

## Proximity Sensor with a Long Screw Length

- Increased tightening strength. Cable protectors provided as a standard feature.
- Increased indicator visibility. A milled section for wrench grip on all models.



 Be sure to read *Safety Precautions* on page 9.

## Ordering Information

### Sensors

#### DC 2-Wire Models

Appearance	Sensing distance	Model		
		Operation mode		
		NO	NC	
	M12	3 mm	E2E2-X3D1 2M *	E2E2-X3D2 2M
	M18	7 mm	E2E2-X7D1 2M *	E2E2-X7D2 2M
	M30	10 mm	E2E2-X10D1 2M *	E2E2-X10D2 2M
	M12	8 mm	E2E2-X8MD1 2M *	E2E2-X8MD2 2M
	M18	14 mm	E2E2-X14MD1 2M *	E2E2-X14MD2 2M
	M30	20 mm	E2E2-X20MD1 2M *	E2E2-X20MD2 2M

\* Models with different frequencies are also available. The model numbers are E2E2-X□D□ (example: E2E2-X3D15).

#### DC 3-Wire Models

Appearance	Sensing distance	Model		
		Operation mode		
		NO	NC	
	M12	2 mm	E2E2-X2C1 2M	E2E2-X2C2 2M
	M18	5 mm	E2E2-X5C1 2M	E2E2-X5C2 2M
	M30	10 mm	E2E2-X10C1 2M	E2E2-X10C2 2M
	M12	5 mm	E2E2-X5MC1 2M	E2E2-X5MC2 2M
	M18	10 mm	E2E2-X10MC1 2M	E2E2-X10MC2 2M
	M30	18 mm	E2E2-X18MC1 2M	E2E2-X18MC2 2M

#### AC 2-Wire Models

Appearance	Sensing distance	Model		
		Operation mode		
		NO	NC	
	M12	2 mm	E2E2-X2Y1 2M	E2E2-X2Y2 2M
	M18	5 mm	E2E2-X5Y1 2M	E2E2-X5Y2 2M
	M30	10 mm	E2E2-X10Y1 2M	E2E2-X10Y2 2M
	M12	5 mm	E2E2-X5MY1 2M	E2E2-X5MY2 2M
	M18	10 mm	E2E2-X10MY1 2M	E2E2-X10MY2 2M
	M30	18 mm	E2E2-X18MY1 2M	E2E2-X18MY2 2M

**Accessories (Order Separately)**

- Mounting Brackets
- Protective Covers
- Sputter Protective Covers

**Ratings and Specifications**

**E2E2-X□D□ DC 2-Wire Models**

Item	Size Shielding Model	M12		M18		M30	
		Shielded	Unshielded	Shielded	Unshielded	Shielded	Unshielded
		E2E2-X3D□	E2E2-X8MD□	E2E2-X7D□	E2E2-X14MD□	E2E2-X10D□	E2E2-X20MD□
Sensing distance		3 mm±10%	8 mm±10%	7 mm±10%	14 mm±10%	10 mm±10%	20 mm±10%
Set distance *1		0 to 2.4 mm	0 to 6.4 mm	0 to 5.6 mm	0 to 11.2 mm	0 to 8 mm	0 to 16 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> on page 5.)					
Standard sensing object		Iron, 12 × 12 × 1 mm	Iron, 30 × 30 × 1 mm	Iron, 18 × 18 × 1 mm	Iron, 30 × 30 × 1 mm	Iron, 30 × 30 × 1 mm	Iron, 54 × 54 × 1 mm
Response frequency *2		1 kHz	800 Hz	500 Hz	400 Hz		100 Hz
Power supply voltage (operating voltage range)		12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max.					
Leakage current		0.8 mA max.					
Control output	Switching capacity	3 to 100 mA					
	Residual voltage	3 V max. (Load current: 100 mA, Cable length: 2 m)					
Indicators		D1 Models: Operation indicator (red) and setting indicator (green) D2 Models: Operation indicator (red)					
Operation mode (with sensing object approaching)		D1 Models: NO Refer to the timing charts under <i>I/O Circuit Diagrams</i> on page 8 for details. D2 Models: NC					
Protection circuits		Surge absorber, Load short-circuit protection					
Ambient temperature		Operating/Storage: -25 to 70°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 to 70°C					
Voltage influence		±1% max. of sensing distance at rated voltage in the rated voltage ±15% range					
Insulation resistance		50 MΩ min. (at 500 VDC) between current-carrying parts and case					
Dielectric strength		1000 VAC, 50/60 Hz for 1 minute 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 <sup>2</sup> 10 times each in X, Y, and Z directions					
Degree of protection		IEC IP67, in-house standard for oil resistance					
Connection method		Pre-wired Models (Standard cable length: 2 m)					
Weight (packed state)		Approx. 65 g		Approx. 150 g		Approx. 210 g	
Materials	Case	Brass					
	Sensing surface	PBT					
	Clamping nuts	Nickel-plated brass					
	Toothed washer	Zinc-plated iron					
Accessories		Instruction sheet					

\*1. Use the E2E2 within the range in which the setting indicator (green LED) is ON (except D2 Models).

