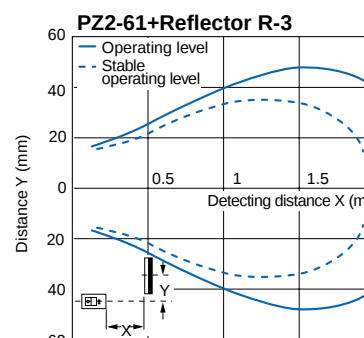
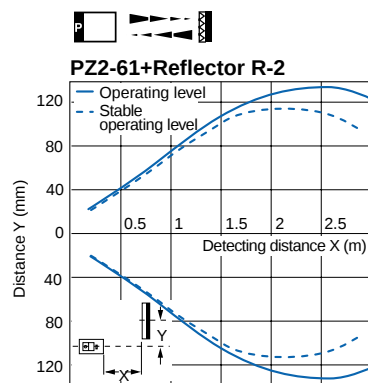
Operating distance vs. detecting distance (Typical)



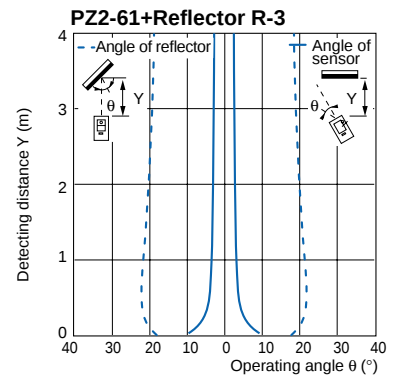
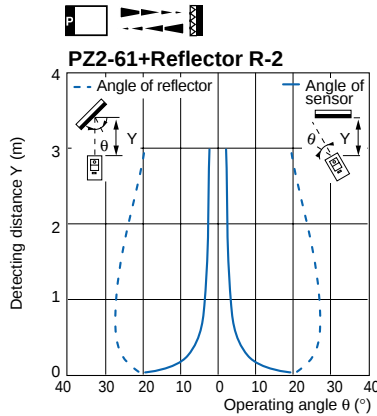
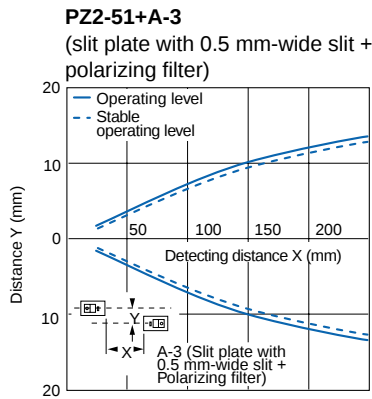
Operating distance vs. detecting distance (Typical)



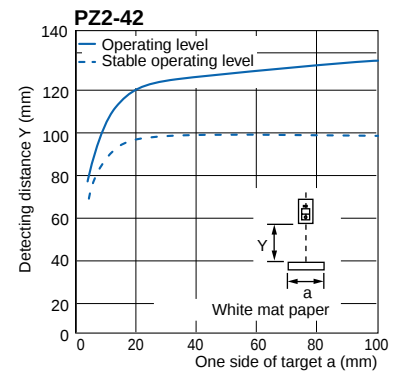
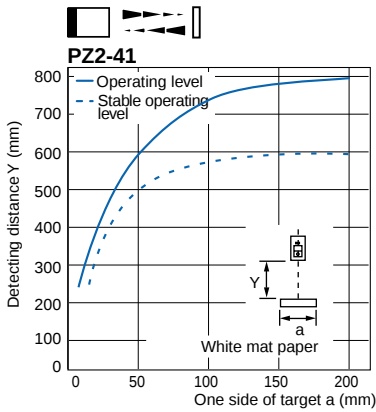
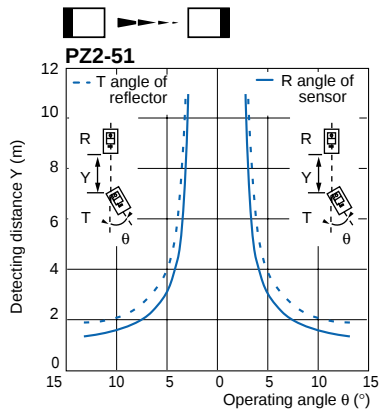
Parallel displacement of optical axis (Typical)



