# Can be installed anywhere Small photoelectric sensor

- Features a high speed response time of 0.5 ms, enabling its use on high speed production lines
- Small in size with noise resistance that conforms to CE standards
- Shock resistance up to 100 G

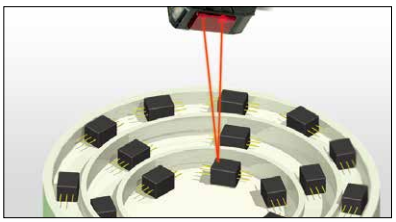
**Related products**

Transparent object detection
**SR-Q** P.412

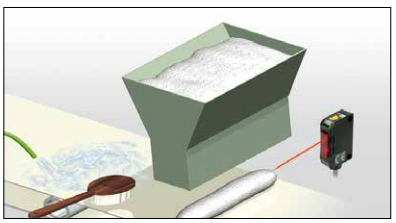
BGS type
**BGS-S** P.342

Overlap detection of empty ice cream cups

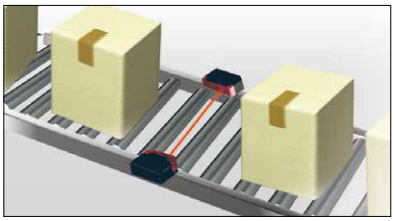
Detection of parts on parts feeder



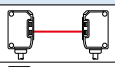
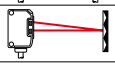
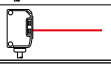
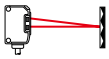
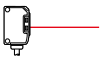
Detection of rice dropped from automatic sushi wrap rolling machine



Detection of items transported on a rolling conveyor



## Selection table

| Type | Shape | Sensing distance | Model (Models in parentheses are connector types) NPN type | PNP type |
|---|---|---|---|---|
| Through-beam |  | 4 m | **ST-400N** (ST-400CN) | **ST-400P** (ST-400CP) |
| Retro-reflective |  | 0.02 to 1.5 m | **SR-150N** (SR-150CN) | **SR-150P** (SR-150CP) |
| Diffuse-reflective |  | 200 mm | **SD-20N** (SD-20CN) | **SD-20P** (SD-20CP) |
| Transparent object detection |  | 10 to 300 mm | **SR-Q50NW** (SR-Q50CNW) P.412 | **SR-Q50PW** (SR-Q50CPW) P.412 |
| BGS |  | 10 to 50 mm (10 to 30 mm) | **BGS-S03N** P.342 | **BGS-S03P** P.342 |
| | | 10 to 80 mm (10 to 80 mm) | **BGS-S08N** (BGS-S08CN) P.342 | **BGS-S08P** (BGS-S08CP) P.342 |

● For the connector type, please purchase an optional JCN series connector cable.

## Features a high speed response time of 0.5 ms, enabling its use on high speed production lines

With a response time of 0.5 ms, this photoelectric sensor with built-in amplifier features a top level response time. This feature makes its use on high speed production lines possible.

## Small in size with noise resistance that conforms to CE standards

In addition to being small in size, it has cleared strict CE inspection standards for EU noise resistance performance. It can be used for a wide range of machine equipment.

## Shock resistance of 100 G with robust structure

Features a shock resistance of 100 G (approx. twice that of conventional products) for protection in the event that workpieces come in contact or impact with sensors. It can be used without having to worry about performance deterioration.


## Small sensor with built-in amplifier

The main unit features a compact design of 10 × 17 × 28 mm. This compact size was realized without sacrificing any specifications, such as those regarding sensing distance.


## Applicable to VDE safety standards

Features a safe design in which the main unit will not catch fire even if sensor troubles (short-circuits/ overvoltage/etc.) occur. S series models conform to VDE standards.

Conforms to EU EN standards

Conforms to German VDE standards

## Can be used globally as it conforms to the strict standard of each country.

S series is conforms to CE, UL and VDE standards and has cleared severe testing standards of various countries worldwide. This series can be used in any region of the world.

