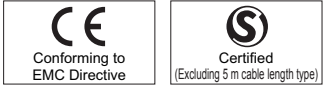


# EX-40 SERIES

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- MICRO PHOTOELECTRIC SENSORS
- AREA SENSORS
- LIGHT CURTAINS
- PRESSURE / FLOW SENSORS
- INDUCTIVE PROXIMITY SENSORS
- PARTICULAR USE SENSORS
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- WIRE-SAVING SYSTEMS
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- FA COMPONENTS
- MACHINE VISION SYSTEMS
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Related Information ■ General terms and conditions..... F-17 ■ Sensor selection guide ..... P.283~  
 ■ Glossary of terms / General precautions ..... P.1359~ / P.1405 ■ Korea's S-mark..... P.1410



[panasonic-electric-works.net/sunx](http://panasonic-electric-works.net/sunx)

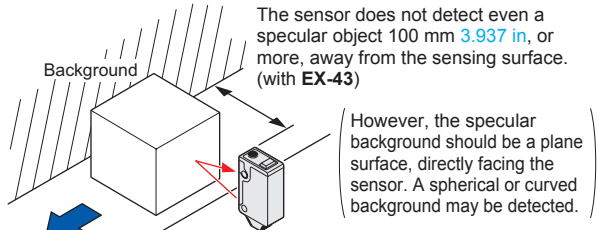
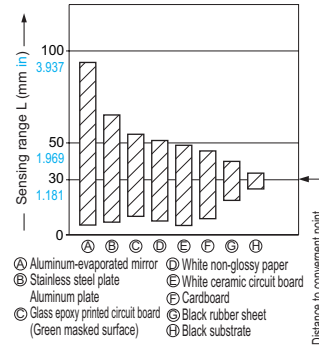


## Reliable object detection in limited area

### Stable convergent distance sensing

Due to convergent distance sensing, the color or material of the object has almost no effect. Further, the background also has very little effect, enabling stable sensing.

EX-43: Correlation between material and sensing range

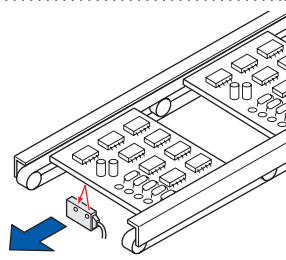


### FUNCTIONS

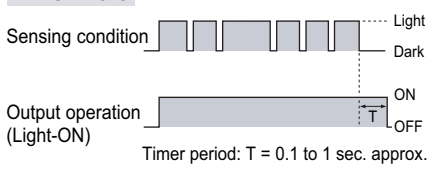
#### Variable OFF-delay timer

EX-43T

The spot-beam type EX-43T is incorporated with an OFF-delay timer. The variable OFF-delay timer is useful for detecting a printed circuit board regardless of small holes, cutouts, or electronic parts on it.



#### Time Chart



### MOUNTING / SIZE

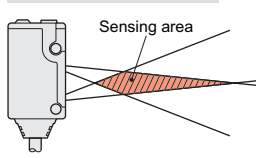
Compact size (W10 × H30 × D18 mm **W0.394 × H1.181 × D0.709 in**)

It can be installed in a limited space.

### VARIETIES

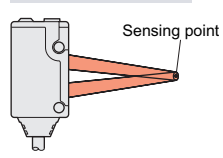
#### Various applications

##### Diffused beam type



Even in a limited sensing area, the sensor is not affected by small perforations or unevenness. It is suitable for presence detection.

##### Spot-beam type

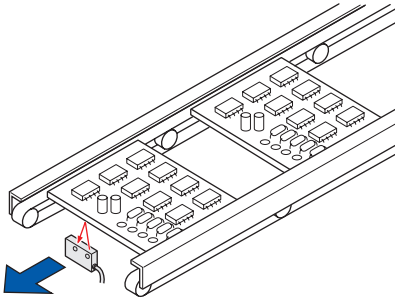


- Visible red spot beam allows easy targeting.
- It is suitable for positioning because of its 0.05 mm **0.002 in** repeatability.

