

Cylindrical Inductive Sensor for AC Power Supply

E2E-□Y/E2F-□Y


- 24 to 240 VAC power supply voltage
- brass or plastic housing (M8 in SUS housing)



Ordering Information

Plastic Housing

AC 2-wire/Pre-wired Models



Size		Sensing distance	Model	
			Operating status	
			NO	NC
	M8	1.5 mm	E2F-X1R5Y1 ^{*1}	E2F-X1R5Y2 ^{*1}
	M12	2 mm	E2F-X1Y1 ^{*1}	E2F-X2Y2 ^{*1}
	M18	5 mm	E2F-X5Y1 ^{*1*2}	E2F-X5Y2 ^{*1*2}
	M30	10 mm	E2F-X10Y1 ^{*1*2}	E2F-X10Y2 ^{*1*2}

*1. A different frequency type is available (E2F-X□□5; e.g. E2F-X5E15)

*2. A short-circuit protection type is available (E2F-X□□-53; e.g. E2F-X5Y1-53) Power Supply Voltage: 100 to 120 VAC

Metal Housing



AC 2-wire/Pre-wired Models

Size		Sensing distance	Operation mode	Model
	M8	1.5 mm	NO	E2E-X1R5Y1
			NC	E2E-X1R5Y2
	M12	2 mm	NO	E2E-X2Y1 ^{*1*2}
			NC	E2E-X2Y2
	M18	5 mm	NO	E2E-X5Y1 ^{*1*2}
			NC	E2E-X5Y2
M30	10 mm	NO	E2E-X10Y1 ^{*1*2}	
			NC	E2E-X10Y2
	M8	2 mm	NO	E2E-X2MY1
			NC	E2E-X2MY2
	M12	5 mm	NO	E2E-X5MY1 ^{*1*2}
			NC	E2E-X5MY2
	M18	10 mm	NO	E2E-X10MY1 ^{*1}
			NC	E2E-X10MY2
	M30	18 mm	NO	E2E-X18MY1 ^{*1}
			NC	E2E-X18MY2

*1. Models with a different frequency are also available. These models are E2E-X□Y□5 (e.g., E2E-X5Y15).

*2. Cables with a length of 5 m are also available. Specify the cable length at the end of the model number (e.g., E2E-X2Y1 5M).

AC 2-wire/Connector Models

Size		Sensing distance	Operation mode	Model
	M12	2 mm	NO	E2E-X2Y1-M1
			NC	E2E-X2Y2-M1
	M18	5 mm	NO	E2E-X5Y1-M1
			NC	E2E-X5Y2-M1
	M30	10 mm	NO	E2E-X10Y1-M1
			NC	E2E-X10Y2-M1
	M12	5 mm	NO	E2E-X5MY1-M1
			NC	E2E-X5MY2-M1
	M18	10 mm	NO	E2E-X10MY1-M1
			NC	E2E-X10MY2-M1
	M30	18 mm	NO	E2E-X18MY1-M1
			NC	E2E-X18MY2-M1

Specifications

Plastic Housing (E2F)

Model	E2F-X1R5Y□	E2F-X2Y□	E2F-X5Y□	E2F-X10Y□
Sensing distance	1.5 mm ±10%	2 mm ±10%	5 mm ±10%	10 mm ±10%
Setting distance	0 to 1.2 mm	0 to 1.6 mm	0 to 4 mm	0 to 8 mm
Differential distance	10% max			
Sensing object	Ferrous metal (Sensitivity lowers with non-ferrous metals)			
Standard sensing object	Iron, 8 x 8 x 1 mm	Iron, 12 x 12 x 1 mm	Iron, 18 x 18 x 1 mm	Iron, 30 x 30 x 1 mm
Response frequency *1	25 Hz			
Power supply (Operating voltage range)	24 to 240 VAC (20 to 264 VAC)			
Leakage current	1.7 mA at 200 VAC			
Control output	Switching capacity	5 to 100 mA		5 to 300 mA
	Residual voltage	Refer to the Specifications		
Indicator lamp	Operation indicator (red LED)			
Operation status (with sensing object approaching)	Y1 Models: ON Y2 Models: NC			
Protection circuit	None *2			
Ambient temperature	Operating/Storage: -25 °C to 70 °C (with no icing or condensation)			
Ambient humidity	Operating/Storage: 35% to 95% RH			
Temperature influence	A maximum fluctuation of ±10% max. of sensing distance at 23 °C in the temperature range of -25 °C to 70 °C			
Voltage influence	±1% max. of sensing distance within a range of ±10% of rated power supply voltage			
Insulation resistance	50 MΩ min. (at 500 VDC) between current carry parts and case			
Vibration resistance	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 for 10 times each in X, Y, and Z directions			
Protective structure	IEC IP68 *3			
Connection method	Pre-wired models (standard length 2 m)			
Weight (Packed state)	Approx. 40 g	Approx. 50 g	Approx. 130 g	Approx. 170 g
Material	Case	Polyarylate		
	Sensing surface			
	Clamping nut	Polyarylate resin		
Accessories	Instruction manual			

*1. The response frequencies are average values measured on condition that the distance between each sensing object is twice as large as the size of the sensing object and the sensing distance set is half of the maximum sensing distance.

*2. Short circuit protection types are available.

*3. **OMRON test method**

Conditions: Less than 10 m natural state under water

(1) It is not flooded underwater with two atmospheric pressure for 1 hour.

(2) A heat shock cycle (it is 1 hour, respectively to 0 °C cold water and 70 °C warm water) is repeated 20 times, and the performance of detection distance and insulation resistance is checked.

