GA Series

Polarization reflector/
diffuse-reflective type

- **Simple operation of just pressing button**

  One large button alone handling sensitivity adjustment and Light-ON/Dark-ON switching

- **Sensitivity adjustment not requiring placing of work**

  Simple sensitivity adjustment without placement of work for detection in narrow spaces or of falling objects that cannot be easily stopped

- **Equipped with inverter light suppression circuit**

  Faulty operation under inverter fluorescent lamps prevented

- **IP 67 water resistance allows washing**

  Reliable use even in sites subject to water or high moisture

Type

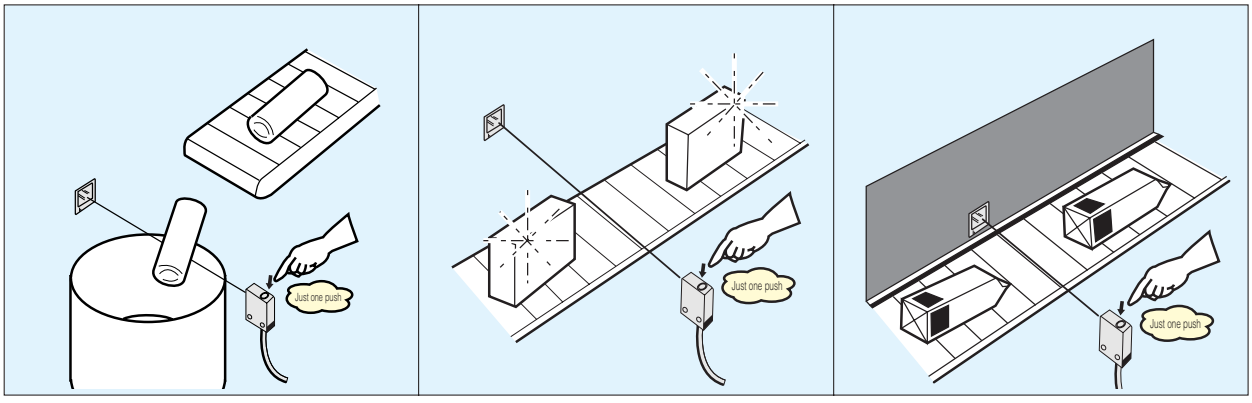
Detection method	Detecting distance	Model		Operation mode	Output mode
		NPN type	PNP type		
Polarization reflector type	0.1 - 3m	**GA-M3R**	**GA-M3RPN**	Light-ON/ Dark-ON (by teaching)	Open collector
Diffuse-reflective type	500mm	**GA-S05R**	**GA-S05RPN**		

Optional Parts

Product name	Model	Description
Polarization reflector	**K-7**	Dimensions: 60 x 40 mm / Detecting distance: 0.1 - 3 m
	K-71	Dimensions: 35 x 23 mm / Detecting distance: 0.1 - 1.8 m
Mounting bracket	**GA-B1**	Vertical mounting bracket
	GA-B2	Horizontal mounting bracket
Protective cover	**G-MSB1**	Rigid protective cover doubling as mounting bracket. See p. 211.
	G-MTB1	
	G-K7B	

Polarization reflectors and mounting brackets do not come with sensors. Select and purchase appropriate models according to the detecting and mounting conditions.

