

Self-contained Proximity Sensors

EZ/EV Series

Features

- Compact sensor head
- Visible output indicator built into sensor
- Flexible cable joint
- IP-67-rated housing

Detecting Distance

DC 3-wire – Up to 10 mm (0.39")

DC 2-wire – Up to 27 mm (1.06")

DC 2-wire (connector type) – Up to 27 mm (1.06")

AC 2-wire – Up to 10 mm (0.39")



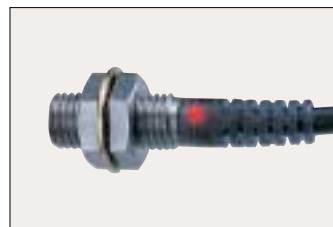
Description

Space-saving

With a sensor body up to 30% shorter than previous models, the EZ/EV Series proximity sensor offers high sensitivity and long detecting distance.

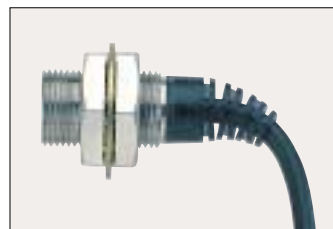
Easy-to-see output indicator

An output indicator is built into the sensor unit in such a manner that sensor operation can be easily confirmed from virtually any angle.

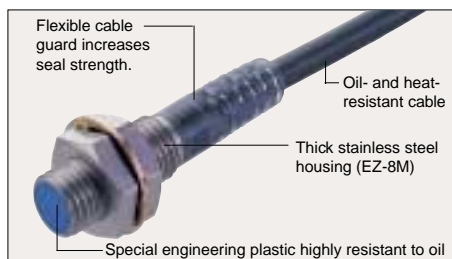


Flexible joint

The cable is connected to the sensor head with a highly flexible joint that can be bent to a 90-degree angle, thus preventing cable wire breakage.



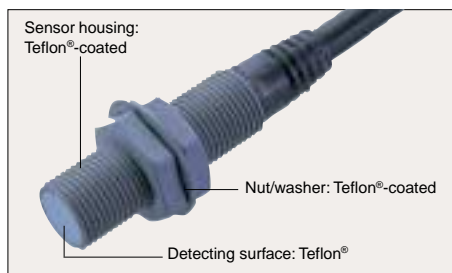
Standard model



Spatter-resistant model

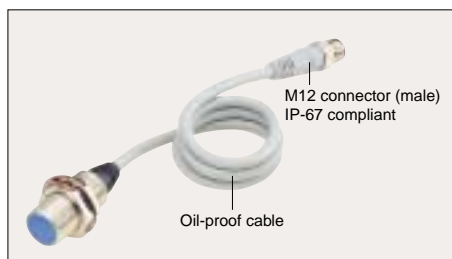
A spatter-resistant model is also available.

This model has a Teflon® detecting surface and Teflon®-coated threads, nuts, and washers to repel welding spatter.



Connector models

Standard and spatter-resistant models are available with connectors.



Refer to P.609 for a list of products complying with EMC directive.

For More Info & Data
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- Photoelectric Sensors
- Safety Light Curtain
- Proximity Sensors**
- Pressure Sensors
- PLCs
- Counters, Timers
- Bar Code Readers
- Vision Systems
- High Precision Sensors
- Displacement Sensors
- Thrubeam Measuring
- Analog Sensor Controllers
- Video Microscopes

Selection Chart

Type		Size	Detecting distance	Model
DC 3-wire	Shielded	M8	1.5 mm 0.06"	EZ-8M
		M12	2.5 mm 0.10"	EZ-12M
		M18	5 mm 0.20"	EZ-18M
		M30	10 mm 0.39"	EZ-30M
		Flat	5 mm 0.20"	EZ-18T
DC 2-wire	Shielded	M8	1.5 mm 0.06"	EV-108M
		M12	2.5 mm 0.10"	EV-112M
		M18	5 mm 0.20"	EV-118M
		M30	10 mm 0.39"	EV-130M
	Non-shielded	M8	4 mm 0.16"	EV-108U
		M12	8 mm 0.31"	EV-112U
		M18	15 mm 0.59"	EV-118U
		M30	27 mm 1.06"	EV-130U ¹
	Spatter-resistant	M12	2.5 mm 0.10"	EV-112F
		M18	5 mm 0.20"	EV-118F
		M30	10 mm 0.39"	EV-130F
		DC 2-wire (Connector type)	Shielded	M8
M12	2.5 mm 0.10"			EV-112M ¹ SO(2062)
M18	5 mm 0.20"			EV-118M ¹ SO(2063)
M30	10 mm 0.39"			EV-130M ¹ SO(2064)
Non-shielded	M12		8 mm 0.31"	EV-112U ¹ SO(2065)
	M18		15 mm 0.59"	EV-118U ¹ SO(2066)
	M30		27 mm 1.06"	EV-130U ¹ SO(2067)
Spatter-resistant	M12		2.5 mm 0.10"	EV-112F ¹ SO(2073)
	M18		5 mm 0.20"	EV-118F ¹ SO(2074)
	M30		10 mm 0.39"	EV-130F ¹ SO(2075)
AC 2-wire	Shielded	M12	2.5 mm 0.10"	EV-12M ¹
		M18	5 mm 0.20"	EV-18M ¹
		M30	10 mm 0.39"	EV-30M ¹

