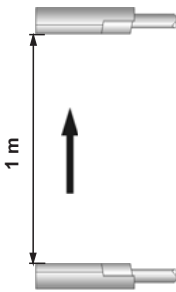

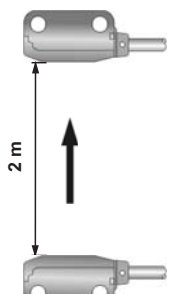

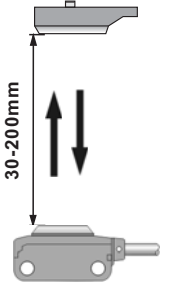



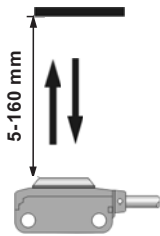

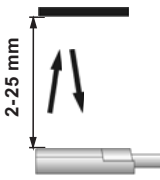

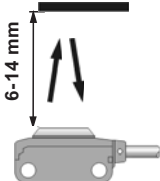

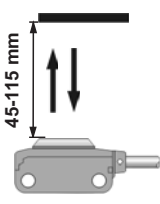

## Selection Guide

Sensing Mode	Connection	Supply Voltage	Output Mode	Part Number
 <p><b>Thru-beam mode</b> (Front sensing) <b>Sensing Distance</b> 1m <b>Light source</b> Red LED</p>	<p>2m Cable</p> 	<p>10-30V DC</p>	Emitter	<u>RP16-T1000D-EY6C2L2</u>
			NPN Light-ON	<u>RP16-T1000N-LY6C3U2</u>
			NPN Dark-ON	<u>RP16-T1000N-DY6C3U2</u>
			PNP Light-ON	<u>RP16-T1000P-LY6C3U2</u>
			PNP Dark-ON	<u>RP16-T1000P-DY6C3U2</u>
 <p><b>Thru-beam mode</b> (Side sensing) <b>Sensing Distance</b> 2 m <b>Light source</b> Red LED</p>	<p>2m Cable</p> 	<p>10-30V DC</p>	Emitter	<u>RP16-T2000D-EY6C2L2-SD</u>
			NPN L.O./D.O.	<u>RP16-T2000N-CY6C3U2-SD</u>
			PNP L.O./D.O.	<u>RP16-T2000P-CY6C3U2-SD</u>
			---	---
			---	---
 <p><b>Retroreflective mode</b> (Side sensing) <b>Sensing Distance</b> 30 to 200 mm <b>Light source</b> Red LED</p>	<p>2m Cable</p> 	<p>10-30V DC</p>	NPN Light-ON	<u>RP16-L0200N-LY6C3U2-SD</u>
			NPN Dark-ON	<u>RP16-L0200N-DY6C3U2-SD</u>
			PNP Light-ON	<u>RP16-L0200P-LY6C3U2-SD</u>
			PNP Dark-ON	<u>RP16-L0200P-DY6C3U2-SD</u>
			---	---

**Note:**

Coming Soon : Part numbers with underline  
 In Preparation: Part numbers with a line through the middle  
 — Am-01 —

## Selection Guide

Sensing Mode	Connection	Supply Voltage	Output Mode	Part Number
 <p><b>Diffuse mode</b> (Side sensing) <b>Sensing Distance</b> 5 to 160 mm <b>Light source</b> Red LED</p>	2m Cable 	10-30V DC	NPN Light-ON	<u>RP16-D0160N-LY6C3U2-SD</u>
			NPN Dark-ON	<u>RP16-D0160N-DY6C3U2-SD</u>
			PNP Light-ON	<u>RP16-D0160P-LY6C3U2-SD</u>
			PNP Dark-ON	<u>RP16-D0160P-DY6C3U2-SD</u>
 <p><b>Convergent mode</b> (Front sensing) <b>Convergent point</b> 10 mm <b>Sensing Distance</b> 2 to 25 mm <b>Light source</b> Red LED</p>	2m Cable 	10-30V DC	NPN Light-ON	<u>RP16-C0025N-LY6C3U2</u>
			NPN Dark-ON	<u>RP16-C0025N-DY6C3U2</u>
			PNP Light-ON	<u>RP16-C0025P-LY6C3U2</u>
			PNP Dark-ON	<u>RP16-C0025P-DY6C3U2</u>
 <p><b>Convergent mode</b> (Side sensing) <b>Convergent point</b> 10 mm <b>Sensing Distance</b> 6 to 14 mm <b>Light source</b> Red LED</p>	2m Cable 	10-30V DC	NPN Light-ON	<u>RP16-C0014N-LY6C3U2-SD</u>
			NPN Dark-ON	<u>RP16-C0014N-DY6C3U2-SD</u>
			PNP Light-ON	<u>RP16-C0014P-LY6C3U2-SD</u>
			PNP Dark-ON	<u>RP16-C0014P-DY6C3U2-SD</u>
 <p><b>Narrow view mode</b> (Side sensing) <b>Sensing Distance</b> 45 to 115 mm <b>Light source</b> Red LED</p>	2m Cable 	10-30V DC	NPN Light-ON	<u>RP16-D0115N-LY6C3U2-SD</u>
			NPN Dark-ON	<u>RP16-D0115N-DY6C3U2-SD</u>
			PNP Light-ON	<u>RP16-D0115P-LY6C3U2-SD</u>
			PNP Dark-ON	<u>RP16-D0115P-DY6C3U2-SD</u>

**Note:**  
 Coming Soon : Part numbers with underline  
 In Preparation: Part numbers with a line through the middle  
 —Am-02—

## Options

Designation		Model No.	Description	
Round slit mask (For thru-beam type sensor only)	For front sensing type	RP16-A1 (Slit size: $\phi$ 0.5mm)	Slit on one side	Sensing range:200mm Min. sensing object: $\phi$ 2.6mm
			Slit on both sides	Sensing range:40mm Min. sensing object: $\phi$ 0.5mm
	For side sensing type	RP16-A2 (Slit size: $\phi$ 0.5mm)	Slit on one side	Sensing range:350mm Min. sensing object: $\phi$ 3mm
			Slit on both sides	Sensing range:70mm Min. sensing object: $\phi$ 0.5mm
Rectangular slit mask (For thru-beam type sensor only)	For front sensing type	RP16-A3 (Slit size:0.5x3mm)	Slit on one side	Sensing range: 600mm Min. sensing object: $\phi$ 2.6mm
			Slit on both sides	Sensing range:300mm Min. sensing object: 0.5x3mm
	For side sensing type	RP16-A4 (Slit size:0.5x3mm)	Slit on one side	Sensing range:800mm Min. sensing object: $\phi$ 3mm
			Slit on both sides	Sensing range:400mm Min. sensing object: 0.5x3mm
Sensor mounting bracket		RP16-A5	Back angled mounting bracket for front sensing type sensor (The thru-beam type sensor needs two brackets)	
		RP16-A6	Foot angled mounting bracket for side sensing type sensor (The thru-beam type sensor needs two brackets)	
		RP16-A7	L-shaped mounting bracket for front sensing type sensor (The thru-beam type sensor needs two brackets)	
		RP16-A8	Back angled mounting bracket for side sensing type sensor (The thru-beam type sensor needs two brackets)	
Universal sensor mounting bracket (Only for thru-beam mode side sensing type sensor)		RP16-A9	It can adjust the height and the angle of the sensor. (Two brackets are needed)	
Mounting spacer (For front sensing type sensor only)		RP16-A10	It is used when mounting the front sensing type from the rear side. (One set consists of 10 pcs.)	

