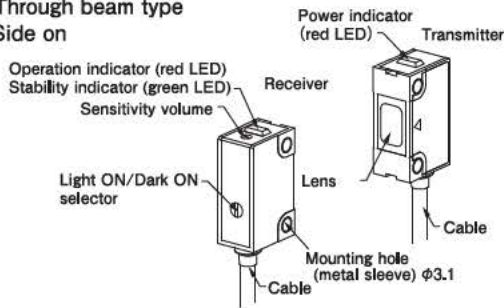
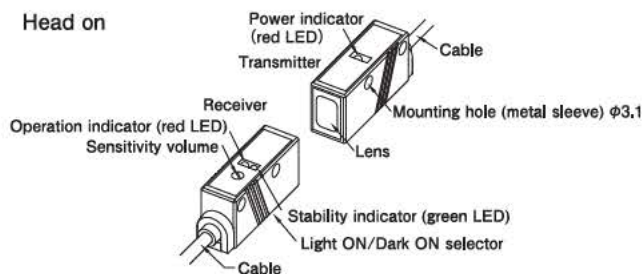


1 PARTS DESCRIPTION

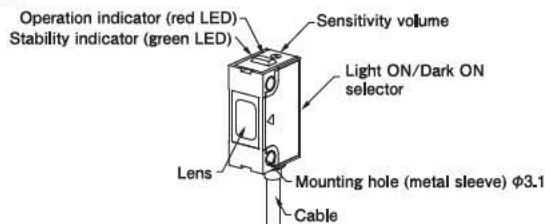
● Through beam type Side on



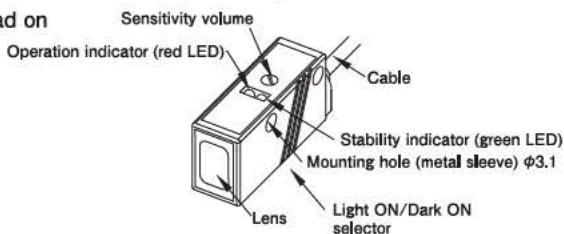
Head on



● Retroreflective, Diffuse and Convergent reflective type Side on



Head on



2 SAFETY CAUTIONS

To ensure safety, be sure to follow the precautions below.

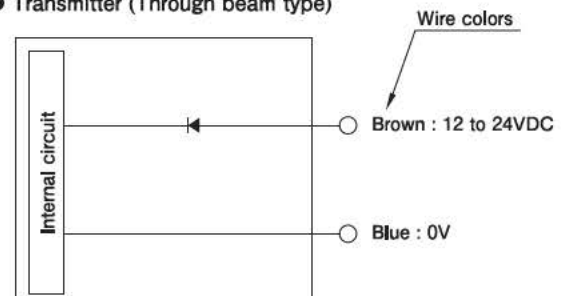
1. Do not use this product for life or safety critical applications.
2. Do not use this product when its housing or cable is damaged.
3. Do not attempt to disassemble, repair, or modify this product.
4. Do not use this product in an environment containing flammable, explosive or corrosive gas.
5. Do not use this product in an environment exposed to chemicals or oils.
6. Do not use this product in an environment exposed to water including outdoors or under the water.
7. Use this product within the product rating and specification.
8. Do not expose this product to direct sunlight.
9. Do not use this product in an environment exposed to vibration or shock.
10. Clean the lens by a soft cloth. Do not use organic solvent including alcohol and thinner to clean the product.
11. Perform a daily operation check, weekly periodical inspections, and prescribed maintenance procedures to ensure correct operation.
12. This product should be disposed of as an industrial waste.

3 PRECAUTIONS DURING USE

1. 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.
2. Do not apply excessive force to the cable.
3. When using a switching regulator, be sure to ground the frame ground (FG) terminal.
4. Turn off the power of the load first as this product may generate an output pulse when the power is turned off.
5. Avoid turning the power on and off consecutively.
6. When extending the cables, use conductors of 0.3 mm² cross-sectional area or more and check the voltage drop.
7. Limit the current of the power supply to 2A.

