GN series

Compact for built-in use
Embedded Amplifier Photo Sensors

- New type of amplifier built-in photo sensor
- Slim and compact side-on models
  - Lightweight and compact
    Thin, space-saving sensor allows flexible mounting
  - Flat lens less affected by dust and dirt
    Superb stability at high power (detecting distance of 10 m)
  - High-intensity indicators with excellent visibility
    Easy to check if the sensor is operating from a distance

Type

Detection method	Detecting distance	Model		Operation mode	Output mode
		NPN Output	PNP Output		
Through beam	10m	**GN-T10CR**	**GN-T10CRPN**	Light-ON/ Dark-ON selectable (with switch)	Open collector
	7m	**GN-T7C**	**GN-T7CPN**		
Polarized retroreflective	0.03-1.3m	**GN-M2CR**	**GN-M2CRPN**		
Diffuse reflective	400mm	**GN-R40CR**	**GN-R40CRPN**		
	300mm	**GN-R30C**	**GN-R30CPN**		
	70mm	**GN-R7C**	**GN-R7CPN**		
Convergent reflective	3-30mm	**GN-Z3CR**	**GN-Z3CRPN**		
	1-40mm	**GN-Z3C**	**GN-Z3CPN**		

Optional Parts

Type		Model	Pinhole diameter / Direction of polarization	Detecting distance with plate/filter attached: Red LED	Detecting distance with plate/filter attached: Infrared LED
For through beam type only	Pinhole plate	**GNP1**	ϕ1mm	400mm	300mm
		GNP2	ϕ2mm	1m	1m
		GNP3	ϕ3mm	3m	2.5m
		GNP5-1	5×1mm	2m	1.7m
	Interference prevention filter	**GN-PFA**	Longitudinal	5m (Applicable to red LED type only)	
		GN-PFB	Horizontal		

Type	Model	Shape
Cable with M8 connector	**FBC-4R2S**	Straight (2 m)
	FBC-4R2L	Angled (2 m)
Mounting bracket	**GN-B1**	Mounting bracket dedicated to cable type

Type	Model	Description	
Protective cover	**GN-PCB1**	For cable type	Robust stainless steel cover to protect the sensor and reflector from impact. See page 195.
	GN-PCB2		
	G-K7B	For retroreflector (K-7 or K-71)	

Rating/Performance/Specification

Type	Cable type	NPN type	GN-T10CR	GN-T7C	GN-M2CR	GN-R40CR	GN-R30C	GN-R7C	GN-Z3CR	GN-Z3C
		PNP type	GN-T10CRPN	GN-T7CPN	GN-M2CRPN	GN-R40CRPN	GN-R30CPN	GN-R7CPN	GN-Z3CRPN	GN-Z3CPN
	Connector type	NPN type	GN-T10CR-J	GN-T7C-J	GN-M2CR-J	GN-R40CR-J	GN-R30C-J	GN-R7C-J	GN-Z3CR-J	GN-Z3C-J
		PNP type	GN-T10CRPN-J	GN-T7CPN-J	GN-M2CRPN-J	GN-R40CRPN-J	GN-R30CPN-J	GN-R7CPN-J	GN-Z3CRPN-J	GN-Z3CPN-J
Detection method			Through beam		Polarized retroreflective	Diffuse reflective			Convergent reflective	
Detecting distance			10m	7m	0.03-1.3m	400mm (200 x 200 mm white drawing paper)	300mm (200 x 200 mm white drawing paper)	70mm (100 x 100 mm white drawing paper)	3-30mm (50 x 50 mm white drawing paper)	1-40mm (50 x 50 mm white drawing paper)
Detection object			ϕ6mm (or more) Opaque		Glossy objects including mirror-like materials and stainless-steel plates or opaques	Opaque, translucent, and transparent				
Power supply			12-24V DC±10% / Ripple 10% or less							
Current consumption			Transmitter: 22mA or less Receiver: 15mA or less		25mA or less					
Output mode		NPN type	NPN open collector Rating: sink current 100mA (30 VDC) or less /Residual voltage: 1 V or less							
		PNP type	PNP open collector Rating: source current 100mA (30 VDC) or less /Residual voltage: 2 V or less							
Operation mode			Light-ON / Dark-ON selectable (with switch)							
Mutual interference prevention function			Anti-interference filter available (up to 2 sensors)	————	Provided (up to 2 sensors)					
Response time			0.5ms or less							
Operating angle			10° (at receiver)		30° (at reflector)	————				
Hysteresis			————			Up to 10% of detecting distance				
Light source (light wavelength)			Red LED (700nm)	Infrared LED (880nm)	Red LED (630nm)	Red LED (640nm)	Infrared LED (880nm)		Red LED (640nm)	Infrared LED (870nm)
Indicator			Transmitter: Power indicator (orange LED) Receiver: Operation indicator (orange LED), Stability indicator (green LED)		Operation indicator (orange LED), Stability indicator (green LED)					
Volume (VR)			Sensitivity adjustment (on receiver for through beam type)							
Switch (SW)			Light-ON / Dark-ON selector switch							
Short circuit protection			Provided							
Material	Case		Polybutylene terephthalate							
	Lens		Methacrylate							
Connection	Cable type		Attached cable (dia.3.5mm) Transmitter: 0.2 mm² x 2 cores 2m (gray) Receiver: 0.2 mm² x 3 cores 2m (black)		Attached cable (dia. 3.5mm) 0.2 mm² x 3 cores 2m (black)					
	Connector type		M8 connector (cable with M8 connector separately available)							
Weight	Cable type		Transmitter / receiver: approx. 60g		Approx. 60g					
	Connector type		Transmitter / receiver: approx. 10g		Approx. 10g					
Accessory			K-71 reflector Mounting screws, instruction manual (mounting bracket separately available)							