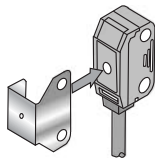
### Round slit mask

Fitted on the front face of the sensor with one-touch.

RP16-A1



RP16-A2



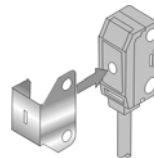
### Rectangular slit mask

Fitted on the front face of the sensor with one-touch.

RP16-A3

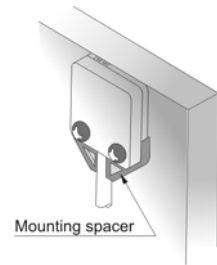


RP16-A4



### Mounting spacer

RP16-A10



### Sensor mounting bracket

RP16-A5



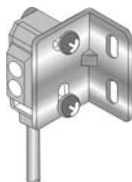
RP16-A6



RP16-A7

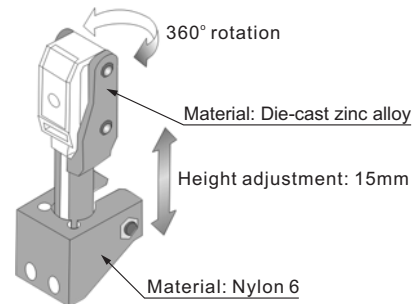


RP16-A8



### Universal sensor mounting bracket

RP16-A9

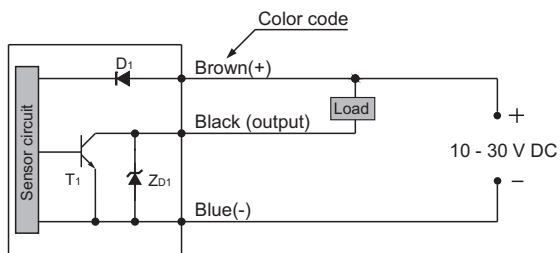


## Specifications

Item	Type	Thru-beam		Retroreflective	Diffuse	Convergent mode		Narrow view	
		Front sensing	Side sensing	Front sensing	Side sensing	with diffused beam	with small spot beam	Long distance spot beam type	
				Front sensing	Side sensing	Front sensing	Side sensing	Side sensing	
Sensing range		1m	2m	30 to 200 mm	5 to 160 mm with white non-glossy paper (200x200 mm)	2 to 25 mm (Conv. point:10 mm) with white non-glossy paper(50x50 mm)	6 to 14 mm(Conv. point: 10mm) with white non-glossy paper(50x50mm), spot diameter φ 1mm with setting distance 10mm	45 to 115mm with white non-glossy paper (100x100mm) spot diameter φ 5mm with setting distance 80mm	
Sensing object		Min. φ2.6 mm opaque object (Setting distance between emitter and receiver: 1 m)	Min. φ3 mm opaque object (Setting distance between emitter and receiver: 2 m)	φ15 mm or more opaque or translucent object	Opaque, translucent or transparent object	Min. φ 0.1 mm copper wire at Setting distance: 10mm	Min. φ 0.1 mm copper wire at Setting distance: 10mm	Opaque, translucent or transparent object (Min. φ 1mm copper wire at setting distance: 80mm)	
Hysteresis		—————			15 % or less of operation distance				
Repeatability		0.05 mm or less		0.5 mm or less	0.3 mm or less	0.1 mm or less at setting distance: 10mm	0.05 mm or less at setting distance:10mm	0.3 mm or less	
Supply power		10 - 30 V DC 10% Ripple P-P % or less							
Current consumption		Emitter: 10mA or less, Receiver: 15mA or less		20 mA or less					
Output		<NPN output type> NPN open-collector transistor Maximum sink current: 50 mA Applied voltage: 30V DC or less(between output and 0V) Residual voltage: 1V or less(at 50 mA sink current) 0.4 V or less (at 16 mA sink current)				<PNP output type> PNP open-collector transistor Maximum source current: 50 mA Applied voltage: 30V DC or less(between output and +V) Residual voltage: 1V or less(at 50 mA source current) 0.4 V or less (at 16 mA source current)			
Short-circuit protection		Incorporated							
Light source		Red LED (modulated)							
Response time		0.5 ms or less							
Operation indicator		Orange LED (lights up when the output is ON)(thru-beam type: located on the receiver)							
Stability indicator		Green LED(lights up under stable light received condition or stable dark condition), located on the receiver		Green LED (lights up under stable light received condition or stable dark condition)					
Sensitivity adjuster		—————	Continuously variable adjuster, located on the emitter	Continuously variable adjuster	—————	Continuously variable adjuster			
Operation mode switch		—————	Located on the receiver	—————					
Pollution degree		3(Industrial environment)							
Protection		IP67 (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							
Ambient illuminance		Sunlight:11,000 ℓx at the light-receiving face, Incandescent light:3500 ℓ x at the light-receiving face							
EMC		IEC 60947-5-2 Parts 7.2.6.1,2,3 or RFI>3V/m(In30-1000MHz),EFT>1KV,ESD>4KV(contact)							
Voltage withstandability		IEC 60947-5-2 Parts 8.3.3.4, or 500VDC for one min between all supply terminals connected together and enclosure							
Insulation resistance		>20MΩ, with 250V DC megger between all supply terminals connected together and enclosure							
Vibration resistance		IEC 60947-5-2 Parts 7.4.2 or 10-55Hz 1.0m amplitude in x, y and z directions for 30 min							
Shock resistance		IEC 60947-5-2 Parts 7.4.1 or 30g 11ms in x, y and z directions for six time each							
Material		Enclosure: Polyethylene terephthalate, Lens: Polyalylate							
Cable		0.1 mm <sup>2</sup> 3-core (thru-beam type sensor emitter: 2-core) cabtyre cable, 2 m long							
Cable extension		Extension up to total 50m is possible with 0.3mm <sup>2</sup> , or more, cable (thru-beam type: both emitter and receiver).							
Weight		Emitter: 20g approx., Receiver: 20g approx.		20g approx.					
Accessories		—————	Adjusting screwdriver: 1pc.	Adjusting screwdriver: 1pc.	Adjusting screwdriver: 1pc.	—————	Adjusting screwdriver: 1pc.		

