

Power Supply Built-in Compact
Multi-voltage Photoelectric Sensor

NX-5 Series

USER'S MANUAL

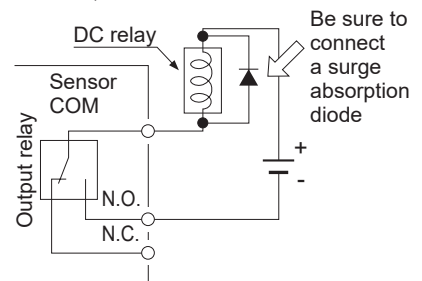
Contents

| | |
|---|----|
| 1. Cautions | 3 |
| 2. Part description | 4 |
| 3. Mounting | 6 |
| 3-1 Installing to sensor mounting bracket | 6 |
| 3-2 Mounting interval (thru-beam type NX5-M□) | 7 |
| 3-3 Long sensing range retroreflective type sensor (NX5-RM7□) | 9 |
| 4. I/O circuit diagram and output operation | 10 |
| 4-1 I/O Circuit diagram | 10 |
| 4-2 Output operation | 10 |
| 5. Adjustment | 11 |
| 5-1 Light axis adjustment (thru-beam type NX5-M10R□ / NX5-M30□) (retroreflective type NX5-PRVM5□ / NX5-RM7□) | 11 |
| 5-2 Sensitivity adjustment | 12 |
| 6. Automatic interference prevention function | 14 |
| 7. Stability indicator | 15 |
| 8. Retroreflective type sensor with | 16 |
| polarizing filter (NX5-PRVM5□) | 16 |
| 9. Option | 17 |
| 9-1 Slit mask (exclusively for thru-beam type sensor NX5-M10R□ / NX5-M30□) | 17 |
| 9-2 Interference prevention filter (exclusively for thru-beam type sensor NX5-M10R□) | 18 |
| 9-3 Reflector / reflective tape (retroreflective type NX5-PRVM5□ / NX5-RM7□) | 19 |
| 10. Specification | 20 |
| 11. Dimensions | 22 |

1. Cautions

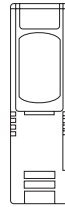
WARNING

- Never use this product as a sensing device for personnel protection.
- In case of using devices for personnel protection, use products which meet laws and standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.
- This product has been developed / produced for industrial use.
- Make sure that the power supply is off while wiring.
- Take care that wrong wiring will damage the sensor.
- Verify that the supply voltage variation is within the rating.
- If power is supplied from a commercial switching regulator, ensure that the frame ground (F.G.) terminal of the power supply is connected to an actual ground.
- In case noise generating equipment (switching regulator, inverter motor, etc.) is used in the vicinity of this product, connect the frame ground (F.G.) terminal of the equipment to an actual ground.
- Do not run the wires together with high-voltage lines or power lines or put them in the same raceway. This can cause malfunction due to induction.
- Take care that the sensor is not directly exposed to fluorescent lamp from a rapid-starter lamp, a high frequency lighting device or sunlight etc., as it may affect the sensing performance.
- Do not use during the initial transient time (50ms) after the power supply is switched on.
- Extension up to total 100m, is possible with 0.3mm², or more, conductor area cable.
- When connecting an inductive load, such as a DC relay, connect a surge absorber as shown in the right figure.
- This sensor is suitable for indoor use only.
- Do not use this product under high temperature and high humidity for long periods of time. The detection performance may be affected due to the deterioration of internal components.
- Avoid dust, dirt, and steam.
- Take care that the sensor does not come in direct contact with water, oil, grease, organic solvents, such as, thinner etc., or strong acid, and alkaline.
- The following items are required, as conditions for use in order to conform to CE.
 - The output applied voltage should be the same as the supply voltage of the sensor.
 - Be sure to add a short-circuit protection (a fuse or a breaker) to the power supply input and the output.

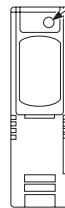
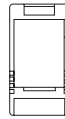


2. Part description

Thru-beam type emitter: NX5-M10R□



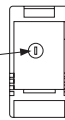
Thru-beam long sensing range type emitter: NX5-M30□



Power indicator (Red)
Lights up when the power is ON

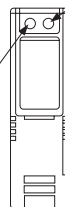
Thru-beam type receiver: NX5-M10R□
Retroreflective type with polarizing filters: NX5-PRVM5□
Diffuse reflective type: NX5-D700□

Sensitivity adjuster
Sensing range becomes
longer by turning clockwise

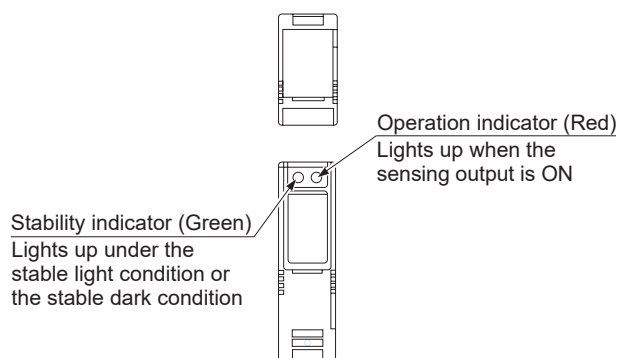


Operation indicator (Red)
Lights up when the
sensing output is ON

Stability indicator (Green)
Lights up under the stable
light condition or the
stable dark condition



