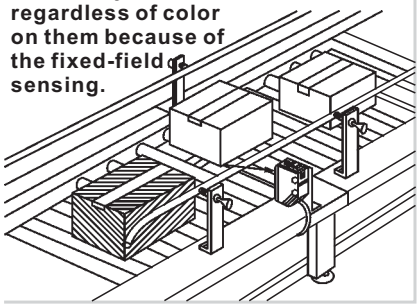
# RP68 SERIES



## Application

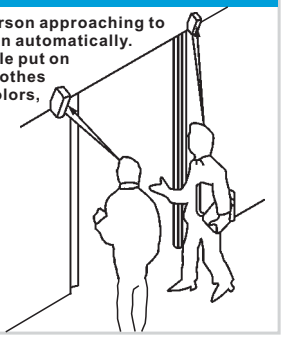
### Detecting cardboard boxes passing by

It securely detects cardboard boxes regardless of color on them because of the fixed-field of sensing.

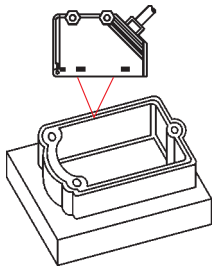


### Detecting people in front of automatic door

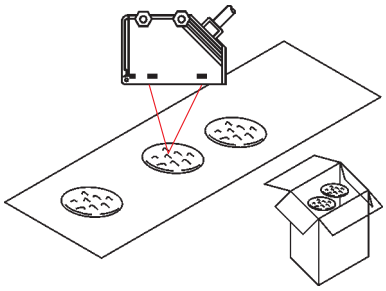
They detect person approaching to the door to open automatically. Although people put on own-desired clothes with various colors, they perfectly detect people.



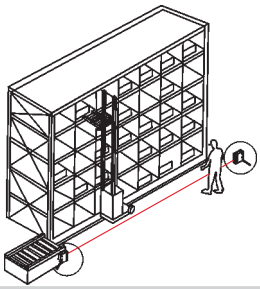
### Detecting Gasket on Die-casting



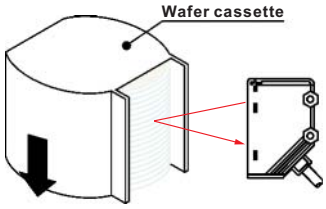
### Sensing of thin-baked rice crackers



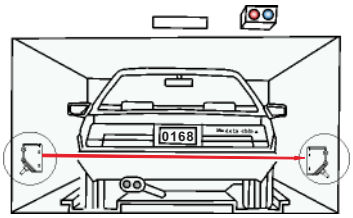
### Detecting person entering stacker crane path



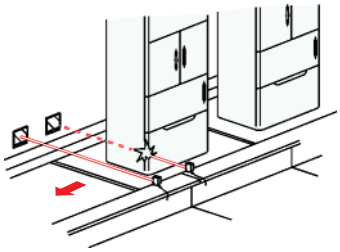
### Wafer counting in cassette



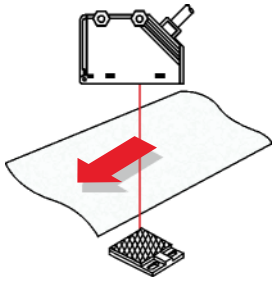

### Detecting car entering dangerous place




### Detection of specular goods

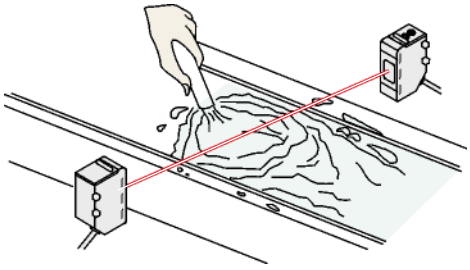


### Sensing transparent sheet



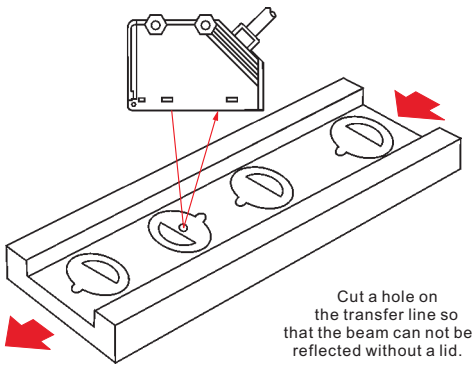
### Waterproof

Achieves IP 67. The sensor can be put on machinery washed with water. The mounting bracket (option) is not corrosive as it is made of stainless steel material.



Note: However, a water drop on the sensing face may cause the sensor generate the output.

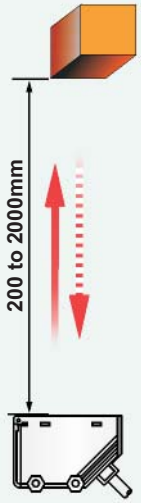
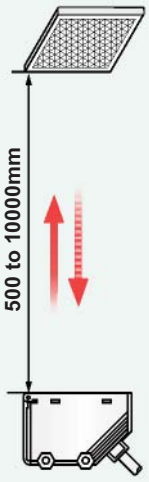
### Detecting lids of cups



Cut a hole on the transfer line so that the beam can not be reflected without a lid.

