

EX-40 SERIES

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	■ Glossary of terms / General precautionsP.1549~ / P.1552~	■ Korea's S-mark..... P.1602

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- SAFETY LIGHT CURTAINS / SAFETY COMPONENTS
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- ENERGY MANAGEMENT SOLUTIONS
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- MACHINE VISION SYSTEMS
- UV CURING SYSTEMS



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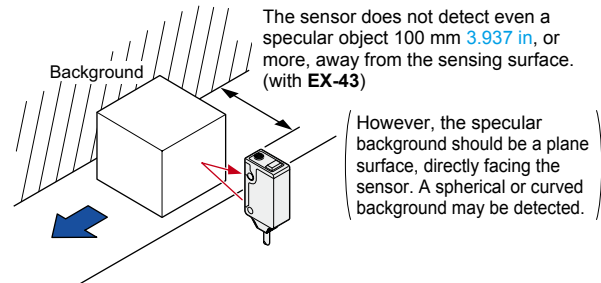
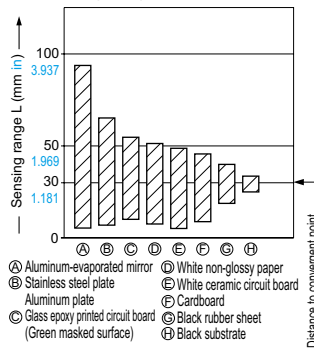


Reliable object detection in limited area

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

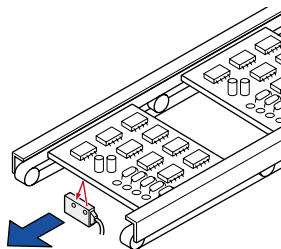


FUNCTIONS

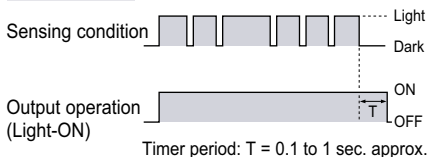
Variable OFF-delay timer

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

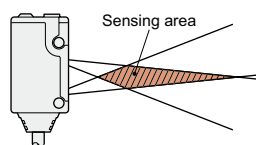
Compact size (W10 × H30 × D18 mm **W0.394 × H1.181 × D0.709 in**)

It can be installed in a limited space.

VARIETIES

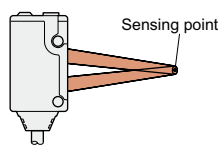
Various applications

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

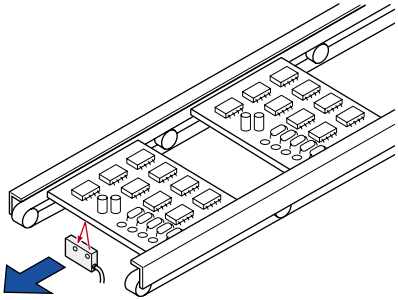


- Visible red spot beam allows easy targetting.
- It is suitable for positioning because of its 0.05 mm **0.002 in** repeatability.

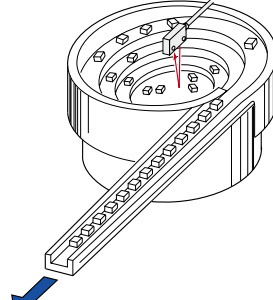
- Selection Guide
- Amplifier Built-in
- Power Supply Built-in
- Amplifier-separated
- EX-Z
- CX-400
- CY-100
- EX-10
- EX-20
- EX-30
- EX-40
- CX-440
- EQ-30
- EQ-500
- MQ-W
- RX-LS200
- RX
- RT-610

APPLICATIONS

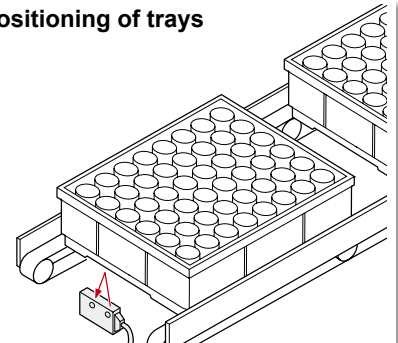
Positioning of a PCB



Sensing parts in feeder



Positioning of 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 0.197 to 1.496 in (Convergent point: 20 mm 0.787 in)	EX-42	NPN open-collector transistor	—	—	Infrared LED	
		10 to 70 mm 0.394 to 2.756 in (Convergent point: 40 mm 1.575 in)	EX-44					
Spot-beam type With timer		20 to 35 mm 0.787 to 1.378 in (Convergent point: 30 mm 1.181 in)	EX-43		—	Incorporated	Incorporated	Red LED
			EX-43T					

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	MS-EX40-1	Rear mounting bracket	
	MS-EX40-2	Bottom mounting bracket	
Universal sensor mounting stand (Note)	MS-AJ1	Horizontal mounting type	Basic assembly
	MS-AJ2	Vertical mounting type	
	MS-AJ1-A	Horizontal mounting type	Lateral arm assembly
	MS-AJ2-A	Vertical mounting type	

Note: Refer to p.953~ for the universal sensor mounting stand **MS-AJ**.