## Specifications

| Type | | | Through-beam type | Retro-reflective type | Diffuse-reflective type |
|---|---|---|---|---|---|
| Model | NPN | Cable type | **ST-400N** | **SR-150N** | **SD-20N** |
| | | Connector type | **ST-400CN** | **SR-150CN** | **SD-20CN** |
| | PNP | Cable type | **ST-400P** | **SR-150P** | **SD-20P** |
| | | Connector type | **ST-400CP** | **SR-150CP** | **SD-20CP** |
| Sensing distance | | | 4 m | 0.02 to 1.5 m*1 | 200 mm*2 |
| Light source | | | Red LED | | |
| Smallest detectable object | | | ø6 mm | □ 45 mm | — |
| Response time | | | 0.5 ms or less | | |
| Hysteresis | | | — | — | 20% or less |
| Distance adjustment | | | 1-turn potentiometer | | |
| Indicators | | | Output indicator (orange LED), Stability indicator (green LED) | | |
| Control output | | | NPN/PNP type Open co-llector Max. 100 mA/30 VDC | | |
| Output mode | | | Light ON / Dark ON Switched by wiring | | |
| Connection type | | | Cable type: Cable length: 2 m / Connector type: M8, 4-pin | | |
| Insulation resistance | | | 20 MΩ or more (with 500 VDC) | | |
| Rating | Supply voltage | | 10 to 30 VDC, including 10% ripple (p-p) | | |
| | Current consumption | | 30 mA or less | 20 mA or less | |
| Applicable regulations | | | EMC directive (2004/108/EC) | | |
| Applicable standards | | | EN 60947-5-2 | | |
| Company standards | | | Noise resistance: Feilen Level 3 cleared | | |
| Environmental resistance | Ambient temperature/humidity | | -25 to +55°C (no freezing) / 35 to 85% RH (no condensation) | | |
| | Ambient illuminance | | Sunlight: 10,000 lx Incandescent lamp: 3,000 lx | | |
| | Vibration resistance | | 10 to 55 Hz; double amplitude 1.5 mm; 2 hours in each of the X, Y, and Z directions | | |
| | Shock resistance | | Approx. 100 G (1000 m/s²); 3 times in each of the X, Y, and Z directions | | |
| | Degree of protection | | IEC standard, IP67 | | |
| Material | | | Housing: PSF + PBT (glass fiber filled), Front cover: Polycarbonate (retro-reflective type is PMMA) | | |
| Weight without cable | | | Approx. 5 g | | |
| Included accessories | | | Mounting bracket: BEF-W150-B | Mounting bracket: BEF-W150-B<br>Reflector: V-61 | Mounting bracket: BEF-W150-B |

*1. With V-61 reflector, *2. With 100 mm × 100 mm white paper

● Specifications are subject to change without prior notice for product improvement purposes.

## Options/Accessories

### Reflector

Standard (included)
Included with retro-reflective type
**V-61**
Sensing distance: 1.5 m
60.9 × 50.9 mm

Small type
**V-42**
Sensing distance: 800 mm
42 × 35 mm

Vertical type
**P45A**
Sensing distance: 500 mm
54 × 12.4 mm

### Reflective sheet

**Diamond grade sheet**
Sensing distance:
50 to 600 mm
100 × 100 mm (adhesive type)

### Protective mounting bracket

- Ultra-durable 2 mm thick type
- Rust-resistant stainless steel
- Sensor is firmly secured using M3 Hex socket head cap screws
- The bracket is also firmly secured using M6 screw

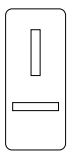
LS series

**LS-S01**

**LS-S02**

### Slit mask

Slit mask for through-beam type
**BL-150-10**
Slit width 1 mm
(2 included)



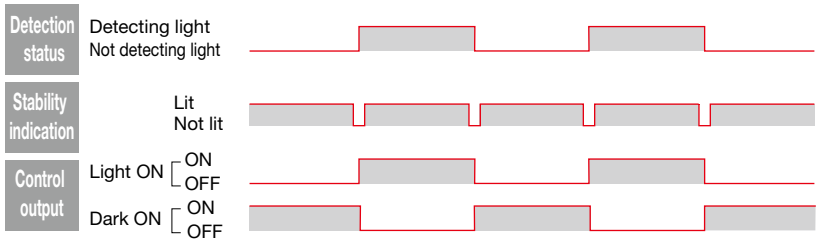
### Sensor stand

Sensor stand
(Image is for flat surface mounting)
**PLN-1**
For PLN-1
Reflector mounting bracket
**PLN-1M**
PLN description
**P.242**