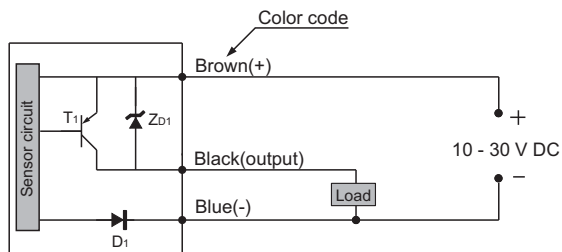
## Connection Diagrams

### NPN output type



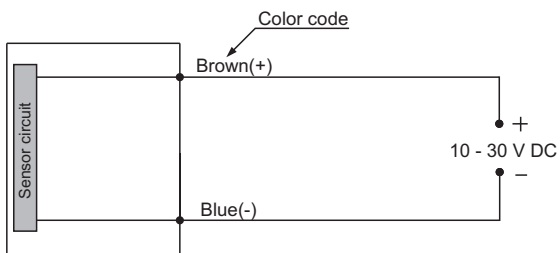
Symbols...D1: Reverse supply polarity protection diode  
ZD1: Surge absorption zener diode  
T1: NPN output transistor

### PNP output type



Symbols...D1: Reverse supply polarity protection diode  
ZD1: Surge absorption zener diode  
T1: PNP output transistor

### Emitter

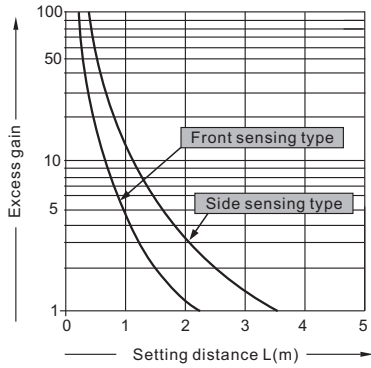


## Sensing Characteristics (Typical)

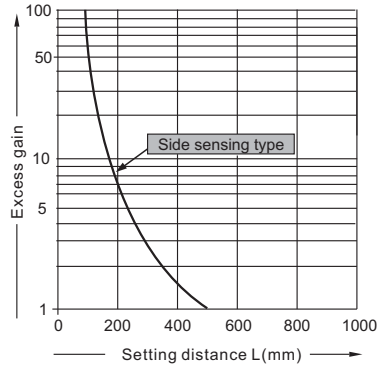
### Thru-beam, Retroreflective & Diffuse mode sensor

Correlation between setting distance and excess gain

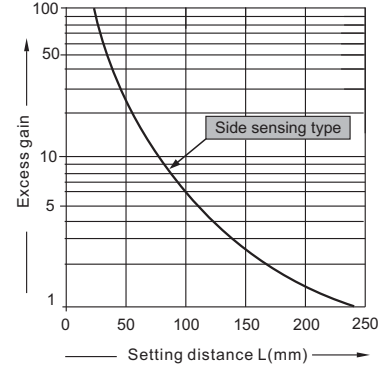
Thru-beam Sensor



Retroreflective Sensor

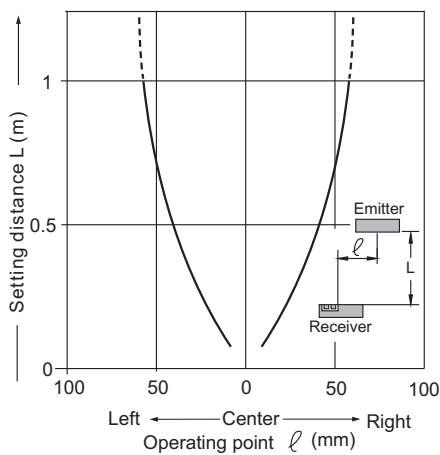


Diffuse Sensor

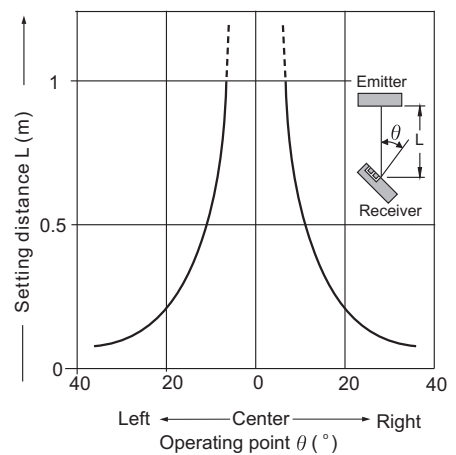


### Thru-beam mode sensor (Front sensing type)

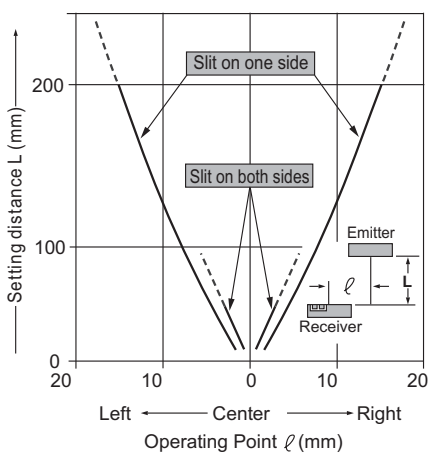
Parallel deviation



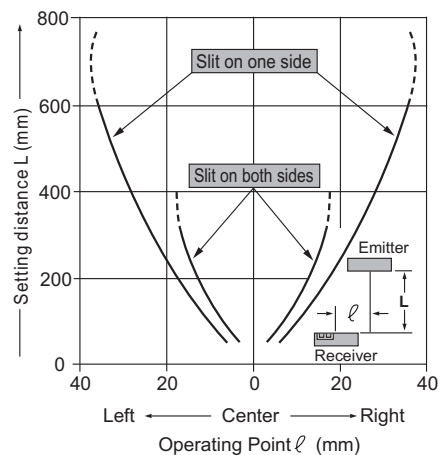
Angular deviation



Parallel deviation with round slit masks ( $\phi 0.5\text{mm}$ )