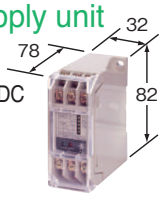
- The detecting distance and detection object of retroreflective types varies, depending on reflector types combined with the sensor. The detecting distance is the range which you can set for the reflector. The sensor can detect an object even in extremely short range.
- The detecting distance of diffuse 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 or more
Ambient temperature	–25 - +55°C (non-freezing)/Storage -30- +70°C
Ambient humidity	35 - 85%RH (non-condensing)
Protective structure	IP67
Vibration	10 - 55 Hz / 1.5 mm double amplitude / 2 hours each in 3 direction
Dielectric strength	AC1000V 1 or more
Insulation resistance	500 VDC, 20 MΩ or higher
Shock	500 m/s² / 3 times each in 3 directions

• Applicable power supply unit

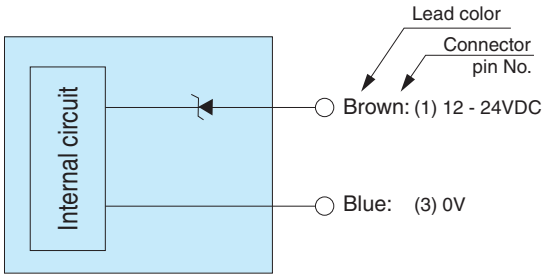
PS series
High capacity of 200 mA at 12 VDC



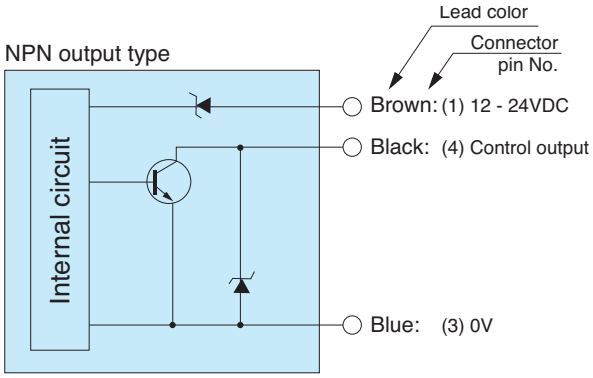
(General-purpose type) PS3N
PS3N-SR
(Multifunctional type) PS3F
PS3F-SR

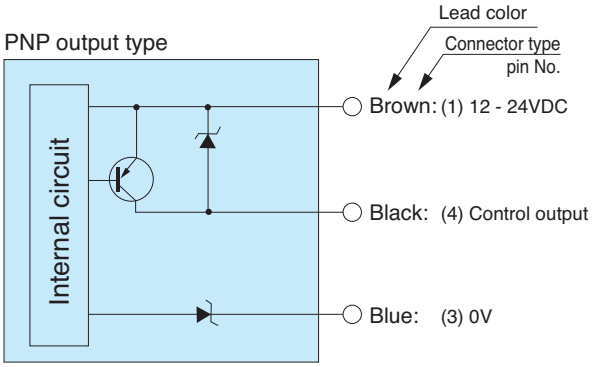
Input/Output Circuit and Connection

Transmitter of through beam type



Receiver of through beam type/polarized retroreflective type/diffuse reflective type/convergent reflective type

