E2F

CSM_E2F_DS_E_5_1

Proximity Sensor with Resin Case with Superb Water Resistance

- IP68 protection.
- Mutual interference prevention with models with different frequencies is also available.

⚠ Be sure to read *Safety Precautions* on page 5.

Ordering Information

Sensors [Refer to *Dimensions* on page *6*.]

Model		Sensing distance	Output configuration	Model	
				Operation mode	
				NO	NC
Shielded	M8	1.5 mm	DC 3-wire, NPN	E2F-X1R5E1 2M	E2F-X1R5E2 2M
			AC 2-wire	E2F-X1R5Y1 2M	E2F-X1R5Y2 2M
	M12	2 mm	DC 3-wire, NPN	E2F-X2E1 2M *1	E2F-X2E2 2M *1
			AC 2-wire	E2F-X2Y1 2M *1	E2F-X2Y2 2M *1
	M18	5 mm	DC 3-wire, NPN	E2F-X5E1 2M *1	E2F-X5E2 2M *1
			AC 2-wire	E2F-X5Y1 2M *1 *2	E2F-X5Y2 2M *1 *2
	M30	10 mm	DC 3-wire, NPN	E2F-X10E1 2M *1	E2F-X10E2 2M *1
			AC 2-wire	E2F-X10Y1 2M *1 *2	E2F-X10Y2 2M *1 *2

*1. Models with different frequencies are also available. The model numbers are E2F-X□□□5 (e.g., E2F-X5E15).
*2. Models are also available with short-circuit protection. The model numbers are E2F-X□Y□-53 (e.g., E2F-X5Y1-53).
The power supply voltage, however, is 100 to 120 VAC.

Accessories (Order Separately)

Protective Covers

Refer to *Y92□* for details.

Ratings and Specifications

Item \ Model	E2F-X1R5E□ E2F-X1R5Y□	E2F-X2E□ E2F-X2Y□	E2F-X5E□ E2F-X5Y□	E2F-X10E□ E2F-X10Y□
Sensing distance	1.5 mm ±10%	2 mm ±10%	5 mm ±10%	10 mm ±10%
Set distance	0 to 1.2 mm	0 to 1.6 mm	0 to 4 mm	0 to 8 mm
Differential travel	10% max. of sensing distance			
Detectable object	Ferrous metal (The sensing distance decreases with non-ferrous metal. Refer to *Engineering Data* on page 3.)			
Standard sensing object	Iron, 8 × 8 × 1 mm	Iron, 12 × 12 × 1 mm	Iron, 18 × 18 × 1 mm	Iron, 30 × 30 × 1 mm
Response frequency *1	E Models: 2 kHz, Y Models: 25 Hz	E Models: 1.5 kHz, Y Models: 25 Hz	E Models: 600 Hz, Y Models: 25 Hz	E Models: 400 Hz, Y Models: 25 Hz
Power supply voltage (operating voltage range)	E Models: 12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max. Y Models: 24 to 240 VAC (20 to 264 VAC)			
Current consumption	E Models: 17 mA max.			
Leakage current	Y Models: 1.7 mA max. at 200 VAC (Refer to *Engineering Data* on page 3.)			
Control output **Load current**	E Models: 200 mA max. Y Models: 5 to 100 mA		E Models: 200 mA max. Y Models: 5 to 300 mA	
Control output **Residual voltage**	E Models: 2 V max. (Load current: 200 mA, Cable length: 2 m) Y Models: Refer to *Engineering Data* on page 4.			
Indicators	E1 Models: Detection indicator (red), E2 Models: Operation indicator (red) Y Models: Operation indicator (red)			
Operation mode (with sensing object approaching)	E1/Y1 Models: NO E2/Y2 Models: NC Refer to the timing charts under *I/O Circuit Diagrams* on page 4 for details.			
Protection circuits	E Models: Reverse polarity protection, Load short-circuit protection, Surge suppressor; Y Models: None			
Ambient temperature range	Operating/Storage: –25 to 70°C (with no icing or condensation)			
Ambient humidity range	Operating/Storage: 35% to 95%			
Temperature influence	±10% max. of sensing distance at 23°C in the temperature range of –25 to 70°C			
Voltage influence	E Models: ±2.5% max. of sensing distance at rated voltage in rated voltage ±15% range Y Models: ±1% max. of sensing distance at rated voltage in rated voltage ±10% range			
Insulation resistance	50 MΩ min. (at 500 VDC) between current-carrying parts and case			
Dielectric strength	E Models: 1,000 VAC, 50/60 Hz for 1 min between current-carrying parts and case Y Models: (M8 Models): 2,000 VAC, 50/60 Hz for 1 min between current-carrying parts and case (Other M8 Models): 4,000 VAC, 50/60 Hz for 1 min between current-carrying parts and case			
Vibration resistance	Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions			
Shock resistance	Destruction: 1,000 m/s^2 10 times each in X, Y, and Z directions			
Degree of protection	IEC 60529 IP68, in-house standards: oil-resistant *2			
Connection method	Pre-wired Models (Standard cable length: 2 m)			
Weight (packed state)	Approx. 40 g	Approx. 50 g	Approx. 130 g	Approx. 170 g
Materials **Case**	Polyarylate resin			
Materials **Sensing surface**	Polyarylate resin			
Materials **Clamping nuts**	Polyacetal			
Accessories	Instruction manual			