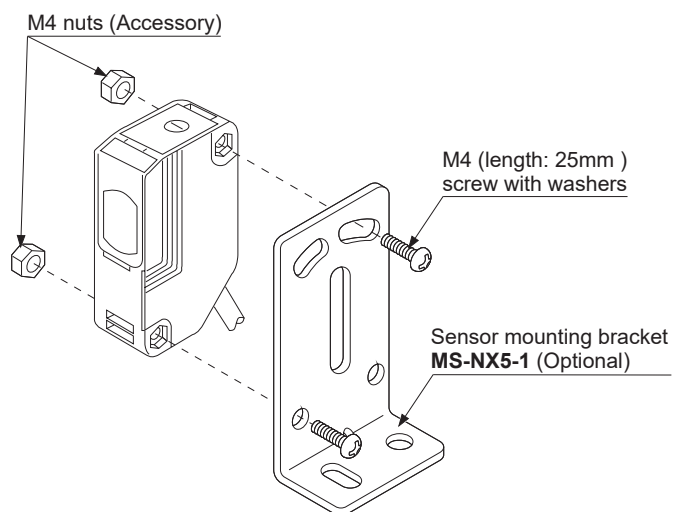
Thru-beam long sensing range type receiver: NX5-M30□
Retroreflective long sensing range type: NX5-RM7□



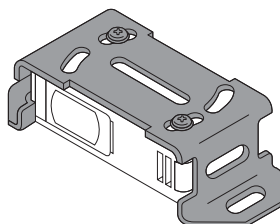
3. Mounting

3-1 Installing to sensor mounting bracket

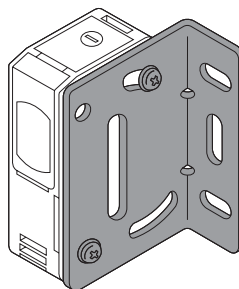
The tightening torque should be 0.8 N·m or less.



MS-NX5-2



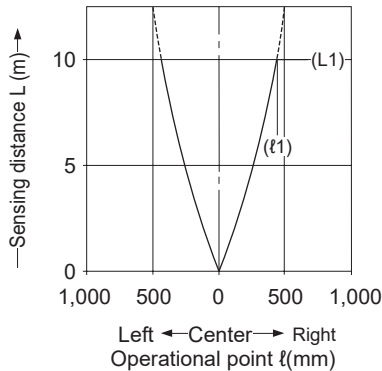
MS-NX5-3



3-2 Mounting interval (thru-beam type NX5-M□)

- In case mounting two sets or more of the this product close together, mount them as drawing left indicates (typical example)
- Find out the operating point ℓ on the parallel deviation diagram for the setting distance L. Separate sensors by $2 \times \ell$ or more.

NX5-M10R□ parallel deviation diagram (typical)



<Installation interval for NX5-M10R□>

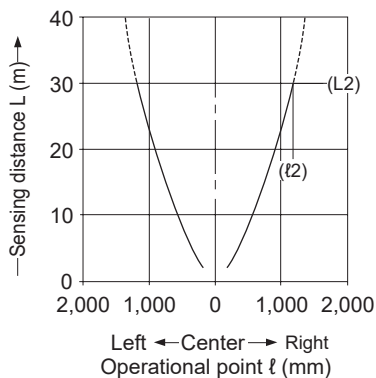
In case using at sensing distance (L1) 10m, the operation point (ℓ_1) is approx. 444mm according to diagram left.

The installation interval is

Approx. $444\text{mm} \times 2 = 888\text{mm}$

Thus, install another NX5-M10R□ to 888mm or more away.

NX5-M30□ parallel deviation diagram (typical)



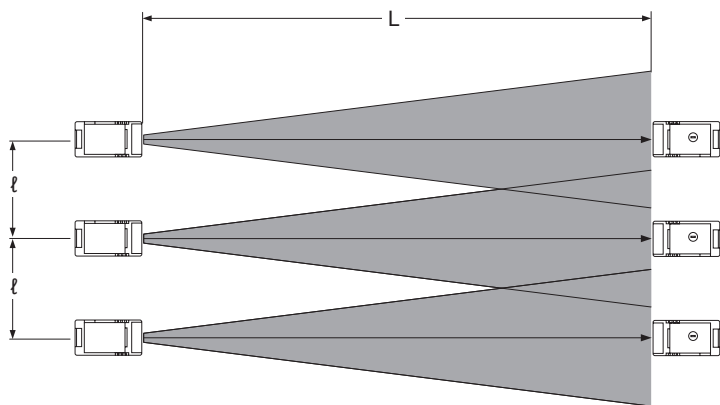
<Installation interval for NX5-M30□>

In case using at sensing distance (L2) 30m, the operation point (ℓ_2) is approx. 1,200mm according to diagram left.

The installation interval is

Approx. $1,200\text{mm} \times 2 = 2,400\text{mm}$

Thus, install another NX5-M30□ to 2,400mm or more away.

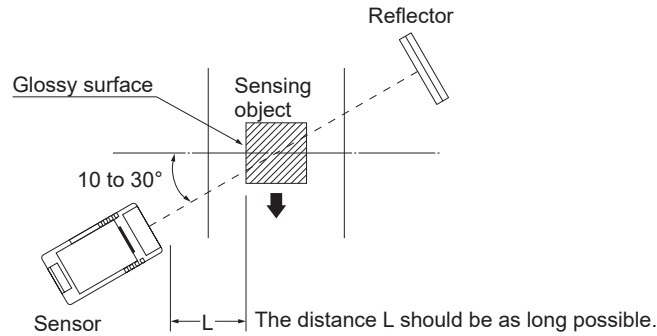


| Type | L | l |
|-------------------|-----|-------------------------|
| NX5-M10R □ | 10m | Approx. 888mm or more |
| NX5-M30 □ | 30m | Approx. 2,400mm or more |

- Since retroreflective type **NX5-PRVM5**□/**NX5-RMA**□ and diffuse reflective type **NX5-D700A**□ incorporate auto interference prevention function, the sensors can mount closely.