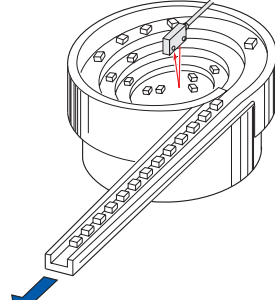
- Selection Guide
- Amplifier Built-in
- Power Supply Built-in
- Amplifier-separated
- CX-400
- EX-10
- EX-20
- EX-30
- EX-40
- CX-440
- EQ-30
- EQ-500
- MQ-W
- RX-LS200
- RX
- RT-610

**APPLICATIONS**

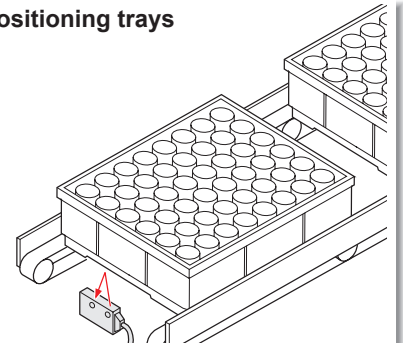
**Determining PCB position**



**Sensing parts in feeder**



**Positioning trays**



**ORDER GUIDE**

Type	Appearance	Sensing range (Note 1)	Model No.	Output	Sensitivity adjuster	Timer function	Emitting element
Diffused beam type Long sensing range		5 to 38 mm <b>0.197 to 1.496 in</b> (Convergent point: 20 mm <b>0.787 in</b> )	<b>EX-42</b>	NPN open-collector transistor	—	—	Infrared LED
		10 to 70 mm <b>0.394 to 2.756 in</b> (Convergent point: 40 mm <b>1.575 in</b> )	<b>EX-44</b>				
Spot-beam type With timer		20 to 35 mm <b>0.787 to 1.378 in</b> (Convergent point: 30 mm <b>1.181 in</b> )	<b>EX-43</b>		—	Incorporated	Red LED
			<b>EX-43T</b>				

**NOTE:** Mounting bracket is not supplied with the sensor. Please select from the range of optional sensor mounting brackets (two types).

Note: The sensor does not detect even a specular background if it is separated by the distance specified below.  
**EX-42**...150 mm **5.906 in** or more, **EX-44**...300 mm **11.811 in** or more, **EX-43** and **EX-43T**...100 mm **3.937 in** or more  
 (These are typical values. However, the specular background should be a plane surface, directly facing the sensor.)  
 (A spherical or curved background may be detected.)

**5 m 16.404 ft cable length type**

5 m **16.404 ft** cable length type (standard: 2 m **6.562 ft**) is also available.  
 When ordering this type, suffix “-C5” to the model No.  
 (e.g.) 5 m **16.404 ft** cable length type of **EX-42** is “**EX-42-C5**”.

**OPTIONS**

Designation	Model No.	Description	
Sensor mounting bracket	<b>MS-EX40-1</b>	Rear mounting bracket	
	<b>MS-EX40-2</b>	Bottom mounting bracket	
Universal sensor mounting stand (Note)	<b>MS-AJ1</b>	Horizontal mounting type	Basic assembly
	<b>MS-AJ2</b>	Vertical mounting type	
	<b>MS-AJ1-A</b>	Horizontal mounting type	Lateral arm assembly
	<b>MS-AJ2-A</b>	Vertical mounting type	

Note: Refer to the universal sensor mounting stand **MS-AJ** pages for details.

**Universal sensor mounting stand**

**• MS-AJ1**

Swivel: 360° rotation  
Elevation angle: ±45°  
Height adjustment: 150 mm **5.906 in** approx.  
Mounting hole for M6 screw

**• MS-AJ1-A**

Swivel: 360° rotation  
Forward / back adjustment: 130 mm **5.118 in**  
Height adjustment: 150 mm **5.906 in** approx.  
Angle adjustment: ±45°  
Mounting hole for M6 screw

**• MS-AJ2**

Swivel: 360° rotation  
Elevation angle: ±45°  
Height adjustment: 150 mm **5.906 in** approx.  
Mounting hole for M6 screw

**• MS-AJ2-A**

Swivel: 360° rotation  
Forward / back adjustment: 130 mm **5.118 in**  
Height adjustment: 150 mm **5.906 in** approx.  
Angle adjustment: ±45°  
Mounting hole for M6 screw

**Sensor mounting bracket**

**• MS-EX40-1**

Two M3 (length 16 mm **0.630 in**) screws with washers are attached.

