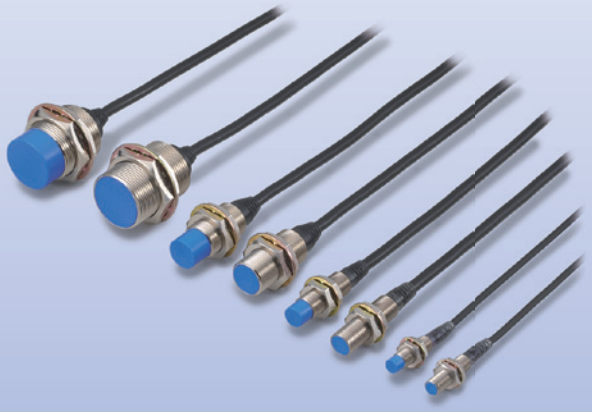
2-wire type Proximity Sensors

EV Series

CE Refer to P.821 for a list of products complying with EU Directives.



Outstanding tightening strength

The sensor housing is thick and tough. The sensor is securely tightened to prevent loosening caused by vibration or shock.

Flexible joint

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

Specifications

DC 2-wire type

Type		Shielded				Non-shielded			
Model	N.O. type	EV-108M	EV-112M	EV-118M	EV-130M[1]	EV-108U[1]	EV-112U	EV-118U	EV-130U
	N.C. type	EV-108MC	EV-112MC	EV-118MC	EV-130MC[1]	EV-108UC[1]	EV-112UC	EV-118UC	EV-130UC
Size		M8	M12	M18	M30	M8	M12	M18	M30
Appearance									
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%	8 mm 0.31" ±10%	15 mm 0.59" ±10%	27 mm 1.06" ±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"	30 x 30 mm 0.47"	50 x 50 mm 1.97"	70 x 70 mm 2.76"
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	600 Hz	350 Hz	250 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)			-5 to +20%, within -10 to +70°C (14 to 158°F)
Operation mode		N.O./N.C. (Differs by model)							
Control output (switching capacity)		5 to 80 mA	5 to 200 mA			5 to 80 mA	5 to 200 mA		
Protection circuit		Reversed polarity, surge voltage	Reversed polarity, short-circuit, surge voltage			Reversed polarity, surge voltage	Reversed polarity, short-circuit, surge voltage		
Power supply		12 to 24 VDC, Ripple (p-p) 20% max.							
Ratings		Current consumption (leakage current): 1.0 mA max., Residual voltage: 3.6 V max. (with 2-m 6.6' cable)							
Enclosure rating		IP67							
Ambient temperature		-25 to +80°C (-13 to +176°F), No freezing							
Relative humidity		35 to 95%, No condensation							
Vibration resistance		10 to 55 Hz, 1.5 mm 0.06" double amplitude in X, Y, and Z directions, 2 hours							
Shock resistance		500 m/s² 1640.4' in X, Y, and Z directions, 3 times respectively		1,000 m/s² 3280.8' in X, Y, and Z directions, 3 times respectively		500 m/s² 1640.4' in X, Y, and Z directions, 3 times respectively		1,000 m/s² 3280.8' in X, Y, and Z directions, 3 times respectively	
Housing		Stainless steel	Nickel-plated brass			Stainless steel	Nickel-plated brass		
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	Approx. 110 g	Approx. 140 g	Approx. 260 g

1. This product does not comply with CE marking.

Connector type (DC 2-wire type)

Type	Shielded				Non-shielded	
Model	EV-108MSO (2091)	EV-112MSO (2062)	EV-118MSO (2063)	EV-130MSO (2064)[1]	EV-112USO (2065)	EV-118USO (2066)[1]
Size	M8	M12	M18	M30	M12	M18
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%	15 mm 0.59" ±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"		50 x 50 mm 1.97"
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	350 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.					Current consumption (leakage current): 1.0 mA max., Residual voltage: 3.6 V max. (with 2-m 6.6' cable)
Enclosure rating	IP67					
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	Approx. 140 g

1. This product does not comply with CE marking.

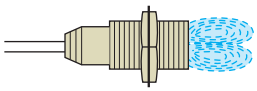
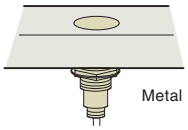
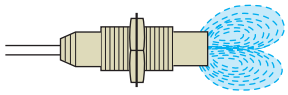
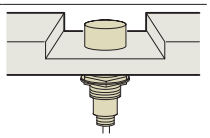
New Products
Fiberoptic Sensors
Photoelectric Sensors
Proximity Sensors
Safety Equipment
Flow/ Pressure/ Temperature
Measurement Sensors
PLCs
Static Eliminators
Vision Systems
Marking Equipment
Code Readers
Digital Microscopes
Measurement Systems