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

• MS-AJ2

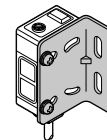
Swivel: 360° rotation
Elevation angle: ±45°
Height adjustment: 150 mm **5.906 in** approx.
Mounting hole for M6 screw

• MS-AJ2-A

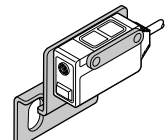
Swivel: 360° rotation
Height adjustment: 150 mm **5.906 in** approx.
Forward / back adjustment: 130 mm **5.118 in**
Angle adjustment: ±45°
Mounting hole for M6 screw

Sensor mounting bracket

- **MS-EX40-1**
- **MS-EX40-2**



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



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

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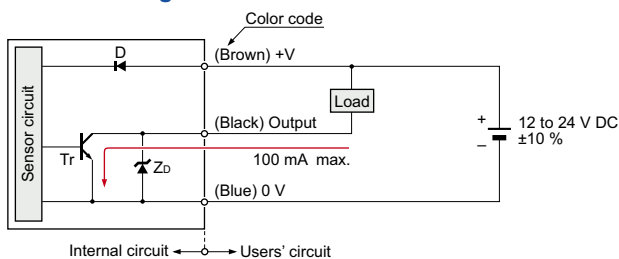
SPECIFICATIONS

Type	Diffused beam type		Spot-beam type	
	Model No.	EX-42	EX-44	EX-43
CE marking directive compliance	EMC Directive, RoHS Directive			
Sensing range	5 to 38 mm 0.197 to 1.496 in (Conv. point: 20 mm 0.787 in) with white non-glossy paper (50 × 50 mm 1.969 × 1.969 in)	10 to 70 mm 0.394 to 2.756 in (Conv. point: 40 mm 1.575 in) with white non-glossy paper (50 × 50 mm 1.969 × 1.969 in)	20 to 35 mm 0.787 to 1.378 in (Conv. point: 30 mm 1.181 in) with white non-glossy paper (50 × 50 mm 1.969 × 1.969 in)	
Min. sensing object	∅0.2 mm ∅0.008 in copper wire (Setting distance: 20 mm 0.787 in)	∅0.2 mm ∅0.008 in copper wire (Setting distance: 40 mm 1.575 in)	∅0.03 mm ∅0.001 in gold wire (Setting distance: 30 mm 1.181 in)	
Hysteresis	15 % or less of operation distance with white non-glossy paper (50 × 50 mm 1.969 × 1.969 in)		10 % or less of operation distance with white non-glossy paper (50 × 50 mm 1.969 × 1.969 in)	
Repeatability (perpendicular to sensing axis)	0.1 mm 0.004 in or less (Setting distance: 20 mm 0.787 in)	0.2 mm 0.008 in or less (Setting distance: 40 mm 1.575 in)	0.05 mm 0.002 in or less (Setting distance: 30 mm 1.181 in)	
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 <ul style="list-style-type: none"> • 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 -13 to +131 °F (No dew condensation or icing allowed), Storage: -30 to +70 °C -22 to +158 °F		
	Ambient humidity	35 to 85 % RH, Storage: 35 to 85 % RH		
	Ambient illuminance	Incandescent light: 3,000 lx or less at the light-receiving face		
	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 0.118 in double amplitude (20 G max.) in X, Y and Z directions for two hours each		
Shock resistance	500 m/s ² acceleration (50 G approx.) in X, Y and Z directions three times each			
Emitting element	Infrared LED (Peak emission wavelength: 880 nm 0.035 mil , modulated)		Red LED (Peak emission wavelength: 680 nm 0.027 mil , modulated)	
Material	Polyalylate			
Cable	0.2 mm ² 3-core cabtyre cable, 2 m 6.562 ft long			
Cable extension	Extension up to total 100 m 328.084 ft is possible with 0.3 mm ² , or more, cable.			
Weight	Net weight: 45 g approx., Gross weight: 70 g approx.			
Accessory	Adjusting screwdriver: 1 pc.			