**• MS-EX40-2**

Two M3 (length 16 mm **0.630 in**) screws with washers are attached.

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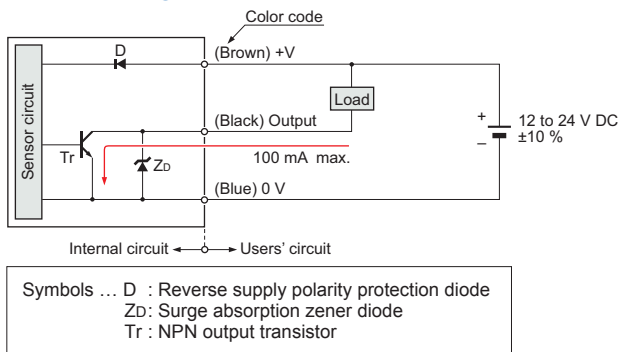
**SPECIFICATIONS**

Item	Type Model No.	Diffused beam type		Spot-beam type	
		EX-42	EX-44	EX-43	EX-43T
Sensing range		5 to 38 mm <b>0.197 to 1.496 in</b> (Conv. point: 20 mm <b>0.787 in</b> ) with white non-glossy paper (50 × 50 mm <b>1.969 × 1.969 in</b> )	10 to 70 mm <b>0.394 to 2.756 in</b> (Conv. point: 40 mm <b>1.575 in</b> ) with white non-glossy paper (50 × 50 mm <b>1.969 × 1.969 in</b> )	20 to 35 mm <b>0.787 to 1.378 in</b> (Conv. point: 30 mm <b>1.181 in</b> ) with white non-glossy paper (50 × 50 mm <b>1.969 × 1.969 in</b> )	
Min. sensing object		ø0.2 mm <b>ø0.008 in</b> copper wire (Setting distance: 20 mm <b>0.787 in</b> )	ø0.2 mm <b>ø0.008 in</b> copper wire (Setting distance: 40 mm <b>1.575 in</b> )	ø0.03 mm <b>ø0.001 in</b> gold wire (Setting distance: 30 mm <b>1.181 in</b> )	
Hysteresis		15 % or less of operation distance with white non-glossy paper (50 × 50 mm <b>1.969 × 1.969 in</b> )		10 % or less of operation distance with white non-glossy paper (50 × 50 mm <b>1.969 × 1.969 in</b> )	
Repeatability (perpendicular to sensing axis)		0.1 mm <b>0.004 in</b> or less (Setting distance: 20 mm <b>0.787 in</b> )	0.2 mm <b>0.008 in</b> or less (Setting distance: 40 mm <b>1.575 in</b> )	0.05 mm <b>0.002 in</b> or less (Setting distance: 30 mm <b>1.181 in</b> )	
Supply voltage		12 to 24 V DC ±10 % Ripple P-P 10 % or less			
Current consumption		35 mA or less			
Output		NPN open-collector transistor • Maximum sink current: 100 mA • Applied voltage: 30 V DC or less (between output and 0 V) • Residual voltage: 1.5 V or less (at 100 mA sink current) 0.4 V or less (at 16 mA sink current)			
Utilization category		DC-12 or DC-13			
Output operation		Light-ON			
Short-circuit protection		Incorporated			
Response time		0.5 ms or less			
Operation indicator		Red LED (lights up when the output is ON)			
Stability indicator		Green LED (lights up under stable light received condition or stable dark condition)			
Sensitivity adjuster		_____	Continuously variable adjuster		_____
Timer function		_____			Variable OFF-delay timer (0.1 to 1 sec. approx.) (Note 2)
Environmental resistance	Pollution degree	3 (Industrial environment)			
	Protection	IP67 (IEC)			
	Ambient temperature	-25 to +55 °C <b>-13 to +131 °F</b> (No dew condensation or icing allowed), Storage: -30 to +70 °C <b>-22 to +158 °F</b>			
	Ambient humidity	35 to 85 % RH, Storage: 35 to 85 % RH			
	Ambient illuminance	Incandescent light: 3,000 lx at the light-receiving face			
	EMC	EN 60947-5-2			
	Voltage withstandability	1,000 V AC for one min. between all supply terminals connected together and enclosure			
	Insulation resistance	20 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure			
	Vibration resistance	10 to 500 Hz frequency, 3 mm <b>0.118 in</b> amplitude (20 G max.) in X, Y and Z directions for two hours each			
Shock resistance	500 m/s <sup>2</sup> acceleration (50 G approx.) in X, Y and Z directions for three times each				
Emitting element		Infrared LED (Peak emission wavelength: 880 nm <b>0.035 mil</b> , modulated)		Red LED (Peak emission wavelength: 680 nm <b>0.027 mil</b> , modulated)	
Material		Polyalylate			
Cable		0.2 mm <sup>2</sup> 3-core cabtyre cable, 2 m <b>6.562 ft</b> long			
Cable extension		Extension up to total 100 m <b>328.084 ft</b> is possible with 0.3 mm <sup>2</sup> , or more, cable.			
Weight		Net weight: 45 g approx., Gross weight: 70 g approx.			
Accessory		_____	Adjusting screwdriver: 1 pc.		