1. This product does not comply with the EMC directive.

- EM
- EZ/EV**
- ES
- ED
- ET
- TA

Specifications

DC 3-wire type

Type		Shielded				
Model	NPN	EZ-8M	EZ-12M	EZ-18M	EZ-30M	EZ-18T
Size		M8	M12	M18	M30	20 x 32 x 8 mm 0.79"x1.26"x0.31"
Detecting distance		1.5 mm 0.06" ±10%	2.5 mm 0.10" ±10%	5 mm 0.20" ±10%	10 mm 0.39" ±10%	5 mm 0.20" ±10%
Detectable object		Ferrous metals (see Characteristics for nonferrous metals)				
Standard target (iron, t=1 mm 0.04")		10 x 10 mm 0.39"	12 x 12 mm 0.47"	18 x 18 mm 0.71"	30 x 30 mm 1.18"	18 x 18 mm 0.71"
Hysteresis		10% max. of detecting distance				
Response frequency		800 Hz	600 Hz	350 Hz	250 Hz	350 Hz
Temperature fluctuation		±10% max. of detecting distance at +23°C (73.4°F), within -25 to +70°C (-13 to 158°F)				
Operation mode		N.O./N.C.				
Control output		100 mA max. (40 V max.), Residual voltage: 1 V max.				
Power supply		12 to 24 VDC ±10%				
Current consumption		13 mA max.				
Enclosure rating		IP-67				
Ambient temperature		-25 to +80°C (-13 to 176°F), No freezing				
Relative humidity		35 to 95%, No condensation				
Cable length		2 m 6.6'				
Weight (including cable and nuts)		Approx. 50 g	Approx. 65 g	Approx. 130 g	Approx. 235 g	Approx. 55 g

DC 2-wire type

Type		Shielded				Non-shielded
Model	NPN	EV-108M	EV-112M	EV-118M	EV-130M	EV-108U
Size		M8	M12	M18	M30	M8
Detecting distance		1.5 mm 0.06" ±10%	2.5 mm 0.10" ±10%	5 mm 0.20" ±10%	10 mm 0.39" ±10%	4 mm 0.16" ±10%
Detectable object		Ferrous metals (see Characteristics for nonferrous metals)				
Standard target (iron, t=1 mm 0.04")		10 x 10 mm 0.39"	12 x 12 mm 0.47"	18 x 18 mm 0.71"	30 x 30 mm 1.18"	20 x 20 mm 0.79"
Hysteresis		10% max. of detecting distance				20% max. of detecting distance, within -10 to +70°C (14 to 158°F)
Response frequency		800 Hz	600 Hz	350 Hz	250 Hz	800 Hz
Temperature fluctuation		±10% max. of detecting distance at +23°C (73.4°F), within -25 to +70°C (-13 to 158°F)				±10% max. of detecting distance, within -10 to +70°C (14 to 158°F)
Operation mode		N.O. (N.C. output type available for all models)				
Control output (switching capacity)		5 to 80 mA	5 to 200 mA			5 to 80 mA
Protection circuit		Reversed polarity, surge voltage	Reversed polarity, short-circuit, surge voltage			Reversed polarity, surge voltage
Power supply		12 to 24 VDC				
Ratings		Current consumption (leakage current): 1.0 mA max., Residual voltage: 3.6 V max. (with 2-m 6.6' cable)				
Enclosure rating		IP-67				
Ambient temperature		-25 to +80°C (-13 to 176°F), No freezing				
Relative humidity		35 to 95%, No condensation				
Housing		Stainless steel	Nickel-plated brass			Stainless steel
Cable length		2 m 6.6'				
Weight (including cable and nuts)		Approx. 42 g	Approx. 110 g	Approx. 150 g	Approx. 300 g	Approx. 42 g

Photoelectric Sensors

Safety Light Curtain

Proximity Sensors

Pressure Sensors

PLCs

Counters, Timers

Bar Code Readers

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Displacement Sensors

Thru-beam Measuring

Analog Sensor Controllers

Video Microscopes

EM

EZ/EV

ES

ED

ET

TA

DC 2-wire type

Type		Non-shielded			Spatter-resistant/Shielded		
Model	NPN	EV-112U	EV-118U	EV-130U ¹	EV-112F ¹	EV-118F ¹	EV-130F ¹
Size		M12	M18	M30	M12	M18	M30
Detecting distance		8 mm 0.31" ±10%	15 mm 0.59" ±10%	27 mm 1.06" ±10%	2.5 mm 0.10" ±10%	5 mm 0.20" ±10%	10 mm 0.39" ±10%
Detectable object	Ferrous metals (see Characteristics for nonferrous metals)						
Standard target (iron, t=1 mm 0.04")		30 x 30 mm 0.47"	50 x 50 mm 1.97"	70 x 70 mm 2.76"	12 x 12 mm 0.47"	18 x 18 mm 0.71"	30 x 30 mm 0.47"
Hysteresis	20% max. of detecting distance, within -10 to +70°C (14 to 158°F)			15% max. of detecting distance			
Response frequency		600 Hz	350 Hz	250 Hz	600 Hz	350 Hz	250 Hz
Temperature fluctuation	±10% max. of detecting distance, within -10 to +70°C (14 to 158°F)			-5 to +20%, within -10 to +70°C (14 to 158°F)	±10% max. of detecting distance at 23°C (73.4°F), within -25 to +70°C (-13 to 158°F)		
Operation mode	N.O. (N.C. output type available for all models)				-		
Control output (switching capacity)	5 to 200 mA						
Protection circuit	Reversed polarity, short-circuit, surge voltage						
Power supply	12 to 24 VDC						
Ratings	Current consumption (leakage current): 1.0 mA max., Residual voltage: 3.6 V max. (with 2-m 6.6' cable)						
Enclosure rating	IP-67						
Ambient temperature	-25 to +80°C (-13 to 176°F), No freezing						
Relative humidity	35 to 95%, No condensation						
Housing	Nickel-plated brass				Teflon®-coated brass		
Cable length	2 m 6.6'						
Weight (including cable and nuts)		Approx. 110 g	Approx. 140 g	Approx. 260 g	Approx. 110 g	Approx. 150 g	Approx. 300 g

1. This product does not comply with EMC directive.

Connector type (DC 2-wire type)