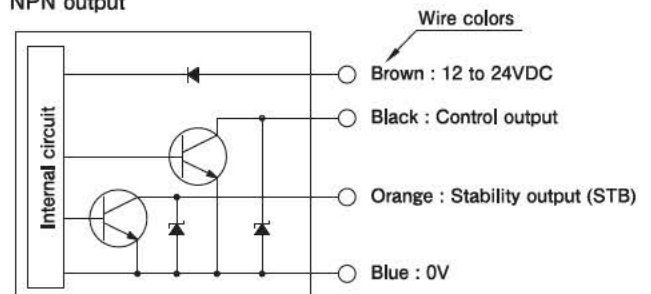
4 CONNECTION

● Transmitter (Through beam type)

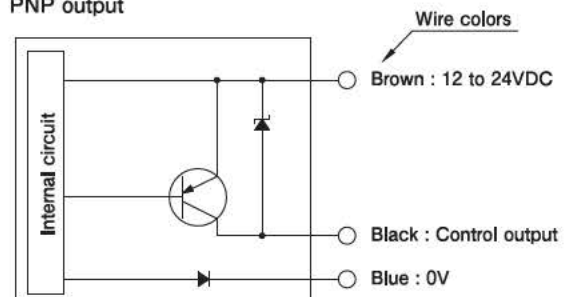


● Receiver (Through beam type), Retroreflective, Diffuse and Convergent reflective types

NPN output



PNP output



(※) The stability output is not available for the PNP output model.

- The stability output is not equipped with short-circuit protection.
- If a load short circuit or overload occurs, the output transistor turns off. Check the load before restoring the power.
- Insulate the stability output cable when unused.

5 ADJUSTMENT

(1) Through beam type Adjustment for Light ON model

- Install the transmitter and the receiver linearly. By moving the transmitter vertically and horizontally, find the range where the stability indicator (green) turns on while the operation indicator (red) turns on and direct the sensor in the center of the range.
- Adjust the position of the receiver in the same way.



Adjustment for Dark ON model

- The adjustment is same for the Light ON model but find the range where the stability indicator (green) turns on while the operation indicator (red) turns off and direct the sensor in the center of the range.

(Pinhole sticker and pinhole plate)

Pinhole sticker and pinhole plate reduce the size of activation area and detection objects. Fine or nearly transparent objects can be detected by using the sensitivity adjustment together.

- Each two pinhole stickers shown below are attached to models GT1N and GT1SN. Put the pinhole sticker on the optical window of the transmitter and/or the receiver.

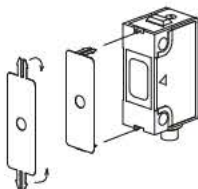
Pinhole sticker	φ 1mm	φ 2mm	φ 3mm	5 × 1
Detection distance	100mm	300mm	400mm	300mm

(Detection distance when the pinhole sticker are put on both transmitter and receiver.)

- Pinhole plates GP1, GP2, GP3 and GP5-1 are optionally available for models GT3RSN and GT7SN.

MODEL	GP1	GP2	GP3	GP5-1
Pinhole sticker	φ 1mm	φ 2mm	φ 3mm	5 × 1
Detection distance	GT3RSN 400mm	1m	3m	2m
	GT7SN 300mm	1m	2.5m	1.7m

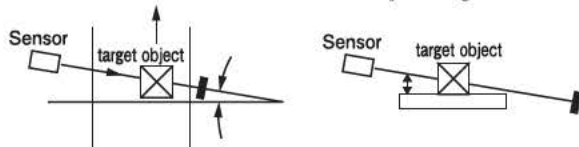
(Detection distance when the pinhole sticker are put on both transmitter and receiver.)



- Bend the top and bottom tabs of the pinhole plate and insert the tabs into the slits on the sensor.
- Avoid dust or water in and around the pinhole which may cause malfunction.

(2) Retroreflective type Adjustment for Light ON model

- Arrange the sensor in line with the reflector. Face the sensor to the mirror and move it vertically and horizontally. Install the sensor in the center of the area where the stability indicator (green LED) turns on while the operation indicator (red LED) turns off in Dark ON mode (or the operation indicator turns on when in Light ON mode). Taking advantage of the red light spot on the reflector seen from the behind of the sensor allows easy setting.