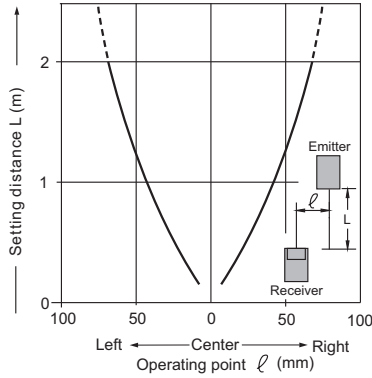
Parallel deviation with rectangular slit masks (0.5 X 3 mm)



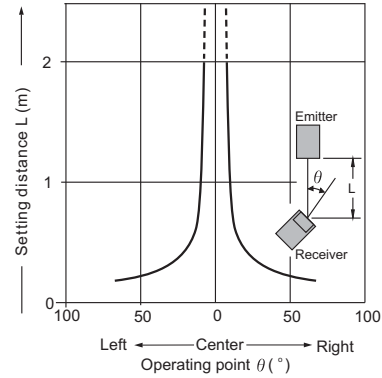
## Sensing Characteristics (Typical)

### Thru-beam mode sensor (Side sensing type)

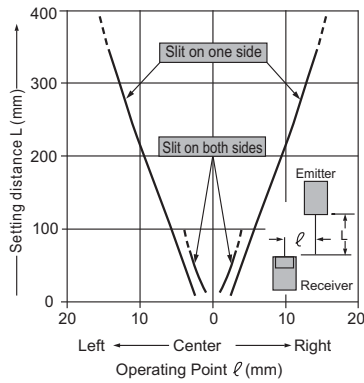
Parallel deviation



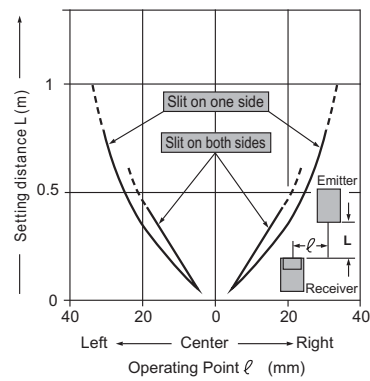
Angular deviation



Parallel deviation with round slit masks ( $\phi 0.5\text{mm}$ )

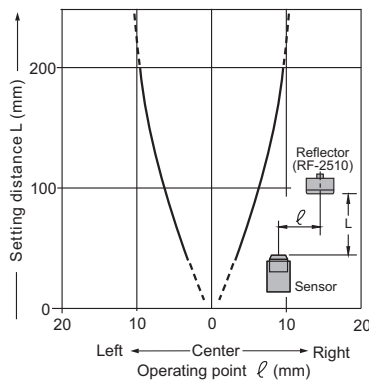


Parallel deviation with rectangular slit masks ( $0.5 \times 3\text{ mm}$ )

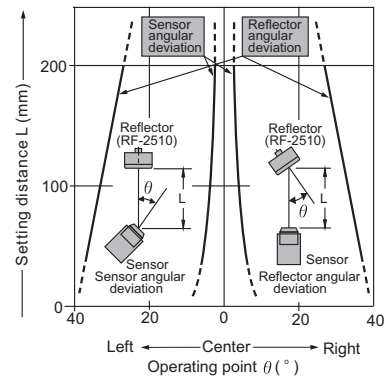


### Retroreflective mode sensor (Side sensing type)

Parallel deviation



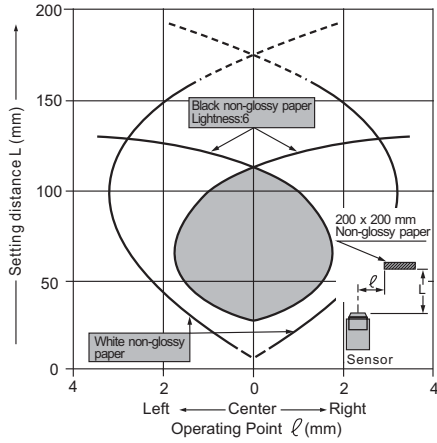
Angular deviation



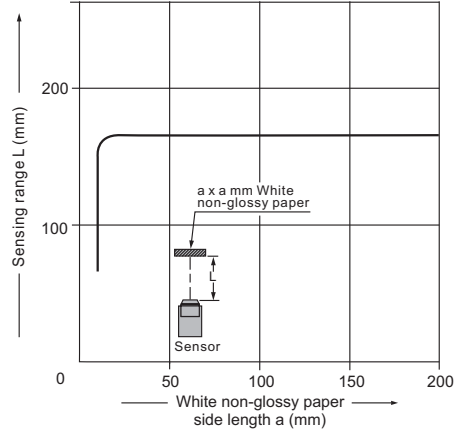
## Sensing Characteristics (Typical)

### Diffuse mode sensor (Side sensing type)

#### Sensing field



#### Correlation between sensing object size and sensing range

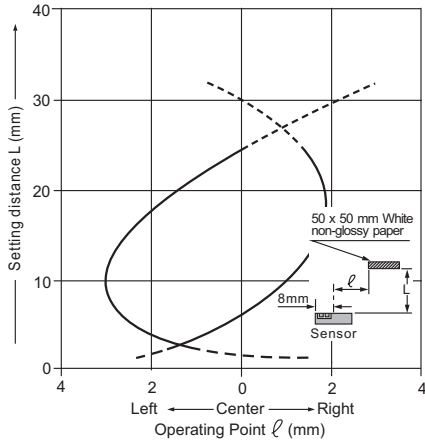


As the sensing object size becomes smaller than standard size (white non-glossy paper 200x200 mm), the sensing range shortens, as shown in the left graph.