*1. The response frequency is an average value. Measurement conditions are as follows: standard sensing object, a distance of twice the standard sensing object, and a set distance of half the sensing distance.

*2. When using the Sensor in environments subject to splashing cutting oil, deterioration may result due to the additives in the oil. The E2E is recommended in such environments.

OMRON Test Method

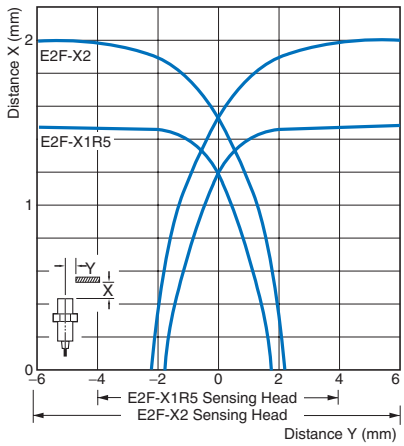
Usage conditions: 10 m or less under water in natural conditions

1. No water ingress after 1 hour under water at 2 atmospheres of pressure.
2. Sensing distance and insulation resistance specifications must be met after 20 repetitions of 1 hour in 0°C water and 1 hour in 70°C water.

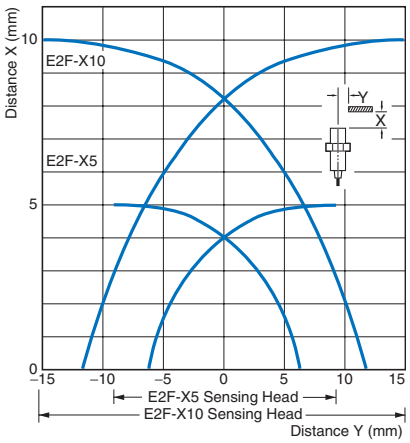
Engineering Data (Typical)