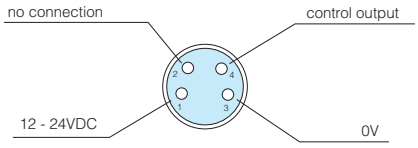




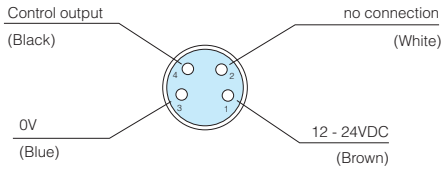
- The output transistor turns off when load short circuit or overload occurs. Check the load and turn the power back on. To extend the cord, use thick wires (at least 0.3 mm^2).

Connector type pin assignment and connection

(Sensor)



(Cord with M8 connector)



M8 connector type

M8 connector type is also available about all models. See Rating/Performance/Specification for details.

M8 connector type

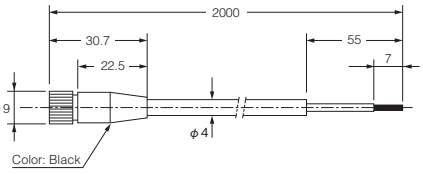
Lead color	Pin No.	Function
Brown	1	12 - 24 VDC
White	2	no connection
Blue	3	0V
Black	4	Control output

Cable with M8 connector (optional)

(in mm)

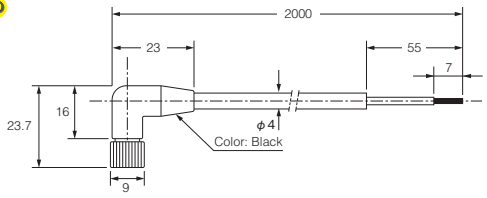
FBC-4R2S (straight)

CAD



FBC-4R2L (angled)

CAD



CAD To download CAD data including dimensions, please visit www.takex-elec.co.jp/index_e.html.

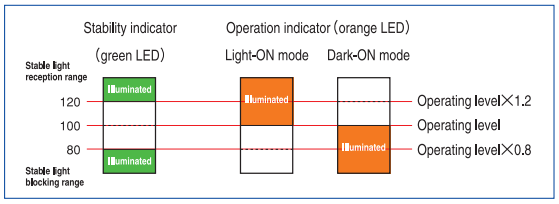
For Correct Use

Be sure to follow the instructions in the operation manual provided for correct use of the product.

- This sensor is not designed to prevent death or injury. It is not a life saving device.
- For safety applications except such usage, ensure safe operation of the system as a whole including detection and control function.
- This product is not explosion proof.

Indicators

- The operation indicator (orange LED) and stability indicator (green LED) each show different received light intensity levels as described in the figure.
- After aligning the optical axis and adjusting the sensitivity, make sure the light received and the light blocked is within the stable ranges by blocking and unblocking the lights with a detection object repeatedly.
  Setting within the stable range increases reliability against differences in environment after installation.



- The orange LED is the operation indicator.
  For the light ON mode, the indicator is illuminated when the light is detected.
  For the dark ON mode, the indicator is illuminated when the light is blocked.

Reflector of polarized retroreflective type

The detection distance varies depending on the reflector model used.

Reflector model	K-71	K-7	S-25	S-510G
Detecting distance	0.03 - 1.3m	0.01 - 2m	50 - 600mm	0.05-1m
Remarks	Accessory	Optional	Optional	Optional

Mounting of sensor

The tightening torque for mounting screws should not exceed 0.6 N·m.

Typical application

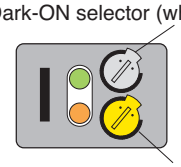
When you put hands in the basin, water comes out.

Switching between light ON and dark ON and setting sensitivity

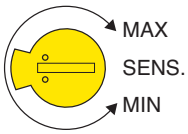
(For the light ON mode)
Turn the switch to L.ON.

(For the dark ON mode)
Turn the switch to D.ON.

