

Amplifier-in-cable Small Proximity Sensors

EM Series

Features

- Ultra-small sensor head
- Amplifier and operation indicator built into cable
- Strong, flexible cable
- IP-67 waterproof housing

Detecting Distance

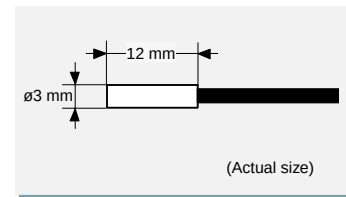
Shielded – Up to 4 mm



Description

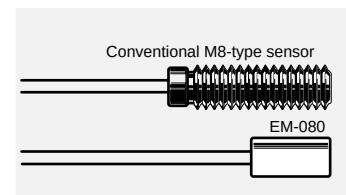
Compact sensor heads

With a sensor head diameter as small as 3 mm for the cylindrical type and M5 for the threaded type, the EM Series sensor is an effective space-saver.



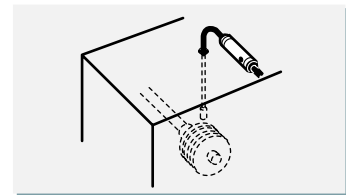
Short length

The sensor head is half the length of conventional M8-sized self-contained proximity sensors. This enables the EM Series to be installed in limited spaces, thereby broadening its range of applications.



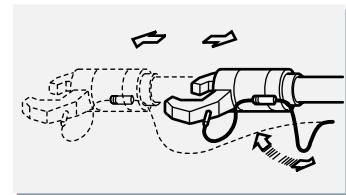
Visible output indicator

The output indicator is located on the amplifier housing installed in the cable, enabling sensor operation to be easily confirmed.



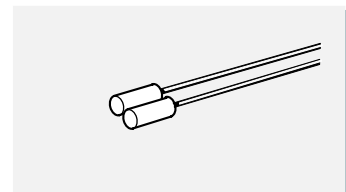
Flexible cable

The output cable is made of a high-tensile copper alloy giving it 5 times greater flexibility than conventional sheathed cables.



Parallel installation

Alternate-frequency EM sensors can be installed next to each other without causing interference.



Specifications

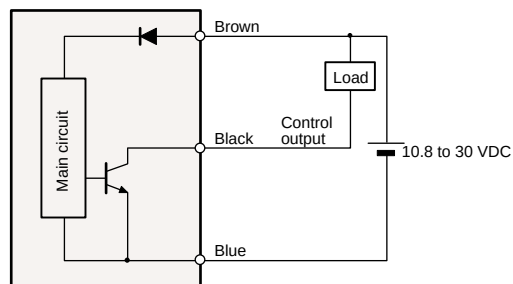
Type		Shielded				
		Cylindrical		Threaded	Cylindrical	
Model	NPN	EM-030	EM-038	EM-005	EM-054	EM-080
	PNP	EM-030P	EM-038P	EM-005P	EM-054P	EM-080P
Size		3 mm dia.	3.8 mm dia.	M5	5.4 mm dia.	8 mm dia.
Detecting distance		0.6 mm ±15%	0.8 mm ±15%	1.0 mm ±15%	1.2 mm ±10%	2.0 mm
Detectable object		Ferrous metals (see Characteristics for non-ferrous metals)				
Standard target (iron, t=1 mm)		5 x 5 mm	5 x 5 mm	5 x 5 mm	6 x 6 mm	10 x 10 mm
Hysteresis		10% max. of detecting distance				
Response frequency		1.2 kHz				
Temperature fluctuation		±10% max. of detecting distance at +23°C (-10 to +70°C)				
Indicator		Output: Red LED				
Control output		200 mA (40 V) max. Residual voltage: 1 V max.				
Power supply		10.8 to 30 VDC	10.8 to 30 VDC	10.8 to 30 VDC	10.8 to 30 VDC	10.8 to 30 VDC
Current consumption		12 mA max.	12 mA max.	12 mA max.	12 mA max.	12 mA max.
Enclosure rating		IP-67	IP-67	IP-67	IP-67	IP-67
Ambient temperature		-25 to +80°C	-25 to +80°C	-25 to +80°C	-25 to +80°C	-25 to +80°C
Housing		Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Weight (including nuts and 2-m cable)		Approx. 36 g	Approx. 38 g	Approx. 40 g	Approx. 40 g	Approx. 42 g