Sample Applications



Rating/Performance/Specification

Rating/performance	Type	NPN type	GA-M3R	GA-S05R
		PNP type	GA-M3RPN	GA-S05RPN
	Detection method		Polarization reflector type	Diffuse-reflective type
	Detecting distance		0.1 - 3 m (With K-7 reflector)	500mm (Standard detection object: 200 x 200 mm white drawing paper)
	Power supply		12-24V DC ±10% / Ripple 10% max.	
	Current consumption	NPN type	30mA max.	
		PNP type	30mA max.	
	Output mode (Control output)	NPN type	Open collector output Rating: Sink current 100 mA (30 VDC) max. / Residual voltage: 1 V or less	
		PNP type	Open collector output Rating: source current 100 mA (30 VDC) max. / Residual voltage: 1 V or less *	
	Output mode (Stability output)	NPN type	Open collector output Rating: Sink current 50 mA (30 VDC) max. / Residual voltage: 1 V or less *	
		PNP type	Open collector output Rating: source current 50 mA (30 VDC) max. / Residual voltage: 1 V or less *	
	Operation mode		Light-ON/Dark-ON selectable	
	Response time		1ms max.	
Specification	Light source		Red LED (700nm)	Red LED (644nm)
	Indicator		Operation indicator (orange LED) Stability indicator (green LED)	
	Setting button		For sensitivity adjustment and Light-ON/Dark-ON switching	
	Short circuit protection		Provided	
	Material		Case: polyarylate Lens: acrylic	Case: polycarbonate Lens: acrylic
	Connection		Permanently attached cord (outer dimension: dia. 4.2mm) 0.2 sq. 4 core 2 m length	
	Mass		Body: about 60 g	
	Accessory		Operation manual, explanation sticker (Note: reflector and mounting bracket separately available)	

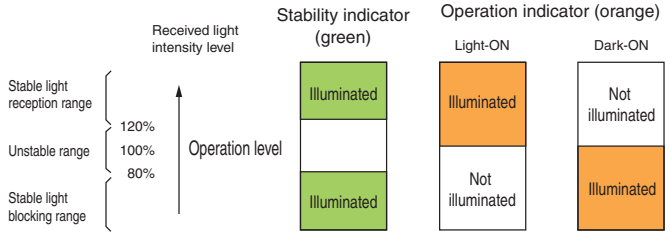
* The residual voltage of GA-M3R (PN) is 2 V max.

Environmental Specification

Environment	Ambient light	5,000 lx max.
	Ambient temperature	–25 - +55 –C (non-freezing)
	Ambient humidity	35~85%RH (non-condensing)
	Protective structure	IP67
	Vibration	10 - 55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction
	Shock	500 m/s2 / 3 times each in 3 directions
	Dielectric strength	1,000 VAC for 1 minute
	Insulation resistance	500 VDC, 20 MΩ or higher

Indicators

The figure below shows the illumination of operation and stability indicators for different received light intensity levels. Set the sensitivity in such a way that the sensor operates in a sensitivity range that allows stable activation.



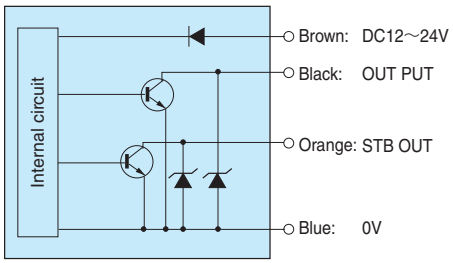
Stability output

When seven consecutive detections have occurred with the intensity of light detected not reaching the range allowing stable operation, the stability signal is output.

Input/Output Circuit and Connection

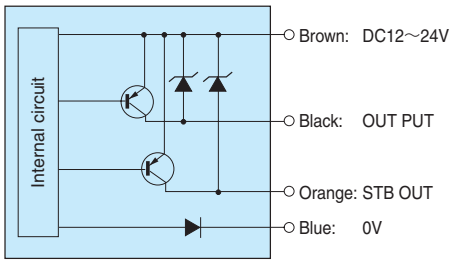
NPN output

GA-M3R
GA-S05R



PNP output

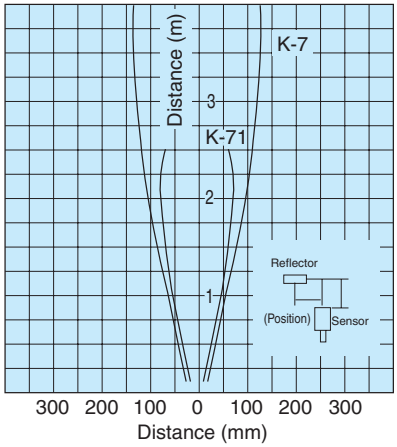
GA-M3RPN
GA-S05RPN



Characteristics (Typical Example)

