

Power Supply Built-in Compact
Multi-voltage Photoelectric Sensor

NX-5 Series

USER'S MANUAL

Contents

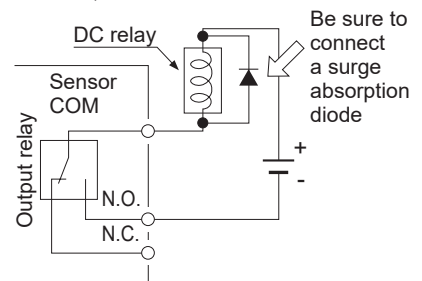
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1. Cautions

WARNING

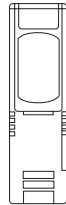
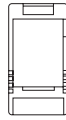
- Never use this product as a sensing device for personnel protection.
- In case of using devices for personnel protection, use products which meet laws and standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.

- 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.

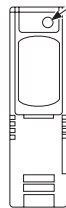
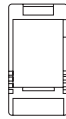


2. Part description

Thru-beam type emitter: NX5-M10R□



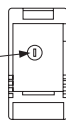
Thru-beam long sensing range type emitter: NX5-M30□



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

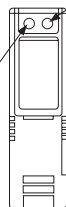
Thru-beam type receiver: NX5-M10R□ Retroreflective type with polarizing filters: NX5-PRVM5□ Diffuse reflective type: NX5-D700□

Sensitivity adjuster
Sensing range becomes longer by turning clockwise

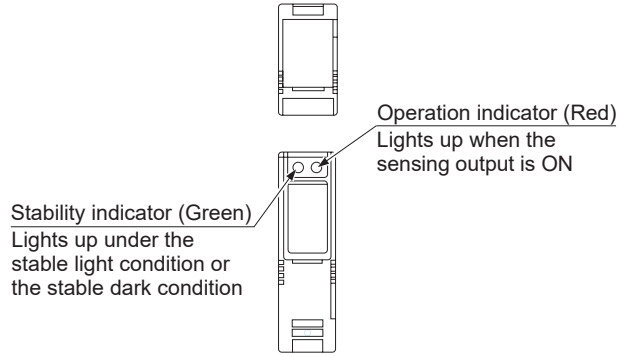


Operation indicator (Red)
Lights up when the sensing output is ON

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



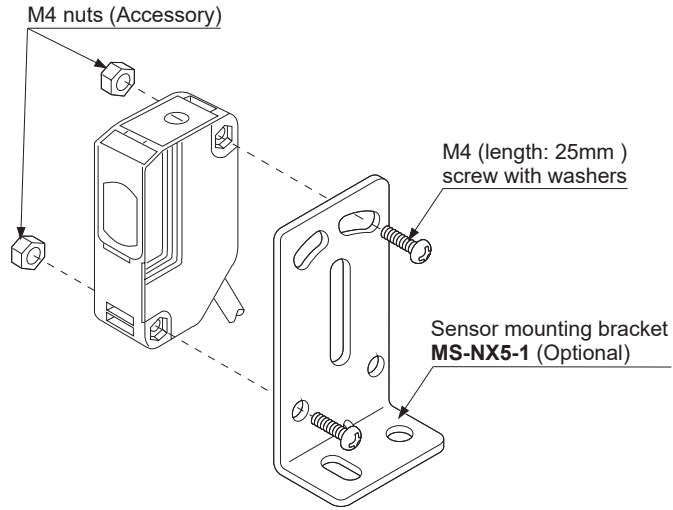
Thru-beam long sensing range type receiver: NX5-M30□
Retroreflective long sensing range type: NX5-RM7□



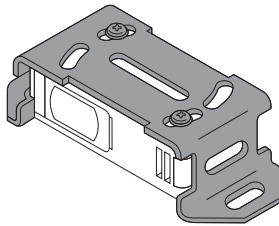
3. Mounting

3-1 Installing to sensor mounting bracket

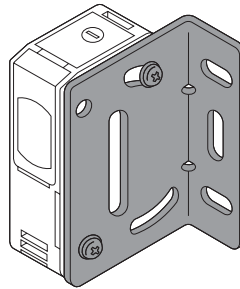
The tightening torque should be 0.8 N·m or less.