EV 2-wire type Proximity Sensors

AC 2-wire type

Type	Shielded		
Model	**EV-12M**[1]	**EV-18M**[1]	**EV-30M**[1]
Size	M12	M18	M30
Appearance			
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	IP67		
Ambient temperature	-25 to +80°C (-13 to +176°F), No freezing		
Relative humidity	35 to 95%, No condensation		
Vibration resistance	10 to 55 Hz, 1.5 mm 0.06" double amplitude in X, Y, and Z directions, 2 hours		
Shock resistance	500 m/s² 1640.4' in X, Y, and Z directions, 3 times respectively	1,000 m/s² 3280.8' in X, Y, and Z directions, 3 times respectively	
Housing	Nickel-plated brass		
Cable length	2 m 6.6'		
Weight (including cable and nuts)	Approx. 110 g	Approx. 150 g	Approx. 300 g

1. This product does not comply with CE marking.

Term	Configuration	Definition
Shielded type		• The sensing coil is encased in a metal-shielding. • This type is less affected by surrounding metal, and can be embedded in a metal base. 
Non-shielded type		• The sensing coil is not metal-shielded. • This type provides a longer detecting distance, compared to a shielded type of the same size. • This type is easily affected by surrounding metal, and therefore no object other than the target must be present around the tip of the sensor head. 

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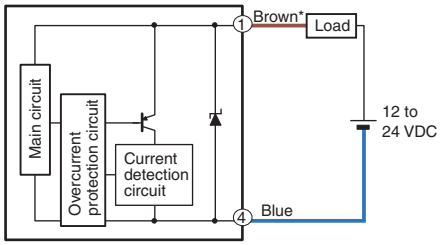
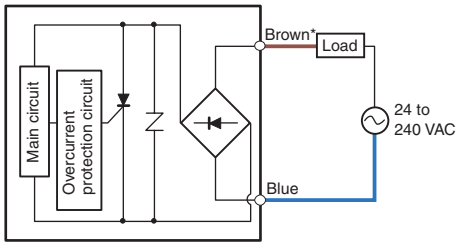
Input/Output Circuits

EV Series
DC 2-wire type



* Load can also be connected between blue wire and negative terminal of power supply.
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.

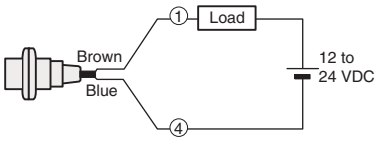
EV Series
AC 2-wire type



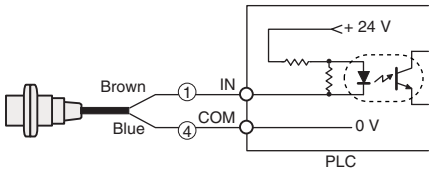
* Load can also be connected between blue wire and power supply.

Connections

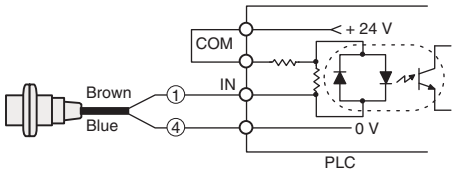
EV Series: DC 2-wire type/Connector type



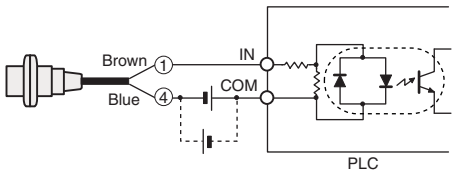
Connection to built-in DC power supply type PLC (externally connected power supply)



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

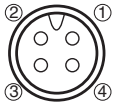


Connection to PLC having no internal DC power supply



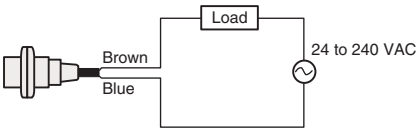
For connections indicated by the dotted lines, reverse brown and blue sensor wires.

Pin arrangement of connector type



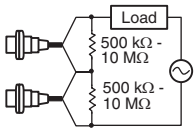
① and ④ in the circuit diagram shows the pin number of the connector type.

EV Series: AC 2-wire type



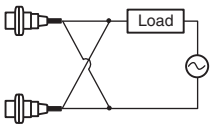
Series connection

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.

