

# EQ-500 SERIES

**New**

Adjustable Range & Fixed-focus Reflective Photoelectric Sensor **Multi-voltage**



CY

PX-2

Amplifier Built-in

RT-610

MS-AJ

Sensor Mounting Stand

PM

Micro

PM2

NX5

VF

Multi-voltage

EQ-500

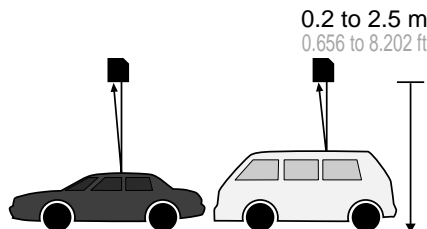


A fixed-focus reflective type with a long-range sensing capability of up to 2.5 m (8.202 ft)



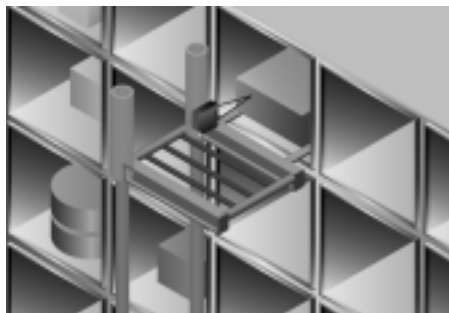
### Long sensing range 2.5 m 8.202 ft

Its adjustable range type enables 2.5 m 8.202 ft long range detection. Installation that allows plenty of extra space is possible.



### Resists color or angle variations

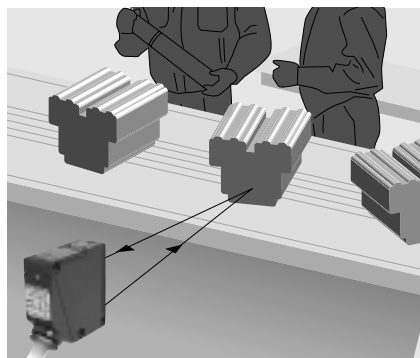
Due to the advanced optical system, it is not affected by variations in the object's angle or gross when compared to conventional sensors. Further, as the difference in sensing range between white and black is 5 % approx (Note). Sensing can be performed at a somewhat constant position even if the sensing object is white or black.



Note: Example of the difference in distance between white non-glossy paper and black non-glossy paper (Lightness: 5) when the setting distance is set at 2 m 6.562 ft.

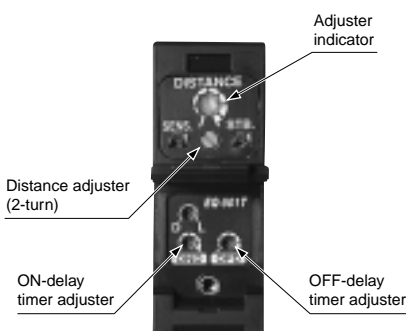
### Not affected by background object

Because it doesn't detect objects out of the preset sensing field, it will not malfunction even if personnel walk behind it or if there are other machines or conveyors in the background.



### An easy to set adjuster with indicator

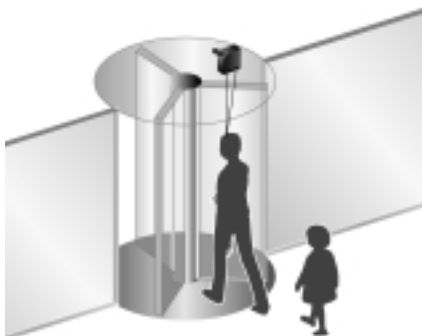
Equipped with a 2-turn adjuster with indicator that is easy to set either for short or long distances.



## APPLICATIONS

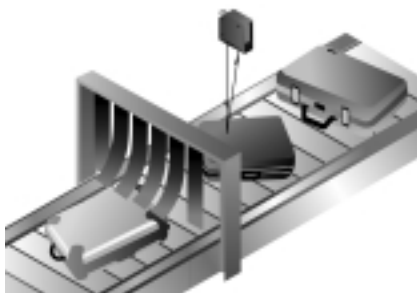
### Detecting people in front of automatic door

Detects a person standing in front of the door and triggers a move and stop mechanism. Accurate sensing is guaranteed even for different colored clothing or height variations.



