

GN SERIES Instruction Manual

(C type) (UL File No. E193797)

Head office : 5-22 Higashino Kitainoue-cho, Yamashina-ku,
Kyoto 607-8141, Japan
Telephone : +81-75-581-7111
FAX : +81-75-581-7118

SPECIFICATION

Type	Attached cable	NPN model	GN-T10CR	GN-T7C	GN-M2CR	GN-R40CR	GN-R30C	GN-R7C	GN-Z3C	GN-Z3CR
	Connector	PNP model	GN-T10CRPN	GN-T7CPN	GN-M2CRPN	GN-R40CRPN	GN-R30CPN	GN-R7CPN	GN-Z3CPN	GN-Z3CRPN
		NPN model	GN-T10CR-J	GN-T7C-J	GN-M2CR-J	GN-R40CR-J	GN-R30C-J	GN-R7C-J	GN-Z3C-J	GN-Z3CR-J
		PNP model	GN-T10CRPN-J	GN-T7CPN-J	GN-M2CRPN-J	GN-R40CRPN-J	GN-R30CPN-J	GN-R7CPN-J	GN-Z3CPN-J	GN-Z3CRPN-J
Detection method		Through beam			Polarized retroreflective	Diffuse reflective *2			Convergent reflective	
Detecting distance		10m	7m	0.03 to 1.3m*1	400mm	300mm	70mm	1 to 40mm	3 to 30mm	
Detection object		φ6mm (or more) Opaque			Glossy objects Opacues	200×200mm white drawing paper		100×100mm white drawing paper	50×50mm white drawing paper	
Power supply		12 to 24VDC ±10% / Ripple 10% max.								
Current consumption		Transmitter : 22mA or less Receiver : 15mA or less			25mA or less					
Output mode		NPN model	Rating sink current 100mA (30VDC or less), Residual voltage 1V (or less)							
		PNP model	Rating source current 100mA (30VDC or less), Residual voltage 2V (or less)							
Operation mode		Light ON / Dark ON selectable (with switch)								
Anti Interference feature		by filter (up to 2 units)	_____			Provided (up to 2 units)				
Response time		0.5 ms max.								
Operating angle		10° (at receiver)			30° (at reflector)		_____			
Hysteresis		10% max.								
Light source (wavelength)		Red LED	Infrared LED	Red LED			Infrared LED		Infrared LED	Red LED
Indicator		Transmitter : Power indicator (orange LED) Receiver : Operation indicator (orange LED) Stability indicator (green LED)			Operation indicator (orange LED) Stability indicator (green LED)					
Volume		Sensitivity adjustment (on receiver for through beam type)								
Switch		Light ON / Dark ON selector switch								
Short circuit protection		Provided for control output and stability output								
Material		Case	Polybutylene terephthalate							
		Lens	Methacrylate							
Connection		Attached cable	Attached cable (outer dimension : dia 3.5) Transmitter 0.2mm ² × 2 core 2m length (gray) Receiver 0.2mm ² × 3 core 2m length (black)			Attached cable (outer dimension : dia.3.5) 0.2mm ² × 3 core 2m length (black)				
		Connector	M8 connector (cord with M8 connector separately available)							
Weight		Attached cable	Transmitter/receiver : approx. 60g			Approx. 60g				
		Connector	Transmitter/receiver : approx. 10g			Approx. 10g				
Accessory					K-71 reflector		Screwdriver for sensitivity adjustment, operation manual, mounting bracket GN-B1 (provided for permanently attached cord type only)			

- *1 The detecting distance and detection object of retroreflective types varies, depending on reflector types combined with the sensor. The detecting distance is the range which you can set for the reflector. The sensor can detect an object even in extremely short range.
*2 The detecting distance of diffuse reflective type varies, depending on transmittance of the detection object. Please be sure to check the detection beforehand.