# RP68 SERIES

## Order guide

| Sensing mode | Appearance | Supply voltage | OUTPUT MODE | Part Number |
|---|---|---|---|---|
|  **Diffuse mode** sensing distance 200 to 2000mm Infrared red LED |  | 10 to 30V DC | NPN/PNP | RP68-D2000D-CX9C3U2 |
| |  | 10 to 30V DC | NPN/PNP | RP68-D2000D-CX9Q4UE-S |
| |  | 10 to 30V DC | NPN/PNP | RP68-D2000D-CX9P4UE |
|  **Retro-reflective mode** sensing distance 500 to 10000mm Red LED |  | 10 to 30V DC | NPN/PNP | RP68-L10000D-CX6C3U2-PF |
| |  | 10 to 30V DC | NPN/PNP | RP68-L10000D-CX6Q4UE-PS |
| |  | 10 to 30V DC | NPN/PNP | RP68-L10000D-CX6P4UE-PF |

# RP68 SERIES

PHOTOELECTRIC
SPECIFICATIONS

## Specifications

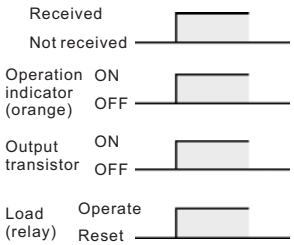
| Type / Item / Model No. | Retroreflective | Diffuse reflective |
|---|---|---|
| | RP68-L10000D-CX6C3U2-PF<br>RP68-L10000D-CX6Q4UE-PS<br>RP68-L10000D-CX6P4UE-PF | RP68-D2000D-CX9C3U2<br>RP68-D2000D-CX9Q4UE-S<br>RP68-D2000D-CX9P4UE |
| Sensing distance | 0.5 to 10m using RE-8160 | 0.2 to 2m |
| Setting distance | ———— | 0.5 to 2m |
| Standard sensing object | Opaque: 80 dia. Min. | Kodak 90% white card 300x300 mm |
| Hysteresis ( typical) | ———— | 10% of setting distance |
| Directional angle | Sensor: 1° to 5° Reflector:40° min. | ———— |
| Reflectivity characteristics (black/white error) | ———— | ±10% max. (At 1m sensing distance) |
| Light source (wave length) | Red LED (700 nm) | Infrared LED (860 nm) |
| Spot size | ———— | 70 dia.max.at 1m sensing distance |
| Supply voltage | 10 to 30VDC including 10% (p-p) ripple | |
| Current consumption | 50 mA max. | 60 mA max. |
| Output | 30V DC max. Load current: 100 mA max.<br>Residual voltage: NPN output 1.2V max.<br>PNP output: 2.0V max.<br>Open collector output (NPN/PNP selectable) | Load power supply voltage: 30V DC max.<br>Load current: 100 mA max. Residual voltage:<br>NPN output: 1.2V max. PNP output: 2.0V max.<br>Open collector output( NPN/PNP selectable) |
| Operation mode | Light-ON/Dark-ON switch selectable | |
| Circuit protection | Protection from reversed power supply connection, load short-circuit, and mutual interference | |
| Response time | 1ms | 5ms |
| Sensitivity adjustment | One-turn potentiometer | Teaching (in NORMAL or ZONE mode) |
| Ambient illumination (receiver side) | Incandescent lamp: 30000 lx max. Sunlight: 10000 lx max. | |
| Ambient temperature | Operating: -25℃ to 55℃( -13 to 131°F)<br>Storage: -30℃ to 70℃ (-22 to 158°F) with no icing or condensation | |
| Relative humidity | Operating: -35% to 85%<br>Storage: 35% to 95% with no icing or condensation | |
| Insulation resistance | 20 MΩ min. At 500V DC | |
| Dielectric strength | 1000VAC, 50/60 Hz for 1 min | |
| Vibration resistance | 10 to 55Hz, 1.5mm double amplitude for 2 hours each in X, Y and Z axes | |
| Shock resistance | 500 m/s² 3 times each in X, Y, and Z axes | |
| Degree of protection | IP 67 | |
| Connection method | Cable type: 2m; connector type: M12 connector; pigtail type: with M12 connector. | |
| Weight (packed state) | Approx. 150g | Approx. 50g |
| Material | Case: PBT (polybutylene terephthalate);<br>Lens: Acrylic (PMMA); Mounting bracket: Stainless steel (SUS 304), order separately | |

