

# EQ-30 SERIES

## Stable Long Range & Fixed-focus Reflective Photoelectric Sensor

**Amplifier Built-in**



**Unaffected by color or material, 2 m (6.562 ft) distance adjustable fixed-focus sensing**

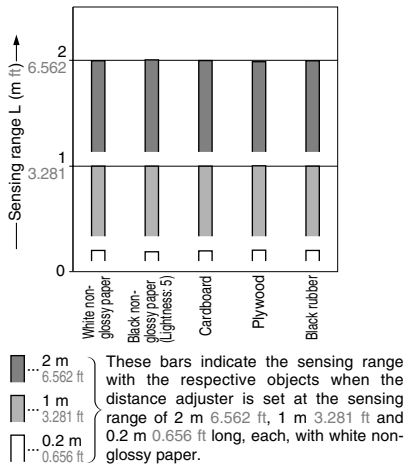


### Not affected by object color or background

The EQ-30 series is incorporated with a high-precision photodiode as the sensing element with a unique circuit that detects an object at the sensing range regardless of its color or background beyond the sensing range.

When the background is specular, it may be necessary to change the angle of the sensor.

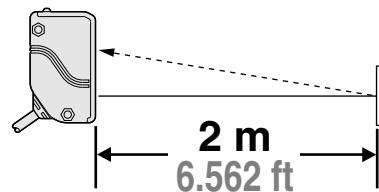
**EQ-34: Correlation between material (200 X 200 mm 7.874 X 7.874 in) and sensing range (typical)**



### Long sensing range 2 m 6.562 ft

The EQ-30 series can detect an object 2 m 6.562 ft away.

It is suitable for various applications, such as, sensing objects or positioning objects traveling on a wide assembly line, etc.



### (far and near) can be set EQ-34W

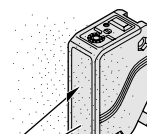
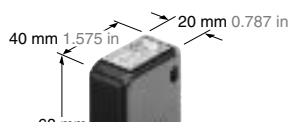
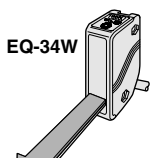
The EQ-34W, two sensing distances, Far (F) and Near (Sub), can be set. The sensor can suffice where, both sensing distances were required.

### Compact

It saves space, since a miniaturized housing of W20 X H68 X D40 mm W0.787 X H2.677 X D1.575 in has been designed for the fixed-focus sensing sensor even though the adjustable sensing range is 2 m 6.562 ft long.

### Insusceptible to contamination on lens

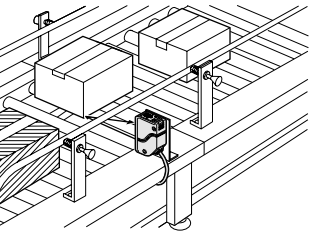
The fixed-focus sensing keeps the detectability better than diffuse reflective type sensors even if the lens is contaminated by dirt, dust, mist, or smoke under an unclean environment.



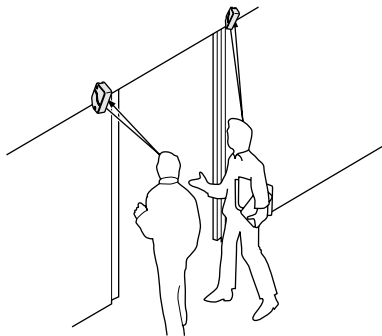
# EQ-30

## APPLICATIONS

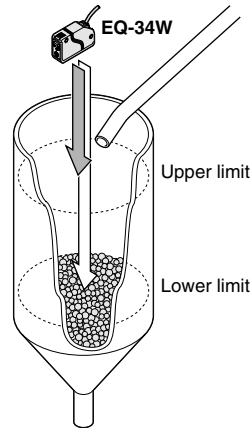
### Detecting traveling cardboard boxes



### Detecting people in front of automatic door

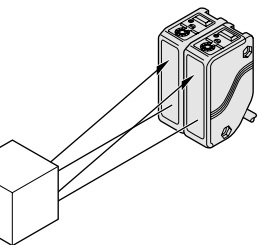


### Detecting level in hopper



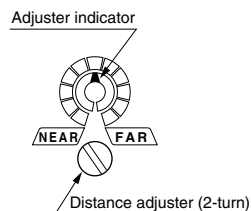
### Automatic interference prevention

The EQ-30 series is the first fixed-focus reflective type sensor to have an automatic interference prevention function so that two sets of sensors can be installed close together without interfering with each other.



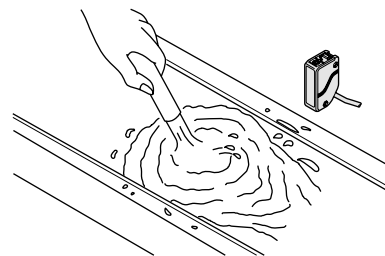
### Mechanical 2-turn adjuster with indicator

It features a mechanical 2-turn distance adjuster with an indicator that shows the set distance at a glance.