MS-NX5-2



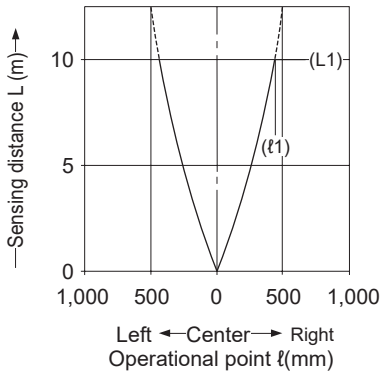
MS-NX5-3



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□>

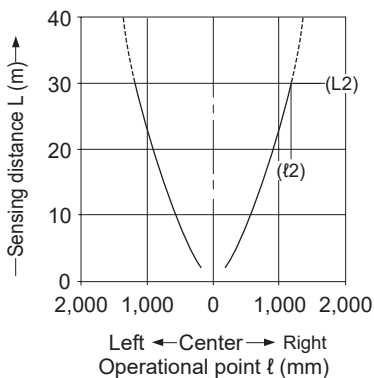
In case using at sensing distance (L1) 10m, the operation point (ℓ_1) is approx. 444mm according to diagram left.

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)



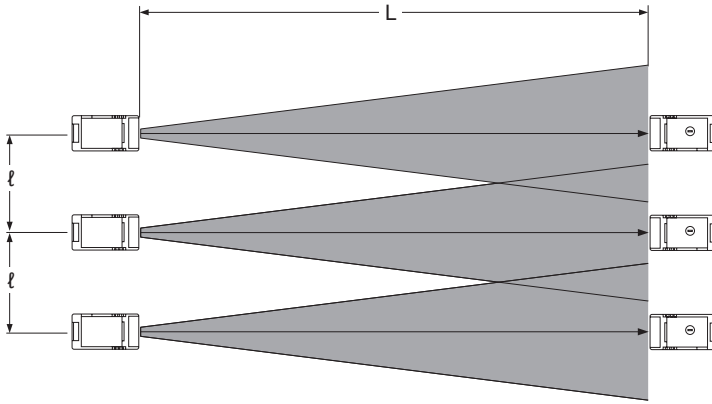
<Installation interval for NX5-M30□>

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.

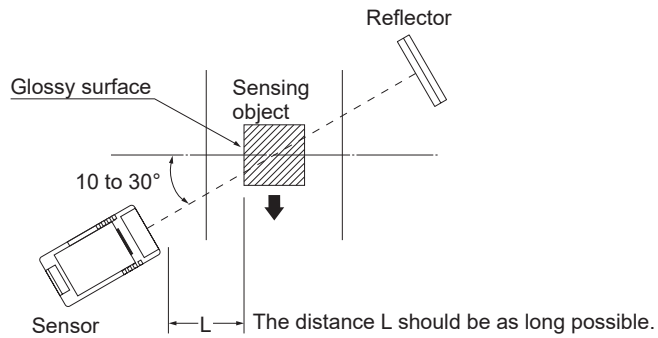


Type	L	ℓ
NX5-M10R □	10m	Approx. 888mm or more
NX5-M30 □	30m	Approx. 2,400mm or more

- 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.



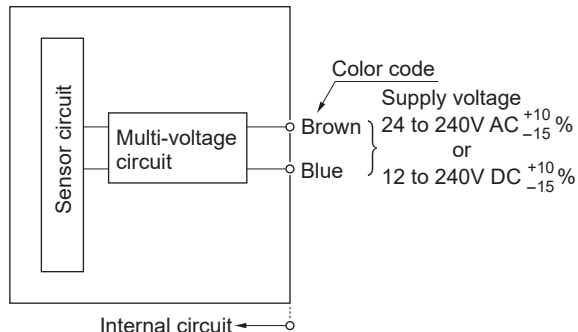
Note: In case the distance between the sensor and the sensing object is short, the reflected light from the sensing object may be detected.