## OUTPUT AND CIRCUITS

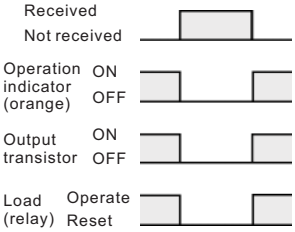
### NPN/PNP Selectable

### Timing chart

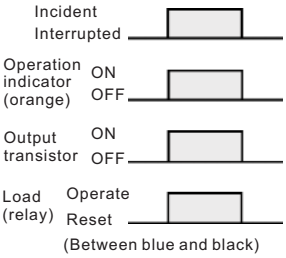
**NPN Light ON**



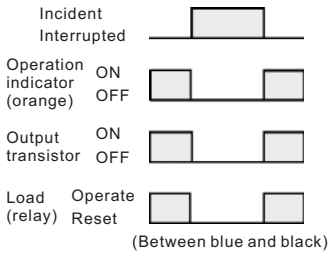

**NPN Dark ON**




**PNP Light ON**

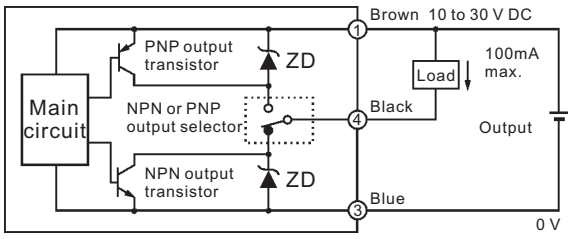


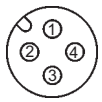

**PNP Dark ON**




### Output circuit

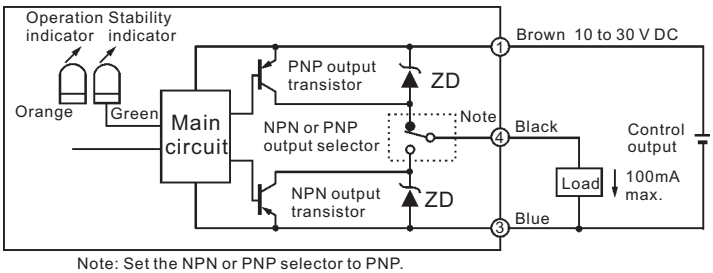
**NPN**




Pin 2 is open

**PNP**




Note: Set the NPN or PNP selector to PNP.

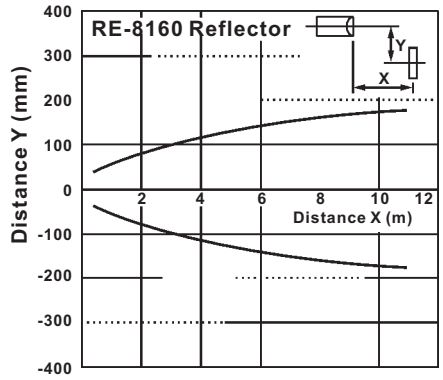
Pin 2 is open

# RP68 SERIES

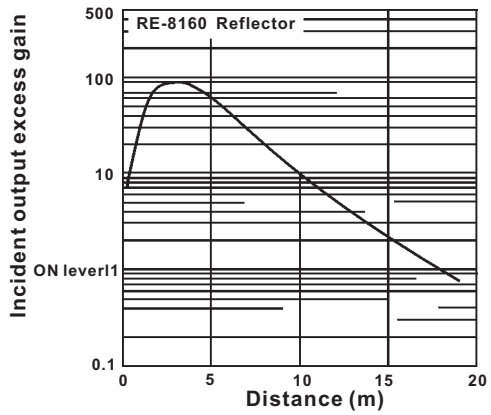
# PHOTOELECTRIC
## SENSING FIELDS (TYPICAL)

