

# EX SERIES

## Amplifier Built-in Miniature-size Photoelectric Sensor

EQ-20

EQ-30

EX-40

RX

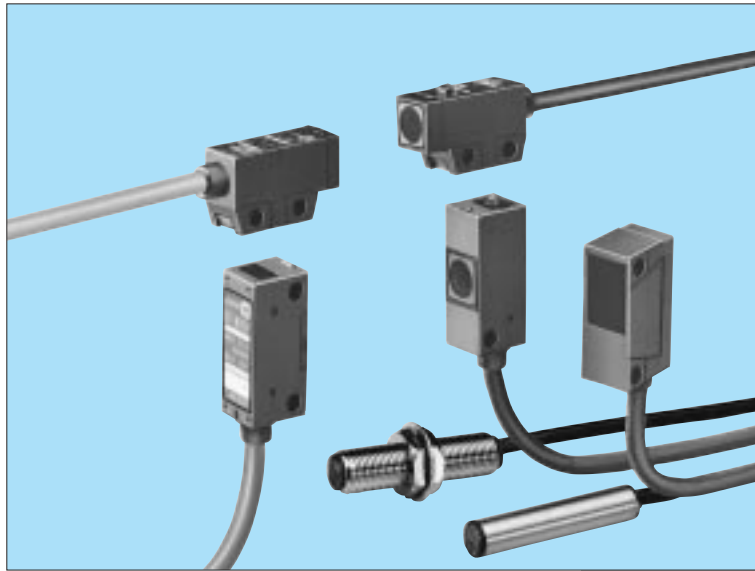
RX-LS200  
Amplifier Built-in Type

CY

EX

PX-2

RT-610



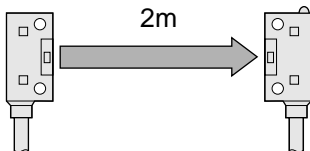
### Amplifier Built-in Micro-size Type

**CE Marked**  
Conforming to EMC Directive  
(Excluding EX-D30S/D30M)

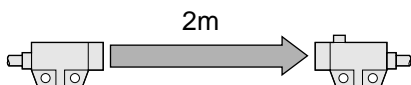
#### Remarkable Sensing Performance

Sufficient sensing range despite its micro-size.

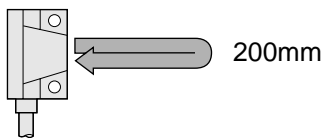
EX-M2E



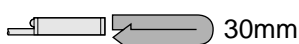
EX-M2



EX-D200E



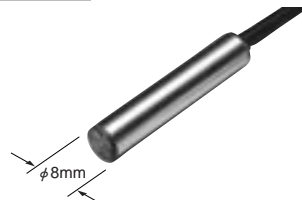
EX-D30S, EX-D30M



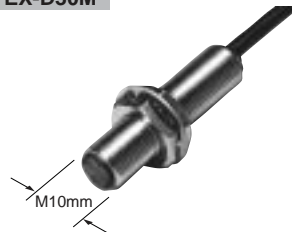
#### Micro-size

A micro-size, high performance, amplifier built-in sensor with strong noise resistance has been realized.

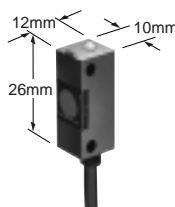
EX-D30S



EX-D30M



EX-M2E

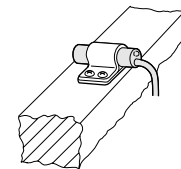


#### High-speed Response Time

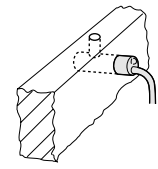
High-speed response time of 1/1,000 sec. makes it possible to reliably detect a moving object.

#### Versatile Mounting Cylindrical type

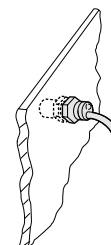
The cylindrical type sensor allows versatile mounting.



