891

FIBER SENSORS

LASER SENSORS

PHOTOELECTRIC SENSORS

MICRO PHOTOELECTRIC SENSORS

AREA SENSORS

SAFETY LIGHT CURTAINS / SAFETY COMPONENTS

PRESSURE / FLOW SENSORS

INDUCTIVE PROXIMITY SENSORS

PARTICULAR USE SENSORS

SENSOR OPTIONS

SIMPLE WIRE-SAVING UNITS

WIRE-SAVING SYSTEMS

MEASUREMENT SENSORS

STATIC CONTROL DEVICES

LASER MARKERS

PLC

HUMAN MACHINE INTERFACES

ENERGY MANAGEMENT SOLUTIONS

FA COMPONENTS

MACHINE VISION SYSTEMS

UV CURING SYSTEMS

Water Detection Sensor
EZ-10 SERIES

Related Information	■ General terms and conditions..............F-3	■ Selection guide .... P.865~
	■ Glossary of terms........................P.1549~	■ General precautions....................P.1552~

CE

UR Recognition
(Excluding 5 m cable length type)

panasonic.net/id/pidsx/global

Detects water...reliably!

Strong penetration power

As the penetration power is strong, its beam can pass through not only translucent containers (PFA tanks, etc.) but also opaque containers of shampoo bottles, etc., and can reliably detect the liquid inside.

Penetration in case of an empty container (Typical)

Penetration (%)
100, 40, 20, 10, 2, 0

Transparent container, Milk-white container, Colored bottle, Opaque container, Shampoo bottle
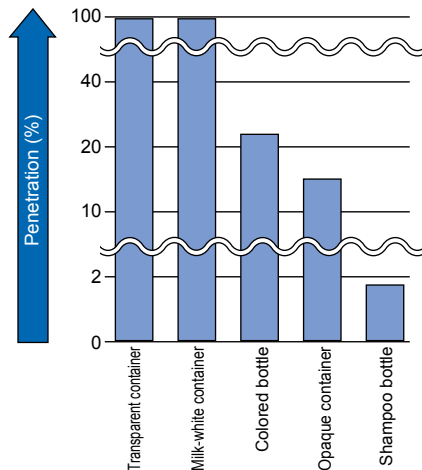
* The graph above is merely a guideline. Penetration power changes due to container material, thickness and color. We strongly recommend that you conduct verification tests prior to use.

Adjacent sensor mounting possible

Several sensors can be mounted adjacently by fitting optional slit masks. Further, they can detect the liquid level accurately.

Not affected by drops, bubbles or froth

It is possible to set its sensitivity adjuster so that water drops, bubbles in the water, or froth on the water surface are not detected.

Water drops

Bubbles

Froth
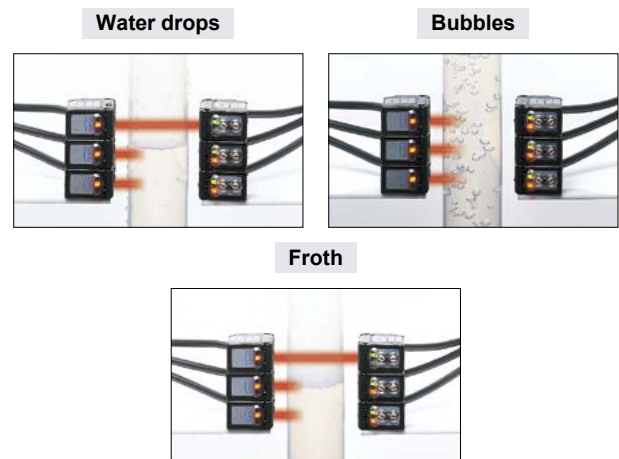
IP67 protection

The sensor can be hosed down because of its IP67 construction and the non-corrosive stainless steel sensor mounting bracket.

Note: However, take care that if it is exposed to water splashes during operation, it will detect the splashed water itself.

Plug-in connector type is available

Plug-in connector type which enables connection / disconnection of the cable by one-touch is available. Anyone can easily replace the sensor in a minute.

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UV
CURING
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APPLICATIONS

Detecting level of aqueous solution in resin tank
It can reliably detect a liquid even in an opaque container.
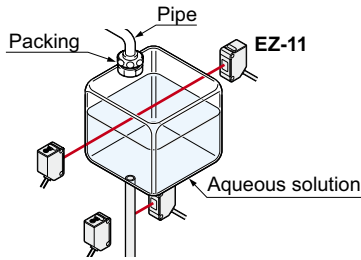
Detecting the boundary between water and oil
Since it does not detect oil, it can reliably detect the boundary between water and oil.
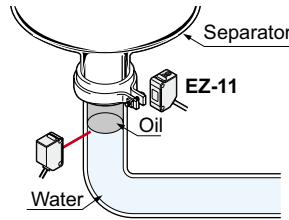
Detecting presence of liquid in colored bottle
Aqueous liquids in translucent colored bottles can be reliably detected.
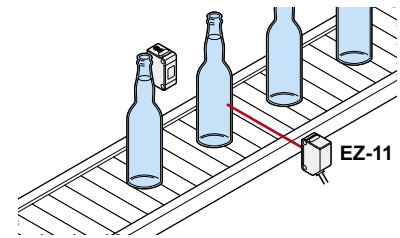
ORDER GUIDE

Type	Appearance	Sensing range (Note 1)	Model No. (Note 2)	Output
NPN output		5m 16.404 ft (without container or pipe)	**EZ-11**	NPN open-collector transistor
PNP output			**EZ-11-PN**	PNP open-collector transistor

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

Notes: 1) The sensing range shortens depending on the thickness, material, color, etc., of the container or pipe.
2) Models whose model name on the product nameplate is followed by "**P**" are emitters, while those whose model name is followed by "**D**" are receivers.