Metal Housing (E2E)







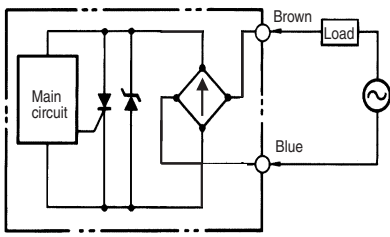

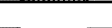




Size	M8		M12		M18		M30		
Type	Shielded	Unshielded	Shielded	Unshielded	Shielded	Unshielded	Shielded	Unshielded	
Item	E2E-X1R5Y□	E2E-X2MY□	E2E-X2Y□	E2E-X5MY□	E2E-X5Y□	E2E-X10MY□	E2E-X10Y□	E2E-X18MY□	
Sensing distance	1.5 mm ±10%	2 mm ±10%	2 mm ±10%	5 mm ±10%	5 mm ±10%	10 mm ±10%	10 mm ±10%	18 mm ±10%	
Set distance	0 to 1.2 mm	0 to 1.6 mm	0 to 1.6 mm	0 to 4.0 mm	0 to 4.0 mm	0 to 8.0 mm	0 to 8.0 mm	0 to 14.0 mm	
Differential travel	10% max. of sensing distance								
Sensing object	Ferrous metal (The sensing distance decreases with non-ferrous metal, refer to <i>Engineering Data</i> .)								
Standard sensing object	Iron, 8 x 8 x 1 mm	Iron, 12 x 12 x 1 mm	Iron, 12 x 12 x 1 mm	Iron, 15 x 15 x 1 mm	Iron, 18 x 18 x 1 mm	Iron, 30 x 30 x 1 mm	Iron, 30 x 30 x 1 mm	Iron, 54 x 54 x 1 mm	
Response speed	25 Hz								
Power supply voltage (operating voltage range) *1	24 to 240 VAC, 50/60 Hz (20 to 264 VAC)								
Leakage current	1.7 mA max.								
Control output	Load current *2	5 to 100 mA		5 to 200 mA		5 to 300 mA			
	Residual voltage	Refer to <i>Engineering Data</i> .							
Indicator	Operation indicator (red LED)								
Operation mode (with sensing object approaching)	Y1 Models: NO Y2 Models: NC For details, refer to <i>Timing Charts</i> .								
Protection circuit	Surge suppressor								
Ambient temperature *1 *2	Operating/Storage: -25 °C to 70 °C (with no icing or condensation)		Operating/Storage: -40 °C to 85 °C (with no icing or condensation)						
Ambient humidity	Operating/Storage: 35% to 95% (with no condensation)								
Temperature influence	±10% max. of sensing distance at 23 °C in the temperature range of -25 °C to 70 °C		±15% max. of sensing distance at 23 °C in the temperature range of -40 °C to 85 °C ±10% max. of sensing distance at 23 °C in the temperature range of -25 °C to 70 °C						
Voltage influence	±1% max. of sensing distance in the rated voltage range ±15%								
Insulation resistance	50 MΩ min. (at 500 VDC) between current-carrying parts and case								
Dielectric strength	4,000 VAC at 50/60 Hz for 1 min between current-carrying parts and case (2,000 VAC for M8 Models)								
Vibration resistance	10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions								
Shock resistance	500 m/s ² 10 times each in X, Y, and Z directions		1,000 m/s ² 10 times each in X, Y, and Z directions						
Degree of protection	IEC 60529 IP67 (Pre-wired models: JEM standard IP67g (waterproof, oil-proof))								
Connection method	Pre-wired models (standard length 2 m), connector models								
Weight (packed state)	Pre-wired models	Approx. 60 g		Approx. 70 g		Approx. 130 g		Approx. 175 g	
	Connector models	Approx. 15 g		Approx. 25 g		Approx. 40 g		Approx. 90 g	
Material	Case	Stainless steel (SUS303)		Brass-nickel plated					
	Sensing surface	PBT (polybutylene terephthalate)							
	Clamping nuts	Brass-nickel plated							
	Toothed washer	Iron-zinc plated							
Accessories	Instruction manual								

*1. When supplying 24 VAC to any of the above models, make sure that the operating ambient temperature range is over -25 °C.

*2. When using an M18- or M30-sized E2E within an ambient temperature of 70 °C to 85 °C, make sure that the E2E has a control output of 5 to 200 mA max.

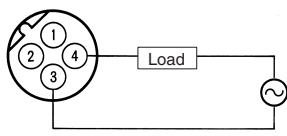
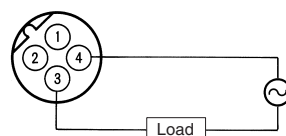
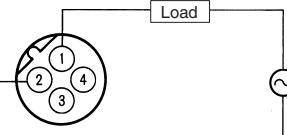
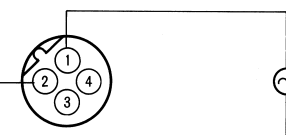
Engineering Data

Output Circuit and Timing Charts

Output	Operating Status	Model	Timing chart	Output circuit
AC 2-wire Models	NO	E2F-X1R5Y1 E2F-X2Y1 E2F-X5Y1 E2F-X10Y1 E2E-□Y1	<p>Sensing object Yes  No </p> <p>Load Operates  Releases </p> <p>Detection indicator ON  OFF </p>	
	NC	E2F-X1R5Y2 E2F-X2Y2 E2F-X5Y2 E2F-X10Y2 E2E-□Y2	<p>Sensing object Yes  No </p> <p>Load Operates  Releases </p> <p>Detection indicator ON  OFF </p>	

Pin Arrangement

E2E-X□Y□-M1 AC 2-wire Models

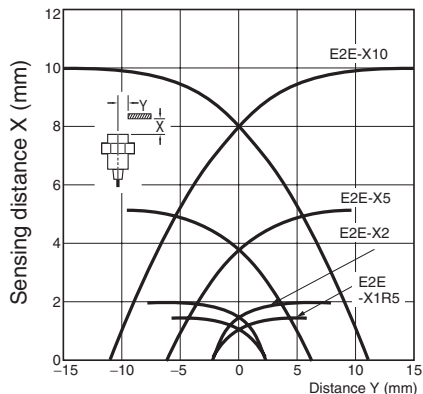
Operation mode	Applicable models	Pin arrangement
NO	E2E-X□Y1-M1	  <p>Note: Terminals 1 and 2 are not used.</p>
NC	E2E-X□Y2-M1	  <p>Note: Terminals 3 and 4 are not used.</p>