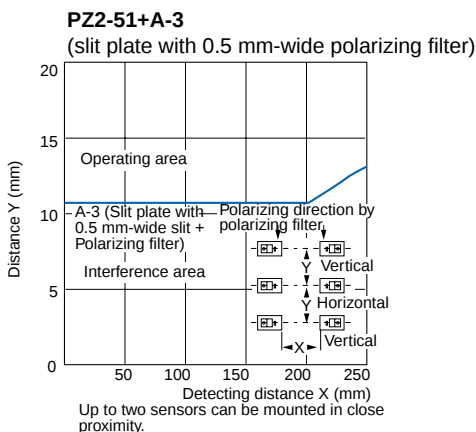
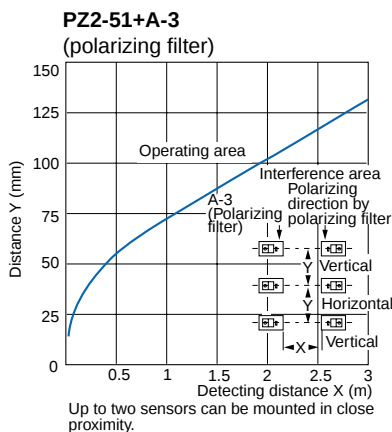
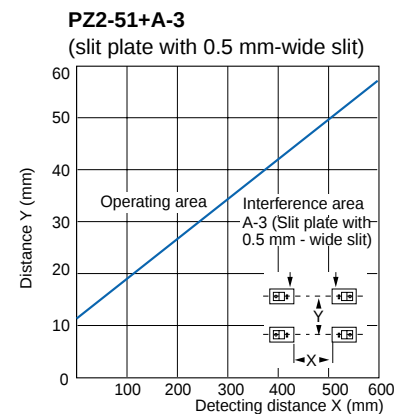
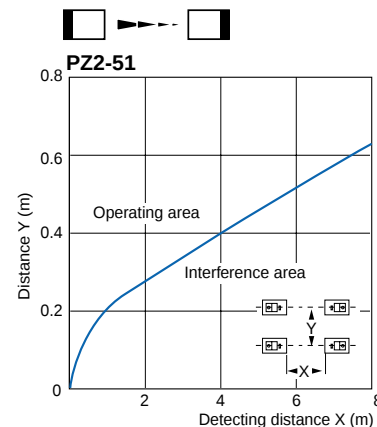
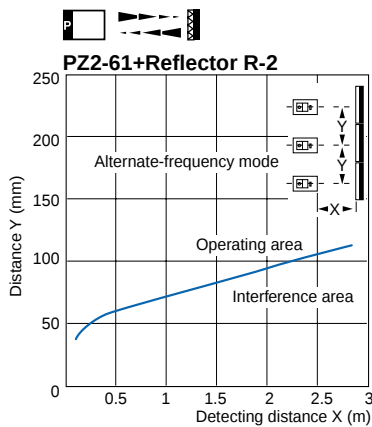
## Optical axis angle (Typical)



## Detecting distance vs. object size (Typical)



## Interference area



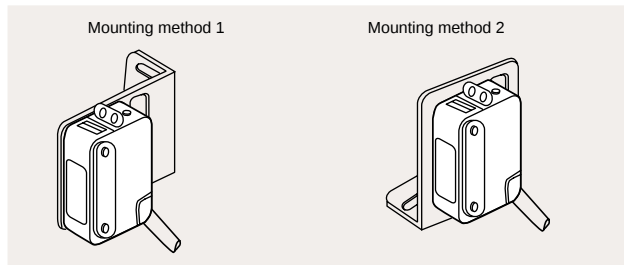
## Hints on Correct Use

### Retro-reflective type with P.R.O. function

When the target is of highly glossy resin or film, the sensor may not detect it stably. To detect such targets stably, tilt the sensor by 10 to 30° in regard to the vertical surface of the traveling target.

### Mounting

Use the special mounting bracket supplied to mount the sensor. According to the mounting location, mount it as illustrated below.