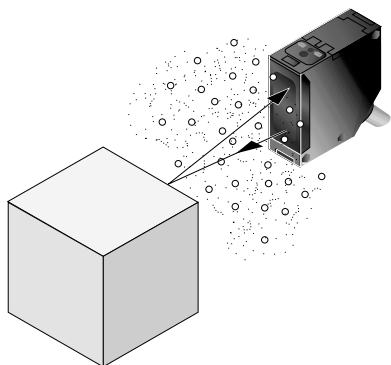
### Confirmation of the passage of packages on a conveyor belt

Can accurately detect packages even if they vary in size and color.



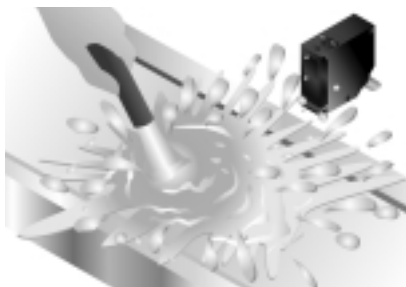
### Insusceptible to contamination on lens

Even if the lens surface gets a little dirty from dust particles, there is very little change in the operation field rendering stable and consistent detection even for objects appearing close to the front surface of the unit.



### Waterproof

It has IP67 protection. It can be used in places splashed with water.



### Multi-voltage

Because it can function with 24 to 240 V for AC voltage and 12 to 240 V for DC, almost any power supply will do. This feature enables its use as is in all European countries, for example, and the rest of the world.

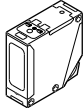

### Convenient timer function models

Types with an ON-delay / OFF-delay timer made available. (EQ-501T)

An OFF-delay, which is useful when the response of the connected device is slow, etc., an ON-delay, which is useful to detect only objects taking a long time to travel.

- Timer period: 0.1 to 5 sec.
- Operation: ON-delay  
OFF-delay

## ORDER GUIDE

Type	Appearance	Adjustable range (Note)	Model No.	Supply voltage	Output	Timer function
Adjustable range & fixed-focus reflective With timer		 0.2 to 2.5 m 0.656 to 8.202 ft	EQ-501	24 to 240 V AC $\pm$ 10 % or 12 to 240 V DC $\pm$ 10 %	Relay contact 1a	_____
			EQ-501T			ON-delay / OFF-delay (Timer period: 0.1 to 5 sec.)

Note: The adjustable range stands for the maximum sensing range which can be set with the adjuster.

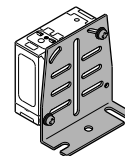
**Note: Mounting bracket is not supplied with the sensor. Please select from the range of optional sensor bracket.**

## OPTION

Designation	Model No.	Description
Sensor mounting bracket	<b>MS-EQ5-01</b>	Foot / back angled mounting bracket

**Sensor mounting bracket****• MS-EQ5-01**

Two M5 (length 32 mm 1.260 in) screws with washers and two nuts are attached.

