

# OMRON ELECTRONICS

E2E2-X5M41-M4

*See full Datasheet below...*

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# Cylindrical Inductive Proximity Sensor

## E2E2

Long Barrel Metal Body Inductive Proximity Sensors in a Wide Range of Configurations

- Available in prewired or quick-disconnect versions
- Quick-disconnect versions feature metal connectors for durability
- Easy-to-see LED indicator
- Flats for wrench tightening
- Ideal for a wide variety of applications



## Ordering Information

### ■ SENSORS

#### DC 2-wire Models

Type	Size	Sensing Distance	Output Configuration	Part Number
Shielded	M12	3 mm	NO (see note)	E2E2-X3D1
			NC	E2E2-X3D2
	M18	7 mm	NO (see note)	E2E2-X7D1
			NC	E2E2-X7D2
	M30	10 mm	NO (see note)	E2E2-X10D1
			NC	E2E2-X10D2
Unshielded	M12	8 mm	NO (see note)	E2E2-X8MD1
			NC	E2E2-X8MD2
	M18	14 mm	NO (see note)	E2E2-X14MD1
			NC	E2E2-X14MD2
	M30	20 mm	NO (see note)	E2E2-X20MD1
			NC	E2E2-X20MD2

Note: A different oscillating frequency is available to reduce mutual interference and allow closer mounting. Add a "5" to the part number (e.g., E2E2-X3D15). Consult OMRON for availability.

**DC 3-wire/Pre-wired Models**

Type	Size	Sensing Distance	Output Configuration	Part Number
Shielded	M12	2 mm	NPN NO	E2E2-X2C1
			NPN NC	E2E2-X2C2
			PNP NO	E2E2-X2B1
			PNP NC	E2E2-X2B2
	M18	5 mm	NPN NO	E2E2-X5C1
			NPN NC	E2E2-X5C2
			PNP NO	E2E2-X5B1
			PNP NC	E2E2-X5B2
	M30	10 mm	NPN NO	E2E2-X10C1
			NPN NC	E2E2-X10C2
			PNP NO	E2E2-X10B1
			PNP NC	E2E2-X10B2
Unshielded	M12	5 mm	NPN NO	E2E2-X5MC1
			NPN NC	E2E2-X5MC2
			PNP NO	E2E2-X5MB1
			PNP NC	E2E2-X5MB2
	M18	10 mm	NPN NO	E2E2-X10MC1
			NPN NC	E2E2-X10MC2
			PNP NO	E2E2-X10MB1
			PNP NC	E2E2-X10MB2
	M30	18 mm	NPN NO	E2E2-X18MC1
			NPN NC	E2E2-X18MC2
			PNP NO	E2E2-X18MB1
			PNP NC	E2E2-X18MB2

**DC 3-wire/Connector Models**

Type	Size	Sensing Distance	Output Configuration	Part Number
Shielded	M12	2 mm	NPN NO	E2E2-X2C1-M1
			NPN NC	E2E2-X2C2-M1
			PNP NO	E2E2-X2B1-M1
			PNP NC	E2E2-X2B2-M1
	M18	5 mm	NPN NO	E2E2-X5C1-M1
			NPN NC	E2E2-X5C2-M1
			PNP NO	E2E2-X5B1-M1
			PNP NC	E2E2-X5B2-M1
	M30	10 mm	NPN NO	E2E2-X10C1-M1
			NPN NC	E2E2-X10C2-M1
			PNP NO	E2E2-X10B1-M1
			PNP NC	E2E2-X10B2-M1
Unshielded	M12	5 mm	NPN NO	E2E2-X5MC1-M1
			NPN NC	E2E2-X5MC2-M1
			PNP NO	E2E2-X5MB1-M1
			PNP NC	E2E2-X5MB2-M1
	M18	10 mm	NPN NO	E2E2-X10MC1-M1
			NPN NC	E2E2-X10MC2-M1
			PNP NO	E2E2-X10MB1-M1
			PNP NC	E2E2-X10MB2-M1
	M30	18 mm	NPN NO	E2E2-X18MC1-M1
			NPN NC	E2E2-X18MC2-M1
			PNP NO	E2E2-X18MB1-M1
			PNP NC	E2E2-X18MB2-M1

Note: Connector cordsets: Use OMRON Y96E-44□□ or equivalent.