### 5 m 16.404 ft cable length type and plug-in connector type

5 m 16.404 ft cable length type (standard: 2 m 6.562 ft) and plug-in connector type (standard: cable type) are also available.
(5 m 16.404 ft cable length type is not available for the **EZ-11-PN**.)
When ordering this type, suffix "**-C5**" for 5 m 16.404 ft cable length type, "**-J**" for plug-in connector type to the model No.
Please order the suitable mating cable separately for plug-in connector type.
(e.g.) Plug-in connector type of **EZ-11-PN** is "**EZ-11-PN-J**".

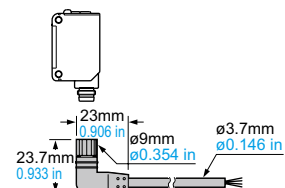### • Mating cable for plug-in connector type (2 cables are required)

Type	Model No.	Description	
Straight	**CN-24E-C2**	Length: 2 m 6.562 ft	0.2 mm² 4-core cabtyre cable with connector on one end Cable outer diameter: ø3.7 mm ø0.146 in
	CN-24E-C5	Length: 5 m 16.404 ft	
Elbow	**CN-24EL-C2**	Length: 2 m 6.562 ft	
	CN-24EL-C5	Length: 5 m 16.404 ft	
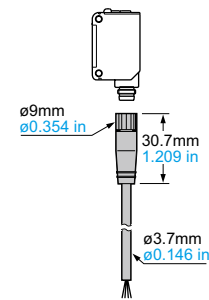
• **CN-24E-C2□, CN-24E-C5**

• **CN-24EL-C2□, CN-24EL-C5**

Selection
Guide

Liquid Leak
Detection

Liquid Level
Detection

Water
Detection

Color Mark
Detection

Wafer
Detection

Ultrasonic
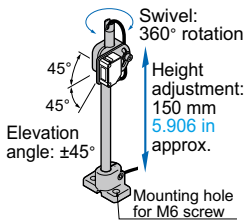
Small / Slim
Object Detection

Obstacle
Detection

EZ-10

■ OPTIONS

Designation	Model No.	Description		
Round slit mask	**OS-CX-05** (Slit size ø0.5 mm ø0.020 in)	Slit on one side	• Sensing range: 200 mm 7.874 in	
		Slit on both sides	• Sensing range: 10 mm 0.394 in	
	OS-CX-1 (Slit size ø1 mm ø0.039 in)	Slit on one side	• Sensing range: 400 mm 15.748 in	
		Slit on both sides	• Sensing range: 60 mm 2.362 in	
	OS-CX-2 (Slit size ø2 mm ø0.079 in)	Slit on one side	• Sensing range: 1 m 3.281 ft	
		Slit on both sides	• Sensing range: 250 mm 9.843 in	
Rectangular slit mask	**OS-CX-05×6** (Slit size 0.5 × 6 mm 0.020 × 0.236 in)	Slit on one side	• Sensing range: 800 mm 31.496 in	
		Slit on both sides	• Sensing range: 250 mm 9.843 in	
	OS-CX-1×6 (Slit size 1 × 6 mm 0.039 × 0.236 in)	Slit on one side	• Sensing range: 1.3 m 4.265 ft	
		Slit on both sides	• Sensing range: 600 mm 23.622 in	
	OS-CX-2×6 (Slit size 2 × 6 mm 0.079 × 0.236 in)	Slit on one side	• Sensing range: 2 m 6.562 ft	
		Slit on both sides	• Sensing range: 1.3 m 4.265 ft	
Sensor mounting bracket (Note 1)	**MS-CX2-1**	Foot angled mounting bracket (Two brackets are required.)		
	MS-CX2-2	Foot biangled mounting bracket (Two brackets are required.)		
	MS-CX2-4	Protective mounting bracket (Two brackets are required.)		
	MS-CX2-5	Back biangled mounting bracket (Two brackets are required.)		
	MS-CX-3	Back angled mounting bracket (Two brackets are required.)		
Universal sensor mounting stand (Note 2)	**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		

Notes: 1) The plug-in connector type sensor does not allow use of some sensor mounting brackets
because of the protrusion of the connector.
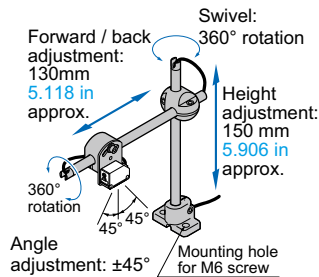2) Refer to p.953~ for the universal sensor mounting stand.
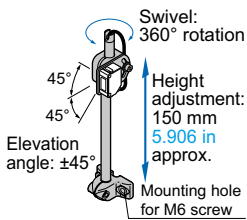
Universal sensor mounting stand

• MS-AJ1

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

• MS-AJ1-A

With the lateral arm, the sensor can sense from above a production line.