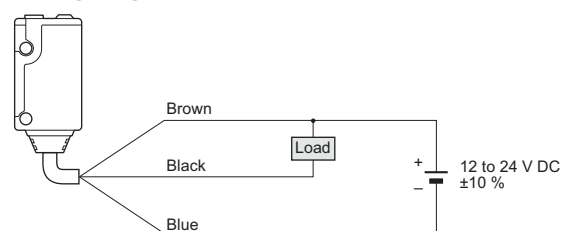
Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C **+73.4 °F**.  
 2) The timer is always effective.

**I/O CIRCUIT AND WIRING DIAGRAMS**

**I/O circuit diagram**



**Wiring diagram**



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CX-440

EQ-30

EQ-500

MQ-W

RX-LS200

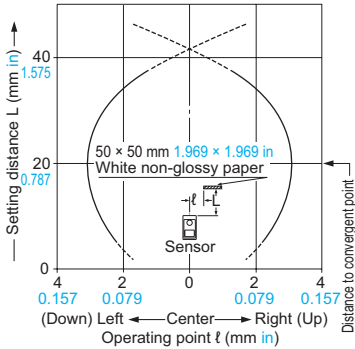
RX

RT-610

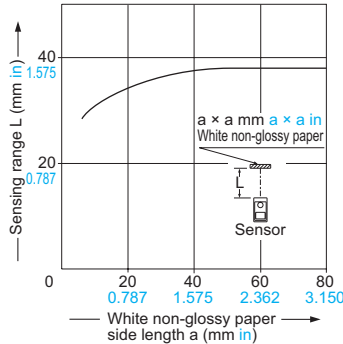
**SENSING CHARACTERISTICS (TYPICAL)**

**EX-42**

**Sensing field**



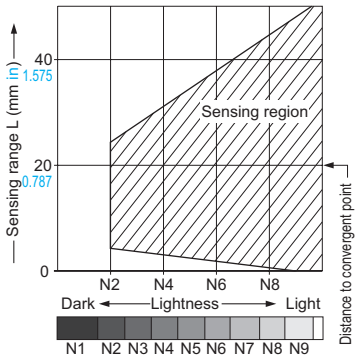
**Correlation between sensing object size and sensing range**



As the sensing object size becomes smaller than the standard size (white non-glossy paper 50 × 50 mm 1.969 × 1.969 in), the sensing range shortens, as shown in the left graph.

(For plotting the left graph, a sensor having a sensitivity such that it can just detect a 50 × 50 mm 1.969 × 1.969 in white non-glossy paper at a distance of 38 mm 1.496 in has been used.)

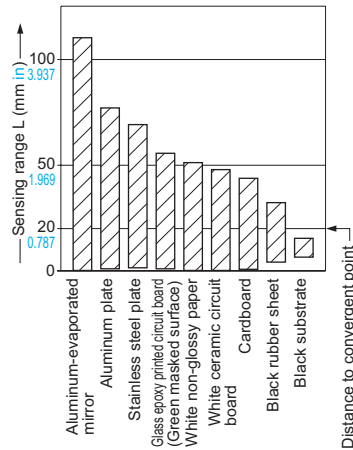
**Correlation between lightness and sensing range**



The sensing region (typical) is represented by oblique lines in the left figure. However, the sensitivity should be set with enough margin because of slight variation in products.