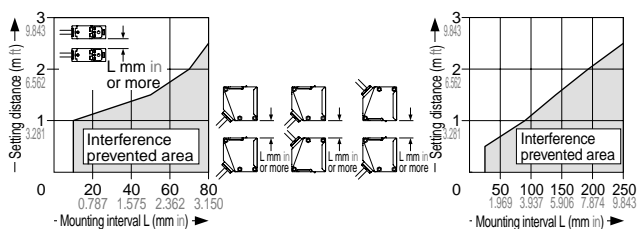


## SPECIFICATIONS

Item	Type Model No.	Adjustable range & fixed-focus reflective	
		EQ-501	EQ-501T
Adjustable range (Note 1)		0.2 to 2.5 m 0.656 to 8.202 ft (with 200 × 200 mm 7.874 × 7.874 in white non-glossy paper)	
Sensing range (at maximum setting distance)		0.1 to 2.5 m 0.328 to 8.202 ft (with 200 × 200 mm 7.874 × 7.874 in white non-glossy paper)	
Hysteresis		10 % or less of operation distance	
Supply voltage		24 to 240 V AC ± 10 % or 12 to 240 V DC ± 10 % Ripple P-P 10 % or less	
Current consumption		AC: 4 VA or less, DC: 3 W or less	AC: 5 VA or less, DC: 4 W or less
Output		Relay contact 1a • Switching capacity: 250 V AC 3 A (resistive load) 30 V DC 3 A (resistive load) • Electrical life: 100,000 or more switching operations (switching frequency 1,200 operations/hour) • Mechanical life: 50 million or more switching operations (switching frequency 18,000 operations/hour)	
	Utilization category	AC-12 or DC-12	
	Output operation	Switchable either Detection-ON or Detection-OFF	
Response time		20 ms or less (Depends on the setting timer period for <b>EQ-501T</b> )	
Operation indicator		Orange LED (lights up when the output is ON)	
Stability indicator		Green LED (lights up under stable operation condition)	
Distance adjuster		2-turn mechanical adjuster with indicator	
Timer function			Incorporated with variable (0.1 to 5 sec.) ON-delay / OFF-delay timer
Automatic interference prevention function		Incorporated (Note 2)	
Environmental resistance	Pollution degree	3 (Industrial environment)	
	Protection	IP67 (IEC)	
	Ambient temperature	− 20 to + 55 °C − 4 to + 131 °F (No dew condensation or icing allowed), Storage: − 25 to + 70 °C − 13 to + 158 °F	
	Ambient humidity	35 to 85 % RH, Storage: 35 to 85 % RH	
	Ambient illuminance	Sunlight: 10,000 lx at the light-receiving face, Incandescent light: 3,000 lx at the light-receiving face	
	EMC	EN 60947-5-2	
	Voltage withstandability	2,000 V AC for one min. between supply terminals, non-supply metal parts and relay contact output terminals, 1,000 V AC for one min. between relay contact terminals	
	Insulation resistance	100 MΩ, or more, with 500 V DC megger between supply terminals, non-supply metal parts and relay contact output terminals as well as between relay contact terminals	
	Vibration resistance	10 to 55 Hz frequency, 1.5 mm 0.059 in amplitude 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 (modulated)	
Receiving element		2-segment photodiode	
Material		Enclosure: ABS	
Connection method		Screw-on terminal connection	
Cable		Suitable for round cable φ9 to φ11 mm φ0.354 to φ0.433 in	
Cable extension		Extension up to total 100 m 328.084 ft is possible with 0.3 mm <sup>2</sup> , or more, cabtyre cable.	
Weight		100 g approx.	
Accessory		Adjusting screwdriver: 1 pc.	

Notes: 1) The adjustable range stands for the maximum sensing range which can be set with the adjuster. The sensor can also detect an object 0.1 m 0.328 ft, or more, away.

2) When the sensors are mounted closely, use them in the interference prevented area, as shown below.

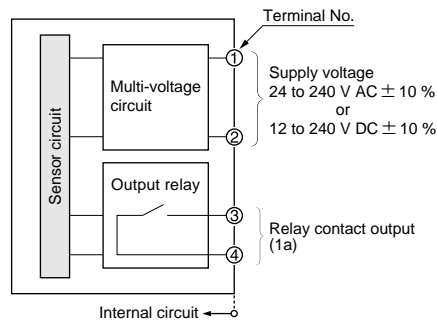


Note that the detection may be unstable depending on the mounting conditions or the sensing object to be used. In the state that this product is mounted, be sure to check the operation with the actual sensing object to be used.