Sensing Area

E2F-X1R5□□/-X2□□

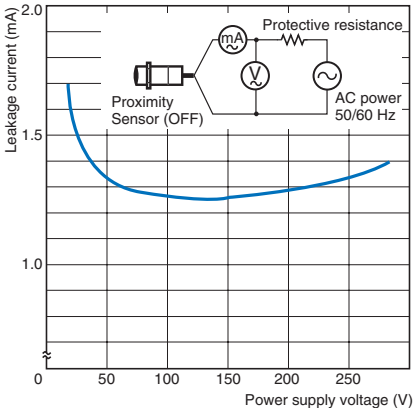


E2F-X5□□/-X10□□



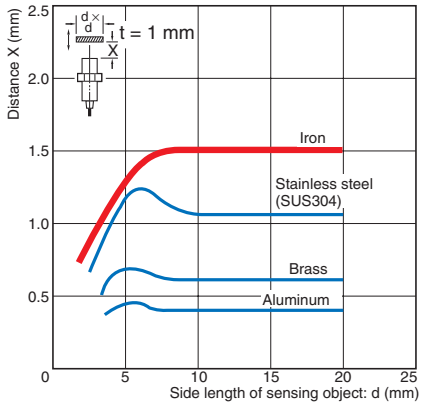
Leakage Current

E2F-X□Y□

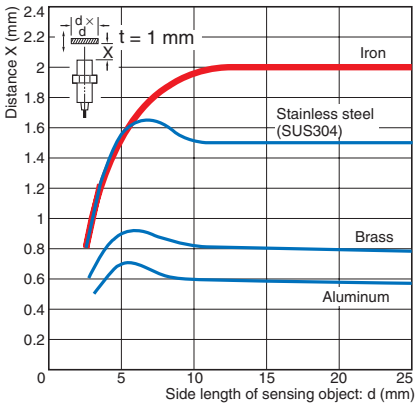


Influence of Sensing Object Size and Material

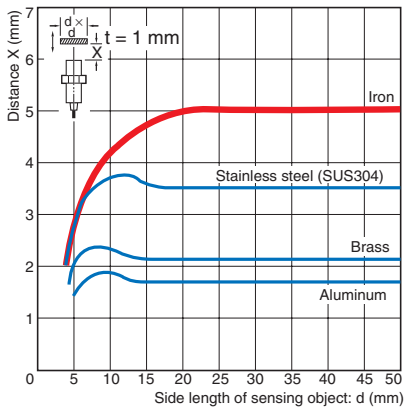
E2F-X1R5□□



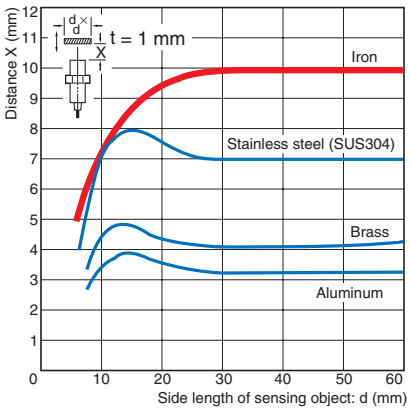
E2F-X2□□



E2F-X5□□

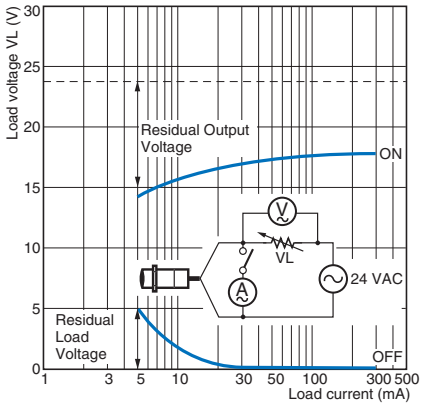


E2F-X10□□

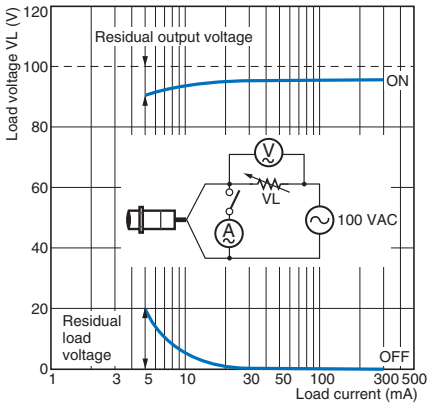


Residual Output Voltage

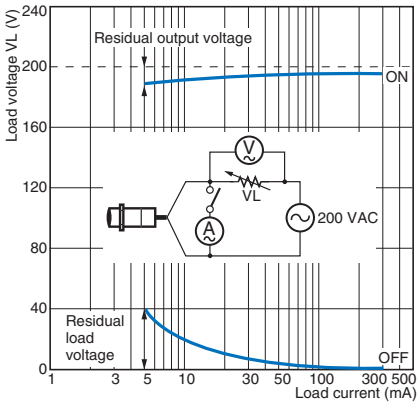
E2F-X□Y□ at 24 VAC



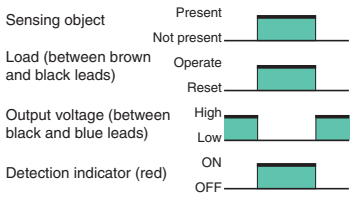
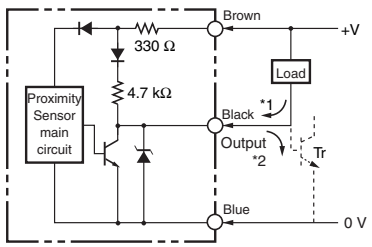
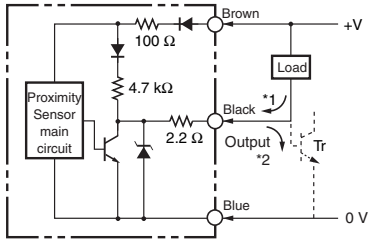
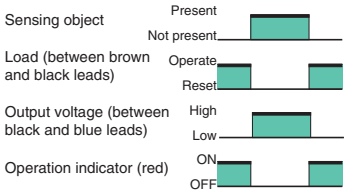
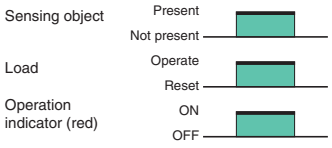
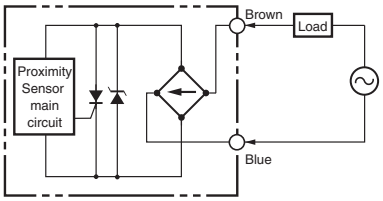
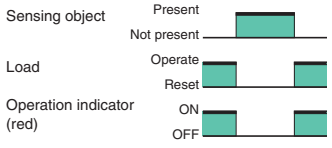