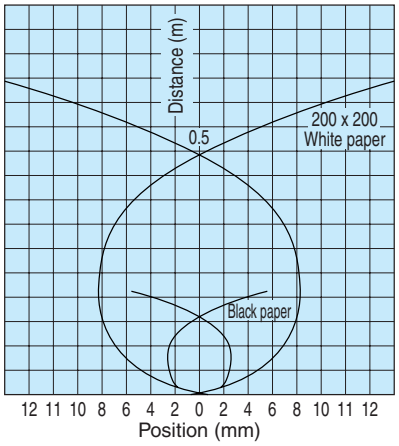
● Directional characteristics

GA-M3R
GA-M3RPN



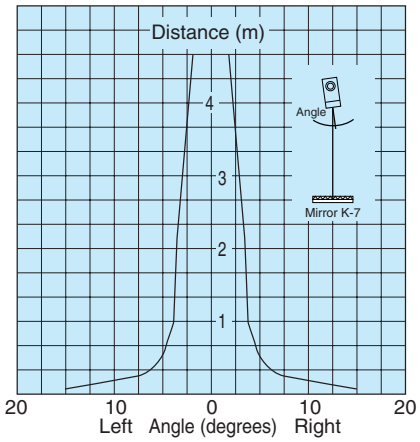
● Activation area characteristics

GA-S05R
GA-S05RPN



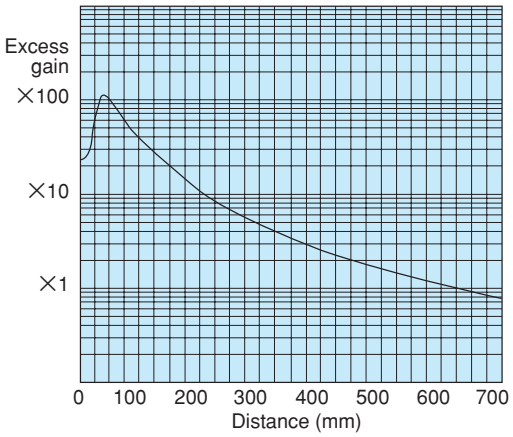
● Operating angle characteristics

GA-M3R
GA-M3RPN



● Distance-output characteristics

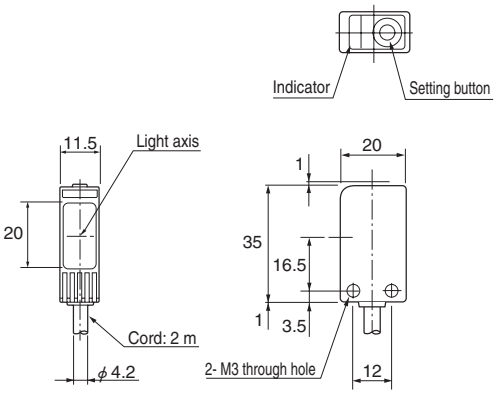
GA-S05R
GA-S05RPN



Dimensions (in mm)

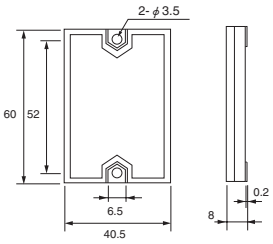
Sensor body
GA-M3R
GA-M3RPN
GA-S05R
GA-S05RPN

CAD



Polarization reflector
K-7

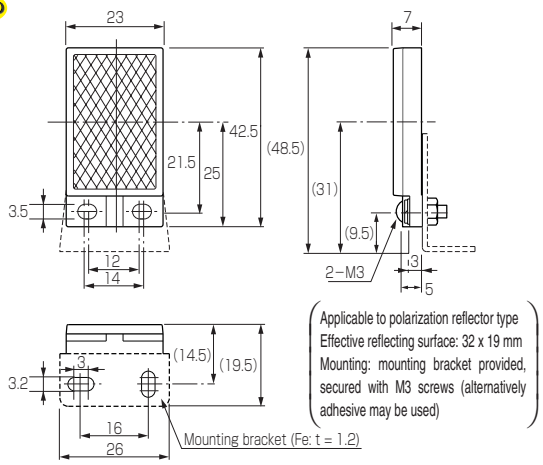
CAD



Applicable to polarization reflector type
Effective reflecting surface: 56 x 36 mm
Mounting: secured with M3 screws
(alternatively adhesive may be used)
Protective structure: IP 67