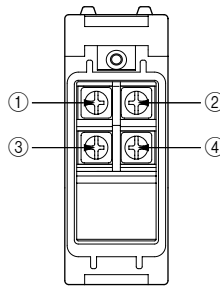
# EQ-500

## I/O CIRCUIT AND WIRING DIAGRAMS

### I/O circuit diagram



### Terminal arrangement diagram

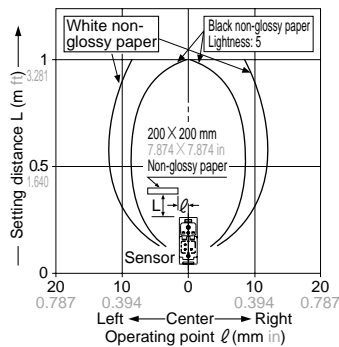


## SENSING CHARACTERISTICS (TYPICAL)

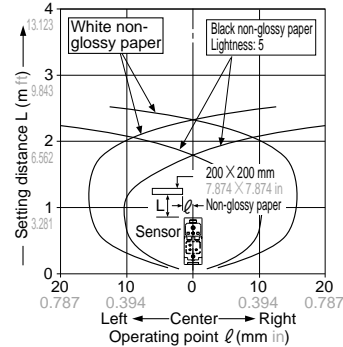
### EQ-501 EQ-501T

#### Sensing fields

• Setting distance: 1 m 3.281 ft

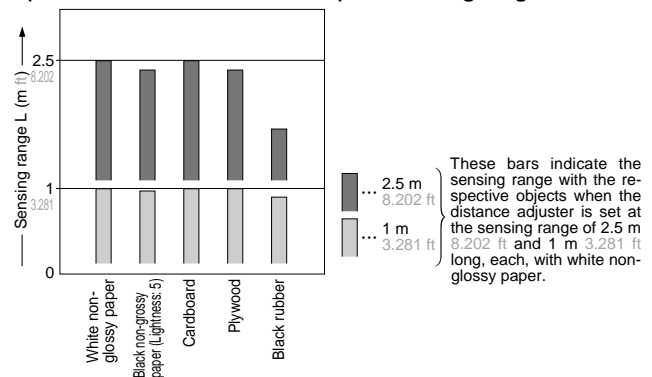


• Setting distance: 2.5 m 8.202 ft



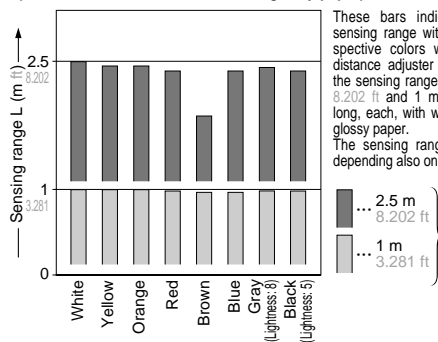
#### Correlation between material

(200 X 200 mm 7.874 X 7.874 in) and sensing range

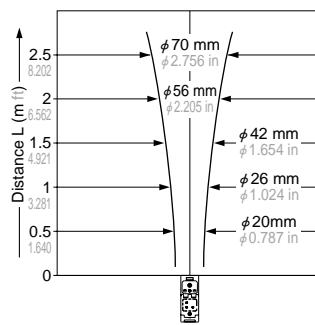


#### Correlation between color

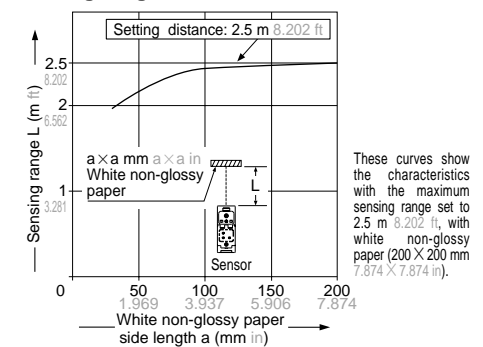
(200 X 200 mm 7.874 X 7.874 in non-glossy paper) and sensing range



#### Emitted beam



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



## PRECAUTIONS FOR PROPER USE

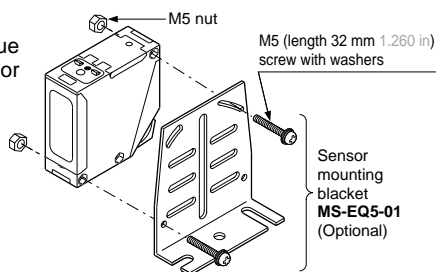
Refer to p.1135~ for general precautions.



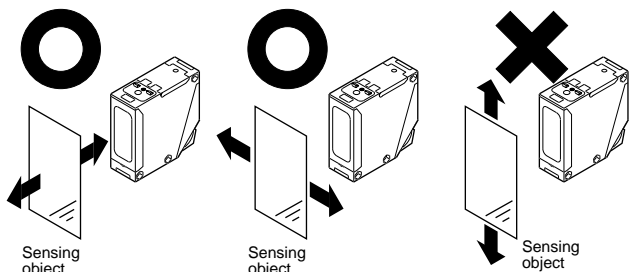
This product is not a safety sensor. Its use is not intended or designed to protect life and prevent body injury or property damage from dangerous parts of machinery. It is a normal object detection sensor.

### Mounting

- The tightening torque should be 0.8 N·m or less.

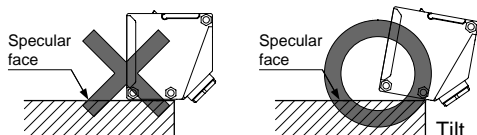


- Care must be taken regarding the sensor mounting direction with respect to the object's direction of movement.