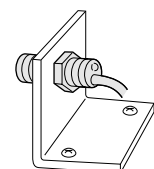
Fixed by the attached mounting bracket



Fixed by a set screw through a hole



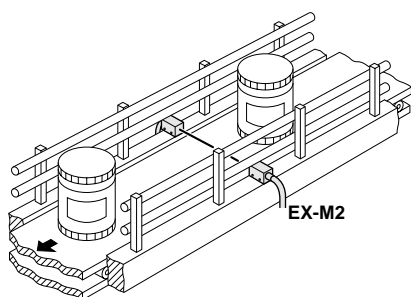
Fixed on an iron plate through a hole



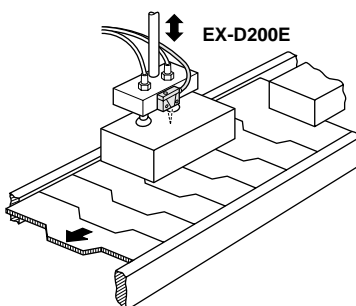
Mounting on a L bracket

## APPLICATIONS

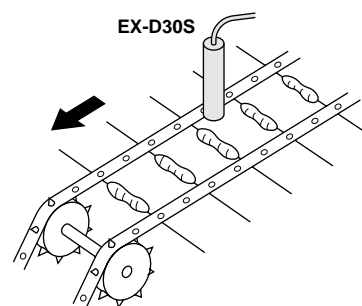
Counting of cans



Confirming chuck operation



Sensing taped components



## ORDER GUIDE

Type	Appearance	Sensing range	Model No.	Sensitivity adjuster	Output operation
Thru-beam	Side sensing 	2m	EX-M2E	—	Selectable either Light-ON or Dark-ON by the control input
	Top sensing 		EX-M2		
Diffuse reflective	Side sensing 	200mm	EX-D200E	Incorporated	
	Cylindrical	30mm	Non-threaded type 	EX-D30S	
			Threaded type 	EX-D30M	

## OPTIONS

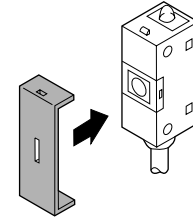
Designation	Model No.	Description	
Slit mask (For EX-M2E only)	<b>OS-EX-05 × 3E</b> (Slit size 0.5 × 3mm)	Slit on one side	• Sensing range: 0.5m • Min. sensing object: $\phi$ 7mm
		Slit on both sides	• Sensing range: 0.1m • Min. sensing object: 0.5 × 3mm
	<b>OS-EX-1 × 4E</b> (Slit size 1 × 4mm)	Slit on one side	• Sensing range: 1m • Min. sensing object: $\phi$ 7mm
		Slit on both sides	• Sensing range: 0.4m • Min. sensing object: 1 × 4mm
	<b>OS-EX-2 × 5E</b> (Slit size 2 × 5mm)	Slit on one side	• Sensing range: 1.5m • Min. sensing object: $\phi$ 7mm
		Slit on both sides	• Sensing range: 1m • Min. sensing object: 2 × 5mm
Slit mask (For EX-M2 only)	<b>OS-EX-05 × 2</b> (Slit size 0.5 × 2mm)	Slit on one side	• Sensing range: 0.5m • Min. sensing object: $\phi$ 7mm
		Slit on both sides	• Sensing range: 0.1m • Min. sensing object: 0.5 × 2mm
	<b>OS-EX-1 × 3</b> (Slit size 1 × 3mm)	Slit on one side	• Sensing range: 1m • Min. sensing object: $\phi$ 7mm
		Slit on both sides	• Sensing range: 0.4m • Min. sensing object: 1 × 3mm
	<b>OS-EX-2 × 4</b> (Slit size 2 × 4mm)	Slit on one side	• Sensing range: 1.5m • Min. sensing object: $\phi$ 7mm
		Slit on both sides	• Sensing range: 1m • Min. sensing object: 2 × 4mm
Sensor mounting bracket	<b>MS-EX-3</b>	Exclusive mounting bracket for EX-D30S	
Sensor checker (Note)	<b>CHX-SC2</b>	It is useful for beam alignment of thru-beam type sensors. The optimum receiver position is given by indicators, as well as, an audio signal.	

Note: Refer to P. 378~ for details of the sensor checker **CHX-SC2**.

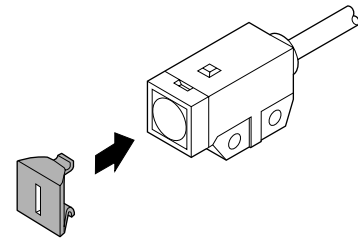
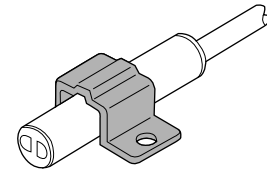
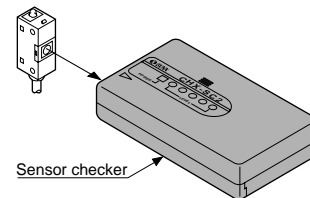
**Slit mask**

Fitted on the front lens with one-touch.