E2E

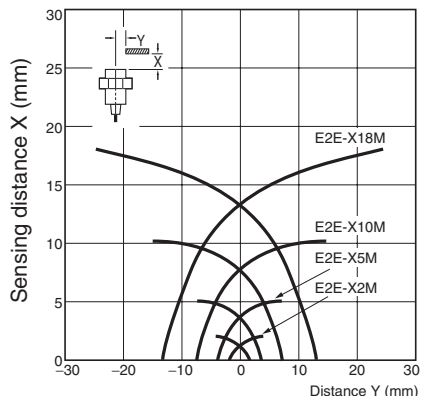
Operating Range (Typical)

E2E-X□Y□

E2F-X□Y□

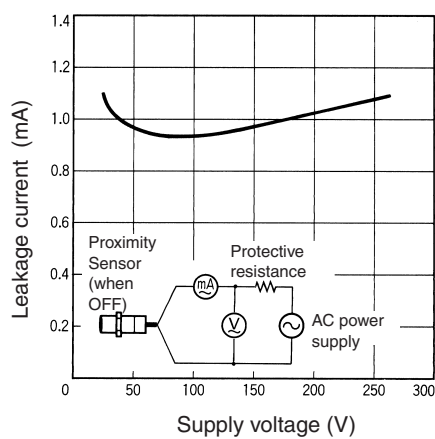


E2E-X□MY□

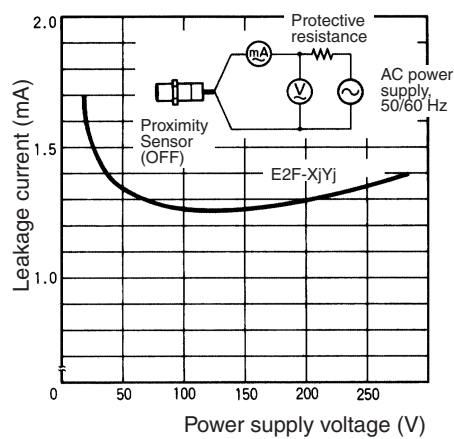


Leakage Current (Typical)

E2E-X□Y□



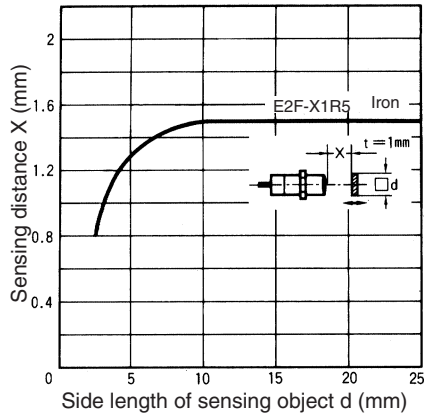
E2F-X□Y□



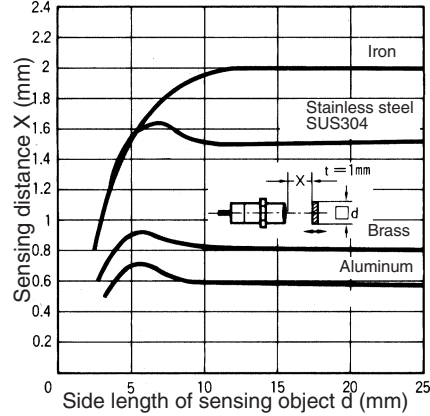
E2F

Sensing Distance vs. Sensing Object

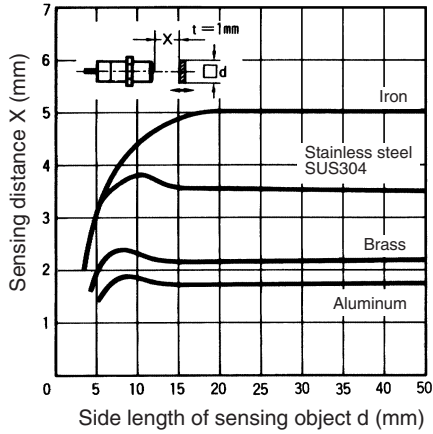
E2F-X1R5



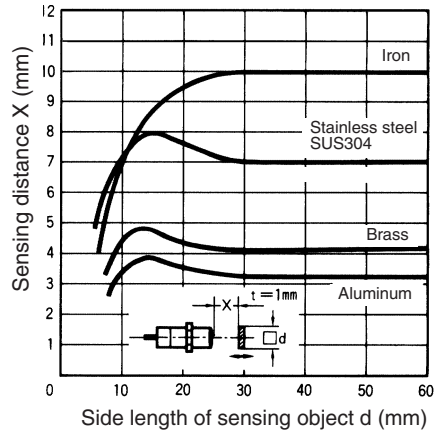
E2F-X2



E2F-X5



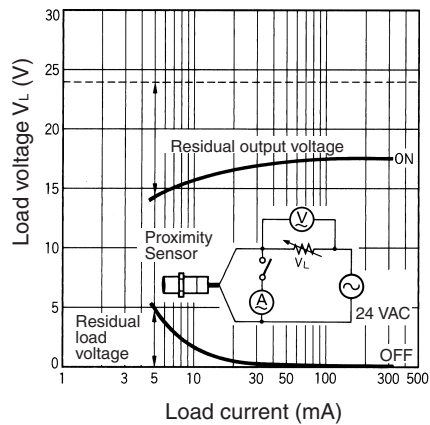
E2F-X10



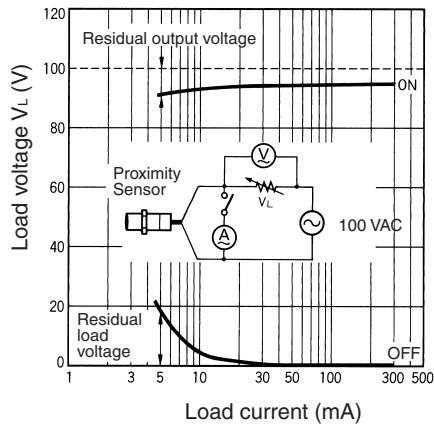
Residual Output Voltage (Typical)