### Waterproof

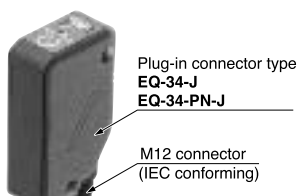
It has IP67 protection. It can be used in places splashed with water.



Note: However, take care that if it is exposed to water splashes during operation, it may detect a water drop itself.

### Plug-in connector type is available

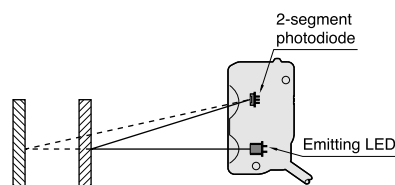
The plug-in connector type, which can be disconnected for replacement is available. In case a problem occurs, you can replace the sensor in a few minutes (excluding EQ-34W).



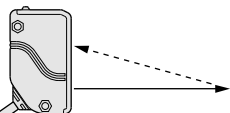

### Principle of fixed-focus sensing with 2-segment photodiode

Normal reflective type sensors operate by sensing the variation in the amount of incident beam. However, the fixed-focus reflective sensing type sensor incorporating the 2-segment photodiode operates by sensing the variation in the incident beam angle. Thus, the output is activated according to the distance of the object from the sensor.

This system helps the EQ-30 series in being unaffected by object color or a background, enabling stable sensing.

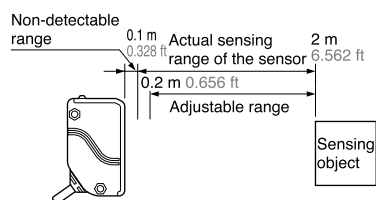


Sensing is based on the difference in the incident beam angle of the dotted line and the solid line in the above figure.

Appearance	Adjustable range (Note)	Model No.	Output
	 0.2 to 2 m 0.656 to 6.562 ft	<b>EQ-34</b>	NPN open-collector transistor
		<b>EQ-34-PN</b>	PNP open-collector transistor
		<b>EQ-34W</b>	Two NPN open-collector transistor outputs

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

Adjustable range stands for the maximum sensing range which can be set with the adjuster. Sensor can detect an object 0.1 m 0.328 ft, or more, away. The detectable range of Near (Sub) type of **EQ-34W** begins at 0.2 m 0.656 ft.



### Connector type, 5 m 16.404 ft cable length type

Standard type (standard: cable type) and 5 m 16.404 ft cable length type (standard: 2 m 6.562 ft) are also available.

#### Model Nos.

Standard	Plug-in connector type (Note)	5 m 16.404 ft cable length type
<b>EQ-34</b>	<b>EQ-34-J</b>	<b>EQ-34-C5</b>
<b>EQ-34-PN</b>	<b>EQ-34-PN-J</b>	_____
<b>EQ-34W</b>	_____	<b>EQ-34W-C5</b>

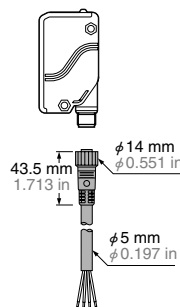
Order the suitable mating cable separately.

#### Table for plug-in connector type

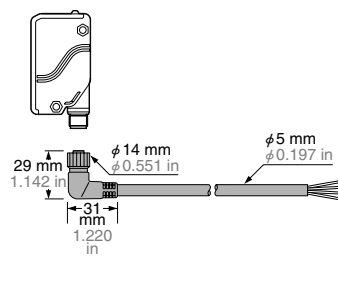
Model No.	Description
<b>CN-24-C2</b>	Length: 2 m 6.562 ft
<b>CN-24-C5</b>	Length: 5 m 16.404 ft
<b>CN-24L-C2</b>	Length: 2 m 6.562 ft
<b>CN-24L-C5</b>	Length: 5 m 16.404 ft

0.34 mm<sup>2</sup> 4-core cable with connector on one end  
Cable outer diameter:  $\phi 5$  mm  $\phi 0.197$  in

#### • CN-24-C□



#### • CN-24L-C□

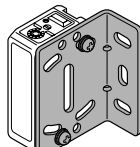


Model No.	Description
<b>MS-EQ3-1</b>	Back angled mounting bracket
<b>MS-EQ3-2</b>	Foot angled mounting bracket

### Sensor mounting bracket

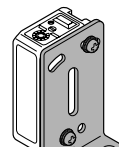
#### • MS-EQ3-1

Two M4 (length 25 mm 0.984 in) screws with washers and two M4 nuts are attached.



#### • MS-EQ3-2

Two M4 (length 25 mm 0.984 in) screws with washers and two M4 nuts are attached.