Type		Shielded	
		Threaded	
Model	NPN	EM-010	EM-014
	PNP	EM-010P	EM-014P
Size		M10	M14
Detecting distance		2.0 mm ±10%	4.0 mm ±10%
Detectable object		Ferrous metals (see Characteristics for non-ferrous metals)	
Standard target (iron, t=1 mm)		10 x 10 mm	15 x 15 mm
Hysteresis		10% max. of detecting distance	
Response frequency		1.2 kHz	
Temperature fluctuation		±10% max. of detecting distance at +23°C (-10 to +70°C)	
Indicator		Output: Red LED	
Control output		200 mA (40 V) max. Residual voltage: 1 V max.	
Power supply		10.8 to 30 VDC	10.8 to 30 VDC
Current consumption		12 mA max.	12 mA max.
Enclosure rating		IP-67	IP-67
Ambient temperature		-25 to +80°C	-25 to +80°C
Housing		Cr-plated brass	Cr-plated brass
Weight (including nuts and 2-m cable)		Approx. 50 g	Approx. 60 g

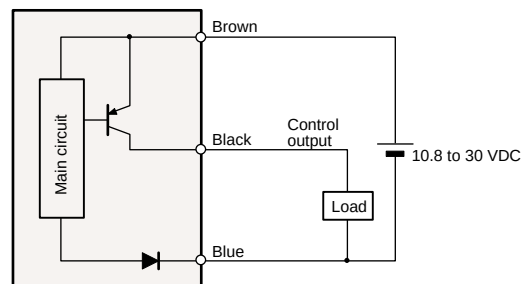
Photoelectric Sensors	1
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Proximity Sensors	3
Pressure Sensors	4
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Output Circuit

NPN

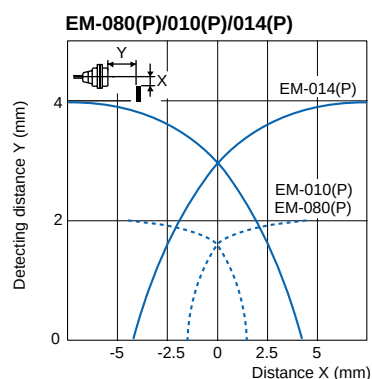
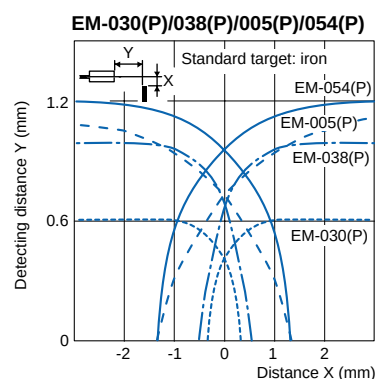