E2E-X

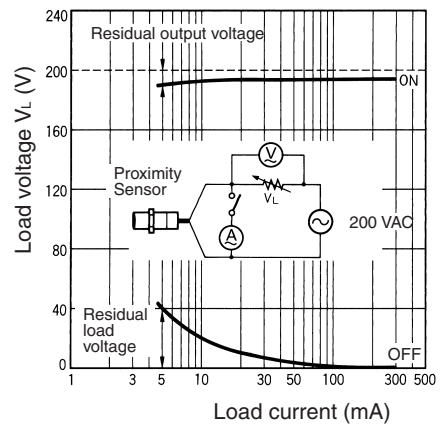
24 VAC



100 VAC

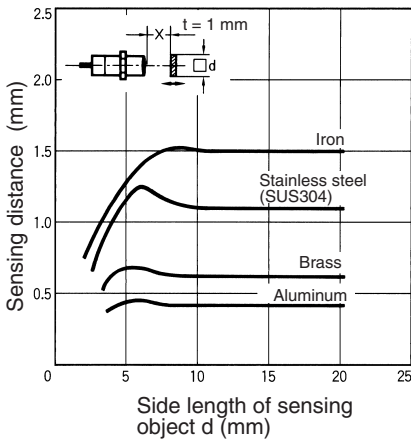


200 VAC

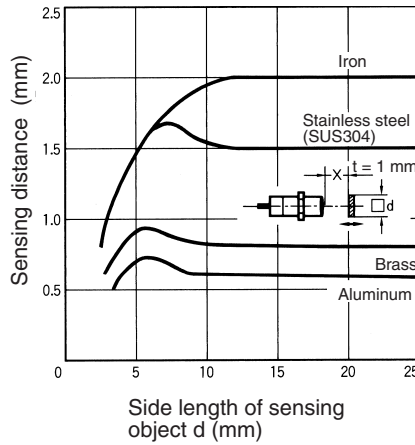


Sensing Distance vs. Sensing Object (Typical)

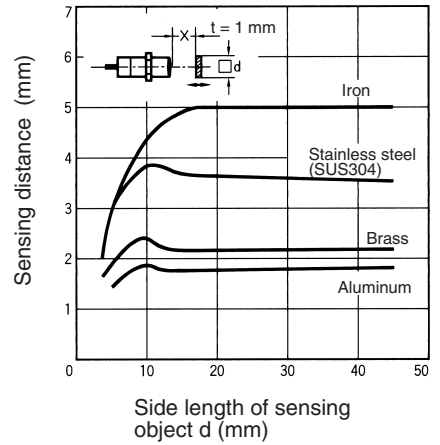
E2E-X1R5Y
E2F-X1R5Y1



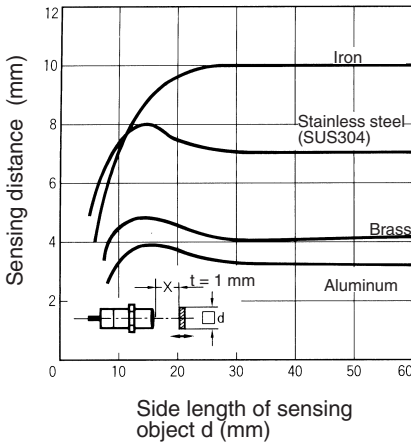
E2E-X2Y
E2F-X2Y1



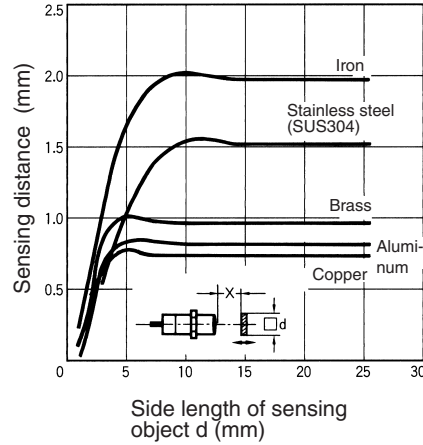
E2E-X5Y
E2F-X5Y1



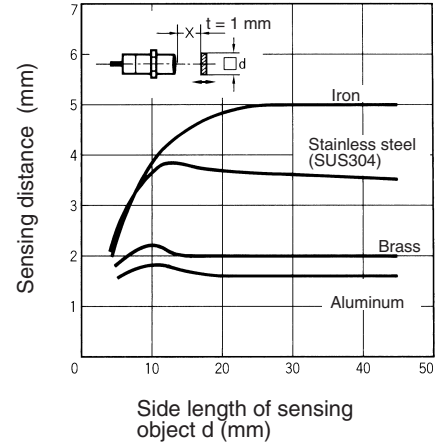
E2E-X10Y
E2F-X10Y1



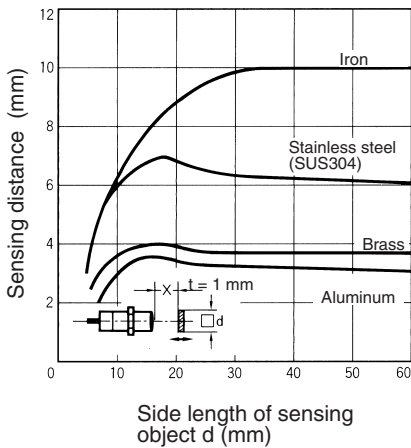
E2E-X2MY



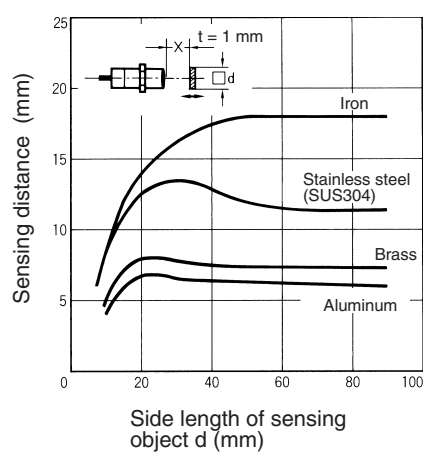
E2E-X5MY



E2E-X10MY



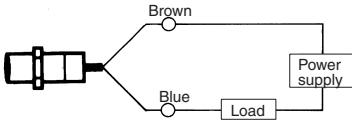
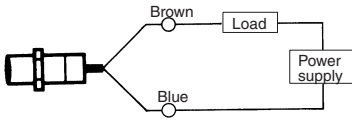
E2E-X18MY



Installation

Connection

E2E-X□Y□ / E2F-X□Y□ AC 2-wire Models

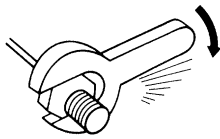


Note: The load can be connected as shown above.