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

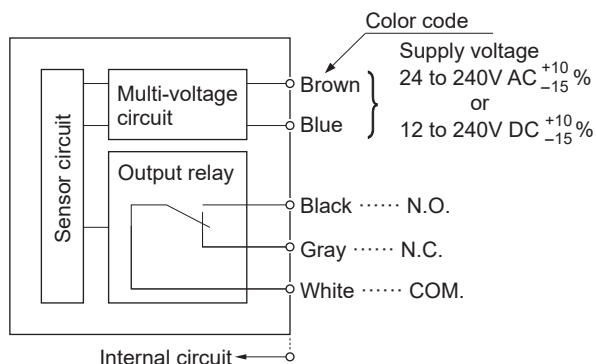
4. I/O circuit diagram and output operation

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)
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

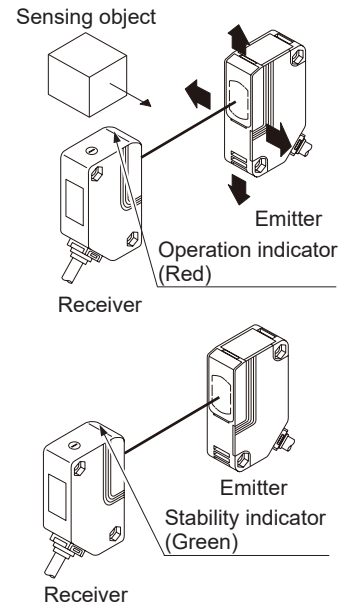
: Object detected state

5. Adjustment

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

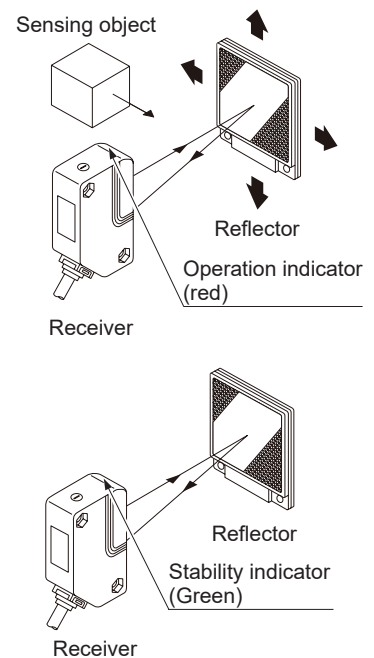
Thru-beam type NX5-M10R□ / NX5-M30□

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□

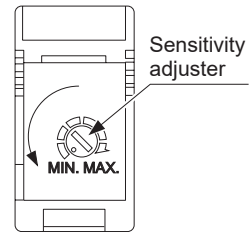
1. Placing the sensor and the reflector face to face along a straight line, move the reflector in the up, down, left and right directions, in order to determine the range of the light received condition with the help of the operation indicator (red). Then, set the reflector at the center of this range.
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□**)



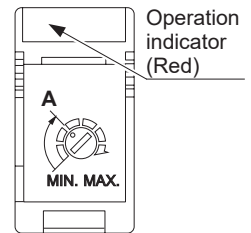
5-2 Sensitivity adjustment

Step

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

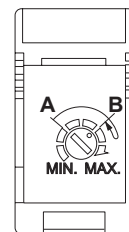


2. In the light received condition, turn the sensitivity adjuster slowly clockwise and confirm the point **A** where the sensor enters the "Light" state operation.

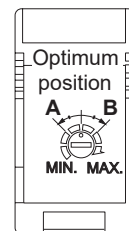


3. In the dark condition, turn the sensitivity adjuster further clockwise until the sensor enters the "Light" state operation and then bring it back to confirm point **B** where the sensor just returns to the "Dark" state operation.

(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	

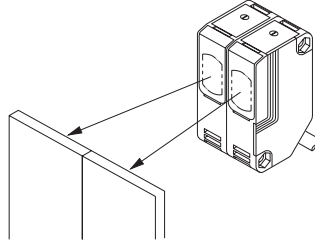
<Diffuse reflective type>

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

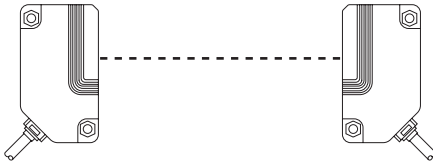
Dark-ON (B) type				
Sensing condition	Operation indicator (Red)	Output		
		N.O.	N.C.	
Light	OFF	OFF	ON	
Dark	ON	ON	OFF	