(Lightness shown on the left may differ slightly from the actual object condition.)

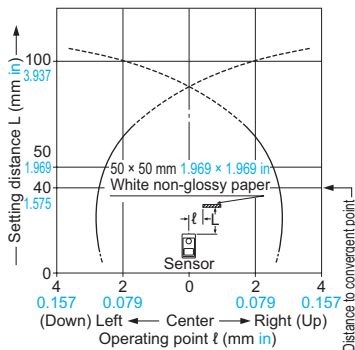
**Correlation between material (50 × 50 mm 1.969 × 1.969 in) and sensing range**



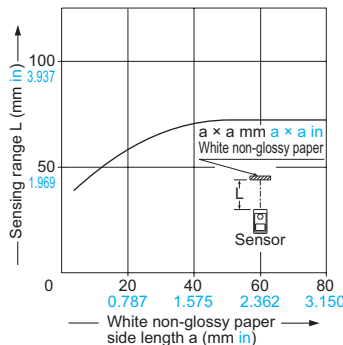
The bars in the graph indicate the sensing range (typical) for the respective material. However, there is a slight variation in the sensing range depending on the product. Further, if there is a reflective object (conveyor, etc.) in the background of the sensing object, since it affects the sensing, separate it by more than twice the sensing range shown in the left graph.

**EX-44**

**Sensing field**



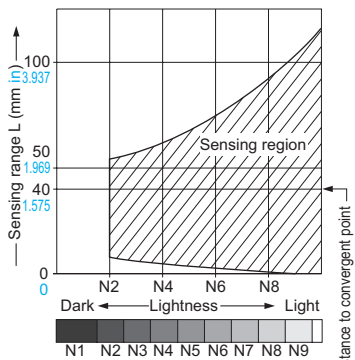
**Correlation between sensing object size and sensing range**



As the sensing object size becomes smaller than the standard size (white non-glossy paper 50 × 50 mm 1.969 × 1.969 in), the sensing range shortens, as shown in the left graph.

(For plotting the left graph, the sensitivity has been set such that a 50 × 50 mm 1.969 × 1.969 in white non-glossy paper is just detectable at a distance of 70 mm 2.756 in.)

**Correlation between lightness and sensing range**

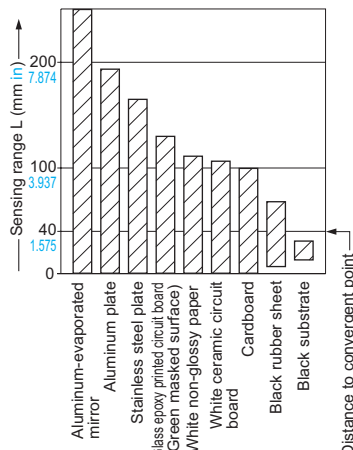


The sensing region (typical) is represented by oblique lines in the left figure. However, the sensitivity should be set with enough margin because of slight variation in products.

(The graph is drawn for the maximum sensitivity setting.)

(Lightness shown on the left may differ slightly from the actual object condition.)

**Correlation between material (50 × 50 mm 1.969 × 1.969 in) and sensing range**



The bars in the graph indicate the sensing range (typical) for the respective material. However, there is a slight variation in the sensing range depending on the product. Further, if there is a reflective object (conveyor, etc.) in the background of the sensing object, since it affects the sensing, separate it by more than twice the sensing range shown in the left graph, or adjust the sensitivity adjuster.

(The graph is drawn for the maximum sensitivity setting.)