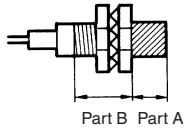
Precautions

Mounting

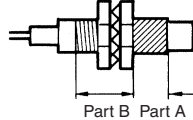
Do not tighten the nut with excessive force. A washer must be used with the nut.



Shielded Model



Unshielded Model

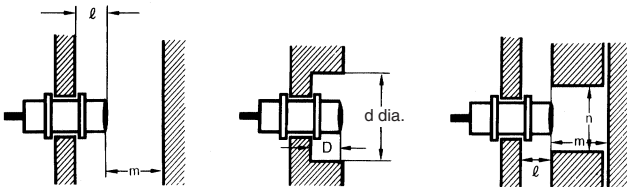


Note: The table below shows the tightening torques for part A and part B nuts. In the previous examples, the nut is on the sensor head side (part B) and hence the tightening torque for part B applies. If this nut is in part A, the tightening torque for part A applies instead.

Model	Part A		Part B
	Length	Torque	Torque
M8	Shielded	9 mm	9 N·m
	Unshielded	3 mm	12 N·m
M12	30 N·m		
M18	70 N·m		
M30	180 N·m		

Influence of Surrounding Metal

When mounting the E2E / E2F 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.

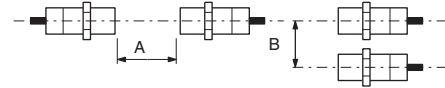


Model		l	d	D	m	n	
E2E-X□Y□ AC 2-wire	Shielded	M8	0 mm	8 mm	0 mm	4.5 mm	12 mm
		M12	0 mm	12 mm	0 mm	8 mm	18 mm
		M18	0 mm	18 mm	0 mm	20 mm	27 mm
		M30	0 mm	30 mm	0 mm	40 mm	45 mm
	Unshielded	M8	6 mm	24 mm	6 mm	8 mm	24 mm
		M12	15 mm	40 mm	15 mm	20 mm	36 mm
		M18	22 mm	55 mm	22 mm	40 mm	54 mm
		M30	30 mm	90 mm	30 mm	70 mm	90 mm

Model		l	d	D	m	n
E2F-X1R5□□	M8	0 mm	8 mm	0 mm	4.5 mm	12 mm
E2F-X25□□	M12	0 mm	12 mm	0 mm	8 mm	18 mm
E2F-X5□□	M18	0 mm	18 mm	0 mm	20 mm	27 mm
E2F-X10□□	M30	0 mm	30 mm	0 mm	40 mm	45 mm

Mutual Interference

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



Model	Item	M8	M12	M18	M30	
E2E-X□Y□ AC 2-wire	Shielded	A	20	30 (20)	50 (30)	100 (50)
		B	15	20 (12)	35 (18)	70 (35)
	Unshielded	A	80	120 (60)	200 (100)	300 (100)
		B	60	100 (50)	110 (60)	200 (100)
E2F-X1R5□□	A	20	-	-	-	
	B	1%	-	-	-	
E2F-X25□□	A	-	30 (20)	-	-	
	B	-	20 (12)	-	-	
E2F-X5□□	A	-	-	50 (30)	-	
	B	-	-	35 (18)	-	
E2F-X10□□	A	-	-	-	100 (50)	
	B	-	-	-	70 (35)	

Unit: mm

Note: Figures in the parentheses are for E2F used in combination with an E2F (i.e., E2F-X□□□5) that is operating at a different frequency.

WARNING

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



Precautions for Safe Use

The colors in parentheses are previous wire colors.

Item	Examples
<p>Connection with no load</p> <p>Make sure to connect a proper load to the E2E in operation, otherwise it may explode or burn.</p>	

Precautions for Correct Use

Installation

Power Reset Time

The Proximity Sensor is ready to operate within 100 ms after power is supplied. If power supplies are connected to the Proximity Sensor and load respectively, be sure to supply power to the Proximity Sensor before supplying power to the load.

Power OFF

The Proximity Sensor may output a pulse signal when it is turned OFF. Therefore, it is recommended to turn OFF the load before turning OFF the Proximity Sensor.

Power Supply Transformer

When using a DC power supply, make sure that the DC power supply has an insulated transformer. Do not use a DC power supply with an auto-transformer.

Sensing Object

Metal Coating:
The sensing distances of the Proximity Sensor vary with the metal coating on sensing objects.

Wiring

High-tension Lines

Wiring through Metal Conduit

If there is a power or high-tension line near the cable of the Proximity Sensor, wire the cable through an independent metal conduit to prevent against Proximity Sensor damage or malfunctioning.

Cable Ttractive Force

Do not pull on cables with tractive forces exceeding the following.

Diameter	Tractive force
4 dia.	50 N max.

Mounting

The Proximity Sensor must not be subjected to excessive shock with a hammer when it is installed, otherwise the Proximity Sensor may be damaged or lose its water-resistivity.

Environment

Water Resistivity

Do not use the Proximity Sensor underwater, outdoors, or in the rain.

Operating Environment

Be sure to use the Proximity Sensor within its operating ambient temperature range and do not use the Proximity Sensor outdoors so that its reliability and life expectancy can be maintained. Although the Proximity Sensor is water resistive, a cover to protect the Proximity Sensor from water or water soluble machining oil is recommended so that its reliability and life expectancy can be maintained. Do not use the Proximity Sensor in an environment with chemical gas (e.g., strong alkaline or acid gasses including nitric, chromic, and concentrated sulfuric acid gasses).