Polarization reflector
K-71

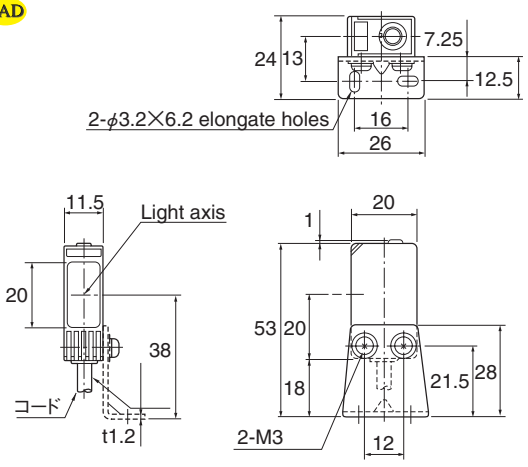
CAD



Applicable to polarization reflector type
Effective reflecting surface: 32 x 19 mm
Mounting: mounting bracket provided,
secured with M3 screws (alternatively
adhesive may be used)

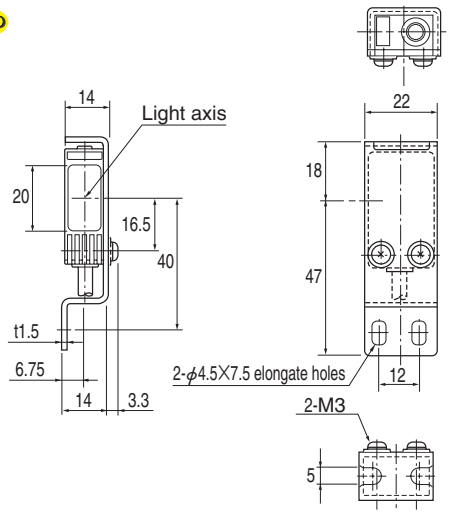
With separately available mounting bracket (GA-B1) attached