## RETRO REFLECTIVE MODELS

### Lateral Movement

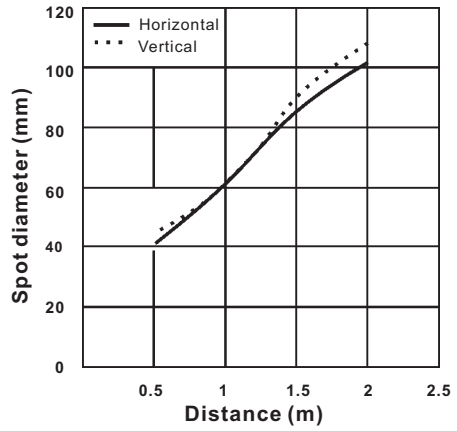



### Excess Gain

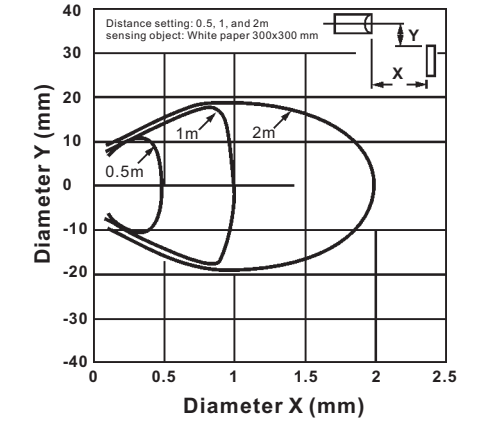



## DIFFUSE MODELS

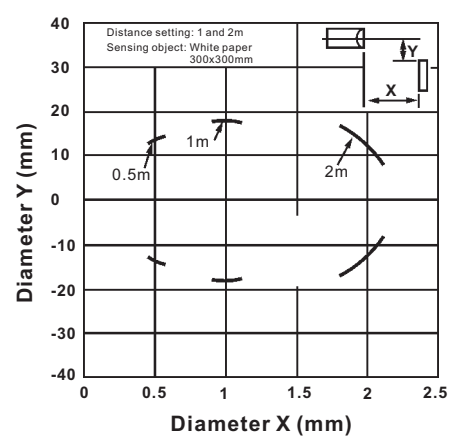
### Spot diameter vs. Sensing distance




### Sensing Zone in NORMAL Mode



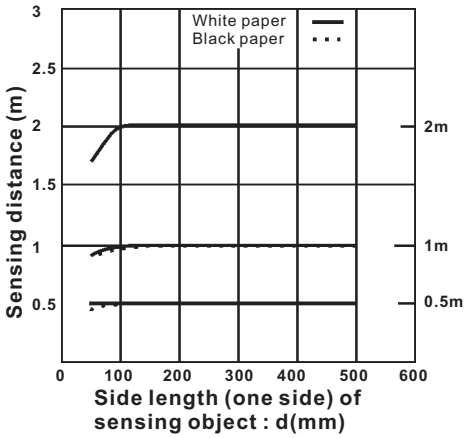

### Sensing Zone in ZONE Mode



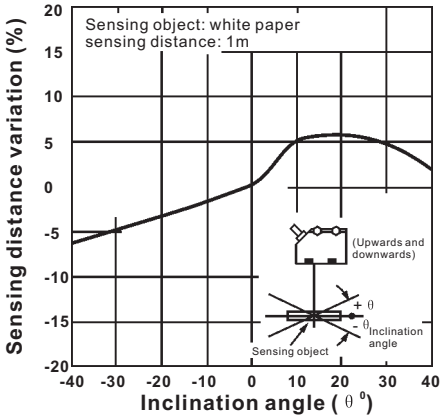
## SENSING FIELDS (TYPICAL)

### DIFFUSE MODELS

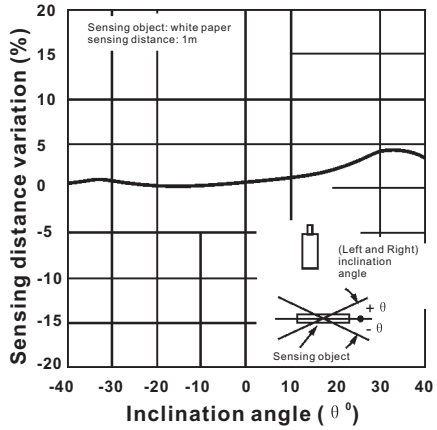
**Sensing Object Size vs. Setting Distance**



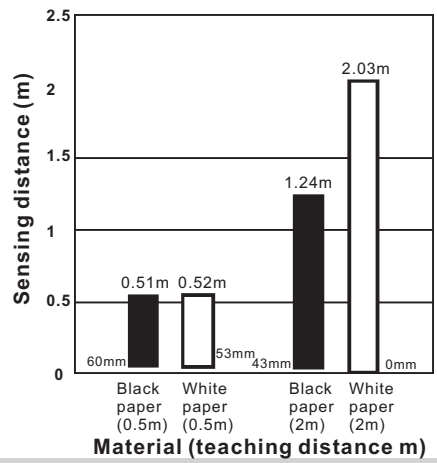

**Sensing object Angle characteristics (Up and Down)**



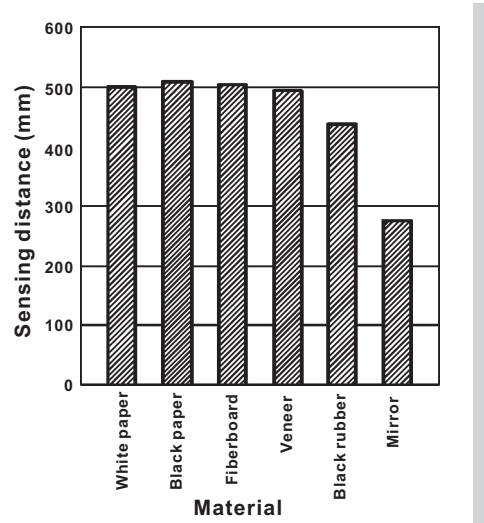

**Sensing Object Angle (Left and Right)**



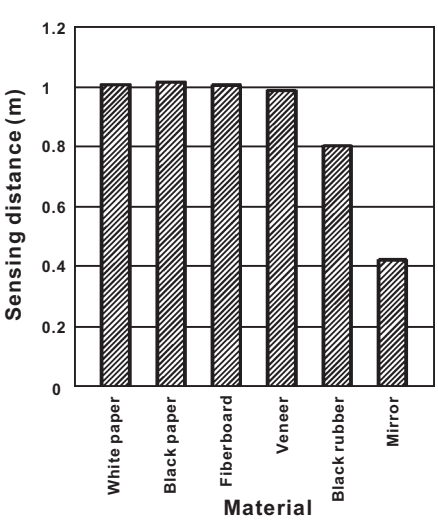

**Close-range Characteristics**




**Sensing Distance vs. Sensing Object Material (at 500-mm Setting Distance)**




**Sensing Distance vs. Sensing object Material (at 1-m Setting Distance)**



# Installation

## WIRING

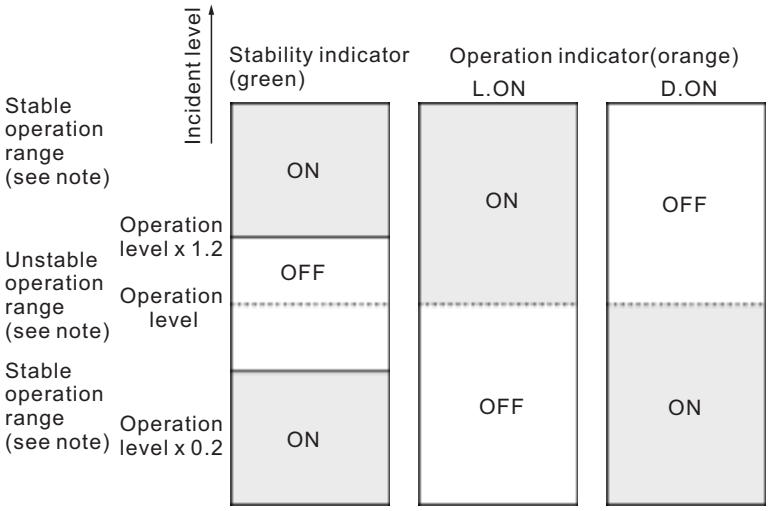
The tensile strength of the cable during operation should not exceed the values shown below.

| Part number | Tensile strength |
|---|---|
| RP68-L10000D-CX6C3U2-PF | 50N max. |
| RP68-L10000D-CX6Q4UE-PS | 10N max. |

## ADJUSTMENTS

**Indicators**

The following illustration indicates the operation levels of the **RP68**. Set the **RP68** so that it will work within the stable operation range.