- The sensitivity is set at the maximum at the factory. Reduce the sensitivity when detecting objects with high reflectance like white paper that may cause unstable operation. Note that the detection distance will decrease when the sensitivity is lowered. Mirror like objects like steel, aluminum or plastic plates may be stably detected by installing the sensor at a slight angle against the horizontal and/or vertical lines.

- Transparent objects may be detected by lowering the sensitivity.
- ※ The detecting distance varies depending on the reflector types combined with the sensor.

Reflector Type	K-71	K-7	S-25
Detection distance	0.01 to 2m	0.01 to 3m	70 to 400mm
Notes	Accessory	Option	Option

(3) Diffuse and Convergent reflective type

- ◆ 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 (red 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 (red 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.

6 OPERATION MODE

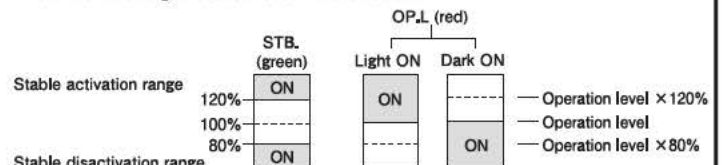
- The selectable switch is located on the bottom side for head-on types and on the back side for the side-on types.

	Light ON (outputs when light is received)	Dark ON (outputs when light is blocked)
Head on type		
Side on type		

Light ON operation : L
Dark ON operation : D

7 INDICATORS

- The operation indicator (red LED) and 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 activation range and the stable deactivation range.
- Setting which allows activation and deactivation within the stable ranges achieves higher reliability against changes in the operating environment generated after installation.

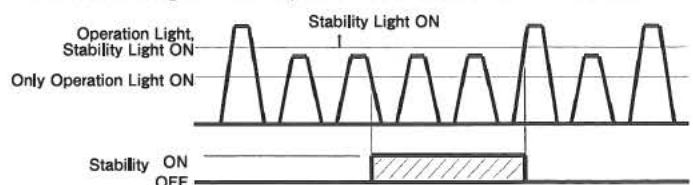


- The red LED is the operation indicator.
- In the Light ON mode, it turns on when the sensor receives light.
- In the Dark ON mode, it turns on when the sensor receives no light.

8 STABILITY OUTPUT

The stability output can be used for the initial setting or to check the reduction in the received light intensity during the operation due to any change in the operating environment. When two or more consecutive operations have occurred with the control output not reaching the stable range, a stability output is generated.

The stability output is reset when the control output operates within the stable range. This output is not available for PNP models.