CAD



With separately available mounting bracket (GA-B2) attached

CAD

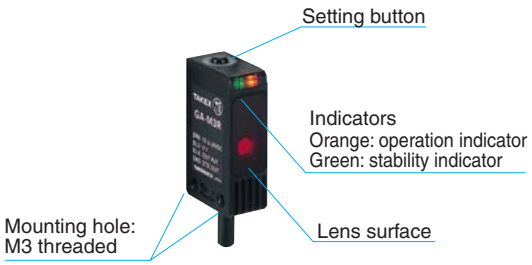


GA-M3R
GA-M3RPN

For Correct Use

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

Part names

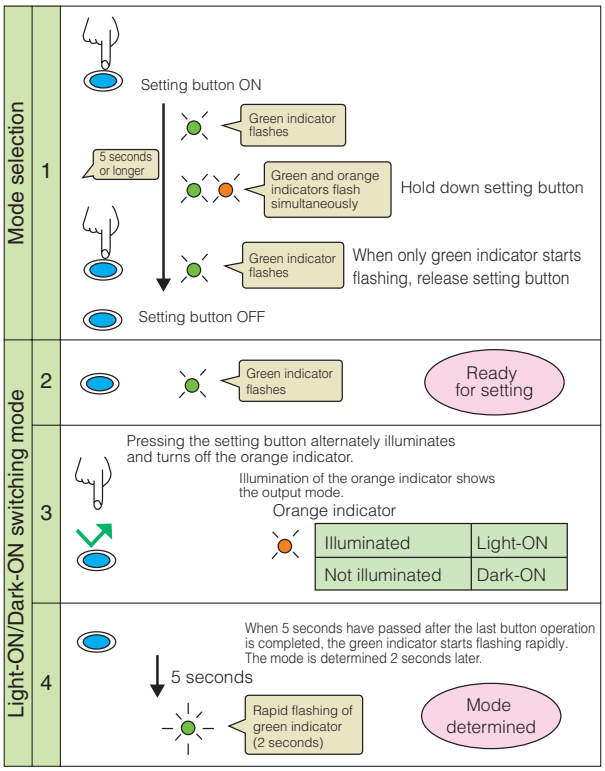


This sensor only has one setting button and no sensitivity adjustment volume or selector switch. Light-ON/Dark-ON switching and sensitivity setting are handled with the setting button alone.
Enter the sensitivity setting mode or Light-ON/Dark-ON switching mode by pressing and holding down the button for a period of time as specified below:

Hold down setting button for 2 - 4 seconds
⇨ Sensitivity setting mode
Hold down setting button for 5 seconds or longer
⇨ Light-ON/Dark-ON switching mode

Switching between Light-ON/Dark-ON mode

The factory setting is Dark-ON mode.
Be sure to check and set either the Light-ON or Dark-ON mode before setting the sensitivity.
Enter the Light-ON/Dark-ON switching mode by pressing the setting button for 5 seconds or longer. While the button is operated, the state of the output before starting the operation of the button is maintained.



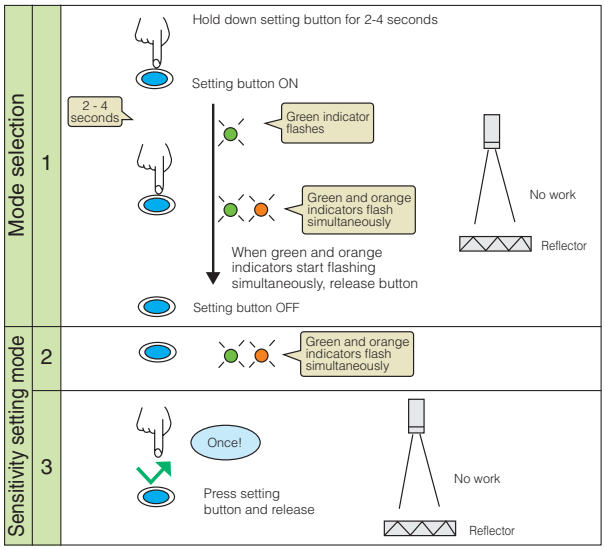
Sensitivity setting

The factory setting is maximum sensitivity. No special sensitivity adjustment is required if the detection object is something that completely blocks the light such as corrugated cardboard box. Adjust the sensitivity as required according to the state of the detection object or sensor mounting condition. Use the table below as guidelines:

Detection object	Sensitivity setting
Translucent object such as milky white plastic case	⇨ Single-touch teaching
Continuously moving object such as falling object	⇨ Full auto teaching
Object that completely blocks light such as corrugated cardboard box	⇨ Maximum sensitivity setting

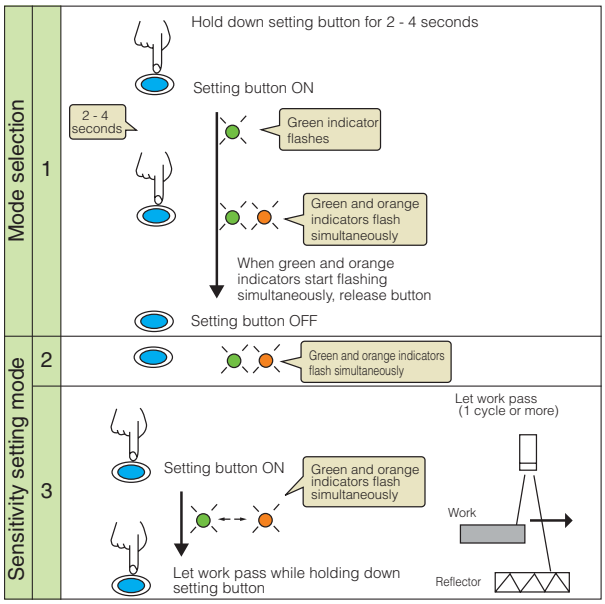
Single-touch teaching —Auto teaching—

No work needs to be placed. Set the sensitivity while the light is received.
Just a single operation of the button sets the optimum sensitivity for the given received light intensity.