Do not make the sensor detect an object in this direction because it may cause unstable operation.

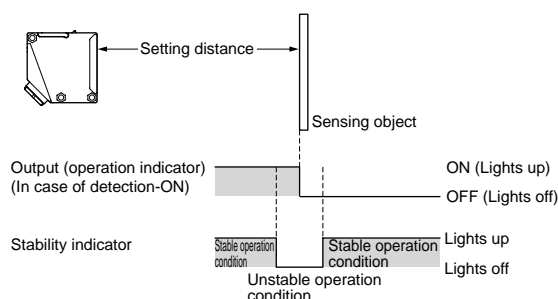
- When detecting a specular object (aluminum or copper foil, etc.) or an object having a glossy surface or coating, please take care that there are cases when the object may not be detected due to a change in angle, wrinkles on the object surface, etc.
- When a specular body is present below the sensor, use the sensor by tilting it slightly upwards to avoid wrong operation.



- If a specular body is present in the background, wrong operation may be caused due to a small change in the angle of the background body. In that case, install the sensor at an inclination and confirm the operation with the actual sensing object.
- Take care that some objects may produce a dead zone right in front of the sensor.
- Mounting screws of the terminal cover and display cover should certainly be tightened to maintain the water tight rating, however, the tightening torque of the screws should be 0.3 to 0.5 N·m.

### Stability indicator

- Since the EQ-500 series uses a 2-segment photodiode as its receiving element, and sensing is done based on the difference in the incident beam angle of the reflected beam from the sensing object, the output and the operation indicator (orange) operate according to the object distance. Further, the stability indicator (green) shows the margin of the setting distance.



### Distance adjustment

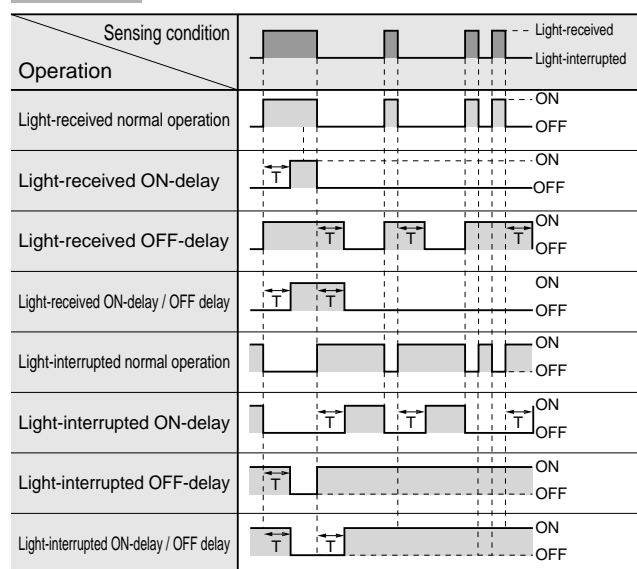
Step	Description	Distance adjuster
①	Turn the distance adjuster fully counterclockwise to the minimum setting distance of 0.2 m 0.656 ft approx.	Turn fully
②	Place an object at the required distance from the sensor, turn the distance adjuster gradually clockwise, and find out point (A) where the sensor changes to the detecting condition.	(A)
③	Remove the object. Turn the adjuster still clockwise until the sensor enters into the detecting state again. Once it has entered, turn the distance adjuster back a little until the sensor returns into the undetecting state where called a point (B). (If the sensor does not go into the detecting state for the full range, the point (B) is regarded as the maximum position on the scale.)	(B)
④	The optimum position to stably detect objects is the center point between (A) and (B).	Optimum position

Note: Turn the distance adjuster gradually and lightly with the attached screwdriver. If the distance adjuster is over turned or pressed heavily, it may be damaged.

### Timer function (Only for EQ-501T)

- EQ-501T incorporates an OFF-delay timer, which is useful when the response of the connected device is slow, etc., and an ON-delay timer, which is useful to detect only objects taking a long time to travel.
- The OFF-delay and ON-delay timers can be used simultaneously.

#### Time chart

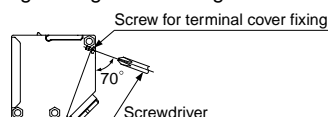


Timer period: T = 0.1 to 5 sec. (variable)

Note: Turn the timer adjuster gradually and lightly with the attached screwdriver. If the timer adjuster is over turned or pressed heavily, it may be damaged.