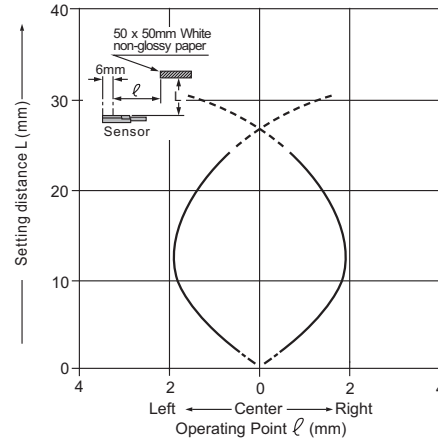
### Convergent mode sensor (Front sensing type)

#### Sensing field

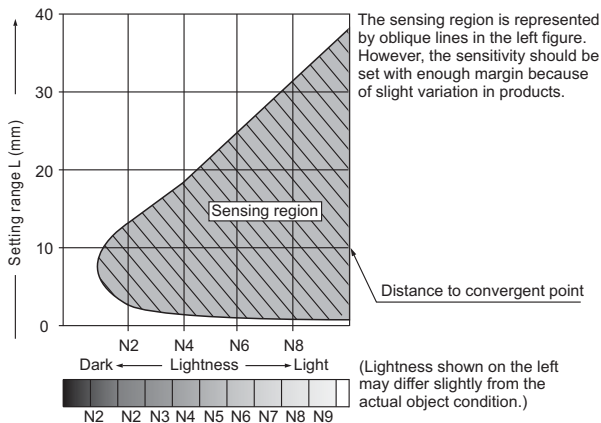
##### • Horizontal (left and right) direction



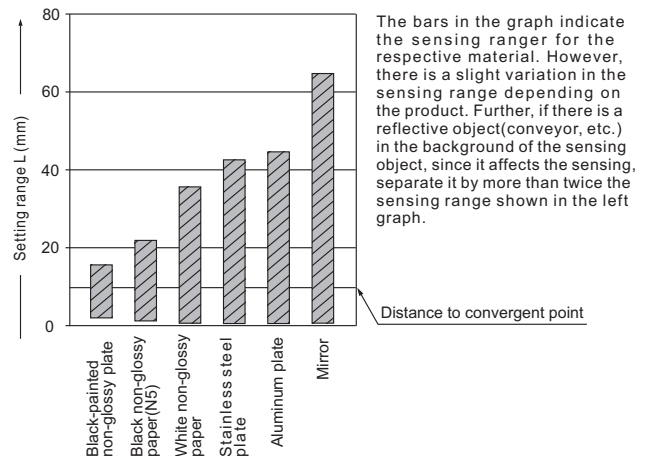
##### • Vertical (up and down) direction



#### Correlation between lightness and sensing range



#### Correlation between material (50x50mm) and sensing range



Am: RP16 SERIES

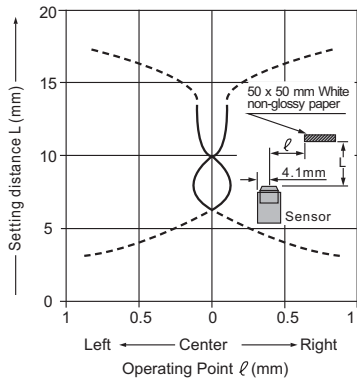


## Sensing Characteristics (Typical)

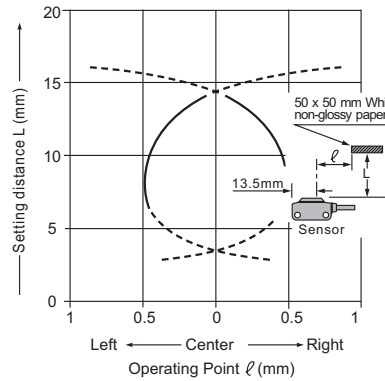
### Convergent mode sensor (Side sensing type)

#### Sensing field

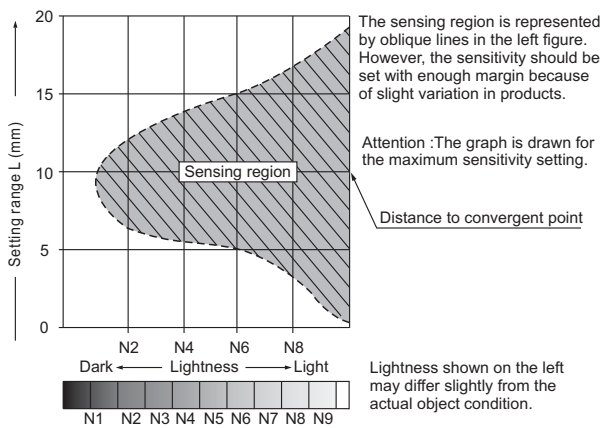
##### • Horizontal (left and right) direction



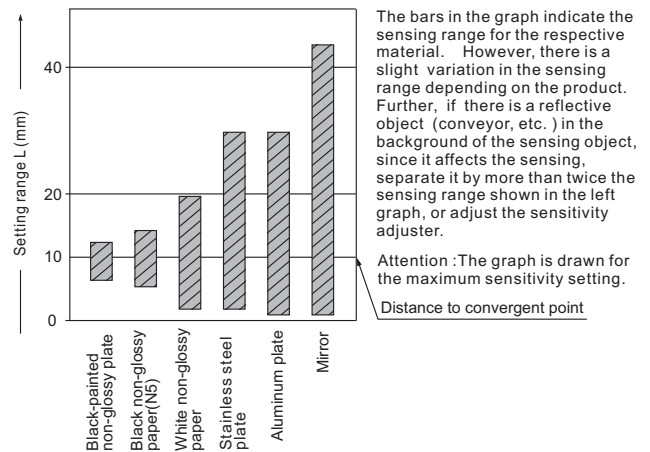
##### • Vertical (up and down) direction



#### Correlation between lightness and sensing range

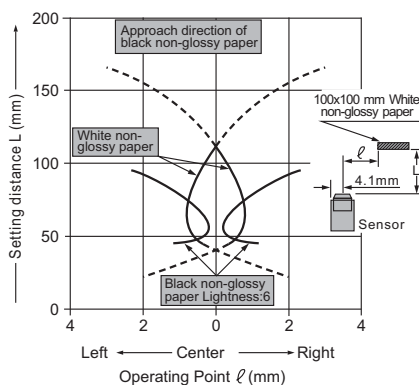


#### Correlation between material(50x50mm)and sensing range

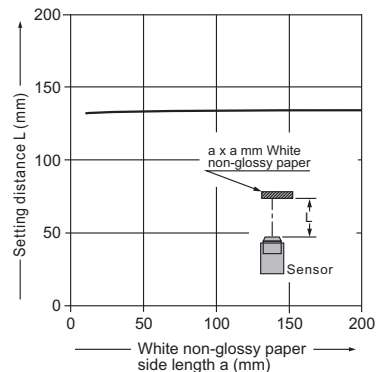


### Narrow View mode sensor (Side sensing type)

#### Sensing field



#### Correlation between sensing object size and sensing range



As the sensing object size becomes smaller than the standard size (white non-glossy paper 100x100 mm), the sensing range shortens, as shown in the left graph.

## Precautions for Proper Use

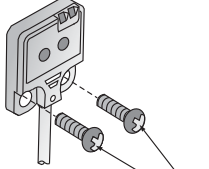


This product is not a safety sensor. Its use is not intended or designed to protect life and prevent body injury or property damage from dangerous parts of machinery. It is a normal object detection sensor.