9 SPECIFICATION

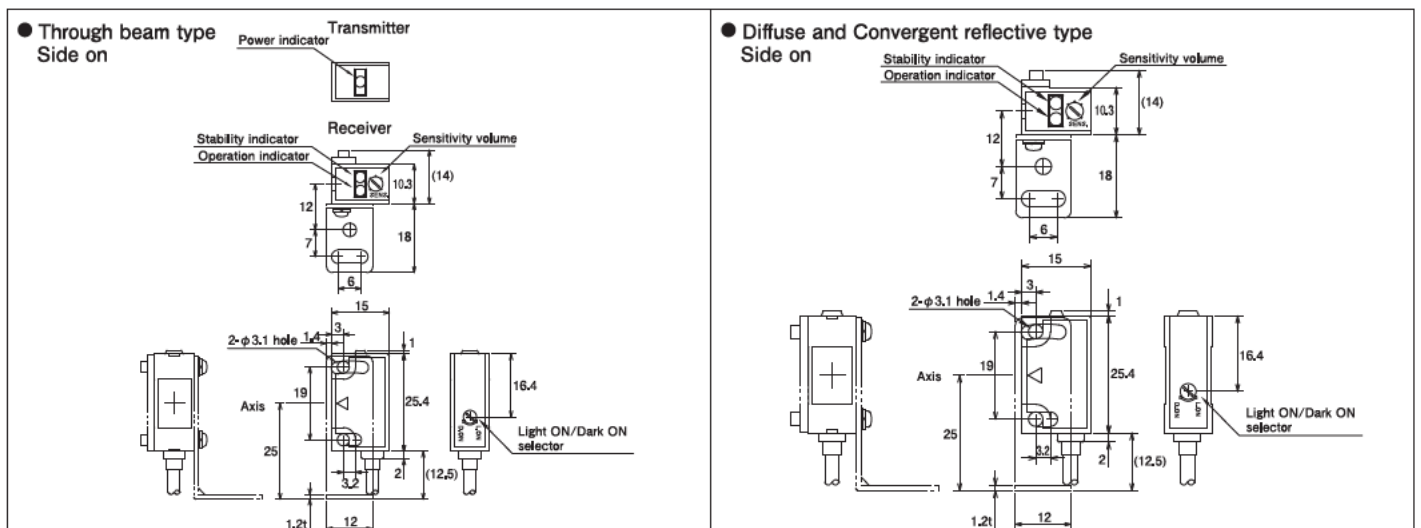


Side-on	NPN model	GT1SN	—	GT3RSN	GT7SN	GSM2RSN	GS5SN	GS20RSN	GS20SN	GSZ3SN	GSZ3RSN
	PNP model	GT1SPN	—	GT3RSPN	GT7SPN	GSM2RSPN	GS5SPN	GS20RSPN	GS20SPN	GSZ3SPN	GSZ3RSPN
Head-on	NPN model	GT1N	GT3N	—	—	—	GS5N	GS20RN	GS20N	—	—
	PNP model	GT1PN	GT3PN	—	—	—	GS5PN	GS20RPN	GS20PN	—	—
Detection method	Through beam					Retroreflective	Diffuse reflective			Convergent reflective	
Detection distance	1 m	7 m	10 m	7 m	0.01 to 2 m (K-71 reflector)	70 mm	400 mm (GS20RSN) 300 mm (GS20RN)	300 mm (GS20SN) 200 mm (GS20N)	1 to 40 mm	3 to 30 mm	
Detection object	φ6 mm or more opaque object					φ40 mm opaque object	Opaque, translucent, and transparent				
Power supply	12 to 24VDC ±10% Ripple 10% (Max)										
Current consumption	NPN model	Transmitter : 23mA or less Receiver : 18mA or less			20mA or less	25mA or less	24mA or less	25mA or less		20mA or less	
	PNP model	Transmitter : 23mA or less Receiver : 21mA or less			25mA or less	28mA or less					
Output mode	Control output	NPN open collector output Rating : sink current 100mA (30VDC) or less									
	PNP model	PNP open collector output Rating : source current 100mA (30VDC) or less									
	Stability output	NPN open collector output Rating : sink current 50mA (30VDC) or less									
	PNP model	PNP output type does not have stability output									
Operation mode	Light ON / Dark ON selectable (By exclusive switch)										
Response time	0.35 ms or less										
Hysteresis	—						10% or less				
Beam deviation	30°(Receiver)	10°(Receiver)				30°(Reflector)	—				
Light source (wave length)	Infrared LED (880nm)		Red LED (700nm)	Infrared LED (880nm)	Red LED (645nm)	Infrared LED (880nm)	Red LED (700nm)	Infrared LED (880nm)		Red LED (645nm)	
Indicator	Transmitter : Power (red), Receiver : Operation (red) Receiver : Stability (green)					Operation (red), Stability (green)					
Adjustment volume	SENS : Sensitivity adjustment										
Switch	Light ON/Dark ON Built-in selectable switch (L.ON side : Light ON, D.ON side : Dark ON)										
Material	Case	Polyarylate									
	Lens	Polycarbonate	Polyarylate			Polycarbonate		Polyarylate		Polycarbonate	Acrylic
Connection	NPN model	Cable type (outer diameter 3mm; length 2m) Transmitter : 0.15mm ² ×2 cores (gray) Receiver : 0.15mm ² ×3 cores (black)				Cable type (outer diameter 3mm; length 2m) 0.15mm ² ×4 cores (black)					
	PNP model	Cable type (outer diameter 3mm; length 2m) Transmitter : 0.15mm ² ×2 cores (gray) Receiver : 0.15mm ² ×3 cores (black)				Cable type (outer diameter 3mm; length 2m) 0.15mm ² ×3 cores (black)					
Weight	Approx. 50g (transmitter/receiver)					Approx. 50g					
Accessories	Pinhole sheets provided					K-71 reflector					
	Mounting bracket, operation manual provided										