## Distance adjustment

| | Order | Diagram | Potentiometer | Output indicator (orange) | Adjustment procedure |
|---|---|---|---|---|---|
| Diffuse type | 1 |  |  | Lit  | Set the object for detection in the detection position and gradually raise the sensitivity adjustment potentiometer from the minimum to position A where the indicator will light up. |
| | 2 |  |  | Not lit  | Remove the object for detection and gradually lower the sensitivity adjustment potentiometer from the maximum to position B where the indicator will go out. |
| | 3 |  |  | Lit  | **Position C between positions A and B** is the optimal position for sensitivity.<br>Positions A and B may be reversed depending on the model and the detection conditions. Place the workpiece in a fixed position and perform an operational check. |

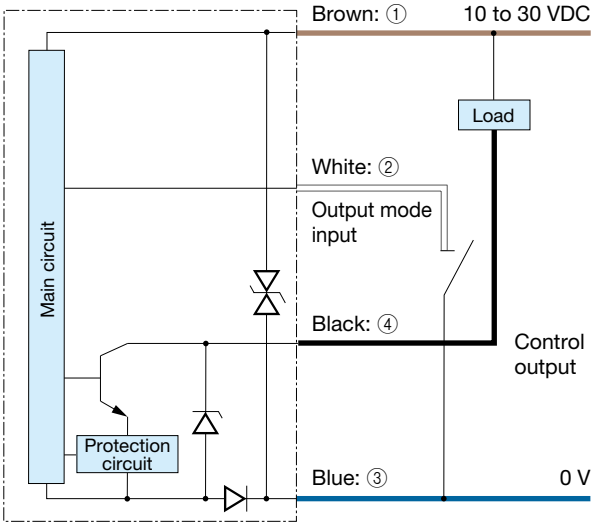
## Operation mode



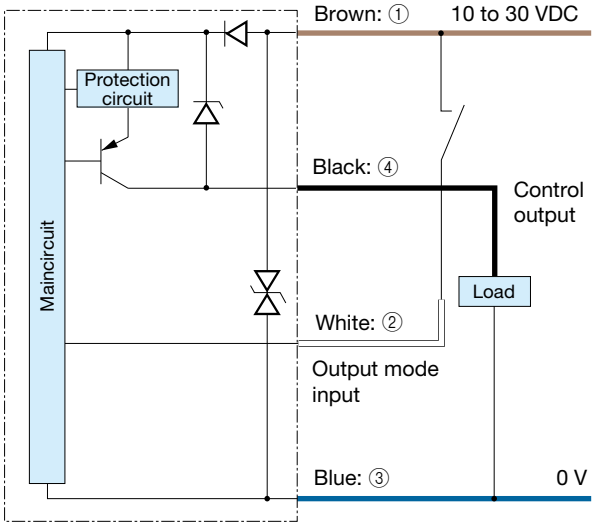

*The operation mode is the same for NPN output and PNP output.

# I/O circuit diagram

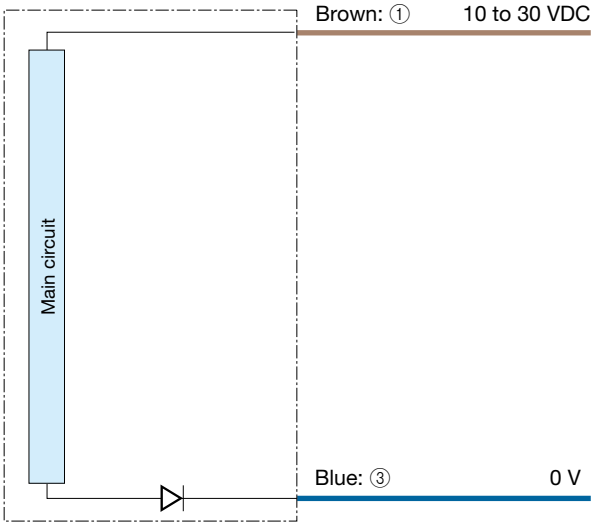
## NPN output type




## PNP output type



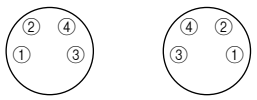

## Through-beam type emitter




## Connector type

(Pin configuration)

Sensor side Connector cable side



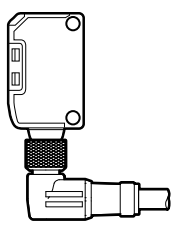

① 10 to 30 VDC
② Not connected/+V: Light ON (NPN)
0 V: Dark ON
③ 0 V
④ Control output

### Connecting

- Turns to Light ON mode when the white wire is connected to +V or not connected and to Dark ON mode when connected to 0 V (for NPN). To use without connecting, disconnect and wrap individually with insulating tape, and do not connect it to any other terminal.
- ① to ④ are connector pin No.