### Mounting

- Mounting using M3 screws. The tightening torque should be 0.5 N·m or less.

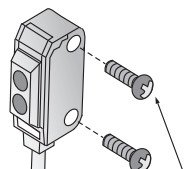
#### Front sensing type



#### M3 pan head screws (Note)

Note: When mounting the front sensing type sensor, use M3 pan head screws without washers, etc.

#### Side sensing type

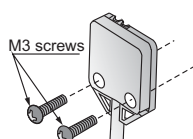
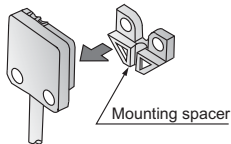


#### M3 screws

- When mounting the front sensing type from the backside, fit the mounting spacer RP16-A10 and fix with screws.

### Mounting method

- (1) Fit the mounting spacer on the sensor.
- (2) Align the mounting holes of the mounting spacer and the sensor and mount with M3 screws. The tightening torque should be 0.5 N·m or less.



### Sensitivity adjustment (Side sensing type only)

Step	Sensitivity adjuster	Description
(1)		Turn the sensitivity adjuster fully counterclockwise to the minimum sensitivity position (* mark).
(2)		In the light received condition, turn 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, this extreme position is point (B).)
(4)		The position at the middle of points (A) and (B) is the optimum sensing position.

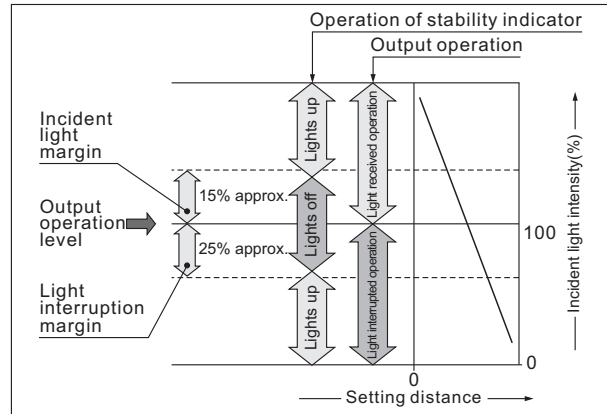
- Notes 1): Use the attached adjusting screwdriver to turn the adjuster slowly. Turning with excessive strength will damage the adjuster.  
 2): In case of using diffuse mode sensor at a sensing distance of 50 mm or less, take care that the sensitivity adjustment range becomes extremely narrow.

### Operation mode switch (Thru-beam side sensing type only)

Switch position	Description
	Light-ON mode is obtained when operation mode switch (located on the receiver) is turned fully clockwise (L side).
	Dark-ON mode is obtained when operation mode switch (located on the receiver) is turned fully counterclockwise (D side).

### Stability indicator

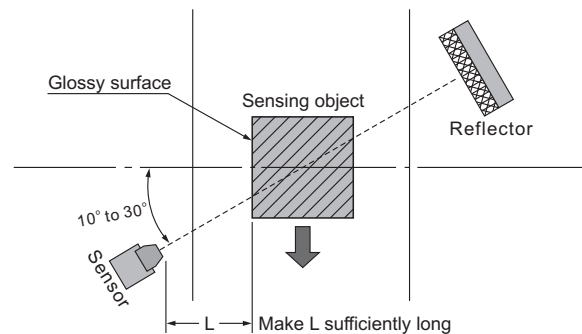
- The stability indicator (green) lights up when the incident light intensity has sufficient margin with respect to the operation level. If the incident light intensity level is such that the stability indicator lights up, stable sensing can be done without the light received operation and the light interrupted operation being affected by a change in ambient temperature or supply voltage.



### Glossy object sensing (Retroreflective mode sensor)

- Please take care of the following points when detecting materials having a gloss.

- (1) Make L, shown in the diagram, sufficiently long.
- (2) Install at an angle of 10°~30° to the sensing object.



### Wiring

- Make sure that the power supply is off while wiring. 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.

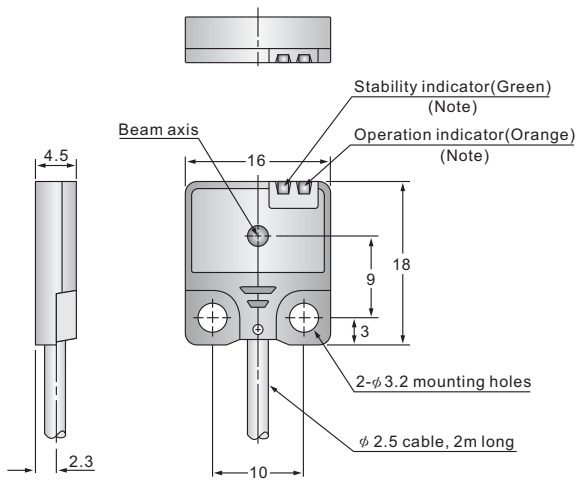
### Others

- Do not use during the initial transient time (50 ms) after the power supply vis switched on.
- If sensors are mounted close together and the ambient temperature is near the maximum rated value, provide for enough heat radiation/ventilation.
- If a reflective object is present in the background, the sensing of narrow view type sensor may be affected.
- When setting the sensor, make sure to confirm that the reflective object affects the sensing, take measures such as removing the reflective object or coloring it in black, etc.