Type		Shielded				Non-shielded
Model	NPN	EV-108MSO(2091) ¹	EV-112MSO(2062) ¹	EV-118MSO(2063) ¹	EV-130MSO(2064) ¹	EV-112USO(2065) ¹
Size		M8	M12	M18	M30	M12
Detecting distance		1.5 mm 0.06" ±10%	2.5 mm 0.10" ±10%	5 mm 0.20" ±10%	10 mm 0.39" ±10%	8 mm 0.31" ±10%
Detectable object	Ferrous metals (see Characteristics for nonferrous metals)					
Standard target (iron, t=1 mm 0.04")		10 x 10 mm 0.39"	12 x 12 mm 0.47"	18 x 18 mm 0.71"	30 x 30 mm 1.18"	
Hysteresis	10% max. of detecting distance					20% max. of detecting distance, within -10 to +70°C (14 to 158°F)
Response frequency		800 Hz	600 Hz	350 Hz	250 Hz	600 Hz
Temperature fluctuation	±10% max. of detecting distance at 23°C (73.4°F), within -25 to +70°C (-13 to 158°F)					±10% max. of detecting distance, within -10 to +70°C (14 to 158°F)
Operation mode	N.O.					
Control output (switching capacity)		5 to 80 mA	5 to 200 mA			
Protection circuit		Reversed polarity, surge voltage	Reversed polarity, short-circuit, surge voltage			
Power supply	12 to 24 VDC					
Ratings	Current consumption (leakage current): 1.0 mA max., Residual voltage: 3.6 V max.					
Enclosure rating	IP-67					
Ambient temperature	-25 to +80°C (-13 to 176°F), No freezing					
Relative humidity	35 to 95%, No condensation					
Housing		Stainless steel	Nickel-plated brass			
Cable length	500 mm 19.69"					
Weight (including cable and connector)		Approx. 30 g	Approx. 55 g	Approx. 95 g	Approx. 245 g	Approx. 55 g

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Photoelectric Sensors

Safety Light Curtain

Proximity Sensors

Pressure Sensors

PLCs

Counters, Timers

Bar Code Readers

Vision Systems

High Precision Sensors

Displacement Sensors

Thrubeam Measuring

Analog Sensor Controllers

Video Microscopes

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Connector type (DC 2-wire type)

Type	Non-shielded		Spatter-resistant/Shielded			
Model	NPN	EV-118USO(2066) ¹	EV-130USO(2067) ¹	EV-112FSO(2073) ¹	EV-118FSO(2074) ¹	EV-130FSO(2075) ¹
Size		M18	M30	M12	M18	M30
Detecting distance		15 mm 0.59" ±10%	27 mm 1.06" ±10%	2.5 mm 0.10" ±10%	5 mm 0.20" ±10%	10 mm 0.39" ±10%
Detectable object	Ferrous metals (see Characteristics for nonferrous metals)					
Standard target (iron, t=1 mm 0.04")		50 x 50 mm 1.97"	70 x 70 mm 2.76"	12 x 12 mm 0.47"	18 x 18 mm 0.71"	30 x 30 mm 0.47"
Hysteresis	20% max. of detecting distance, within -10 to +70°C (14 to 158°F)			15% max. of detecting distance		
Response frequency		350 Hz	250 Hz	600 Hz	350 Hz	250 Hz
Temperature fluctuation		±10% max. of detecting distance, within -10 to +70°C (14 to 158°F)	-5 to +20%, within -10 to +70°C (14 to 158°F)	±10% max. of detecting distance at 23°C (73.4°F), within -25 to +70°C (-13 to 158°F)		
Operation mode	N.O.					
Control output (switching capacity)	5 to 200 mA					
Protection circuit	Reversed polarity, short-circuit, surge voltage					
Power supply	12 to 24 VDC					
Ratings	Current consumption (leakage current): 1.0 mA max., Residual voltage: 3.6 V max. (with 2-m 6.6' cable)					
Enclosure rating	IP-67					
Ambient temperature	-25 to +80°C (-13 to 176°F), No freezing					
Relative humidity	35 to 95%, No condensation					
Housing	Nickel-plated brass			Teflon®-coated brass		
Cable length	500 mm 19.69"					
Weight (including cable and nuts)		Approx. 140 g	Approx. 260 g	Approx. 110 g	Approx. 150 g	Approx. 300 g

1. This product does not comply with the EMC directive.

AC 2-wire type

Type	Shielded		
Model	EV-12M ¹	EV-18M ¹	EV-30M ¹
Size	M12	M18	M30
Detecting distance	2.5 mm 0.10" ±10%	5 mm 0.20" ±10%	10 mm 0.39" ±10%
Detectable object	Ferrous metals (see Characteristics for nonferrous metals)		
Standard target (iron, t=1 mm 0.04")	12 x 12 mm 0.47"	18 x 18 mm 0.71"	30 x 30 mm 1.18"
Hysteresis	10% max. of detecting distance		
Response frequency	25 Hz		
Temperature fluctuation	±10% max. of detecting distance at +23°C (73.4°F), within -25 to +70°C (-13 to 158°F)		
Operation mode	N.O.		
Control output (switching capacity)	5 to 200 mA		
Protection circuit	Short-circuit		
Power supply	24 to 240 VAC, 50/60 Hz		
Current consumption (leakage current)	1.3 mA max. (at 240 VAC)		
Enclosure rating	IP-67		
Ambient temperature	-25 to +80°C (-13 to 176°F), No freezing		
Relative humidity	35 to 95%, No condensation		
Housing	Nickel-plated brass		
Cable length	2 m 6.6'		
Weight (including cable and nuts)	Approx. 110 g	Approx. 150 g	Approx. 300 g

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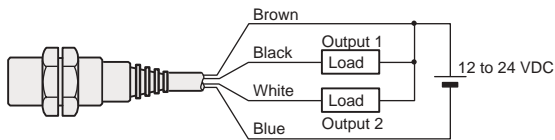
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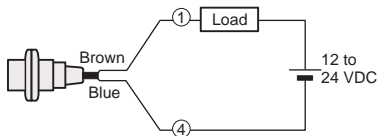
Connections

EZ Series: DC 3-wire type

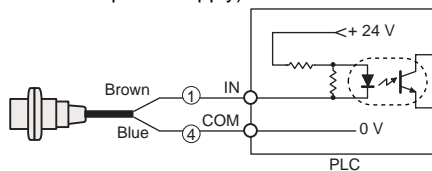


Black (output 1): N.O.
White (output 2): N.C.