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EX-30

EX-40

CX-440

EQ-30

EQ-500

MQ-W

RX-LS200

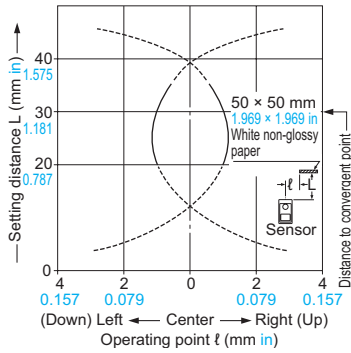
RX

RT-610

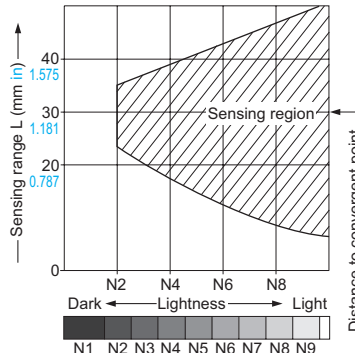
**SENSING CHARACTERISTICS (TYPICAL)**

**EX-43 EX-43T**

**Sensing field**



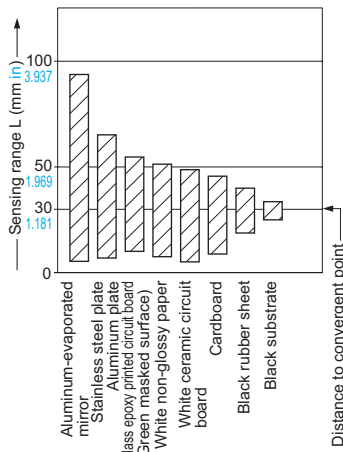
**Correlation between lightness and sensing range**



The sensing region (typical) is represented by oblique lines in the left figure. However, the sensitivity should be set with enough margin because of slight variation in products.

(The graph is drawn for the maximum sensitivity setting. However, **EX-43T** does not incorporate the sensitivity adjuster.)  
(Lightness shown on the left may differ slightly from the actual object condition.)

**Correlation between material (50 x 50 mm 1.969 x 1.969 in) and sensing range**



The bars in the graph indicate the sensing range (typical) for the respective material. However, there is a slight variation in the sensing range depending on the product. Further, if there is a reflective object (conveyor, etc.) in the background of the sensing object, since it affects the sensing, separate it by more than twice the sensing range shown in the left graph, or adjust the sensitivity adjuster.

(The graph is drawn for the maximum sensitivity setting. However, **EX-43T** does not incorporate the sensitivity adjuster.)

**PRECAUTIONS FOR PROPER USE**

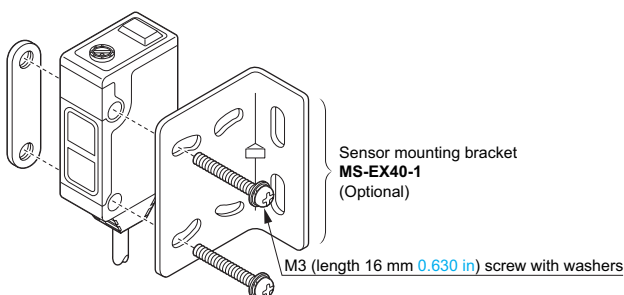
Refer to General precautions.



- Never use this product as a sensing device for personnel protection.
- In case of using sensing devices for personnel protection, use products which meet laws and standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.

**Mounting**

- With the optional sensor mounting bracket, the tightening torque should be 0.5 N·m or less.



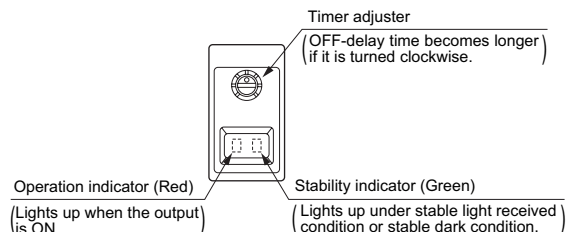
**Others**

- Do not use during the initial transient time (50 ms) after the power supply is switched on.

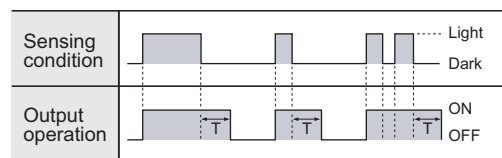
**Timer function (Only for EX-43T)**

- The variable OFF-delay timer prolongs the output for a certain period (0.1 to 1 sec. approx.). It is useful when the connected device has a slow response time or when small objects are sensed and the signal width is small. (The timer is always effective.)

**Adjusters**



**Time chart**



Timer period: T = 0.1 to 1 sec. approx.