3-3 Long sensing range retroreflective type sensor (NX5-RM7□)

- Please take care of the following points when detecting materials having a gloss with retroreflective type sensor (NX5-RM7□).
 1. Make L, shown in the diagram, sufficiently long. (Note)
 2. Install at an angle of 10 to 30 degrees to the sensing object.



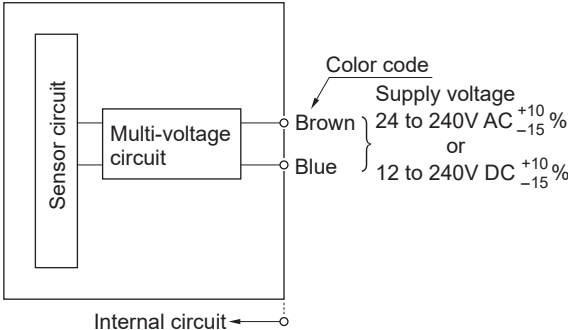
Note: In case the distance between the sensor and the sensing object is short, the reflected light from the sensing object may be detected.

- Retroreflective type with polarizing filter (NX5-PRVM5□) does not need the above adjustment.

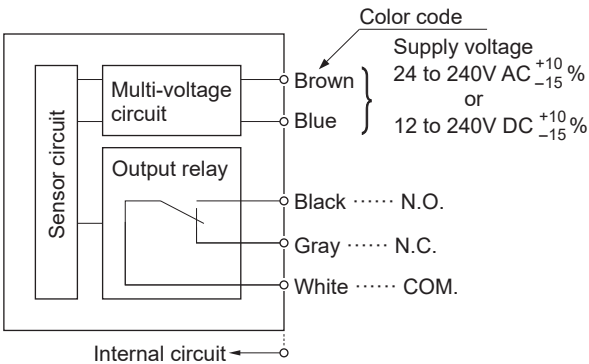
4. I/O circuit diagram and output operation

4-1 I/O Circuit diagram

Thru-beam type emitter NX5-M10R□/NX5-M30□




Thru-beam type receiver NX5-M10R□ / NX5-M30□, Retroreflective reflective type NX5-PRVM5□ / NX5-RM7□ Diffuse reflective NX5-D700□



4-2 Output operation

| Type | | Thru-beam & Retroreflective type | | | | Diffuse reflective type | | | |
|------------------|------------------|----------------------------------|----------------------|-----------------------|----------------------|-------------------------|----------------------|-----------------------|----------------------|
| | | Light-ON (A) type | | Dark-ON (B) type | | Light-ON (A) type | | Dark-ON (B) type | |
| Output | | N.O. (Black cable) | N.C. (Gray cable) | N.O. (Black cable) | N.C. (Gray cable) | N.O. (Black cable) | N.C. (Gray cable) | N.O. (Black cable) | N.C. (Gray cable) |
| Output condition | Power OFF | Open | Close | Open | Close | Open | Close | Open | Close |
| | Beam-received | Close | Open | Open | Close | Close | Open | Open | Close |
| | Beam-interrupted | Open | Close | Close | Open | Open | Close | Close | Open |

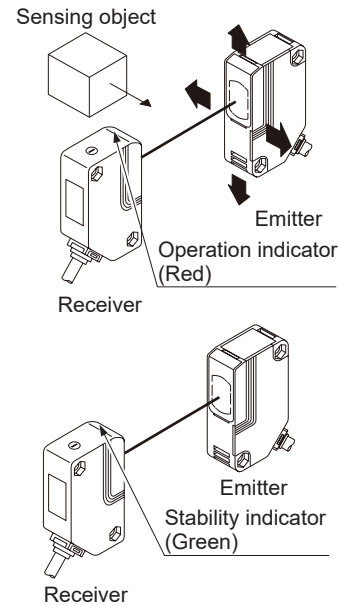
: Object detected state

5. Adjustment

5-1 Light axis adjustment (thru-beam type NX5-M10R□ / NX5-M30□) (retroreflective type NX5-PRVM5□ / NX5-RM7□)

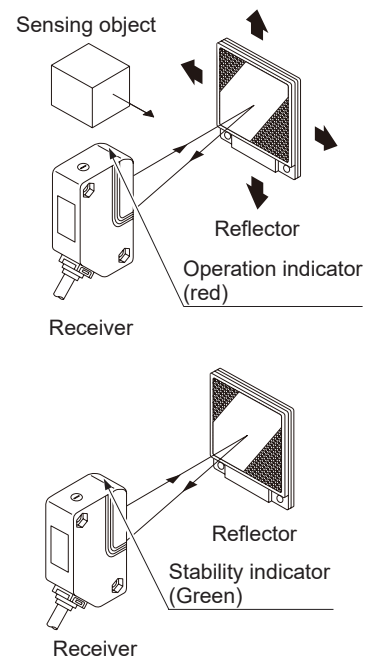
Thru-beam type NX5-M10R□ / NX5-M30□

1. Place the emitter and the receiver face to face along a straight line, move the emitter in the up, down, left and right directions, in order to determine the range of the light received condition with the help of the operation indicator (red). Then, set the emitter at the center of this range.
2. Similarly, adjust for up, down, left and right angular movement of the emitter.
3. Further, perform the angular adjustment for the receiver also.
4. Check that the stability indicator (green) lights up.(only for **NX5-M10R□**)