\*2. 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.

## E2E2-X□C□ DC 3-Wire Models

Item	Size Shielding Model	M12		M18		M30	
		Shielded	Unshielded	Shielded	Unshielded	Shielded	Unshielded
		E2E2-X2C□	E2E2-X5MC□	E2E2-X5C□	E2E2-X10MC□	E2E2-X10C□	E2E2-X18MC□
<b>Sensing distance</b>		2 mm±10%	5 mm±10%	5 mm±10%	10 mm±10%	10 mm±10%	18 mm±10%
<b>Set distance</b>		0 to 1.6 mm	0 to 4 mm	0 to 4 mm	0 to 8 mm	0 to 8 mm	0 to 14 mm
<b>Differential travel</b>		10% max. of sensing distance					
<b>Sensing object</b>		Ferrous metal (The sensing distance decreases with non-ferrous metal. Refer to <i>Engineering Data</i> on page 5.)					
<b>Standard sensing object</b>		Iron, 12 × 12 × 1 mm	Iron, 15 × 15 × 1 mm	Iron, 18 × 18 × 1 mm	Iron, 30 × 30 × 1 mm	Iron, 30 × 30 × 1 mm	Iron, 54 × 54 × 1 mm
<b>Response frequency *1</b>		1.5 kHz	400 Hz	600 Hz	200 Hz	400 Hz	100 Hz
<b>Power supply voltage (operating voltage range) *2</b>		12 to 24 VDC (10 to 55 VDC), ripple (p-p): 10% max.					
<b>Leakage current</b>		13 mA max.					
<b>Control output</b>	<b>Load current</b>	NPN open-collector output, 200 mA max. (55 VDC max.)					
	<b>Residual voltage</b>	2 V max. (Load current: 200 mA, Cable length: 2 m)					
<b>Indicators</b>		Operation indicator (red)					
<b>Operation mode (with sensing object approaching)</b>		C1 Models: NO    Refer to the timing charts under <i>I/O Circuit Diagrams</i> on page 8 for details. C2 Models: NC					
<b>Protection circuits</b>		Reverse polarity protection, Surge absorber, Load short-circuit protection					
<b>Ambient temperature</b>		Operating/Storage: -40 to 85°C (with no icing or condensation)					
<b>Ambient humidity</b>		Operating/Storage: 35% to 95% (with no condensation)					
<b>Temperature influence</b>		±15% max. of sensing distance at 23°C in the temperature range of -40 to 85°C ±10% max. of sensing distance at 23°C in the temperature range of -25 to 70°C					
<b>Voltage influence</b>		±1% max. of sensing distance at rated voltage in the rated voltage ±15% range					
<b>Insulation resistance</b>		50 MΩ min. (at 500 VDC) between current-carrying parts and case					
<b>Dielectric strength</b>		1,000 VAC, 50/60 Hz for 1 minute between current carry parts and case					
<b>Vibration resistance (destruction)</b>		10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions					
<b>Shock resistance (destruction)</b>		1,000 m/s <sup>2</sup> 10 times each in X, Y, and Z directions					
<b>Degree of protection</b>		IEC IP67, in-house standard for oil resistance					
<b>Connection method</b>		Pre-wired Models (Standard cable length: 2 m) and Connector Models					
<b>Weight (packed state)</b>		Approx. 75 g		Approx. 160 g		Approx. 220 g	
<b>Materials</b>	<b>Case</b>	Brass					
	<b>Sensing surface</b>	PBT					
	<b>Clamping nuts</b>	Nickel-plated brass					
	<b>Toothed washer</b>	Zinc-plated iron					
<b>Accessories</b>		Instruction sheet					

\*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. A full-wave rectification power supply of 24 VDC ±20% (average value) can be used.