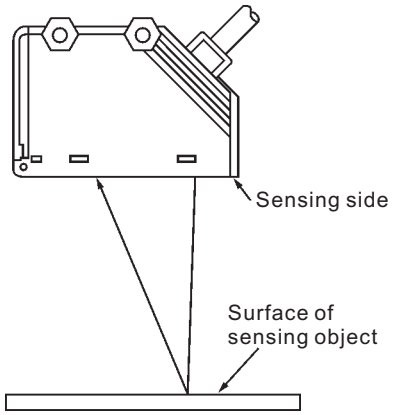



Note: If the operation level is set to the stable operation range, the RP68 series will operation with the highest reliability and without being influenced by temperature change, voltage fluctuation, dust, or setting change. If the operation level can not be set to the stable operation range, pay close attention to environmental changes while operating the RP68 series.

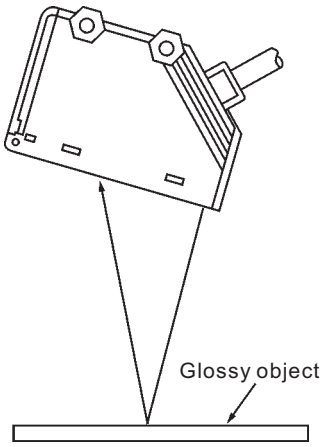
## MOUNTING DIFFUSE MODELS

Mounting directions

Make sure that the sensing side of the sensor is parallel with the surface of each sensing object. Do not tilt the sensor towards the sensing object.




If the sensing object has a glossy surface, tilt the sensor by 5° to 10° as shown below, provided that the sensor is not influenced by any background objects.



## Installation

### DISTANCE SETTING (TEACHING)

Select the most appropriate teaching method in reference to the following descriptions.

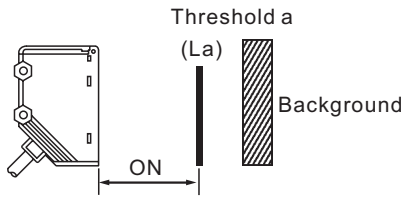
| Application | Teaching without sensing objects (i.e.,teaching the background). | Setting a threshold in the middle between the background and sensing object for operation. | Detection of glossy objects in front of the background. | Setting the maximum sensing distance of the sensor. |
|---|---|---|---|---|

| Teaching | Normal one-point teaching | Normal two-point teaching | Zone teaching | Maximum distance setting (in normal mode) |
|---|---|---|---|---|
| Setting method | Press the TEACH button with the background object. | Press the TEACH button with the background object and with the sensing object. | Press the TEACH button with the background object (conveyor, etc.) | Press the TEACH button for longer than three seconds. |
| Set threshold | Threshold (a) is set to a distance in front of the background of 20% of the background distance | Threshold (a) is set approximately in the middle between the background and sensing object. | Thresholds (a and b) are set in the sensing distance on condition that the difference between these thresholds are approximately 10% of the whole sensing distance. | The threshold is set so that the stability indicator will turn ON at approximately 2m if the sensing object is white paper. |
| Output ON range | The output is ON between the Sensor and La. | The output is ON between the sensor and La. | The output is ON between La and Lb. | The output is ON whenever the sensing object is located between the sensor and at a distance of 2.2m. |

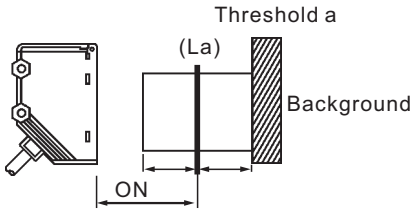
La: Distance equivalent to threshold (a)
Lb: Distance equivalent to threshold (b)

### NORMAL MODE

1.Normal one-point teaching




2.Normal two-point teaching




Normal One-point teaching

| Procedure | | Operation |
|---|---|---|
| | 1. | Set the more selector to TEACH. |
| | 2. | Set the NORMAL/ZONE mode selector to NORMAL |
| | 3. | Press the TEACH button with no sensing object (i.e.,teach the background ). The teaching indicator (red) will turn ON. |
| | 4. | Set the mode selector to RUN. (Set to L-ON or D-ON mode.) |

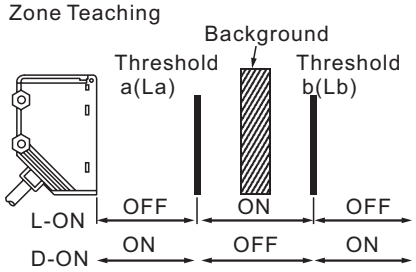
Note: Perform normal one-point teaching with the background.