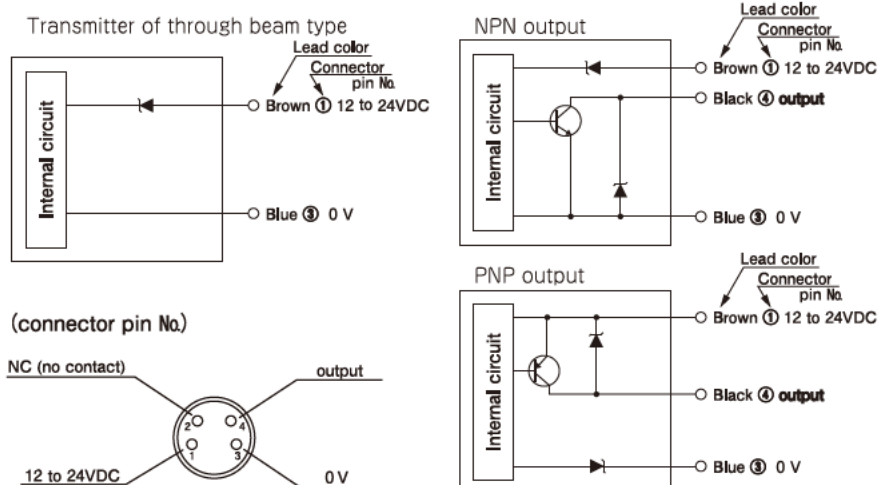
ENVIRONMENTAL SPECIFICATION

- Ambient light**
5,000 lx max.
- Ambient temperature**
-25 to +55°C (non-freezing)
Storage -30 to +70°C
- Ambient humidity**
35 to 85%RH (non-condensing)
- Protective structure**
I P67
- Vibration**
10 to 55Hz / 1.5mm amplitude / 2 hours each in 3 direction
- Dielectric strength**
1000VAC, 1 min.
- Insulation resistance**
500VDC, 20MΩ or higher
- Shock**
500m/s² / 3 times each in 3 directions

FOR CONNECTOR SENSOR

- - J : quick disconnect type
receptacle cable is optional
- Straight type : FBC-4R2S
- L angle type : FBC-4R2L

INPUT/OUTPUT CIRCUIT AND CONNECTION

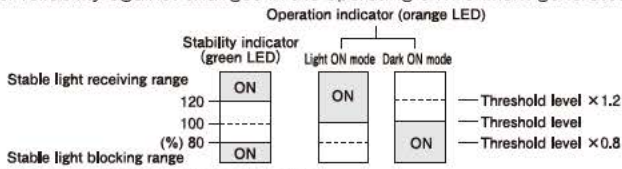


- For transmitter of through beam type
Pin No 1 and 3 only.

- The output transistor turns off when load short circuit or overload occurs.
- Check the load and turn the power back on.

INDICATOR

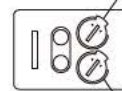
- The operation indicator (orange LED) and the stability indicator (green LED) show the levels of received light intensity as described in the figure.
- After aligning the optical axis and adjusting the sensitivity, use a detection object to block and unblock the light beam several times to make sure that the both activation and deactivation are occurred within the stable light receiving range and the stable light blocking range.
- Setting which allows activation and deactivation within the stable ranges achieves higher reliability against changes in the operating environment generated after installation.



- The red LED is the operation indicator.
- In the Light ON mode, it turns on when the sensor receives light.
- In the Dark ON mode, it turns on when the sensor receives no light.

OPERATING MODE

Light ON/Dark ON selector (white)



Light ON (L.ON)



Dark ON (D.ON)



Sensitivity adjustment volume (yellow)

(Be sure to use the attached driver. Turning the volumes with excessive force may damage the volumes. Operate with the rotation torque of 0.03N·m or less.)

ADJUSTMENT

Through beam Type

(Light ON Condition)

- Install the transmitter and the receiver linearly. By swinging the transmitter vertically and horizontally, find the range where the stability indicator (green LED) turns on while the operation indicator (orange LED) turns on, then direct the sensor in the center of the range. Adjust the position of the receiver in the same way.
- Set the sensitivity volume to the max while the alignment.
- Reduce the sensitivity when there's an unwanted reflection from adjacent floor or wall.

◎ Pinhole plate (option)

Pinhole plate reduces the size of activation area and detection objects.

Fine and nearly transparent objects may be detected by using the sensitivity adjustment together.

- The following pinhole masks are prepared as an option. (optional)

Type	Model	Diameter of pinhole mask	Detecting distance		
			Red LED type	Infrared LED type	
Through beam type only	pinhole plate	GNP1	φ 1mm	400mm	300mm
		GNP2	φ 2mm	1m	1m
		GNP3	φ 3mm	3m	2.5m
		GNP5-1	5 × 1mm	2m	1.7m
Interference prevention filter	Model	Polarization			
	GN-PFA	Vertical	5m	(For use only red LED)	
	GN-PFB	Horizontal			

(Detecting distance when mounted on both transmitters and receivers.)

Diffuse and Convergent reflective Type

(Adjustment for Light ON mode)

- ※ When any light reflecting object is in the background.
 - ① Place a detection object at a given position and turn up the Sensitivity adjustment volume from MIN until the Operation indicator (orange LED) turns on (Point A).
 - ② Remove the object and turn down the Sensitivity adjustment volume from MAX until the Operation indicator turns off (Point B). (MAX is regarded as Point B if the Operation indicator doesn't turn on at MAX.)
 - ③ Set the volume at the middle point between Points A and B.