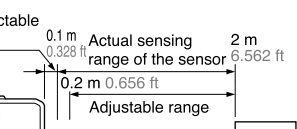


# EQ-30

## APPLICATIONS

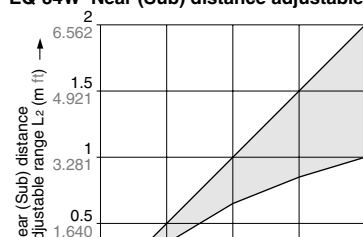
Type	NPN output	PNP output	Two outputs
Model No.	EQ-34	EQ-34-PN	EQ-34W
Operating range (Note 1)	0.2 to 2 m 0.656 to 6.562 ft		Far (Main): 0.2 to 2 m 0.656 to 6.562 ft Near (Sub): Refer to diagram in (Note 2)
Operating range (non-glossy paper) (distance 2 m 6.562 ft)	0.1 to 2 m 0.328 to 6.562 ft		Far (Main): 0.1 to 2 m 0.328 to 6.562 ft Near (Sub): 0.2 to 2 m 0.656 to 6.562 ft [with Near (Sub) distance for adjuster at max.]
Accuracy	10 % or less of operation distance		
Resolution	Along sensing axis: 10 mm 0.394 in or less, Perpendicular to sensing axis: 1 mm 0.039 in or less (with white non-glossy paper)		
Supply voltage	10 to 30 V DC Ripple P-P 10 % or less		
Power consumption	50 mA or less	55 mA or less	90 mA or less
Output characteristics	NPN open-collector transistor • Maximum sink current: 100 mA • Applied voltage: 30 V DC or less (between output and 0 V) • Residual voltage: 1 V or less (at 100 mA sink current) 0.4 V or less (at 16 mA sink current)	PNP open-collector transistor • Maximum source current: 100 mA • Applied voltage: 30 V DC or less (between output and + V) • Residual voltage: 1 V or less (at 100 mA source current) 0.4 V or less (at 16 mA source current)	<Far (Main) output, Near (Sub) output> NPN open-collector transistor • Maximum sink current: 100 mA • Applied voltage: 30 V DC or less (between Far (Main) output and 0 V) [between Near (Sub) output and 0 V] • Residual voltage: 1 V or less (at 100 mA sink current) 0.4 V or less (at 16 mA sink current)
Output category	DC-12 or DC-13		
Output operation	Switchable either Detection-ON or Detection-OFF		
Circuit protection	Incorporated		
Response time	2 ms or less		
Indicator	Red LED (lights up when the output is ON)		Far (Main) output: Red LED [lights up when the Far (Main) output is ON] Near (Sub) output: Red LED [lights up when the Near (Sub) output is ON]
Indicator	Green LED (lights up under stable light received condition or stable dark condition) (Note 3)		
Adjuster	2-turn mechanical adjuster with pointer		Far (Main): 2-turn mechanical adjuster with pointer Near (Sub): Variable adjuster
Interference prevention function	Incorporated (Two units of sensors can be mounted close together.)		
Operating degree	3 (Industrial environment)		
Protection	IP67 (IEC)		
Operating temperature	-20 to +55 °C -4 to +131 °F (No dew condensation or icing allowed), Storage: -25 to +70 °C -13 to +158 °F		
Operating humidity	35 to 85 % RH, Storage: 35 to 85 % RH		
Operating illuminance	Sunlight: 10,000 lx at the light-receiving face, Incandescent light: 3,000 lx at the light-receiving face EN 50081-2, EN 50082-2, EN 60947-5-2		
Dielectric 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 megger between all supply terminals connected together and enclosure		
Vibration resistance	10 to 55 Hz frequency, 1.5 mm 0.059 in amplitude (10 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		
Light emission	Infrared LED (modulated)		
Enclosure	Enclosure: Polyacrylate and Polyethylene terephthalate, Lens: Polyacrylate		
Cable	0.3 mm <sup>2</sup> 3-core (EQ-34W: 4-core) cable, 2 m 6.562 ft long		
Extension	Extension up to total 100 m 328.084 ft is possible with 0.3 mm <sup>2</sup> , or more, cable. 150 g approx. Adjusting screwdriver: 1pc.		

The adjustable range stands for the maximum sensing range which can be set with the adjuster. The sensor can detect an object 0.1 m 0.328 ft, or more, away. However, the detectable area of the Near (Sub) type of the EQ-34W begins at 0.2 m 0.656 ft.



2) The Near (Sub) distance adjustable range, L<sub>2</sub>, changes with the setting of the Far (Main) distance, L<sub>1</sub>, as shown in the table below.