6. Automatic interference prevention function

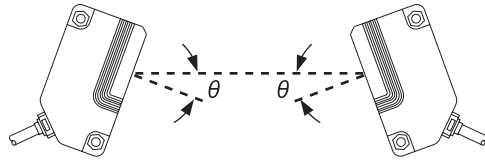
- The retroreflective type **NX5-PRVM5**□ / **NX5-RM7**□ and the diffuse reflective type **NX5-D700**□ incorporate an automatic interference prevention function, so that two sensors can be mounted closely. (Thru-beam type **NX5-M10R** / **NX5-M30**□ does not incorporate the automatic interference prevention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

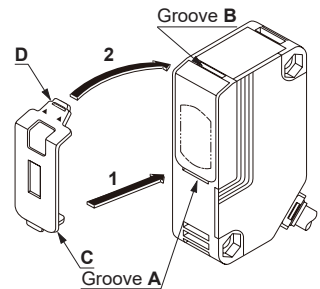
(exclusively for thru-beam type sensor NX5-M10R□ / NX5-M30□)

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

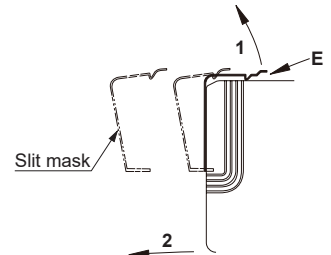
Mounting method

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.



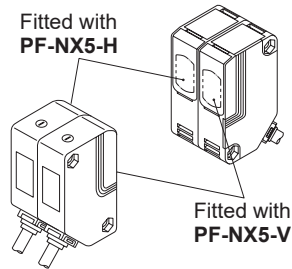
Removing method

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

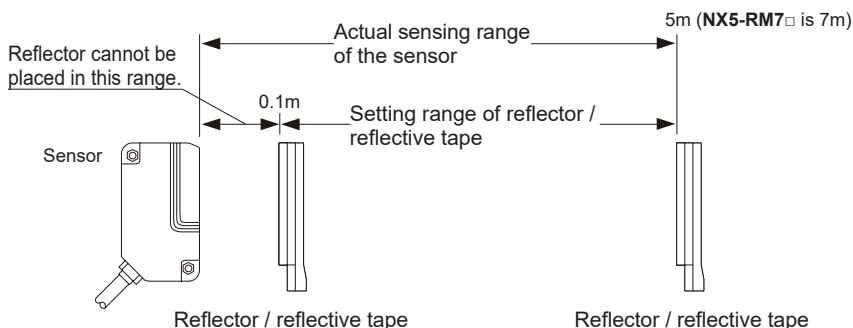
Note: The model No. is not shown on the interference prevention filters. Take care when mounting them on the sensors.

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		

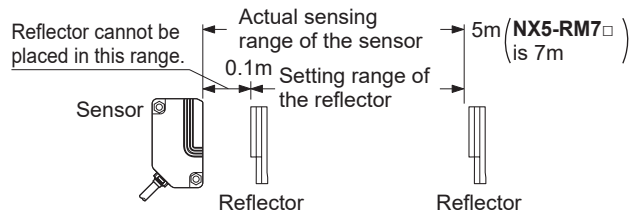
<In case of RF-230>



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 $_{-15}^{+10}$ % or 12 to 240V DC $_{-15}^{+10}$ % 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.

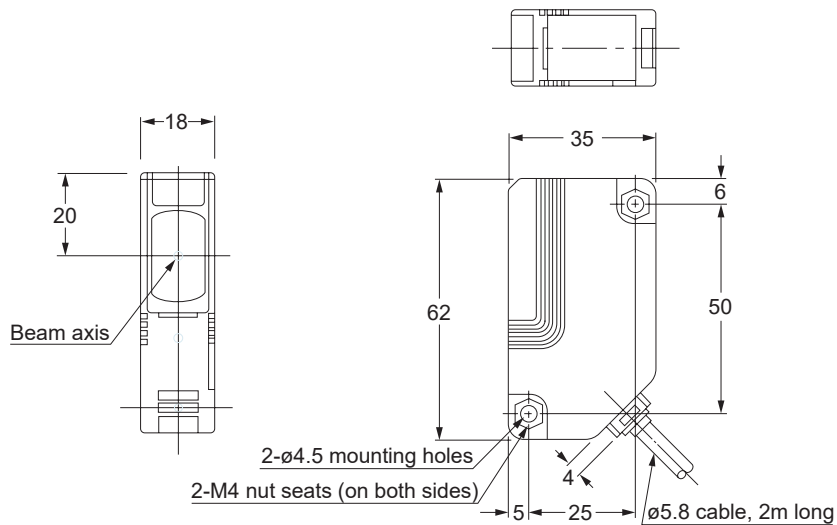


- 4) The sensing range and hysteresis of the diffuse reflective type sensor and narrow-view reflective type sensor are specified for white non-glossy paper (200 × 200mm) as the object.
- 5) If slit masks (optional) are fitted, an object as small as 3 × 6mm can be detected.
- 6) Make sure to confirm detection 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