- For EX-M2E



- For EX-M2

**Sensor mounting bracket****Sensor checker**

## SPECIFICATIONS

Item	Model No.	Thru-beam		Diffuse reflective		
		Side sensing	Top sensing	Side sensing	Non-threaded type	Threaded type
		<b>EX-M2E</b>	<b>EX-M2</b>	<b>EX-D200E</b>	<b>EX-D30S</b>	<b>EX-D30M</b>
Sensing range		2m		200mm (Note 1)	30mm ± 15% (Note 1)	
Sensing object		φ 7mm or more opaque object (Note 2)		Opaque, translucent or transparent object	Opaque, translucent or transparent object (Min. sensing object: φ0.7mm copper wire at a setting distance of 5mm)	
Hysteresis		_____		15% or less of operation distance	10% or less of operation distance	
Repeatability (perpendicular to sensing axis)		0.1mm or less	0.04mm or less	_____		
Supply voltage		12 to 24V DC ± 10% Ripple P-P 10% or less				
Current consumption		Emitter: 20mA or less, Receiver: 20mA or less		30mA or less	35mA or less	
Output		NPN open-collector transistor • Maximum sink current: 100mA • Applied voltage: 30V DC or less (between output and 0V) • Residual voltage: 1V or less (at 100mA sink current) 0.4V or less (at 16mA sink current)				
	Utilization category	DC-12 or DC-13			_____	
	Output operation	Selectable either Light-ON or Dark-ON by the control input			Light-ON	
	Short-circuit protection	Incorporated			_____	
Response time		1ms or less			Under light received condition: 1ms or less Under light interrupted condition: 1.5ms or less	
Operation indicator		Red LED (lights up when the output is ON)				
Sensitivity adjuster		_____		Continuously variable adjuster	_____	
Environmental resistance	Pollution degree	3 (Industrial environment)			_____	
	Protection	IP65 (IEC)			IP66 (IEC)	
	Ambient temperature	- 10 to + 60°C (No dew condensation or icing allowed), Storage: - 30 to + 70°C ( <b>EX-D30S</b> and <b>EX-D30M</b> : - 10 to + 60°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: 3,500 lx at the light-receiving face				
	EMC	Emission: EN50081-2, Immunity: EN50082-2			_____	
	Voltage withstandability	1,000V AC for one min. between all supply terminals connected together and enclosure			600V AC for one min. between all supply terminals connected together and enclosure	
	Insulation resistance	20MΩ, or more, with 250V DC megger between all supply terminals connected together and enclosure			50MΩ, or more, with 500V DC megger between all supply terminals connected together and enclosure	
	Vibration resistance	10 to 55Hz frequency, 1.5mm amplitude in X, Y and Z directions for two hours each				
Shock resistance	100m/s <sup>2</sup> acceleration (10G approx.) in X, Y and Z directions for three times each					
Emitting element		Infrared LED (modulated)				
Material		Enclosure: PBT (glass fiber reinforced) Lens: Polycarbonate			Enclosure: Stainless steel Resin part: Polycarbonate	Enclosure: Brass (Nickel plated) Resin part: Polycarbonate
Cable		0.14mm <sup>2</sup> 4-core (thru-beam type emitter: 2-core) oil, heat and cold resistant cabtyre cable, 3m long			0.18mm <sup>2</sup> 3-core cabtyre cable, 3m long	
Cable extension		Extension up to total 100m is possible with 0.3mm <sup>2</sup> , or more, cable (thru-beam type: both emitter and receiver).				
Weight		Emitter: 60g approx. Receiver: 60g approx.	Emitter: 60g approx. Receiver: 65g approx.	65g approx.	65g approx.	70g approx. (including the nut and the washer)
Accessories		<b>MS-EX-1E</b> (Sensor mounting bracket): 2 sets	<b>MS-EX-1</b> (Sensor mounting bracket): 2 sets	<b>MS-EX-1E</b> (Sensor mounting bracket): 1 set Adjusting screwdriver: 1 No. Adjuster cap: 1 No.	<b>MS-SS8</b> (Sensor mounting bracket): 1 No.	Nut: 2 Nos. Toothed lock washer: 1 No.