E2F-X□Y□ at 100 VAC



E2F-X□Y□ at 200 VAC



I/O Circuit Diagrams

Output configuration	Operation mode	Model	Timing chart	Output circuit
DC 3-wire	NO	E2F-X1R5E1 E2F-X2E1 E2F-X5E1 E2F-X10E1		E2F-X1R5□  *1. Load current: 200 mA max. *2. When a transistor is connected. Except the E2F-X1R5□.  *1. Load current: 200 mA max. *2. When a transistor is connected.
	NC	E2F-X1R5E2 E2F-X2E2 E2F-X5E2 E2F-X10E2		
AC 2-wire	NO	E2F-X1R5Y1 E2F-X2Y1 E2F-X5Y1 E2F-X10Y1		
	NC	E2F-X1R5Y2 E2F-X2Y2 E2F-X5Y2 E2F-X10Y2		

Safety Precautions

Refer to *Warranty and Limitations of Liability*.

⚠ WARNING

This product is not designed or rated for ensuring safety of persons either directly or indirectly. Do not use it for such purposes.

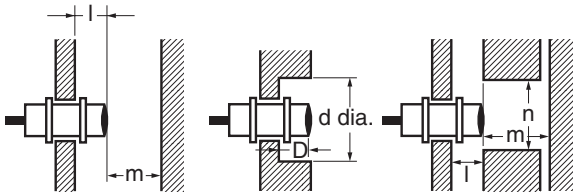
Precautions for Correct Use

Do not use this product under ambient conditions that exceed the ratings.