### Wiring

- Make sure that the power supply is off while wiring.
- Check all wiring before applying power since incorrect wiring may damage the internal circuit. Also, carefully tighten the terminal screws so that the wires of adjacent terminals do not touch.
- The mounting hole for screw the terminal cover fixing inclines 70 degrees to the terminal cover, as shown in the figure below. To avoid damaging this product or screw, take care when tightening or loosening a screw.



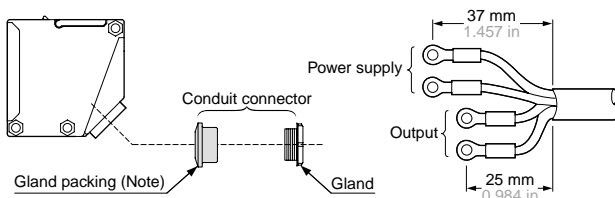
## PRECAUTIONS FOR PROPER USE

Refer to p.1135~ for general precautions.

## Wiring

- To maintain a watertight performance, the cable should have an outer diameter between  $\phi 9$  to  $\phi 11$  mm  $\phi 0.354$  to  $\phi 0.433$  in with a smooth covering material that allows the attached conduit connector to be securely tightened, however, the tightening torque of the screw should be of 1.5 to 2.0 N·m.
- 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 sensor, 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.
- If an external surge voltage exceeding 4 kV is impressed, the internal circuit will be damaged, and a surge suppressing element should be used.
- Prepare the cable end as shown below.

## Conduit connector construction and cabling

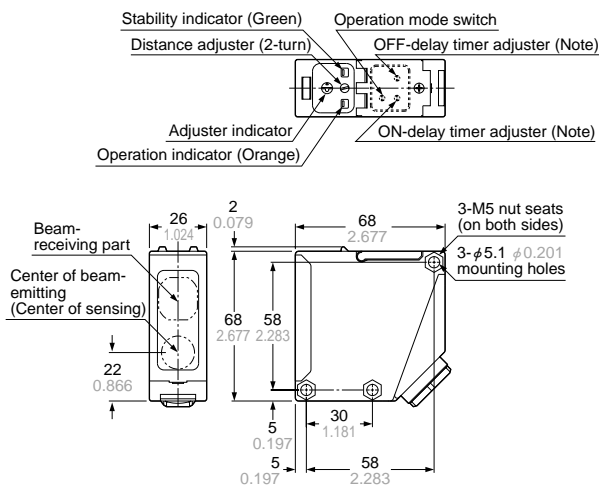


- Note: When assembling the conduit connector, take care of the direction of the gland packing.  
Furthermore, in order to maintain the water-resistance, fit the gland packing such that the seating surface of the gland packing contacts the packing holder part of the terminal cover evenly.
- The size of conduit is M20 × 1.5.
  - If pressure terminals are to be used, affix the connected pressure terminals to a terminal (M3.5 screw).

## DIMENSIONS (Unit: mm in)

EQ-501  
EQ-501T

## Sensor



Note: EQ-501 does not incorporate those.

## Dimensions of the suitable crimp terminals

(Unit: mm in)

Round type	Y-shaped type

Note: Use crimp terminals with insulating sleeves.

Recommended crimp terminal: Nominal size 1.25 × 3.5 0.049 × 0.138.

- The tightening torque for the terminal screws should be 0.3 to 0.5 N·m.

## Others

- Take care that the sensor is not directly exposed to fluorescent light from a rapid-starter lamp or a high frequency lighting device, as it may affect the sensing performance.
- Do not use during the initial transient time (50 ms) after the power supply is switched on.
- This sensor is suitable for indoor use only.
- Its distance adjuster is mechanically operated. Avoid drops or other shocks.
- Do not use this sensor in places having excessive vapor, dust, etc., or where it may come in direct contact with water, or corrosive gas.
- Take care that the sensor does not come in direct contact with water, oil, grease or organic solvents, such as, thinner, etc.
- This sensor cannot be used in an environment containing inflammable or explosive gases.
- Never disassemble or modify the sensor.

Assembly dimensions with sensor mounting bracket  
MS-EQ5-01 (Optional)(Foot angled mounting)