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

• MS-AJ2

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

• MS-AJ2-A

With the lateral arm, the sensor can sense from above a production line.

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

## Round slit mask

• OS-CX-□

Used for narrowing the beam for cases when detecting water or other substances inside slender pipes. Fitted on the front face of the sensor with one-touch.
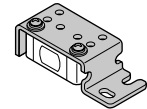
Round slit mask (Stainless steel)
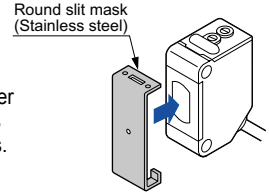
Rectangular slit mask

• OS-CX-□×6

Used for narrowing the beam for cases when detecting water or other substances inside slender pipes. Fitted on the front face of the sensor with one-touch.

Rectangular slit mask (Stainless steel)
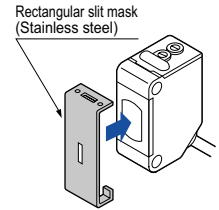
Sensor mounting bracket
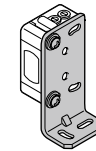
• MS-CX2-1

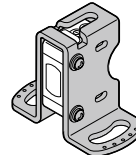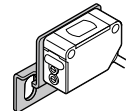Two M3 (length 12 mm 0.472 in) screws with washers are attached.

• MS-CX2-2

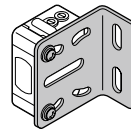Two M3 (length 12 mm 0.472 in) screws with washers are attached.

• MS-CX2-4

Two M3 (length 14 mm 0.551 in) screws with washers are attached.

• MS-CX2-5

Two M3 (length 12 mm 0.472 in) screws with washers are attached.

• MS-CX-3

Two M3 (length 12 mm 0.472 in) screws with washers are attached.

SPECIFICATIONS

Item	Type Model No.	NPN output **EZ-11**	PNP output **EZ-11-PN**
CE marking directive compliance		EMC Directive, RoHS Directive	
Sensing range		5 m 16.404 ft (without container or pipe)(Note 2)	
Sensing object		ø12 mm ø0.472 in or more liquid which contains water, or opaque object (Note 3)	
Supply voltage		12 to 24 V DC ±10 % Ripple P-P 10 % or less	
Current consumption		Emitter: 25 mA or less, Receiver: 25 mA or less	

Output		NPN open-collector transistor
		• Maximum sink current: 100 mA
		• Applied voltage : 30 V DC or less (between output and 0 V)
		• Residual voltage: 1.5 V or less (at 100 mA sink current)
		  0.4 V or less (at 16 mA sink current)
			PNP open-collector transistor
			• Maximum source current: 100 mA
			• Applied voltage: 30 V DC or less (between output and V)
			• Residual voltage: 1.5 V or less (at 100 mA source current)
			  0.4 V or less (at 16 mA source current)

	Utilization category	DC-12 or DC-13	
	Output operation	Switchable either Light-ON or Dark-ON	
	Short-circuit protection	Incorporated	
Response time		12 ms or less	
Operation indicator		Orange LED (lights up when the output is ON), located on the receiver	
Stability indicator		Green LED (lights up under stable light received condition or stable dark condition), located on the receiver	
Power indicator		Orange LED (lights up when the power is ON), located on the emitter	
Sensitivity adjuster		Continuously variable adjuster	
Environmental resistance	Pollution degree	3 (Industrial environment)	
	Protection	IP67 (IEC)	
	Ambient temperature	0 to +55 °C +32 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 (modulated)	
Material		Polycarbonate	
Cable		0.2 mm^2 3-core (emitter: 2-core) oil resistant cabtyre cable, 2 m, 6.562 ft long	
Cable extension		Extension up to total 100 m 328.084 ft is possible, for both emitter and receiver, with 0.3 mm^2, or more, cable.	
Weight		Emitter: 45 g approx., Receiver: 50 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 sensing range shortens depending on the thickness, material, color, etc., of the container or pipe.
   3) If there are two slit on both sides, the size of those slit represents the min. sensing object.

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SAFETY LIGHT
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Selection
Guide

Liquid Leak
Detection

Liquid Level
Detection

Water
Detection

Color Mark
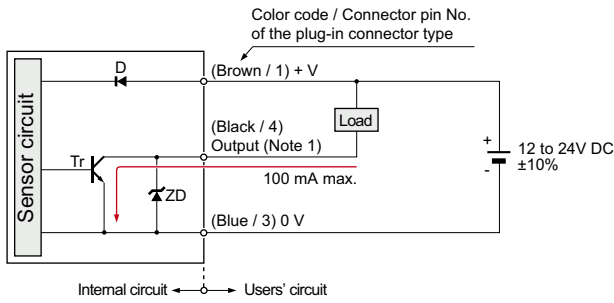Detection

Wafer
Detection

Ultrasonic

Small / Slim
Object Detection

Obstacle
Detection

EZ-10

I/O CIRCUIT DIAGRAMS

NPN output type

I/O circuit diagram

Color code / Connector pin No. of the plug-in connector type

(Brown / 1) + V

(Black / 4) Output (Note 1)

100 mA max.