**AC 2-wire/Pre-wired Models**

Type	Size	Sensing Distance	Output Configuration	Part Number
Shielded	M12	2 mm	NO	E2E2-X2Y1-US
			NC	E2E2-X2Y2-US
	M18	5 mm	NO	E2E2-X5Y1-US
			NC	E2E2-X5Y2-US
	M30	10 mm	NO	E2E2-X10Y1-US
			NC	E2E2-X10Y2-US
Unshielded	M12	5 mm	NO	E2E2-X5MY1-US
			NC	E2E2-X5MY2-US
	M18	10 mm	NO	E2E2-X10MY1-US
			NC	E2E2-X10MY2-US
	M30	18 mm	NO	E2E2-X18MY1-US
			NC	E2E2-X18MY2-US

**AC 2-wire/Connector Models**

Type	Size	Sensing Distance	Output Configuration	Part Number
Shielded	M12	2 mm	NO	E2E2-X2Y1-M4
			NC	E2E2-X2Y2-M4
	M18	5 mm	NO	E2E2-X5Y1-M4
			NC	E2E2-X5Y2-M4
	M30	10 mm	NO	E2E2-X10Y1-M4
			NC	E2E2-X10Y2-M4
Unshielded	M12	5 mm	NO	E2E2-X5MY1-M4
			NC	E2E2-X5MY2-M4
	M18	10 mm	NO	E2E2-X10MY1-M4
			NC	E2E2-X10MY2-M4
	M30	18 mm	NO	E2E2-X18MY1-M4
			NC	E2E2-X18MY2-M4

Note: Connector cordsets: Use OMRON Y96E-33□A□ or equivalent.

■ **ACCESSORIES**

Description	Part Number
Mounting brackets	Fits M12 size sensors Fits M18 size sensors Fits M30 size sensors Y92E-B12 Y92E-B18 Y92E-B30
Silicone rubber covers for shielded sensors	Fits M12 size sensors Fits M18 size sensors Fits M30 size sensors Y92E-E12-2 Y92E-E18-2 Y92E-E30-2
Connector cordsets	See Y96E Connector Cordsets data sheet for details

■ **REPLACEMENT PARTS**

Description	Part Number
Mounting hardware including one pair of metal nuts and one washer	Fits M12 size sensors Fits M18 size sensors Fits M30 size sensors M12-MHWS M18-MHWS M30-MHWS