E2E2-X□Y□ AC 2-Wire Models

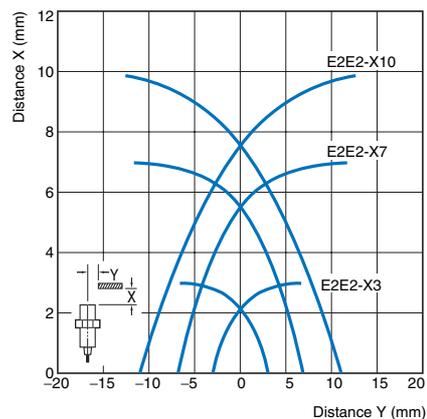
Item	Size Shielding Model	M12		M18		M30	
		Shielded	Unshielded	Shielded	Unshielded	Shielded	Unshielded
		E2E2-X2Y□	E2E2-X5MY□	E2E2-X5Y□	E2E2-X10MY□	E2E2-X10Y□	E2E2-X18MY□
Sensing distance		2 mm±10%	5 mm±10%	5 mm±10%	10 mm±10%	10 mm±10%	18 mm±10%
Set distance		0 to 1.6 mm	0 to 4 mm	0 to 4 mm	0 to 8 mm	0 to 8 mm	0 to 14 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> on page 5.)					
Standard sensing object		Iron, 12 × 12 × 1 mm	Iron, 15 × 15 × 1 mm	Iron, 18 × 18 × 1 mm	Iron, 30 × 30 × 1 mm	Iron, 30 × 30 × 1 mm	Iron, 54 × 54 × 1 mm
Response frequency		25 Hz					
Power supply voltage (operating voltage range) *1		24 to 240 VAC (20 to 264 VAC), 50/60 Hz					
Leakage current		1.7 mA max.					
Control output	Load current *2	5 to 200 mA		5 to 300 mA			
	Residual voltage	Refer to <i>Engineering Data</i> on page 5.					
Indicators		Operation indicator (red)					
Operation mode (with sensing object approaching)		Y1 Models: NO    Y2 Models: NC    Refer to the timing charts under <i>I/O Circuit Diagrams</i> on page 8 for details.					
Ambient temperature *1, 2		Operating/Storage: -40 to 85°C (with no icing or condensation)					
Ambient humidity		Operating/Storage: 35% to 95% (with no condensation)					
Temperature influence		±15% max. of sensing distance at 23°C in the temperature range of -40 to 85°C, ±10% max. of sensing distance at 23°C in the temperature range of -25 to 70°C					
Voltage influence		±1% max. of sensing distance at rated voltage in the rated voltage ±15% range					
Insulation resistance		50 MΩ min. (at 500 VDC) between current-carrying parts and case					
Dielectric strength		4,000 VAC, 50/60 Hz for 1 minute between current carry 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 <sup>2</sup> 10 times each in X, Y, and Z directions					
Degree of protection		IEC IP67, in-house standard for oil resistance					
Connection method		Pre-wired Models (Standard cable length: 2 m) and Connector Models					
Weight (packed state)		Approx. 65 g		Approx. 150 g		Approx. 210 g	
Materials	Case	Brass					
	Sensing surface	PBT					
	Clamping nuts	Nickel-plated brass					
	Toothed washer	Zinc-plated iron					
Accessories		Instruction sheet					

\*1. When supplying 24 VAC to any of the above models, make sure that the operating ambient temperature range is at least -25°C to 85°C.

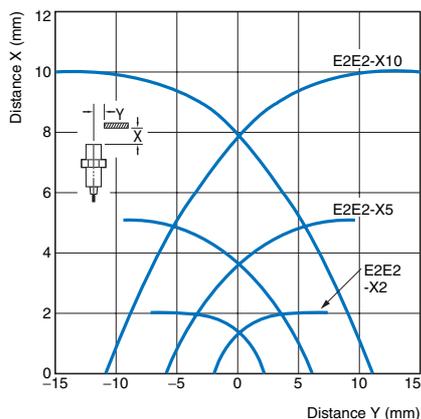
\*2. When using an M18 or M30 Connector Model at an ambient temperature between 70 and 85°C, make sure that the Sensor has a control output (load current) of 5 to 200 mA max.

## Engineering Data (Typical)

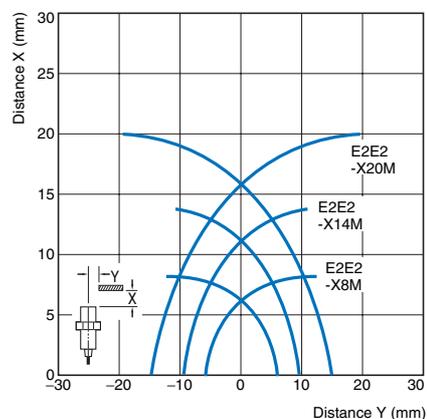
### Sensing Area Shielded Models E2E2-X□D□