EQ-34W Near (Sub) distance adjustable range

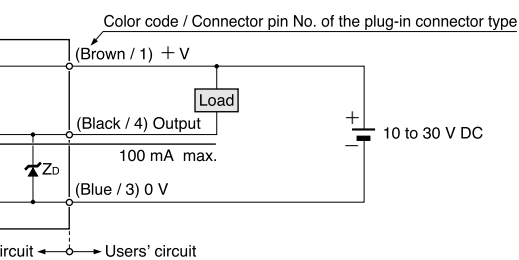


EQ-34W	
Far (Main) setting distance L <sub>1</sub>	Near (Sub) distance adjustable range L <sub>2</sub>
2 m 6.562 ft	1 to 2 m 3.281 to 6.562 ft
1.5 m 4.921 ft	0.85 to 1.5 m 2.789 to 4.921 ft
1 m 3.281 ft	0.65 to 1 m 2.133 to 3.281 ft
0.5 m 1.640 ft	0.35 to 0.5 m 1.148 to 1.640 ft
0.2 m 0.656 ft	0.2 m 0.656 ft

## UNIT AND WIRING DIAGRAMS

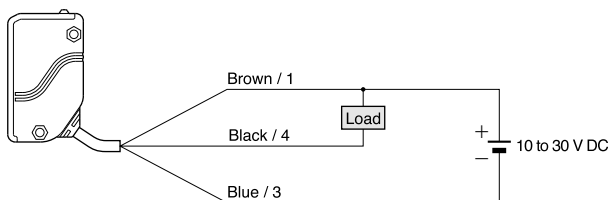
### 34 NPN output type

#### Diagram

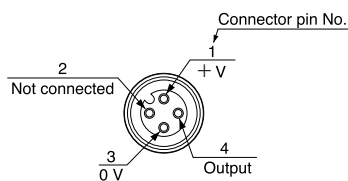


: Reverse supply polarity protection diode  
 : Surge absorption zener diode  
 : NPN output transistor

#### Wiring diagram

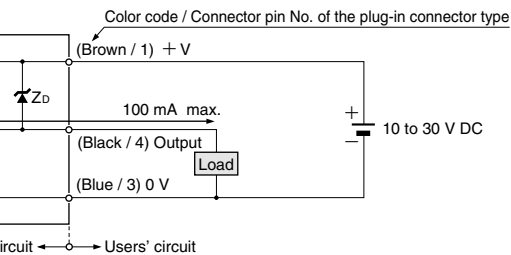


#### Connector pin position (Plug-in connector type)



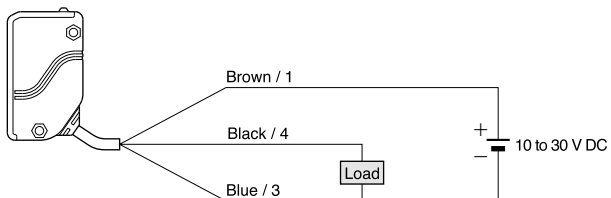
### PNP output type

#### Diagram

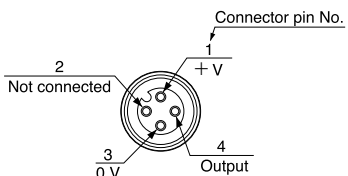


: Reverse supply polarity protection diode  
 : Surge absorption zener diode  
 : PNP output transistor

#### Wiring diagram

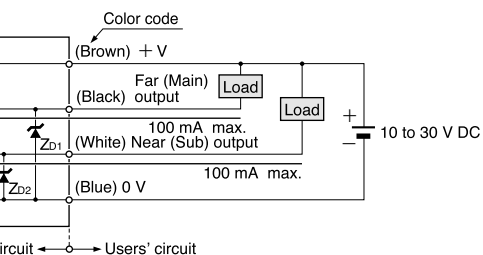


#### Connector pin position (Plug-in connector type)



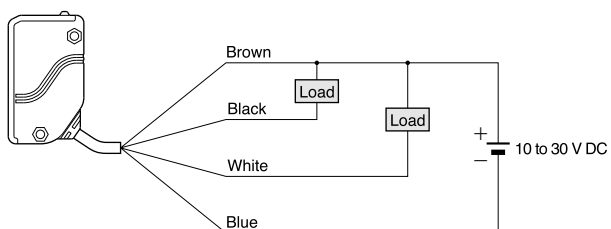
### Two output type

#### Diagram



: Reverse supply polarity protection diode  
 ZD1, ZD2: Surge absorption zener diode  
 Tr1, Tr2: NPN output transistor