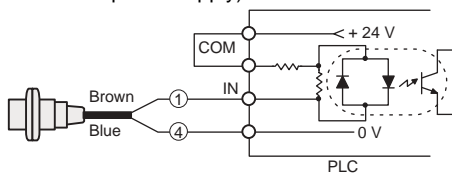
EV Series: DC 2-wire type/Connector type



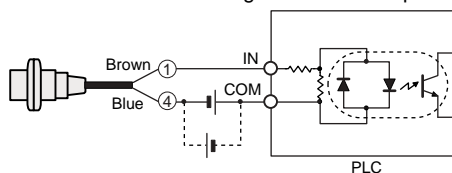
Connection to built-in DC power supply type PLC (externally connected power supply)



Connection to built-in DC power supply type PLC (internally connected power supply)

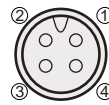


Connection to PLC having no internal DC power supply



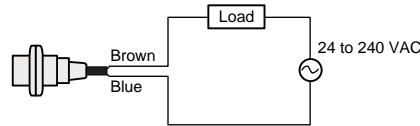
For connections indicated by the dotted lines, reverse brown and blue sensor wires.

Pin arrangement of connector type



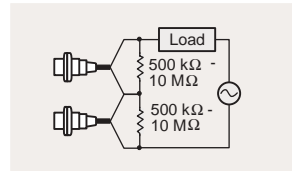
① and ④ in the circuit diagram shows the pin number of the connector type.

EV Series: AC 2-wire type



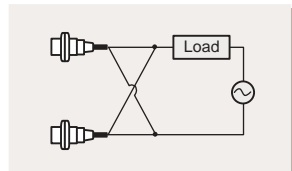
Series connection

Up to 3 proximity sensors can be connected in Series. For this, the supply voltage must be within the range of 85 to 240 VAC. If sensor operation is unstable, connect resistors with a resistance of 500 kΩ to 10 MΩ parallel to the sensor in order to balance the supply voltage.



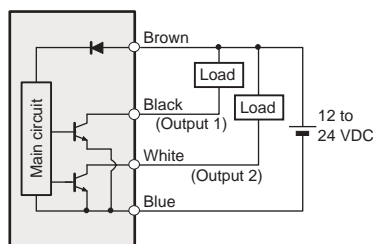
Parallel connection

Connect proximity sensors in parallel only if the sensors do not operate simultaneously. Note, however, that the leakage current will increase in proportion to the number of sensors connected.

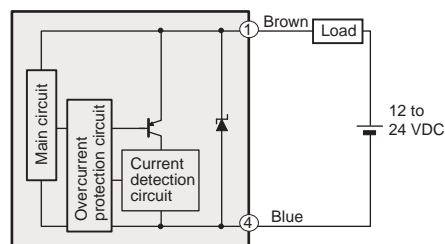


Output Circuits

EZ Series DC 3-wire type

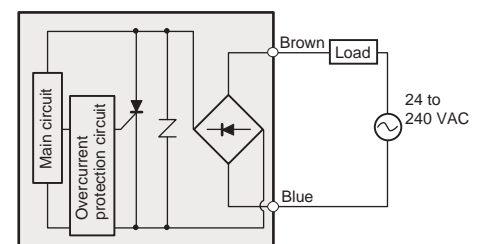


EV Series DC 2-wire type*



* The M8 sensor does not contain short-circuit protection or a current detection circuit. 1 and 4 in the circuit diagram shows the pin number of the connector type.

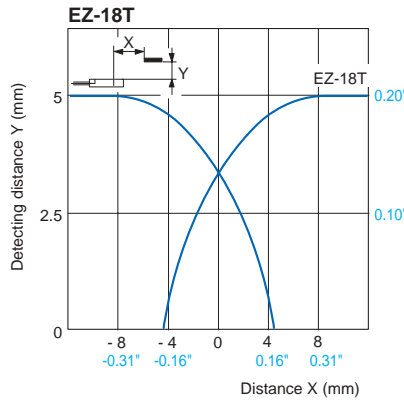
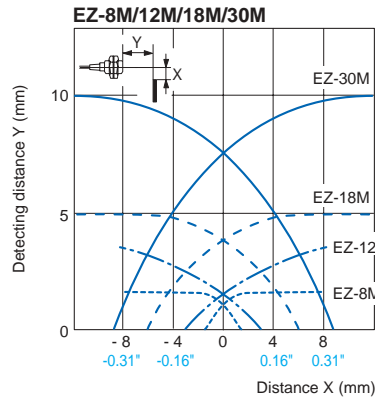
EV Series AC 2-wire type



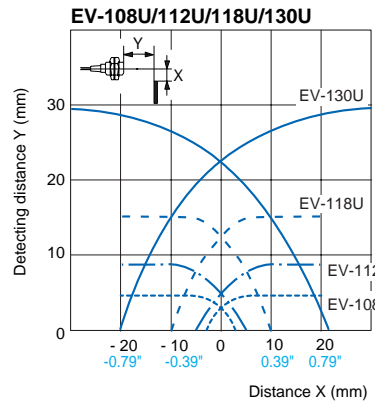
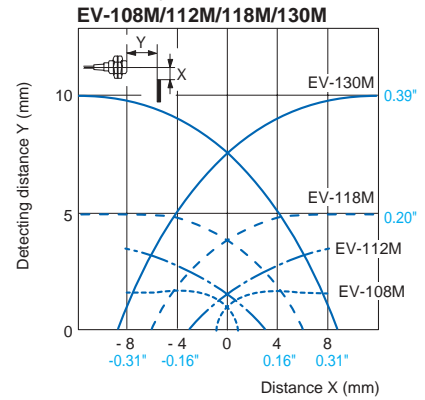
Characteristics

Detecting range (Typical)