Retroreflective type NX5-PRVM5□ / NX5-RM7□

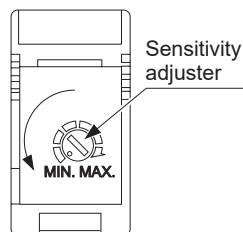
1. Placing the sensor and the reflector face to face along a straight line, move the reflector in the up, down, left and right directions, in order to determine the range of the light received condition with the help of the operation indicator (red). Then, set the reflector at the center of this range.
2. Similarly, adjust for up, down, left and right angular movement of the reflector.
3. Further, perform the angular adjustment for the sensor also.
4. Check that the stability indicator (green) lights up. (only for **NX5-PRVM5□**)



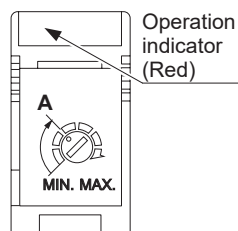
5-2 Sensitivity adjustment

Step

1. Turn the sensitivity adjuster fully counterclockwise to the minimum sensitivity position (MIN.)

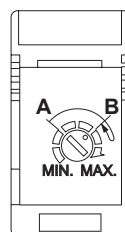


2. In the light received condition, turn the sensitivity adjuster slowly clockwise and confirm the point **A** where the sensor enters the "Light" state operation.

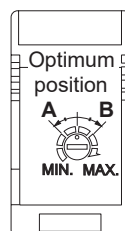


3. In the dark condition, turn the sensitivity adjuster further clockwise until the sensor enters the "Light" state operation and then bring it back to confirm point **B** where the sensor just returns to the "Dark" state operation.

(If the sensor does not enter the "Light" state operation even when the sensitivity adjuster is turned fully clockwise, the position is point **B**.)


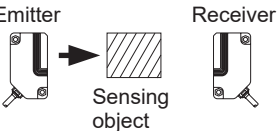
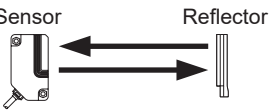
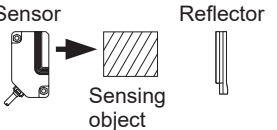

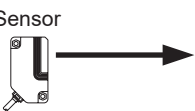


4. The position at the middle of points **A** and **B** is the optimum sensing position.



Note: Use the accessory adjusting screwdriver to turn the adjuster slowly. Turning with excessive strength will cause damage to the adjuster.

<Reference>

| | Light received condition | Dark condition |
|-------------------------|---|---|
| Thru-beam type |  |  |
| Retroreflective type |  |  |
| Diffuse reflective type |  |  |

Relation between output and indicators

<Thru-beam type・Retroreflective type>

| Light-ON (A) type | | | | |
|-------------------|--------------------------|--------|------|-----|
| Sensing condition | Operation indicator(Red) | Output | | |
| | | N.O. | N.C. | |
| | Light | ON | ON | OFF |
| | Dark | OFF | OFF | ON |

| Dark-ON (B) type | | | | |
|-------------------|--------------------------|--------|------|-----|
| Sensing condition | Operation indicator(Red) | Output | | |
| | | N.O. | N.C. | |
| | Light | OFF | OFF | ON |
| | Dark | ON | ON | OFF |

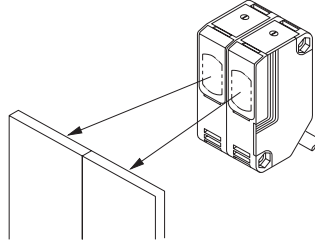
<Diffuse reflective type>

| Light-ON (A) type | | | | |
|-------------------|--------------------------|--------|------|-----|
| Sensing condition | Operation indicator(Red) | Output | | |
| | | N.O. | N.C. | |
| | Light | ON | ON | OFF |
| | Dark | OFF | OFF | ON |

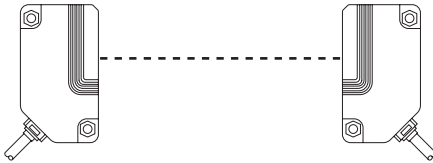
| Dark-ON (B) type | | | | |
|-------------------|--------------------------|--------|------|-----|
| Sensing condition | Operation indicator(Red) | Output | | |
| | | N.O. | N.C. | |
| | Light | OFF | OFF | ON |
| | Dark | ON | ON | OFF |

6. Automatic interference prevention function

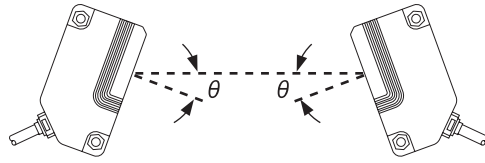
- The retroreflective type **NX5-PRVM5**□ / **NX5-RM7**□ and the diffuse reflective type **NX5-D700**□ incorporate an automatic interference prevention function, so that two sensors can be mounted closely. (Thru-beam type **NX5-M10R** / **NX5-M30**□ does not incorporate the automatic interference prevention function.)



Note: If **NX5-D700**□ are mounted facing each other, they should be angled so as not to receive the beam from the opposing sensor or to detect its front face.