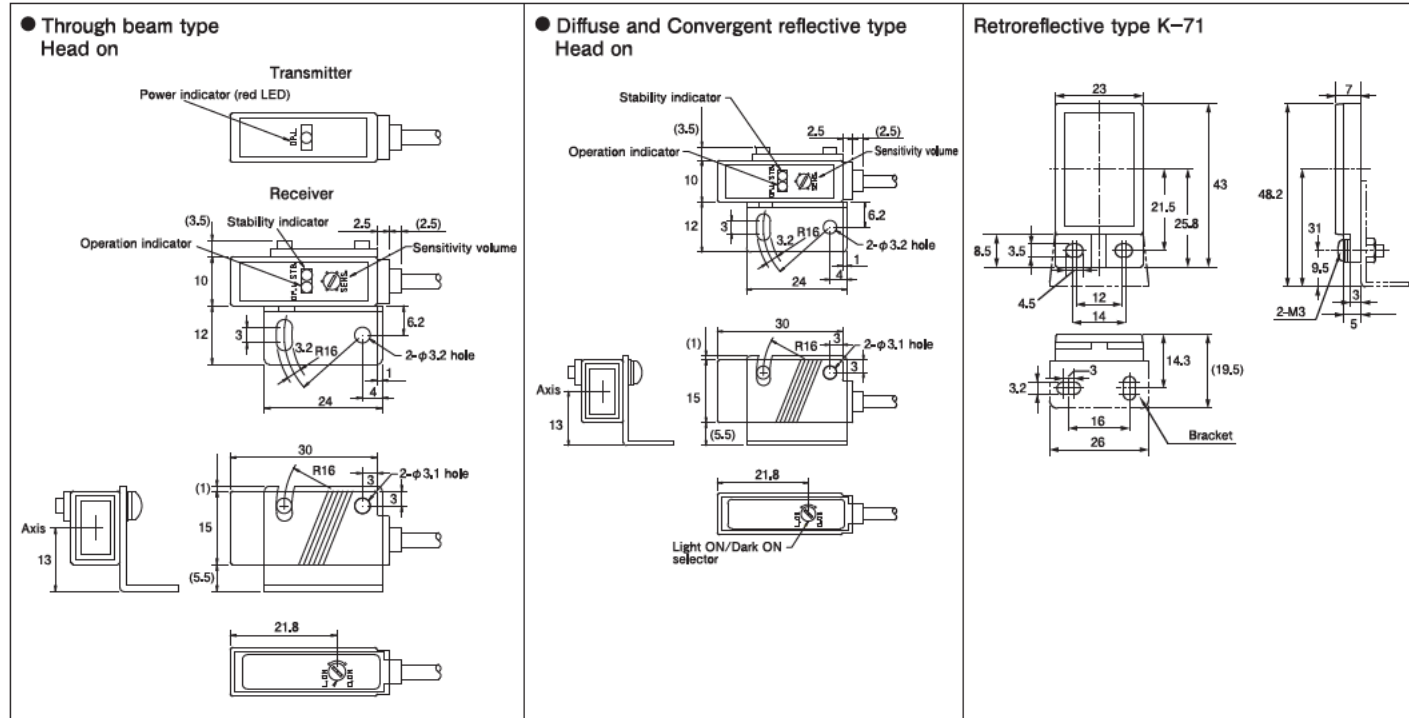
ENVIRONMENTAL SPECIFICATION

Ambient light	Withstands 5,000 lx (Max)
Ambient temperature	−25 to +55℃
Ambient humidity	35 to 85%RH (non-condensing)
Protective structure	I P67
Vibration	10 to 55Hz, 1.5mm double amplitude 2Hr., 3 Direction
Shock	500m/s ² 3 times, 3 Direction
Dielectric withstand voltage	1000 VAC for one minute
Insulation resistance	20MΩ or more when tested with 500 VDC megger