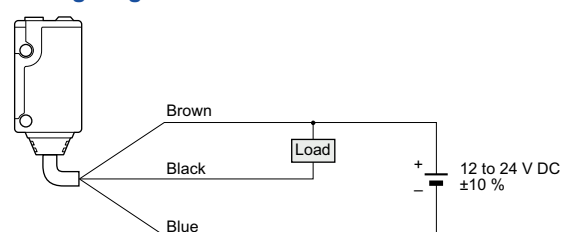
Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C **+73.4 °F**.
 2) The timer is always effective.

I/O CIRCUIT AND WIRING DIAGRAMS

I/O circuit diagram



Wiring diagram



Symbols ... D : Reverse supply polarity protection diode
 ZD: Surge absorption zener diode
 Tr : NPN output transistor

EX-Z

CX-400

CY-100

EX-10

EX-20

EX-30

EX-40

CX-440

EQ-30

EQ-500

MQ-W

RX-LS200

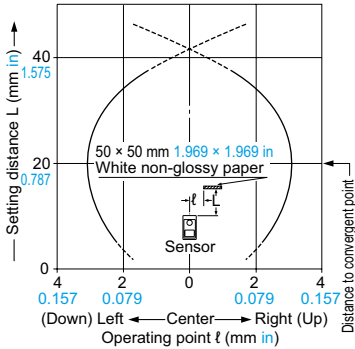
RX

RT-610

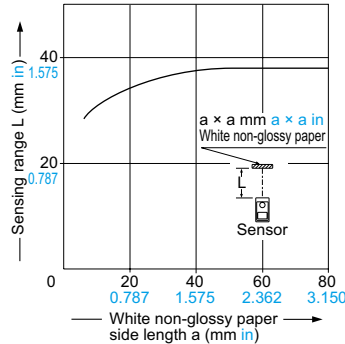
SENSING CHARACTERISTICS (TYPICAL)

EX-42

Sensing field



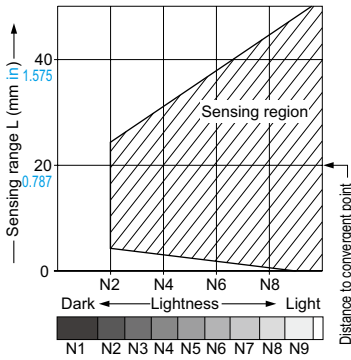
Correlation between sensing object size and sensing range



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.)

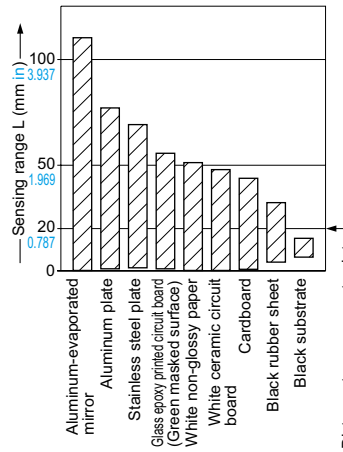
Correlation between lightness and sensing range



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.)

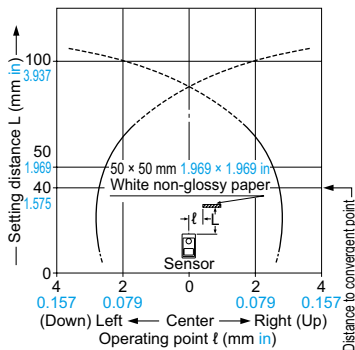
Correlation between material (50 × 50 mm 1.969 × 1.969 in) and sensing range



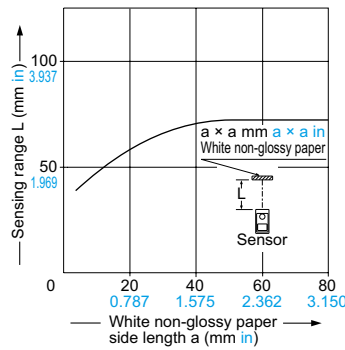
The bars in the graph indicate the sensing range (typical) for the respective material. However, there is a slight variation in the sensing range depending on the product. Further, if there is a reflective object (conveyor, etc.) in the background of the sensing object, since it affects the sensing,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