Notes: 1) The sensing range of the diffuse reflective type sensor is specified for white non-glossy paper (**EX-D200E**: 200 × 200mm, **EX-D30S** and **EX-D30M**: 30 × 30mm) as the object.  
2) If slit masks (optional) are fitted, an object of 0.5 × 3mm in case of **EX-M2E** and 0.5 × 2mm in case of **EX-M2** can be detected.

EQ-20

EQ-30

EX-40

RX

Amplifier Built-in Type

RX-LS200

CY

EX

PX-2

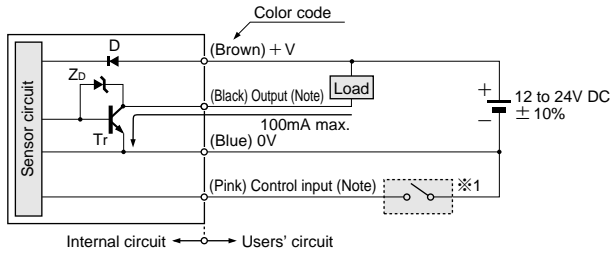
RT-610

# EX

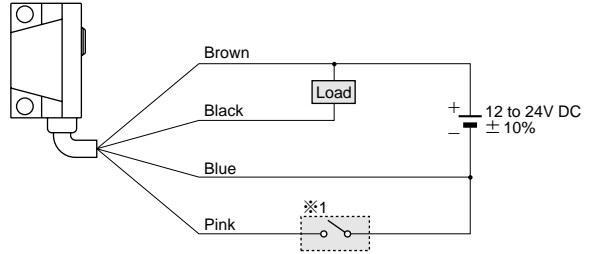
## I/O CIRCUIT AND WIRING DIAGRAMS

### EX-M2E EX-M2 EX-D200E

#### I/O circuit diagram



#### Wiring diagram



Note: The emitter of the thru-beam type sensor does not incorporate the output and the control input.

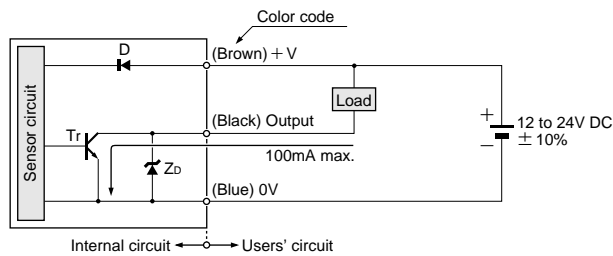
Symbols ... D: Reverse supply polarity protection diode  
Zb: Surge absorption zener diode  
Tr: NPN output transistor

#### ※ Selecting output operation by control input (pink)

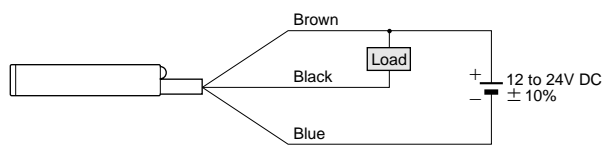
Connection	Model No.	EX-M2E	EX-M2	EX-D200E
Connected to 0V		Light-ON	Light-ON	Dark-ON
Connected to +V		Dark-ON	Dark-ON	Dark-ON
Open circuit		Dark-ON	Dark-ON	Light-ON

### EX-D30S EX-D30M

#### I/O circuit diagram



#### Wiring diagram

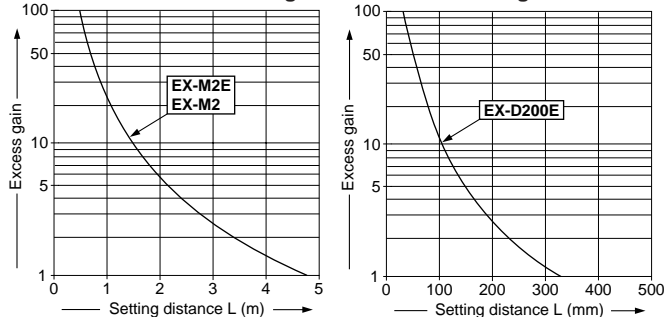


Symbols ... D: Reverse supply polarity protection diode  
Zb: Surge absorption zener diode  
Tr: NPN output transistor