Not good



Good

7. Stability indicator

- The stability indicator (green) lights up when the incident light intensity has sufficient margin with respect to the operation level.
Incident light intensity level is such that the stability indicator light up, stable sensing can be done without the light received operation and the light interrupted operation being affected by a change in ambient temperature or supply voltage.
Use the stability indicator in the condition below
 - Adjusting the light axes
 - Checking dirt of the sensor

8. Retroreflective type sensor with polarizing filter (NX5-PRVM5□)

If a shiny object is covered or wrapped with a transparent film, such as those described below, the retroreflective type sensor with polarizing filters **NX5-PRVM5□** may not be able to detect it. In that case, take the following measures 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

<Measures>

- Tilt the sensor with respect to the sensing object while fitting.
- Reduce the sensitivity.
- Increase the distance between the sensor and the sensing object.

9. Option

9-1 Slit mask

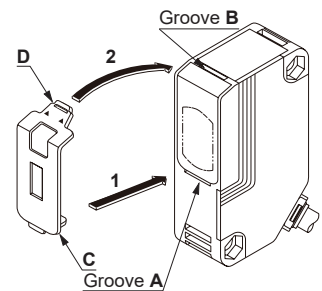
(exclusively for thru-beam type sensor NX5-M10R□ / NX5-M30□)

With the slit mask **OS-NX5-3×6**, the sensor can detect an object as small as 3 × 6mm. However, the sensing range is reduced when the slit mask is mounted.

| Type | Model No. | | Slit mask size | Sensing distance | | Min. sensing object | |
|--|-------------------|------------------|----------------|----------------------|-----------------------|----------------------|-----------------------|
| | Slit mask | Sensor | | Mounting on one side | Mounting on both side | Mounting on one side | Mounting on both side |
| Slit mask (Exclusively for thru-beam type / | OS-NX5-3×6 | NX5-M10R□ | 3 × 6mm | 3m | 1m | φ10mm | 3 × 6mm |
| | | NX5-M30□ | | 16m | 6m | φ20mm | 3 × 6mm |

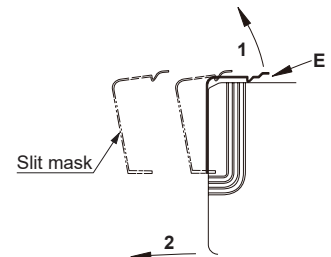
Mounting method

1. Fit the **C** portion of the slit mask in the groove **A** of the main body case.
2. Then press the slit mask against the main body to fit the slit mask hook **D** portion in the groove **B** of the main body case.



Removing method

1. Insert a flat head driver into the **E** portion of the slit mask.
2. Lift the E portion up to remove the slit mask from the main body case.

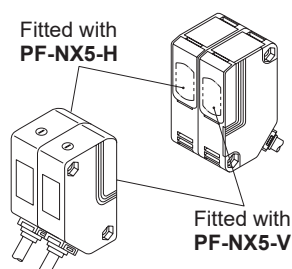


9-2 Interference prevention filter (exclusively for thru-beam type sensor NX5-M10R□)

- By mounting interference prevention filters **PF-NX5-□**, two sets of **NX5-M10R□** can be mounted close together.

However, the sensing range is reduced when the interference prevention is mounted.

- The filters can be mounted by the same method as for the slit masks.
- There are two types of interference prevention filters. The two sets of thru-beam type sensors should be fitted with different types of interference prevention filters.
- The interference prevention does not work even if the filters are mounted for emitters only, receivers only or the same model No. of the interference prevention filters are mounted on both the sets of the sensor.



| Model No. | Direction of thru-beam axis | Color of the bracket | Sensing distance | Min. sensing object |
|-----------------|-----------------------------|----------------------|------------------|---------------------|
| PF-NX5-V | Vertical | Silver | 5m | ø20mm |
| PF-NX5-H | Horizontal | Light brown | 5m | ø20mm |

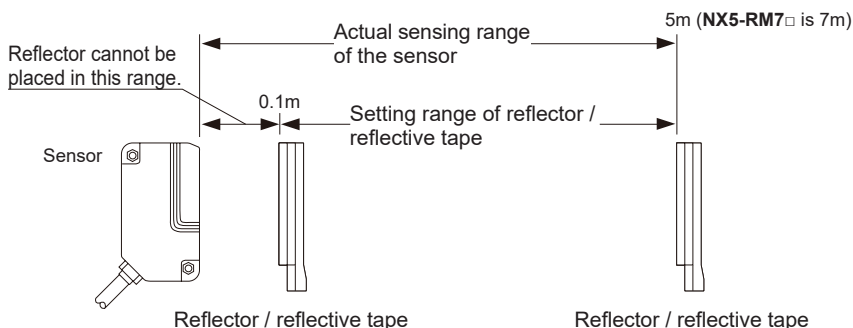
Note: The model No. is not shown on the interference prevention filters. Take care when mounting them on the sensors.