## Dimensions (Unit: mm)

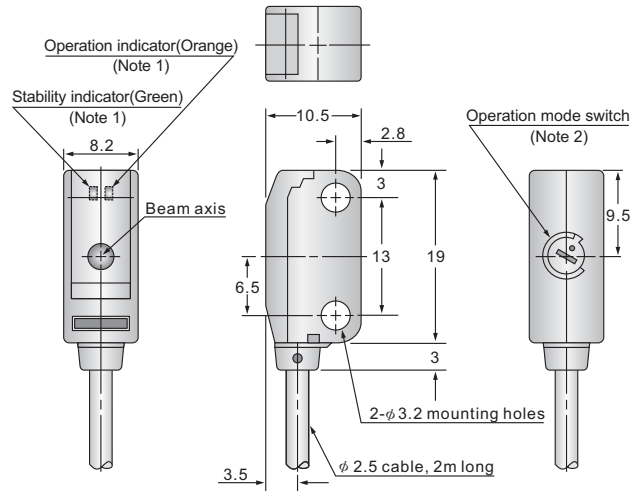
Am: RP16 SERIES

### Thru-beam Sensor (Front sensing type)



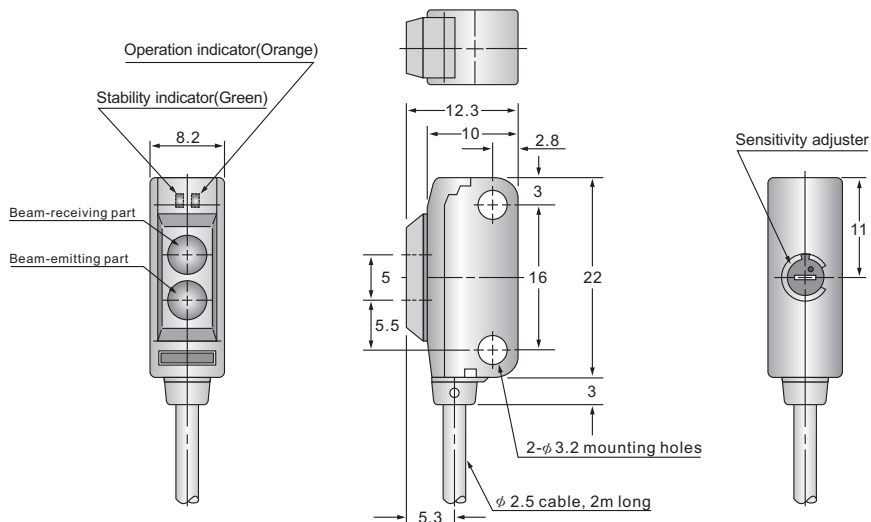
Note: Not incorporated on the emitter.

### Thru-beam Sensor (Side sensing type)

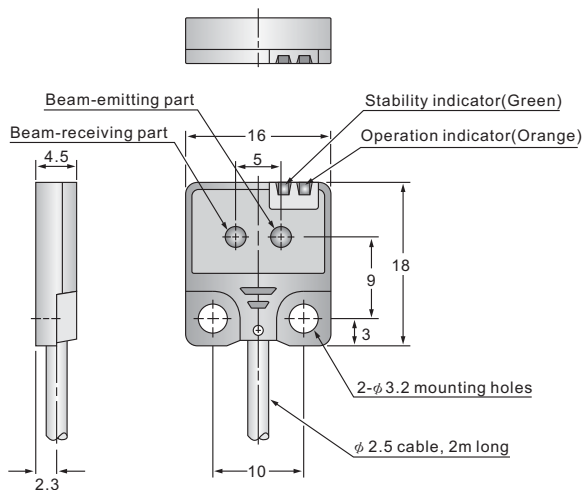


Note (1): Not incorporated on the emitter.  
Note (2): It is sensitivity adjuster on the emitter.

### Retroreflective, Diffuse, Convergent Narrow View Sensor (Side sensing type)

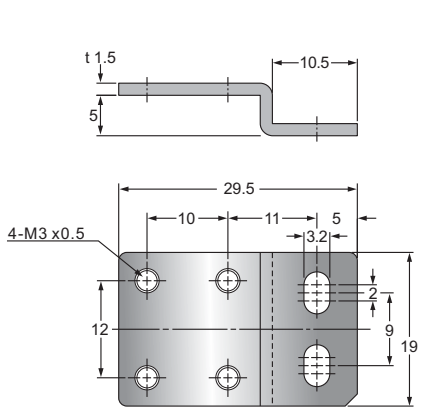


### Convergent Sensor (Front sensing type)



## Dimensions (Unit: mm)

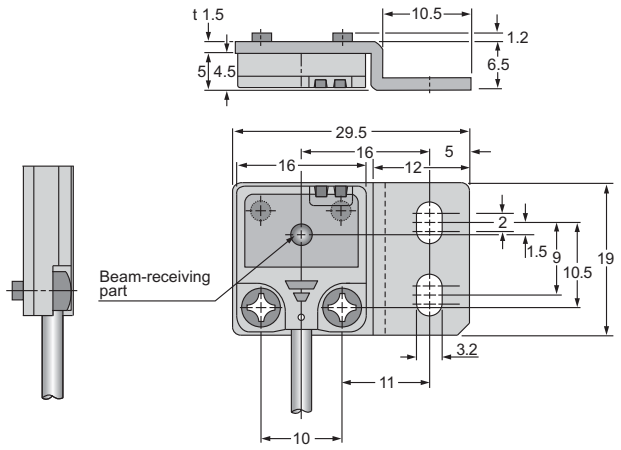
### RP16-A5 (Sensor mounting bracket-optional)



Material: Stainless steel (SUS304)  
Two M3 (length 5mm) pan head screws [stainless steel (SUS304)] are attached.

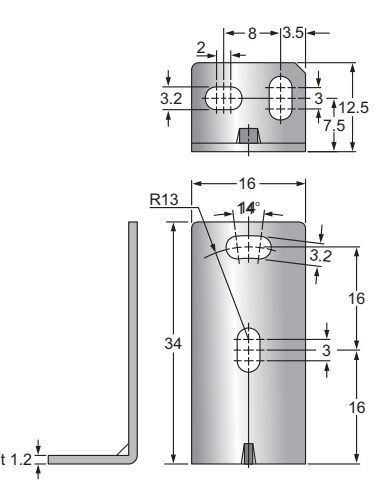
#### Assembly dimensions

Mounting drawing with the receiver of the Thru-beam mode front sensing type sensor



Am: RP16 SERIES

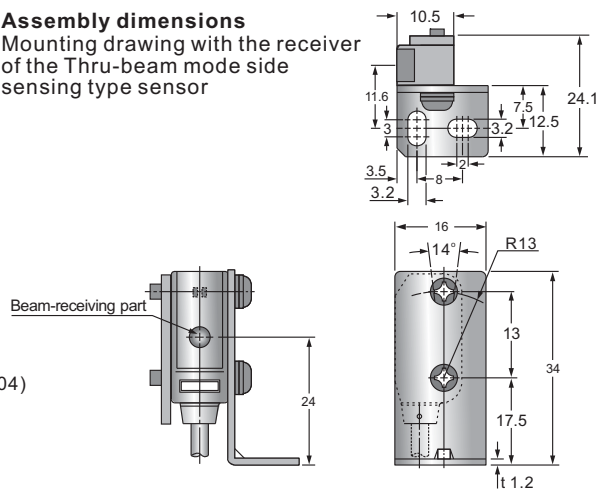
### RP16-A6 (Sensor mounting bracket-optional)



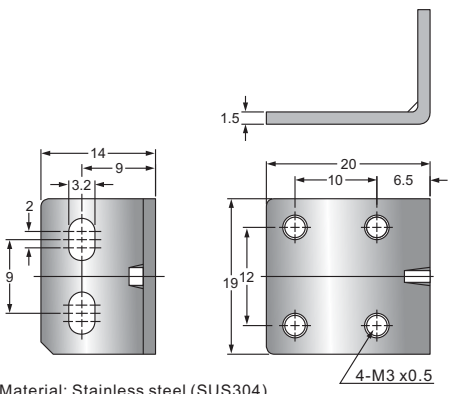
Material: Stainless steel (SUS304)  
Two M3 (length 14mm) screws with washers [stainless steel (SUS304)] are attached.