## SENSING CHARACTERISTICS (TYPICAL)

### EX-M2E EX-M2 EX-D200E

#### Correlation between setting distance and excess gain

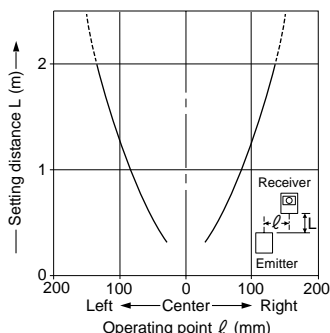


## SENSING CHARACTERISTICS (TYPICAL)

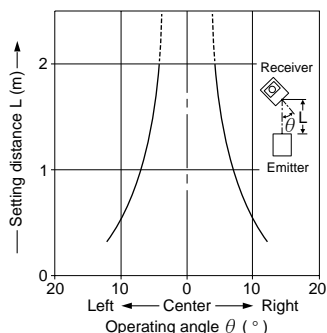
### EX-M2E

Thru-beam type

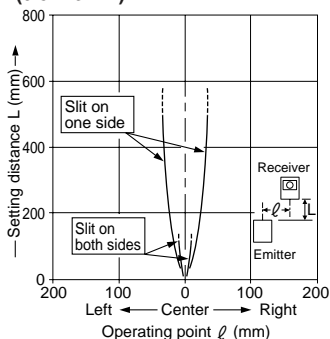
#### Parallel deviation



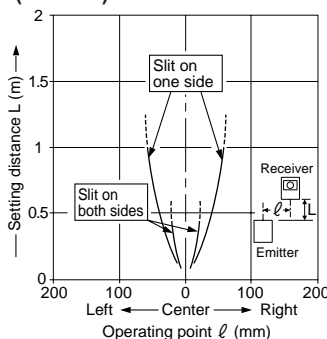
#### Angular deviation



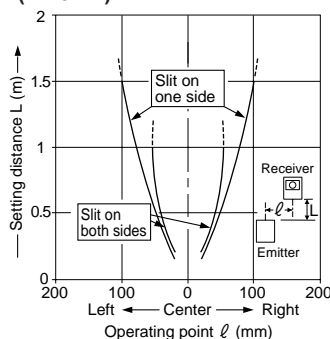
#### Parallel deviation with slit masks (0.5 X 3mm)



#### Parallel deviation with slit masks (1 X 4mm)



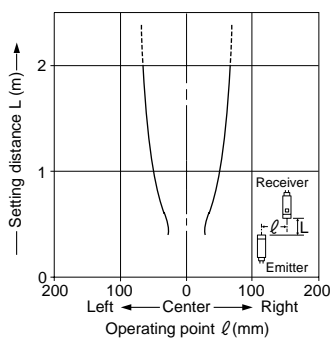
#### Parallel deviation with slit masks (2 X 5mm)



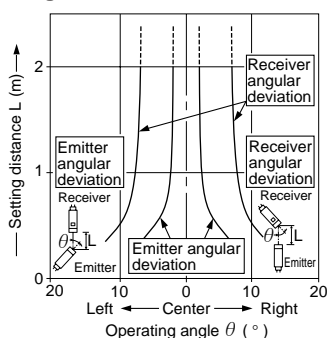
### EX-M2

Thru-beam type

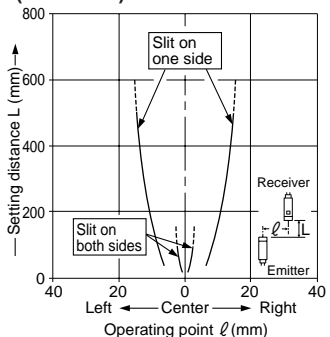
#### Parallel deviation



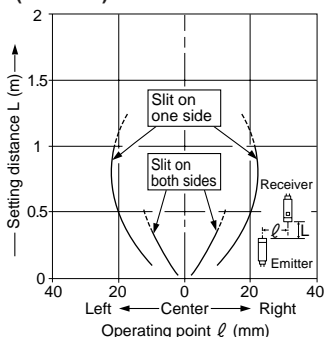
#### Angular deviation



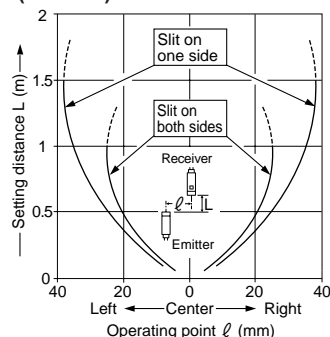
#### Parallel deviation with slit masks (0.5 X 2mm)