PNP

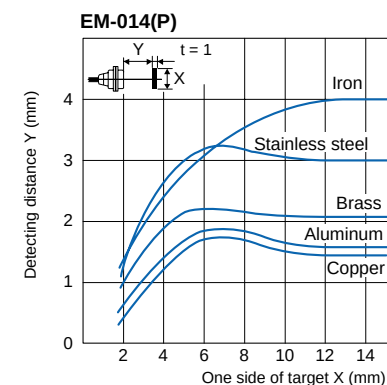
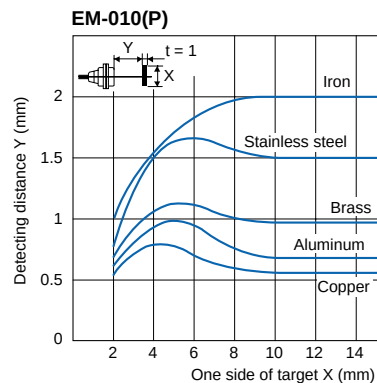
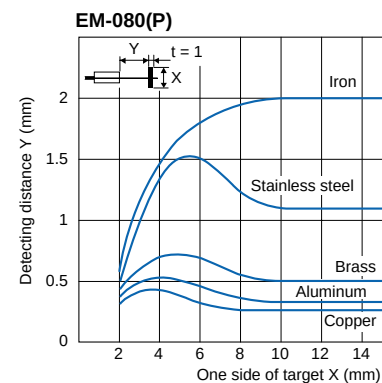
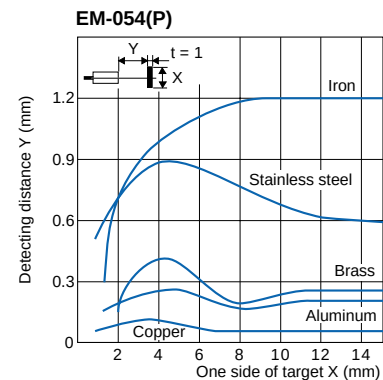
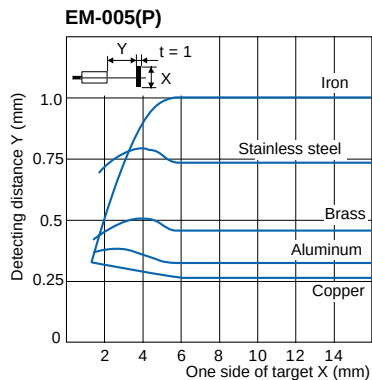
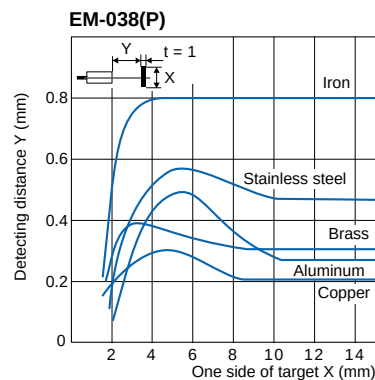
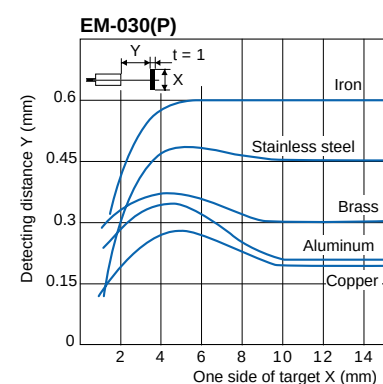


Characteristics

Detecting range (Typical)



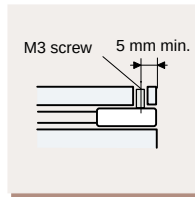
Detecting distance vs. size and material of target (Typical)



Hints on Correct Use

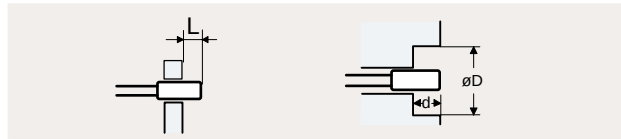
Mounting

- Cylindrical type
Secure the sensor head with a screw at a position 5 mm or more from the tip of the head. [Tightening torque: 0.4 N•m]



Surrounding metal

When embedding the sensor in an iron base, follow the guidelines given below in order to minimize interference from the surrounding metal.



Model	L (mm min.)	D (mm min.)	d (mm min.)
EM-030(P)	4	6	5
EM-038(P)	4	7.6	5
EM-005(P)	4	10	5
EM-054(P)	4	10.8	5
EM-080(P)	5	16	8
EM-010(P)	5	20	8
EM-014(P)	5	28	8

- Threaded type

When mounting the threaded-type sensor head, do not tighten beyond the torque specified in the following table.

Model	Tightening torque
EM-005(P)	1.5 N•m max.
EM-010(P)	10 N•m max.
EM-014(P)	20 N•m max.