### Notes

- When using a switching regulator for the power supply, be sure to ground the frame ground terminal.
- Because wiring sensor wires with high-voltage wires or power supply wires can result in malfunctions due to noise, which can cause damage, make sure to wire separately.
- Avoid using the transient state while the power is on (approx. 100 ms).
- The connector direction is fixed as the drawing below when you use L-shaped connector cable. Be aware that rotation is not possible.

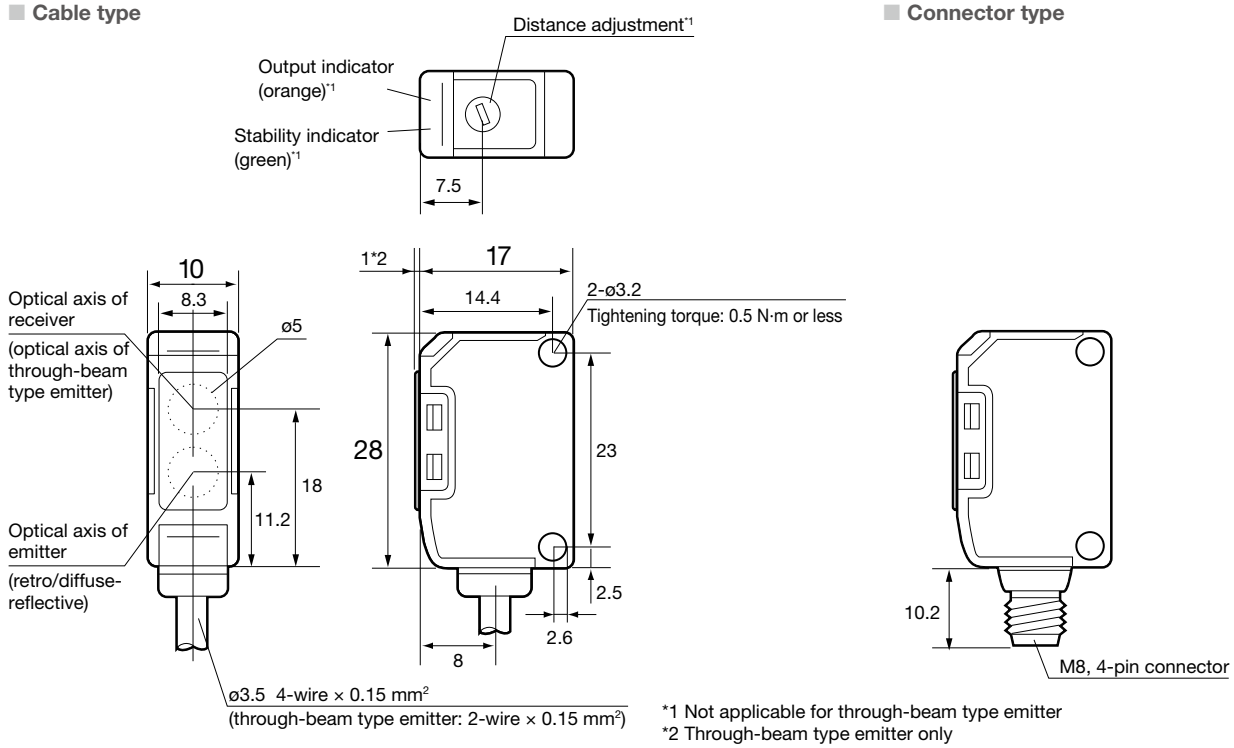


# Dimensions

## Sensor

(Unit: mm)