#### Parallel deviation with slit masks (1 X 3mm)



#### Parallel deviation with slit masks (2 X 4mm)



EQ-20

EQ-30

EX-40

RX

Amplifier Built-in Type

RX-LS200

CY

EX

PX-2

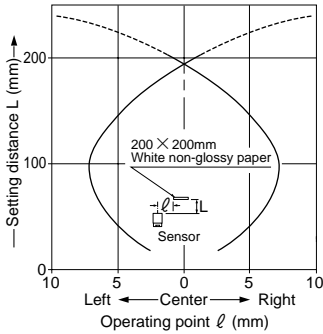
RT-610

# EX

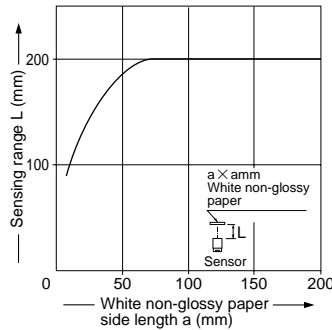
## SENSING CHARACTERISTICS (TYPICAL)

### EX-D200E Diffuse reflective type

Sensing field



Correlation between sensing object size and sensing range

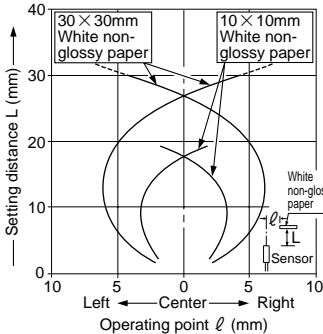


As the sensing object size becomes smaller than the standard size (white non-glossy paper 200×200mm), the sensing range shortens, as shown in the left graph.

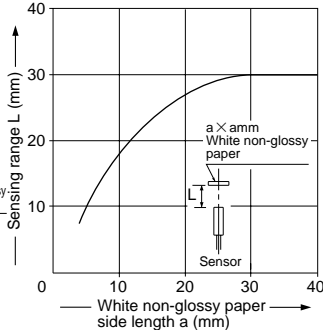
( For plotting the left graph, the sensitivity has been set such that a 200×200mm white non-glossy paper object is just detectable at a distance of 200mm. )

### EX-D30S EX-D30M Diffuse reflective 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 30×30mm), the sensing range shortens, as shown in the left graph.

## PRECAUTIONS FOR PROPER USE

Refer to P.820~ for general precautions.



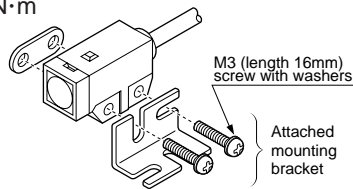
This product is not a safety sensor. Its use is not intended or designed to protect life and prevent body injury or property damage from dangerous parts of machinery. It is a normal object detection sensor.

### Mounting

• The tightening torque should not exceed the value given below.

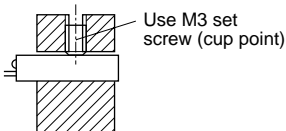
EX-M2E: 0.58N·m

EX-M2, EX-D200E: 0.39N·m



### EX-D30S, EX-D30M

#### Mounting with a set screw

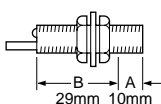


The tightening torque should be as follows.