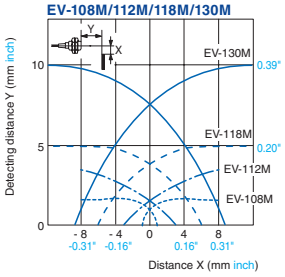


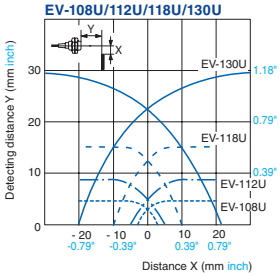
EV 2-wire type Proximity Sensors

Characteristics

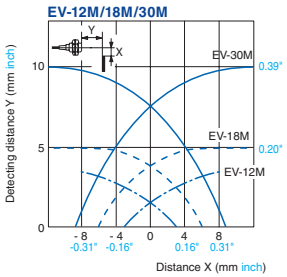
Detecting range (Typical)

DC 2-wire type

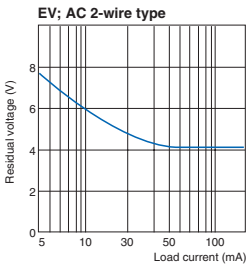




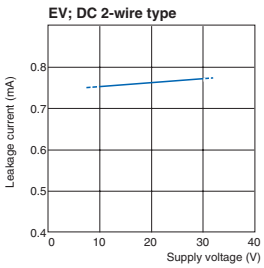
AC 2-wire type



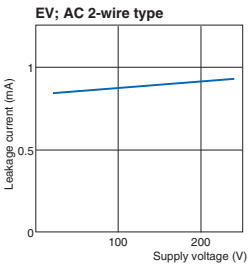
Residual Voltage (Typical)



Leakage current (Typical)

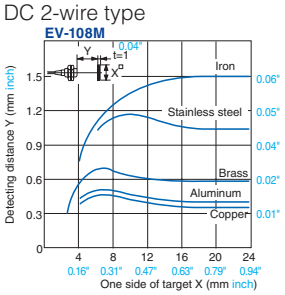


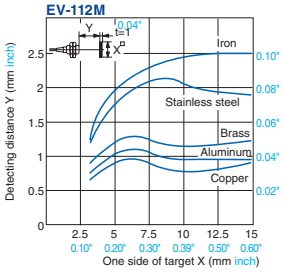
Leakage current (Typical)

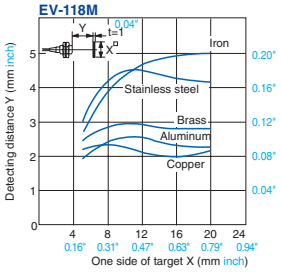


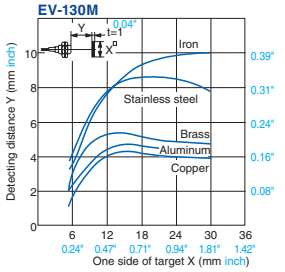
Detecting distance vs. size and material of target (Typical)

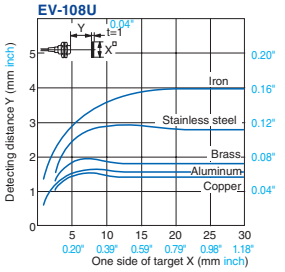
DC 2-wire type

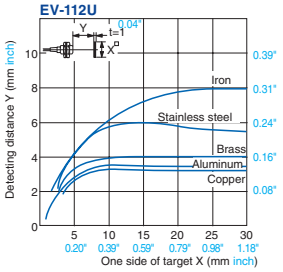


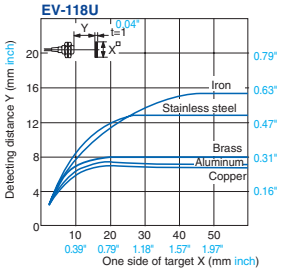


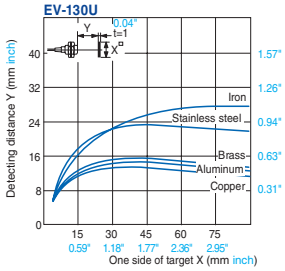




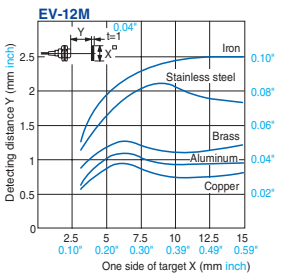


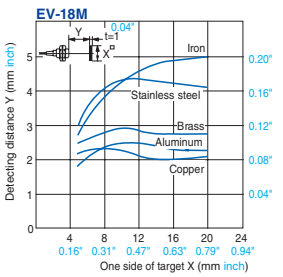


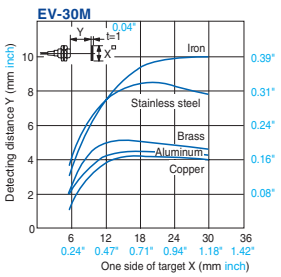




AC 2-wire type







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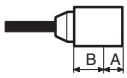
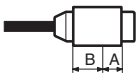
Hints on Correct Use

Mounting

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

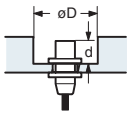
Shielded type 

Non-shielded type 

Model	Dimension A (mm inch)	Tightening torque	
		at A	at B
EV-108M, EV-108U	3 0.12"	8 N·m max.	9 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.
EV-30M, EV-130M, EV-130U	10 0.39"	120 N·m max.	180 N·m max.