#### Wiring diagram



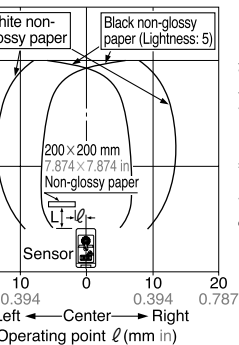
# EQ-30

## WORKING CHARACTERISTICS (TYPICAL)

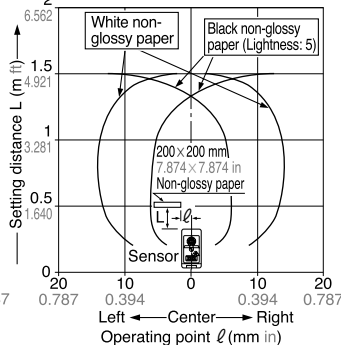
EQ-30  
EQ-30-PN

### Fields

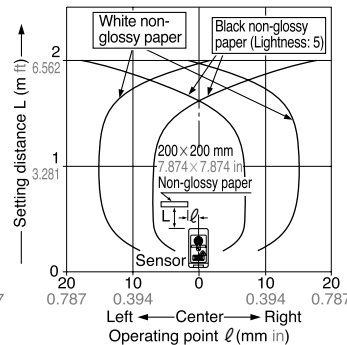
Setting distance: 1 m 3.281 ft



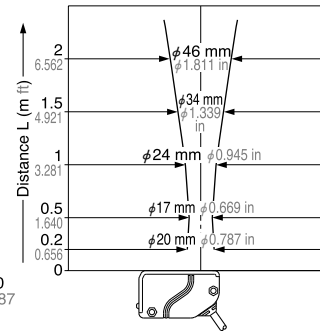
Setting distance: 1.5 m 4.921 ft



Setting distance: 2 m 6.562 ft

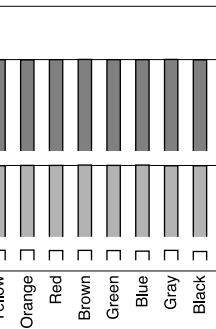


### Emitted beam

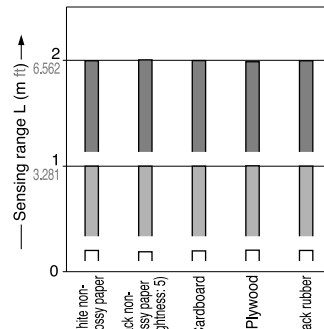


Correlation between material (200 X 200 mm 7.874 X 7.874 in non-glossy paper) and sensing range

Correlation between material (200 X 200 mm 7.874 X 7.874 in) and sensing range



These bars indicate the sensing range with the respective colors when the distance adjuster is set at the sensing range of 2 m 6.562 ft, 1 m 3.281 ft and 0.2 m 0.656 ft long, each, with white color. The sensing distance varies depending also on material.

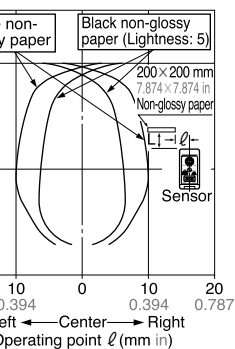


These bars indicate the sensing range with respective objects when the distance adjuster is set at the sensing range of 2 m 6.562 ft, 1 m 3.281 ft and 0.2 m 0.656 ft long, each, with white non-glossy paper.

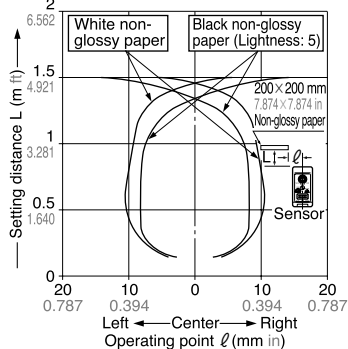
EQ-30W

### Fields

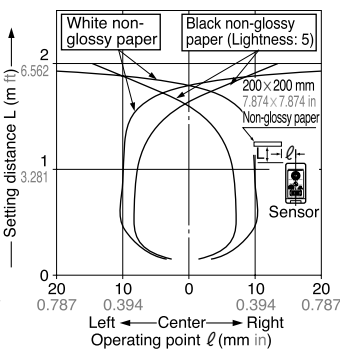
(Main) setting distance: 1 m 3.281 ft



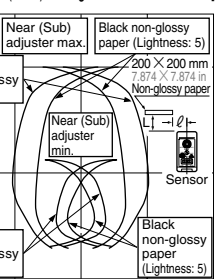
Far (Main) [Far (Main) setting distance: 1.5 m 4.921 ft]



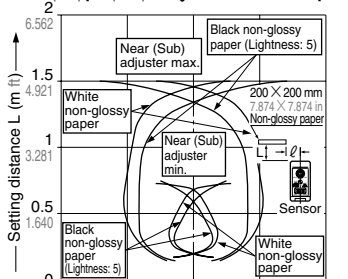
Far (Main) [Far (Main) setting distance: 2 m 6.562 ft]