Full auto teaching

When it is not possible to make "no-work" state as in detection of continuously moving (e.g. falling) object



For Correct Use

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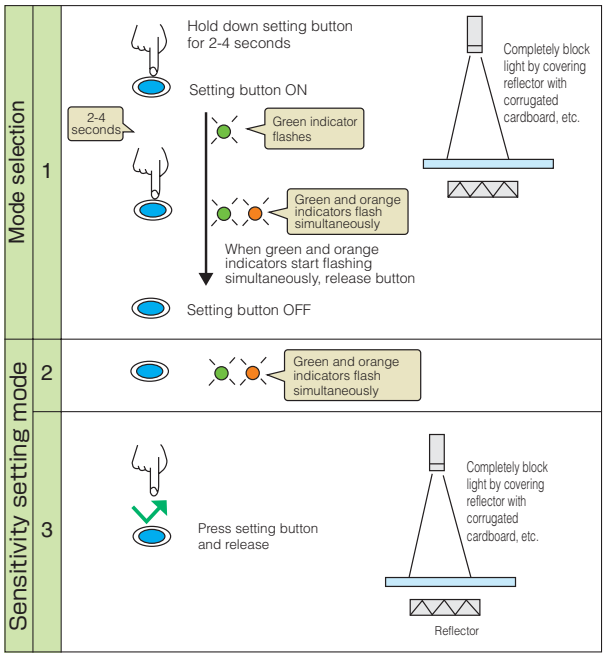
Maximum sensitivity setting

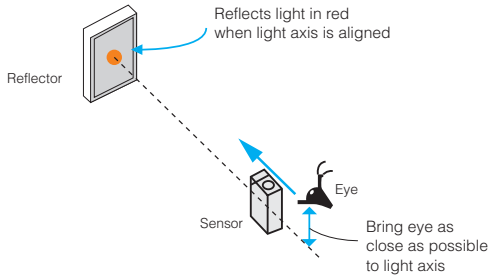
Enter the sensitivity setting mode with the light blocked and press the setting button once. The sensitivity is set at the maximum, which is the factory setting.



Installation

- Polarization reflectors and mounting brackets do not come with sensors. Purchase appropriate reflectors and mounting brackets according to the application.
- Sensor mounting
  The mounting holes in the sensor are M3 threaded. Select M3 screws of an appropriate length so that the screw-in length to the body of the sensor will be at least 10 mm.
  The tightening torque should be up to 0.5 N·m.
  If the effective length of the screw to the sensor is too short, the thread of the sensor may be damaged.
- Secure the sensor on a solid base.
  Inadequate securing allowing the sensor to move when the setting button is pressed hampers accurate sensitivity setting.
  Be sure to firmly secure the sensor.
  Make sure that the sensor and reflector are fixed before use.
  If the sensor or reflector is allowed to move, the operation may become unstable.
  Rotation of the reflector with reference to the sensor is especially likely to cause problems such as chattering.
- If the ambient temperature is low enough for freezing to occur, the operation of the setting button may not feel smooth. In such a case, press hard until the indicator flashes.

Light axis alignment



Place the reflector and sensor face-to-face and look towards the reflector from right behind the sensor.
Adjust the mounting of the sensor so that the light is reflected on the reflector in red.
For accurate alignment, try to look from as close to the sensor light axis as possible.

GA-S05R
GA-S05RPN

For Correct Use

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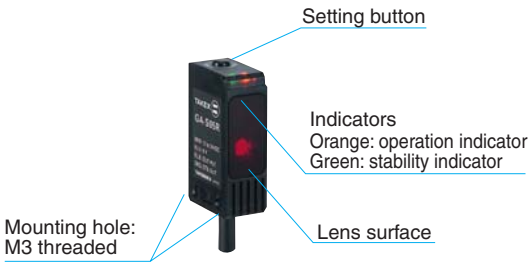
Part names