#### Assembly dimensions

Mounting drawing with the receiver of the Thru-beam mode side sensing type sensor



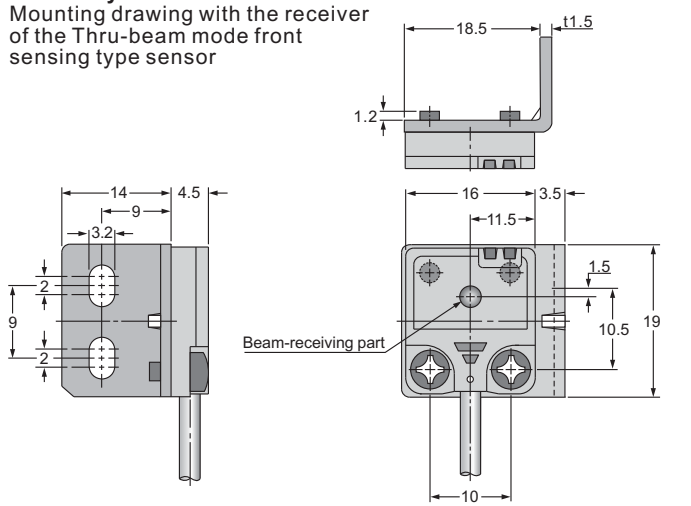
### RP16-A7 (Sensor mounting bracket-optional)



Material: Stainless steel (SUS304)  
Two M3 (length 5mm) pan head screws [stainless steel (SUS304)] are attached.

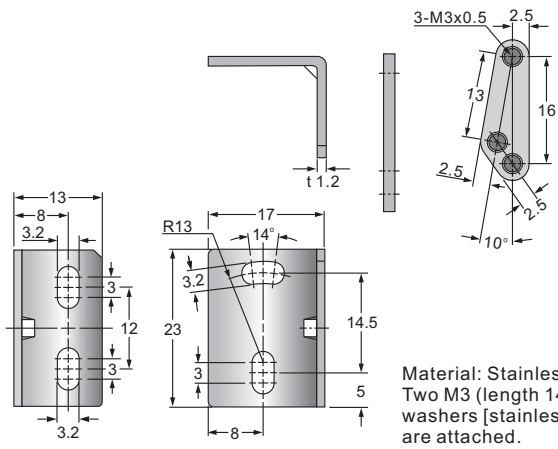
#### Assembly dimensions

Mounting drawing with the receiver of the Thru-beam mode front sensing type sensor



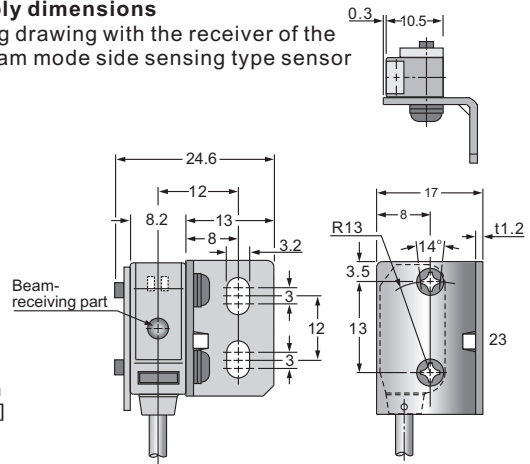
## Dimensions (Unit: mm)

### RP16-A8 (Sensor mounting bracket-optional)

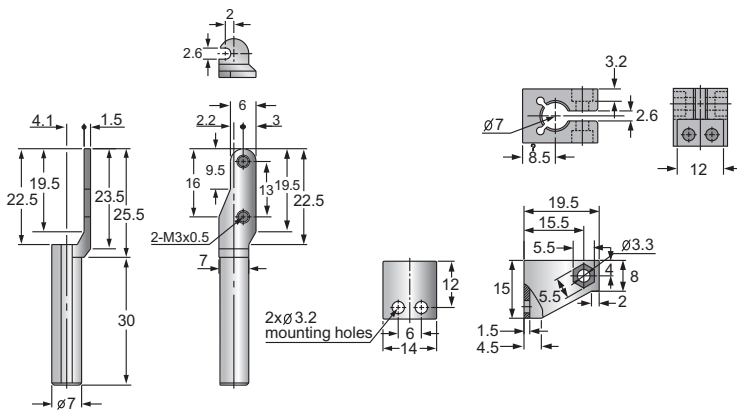


#### Assembly dimensions

Mounting drawing with the receiver of the Thru-beam mode side sensing type sensor

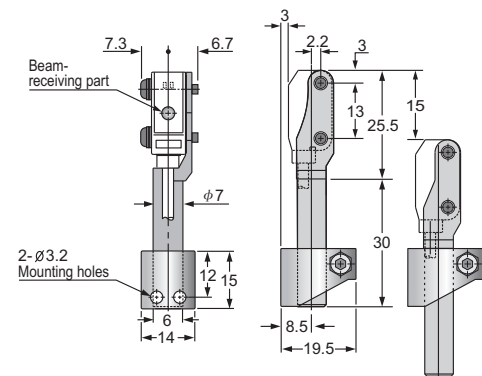


### RP16-A9 (Universal sensor mounting bracket-optional)

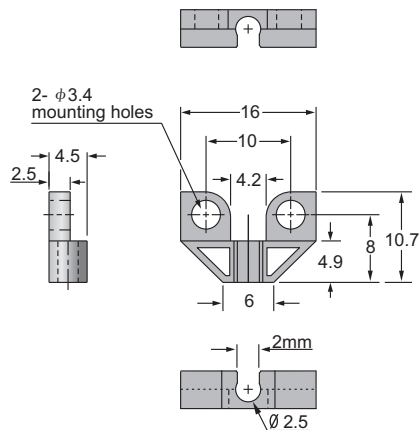


#### Assembly dimensions

Mounting drawing with the receiver of the Thru-beam mode side sensing type sensor



### RP16-A10 (Mounting spacer-optional)



#### Assembly dimensions

Mounting drawing with the receiver of the Thru-beam mode front sensing type sensor