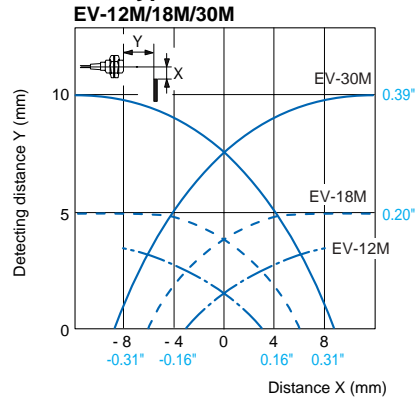
DC 3-wire type



DC 2-wire type

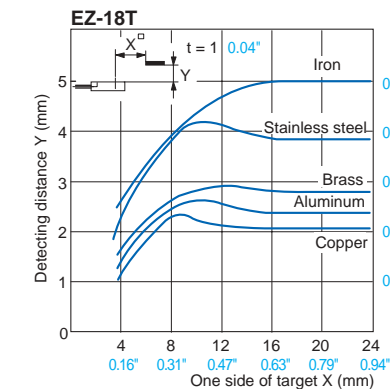
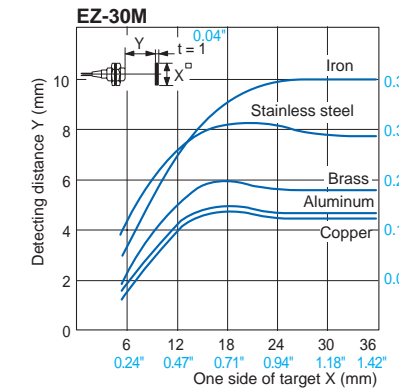
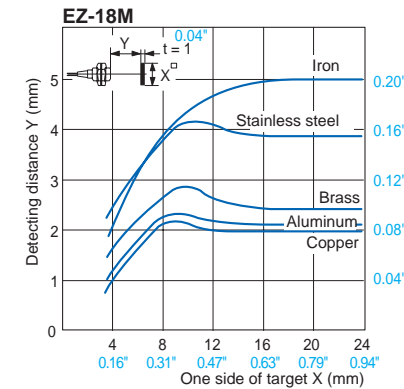
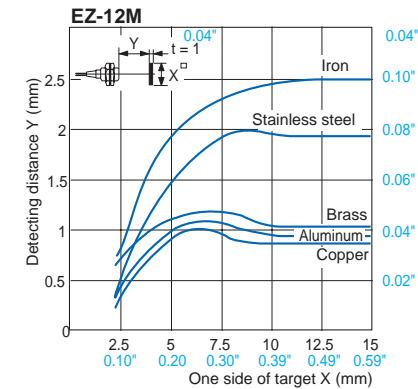
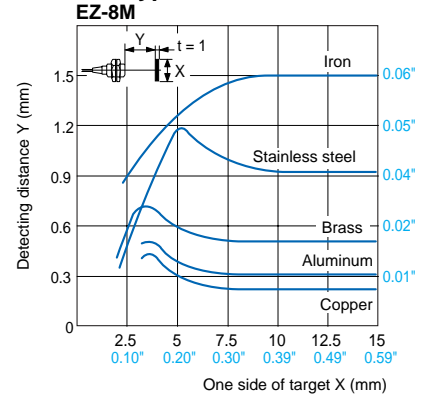


AC 2-wire type

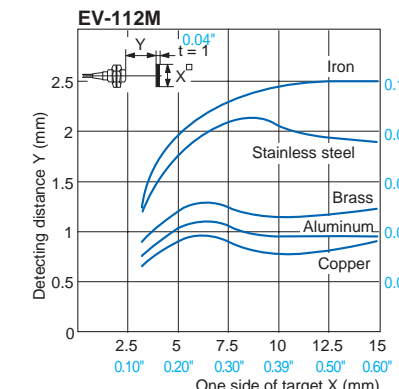
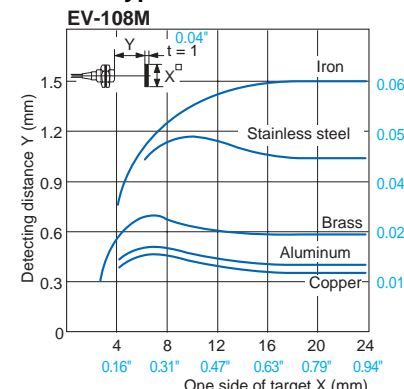


Detecting distance vs. size and material of target (Typical)

DC 3-wire type



DC 2-wire type



EM

EZ/EV

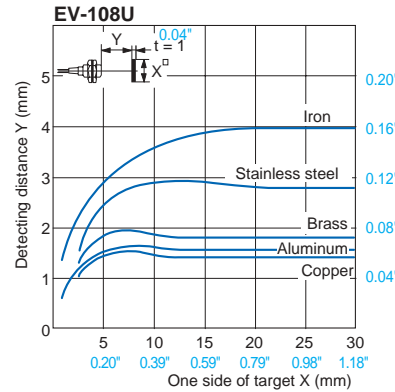
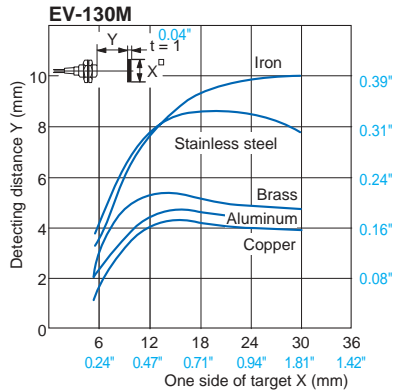
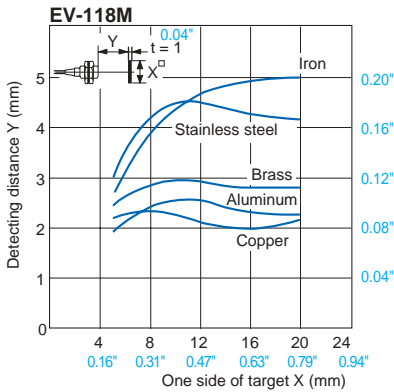
ES