Connecting Load to AC 2-wire Sensor

Refer to the following before using AC 2-wire Proximity Sensors.

Surge Protection

Although the Proximity Sensor has a surge absorption circuit, if there is any machine that has a large surge current (e.g., a motor or welding machine) near the Proximity Sensor, connect a surge absorber to the machine.

Leakage Current

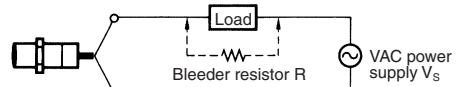
When the Proximity Sensor is OFF, the Proximity Sensor has leakage current. Refer to 5 and 6 Leakage Current Characteristics. In this case, the load is imposed with a small voltage and the load may not be reset. Before using the Proximity Sensor, make sure that this voltage is less than the load reset voltage. The AC 2-wire Proximity Sensor cannot be connected to any card-lift-off relay (e.g., the G2A) because contact vibration of the relay will be caused by the leakage current and the life of the relay will be shortened.

Countermeasures Against Leakage Current

AC 2-wire Models

Connect a bleeder resistor as the bypass for the leakage current so that the current flowing into the load will be less than the load reset current.

As shown in the following diagram, connect the bleeder resistor so that the current flowing into the Proximity Sensor will be 10 mA minimum and the residual voltage imposed on the load will be less than the load reset voltage.



Refer to the following to calculate the bleeder resistance and the allowable power of the bleeder resistor.

$$R \leq V_s / (10 - I) \text{ (k}\Omega\text{)}$$

$$P > V_s^2 / R \text{ (mW)}$$

P: The allowable power of the bleeder resistor. (The actual power capacity of the bleeder resistor must be at least a few times as large as the allowable power of the bleeder resistor.)

I: Load current (mA)

The following resistors are recommended.

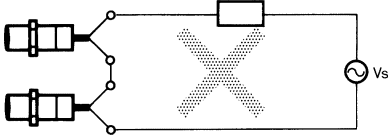
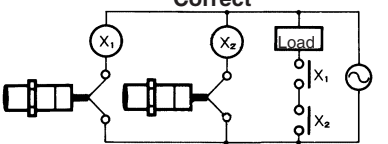
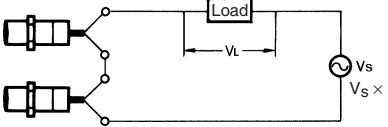
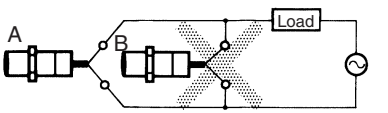
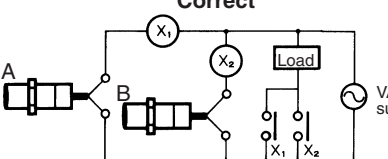
100 VAC (supply voltage): A resistor with a resistance of 10 kΩ maximum and an allowable power of 3 W minimum

200 VAC (supply voltage): A resistor with a resistance of 20 kΩ maximum and an allowable power of 10 W minimum

If these resistors generate excessive heat, use a resistor with a resistance of 10 kΩ maximum and an allowable power of 5 W minimum at 100 VAC and a resistor with a resistance of 20 kΩ maximum and an allowable power of 10 W minimum at 200 VAC instead.

Precautions for AC 2-wire Proximity Sensors in Operation

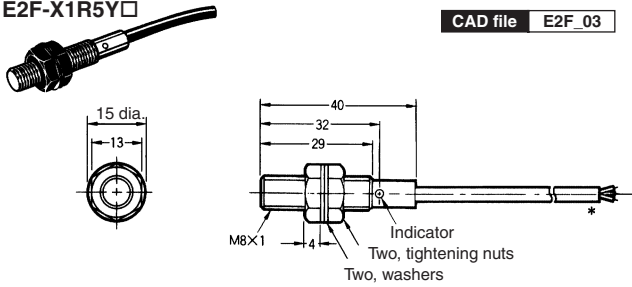
Connection

Model	Connection type	Method	Description
AC 2-wire	AND (serial connection)	<p style="text-align: center;">Incorrect</p>  <p style="text-align: center;">Correct</p>  	<p>If 100 or 200 VAC is imposed on the Proximity Sensors, V_L (i.e., the voltage imposed on the load) will be obtained from the following.</p> $V_L = V_S - (\text{residual voltage} \times \text{No. of Proximity Sensors}) (V)$ <p>Therefore, if V_L is lower than the load operating voltage, the load will not operate.</p> <p>A maximum of three Proximity Sensors can be connected in series provided that the supply voltage is 100 V minimum.</p>
	OR (parallel connection)	<p style="text-align: center;">Incorrect</p>  <p style="text-align: center;">Correct</p> 	<p>In principle, more than two Proximity Sensors cannot be connected in parallel.</p> <p>Provided that Proximity Sensor A does not operate with Proximity Sensor B simultaneously and there is no need to keep the load operating continuously, the Proximity Sensors can be connected in parallel. In this case, however, due to the total leakage current of the Proximity Sensors, the load may not reset properly.</p> <p>It is not possible to keep the load operating continuously with Proximity Sensors A and B in simultaneous operation to sense sensing objects due to the following reason.</p> <p>When Proximity Sensor A is ON, the voltage imposed on Proximity Sensor A will drop to approximately 10 V and the load current flows into Proximity Sensor A, and when one of the sensing objects is close to Proximity Sensor B, Proximity Sensor B will not operate because the voltage imposed on Proximity Sensor B is 10 V, which is too low. When Proximity Sensor A is OFF, the voltage imposed on Proximity Sensor B will reach the supply voltage and Proximity Sensor B will be ON. Then, Proximity Sensor A as well as Proximity Sensor B will be OFF for approximately 10 ms, which resets the load for an instant. To prevent the instantaneous resetting of the load, use a relay as shown on the left.</p>