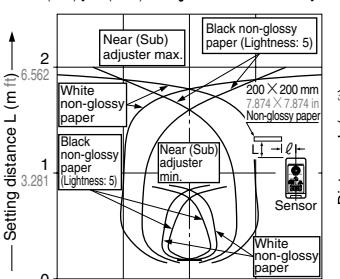
(Sub) setting distance: 1 m 3.281 ft



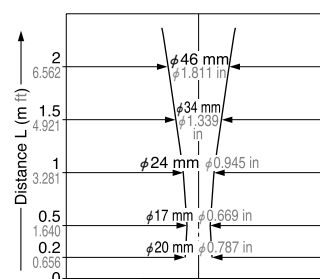
Near (Sub) [Far (Main) setting distance: 1.5 m 4.921 ft]



Near (Sub) [Far (Main) setting distance: 2 m 6.562 ft]



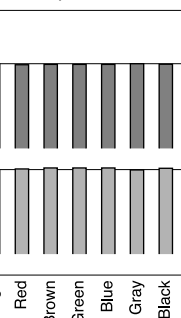
### Emitted beam



## CHARACTERISTICS (TYPICAL)

4W

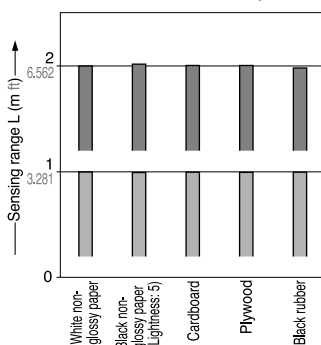
Color (200 X 200 mm 7.874 X 7.874 in non-glossy paper) and sensing range



These bars indicate the sensing range with respective colors when the distance adjuster is set at the sensing range of Far (Main) 2 m 6.562 ft and Near (Sub) 1 m 3.281 ft long, each, with white color. The sensing distance varies depending also on material.

... Far (Main)  
2 m 6.562 ft  
... Near (Sub)  
1 m 3.281 ft

Correlation between material (200 X 200 mm 7.874 X 7.874 in) and sensing range



These bars indicate the sensing range with respective objects when the distance adjuster is set at the sensing range of Far (Main) 2 m 6.562 ft and Near (Sub) 1 m 3.281 ft long, each, with white non-glossy paper.

... Far (Main)  
2 m 6.562 ft  
... Near (Sub)  
1 m 3.281 ft

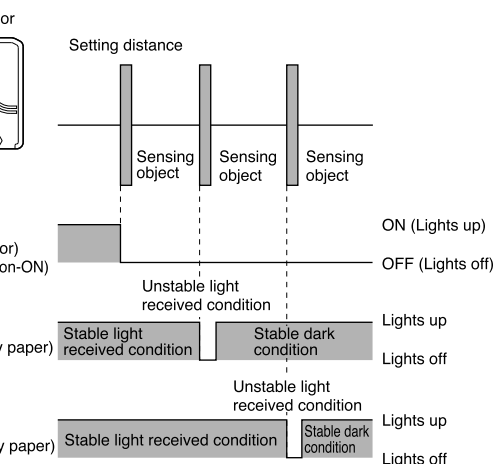
## CONDITIONS FOR PROPER USE

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.

### Indicator

The EQ-30 series uses a 2-segment photodiode as a sensing element, and sensing is done based on the change in the incident beam angle of the reflected light from the sensing object, the output and the stability indicator operate according to the object's movement.

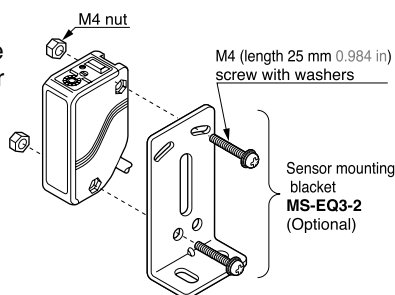
The stability indicator shows the margin of the light intensity and not that of the object distance. The distance at which it lights up/off depends on the object's reflectivity and is not at all related to the output. Do not use the sensor when the stability indicator is off (unstable light received condition), since the output will be unstable.



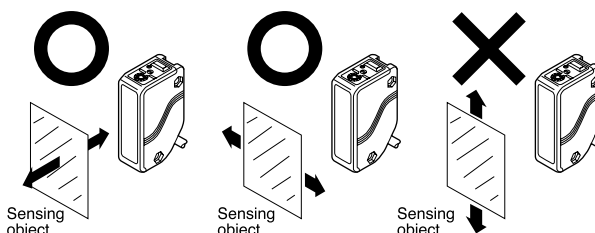
During the initial transient time (50 ms) after power supply is switched on.

### Mounting

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

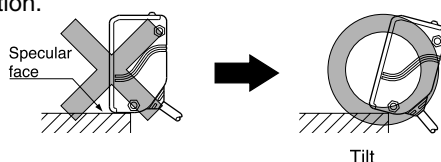


- Care must be taken regarding the sensor mounting direction with respect to the object's direction of movement.