ED

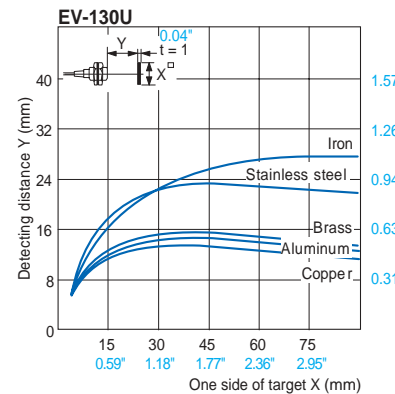
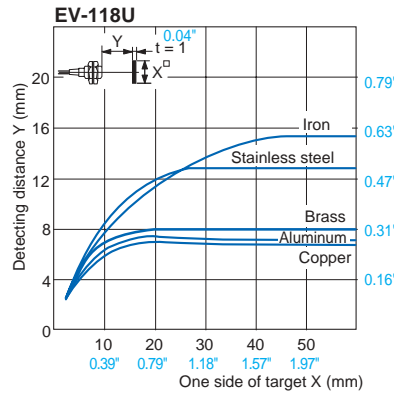
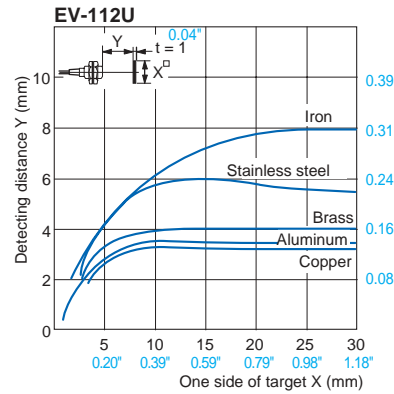
ET

TA

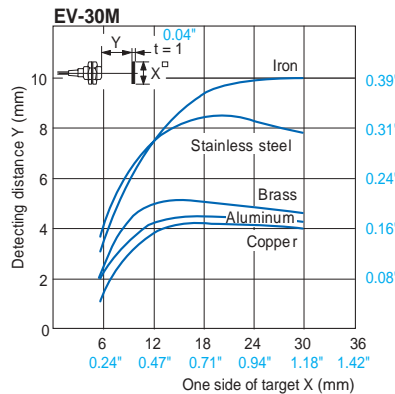
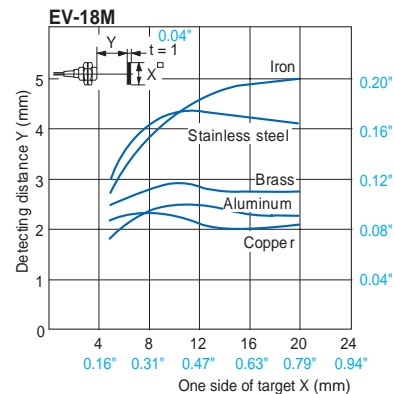
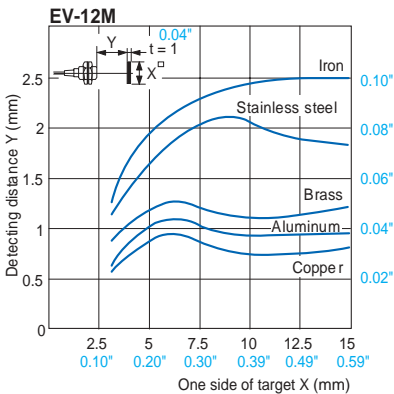
DC 2-wire type



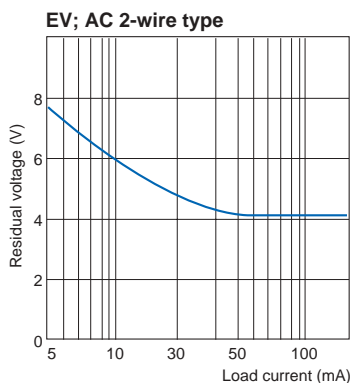
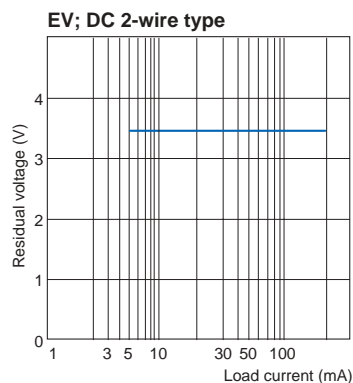
DC 2-wire type



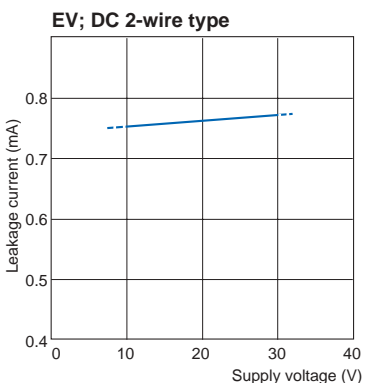
AC 2-wire type



Residual voltage (Typical)



Leakage current (Typical)



Photoelectric Sensors

Safety Light Curtain

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Pressure Sensors

PLCs

Counters, Timers

Bar Code Readers

Vision Systems

High Precision Sensors

Displacement Sensors

Throughbeam Measuring

Analog Sensor Controllers

Video Microscopes

EM

EZ/EV

ES

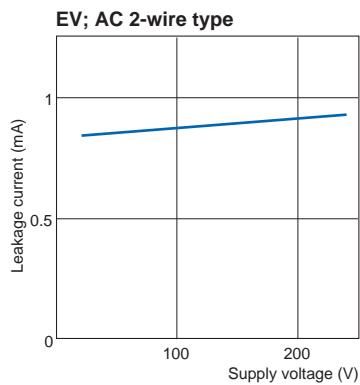
ED

ET

TA

- Photoelectric Sensors
- Safety Light Curtain
- Proximity Sensors**
- Pressure Sensors
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- High Precision Sensors
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- Throughbeam Measuring
- Analog Sensor Controllers
- Video Microscopes

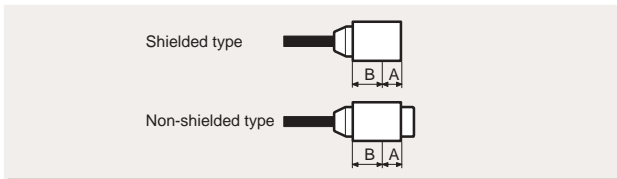
Leakage current (Typical)



Hints on Correct Use

Mounting

When mounting the sensor, insert the attached toothed washer. Do not tighten beyond the torque specified in the following table.