Light-ON/Dark-ON selector (white)



Sensitivity adjustment volume (yellow)



Sensitivity can be adjusted for detection with a through beam model in which blocking of the light beam is inadequate due to a translucent or small object or for detection with a reflective model in which any influence of the background should be avoided or the sensor must detect low intensity of reflected light. Turning the volume counterclockwise reduces the sensitivity.

For setting the light ON/dark ON switch (white) and adjusting the sensitivity volume (yellow), use the adjustment screwdriver supplied and turn carefully. Turning the volumes with excessive force may damage the volumes.

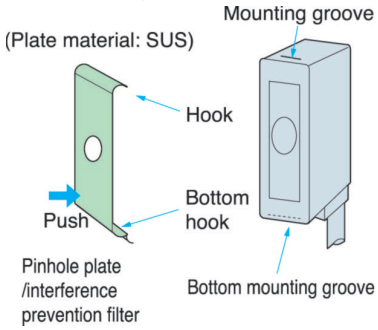
About pinhole plate

Pinhole plates allow the reduction of the size of a detection object or the margin of movement. Using the sensitivity adjustment volume in combination allows detection of even smaller or near-transparent objects.

Interference prevention filters

When two sensors are mounted close to or in contact with each other, interference prevention filters can be used to avoid faulty operation caused by mutual interference.
Interference prevention filters can be used only for through beam type sensors emitting red light.

Attachment of pinhole plate
/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.

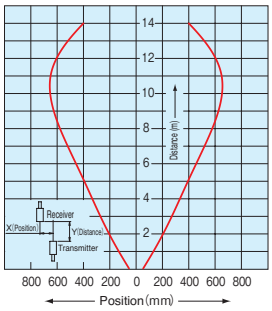
Dust, drops of water, etc. in the pinhole or the filter may cause faulty operation.

(Note: You cannot use the pinhole plate and the interference immune filter at the same time.)

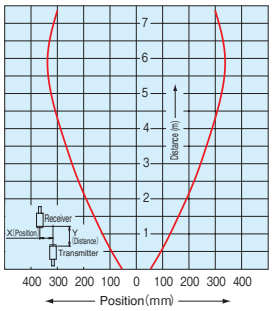
Performance Curves (Typical)

Response Curves: Beam Pattern

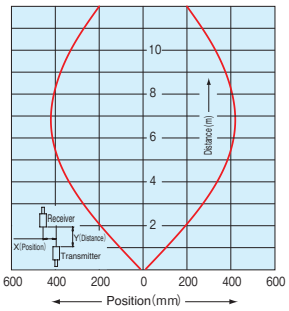
GN-T10CR
GN-T10CRPN



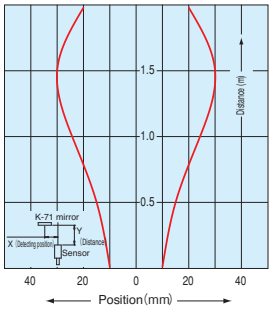
GN-T10CR
When using GN-PFA、GN-PFB



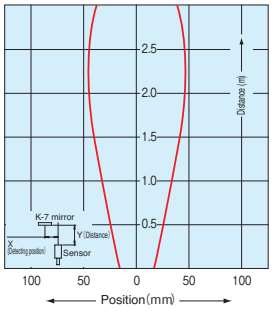
GN-T7C
GN-T7CPN



GN-M2CR
GN-M2CRPN (K-71)

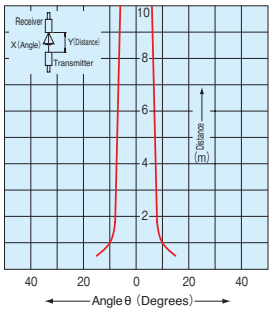


GN-M2CR
GN-M2CRPN (K-7)

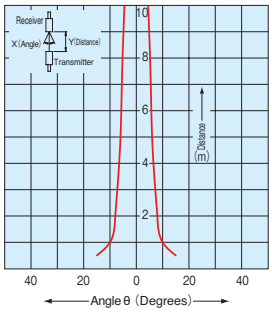


Response Curves: Tilt Angle

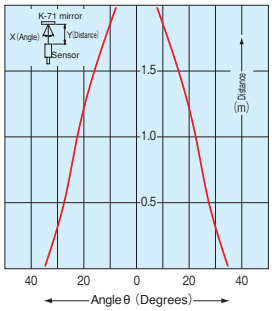
GN-T10CR
GN-T10CRPN



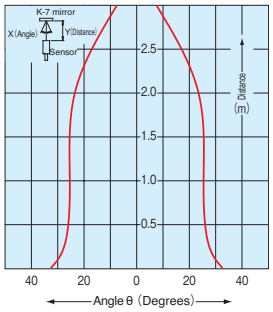
GN-T7C
GN-T7CPN



GN-M2CR
GN-M2CRPN (K-71)