(Blue / 3) 0 V

12 to 24V DC ±10%

Internal circuit ← ┊ → Users' circuit

Notes: 1) The emitter does not incorporate the output.
2) When the mating cable is connected to the plug-in connector type sensor, the white wire of the mating cable is not connected.
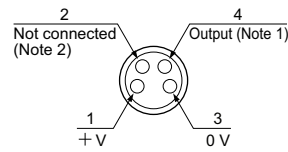
Symbols ... D : Reverse supply polarity protection diode
ZD: Surge absorption zener diode
Tr : NPN output transistor
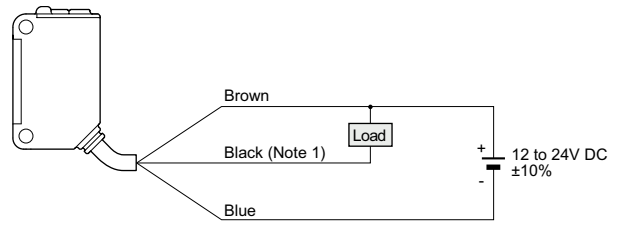
Wiring diagram

Brown

Load

Black (Note 1)

Blue

12 to 24V DC ±10%

Note: The emitter does not incorporate the black wire.

Connector pin position (plug-in connector type)

2 Not connected (Note 2)

4 Output (Note 1)

1 + V

3 0 V

Notes: 1) The emitter does not incorporate the output.
2) When the mating cable is connected to the plug-in connector type sensor, the white wire of the mating cable is not connected.

PNP output type

I/O circuit diagram
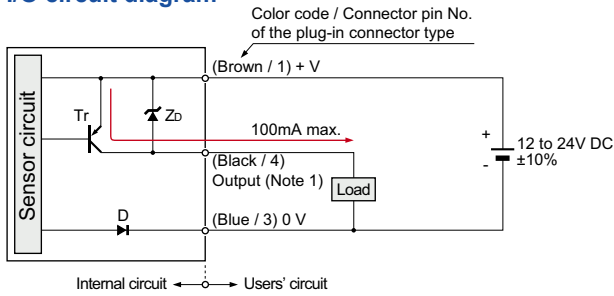
Color code / Connector pin No. of the plug-in connector type

(Brown / 1) + V

100mA max.

(Black / 4) Output (Note 1)

(Blue / 3) 0 V

12 to 24V DC ±10%

Internal circuit ← ┊ → Users' circuit

Notes: 1) The emitter does not incorporate the output.
2) When the mating cable is connected to the plug-in connector type sensor, the white wire of the mating cable is not connected.
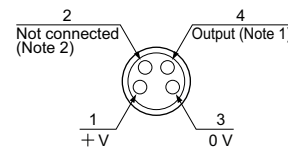
Symbols ... D : Reverse supply polarity protection diode
ZD: Surge absorption zener diode
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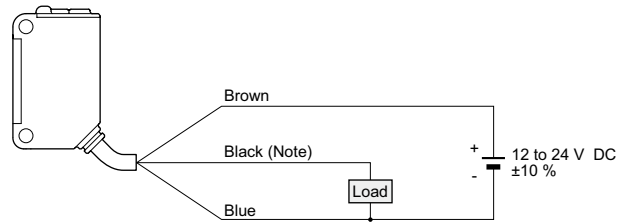
Wiring diagram

Brown

Black (Note)

Load

Blue

12 to 24 V DC ±10 %

Note: The emitter does not incorporate the black wire.

Connector pin position (plug-in connector type)