Dimensions

E2F-X1R5Y□

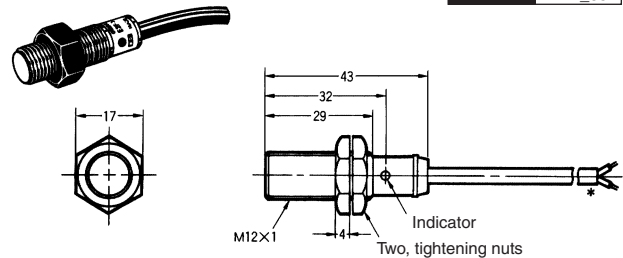
CAD file E2F_03



Note:
Vinyl-insulated round cord, 3.5 dia.,
3 cores (0.12 dia. x 13); Standard length: 2 m

E2F-X2Y□

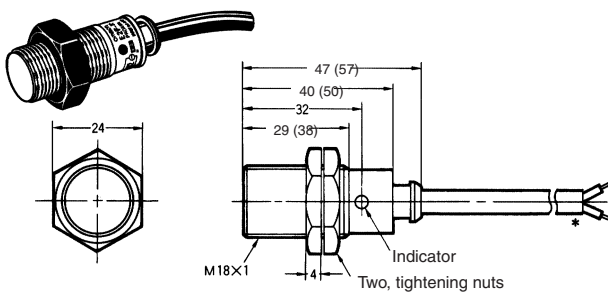
CAD file E2F_05



Note:
Oil-and vibration-resistant,
vinyl-insulated round cord, 6 dia.,
0.5 dia. x 2 cores; Standard length: 2 m
The cord can be extended up to 200 m
in an independent metal conduit.

E2F-X5Y□

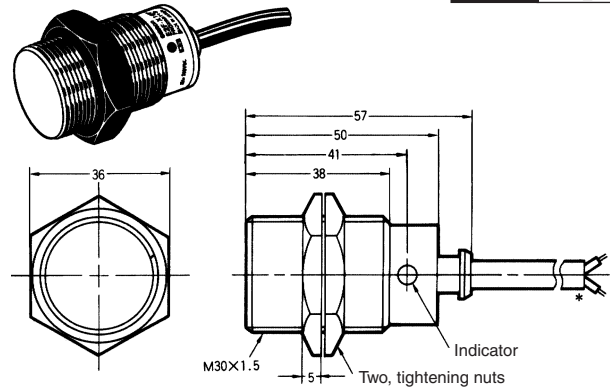
CAD file E2F_06



Note:
Oil-and vibration-resistant,
vinyl-insulated round cord, 6 dia.,
0.5 dia. x 2 cores; Standard length: 2 m
The cord can be extended up to 200 m
in an independent metal conduit.

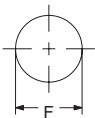
E2F-X10Y□

CAD file E2F_01



Note:
Oil-and vibration-resistant,
vinyl-insulated round cord, 6 dia.,
0.5 dia. x 2 cores; Standard length: 2 m
The cord can be extended up to 200 m
in an independent metal conduit.

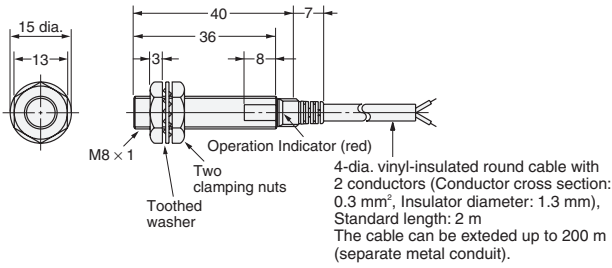
Mounting Hole Dimension



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.

Pre-wired Models (Shielded)

Fig. 1 : E2E-X1R5Y□



Pre-wired Models (Unshielded)