E2E2

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E2E2

## Specifications

### E2E2-X□D□ DC 2-wire Models

Part number	E2E2-X3D□	E2E2-X8MD□	E2E2-X7D□	E2E2-X14MD□	E2E2-X10D□	E2E2-X20M□
Size	M12		M18		M30	
Type	Shielded	Unshielded	Shielded	Unshielded	Shielded	Unshielded
Sensing distance	3 mm (0.12 in) ±10%	8 mm (0.31 in) ±10%	7 mm (0.28 in) ±10%	14 mm (0.55) ±10%	10 mm (0.39) ±10%	20 mm (0.79 in) ±10%
Supply voltage (operating voltage range)	12 to 24 VDC, ripple (p-p): 10% max., (10 to 30 VDC)					
Leakage current	0.8 mA max.					
Sensing object	Magnetic metals (refer to <i>Engineering Data</i> for non-magnetic metals)					
Setting distance	0 to 2.4 mm (0 to 0.09 in)	0 to 6.4 mm (0 to 0.25 in)	0 to 5.6 mm (0 to 0.22 in)	0 to 11.2 mm (0 to 0.44 in)	0 to 8.0 mm (0 to 0.31 in)	0 to 16.0 mm (0 to 0.63 in)
Standard object (mild steel)	12 x 12 x 1 mm (0.47 x 0.47 x 0.04 in)	30 x 30 x 1 mm (1.18 x 1.18 x 0.04 in)	18 x 18 x 1 mm (0.71 x 0.71 x 0.04 in)	30 x 30 x 1 mm (1.18 x 1.18 x 0.04 in)	30 x 30 x 1 mm (1.18 x 1.18 x 0.04 in)	54 x 54 x 1 mm (2.13 x 2.13 x 0.04 in)
Differential travel	10% max. of sensing distance					
Response frequency	1.0 kHz	0.8 kHz	0.5 kHz	0.4 kHz	0.4 kHz	0.1 kHz
Operation (with sensing object approaching)	D1 models: Load ON D2 models: Load OFF					
Control output (switching capacity)	3 to 100 mA					
Circuit protection	Surge absorber, load short-circuit protection					
Indicator	D1 models: Operation indicator (red LED), operation set indicator (green LED) D2 models: Operation indicator (red LED)					
Ambient temperature	Operating: -25°C to 70°C with no icing (-13°F to 158°F)					
Ambient humidity	Operating: 35% to 95%					
Temperature influence	±10% max. of sensing distance at 23°C in temperature range of -25°C to 70°C (-13°F to 158°F)					
Voltage influence	±1% max. of sensing distance in rated voltage range ±15%					
Residual voltage	3.0 V max. (under load current of 100 mA with cable length of 2 m)					
Insulation resistance	50 MΩ min. (at 500 VDC) between current carry parts and case					
Dielectric strength	1,000 VAC for 1 min between current carry parts and case					
Vibration resistance	Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 10 times each in X, Y, and Z directions					
Shock resistance	Destruction: 1,000 m/s <sup>2</sup> (approx. 100G) for 10 times each in X, Y, and Z directions					
Enclosure rating	IEC	IP67				
	NEMA	1, 4, 6, 12, 13				
Weight	65 g		150 g		220 g	
Material	Body	Brass				
	Sensing face	PBT				

E2E2

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E2E2

E2E2-X□C□/B□ DC 3-wire Models

Part number	E2E2-X2C□/ B□	E2E2-X5MC□/ B□	E2E2-X5C□/ B□	E2E2-X10MC □/B□	E2E2-X10C□/ B□	E2E2-X18MC □/B□
Size	M12		M18		M30	
Type	Shielded	Unshielded	Shielded	Unshielded	Shielded	Unshielded
Sensing distance	2 mm (0.08 in) ±10%	5 mm (0.20 in) ±10%	5 mm (0.20 in) ±10%	10 mm (0.39 in) ±10%	10 mm (0.39 in) ±10%	18 mm (0.71 in) ±10%
Supply voltage (operating voltage range)	12 to 24 VDC, ripple (p-p): 10% max., (10 to 55 VDC)					
Current consumption	13 mA max.					
Sensing object	Magnetic metals (refer to <i>Engineering Data</i> for non-magnetic metals)					
Setting distance	0 to 1.6 mm (0 to 0.06 in)	0 to 4.0 mm (0 to 0.16 in)	0 to 4.0 mm (0 to 0.16 in)	0 to 8.0 mm (0 to 0.31 in)	0 to 8.0 mm (0 to 0.31 in)	0 to 14.0 mm (0 to 0.55 in)
Standard object (mild steel)	12 x 12 x 1 mm (0.47 x 0.47 x 0.04 in)	15 x 15 x 1 mm (0.59 x 0.59 x 0.04 in)	18 x 18 x 1 mm (0.71 x 0.71 x 0.04 in)	30 x 30 x 1 mm (1.18 x 1.18 x 0.04 in)	30 x 30 x 1 mm (1.18 x 1.18 x 0.04 in)	54 x 54 x 1 mm (2.13 x 2.13 x 0.04 in)
Differential travel	10% max. of sensing distance					
Response frequency	1.5 kHz	0.4 kHz	0.6 kHz	0.2 kHz	0.4 kHz	0.1 kHz
Operation (with sensing object approaching)	B1/C1 models: Load ON B2/C2 models: Load OFF					
Control output (switching capacity)	200 mA max., open collector					
Circuit protection	Reverse connection protection, surge absorber, load short-circuit protection					
Indicator	Operation indicator (red LED)					
Ambient temperature	Operating: -40°C to 85°C with no icing (-40°F to 185°F)					
Ambient humidity	Operating: 35% to 95%					
Temperature influence	±15% max. of sensing distance at 23°C in temperature range of -40°C to 85°C (-40°F to 185°F) ±10% max. of sensing distance at 23°C in temperature range of -25°C to 70°C (-13°F to 158°F)					
Voltage influence	±1% max. of sensing distance in rated voltage range ±15%					
Residual voltage	2.0 V max. (under load current of 200 mA with cable length of 2 m)					
Insulation resistance	50 MΩ min. (at 500 VDC) between current carry parts and case					
Dielectric strength	1,000 VAC for 1 min between current carry parts and case					
Vibration resistance	Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 10 times each in X, Y, and Z directions					
Shock resistance	Destruction: 1,000 m/s <sup>2</sup> (approx. 100G) for 10 times each in X, Y, and Z directions					
Enclosure rating	IEC	IP67				
	NEMA	1, 4, 6, 12, 13				
Weight	65 g		150 g		220 g	
Material	Body	Brass				
	Sensing face	PBT				