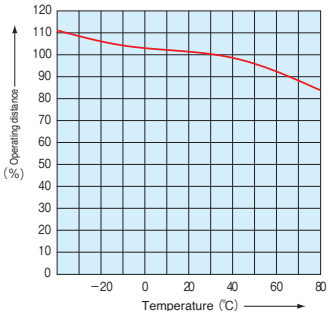


GN-M2CR
GN-M2CRPN (K-7)

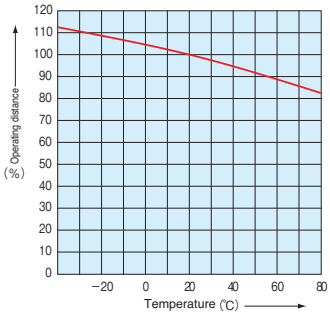


Response Curves: Ambient Temperature

GN-T10CR
GN-T10CRPN

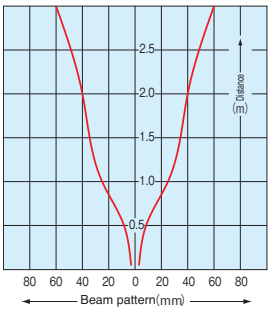


GN-R40CR
GN-R40CRPN



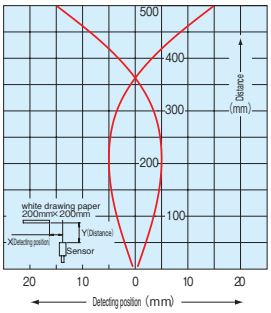
Beam Pattern

GN-M2CR
GN-M2CRPN

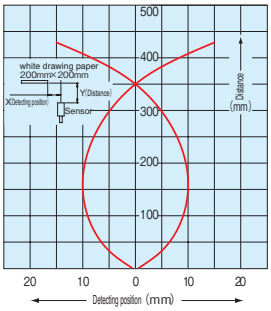


● Response Curves: Detecting Position

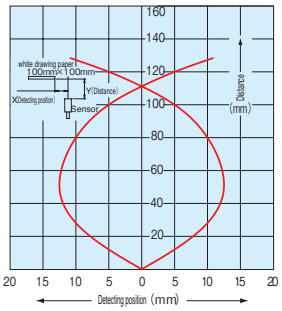
GN-R40CR
GN-R40CRPN



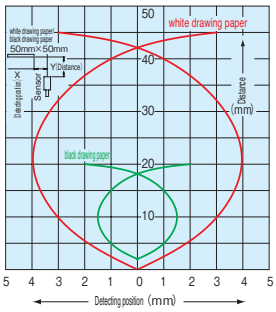
GN-R30C
GN-R30CPN



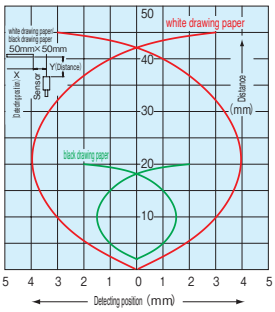
GN-R7C
GN-R7CPN



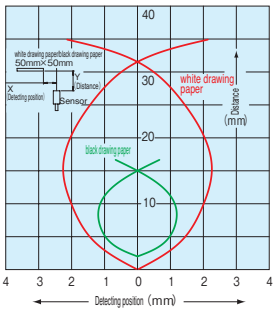
GN-Z3C
GN-Z3CPN



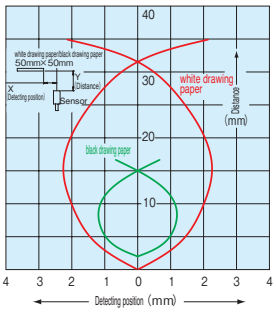
GN-Z3C-J
GN-Z3CPN-J



GN-Z3CR
GN-Z3CRPN

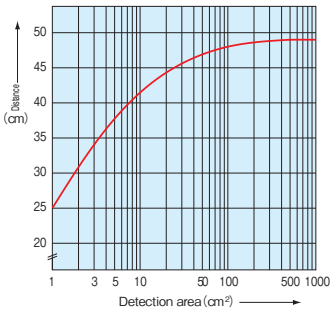