Surrounding metal

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



Model	D (mm inch min.)	d (mm inch min.)
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	120 4.72"	28 1.10"

Interference

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

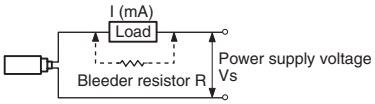
Distance / Model	Face-to-face (mm inch min.)	Parallel (mm inch min.)
EV-108M/108MSO	20 0.79"	11 0.43"
EV-112M/ EV-12M/112MSO	30 1.18"	22 0.87"
EV-118M, EV-18M/118MSO	40 1.57"	28 1.10"
EV-130M, EV-30M/130MSO	100 3.94"	50 0.97"
EV-108U	30 0.79"	28 1.10"
EV-112U/112USO	55 2.17"	62 2.44"
EV-118U/118USO	70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

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 (Typical)”.)
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:

$$P \leq \frac{V_S}{5 - I}\ (k\Omega) \qquad P > \frac{V_S^2}{R}\ (mW)$$

DC 2-wire type:

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

VS: 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

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

- 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

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

Wiring

The sensor cable can be extended up to 200 m 656.2'.

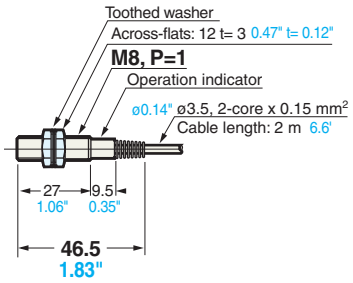
EV 2-wire type Proximity Sensors

Dimensions

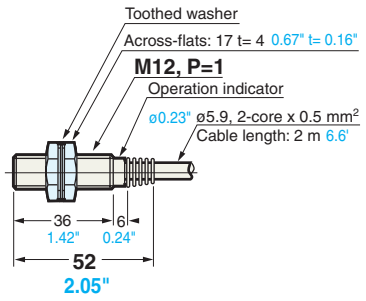
Unit: mm inch

DC 2-wire type

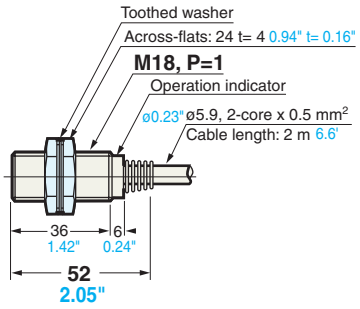
EV-108M



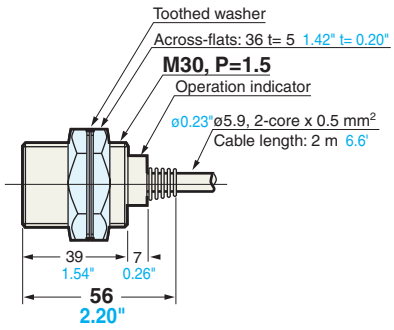
EV-112M



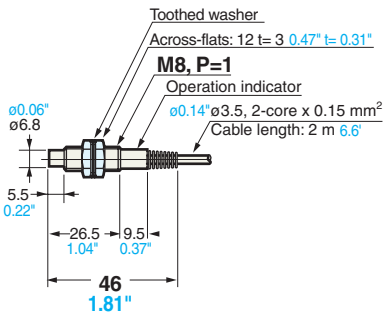
EV-118M



EV-130M



EV-108U



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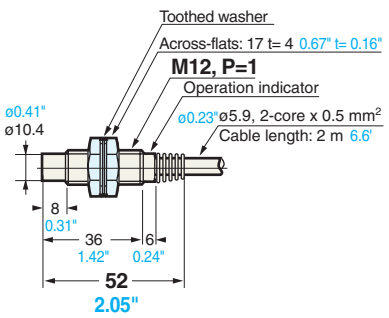