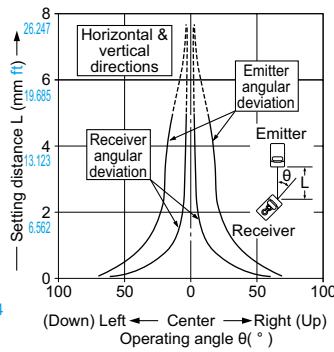

2 Not connected (Note 2)

4 Output (Note 1)

1 + V

3 0 V

Notes: 1) The emitter does not incorporate the output.
2) When the mating cable is connected to the plug-in connector type sensor, the white wire of the mating cable is not connected.
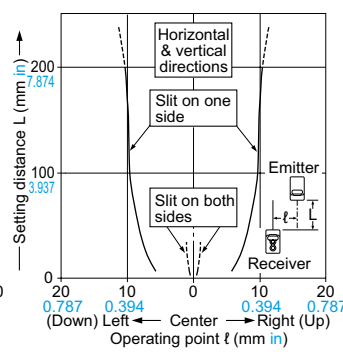
■ SENSING CHARACTERISTICS (TYPICAL)
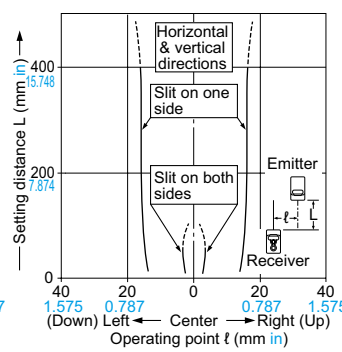
Parallel deviation
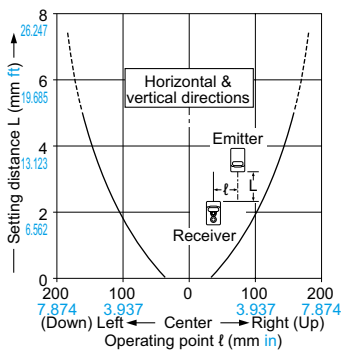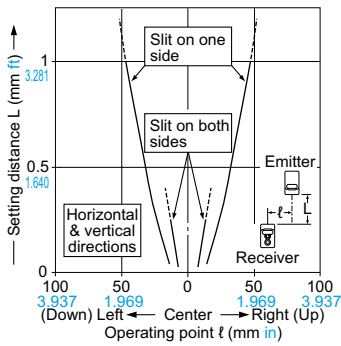

Angular deviation

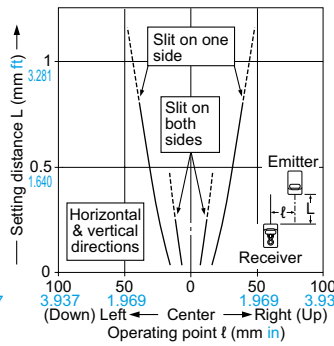**Parallel deviation with round slit masks (ø0.5 mm ø0.020 in)**

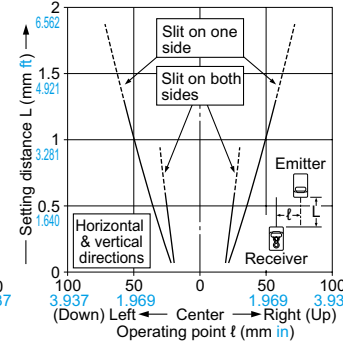**Parallel deviation with round slit masks (ø1 mm ø0.039 in)**

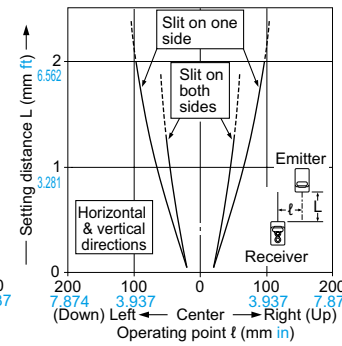**Parallel deviation with round slit masks (ø2 mm ø0.079 in)**

Parallel deviation with rectangular slit masks (0.5 × 6 mm 0.020 × 0.236 in)

Parallel deviation with rectangular slit masks (1 × 6 mm 0.039 × 0.236 in)

Parallel deviation with rectangular slit masks (2 × 6 mm 0.079 × 0.236 in)


■ 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

• The tightening torque should be 0.5 N·m or less.

M3 (length 12 mm 0.472 in) screw with washers

Sensor mounting bracket **MS-CX2-1** (Optional)
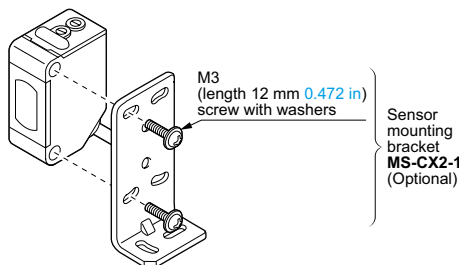
Wiring

• When connecting the mating cable to the plug-in connector type sensor, the tightening torque should be 0.4 N·m or less.

Stability indicator

• The stability indicator (green) lights up when the incident light intensity has sufficient margin with respect to the operation level. If the incident light intensity level is such that the stability indicator lights up, stable sensing can be done without the light received operation and the light interrupted operation being affected by a change in ambient temperature or supply voltage.
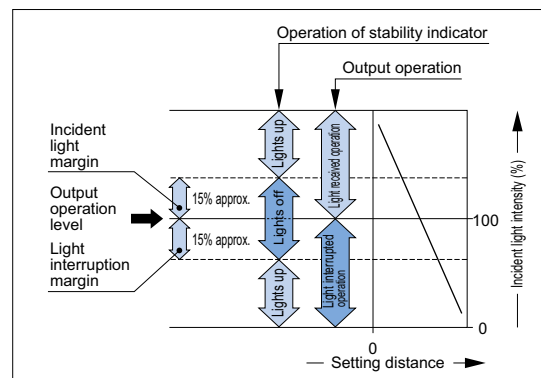
Others

• Because these units use special emitter and receiver elements, they are susceptible to the effects of operating ambient temperature and humidity. Sensitivity adjustment should be performed in the environment in which they will actually be used.
• Do not use during the initial transient time (100 ms) after the power supply is switched on.