9-3 Reflector / reflective tape (retroreflective type NX5-PRVM5□ / NX5-RM7□)

- Reflector **RF-230** is accessory of retroreflective type **NX5-PRVM5□** and **NX5-RM7□**.
- By using reflector (optional) or reflectivity tape (optional), small object can be detected. However, the sensing distance would be shorter by using reflector (optional) or reflectivity tape (optional).

| Designation | Model No. | | Sensing distance | Min. sensing object | Specification |
|-----------------|-----------------------|------------|------------------|---------------------|---|
| | Sensor | | | | |
| Reflector | RF-230 (Accessory) | NX5-PRVM5□ | 0.1 to 5m | ø50mm | Dimension (W × H × D): 50.3mm × 59.3mm × 8.3mm Thru-hole threads: ø3.7mm |
| | | NX5-RM7□ | 0.1 to 7m | | |
| | RF-210 (Optional) | NX5-PRVM5□ | 0.1 to 1.5m | ø30mm | Dimension (W × H × D): 33.3mm × 12.8mm × 11mm Thru-hole threads: ø3.4mm |
| | | NX5-RM7□ | 0.1 to 2.5m | | |
| | RF-220 (Optional) | NX5-PRVM5□ | 0.1 to 3.5m | ø35mm | Dimension (W × H × D): 35.3mm × 42.3mm × 8.3mm Thru-hole threads: ø3.6mm |
| | | NX5-RM7□ | 0.1 to 5m | | |
| Reflective tape | RF-11 (Optional) | NX5-PRVM5□ | 0.1 to 0.8m | ø30mm | Dimension (W × H × D): 30mm×8mm×0.7mm Ambient temperature: -25 to +50°C Ambient humidity: 35 to 85%RH |
| | | NX5-RM7□ | 0.1 to 1m | | |
| | RF-12 (Optional) | NX5-PRVM5□ | 0.1 to 1m | ø30mm | Dimension (W × H × D): 30mm × 25mm × 0.7mm Ambient temperature: -25 to +50°C Ambient humidity: 35 to 85%RH |
| | | NX5-RM7□ | 0.1 to 1.5m | | |

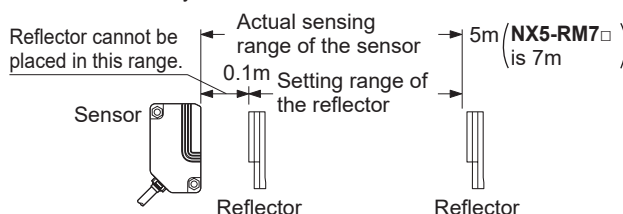
<In case of RF-230>



10. Specification

| Type | | Thru-beam | | Retroreflective | | Diffuse reflective |
|---|----------|---|--|--|---|--|
| | | | Long sensing range | With polarizing filters (Note 2) | Long sensing range | |
| Model No. (Note 1) | Light-ON | NX5-M10RA | NX5-M30A | NX5-PRVM5A | NX5-RM7A | NX5-D700A |
| | Dark-ON | NX5-M10RB | NX5-M30B | NX5-PRVM5B | NX5-RM7B | NX5-D700B |
| Sensing range | | 10m | 30m | 0.1 to 5m (Note 3) | 0.1 to 7m (Note 3) | 700mm (Note 4) |
| Sensing object | | Opaque object of ø20mm or more (Note 5) | Opaque object of ø20mm or more (Completely beam interrupted object) (Note 5) | ø50mm, Opaque, translucent or specular objects (Note 3, 6) | ø50mm, Opaque, translucent or objects (Note 3, 6) | Opaque, translucent or transparent object (Note 6) |
| Hysteresis | | — | | | | 15% or less of operation distance (Note 4) |
| Repeatability (perpendicular to sensing axis) | | 0.1 mm or less | 0.2 mm or less | | | 0.3 mm or less |
| Supply voltage | | 24 to 240V AC ⁺¹⁰ ₋₁₅ % or 12 to 240V DC ⁺¹⁰ ₋₁₅ % Ripple P-P10% or less | | | | |
| Power consumption | | Emitter: 1VA or less Receiver: 2VA or less | Emitter: 1.5VA or less Receiver: 2VA or less | 2VA or less | | |
| Output | | Relay contact 1c <ul style="list-style-type: none">Switching capacity: 250V AC 1A (resistive load) 30V DC 2A (resistive load)Electrical life: 100,000 or more operations (at AC rated load and switching 3,600 operations/hour) 500,000 or more operations (at AC rated load and switching 3,600 operations/hour)Mechanical life: 100,000,000 or more operations (switching 36,000 operations/hour) | | | | |
| Response time | | 10ms or less | | | | |
| Sensitivity adjuster | | Variable adjuster | — | Variable adjuster | — | Variable adjuster |
| Automatic interference prevention function | | — (Note 7) | — | Incorporated (Two units of sensors can be mounted closely.) | | |
| Protection | | IP66 (IEC) | | | | |
| Ambient temperature | | -25 to +55 °C (No dew condensation or icing allowed), Storage: -30 to +70 °C | | | | |
| Ambient humidity | | 35 to 85% RH, Storage: 35 to 85 %RH | | | | |
| Emitting element | | Red LED | Infrared LED | Red LED | Infrared LED | |
| Material | | Enclosure: Polycarbonate, Lens: Polycarbonate, Cover: Polycarbonate Front cover: Acrylic (retroreflective type sensor only) | | | | |
| Cable | | 0.3 mm ² 5-core (thru-beam type emitter: 2-core) cabtyre cable, 2m long | | | | |
| Weight | | Emitter: approx. 100g Receiver: approx. 140g | Emitter: approx. 125g Receiver: approx. 40g | Approx. 140g | | |
| Accessories | | Adjusting screwdriver: 1 pc. | — | RF-230 (Reflector): 1 pc. Adjusting screwdriver: 1 pc. | RF-230 (Reflector): 1 pc. | Adjusting screwdriver: 1 pc. |

- Notes: 1) The model No. with suffix "**P**" shown on the label affixed to the thru-beam type sensor is the emitter, "**D**" shown on the label is the receiver.
(e.g.) Thru-beam type sensor emitter: **NX5-M10RP**, Thru-beam type sensor receiver: **NX5-M10RAD**
- 2) The retroreflective type sensor with polarizing filters may not stably detect specular or glossy objects through transparent film since light is polarized by the transparent film.
- 3) The sensing range and sensing object for the retroreflective type sensor is specified for the **RF-230** reflector. Further, the sensing range is the possible setting range for the reflector. The sensor can detect an object less than 0.1m away.