**E2E2-X□Y□ AC 2-wire Models**

Part number	E2E2-X2Y□-US	E2E2-X5M□-US	E2E2-X5Y□-US	E2E2-X10MY□-US	E2E2-X10□-US	E2E2-X18MY□-US
Size	M12		M18		M30	
Type	Shielded	Unshielded	Shielded	Unshielded	Shielded	Unshielded
Sensing distance	2 mm (0.08 in) ±10%	5 mm (0.20 in) ±10%	5 mm (0.20 in) ±10%	10 mm (0.39 in) ±10%	10 mm (0.39 in) ±10%	18 mm (0.71 in) ±10%
Supply voltage (operating voltage range) (see note 1)	24 to 240 VAC, 50/60 Hz (20 to 264 VAC)					
Leakage current	1.7 mA max.					
Sensing object	Magnetic metals					
Setting distance	0 to 1.6 mm (0 to 0.06 in)	0 to 4.0 mm (0 to 0.16 in)	0 to 4.0 mm (0 to 0.16 in)	0 to 8.0 mm (0 to 0.31 in)	0 to 8.0 mm (0 to 0.31 in)	0 to 14.0 mm (0 to 0.55 in)
Standard object (mild steel)	12 x 12 x 1 mm (0.47 x 0.47 x 0.04 in)	15 x 15 x 1 mm (0.59 x 0.59 x 0.04 in)	18 x 18 x 1 mm (0.71 x 0.71 x 0.04 in)	30 x 30 x 1 mm (1.18 x 1.18 x 0.04 in)	30 x 30 x 1 mm (1.18 x 1.18 x 0.04 in)	54 x 54 x 1 mm (2.13 x 2.13 x 0.04 in)
Differential travel	10% max. of sensing distance					
Response frequency	25 Hz					
Operation (with sensing object approaching)	Y1 models: Load ON Y2 models: Load OFF					
Control output (switching capacity)	5 to 200 mA		5 to 300 mA (see note 2)			
Indicator	Operation indicator (red LED)					
Ambient temperature	Operating: -40°C to 85°C with no icing (-40°F to 185°F)					
Ambient humidity	Operating: 35% to 95%					
Temperature influence	±15% max. of sensing distance at 23°C in temperature range of -40°C to 85°C (-40°F to 185°F) ±10% max. of sensing distance at 23°C in temperature range of -25°C to 70°C (-13°F to 158°F)					
Voltage influence	±1% max. of sensing distance in rated voltage range ±15%					
Residual voltage	Refer to <i>Engineering Data</i>					
Insulation resistance	50 MΩ min. (at 500 VDC) between current carry parts and case					
Dielectric strength	4,000 VAC for 1 min between current carry parts and case					
Vibration resistance	Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 10 times each in X, Y, and Z directions					
Shock resistance	Destruction: 1,000 m/s <sup>2</sup> (approx. 100G) for 10 times each in X, Y, and Z directions					
Enclosure rating	IEC	IP67				
	NEMA	1, 4, 6, 12, 13				
Weight	65 g		150 g		220 g	
Approvals	UL	Recognized, File Number E76675				
	CSA	Certified, File Number LR45951				
Material	Body	Brass				
	Sensing face	PBT				