Normal Two-point teaching

| Procedure | | Operation |
|---|---|---|
| | 1. | Set the more selector to TEACH. |
| | 2. | Set the NORMAL/ZONE mode selector to NORMAL |
| | 3. | Press the TEACH button with a sensing object located at the sensing position.<br>The teaching indicator (red ) will turn ON. |
| | 4. | Move the sensing object and press the TEACH button with the background.<br>● If the teaching is successful, the teaching indicator(green) will turn ON.<br>● If the teaching is not successful, the teaching indicator(red) will start to flash. |
| | 5. | If the teaching is successful, set the mode selector to RUN to complete the teaching operation.<br>Set the Rp68 series to light-or dark-ON mode with the mode selector according to the application.<br>If the teaching is not successful, change the set distance and object sensing position and repeat two-point teaching from step 3. |

### ZONE MODE

Zone Teaching




Zone teaching

| Procedure | | Operation |
|---|---|---|
| | 1. | Set the more selector to TEACH. |
| | 2. | Set the NORMAL/ZONE mode selector to NORMAL |
| | 3. | Press the TEACH button with the background.<br>● The teaching indicator (red) will turn ON first. Then the teaching indicator (green) will turn ON. |
| | 4. | Set the mode selector to RUN.<br>(Set L-ON or D-ON mode.) |

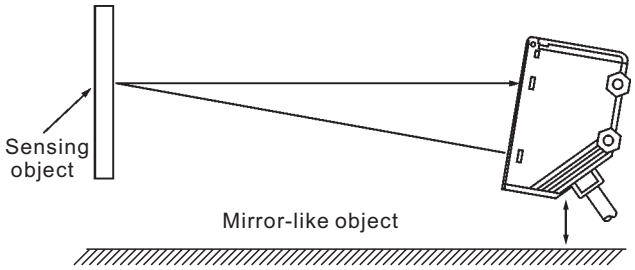
Note: Perform zone teaching with the background.

Maximum distance setting (in normal mode)

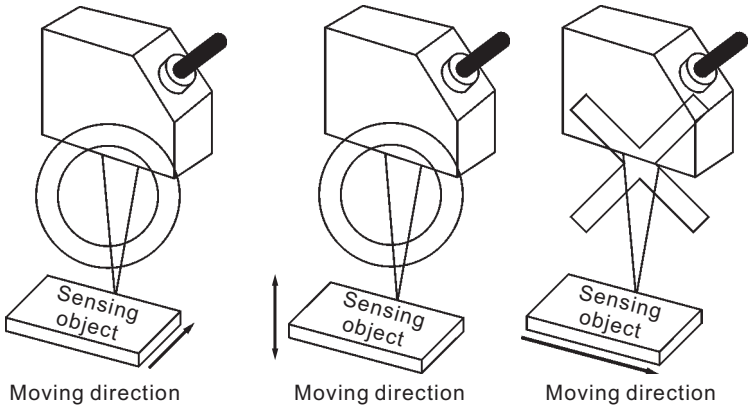
| Procedure | | Operation |
|---|---|---|
| | 1. | Set the more selector to TEACH. |
| | 2. | Set the NORMAL/ZONE mode selector to NORMAL |
| | 3. | Press the TEACH button for 3s or more.<br>● The teaching indicator (red) will turn ON.<br>● The teaching indicator (green) will turn ON in 3s.<br>This means that teaching was successful. |
| | 4. | If the teaching is successful, set the mode selector to RUN to complete the teaching operation.<br>(Set to L-ON or D-ON mode) |

## Installation

If there is a mirror-like object below the sensor, the sensor may not be in stable operation. Therefore, tilt the sensor or keep the sensor a distance away from the mirror-like object as shown below.




Make sure not to install the sensor in the incorrect direction. Refer to the following.

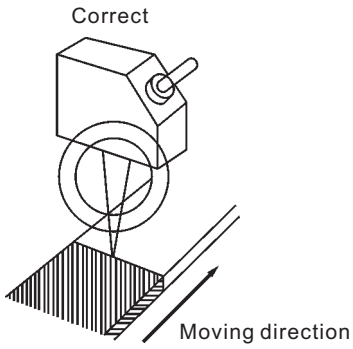


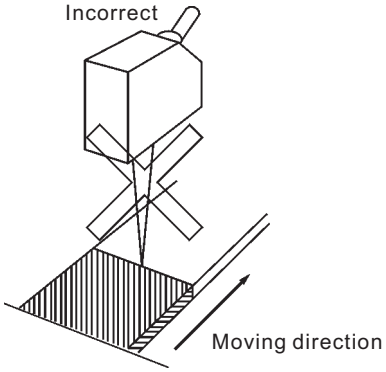

### ADJUSTMENTS FOR DIFFUSE MODE

Adjustment steps

| | |
|---|---|
| 1 | Install, wire, and turn ON the sensor. |
| 2 | Perform sensitivity adjustments(teaching). Refer to distance setting(Teaching)below. |
| 3 | Check that the mode selector is set to RUN. |

Install the sensor as shown in the following if each sensing object greatly differs in color or material.