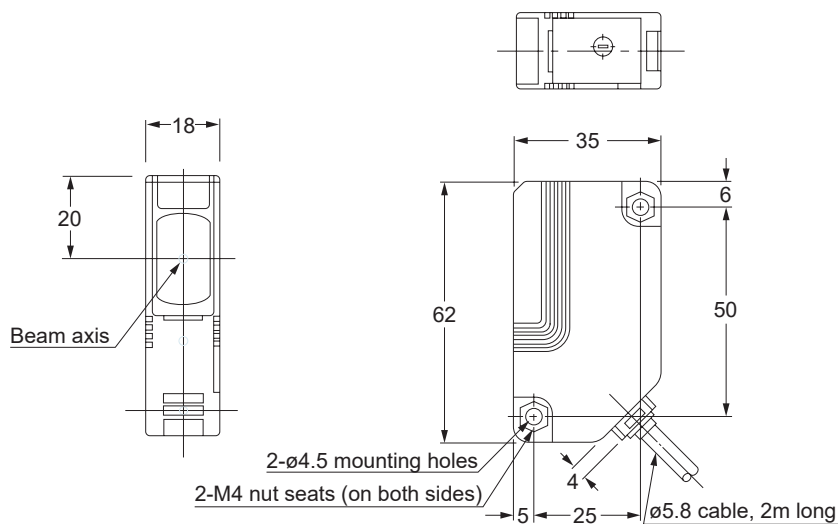
Thru-beam type emitter: NX5-M10R□, Thru-beam long sensing range type: NX5-M30□

(Unit: mm)



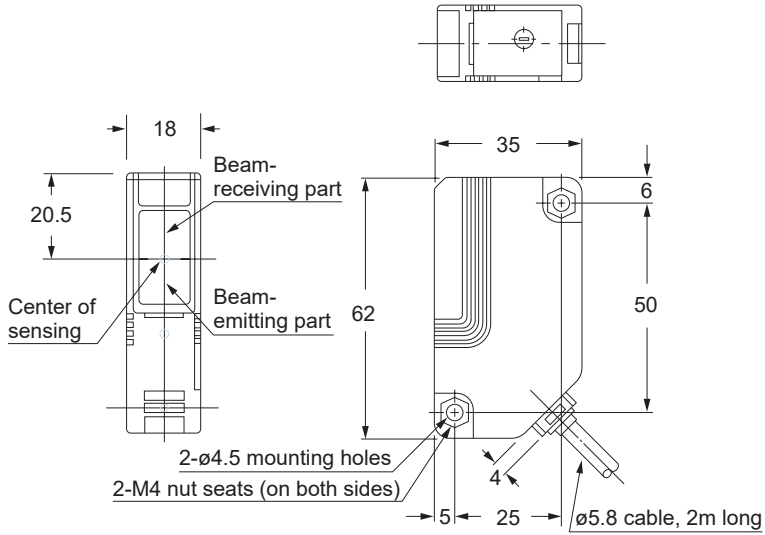
Thru-beam type receiver: NX5-M10□

(Unit: mm)