EX-44

Sensing field



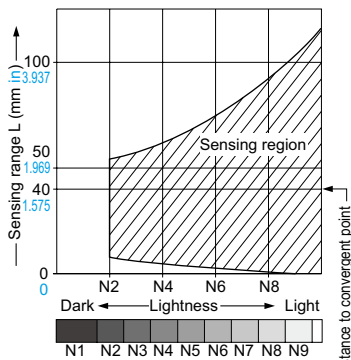
Correlation between sensing object size and sensing range



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

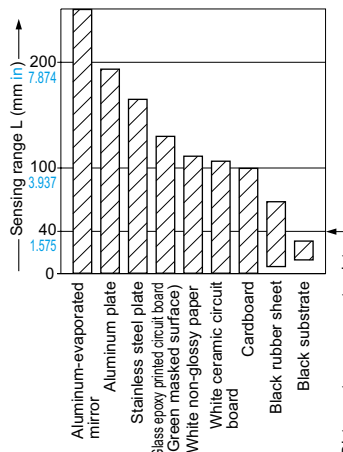


The sensing region (typical) is represented by oblique lines in the left figure. However, the sensitivity should be set with enough margin because of slight variation in products.

(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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CY-100

EX-10

EX-20

EX-30

EX-40

CX-440

EQ-30

EQ-500

MQ-W

RX-LS200

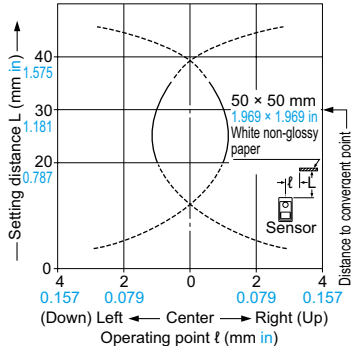
RX

RT-610

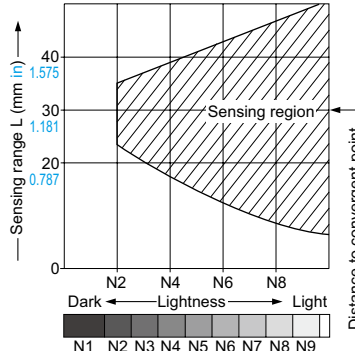
SENSING CHARACTERISTICS (TYPICAL)

EX-43 EX-43T

Sensing field



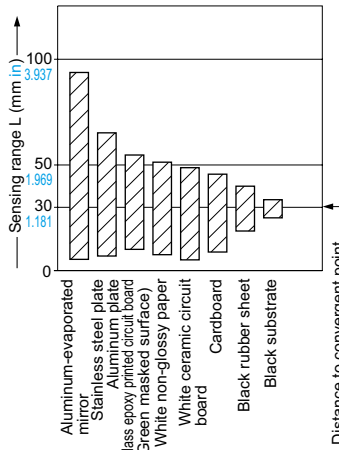
Correlation between lightness and sensing range



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

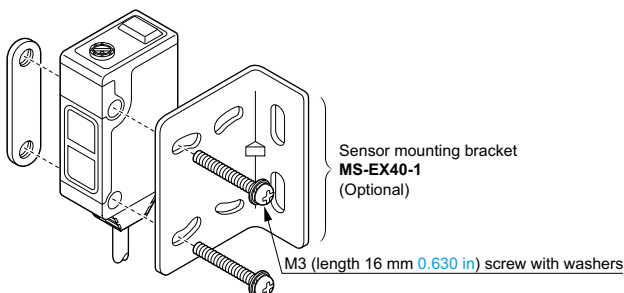
Refer to p.1552~ for general precautions.



- 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.



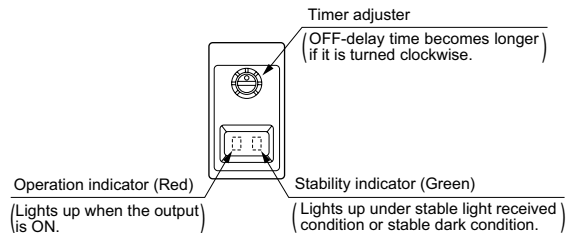
Others

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

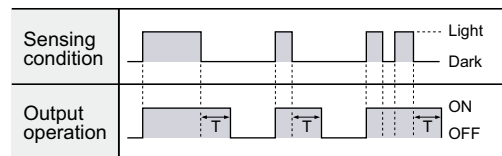
Timer function (Only for EX-43T)

- 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



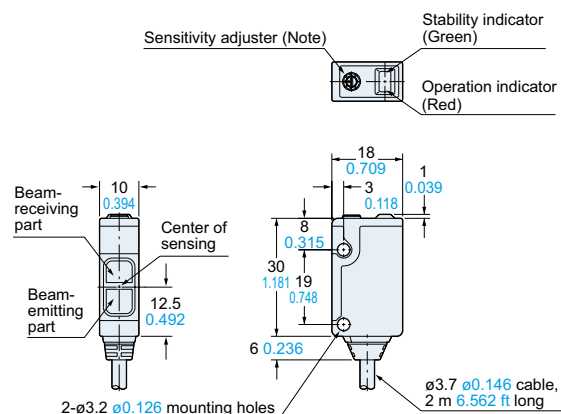
Timer period: T = 0.1 to 1 sec. approx.