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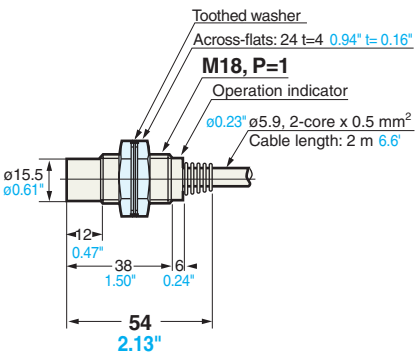
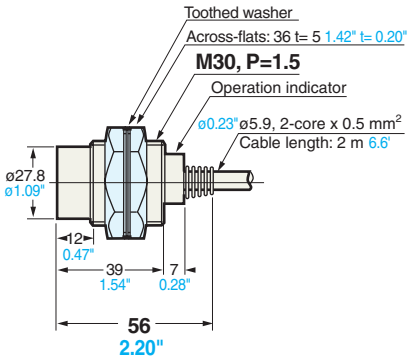


EV-130U



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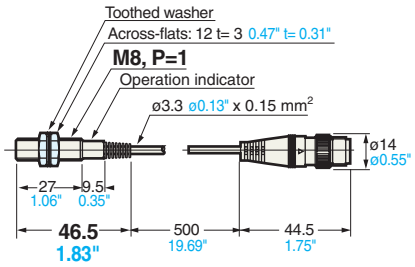
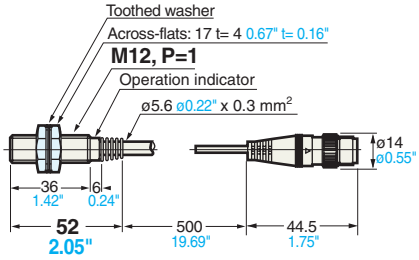
DC 2-wire (connector type)

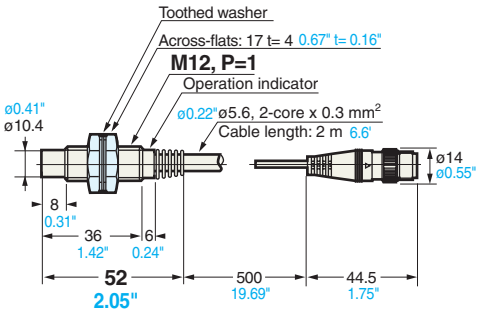
EV-108MSO (2091)



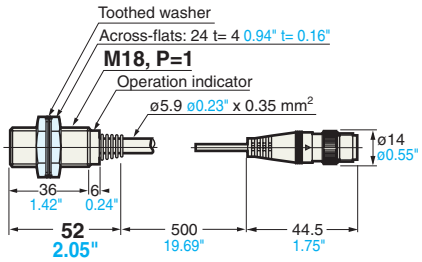
EV-112MSO (2062)



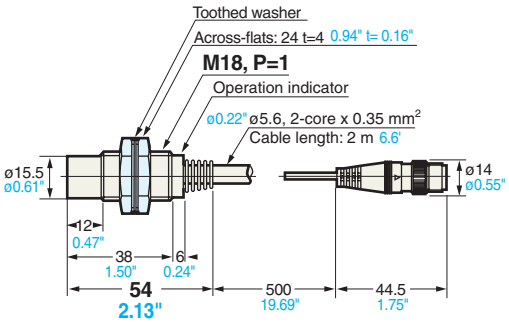
EV-112USO (2065)



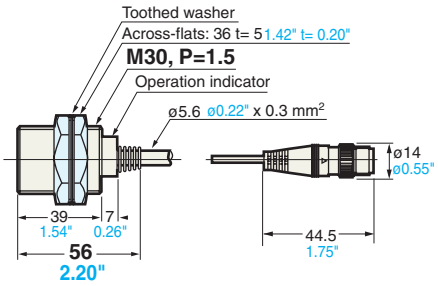
EV-118MSO (2063)



EV-118USO (2066)

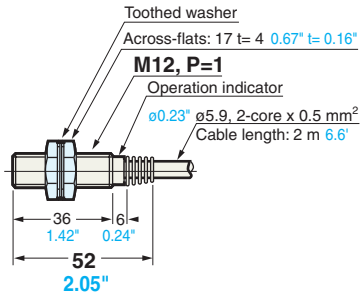


EV-130MSO (2064)

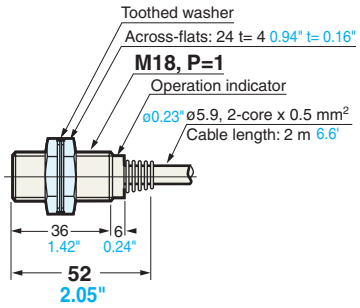


AC 2-wire

EV-12M



EV-18M



EV-30M