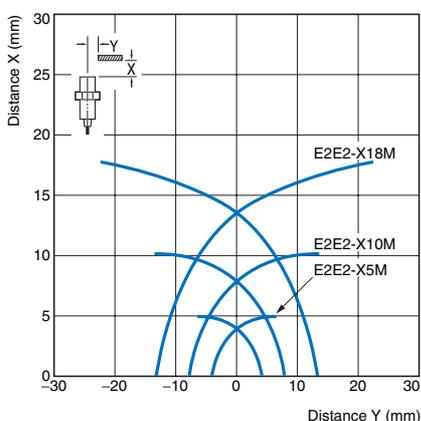
### E2E2-X□C□/-X□Y□



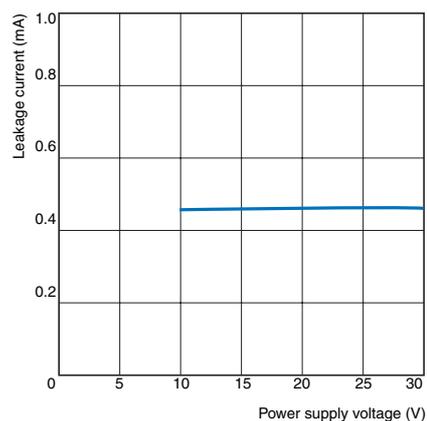
### Unshielded Models E2E2-X□MD□



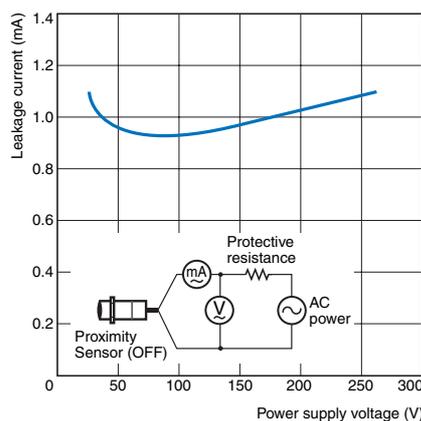
### E2E2-X□MC□/-X□MY□



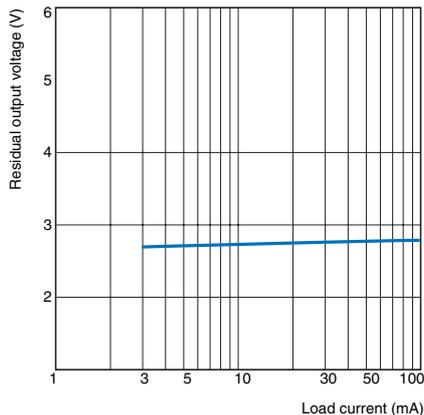
### Leakage Current E2E2-X□D□



### E2E2-X□Y□

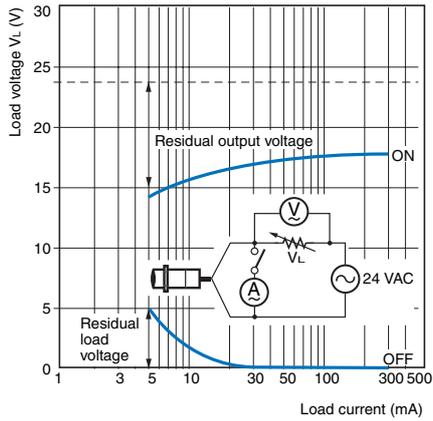


### Residual Output Voltage E2E2-X□D□



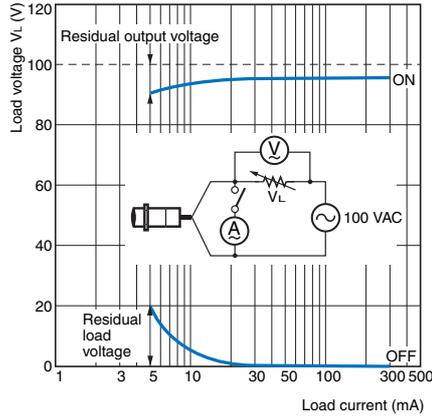
E2E2-X□Y□

at 24 VAC



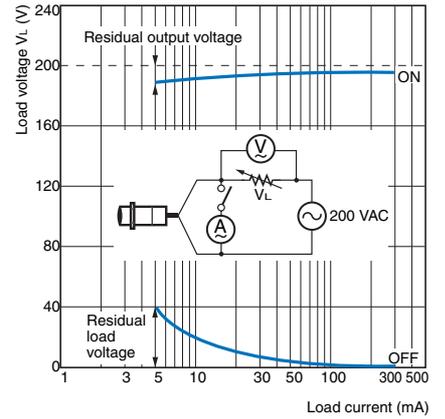
E2E2-X□Y□

at 100 VAC



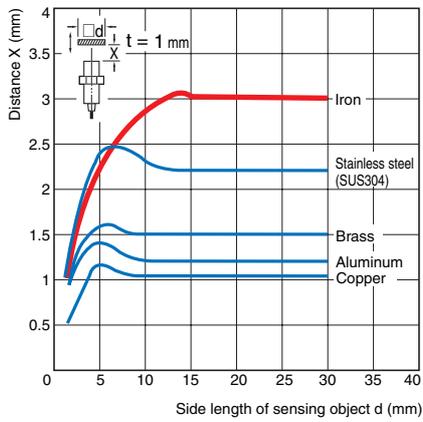
E2E2-X□Y□

at 200 VAC

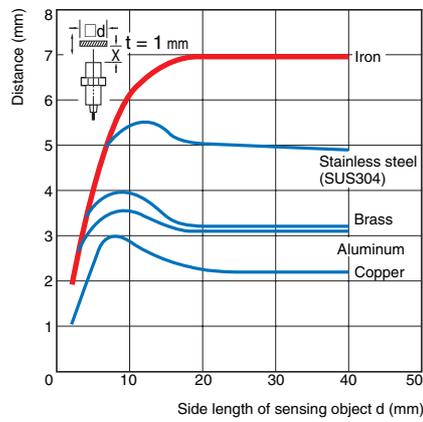


**Influence of Sensing Object Size and Material**

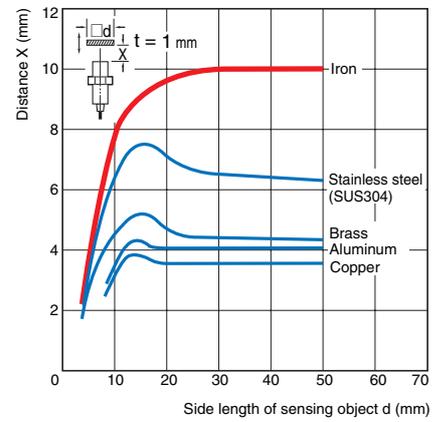
E2E2-X3D□



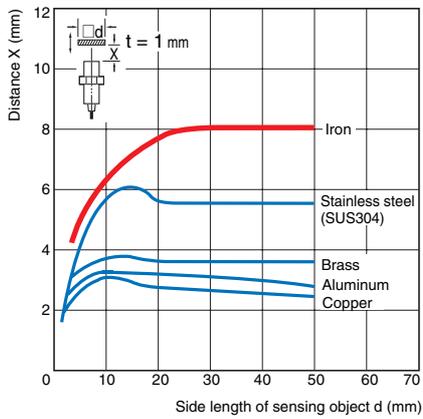
E2E2-X7D□



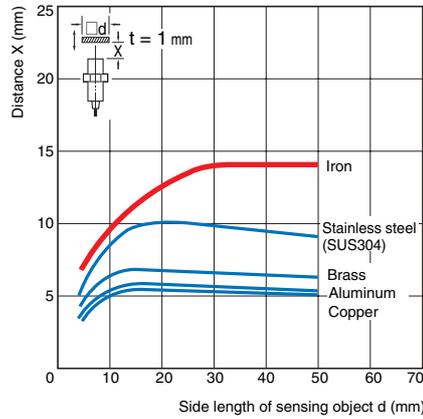
E2E2-X10D□



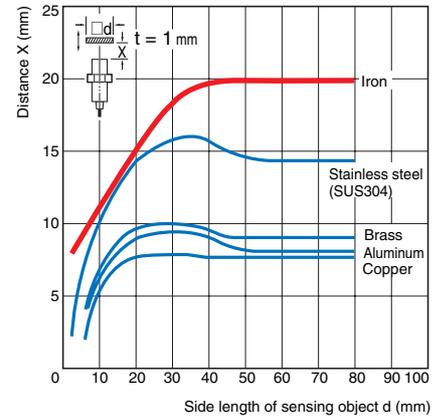
E2E2-X8MD□