- ※ When no light reflecting object is in the background.

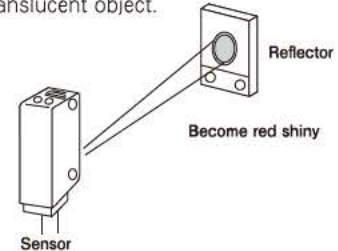
- ① Place a detection object at a given position and turn up the Sensitivity adjustment volume from MIN until the Operation indicator (orange LED) turns on (Point A).
- ② Set the volume at the middle point between Point A and MAX. Make sure both the Operation indicator and the Stability indicator (green LED) turn on when the detection object is placed at the given position.



Polarized retro reflective Type

(Light ON Condition)

- ① Arrange the sensor in line with the reflector. Face the sensor to the mirror and swing it vertically and horizontally. Install the sensor in the center of the area where the operation indicator (orange) turns on. Taking advantage of the red light spot on the reflector seen from the behind the sensor allows easy setting. Then make sure the Stability indicator (green LED) turns on. Transparent objects may be detected by lowering the sensitivity.
- ② Set the sensitivity adjustment volume at the max for operation.
- ③ Adjust the sensitivity when detecting a translucent object.



※ The detecting distance varies depending on the reflector types combined with the sensor.

Reflector Type	K-71	K-7	S-25	S-510G
Range	0.03 to 1.3m	0.01 to 2m	50 to 600mm	0.05 to 1m
Notes	Accessory	Optional	Optional	Optional

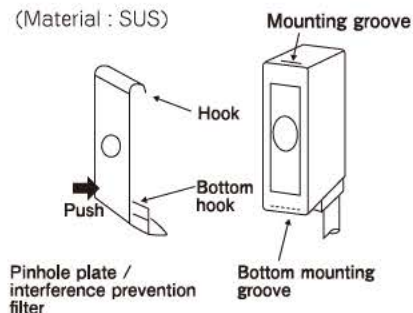
HOW TO MOUNT

(Common for pinhole plate and interference prevention filter)

Put a hook of the plate on the mounting groove at the top of the sensor and press the bottom of the plate in until it clicks.

- Dust, drops of water, etc. in the pinhole or the filter may cause faulty operation.

(Material : SUS)



NOTES

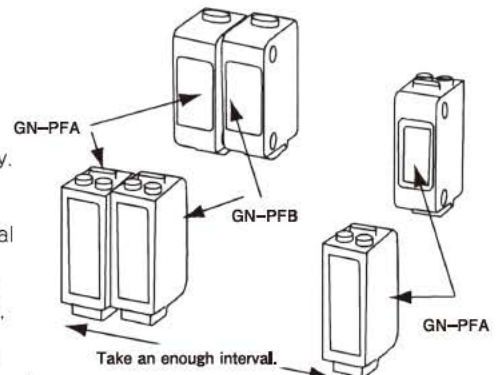
(Do not use the pinhole plate and the interference immune filter at the same time.)

Pinhole plate

- Use appropriate model according to the detecting distance. Make an accurate light axis alignment.

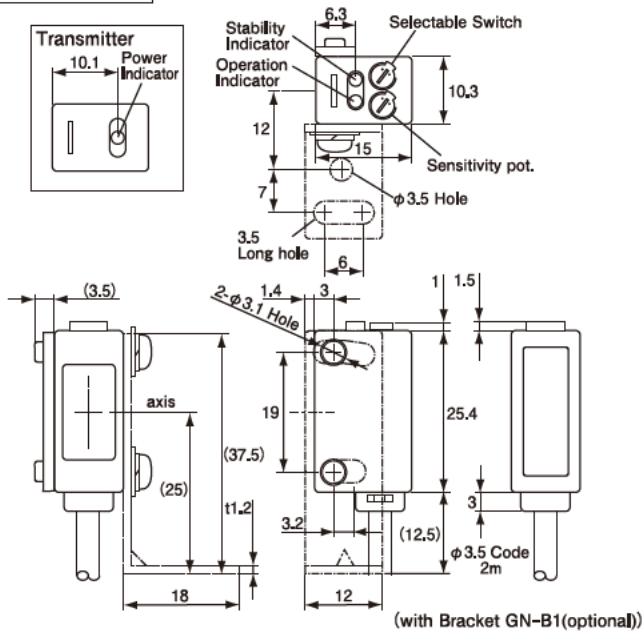
Interference prevention filters

- Interference prevention filter doesn't work for infrared type models.
- Interference immune filters (GN-PFA/GN-PFB) are filters with longitudinal and transverse polarization respectively. Use each set of the filter for respective pair of sensors.
- Interference immune filters prevent mutual interference in case that two through beam type sensors are installed side by side. In case of adding an extra sensor, install with enough distance from the existing sensors so that the sensor has no interference. Use a filter with a different polarity from the adjacent sensor.