DIMENSIONS (Unit: mm in)

The CAD data can be downloaded from our website.

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

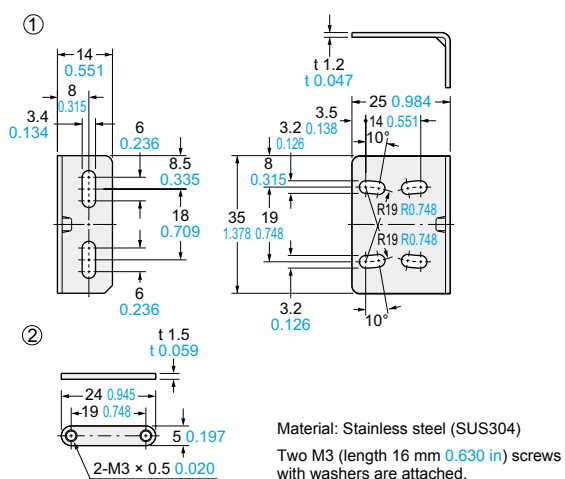
Sensor



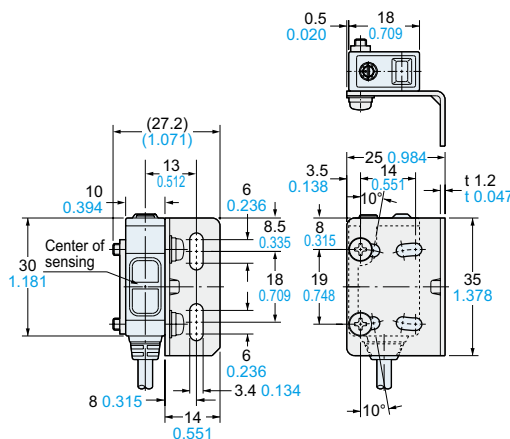
Note: **EX-42** does not incorporate it.
In **EX-43T**, it is the timer adjuster.

MS-EX40-1

Sensor mounting bracket (Optional)

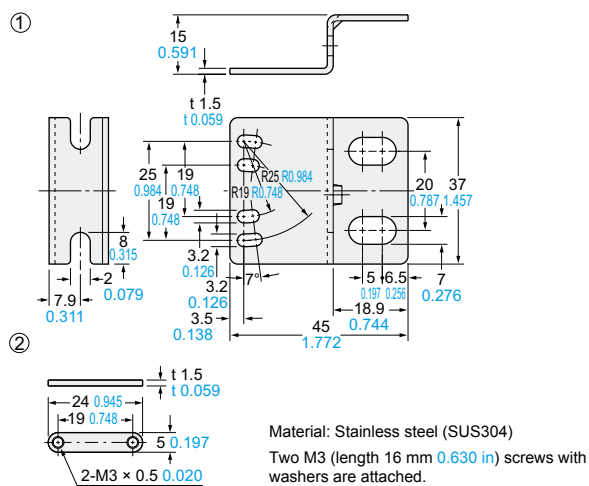


Assembly dimensions

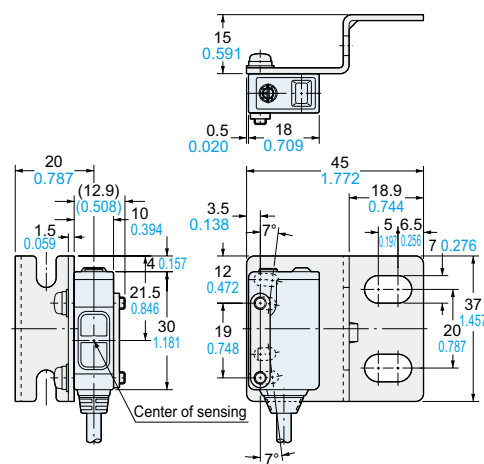


MS-EX40-2

Sensor mounting bracket (Optional)



Assembly dimensions



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