GN-Z3CR-J
GN-Z3CRPN-J

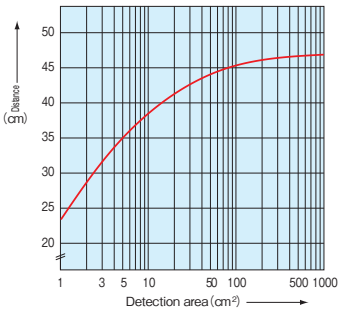


● Response Curves: Target Size

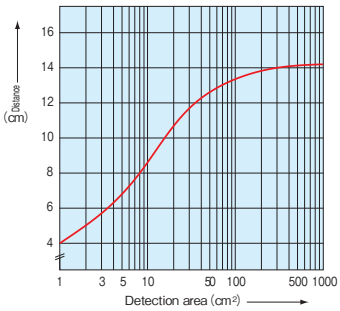
GN-R40CR
GN-R40CRPN



GN-R30C
GN-R30CPN



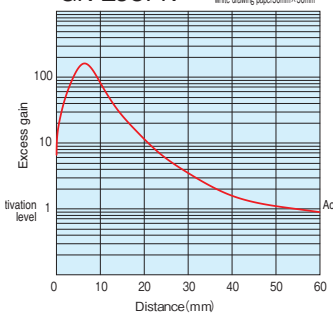
GN-R7C
GN-R7CPN



● Excess Gain Curves

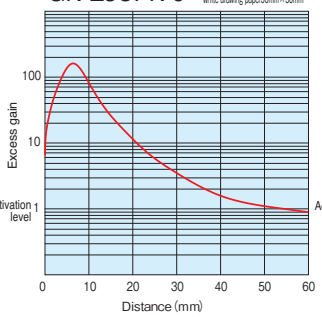
GN-Z3C
GN-Z3CPN

Detection object : white drawing paper50mm×50mm



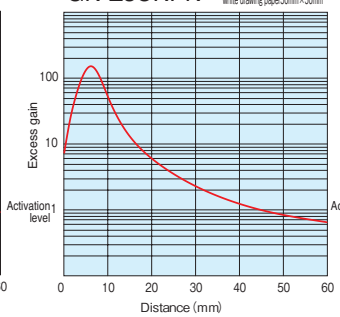
GN-Z3C-J
GN-Z3CPN-J

Detection object : white drawing paper50mm×50mm



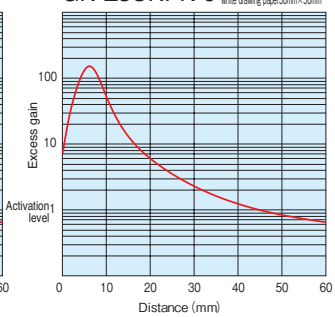
GN-Z3CR
GN-Z3CRPN

Detection object : white drawing paper50mm×50mm



GN-Z3CR-J
GN-Z3CRPN-J

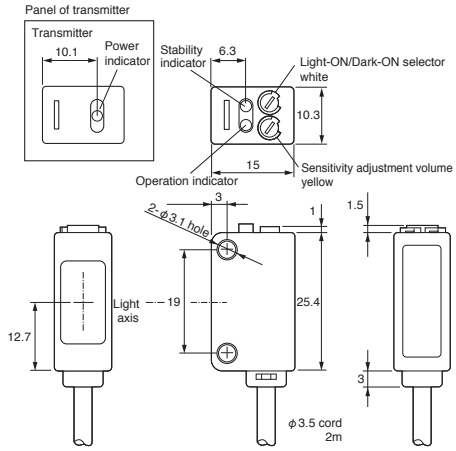
Detection object : white drawing paper50mm×50mm



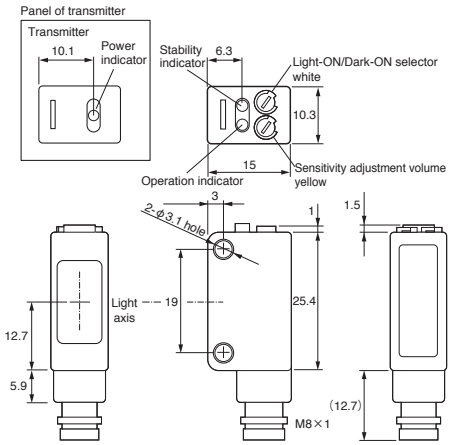
Dimensions (in mm)