EX-D30S: 0.24N·m

EX-D30M: 0.34N·m

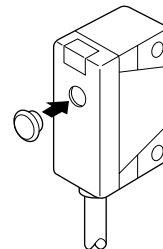
#### Mounting with nuts



A part	B part
2.45N·m	8.33N·m

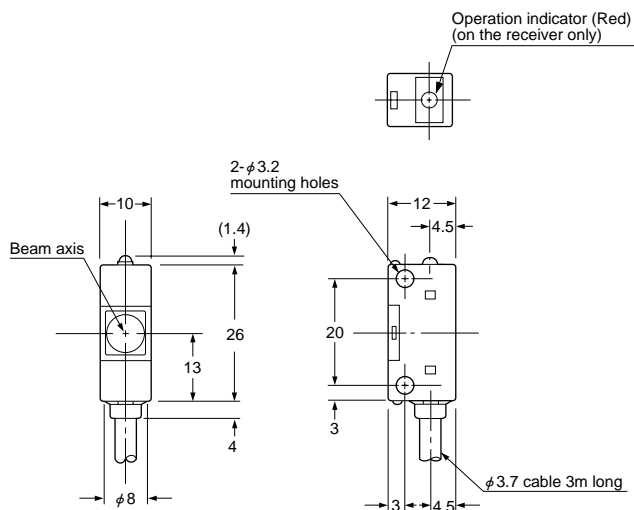
### Others

- The output of **EX-D30S** and **EX-D30M** is not incorporated with a short-circuit protection circuit. Do not connect it directly to a power supply or a capacitive load.
- Do not use during the initial transient time (20ms) after the power supply is switched on.
- After the sensitivity is adjusted, fit the attached adjuster cap. (For **EX-D200E** only)

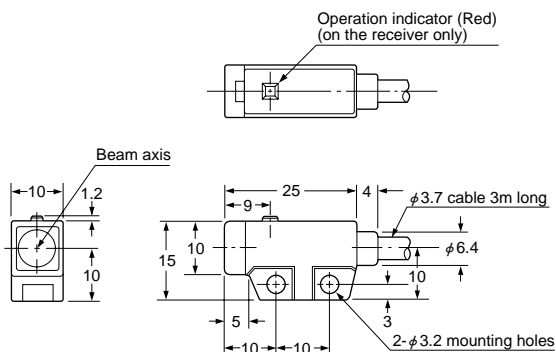


## DIMENSIONS (Unit: mm)

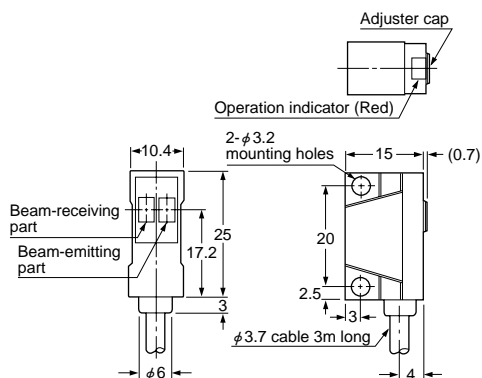
**EX-M2E** Sensor



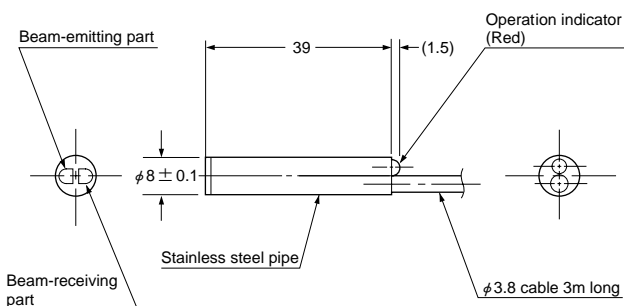
**EX-M2** Sensor



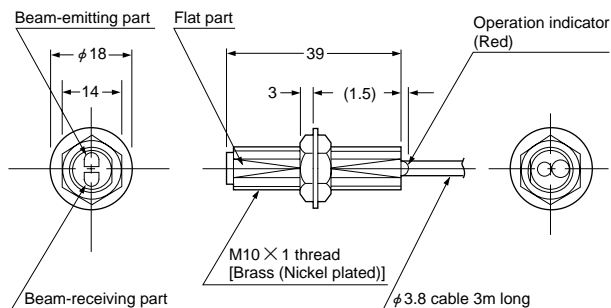
**EX-D200E** Sensor



**EX-D30S** Sensor



**EX-D30M** Sensor



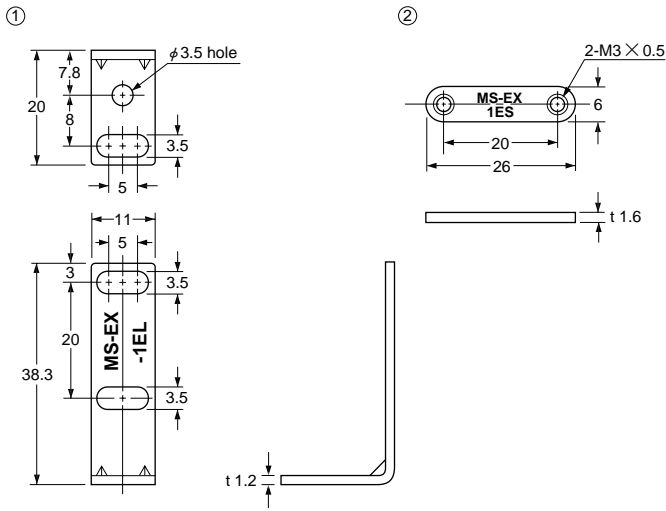
※Mounting hole cut-out dimensions:  $\phi 9 \pm 0.5$ mm