● Design

Influence of Surrounding Metal

When mounting the Sensor within a metal panel, ensure that the clearances given in the following table are maintained. Failure to maintain these distances may cause deterioration in the performance of the Sensor.

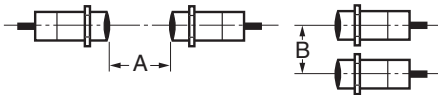


Influence of Surrounding Metal (Unit: mm)

Model / Item	l	d	D	m	n
E2F-X1R5□□	0	8	0	4.5	12
E2F-X2□□		12		8	18
E2F-X5□□		18		20	27
E2F-X10□□		30		40	45

Mutual Interference

When installing Sensors face-to-face or side-by-side, ensure that the minimum distances given in the following table are maintained.



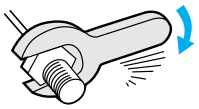
Mutual Interference (Unit: mm)

Model / Item	A	B
E2F-X1R5□□	20	15
E2F-X2□□	30 (20)	20 (12)
E2F-X5□□	50 (30)	35 (18)
E2F-X10□□	100 (50)	70 (35)

Note: Values in parentheses apply to Sensors operating at different frequencies. Models numbers for Sensors with different frequencies are E2F-X□□□5.

● Mounting

Do not tighten the nut with excessive force.



Model	Torque
E2F-X1R5□□	0.78 N·m
E2F-X2□□	
E2F-X5□□	2 N·m
E2F-X10□□	

● Maintenance and Inspection

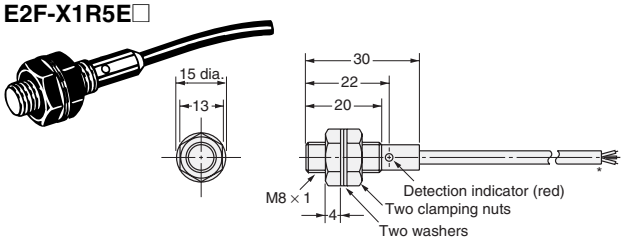
Do not use AC 2-Wire Models in water or in locations subject to water if the sensing surface or any other part of the Sensor is damaged, e.g., from contact with the sensing object. Electric shock may result.

Dimensions

(Unit: mm)
Tolerance class IT16 applies to dimensions in this data sheet unless otherwise specified.

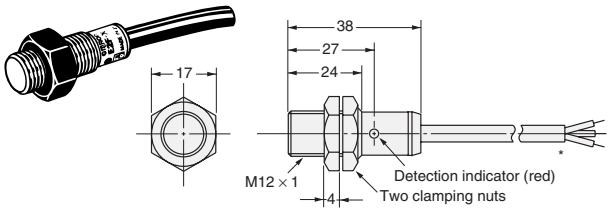
DC 3-Wire Models

E2F-X1R5E□



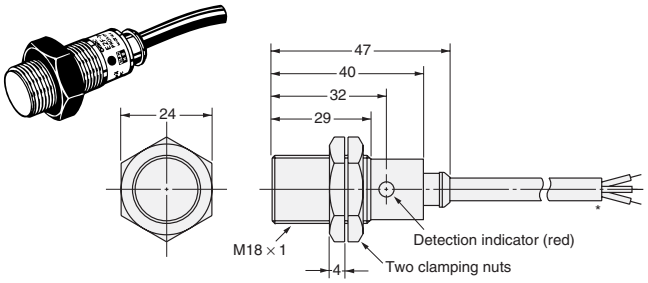
* 3.5-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.14 mm^2, Insulator diameter: 1 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).