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) 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 small 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.



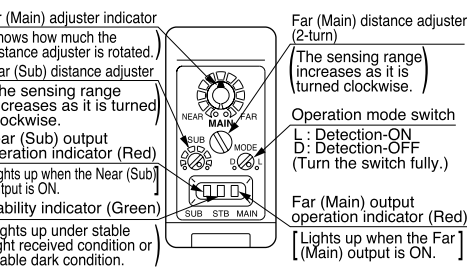
- If a specular body is present in the background, wrong operation may be caused due to a small change in the background.

# EQ-30

## INSTRUCTIONS FOR PROPER USE

### Distance adjustment

Adjusters



### Adjusting procedure

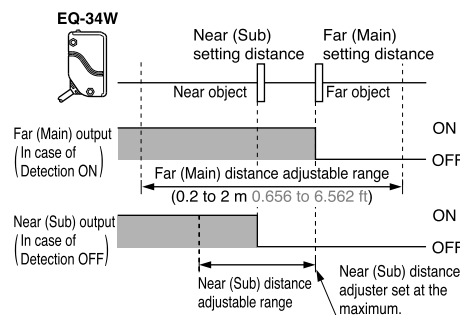
Description	Distance adjuster
Turn the Far (Main) distance adjuster fully counterclockwise to the minimum sensing point of 0.656 ft approx.	 Turn fully
Place an object at the far place at the required distance from the sensor, turn the Far (Main) distance adjuster gradually clockwise, and find out point (A) where the sensor changes to the light received condition.	
Remove the object, turn the Far (Main) distance adjuster further clockwise, and find out point (B) where the sensor changes to the light received condition again with only the background.	
When the sensor does not go to the light received condition even if the adjuster is fully turned clockwise, point (B) is this extreme point in the range.	
The optimum position to stably detect objects for Far (Main) setting is the center point between (A) and (B).	

Description	Distance adjuster
Turn the Near (Sub) distance adjuster fully counterclockwise to the minimum sensing point.	 Turn fully
Place an object at the near position, at the required distance from the sensor, turn the Near (Sub) distance adjuster gradually clockwise, and find out point (C) where the sensor changes to the light received condition.	
Remove the object from the near position, and place an object for Far (Main) sensing at the sensing distance. Turn the Near (Sub) distance adjuster further clockwise, and find out point (D) where the sensor changes to the light received condition again with only the background.	
When the sensor does not go to the light received condition even if the adjuster is fully turned clockwise, point (D) is this extreme point.	
The optimum position to stably detect objects for Near (Sub) setting is the center point between (C) and (D).	

Notes: 1) Turn the distance adjuster gradually and lightly with the attached screwdriver.

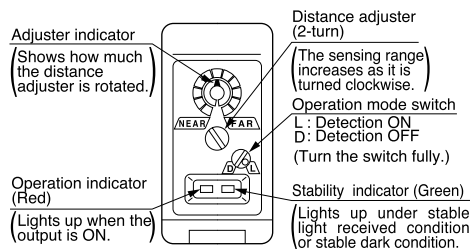
If the distance adjuster is over turned or pressed heavily, it may be damaged.

2) The Far (Main) distance adjustment should be done before the Near (Sub) distance adjustment. Take care that the Near (Sub) setting distance changes with change in the Far (Main) setting distance.



### EQ-34, EQ-34-PN

#### <Adjusters>



#### <Adjusting procedure>

Step	Description	Distance adjuster
①	Turn the distance adjuster fully counterclockwise to the minimum sensing range position 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 light received condition.	
③	Remove the object, turn the distance adjuster further counterclockwise, and find out point (B) where the sensor changes to the light received condition again with only the background. (When the sensor does not go to the light received condition even if the adjuster is fully turned clockwise, point (B) is this extreme point in the range.)	
④	The optimum position to stably detect objects is the center point between (A) and (B).	

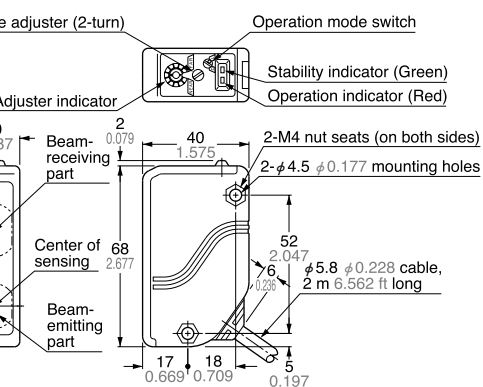
Note: Turn the distance adjuster gradually and lightly with the attached