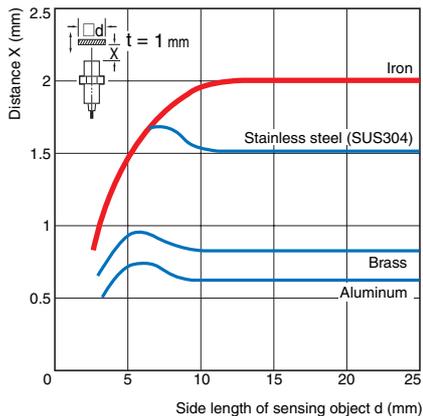
E2E2-X14MD□



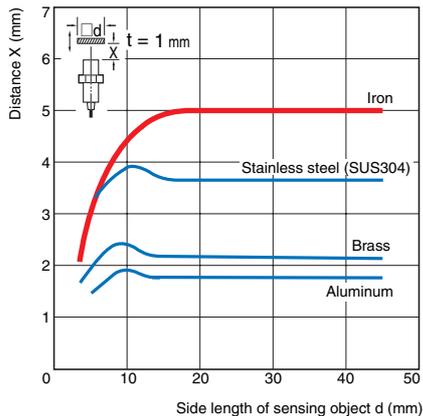
E2E2-X20MD□



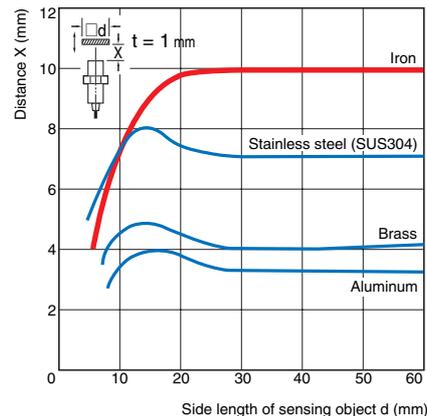
**E2E2-X2C□/-X2Y□**



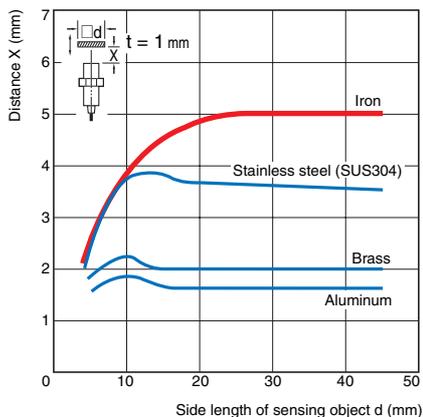
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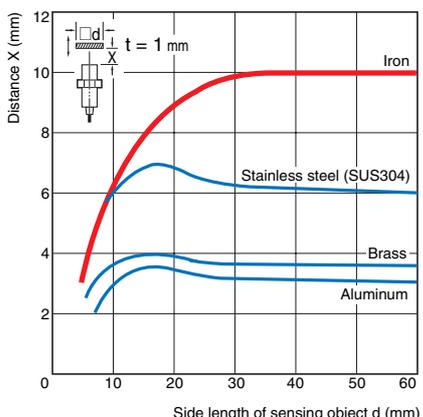
**E2E2-X10C□/-X10Y□**



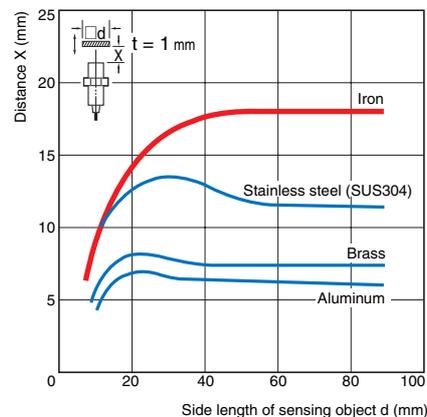
**E2E2-X5MC□/-X5MY□**



**E2E2-X10MC□/-X10MY□**



**E2E2-X18MC□/-X18MY□**



I/O Circuit Diagrams

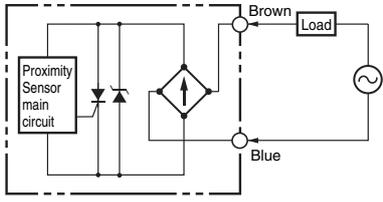
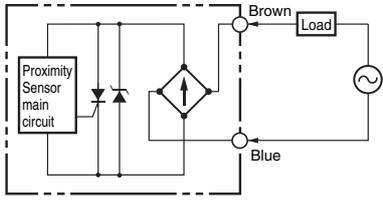
DC 2-Wire Models

Operation mode	Model	Timing Charts	Output circuit
NO	E2E2-X3D1 E2E2-X7D1 E2E2-X10D1 E2E2-X8MD1 E2E2-X14MD1 E2E2-X20MD1		<p>Note: The load can be connected to either the +V or 0 V side.</p>
NC	E2E2-X3D2 E2E2-X7D2 E2E2-X10D2 E2E2-X8MD2 E2E2-X14MD2 E2E2-X20MD2		

DC 3-Wire Models

Operation mode	Model	Timing Charts	Output circuit