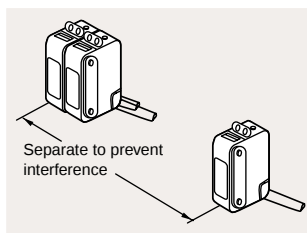


- Mount the sensor at a torque of 0.5 N•m or less.
- With the diffuse-reflective type and retro-reflective type, combination of the normal and alternate-frequency types allows up to two sensors to be mounted in close proximity. (Response time of the alternate-frequency type sensor is 2 ms.) (PZ2-41D(P)/42D(P)/61D only)

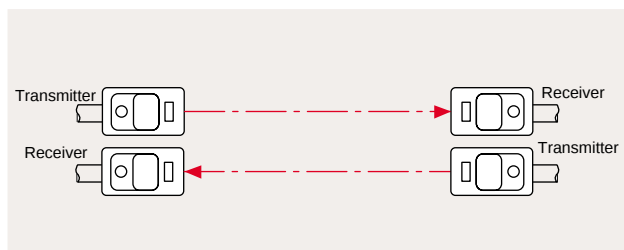
#### [Note]

Up to two sensors can be mounted side by side. If a third sensor is used, it needs be mounted far enough away from the others so that they do not interfere with each other.

Check that the third one does not interfere with the first two under actual detecting conditions, then mount it.



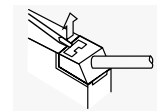
- When two or more thru-beam type sensors are mounted close to each other, alternate the transmitter and receiver. This reduces mutual interference and stabilises detection. When the detecting distance is 2.5 m or less, attach the polarizing filter. This allows you to mount up to two sensors in close proximity.



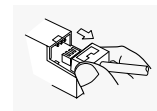
### Handling the connector

Be sure to insert the connector completely then press the lock. If the connector is not inserted completely, the watertightness will be lost.

#### Disconnecting the connector from the sensor

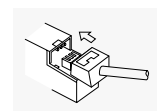


1. Lift the lock using a slim screwdriver, etc.  
Caution: Do not lift the lock by 1 mm or more.

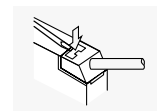


2. While holding the connector, disconnect it from the sensor.  
Do not pull the cable.

#### Connecting the connector to the sensor



1. Insert the connector into the sensor completely.



2. Press the lock.

- Excessively frequent connecting and disconnecting deteriorates the packing, causing the watertightness to be lost. Limit the frequency of connecting and disconnecting to 15 times or less.
- The sensor cable has a tensile strength of 5 kg for 1 second maximum. Do not use excessive force to pull the cable.

### Wiring

Limit the cable length to 100 m or less.

#### Optional attachment kit specially designed for thru-beam type

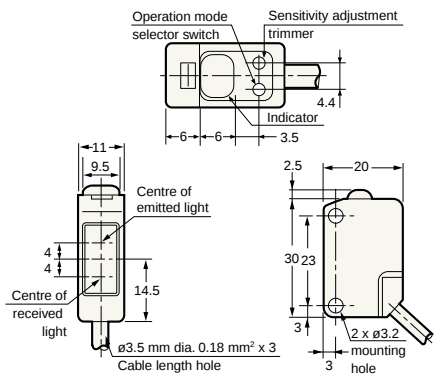
Slit plate and polarizing filter (A-3)

- The optional slit plate and/or polarizing filter can be attached to the thru-beam type (PZ2-51 and -51P). To detect or position thin (minute) targets, use the slit plate. And, to prevent mutual interference, use the polarizing filter. Both of the slit plate and polarizing filter can be attached to the sensor at the same time.
- The 3 type slit plates (different in slit width) and polarizing filter are packaged in the A-3 attachment kit. According to the application, use the appropriate attachment.

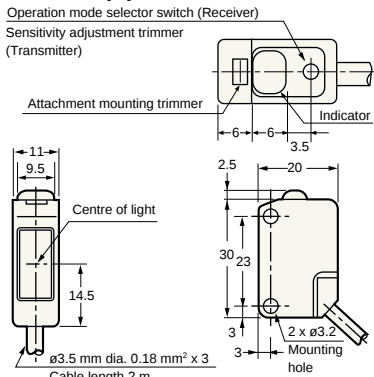
Dimensions

Unit: mm

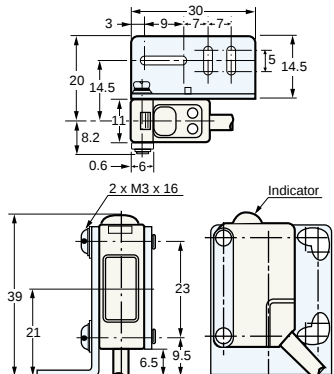
PZ2-41(P), 42(P), 61(P), 62(P)