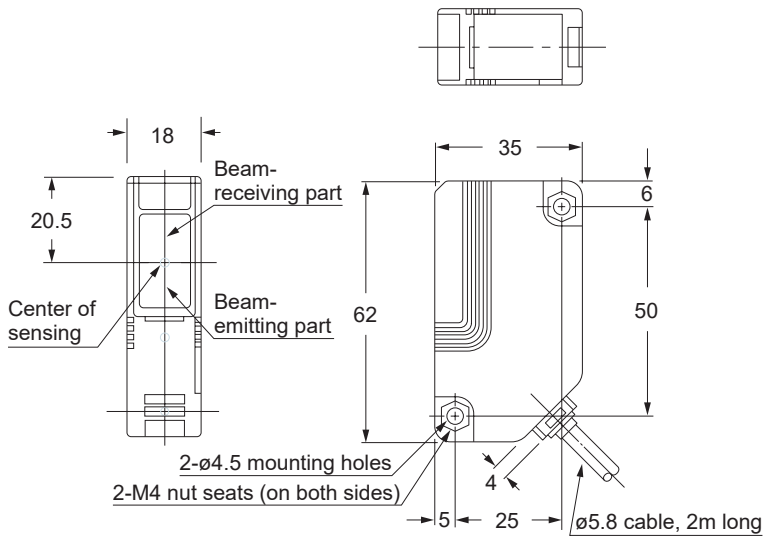
**Retroreflective with polarizing filters type: NX5-PRVM5□,
Diffuse reflective type: NX5-D700□**

(Unit: mm)



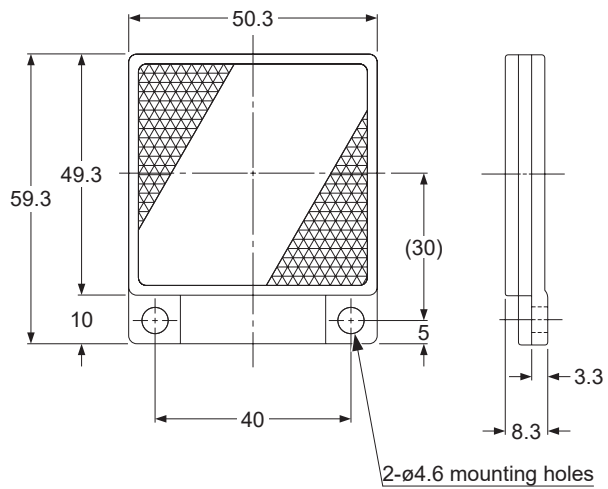
Retroreflective long sensing range type: NX5-RM7□

(Unit: mm)



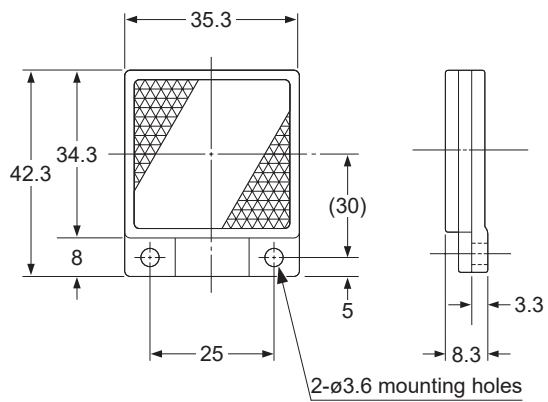
Reflector: RF-230

(Unit: mm)



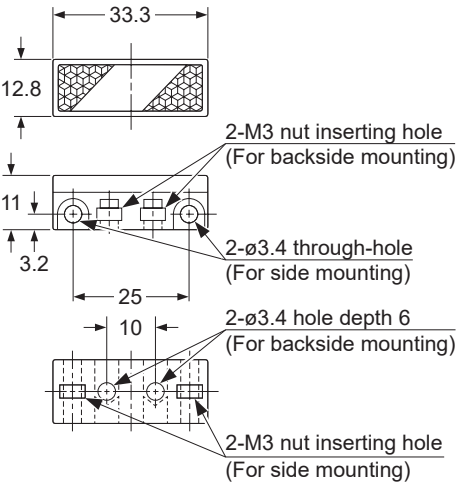
Reflector: RF-220

(Unit: mm)



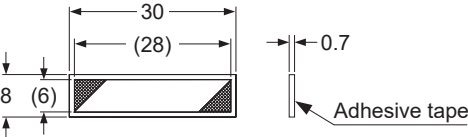
Reflector: RF-210

(Unit: mm)



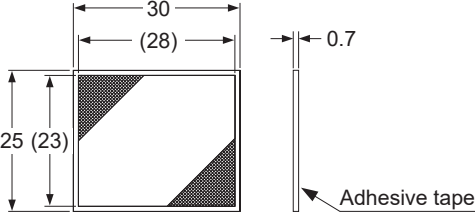
Reflective tape: RF-11

(Unit: mm)



Reflective tape: RF-12

(Unit: mm)



(MEMO)

(MEMO)

Please contact

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