■ DIMENSIONS (Unit: mm in)

EZ-11 EZ-11-PN   Sensor

Stability indicator (Green)(Note 1)   Operation mode switch (Note 1)

Operation indicator (Orange)(Note 2)   Sensitivity adjuster (Note 1)

12 0.472
2-M3 × 0.5 0.020 thru-hole threads
20 0.787
1.7 0.067
3 0.118
3 0.118
15.5 0.610
31 1.220
25 0.984
Beam axis
ø3.7 ø0.146 cable, 2 m 6.562 ft long

Notes: 1) Not incorporated on the emitter.
2) It is the power indicator (orange) on the emitter.

EZ-11-J EZ-11-PN-J   Sensor

Stability indicator (Green)(Note 1)   Operation mode switch (Note 1)

Operation indicator (Orange)(Note 2)   Sensitivity adjuster (Note 1)

12 0.472
1.7 0.067
3 0.118
22 0.866
3 0.118
15.5 0.610
40.5 1.594
34.5 1.358
31 1.220
25 0.984
Beam axis
ø11 ø0.433
2-M3 × 0.5 0.020 thru-hole threads
16 0.630
M8 connector
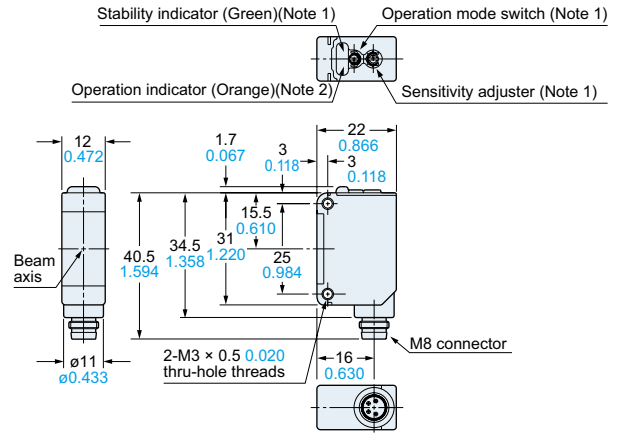
Notes: 1) Not incorporated on the emitter.
2) It is the power indicator (orange) on the emitter.

MS-CX2-1   Sensor mounting bracket (Optional)

5 0.197
12 0.472
3.4 0.134
3 0.118
R12 R0.472
14 0.551
8 0.315
14°
3.4 0.134
22 0.866
15 0.591
7°
2-ø3.4 ø0.134 holes
3.4 0.134
25 0.984
R25 R0.984
10 0.394
42.5 1.673
20 0.787
12.5 0.492
t 1.2 t 0.047

Material: Stainless steel (SUS304)

Two M3 (length 12 mm 0.472 in) screws with washers are attached.

Assembly dimensions

Mounting drawing with the receiver of **EZ-11**(**-PN**)

3.4 0.134
14 0.551
26 1.024
14°
R12 R0.472
3.4 0.134
3 0.118
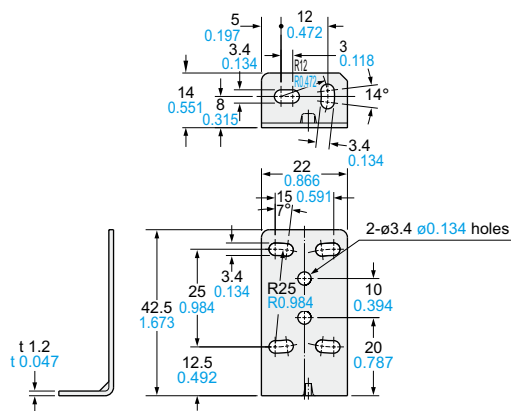12 0.472
5 0.197
12 0.472
Beam axis
31 1.220
25 0.984
9.5 0.374
0.5 0.020
7°
22 0.866
25 0.984
42.5 1.673
12.5 0.492
t 1.2 t 0.047
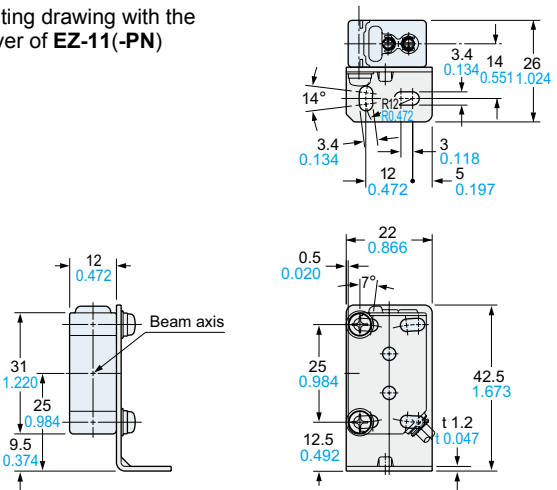
MS-CX2-2   Sensor mounting bracket (Optional)