Wiring

Limit the length of extension to within 50 m. The sensor cable (coaxial cable) must not be extended or cut.

Interference

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

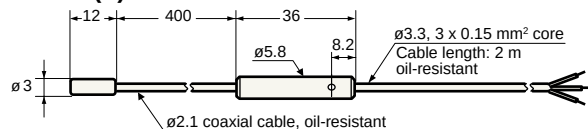
Model	Distance	
	Face-to-face (mm min.)	Parallel (mm min.)
EM-030(P)	12 (1)	11 (0)
EM-038(P)	15 (1)	12 (0)
EM-005(P)	12 (1.5)	13 (0)
EM-054(P)	20 (1.5)	18 (0)
EM-080(P)	24 (2.5)	23 (0)
EM-010(P)	20 (2.5)	25 (0)
EM-014(P)	40 (4.5)	34 (0)

[Note]

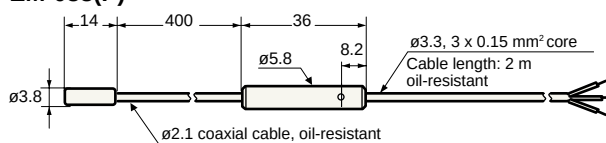
The values in parentheses apply to the alternate-frequency type.

Dimensions

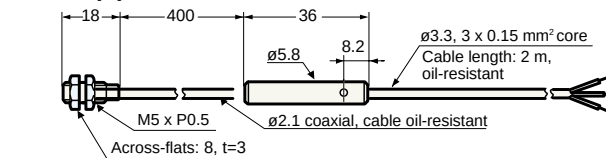
EM-030(P)



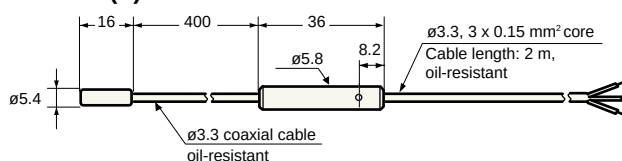
EM-038(P)



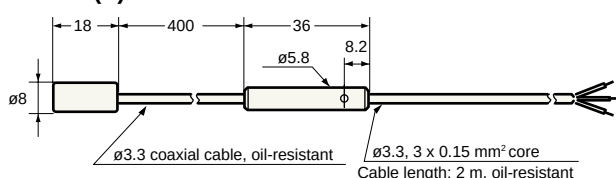
EM-005(P)



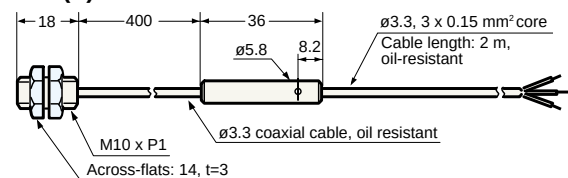
EM-054(P)



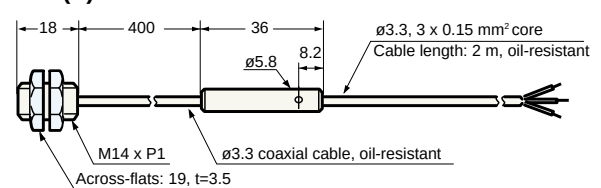
EM-080(P)



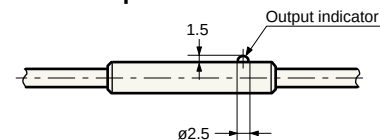
EM-010(P)



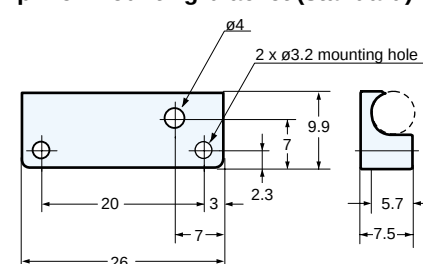
EM-014(P)



Detail of output indicator



Amplifier mounting bracket (standard)



Unit: mm