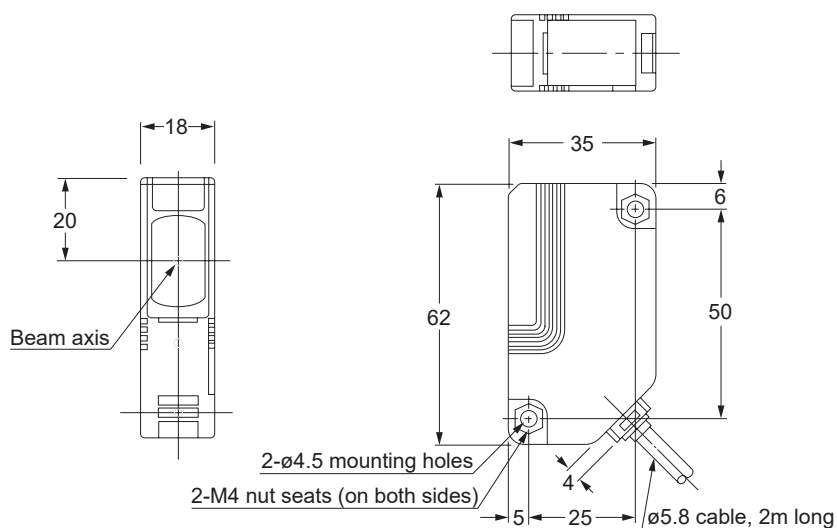


- 4) The sensing range and hysteresis of the diffuse reflective type sensor and narrow-view reflective type sensor are specified for white non-glossy paper (200 × 200mm) as the object.
- 5) If slit masks (optional) are fitted, an object as small as 3 × 6mm can be detected.
- 6) Make sure to confirm detection with an actual sensor before use.
- 7) By mounting optional interference prevention filter **PF-NX5-□**, two sensors can be mounted closely.
- 8) In case the sensor is to be used at an ambient temperature of -15°C or less, please contact our office.

11. Dimensions

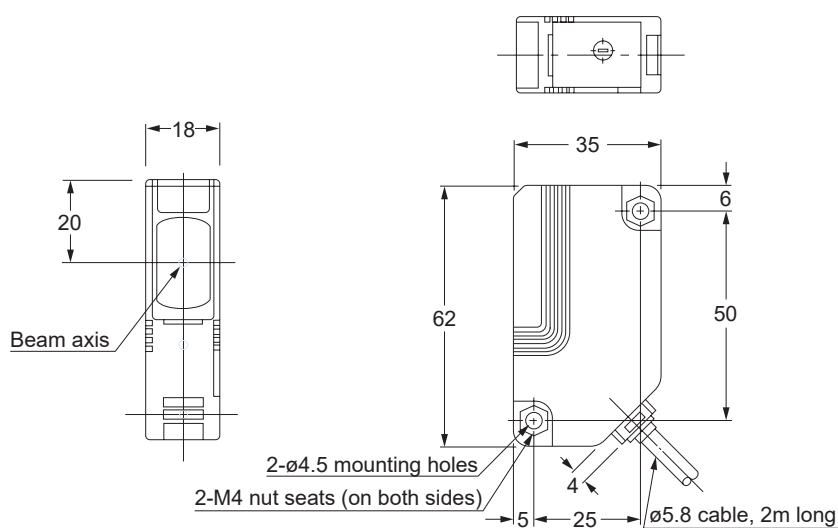
Thru-beam type emitter: NX5-M10R□, Thru-beam long sensing range type: NX5-M30□

(Unit: mm)



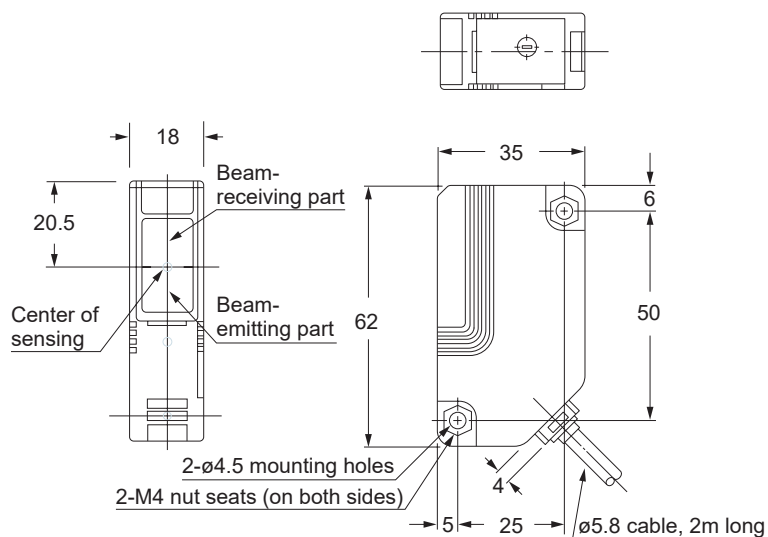
Thru-beam type receiver: NX5-M10□

(Unit: mm)