14 0.551
7.8 0.307
7 0.276
15.8 0.622
22 0.866
14 0.551
8-ø3.4 ø0.134 holes
36 1.417
55 2.165
10 0.394
25 0.984
4.5 0.177
23 0.906
15.5 0.610
R12 R0.472
14°
4.5 0.177
12 0.472
5 0.197
7 0.276
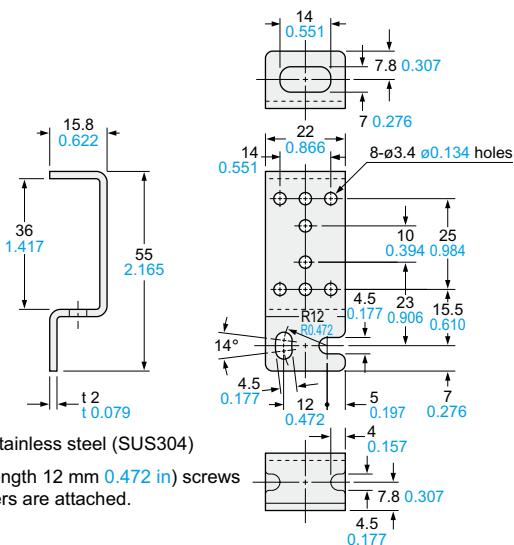4 0.157
7.8 0.307
4.5 0.177
t 2 t 0.079

Material: Stainless steel (SUS304)

Two M3 (length 12 mm 0.472 in) screws with washers are attached.

Assembly dimensions

Mounting drawing with the receiver of **EZ-11**(**-PN**)

15.8 0.622
(3.6) (0.142)
7.8 0.307
Beam axis
36 1.417
55 2.165
28 1.102
22 0.866
14 0.551
25 0.984
R12 R0.472
14°
4.5 0.177
15.5 0.610
7 0.276
4.5 0.177
12 0.472
5 0.197
4 0.157
7.8 0.307
4.5 0.177
t 2 t 0.079

DIMENSIONS (Unit: mm in)

MS-CX2-4 — Sensor mounting bracket (Optional)

ø55 ø2.165
ø39 ø1.535
6 0.236
40° 20°
7 0.276
19 0.748
29 1.142
5.5 0.217
5.5 0.217

14°
19 0.748
4 0.157
18 0.709
6.2 0.244
3.4 0.134
7°
3.4 0.134
25 0.984
ø25 ø0.984
R25 R0.984
25 0.984
25 0.984
R9.5 R0.374
SENSOR
46 1.811
t 2.5 t 0.098

Material: Stainless steel (SUS304)
Two M3 (length 14 mm 0.551 in) screws with washers are attached.

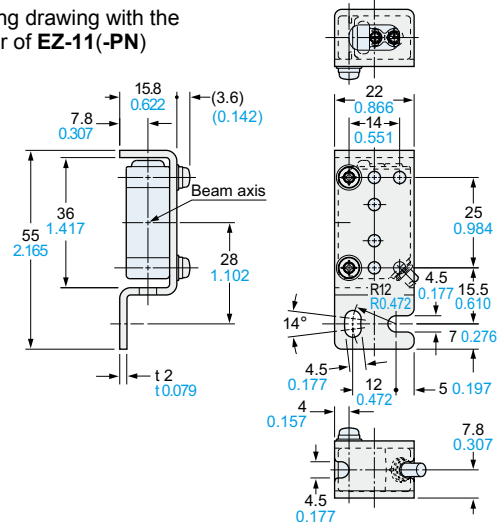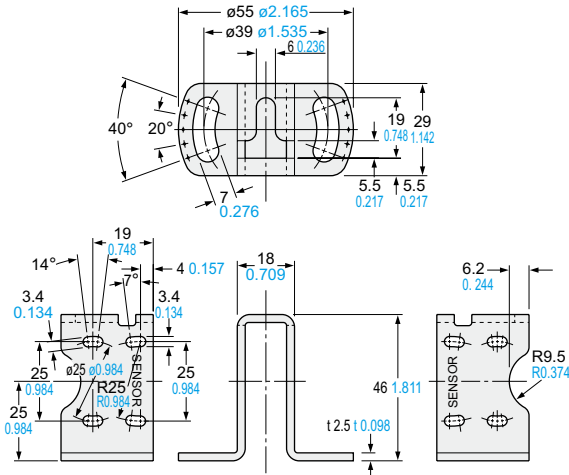### Assembly dimensions

Mounting drawing with the receiver of **EZ-11**(-**PN**)

ø55 ø2.165
ø39 ø1.535
7 0.276
40° 20°
29 1.142
0.5 0.020
19 0.748
7°
4 0.157
18 0.709
SENSOR
25 0.984
Beam axis
t 2.5 t 0.098
25 0.984
SENSOR
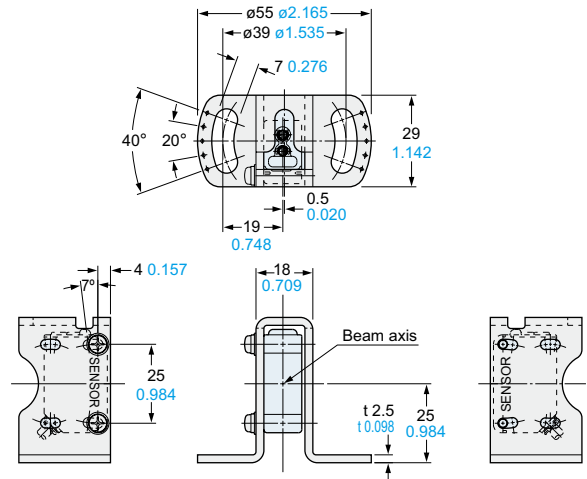
MS-CX2-5 — Sensor mounting bracket (Optional)