E2F-X2E□



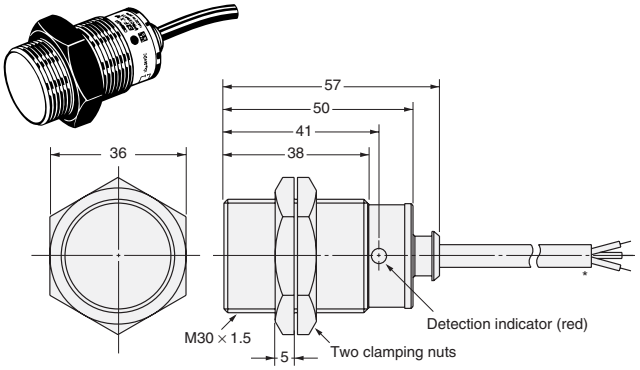
* 6-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.9 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).

E2F-X5E□



* 6-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.9 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).

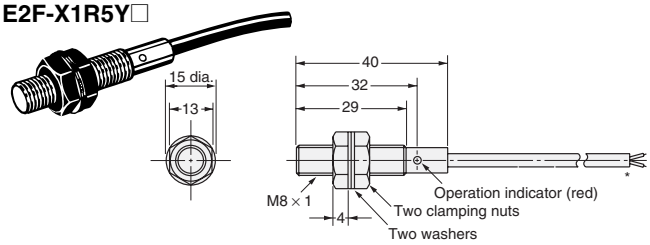
E2F-X10E□



* 6-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.9 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).

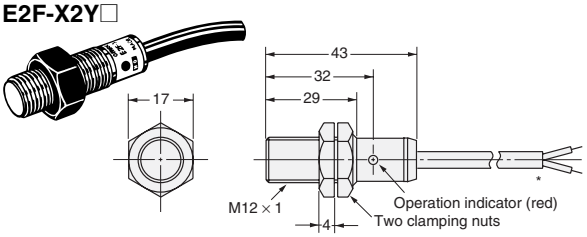
AC 2-Wire Models

E2F-X1R5Y□



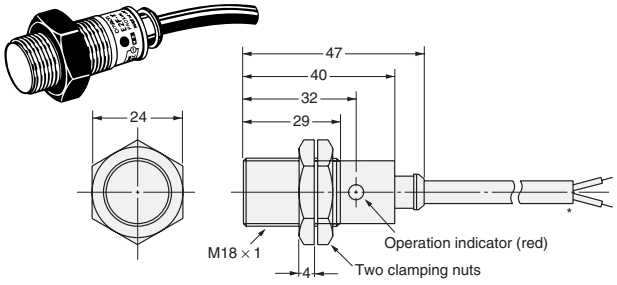
* 3.5-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.14 mm^2, Insulator diameter: 1 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).

E2F-X2Y□



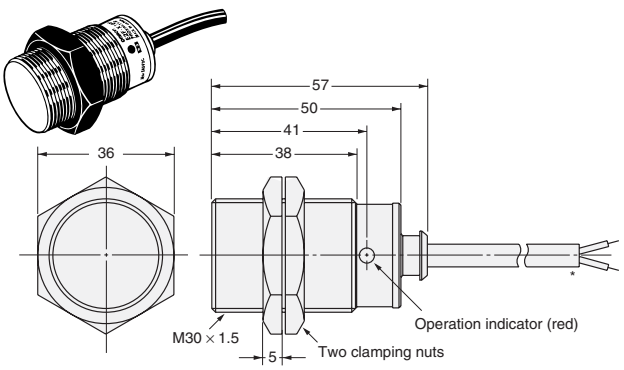
* 6-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.9 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).

E2F-X5Y□



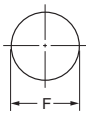
* 6-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.9 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).

E2F-X10Y□



* 6-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.9 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).

Mounting Hole Dimensions



Model	E2F-X1R5□□	E2F-X2□□	E2F-X5□□	E2F-X10□□
F (mm)	$8.5^{+0.5}_{0}$ dia.	$12.5^{+0.5}_{0}$ dia.	$18.5^{+0.5}_{0}$ dia.	$30.5^{+0.5}_{0}$ dia.