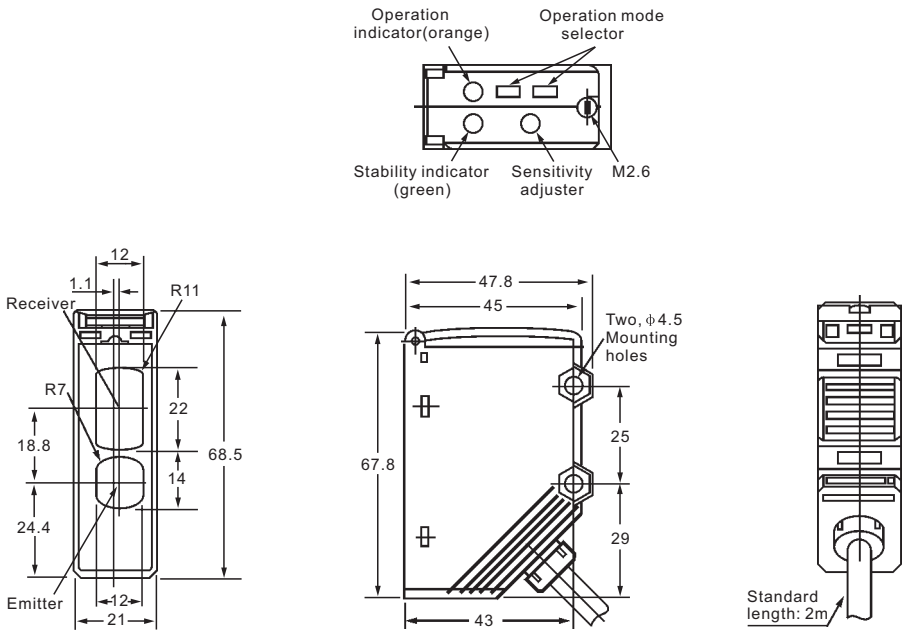

### OTHERS

If a teaching data error occurs with the operation indicator flashing due to a power failure or static noise, perform the teaching operation of the Sensor again.

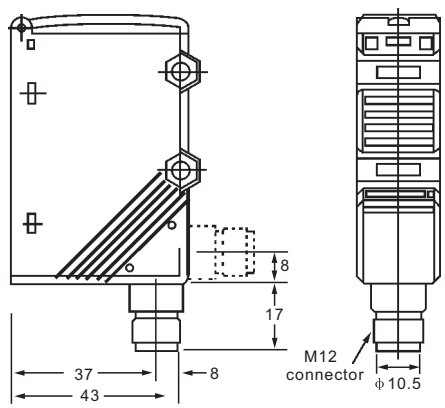
## DIMENSIONS (Unit: mm)

### Dimensions

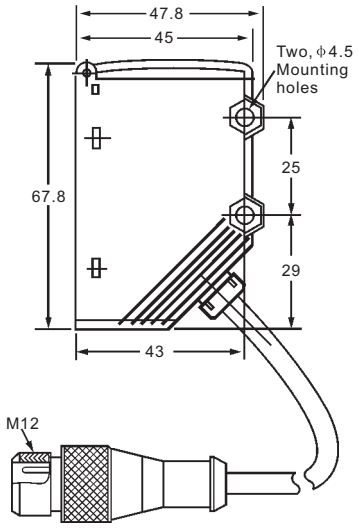
**RP68-D2000D-CX9C3U2 RP68-L10000D-CX6C3U2-PF**