Fig. 2 : E2E-X2MY□

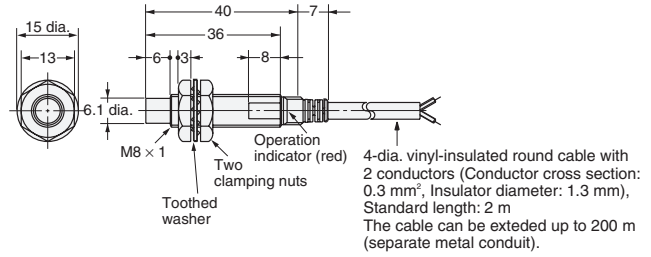


Fig. 3 : E2E-X2Y□

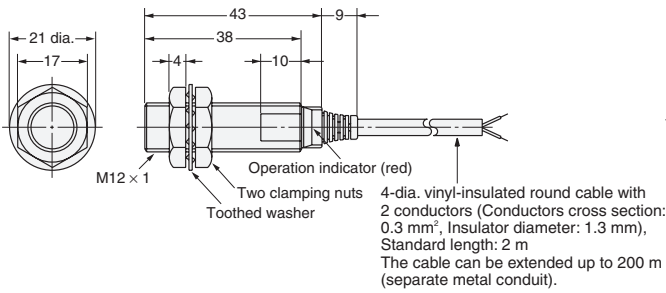


Fig. 4 : E2E-X5MY□

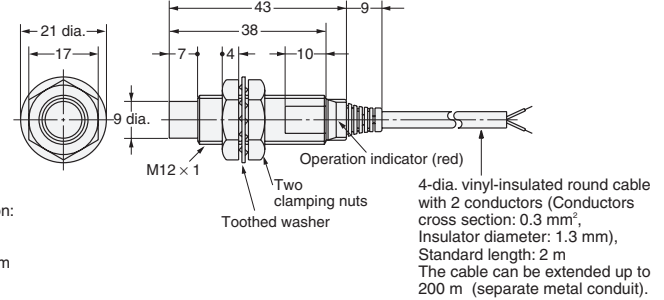
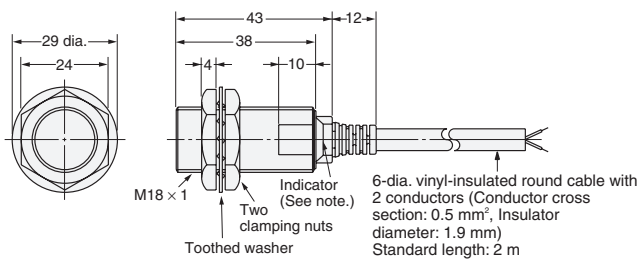
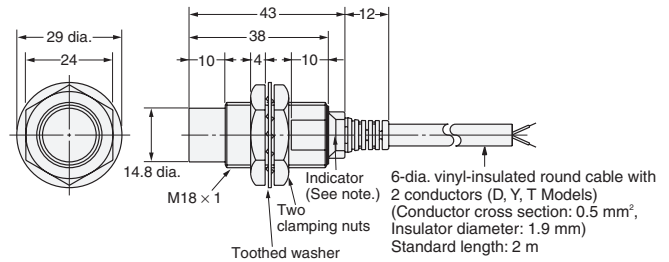


Fig. 5 : E2E-X5Y□



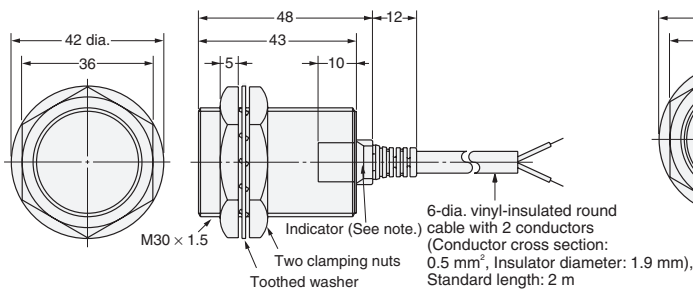
Note: Operation indicator (red)

Fig. 6 : E2E-X10MY□



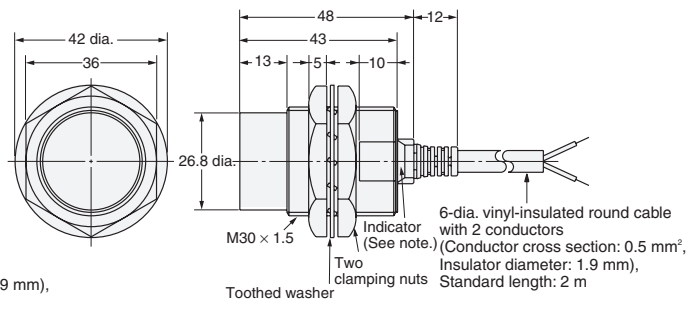
Note: Operation indicator (red)

Fig. 7 : E2E-X10Y□



Note: Operation indicator (red)

Fig. 8 : E2E-X18MY□



Note: Operation indicator (red)

Fig. 9 : E2E-X2Y□-M1

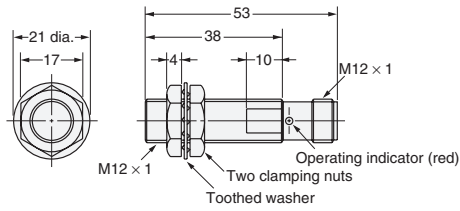


Fig. 10 : E2E-X5MY□-M1

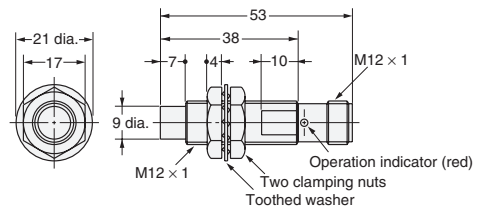


Fig. 11 : E2E-X5Y□-M1

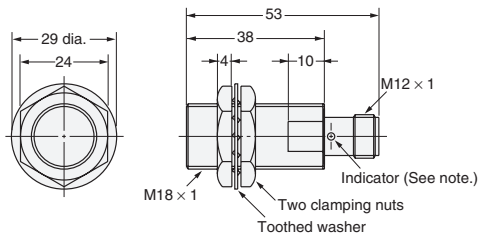
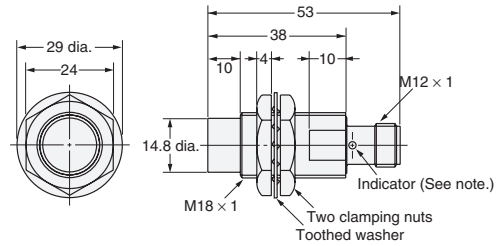


Fig. 12 : E2E-X10MY□-M1



Note: Operation indicator (red)

Note: Operation indicator (red)

Fig. 13 : E2E-X10Y□-M1

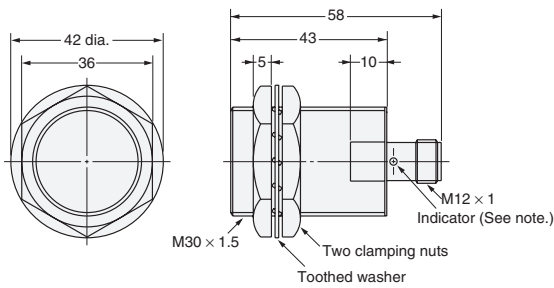
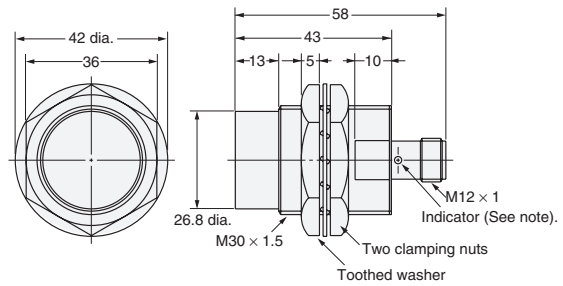


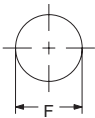
Fig. 14 : E2E-X18MY□-M1



Note: Operation indicator (red)

Note: Operation indicator (red)

Mounting Hole Dimension



Dimensions	M8	M12	M18	M30
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.

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