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The factory setting is Dark-ON mode.
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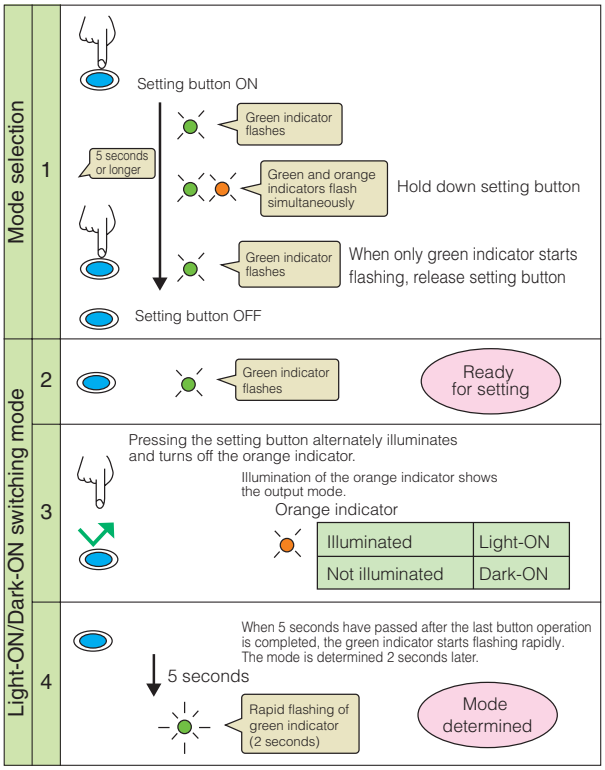


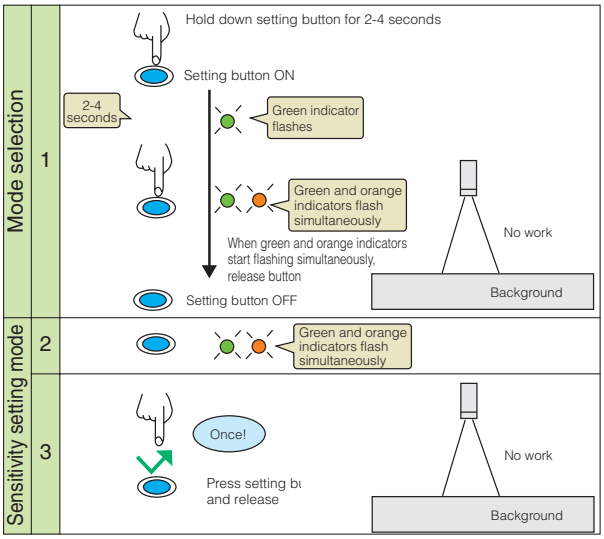
Sensitivity setting

The factory setting is maximum sensitivity. No special sensitivity adjustment is required if there is no background object in the direction of the detection. Adjust the sensitivity as required depending on whether there is any background object such as a wall or conveyor and according to the state of the detection object or sensor mounting condition. Use the table below as guidelines:

Detection object	Sensitivity setting
With background object such as wall	⇨ Single-touch teaching
Continuously moving object such as falling object	⇨ Full auto teaching

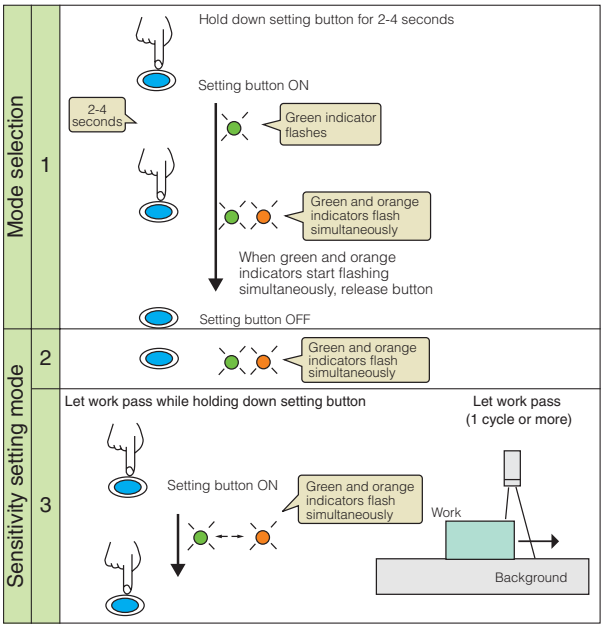
Single-touch teaching —Auto teaching—

No work needs to be placed. Just a single operation of the button sets the optimum sensitivity for the given received light intensity even an object such as wall is in the background.