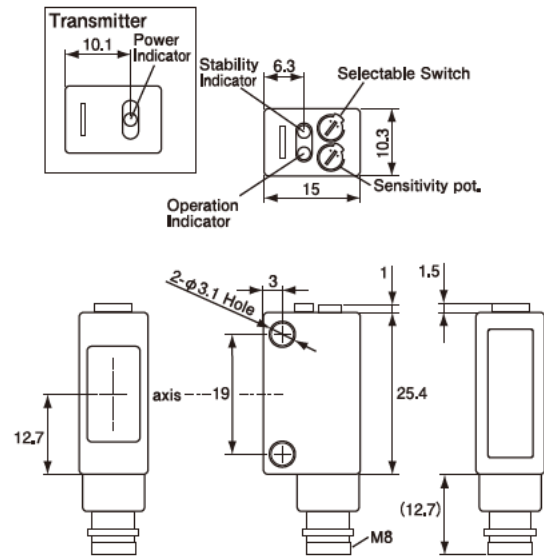


DIMENSIONS (in mm)

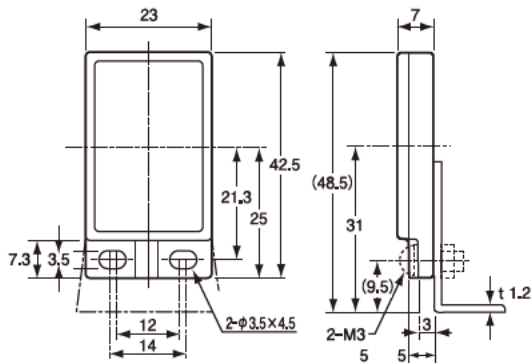
CABLE TYPE (Bracket is optional)



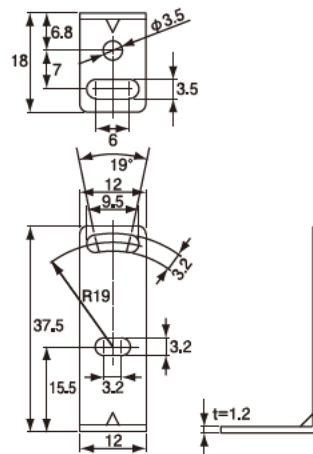
M8 CONNECTOR TYPE (Bracket is optional)



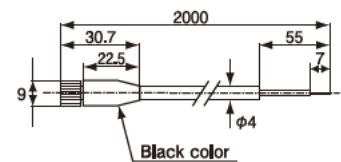
REFLECTOR K-71



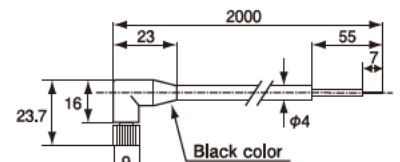
WITH BRACKET : GN-B1



FBC-4R2S (Straight type)



FBC-4R2L (L angle type)



NOTES

- Be sure to route the sensor cables separate from any power transmission or high voltage line, or else use shielded cables. Using the same conduit or duct as high voltage or power lines will cause malfunctions or damage because of electromagnetic induction.
- Do not apply excessive force to the cable.
- For wire extension, use a thick cable (0.3mm² or more).
- Turn off the power of the load first as this product may generate an output pulse when the power is turned off.
- Avoid turning the power on and off consecutively.
- Use the power source of UL class 2 for operation, and control the current (2A) according to the conducting wire size.
- High frequency equipment such as high frequency fluorescent lamps or inverters can emit light or noise that has frequency similar to the modulated frequency of the photoelectric sensors. Avoid mounting these equipment to an adjacent place.
- For safety reasons, do not use direct current power source using auto-transformer. Be sure to use the direct current power source using insulation transformer.
- When using a switching regulator, be sure to ground the frame grand (FG). Otherwise, the switching noise from the power source could cause malfunction.
- This product is equipped with waterproof structure (IP67) that allows washing. However, do not use this product in water or at a place exposed to constant water spray.
- Operate the potentiometer and the switch using the rotation torque of 0.03N·m or less.
- The tightening torque of the mounting brackets is 0.6N·m or less.

- The guarantee period of this product is one year after the delivery.
- If any defect is found during the guarantee period, Takenaka will repair or replace the defective product.
- This product is an industrial sensor which issues an output upon detecting an object. It does not have any function to prevent accidents, death or injuries.
- Takenaka will not held responsible for any damage or loss incurred due to accidents, faulty installation, abuse, misuse, improper maintenance or acts of God including lightning surge.