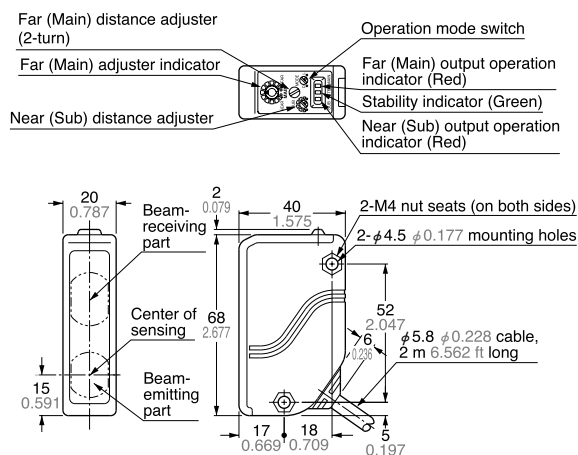
# EQ-30

Dimensions (Unit: mm in)

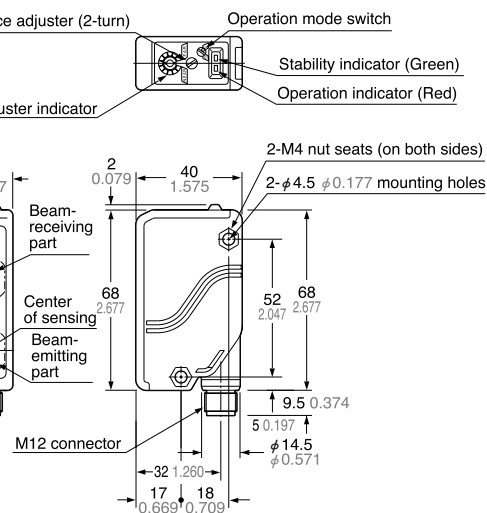
## EQ-30 Sensor



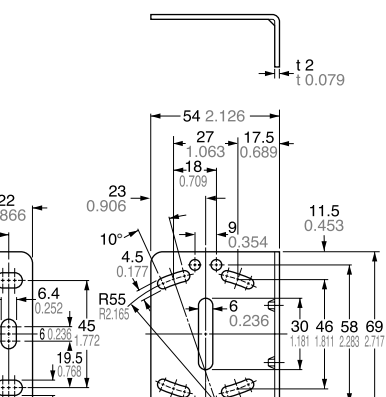
## EQ-34W Sensor



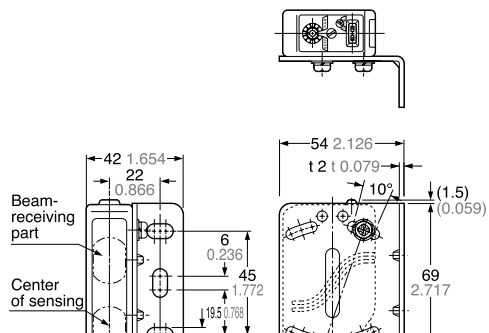
## EQ-30 Sensor



## EQ-30-1 Sensor mounting bracket (Optional)



## Assembly dimensions Mounting drawing with EQ-34

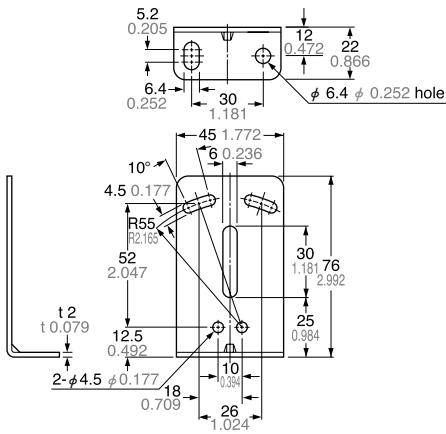


# EQ-30

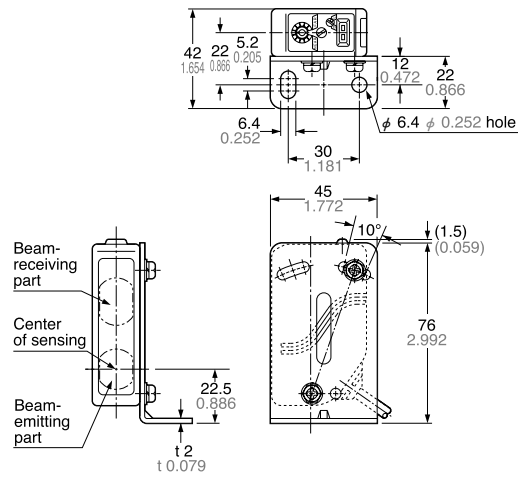
Dimensions (Unit: mm in)

## EQ3-2 Sensor mounting bracket (Optional)

### Assembly dimensions Mounting drawing with EQ-34



Material: Cold rolled carbon steel (SPCC)  
 Screws: 2- $\phi 4.5$  (length 25 mm 0.984 in) screws with washers  
 Nuts: 2 M4 nuts are attached.



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