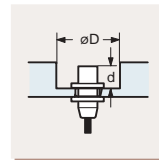
Model	Dimension A (mm) Inch	Tightening torque	
		at A	at B
EZ-8M	3 0.12"	3 N•m max.	5 N•m max.
EV-108M, EV-108U	3 0.12"	8 N•m max.	9 N•m max.
EZ-12M	6 0.24"	6 N•m max.	10 N•m max.
EZ-18M	6 0.24"	15 N•m max.	20 N•m max.
EV-12M, EV-112M, EV-112U	6 0.24"	15 N•m max.	30 N•m max.
EV-18M, EV-118M, EV-118U	7 0.28"	60 N•m max.	70 N•m max.
EZ-30M	10 0.39"	50 N•m max.	100 N•m max.
EV-30M, EV-130M, EV-130U	10 0.39"	120 N•m max.	180 N•m max.

Wiring

The sensor cable can be extended up to 100 m 328.0' (EZ Series), or 200 m 656.2' (EV Series).

Surrounding metal

Shielded-type sensors can be flush-mounted in a metal base. Sensors of the non-shielded type, however, should be mounted according to the guidelines given below in order to minimize interference from the surrounding metal.



Model	D (mm min.) Inch	d (mm min.) Inch
EV-108U	25 0.98"	13 0.51"
EV-112U/ 112USO	55 2.17"	20 0.79"
EV-118U/ 118USO	70 2.76"	25 0.98"
EV-130U/ 130USO	120 4.72"	28 1.10"

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Interference

When installing 2 or more sensors of the same model face-to-face or in parallel, separate by the distance specified in the following table to prevent interference.

Model	Distance	Face-to-face (mm min.)	Parallel (mm min.)
EZ-8M		20 0.79"	23 0.91"
EZ-12M		30 1.18"	32 1.26"
EZ-18M		40 1.57"	48 1.89"
EZ-30M		100 3.94"	100 3.94"
EV-108M/108MSO		20 0.79"	11 0.43"
EV-112M/ EV-12M/ 112MSO/ 112FSO		30 1.18"	22 0.87"
EV-118M, EV-18M/ 118MSO/ 118FSO		40 1.57"	28 1.10"
EV-130M, EV-30M/ 130MSO/ 130FSO		100 3.94"	50 0.97"
EV-108U		30 0.79"	28 1.10"
EV-112U/ 112USO		55 2.17"	62 2.44"
EV-118U/ 118USO		70 2.76"	88 3.46"
EV-130U/ 130USO		160 6.30"	180 7.09"
EZ-18T		40 1.57"	35 1.38"

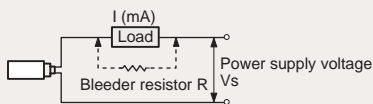
Effects of leakage current

With a 2-wire proximity sensor, a small amount of current flows (leakage current) to keep the circuit operating even when the sensor is turned OFF. (Refer to graph "Leakage current characteristics".)

Because of this current, a low voltage remains on the load, sometimes preventing the load from properly resetting. Before operation, check that the residual voltage is lower than the reset voltage of the load.

When the load current is low

When the load current is less than 5 mA, connect a bleeder resistor to give the sensor 5 mA or more load current. Make sure the residual voltage is less than the reset voltage of the load.



Calculate the resistance (R) and rated bleeder resistor wattage (P) from the following expressions:

AC 2-wire type:

$$R \leq \frac{V_s}{5 - I} \text{ (k}\Omega\text{)} \quad P > \frac{V_s^2}{R} \text{ (mW)}$$

DC 2-wire type:

$$R \leq \frac{V_s - 3.6^*}{5 - I} \text{ (k}\Omega\text{)} \quad P > \frac{V_s^2}{R} \text{ (mW)}$$

V_s : Power supply voltage (V)

I: Load current (mA)

P: Rated wattage of bleeder resistor

* 3.6 V is the rated residual voltage.

DC 2-wire type (EV Series)

If a relay is connected as the load, confirm that the dropout voltage of the relay is sufficiently higher than the sensor's residual voltage of 3.6 V. (A 12 VDC relay cannot be activated.)

Protection circuits of DC 2-wire type (EV Series)

- Since this sensor incorporates short-circuit protection (not applicable to M8 type), direct connection of the power supply to the sensor does not cause the sensor to break down. However, the sensor will not be able to perform detection. Connect the brown cable to the positive terminal of the power supply and the blue cable to the negative terminal.
- This sensor incorporates a reversed-polarity protection circuit. However, reverse connection of the power supply to the sensor without a load may damage the sensor.

Protection circuit of AC 2-wire type (EV Series)

Note that short-circuit protection may not function when the power supply capacity is 85 VAC or less.