### Cable type



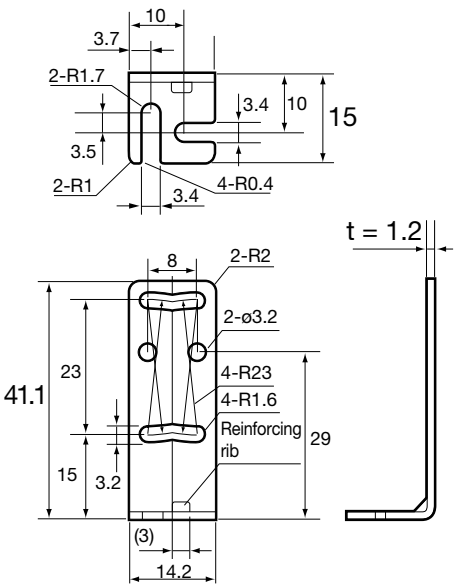

### Connector type



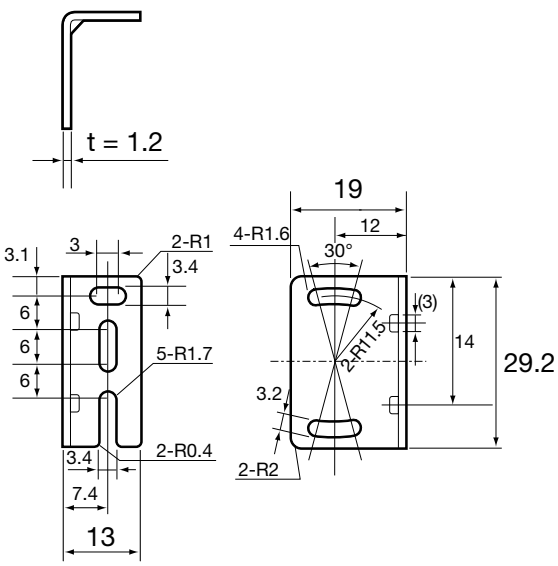

*1 Not applicable for through-beam type emitter
*2 Through-beam type emitter only

## Mounting bracket

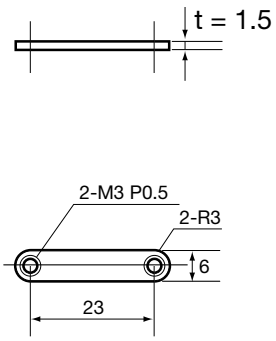
### BEF-W150-B (included with sensor)




### BEF-W150-A (optional)




### Nut plate (included)

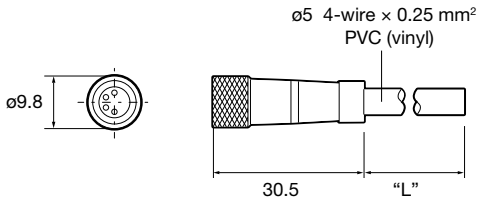


# Dimensions

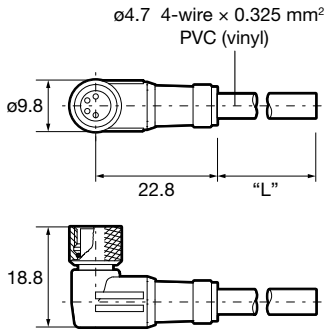
## Connector cable (optional)

(Unit: mm)