PZ2-51(P)

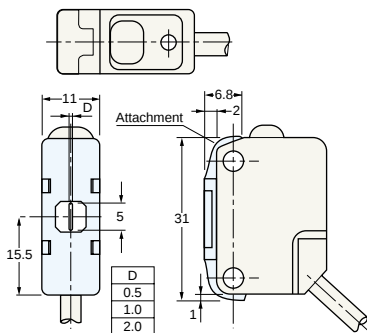


PZ2 (with mounting bracket)

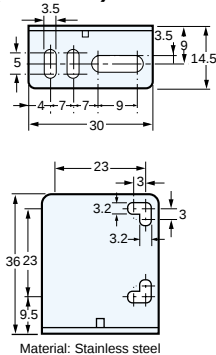


PZ2-51(P)

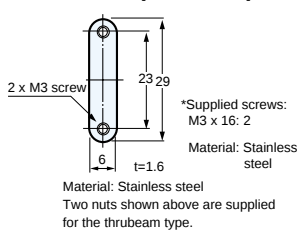
When attachment (A-3) is attached.



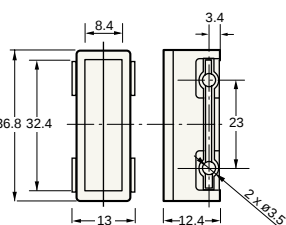
Mounting bracket (standard)



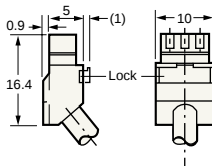
Flat nut (standard)



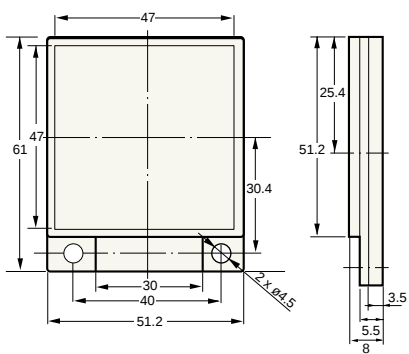
Reflector R-4 (optional) OP-97225



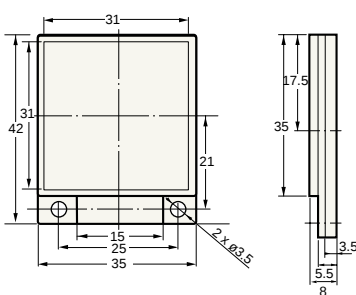
Connector



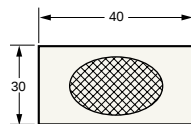
Reflector R-2 (accessory for PZ2-61)



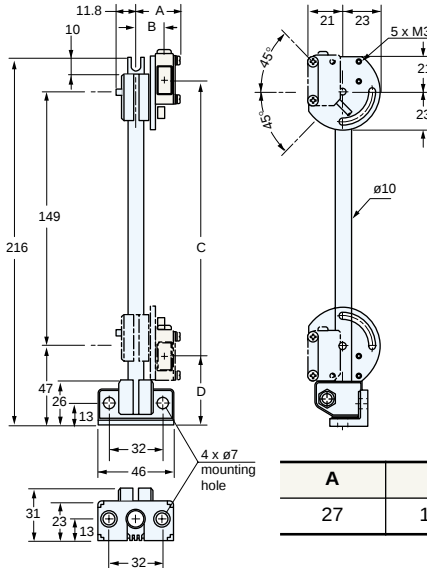
Reflector R-3 (optional) OP-96436



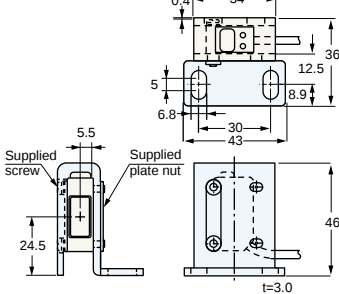
PRO reflection tape (optional) OP-96629



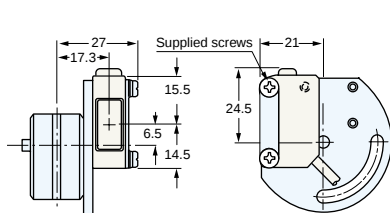
S-P01



S-P12



S-P01 Head



| A  | B    | C   | D    |
|----|------|-----|------|
| 27 | 17.3 | 162 | 40.5 |