All cable type models

CAD

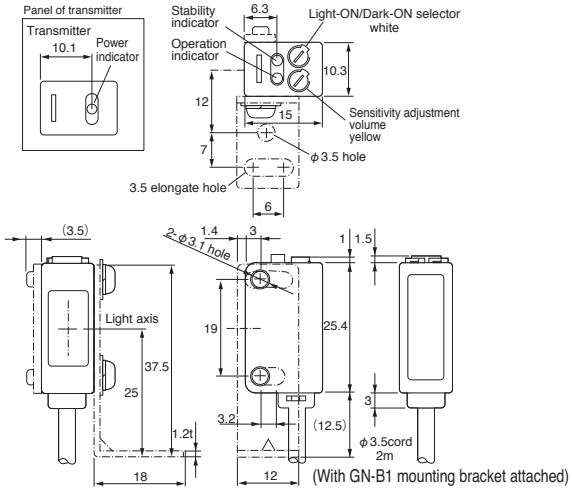


All connector type (-J) models



Figures above show receivers. Transmitters have different panels.

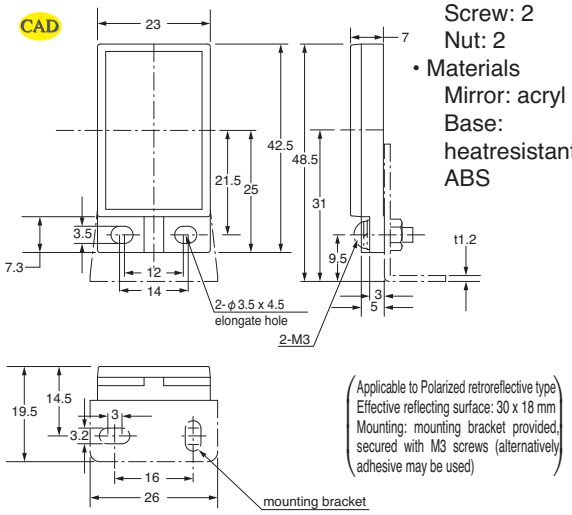
All cable type models



Figures above show receivers. Transmitters have different panels.

Reflector K-71

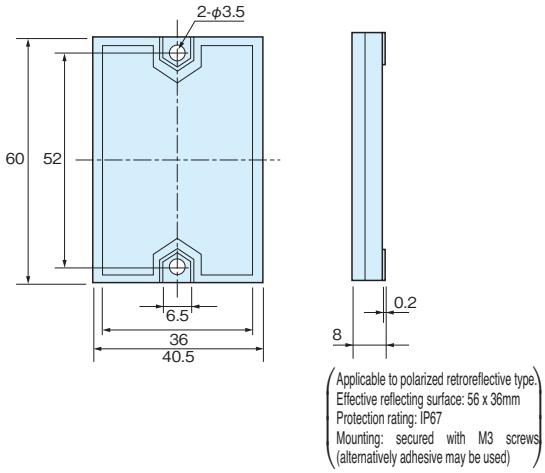
CAD



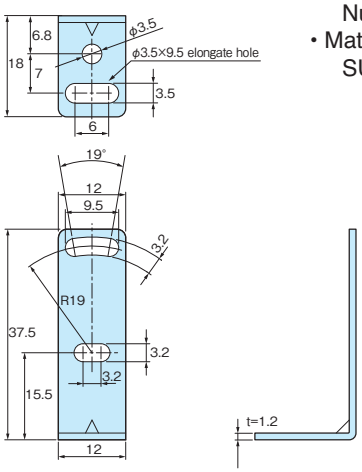
- Accessories
  Screw: 2
  Nut: 2
- Materials
  Mirror: acryl
  Base: heatresistant ABS