■ JCN-S, JCN-5S, JCN-10S

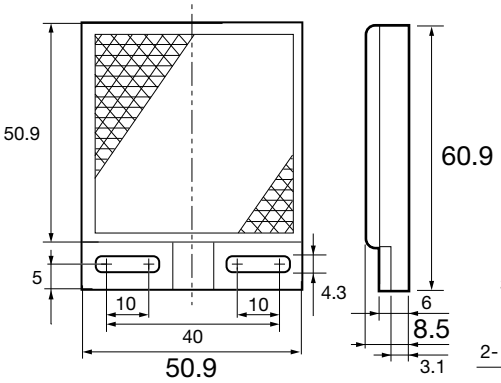



■ JCN-L, JCN-5L, JCN-10L

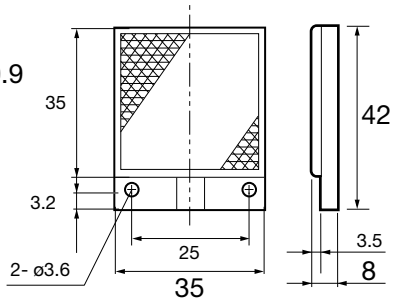



## Reflector

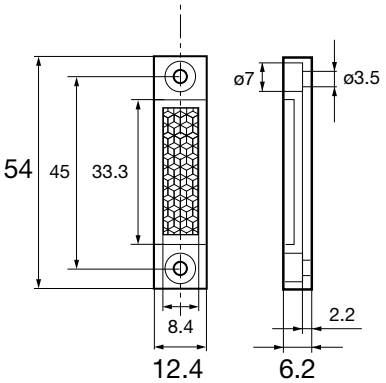
■ V-61: Standard type reflector (included with retro-reflective type)




■ V-42: Small reflector (optional)

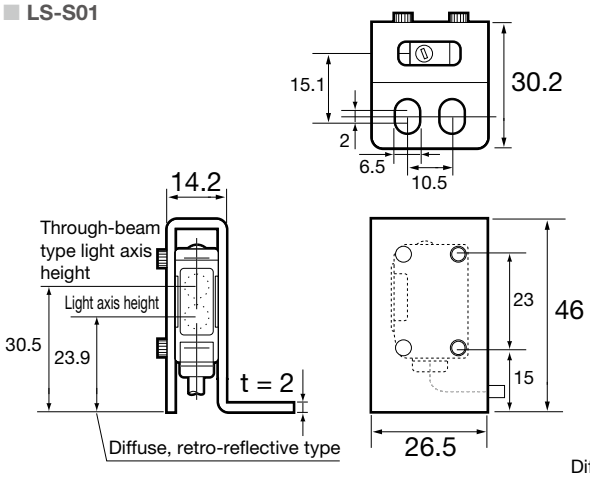



■ P45A: Vertical type reflector (optional)

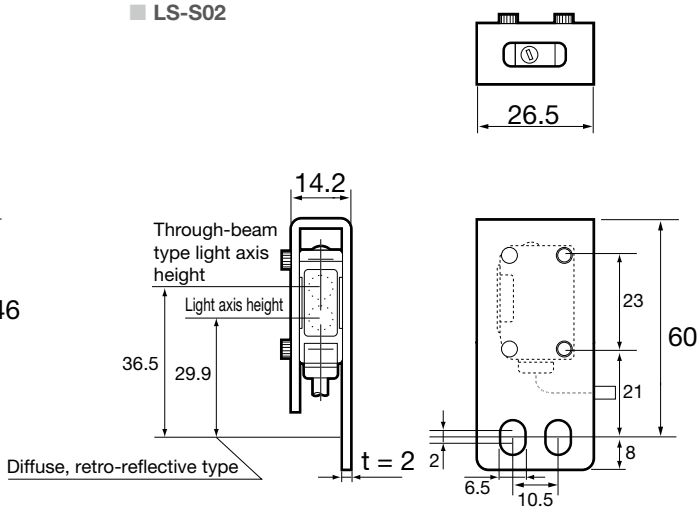



## Protective mounting bracket

■ LS-S01




■ LS-S02

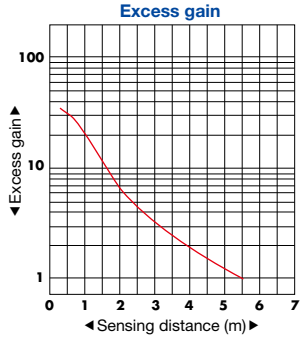


# Typical characteristic data

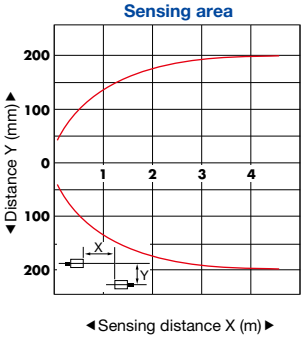
*Contact us for any other characteristic data that may be required.