※Mounting hole cut-out dimensions:  $\phi 11 \pm 0.5$ mm



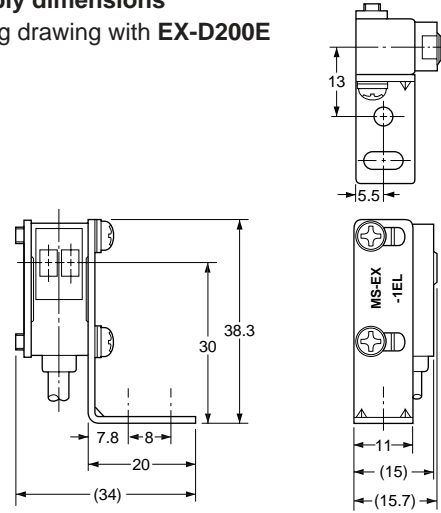
## DIMENSIONS (Unit: mm)

### MS-EX-1E Sensor mounting bracket (Accessory for EX-M2E and EX-D200E)

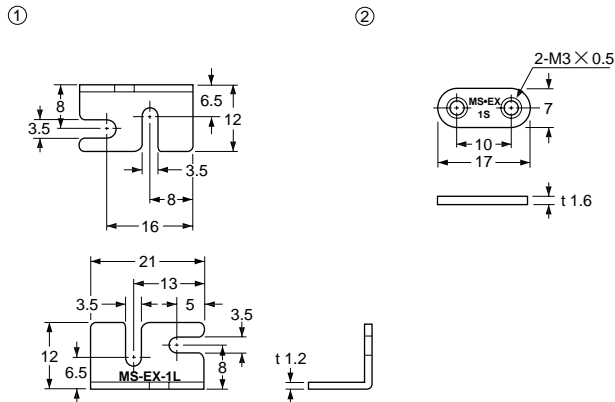


Material: Cold rolled carbon steel (SPCC)  
(Uni-chrome plated)  
Two M3 (length 16mm) screws with washers are attached.

### Assembly dimensions Mounting drawing with EX-D200E

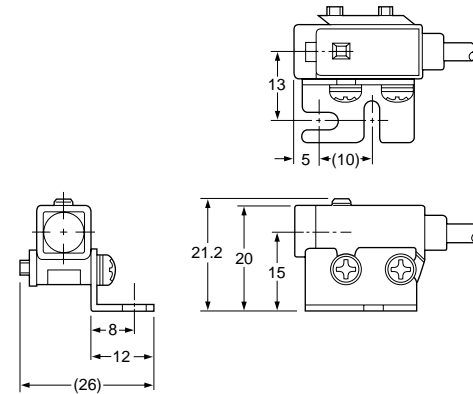


### MS-EX-1 Sensor mounting bracket (Accessory for EX-M2)

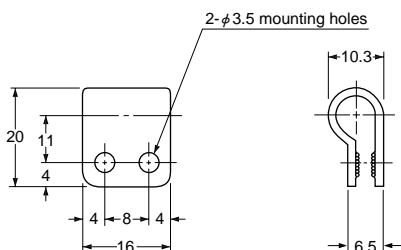


Material: Cold rolled carbon steel (SPCC)  
(Uni-chrome plated)  
Two M3 (length 16mm) screws with washers are attached.

### Assembly dimensions

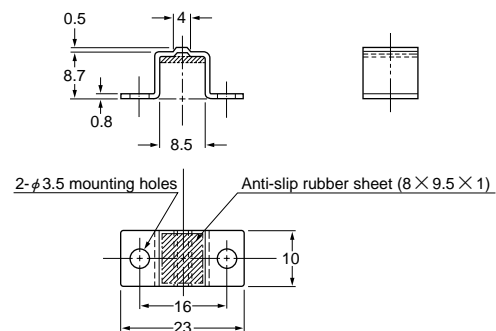


### MS-SS8 Sensor mounting bracket (Accessory for EX-D30S)



Material: Nylon 66

### MS-EX-3 Sensor mounting bracket for EX-D30S (Optional)



Material: Brass (Nickel plated)