Reflector K-7

- Materials
  Mirror: acryl
  Base: heat-resistant ABS



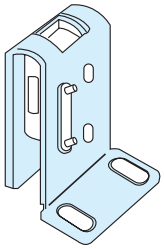
Mounting bracket GN-B1



- Accessories
  Screw: 2
  Nut: 2
- Materials
  SUS

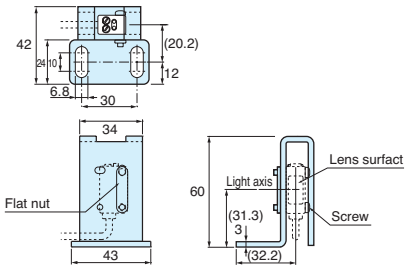
Dimensions (in mm)

GN-PCB1
(for mounting on the bottom)

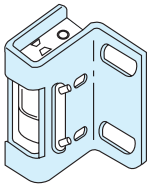


●Accessories
Screw: 2
Flat nut: 1
●Materials
SUS

Applicable sensors
GN Series All cable type models

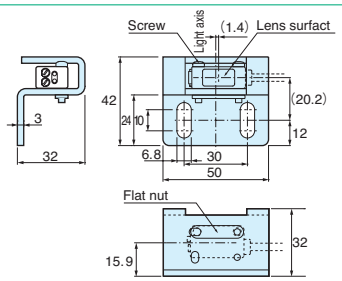


GN-PCB2
(for mounting on the back)

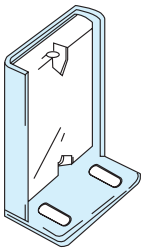


●Accessories
Screw: 2
Flat nut: 1
●Materials
SUS

Applicable sensors
GN Series All cable type models



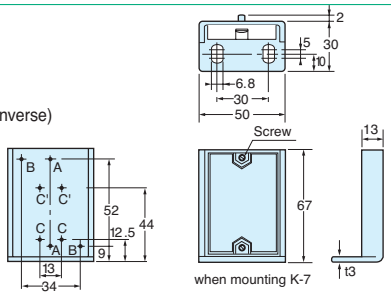
G-K7B
(for reflector)



●Accessories
Screw: 2
●Materials
SUS

Applicable reflectors
K－7
K－10
K－71

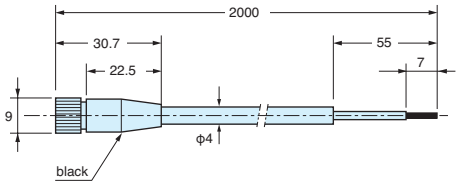
A for K -7
B for K -10
C for K -71
C' for K-71 (inverse)



The tightening torque between brackets and sensors or between brackets and screws must be up to 0.6 N・m.

Cable with M8 connector
FBC-4R2S

CAD

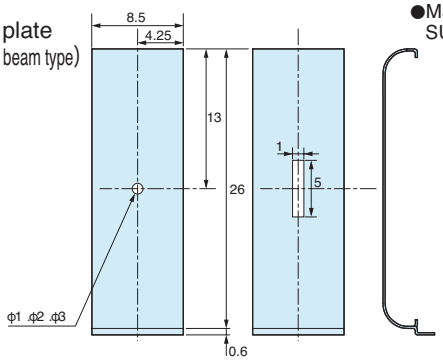


Outer diameter ϕ4 Cable: 0.2mm ²×4 core 2m（Sheath：black）

Pinhole plate
(for through beam type)

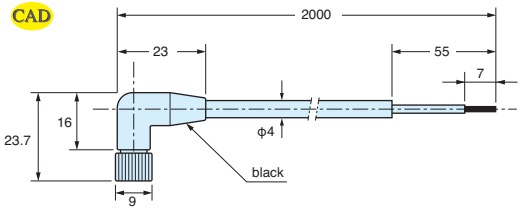
GNP1
GNP2
GNP3
GNP5-1

●Materials
SUS



Cable with M8 connector
FBC-4R2L

CAD

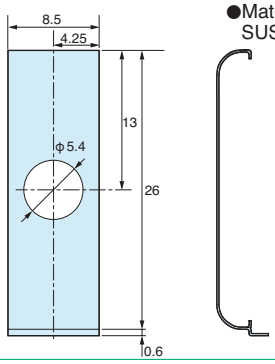


Outer diameter ϕ4 Cable: 0.2mm ²×4 core 2m（Sheath：black）

Interference immune filter
(for through beam type)

GN-PFA
GN-PFB

●Materials
SUS



CAD To download CAD data including dimensions, please visit www.takex-elec.co.jp/index_e.html.