## ST-400□

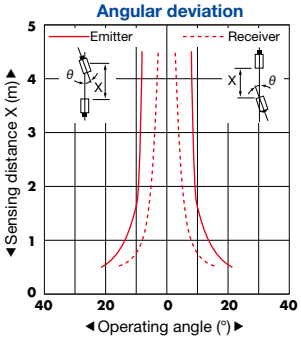
### Excess gain



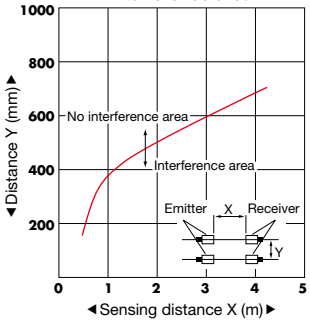

### Sensing area




### Angular deviation

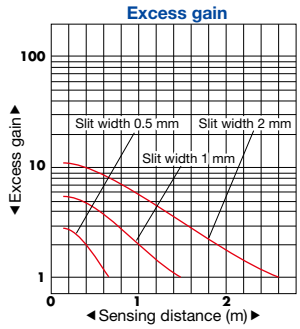



### Interference area

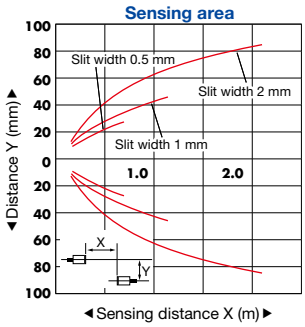



## When slit mask (BL-150-10) is attached ST-400□

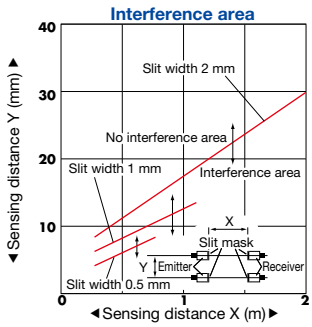
### Excess gain




### Sensing area

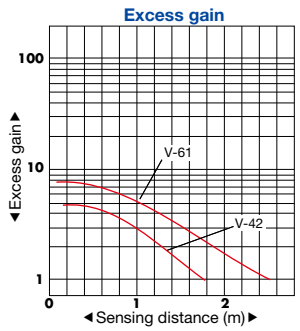



### Interference area

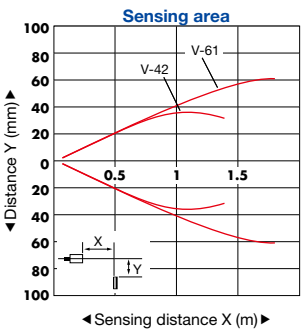



## SR-150□

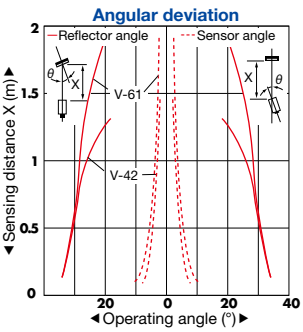
### Excess gain



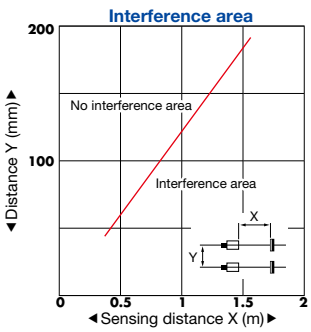

### Sensing area




### Angular deviation

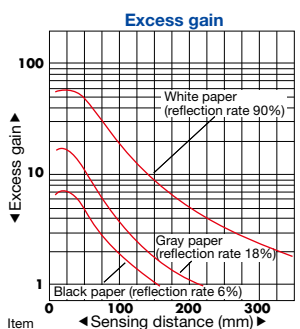



### Interference area



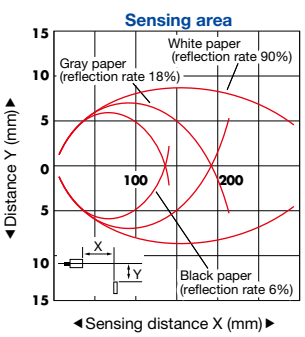

## SD-20□

### Excess gain

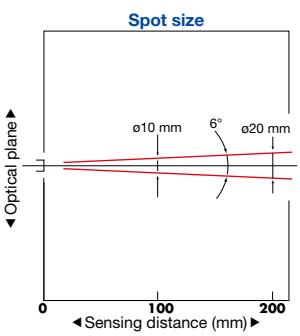



Item targeted for detection
100 × 100 mm

### Sensing area




### Spot size




### Interference area