15 0.591
t 1.5 t 0.059
25 0.984
19 0.748
3.5 0.138
3.4 0.134
3.4 0.134
19 0.748
7°
R19 R0.748
R25 R0.984
45 1.772
5 0.197
18.9 0.744
20 0.787
6.5 0.256
7 0.276
37 1.457
5 0.197
8 0.315
7.9 0.311

Material: Stainless steel (SUS304)
Two M3 (length 12 mm 0.472 in) screws with washers are attached.

Assembly dimensions

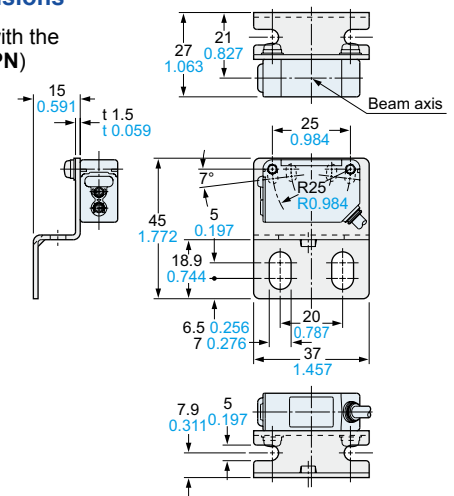Mounting drawing with the receiver of **EZ-11**(-**PN**)

21 0.827
27 1.063
15 0.591
t 1.5 t 0.059
Beam axis
25 0.984
7°
R25 R0.984
45 1.772
5 0.197
18.9 0.744
20 0.787
6.5 0.256
7 0.276
37 1.457
7.9 0.311
5 0.197

MS-CX-3 — Sensor mounting bracket (Optional)

t 1.2 t 0.047
30 1.181
20.5 0.807
3.5 0.138
3.4 0.134
5 0.197
14 0.551
8 0.315
3.4 0.134
6 0.236
R25 R0.984
10°
3.4 0.134
3.4 0.134
8.5 0.335
25 0.984
35 1.378
18 0.709
R25 R0.984
10°
15 0.591
3.4 0.134
5 0.197
6 0.236

Material: Stainless steel (SUS304)
Two M3 (length 12 mm 0.472 in) screws with washers are attached.

Assembly dimensions

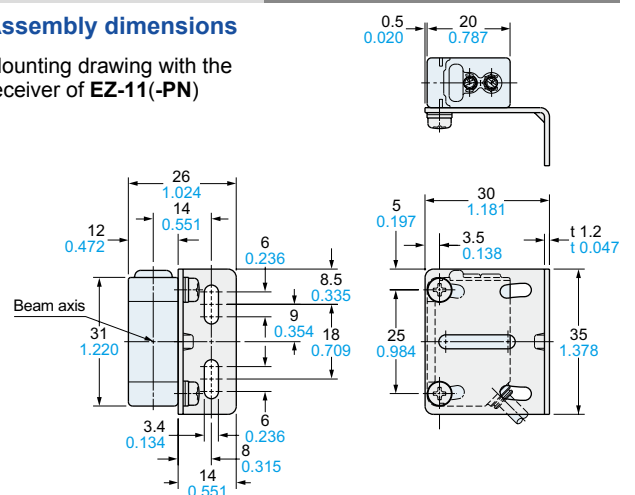Mounting drawing with the receiver of **EZ-11**(-**PN**)

0.5 0.020
20 0.787
26 1.024
14 0.551
12 0.472
6 0.236
8.5 0.335
9 0.354
Beam axis
31 1.220
18 0.709
3.4 0.134
6 0.236
8 0.315
14 0.551
5 0.197
30 1.181
3.5 0.138
t 1.2 t 0.047
25 0.984
35 1.378

FIBER SENSORS
LASER SENSORS
PHOTO-ELECTRIC SENSORS
MICRO PHOTO-ELECTRIC SENSORS
AREA SENSORS
SAFETY LIGHT CURTAINS / SAFETY COMPONENTS
PRESSURE / FLOW SENSORS
INDUCTIVE PROXIMITY SENSORS
PARTICULAR USE SENSORS
SENSOR OPTIONS
SIMPLE WIRE-SAVING UNITS
WIRE-SAVING SYSTEMS
MEASURE-MENT SENSORS
STATIC CONTROL DEVICES
LASER MARKERS
PLC
HUMAN MACHINE INTERFACES
ENERGY MANAGEMENT SOLUTIONS
FA COMPONENTS
MACHINE VISION SYSTEMS
UV CURING SYSTEMS

Selection Guide
Liquid Leak Detection
Liquid Level Detection
Water Detection
Color Mark Detection
Wafer Detection
Ultrasonic
Small / Slim Object Detection
Obstacle Detection

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