NO	E2E2-X2C1 E2E2-X5C1 E2E2-X10C1 E2E2-X5MC1 E2E2-X10MC1 E2E2-X18MC1		
NC	E2E2-X2C2 E2E2-X5C2 E2E2-X10C2 E2E2-X5MC2 E2E2-X10MC2 E2E2-X18MC2		

AC 2-Wire Models

Operation mode	Model	Timing Charts	Output circuit
NO	E2E2-X2Y1	<p>Sensing object Present </p> <p>Sensing object Not present </p> <p>Operation indicator (red) ON </p> <p>Operation indicator (red) OFF </p> <p>Control output ON </p> <p>Control output OFF </p>	
	E2E2-X5Y1		
	E2E2-X10Y1		
	E2E2-X5MY1		
	E2E2-X10MY1		
NC	E2E2-X2Y2	<p>Sensing object Present </p> <p>Sensing object Not present </p> <p>Operation indicator (red) ON </p> <p>Operation indicator (red) OFF </p> <p>Control output ON </p> <p>Control output OFF </p>	
	E2E2-X5Y2		
	E2E2-X10Y2		
	E2E2-X5MY2		
	E2E2-X10MY2		

Safety Precautions

**WARNING**

This product is not designed or rated for ensuring safety of persons either directly or indirectly.



Do not use it for such purposes.