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EX-30

**EX-40**

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EQ-30

EQ-500

MQ-W

RX-LS200

RX

RT-610

**DIMENSIONS (Unit: mm in)**

The CAD data in the dimensions can be downloaded from our website.

**EX-42 EX-44 EX-43 EX-43T**

Sensor

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**EX-30**

**EX-40**

**CX-440**

**EQ-30**

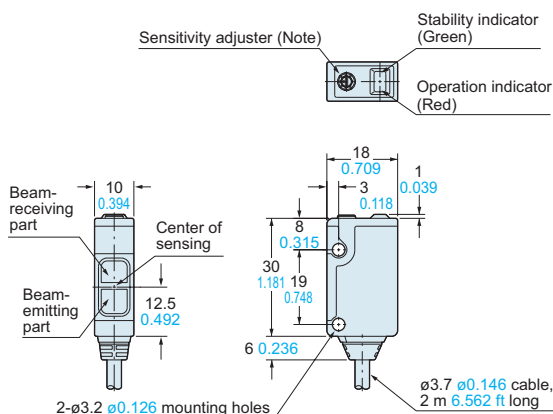
**EQ-500**

**MQ-W**

**RX-LS200**

**RX**

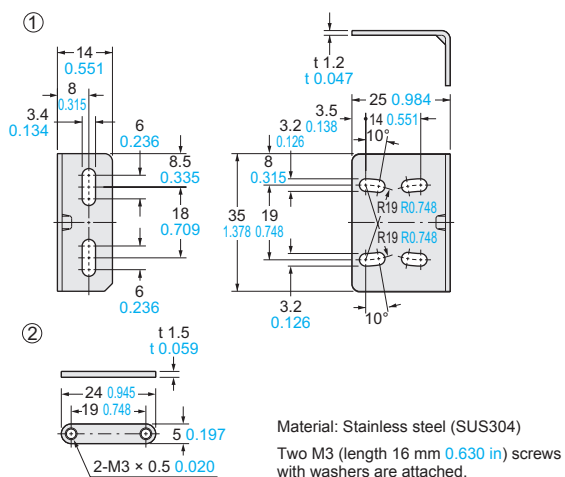
**RT-610**



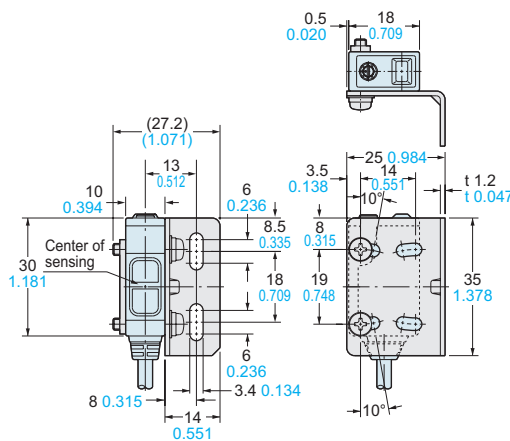
Note: **EX-42** does not incorporate it.  
In **EX-43T**, it is the timer adjuster.

**MS-EX40-1**

Sensor mounting bracket (Optional)

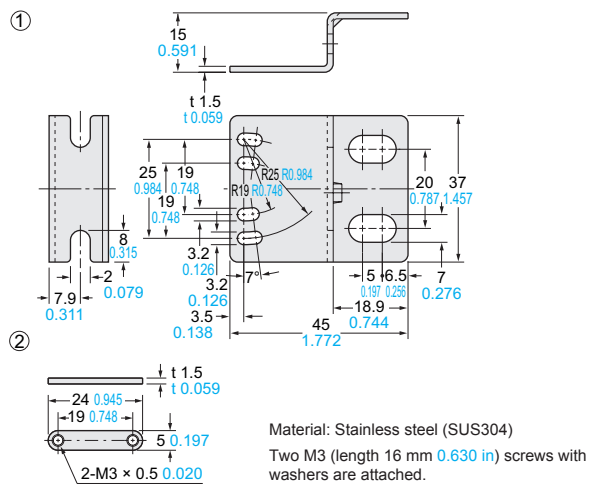


Assembly dimensions



**MS-EX40-2**

Sensor mounting bracket (Optional)



Assembly dimensions