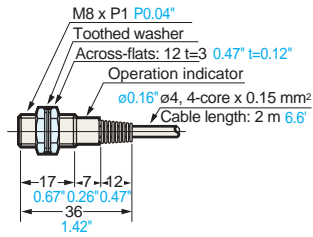
Dimensions

▶ For CAD Data Download >>> <http://www.keyence.com/cadg>

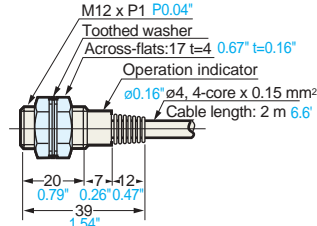
Unit: mm Inch

DC 3-wire type

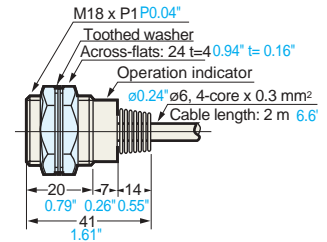
EZ-8M



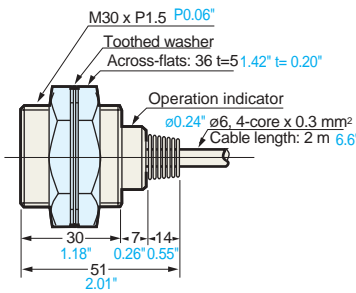
EZ-12M



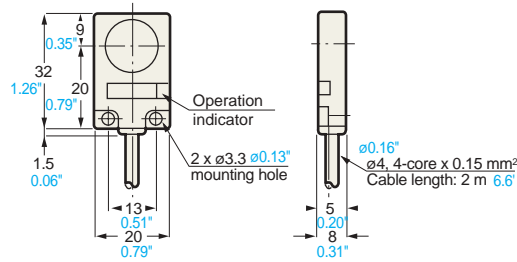
EZ-18M



EZ-30M

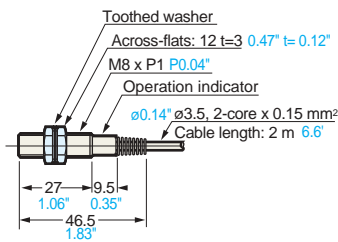


EZ-18T

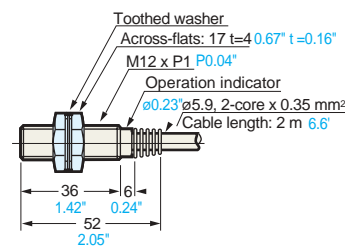


DC 2-wire type

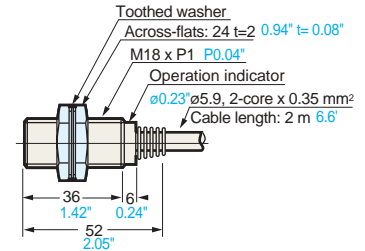
EV-108M



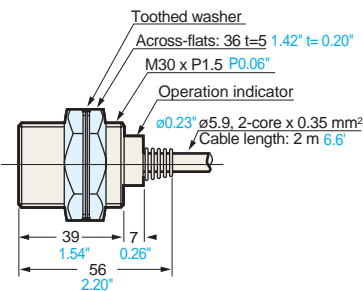
EV-112M,112F



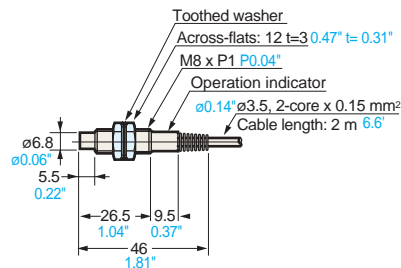
EV-118M,118F



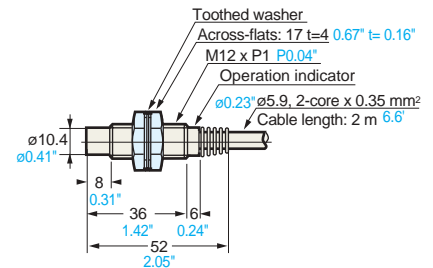
EV-130M,130F



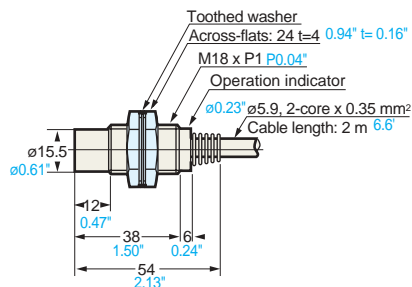
EV-108U



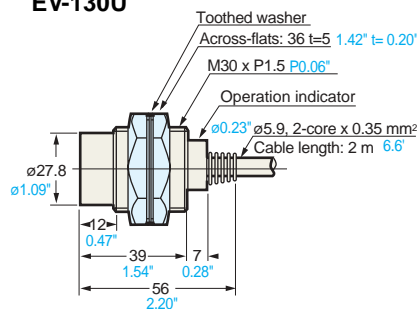
EV-112U



EV-118U



EV-130U



EM

EZ/EV

ES

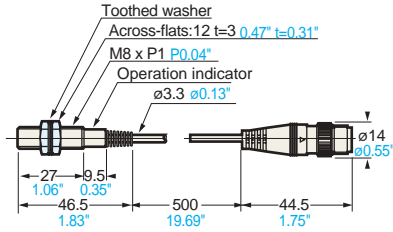
ED

ET

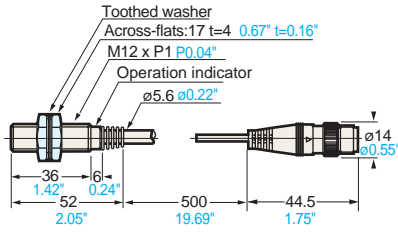
TA

DC 2-wire (connector type)
EV-108MSO (2091)

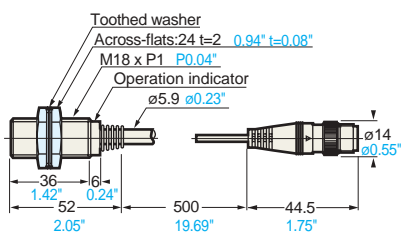
Unit: mm Inch



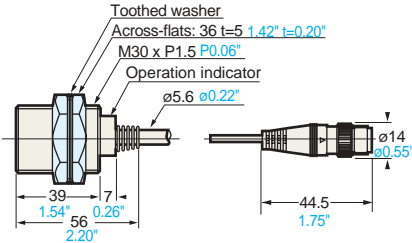
EV-112MSO (2062), 112USO (2065), 112FSO (2073)



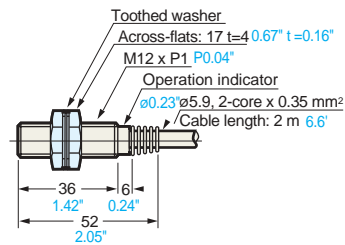
EV-118M, 118USO (2066), 118FSO (2074)



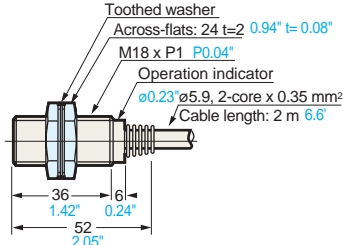
EV-130MSO (2075), 130USO (2067), 130FSO (2075)



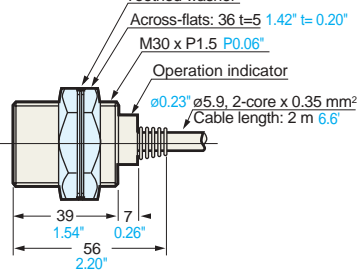
AC 2-wire
EV-12M



EV-18M



EV-30M



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