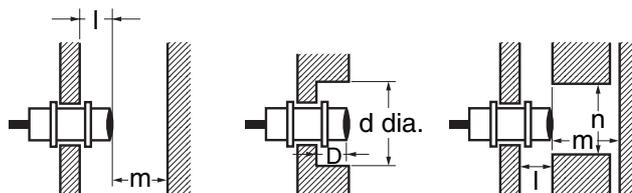
**Precautions for Correct Use**

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.

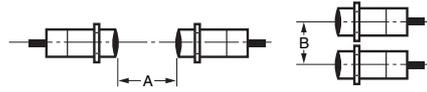


(Unit: mm)

Model	Item	M12	M18	M30	
DC 2-Wire Models E2E2-X□D□	Shielded	l	0	0	0
		d	12	18	30
		D	0	0	0
		m	8	20	40
		n	18	27	45
	Unshielded	l	15	22	30
		d	40	70	90
		D	15	22	30
		m	20	40	70
		n	40	70	90
DC 3-Wire Models E2E2-X□C□ AC 2-Wire Models E2E2-X□Y□	Shielded	l	0	0	0
		d	12	18	30
		D	0	0	0
		m	8	20	40
		n	18	27	45
	Unshielded	l	15	22	30
		d	40	55	90
		D	15	22	30
		m	20	40	70
		n	36	54	90

**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	M12	M18	M30	
DC 2-Wire Models E2E2-X□D□	Shielded	A	30 (20)	50 (30)	100 (50)
		B	20 (12)	35 (18)	70 (35)
	Unshielded	A	120 (60)	200 (100)	300 (100)
		B	100 (50)	110 (60)	200 (100)
DC 3-Wire Models E2E2-X□C□	Shielded	A	30	50	100
		B	20	35	70
AC 2-Wire Models E2E2-X□Y□	Unshielded	A	120	200	300
		B	100	110	200

Note: Values in parentheses apply to Sensors operating at different frequencies.

● **Mounting**

**Tightening Torque**

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

The following strengths assume washers are being used.



Model	Torque
M12	30 N·m
M18	70 N·m
M30	180 N·m

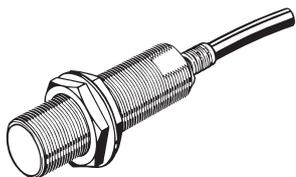
**Relationship between Sizes and Models**

Size	Model	
M12	Shielded	E2E2-X3D□ E2E2-X2C□ E2E2-X2Y□
	Unshielded	E2E2-X8MD□ E2E2-X5MC□ E2E2-X5MY□
	M18	Shielded
Unshielded		E2E2-X14MD□ E2E2-X10MC□ E2E2-X10MY□
M30		Shielded
	Unshielded	E2E2-X20MD□ E2E2-X18MC□ E2E2-X18MY□

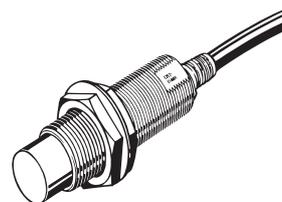
## Dimensions

Unless otherwise specified, the tolerance class IT16 is used for dimensions in this data sheet.

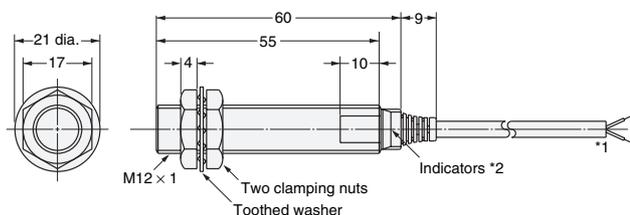
### Shielded



### Unshielded

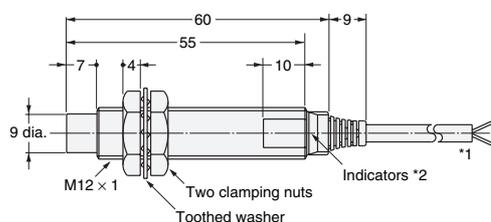


#### E2E2-X3D□/E2E2-X2C□/E2E2-X2Y□



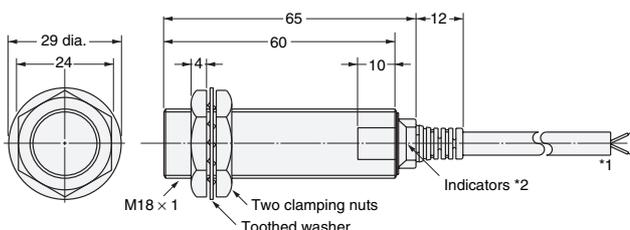
- \*1. 4-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.3 mm<sup>2</sup>, Insulator diameter: 1.3 mm), Standard length: 2 m
- 4-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.3 mm<sup>2</sup>, Insulator diameter: 1.3 mm), Standard length: 2 m
- The cable can be extended to up to 200 m (Separate metal conduit.)
- \*2. D Models: Operation indicator (red) and setting indicator (green), C/Y Models: Operation indicator (red)