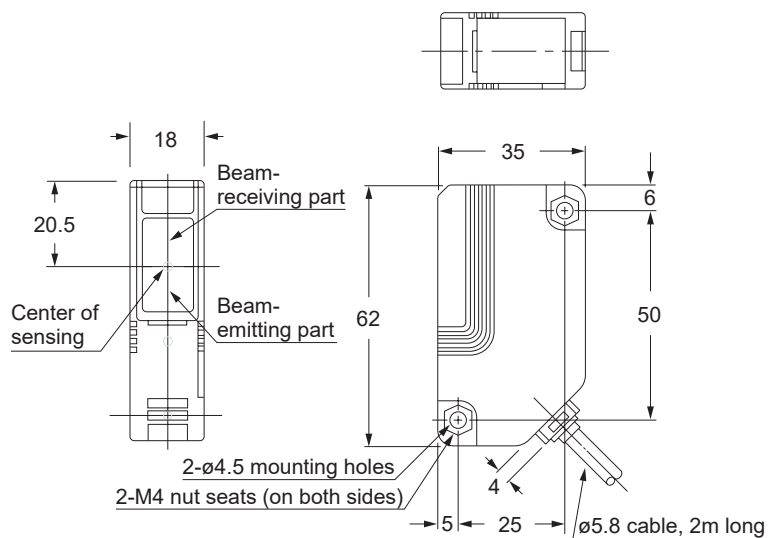
**Retroreflective with polarizing filters type: NX5-PRVM5□,
Diffuse reflective type: NX5-D700□**

(Unit: mm)



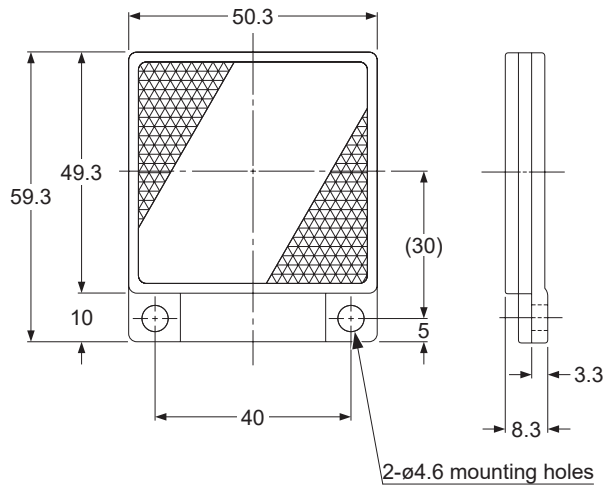
Retroreflective long sensing range type: NX5-RM7□

(Unit: mm)



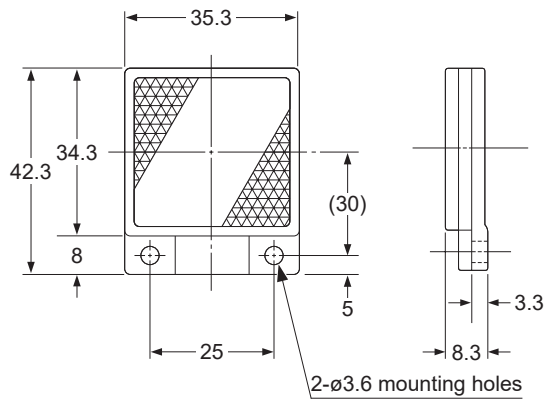
Reflector: RF-230

(Unit: mm)



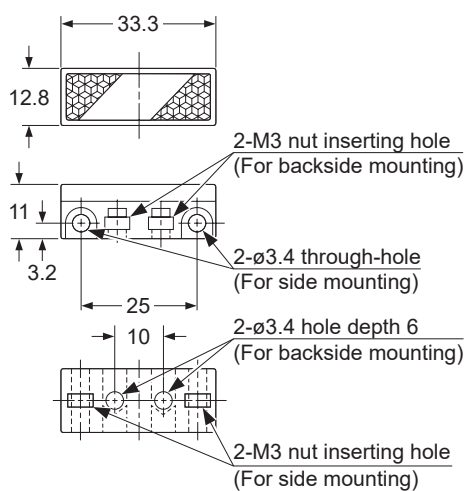
Reflector: RF-220

(Unit: mm)



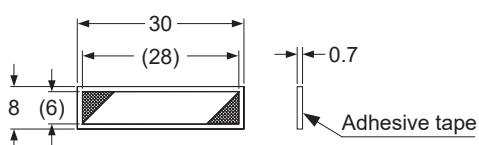
Reflector: RF-210

(Unit: mm)



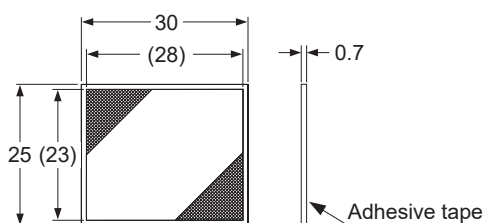
Reflective tape: RF-11

(Unit: mm)



Reflective tape: RF-12

(Unit: mm)



(MEMO)

(MEMO)

Please contact

Panasonic Corporation

Panasonic Industrial Devices SUNX Co., Ltd.

<https://panasonic.net/id/pidsx/global>

Please visit our website for inquiries and about our sales network.