10 DIMENSIONS (in mm) (Tightening torque for body and mounting bracket is 0.6N·m or less)



10 DIMENSIONS (in mm) (Tightening torque for body and mounting bracket is 0.6N·m or less)



11 WARRANTY

The product is covered by a warranty based on the Quality Regulations of Takenaka Electronic Industrial Co., LTD. (Takenaka). Regarding the warranty, please feel free to ask any questions to Takenaka, Takex sales office or authorized distributors.

1 《Warranty period》

The warranty period is one (1) year after delivery to a designated location. This warranty does not apply to expendable supplies like batteries or relays, and products of other manufacturers which Takenaka markets.

2 《Scope of warranty》

If any defect is found during the warranty period. Takenaka will, at its option, repair or replace the defective product at the location of delivery. This warranty is void and of no effect if the product is subject to improper use or handling, improper maintenance, modification, repair made by persons not authorized by Takenaka or a lack of reasonable care. The warranty does not cover defects caused by the other product, reason including fire, flood, earthquake, lighting surge and other natural disasters.

- ① If the product is used inappropriately or used under inappropriate conditions that are not described in the instruction manual or specifications.
- ② If the defect is caused by improper maintenance, including a failure to replace consumable or periodical parts as described in the instruction manual or specifications.
- ③ If the defect is not directly caused by the warranted product.
- ④ If the products is modified or repaired by persons not authorized by Takenaka.
- ⑤ If the defect is caused by rough handling, dropping, or collision after the product is delivered.
- ⑥ If the defect could not be predicted from a technical viewpoint at the time Takenaka made the agreement for, manufactured, or installed the product.
- ⑦ If the defect is caused by a natural disaster such as a fire, flood, earthquake, lightning (including a lightning surge) and so on, or an accident such as an abnormal voltage that Takenaka is not responsible for.

The warranty provided here is only for the Takenaka product and does not cover any secondary damage caused by problems related to the product.

3 《Target of Warranty》

- (1) In case that the product is used in combination with other products or as a part of a system, Buyer should confirm the compatibility of the product to the application by relevant laws, decrees, standards and regulations.
- (2) This product is designed and manufactured for use in general industries. This warranty does not cover the application of the product to:
 - ① Nuclear power facilities including power station, incineration plant, public utilities including railway, vehicle and airway facilities, medical devices, amusement machines, safety devices and facilities that are governed by regulation of government or industrial organization.
 - ② Facilities that may cause danger or serious effects on human life and assets.
 - ③ Utilities like electricity, gas or water facilities. Facilities that are required 24 hour continuous operation.
 - ④ Outdoor use or use in improper conditions or environment.
 - ⑤ Other facilities which requires broad and detailed consideration concerning safety and reliability equivalent to the above.

This warranty may cover these application in case that Takenaka is notified about the application of the product before sale and Buyer approves the compatibility and the specifications of the product by written agreement and / or by providing required safety measures.

12 DISCLAIMER

- This product is designed to detect a presence or passage of an object. This product does not have any function to prevent accidents, death or injuries. Takenaka will assume no responsibility for damages or losses resulting from accidents or disasters caused by a failure of the product, complete wiring or installation or any act that does not follow the instruction manual.
- Earthquakes, lightning (including lightning surges), fires that we are not responsible for, acts or incidents caused by third parties, intentional or accidental misuse, or usage under other abnormal conditions.
- Any secondary damage caused by the usage, faulty operation, or malfunction of the product like suspended operation or malfunction of a connected device or system, damage to a device, loss of profit, interruption of business, corruption or loss of memory contents, cost of restoration, etc.
- Misuse, failure related to maintenance, installation or deinstallation, or failure to follow the contents of the instruction manual.
- Any malfunction (including false alarm or lost alarm) caused by the combination with a connected device or software over that we have no control.
- The responsibility of Takenaka is limited to the extent of repair or replacement of the product. The expenses we are liable for will not exceed the original product cost.