#### E2E2-X8MD□/E2E2-X5MC□/E2E2-X5MY□



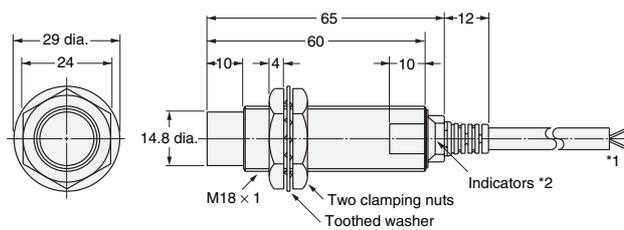
- \*1. 4-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.3 mm<sup>2</sup>, Insulator diameter: 1.3 mm), Standard length: 2 m
- 4-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.3 mm<sup>2</sup>, Insulator diameter: 1.3 mm), Standard length: 2 m
- The cable can be extended to up to 200 m (Separate metal conduit.)
- \*2. D Models: Operation indicator (red) and setting indicator (green), C/Y Models: Operation indicator (red)

#### E2E2-X7D□/E2E2-X5C□/E2E2-X5Y□



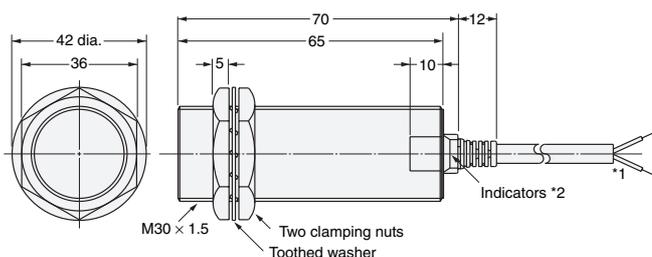
- \*1. 6-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.5 mm<sup>2</sup>, Insulator diameter: 1.9 mm), Standard length: 2 m
- 6-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.5 mm<sup>2</sup>, Insulator diameter: 1.9 mm), Standard length: 2 m
- The cable can be extended to up to 200 m (Separate metal conduit.)
- \*2. D Models: Operation indicator (red) and setting indicator (green), C/Y Models: Operation indicator (red)

#### E2E2-X14MD□/E2E2-X10MC□/E2E2-X10MY□



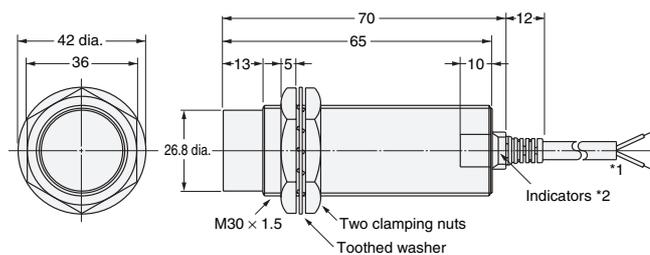
- \*1. 6-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.5 mm<sup>2</sup>, Insulator diameter: 1.9 mm), Standard length: 2 m
- 6-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.5 mm<sup>2</sup>, Insulator diameter: 1.9 mm), Standard length: 2 m
- The cable can be extended to up to 200 m (Separate metal conduit.)
- \*2. D Models: Operation indicator (red) and setting indicator (green), C/Y Models: Operation indicator (red)

#### E2E2-X10D□/E2E2-X10C□/E2E2-X10Y□



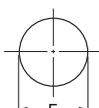
- \*1. 6-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.5 mm<sup>2</sup>, Insulator diameter: 1.9 mm), Standard length: 2 m
- 6-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.5 mm<sup>2</sup>, Insulator diameter: 1.9 mm), Standard length: 2 m
- The cable can be extended to up to 200 m (Separate metal conduit.)
- \*2. D Models: Operation indicator (red) and setting indicator (green), C/Y Models: Operation indicator (red)

#### E2E2-X20MD□/E2E2-X18MC□/E2E2-X18MY□



- \*1. 6-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.5 mm<sup>2</sup>, Insulator diameter: 1.9 mm), Standard length: 2 m
- 6-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.5 mm<sup>2</sup>, Insulator diameter: 1.9 mm), Standard length: 2 m
- The cable can be extended to up to 200 m (Separate metal conduit.)
- \*2. D Models: Operation indicator (red) and setting indicator (green), C/Y Models: Operation indicator (red)

### Mounting Hole Dimensions



Dimension	M12	M18	M30
F (mm)	12.5 <sup>+0.5</sup> <sub>0</sub> dia.	18.5 <sup>+0.5</sup> <sub>0</sub> dia.	30.5 <sup>+0.5</sup> <sub>0</sub> dia.

- Note 1. Two clamping nuts and one toothed washer are provided with each Sensors.  
 2. The model number is laser-marked on the cable section and milled section.

In the interest of product improvement, specifications are subject to change without notice.

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2009.1

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