Full auto teaching

When it is not possible to make ‘no-work’ state as in detection of continuously moving (e.g. falling) object



For Correct Use

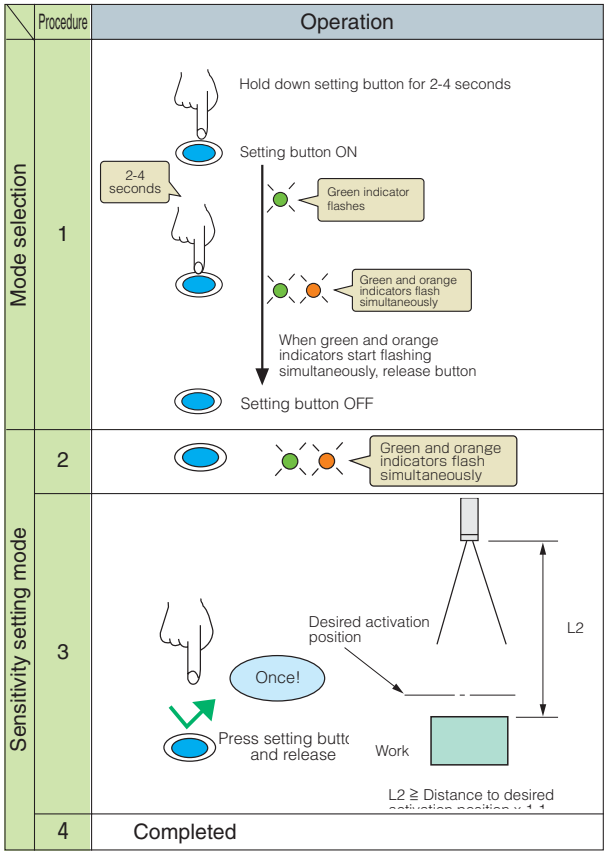
Be sure to follow the instructions in the operation manual provided for correct use of the product.

Arbitrary activation position setting

To set the detection point of the sensor at an arbitrary position

Place the work at a point about 90 % of the distance to the desired activation position and select the sensitivity setting mode.

Move the work to a point about 110 % of the distance to the desired activation position and press the setting button once.

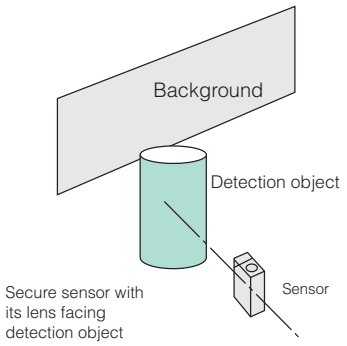


Although shorter distance between L1 and L2 allows more precise setting, too short a distance makes the setting similar to the single-touch teaching with only the background taken into account.

Try to make the difference between L1 and L2 at least ±10 % of the distance to the desired activation position whenever possible.

Installation

- No mounting bracket is provided. Purchase mounting brackets separately available according to the application.
- Sensor mounting
  The mounting holes in the sensor are M3 threaded. Select M3 screws of an appropriate length so that the screw-in length to the body of the sensor will be at least 10 mm.
  The tightening torque should be up to 0.5 N·m.
  If the effective length of the screw to the sensor is too short, the thread of the sensor may be damaged.
- Secure the sensor firmly on a solid base so that the sensor will not move when the setting button is pressed.
  Inadequate securing allowing the sensor to move when the setting button is pressed hampers accurate sensitivity setting.



- If the ambient temperature is low enough for freezing to occur, the operation of the setting button may not feel smooth. In such a case, press hard until the indicator flashes.