**RP68-D2000D-CX9Q4UE-S**
**RP68-L10000D-CX6Q4UE-PS**

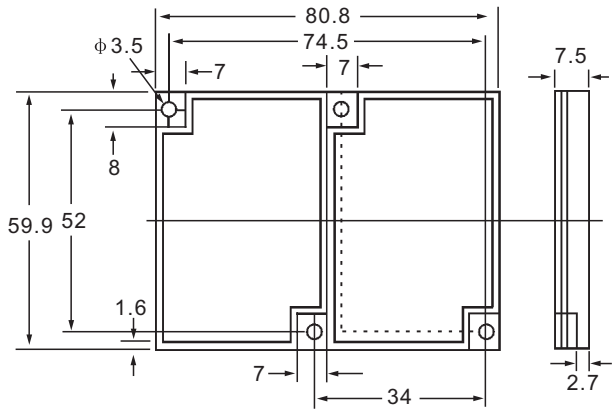



**RP68-D2000D-CX9P4UE**
**RP68-L10000D-CX6P4UE-PF**

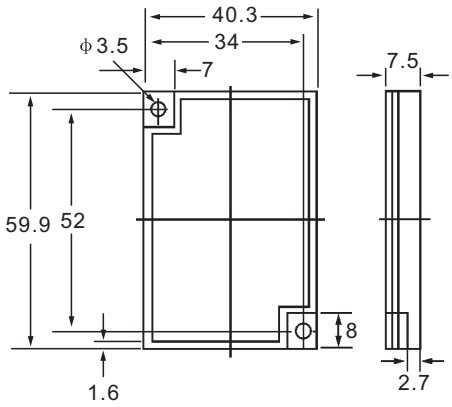


## Dimensions

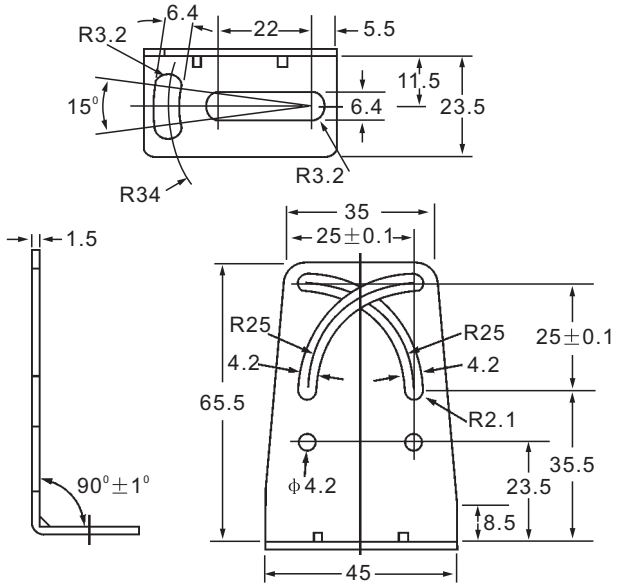
### RE-8160



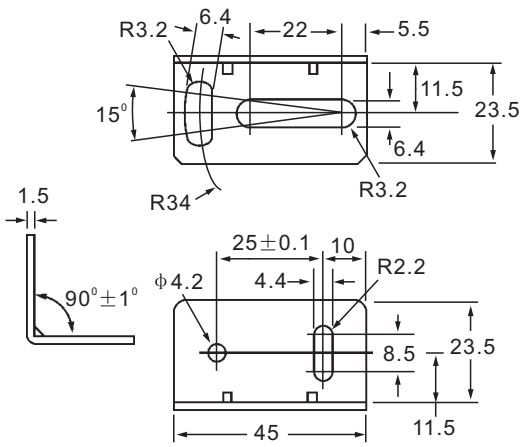

### RE-4060




### SMB-3566




### SMB-3545



Do not ignore the following items that are essential for securing safety during sensor operation.

- Do not use the sensor in locations with explosive or flammable gas.
- Do not use the sensor in the water or electrically conductive solutions.
- Do not disassemble, repair, or modify the product.
- Make sure that the power supply specifications, such as AC or DC , are correct.
- Do not apply voltage or current exceeding the rated ranges.
- Do not make mistakes in wiring, such as mistakes in polarity.
- Be sure to connect the load correctly.
- Do not short-circuit the load terminals.

## Designing

### Load relay contact

If RP series is connected to an inductive load with contacts that spark when the load is turned OFF (e.g., A contactor or valve), the normally-closed side may be turned ON before the normally-open side is turned OFF or vice-versa. If both normally-open output and normally-close output are used simultaneously, apply an surge suppressor to the load.

### Stabilization on Power-up

The sensor needs 100ms to be ready to operate after it is turned ON. The devices connected to RP wait until the sensor is ready to operate. If the sensor and load are connected to separate power supplies, be sure to turn ON the sensor first.

### Power OFF

A single pulse signal may be output from the sensor immediately after it is turned OFF. This will occur more frequently if a timer or counter is connected to the sensor and power is supplied to the timer or counter independently. Be sure to supply power to the timer or counter from the built-in power supply of the sensor.

### Power Supply

If a standard switching regulator is used, be sure to ground the FG(frame ground) and G (ground) terminals, otherwise the sensor may malfunction due to the switching noise of the regulator.

### Repeated cable bending

Do not bend the sensor cable repeately.

### High-tension lines

Do not wire power lines or high-tension lines alongside the lines of the sensor in the same conduit, otherwise the sensor may be damaged or may malfunction due to induction. Be sure to wire the lines of the sensor separated from power lines or high-tension lines or laid in an exclusive, shielded conduit.

## WIRING

The RP series has a built-in function to protect the sensor from load short-circuiting. If load short-circuit results, the output will be turned OFF. In that case, check the wiring and turn ON the RP series again so that the short-circuit protection circuit will be reset. This function will operate if the output current flow is at least 2.0 times the rated load current. If an inductive load is connected to the RP series, make sure that the inrush current does not exceed 1.2 times the rated load current.

The cable can be extended up to a total length of 100m, on condition that the thickness of the wire is at least 0.3mm.

## MOUNTING

### Mounting Conditions

If sensors are mounted face-to-face, make sure that no optical axes cross each other. Otherwise, mutual interference may result.

Be sure to install the sensor carefully so that the directional angle range of the sensor will not be directly exposed to intensive light, such as sunlight, fluorescent light, or incandescent light .

Do not strike the Photoelectric sensor with a hammer or any other tool during the installation of the sensor, or the sensor will loose its water-resistive properties.

Use M4 screws to mount the sensor.

When mounting the case, make sure that the tightening torque applied to each screw not exceed 1.2N • m.

### M12 connector

Be sure to connector or disconnector the M12 connector after turning OFF the sensor.

Be sure to hold the connector cover when connecting or disconnecting the M12 connector.

The M12 connector must be only hand-tightened.

If the M12 connector is not connected securely, the proper degree of protection of the sensor may not be maintained or the connector may be disconnected due to vibration.

### Water Resistance

Do not use the product in water, in rain, or outdoors.

Tighten the operation cover screws and terminal block cover screws to a torque of 0.3 to 0.5N • m in order to ensure water resistivity.

## MAINTENANCE AND INSPECTION

### Cleaning

Use only water and mild detergent. Do not use harsh chemicals or solvents.

## OPERATING ENVIRONMENT

Do not install the RP serise in locations with the following conditions.

- Excessive dust.
- Corrosive gases.
- Directly exposed to sprays of water, oil, or chemicals.
- Directly exposed to vibration or shock.