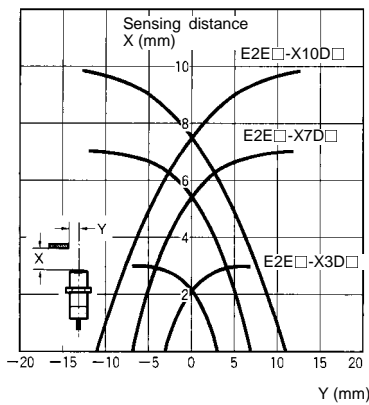
- Note: 1. When using an M18 or M30 size E2E2 at an ambient temperature between 70°C and 85°C, make sure the E2E2 has a control output of 200 mA maximum.
2. When supplying 24 VAC to any of the above models, make sure that the operating ambient temperature range is -25°C to 85°C (-13°F to 185°F).

# Engineering Data

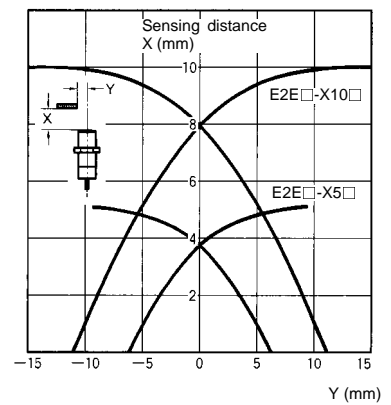
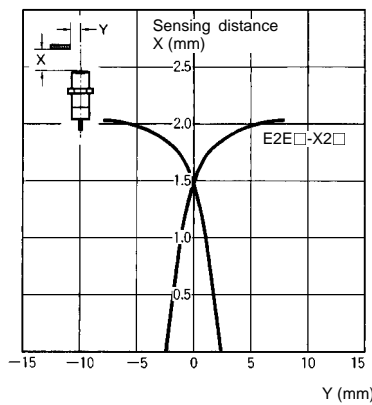
## OPERATING RANGE (TYPICAL)

### Shielded Models

E2E2-X□D□

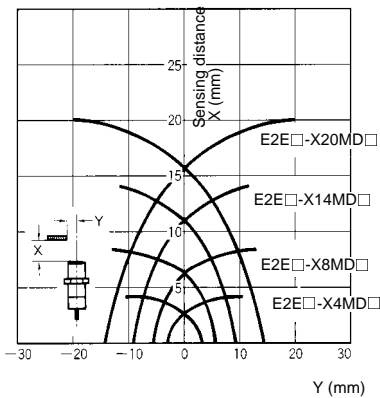


E2E2-X□C□/B□  
E2E2-X□Y□

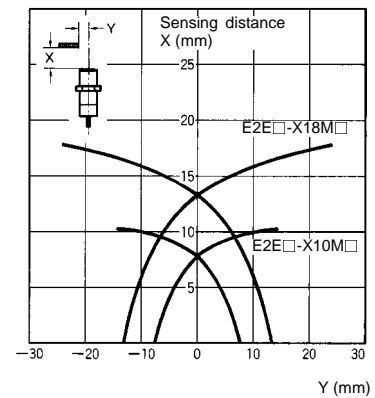
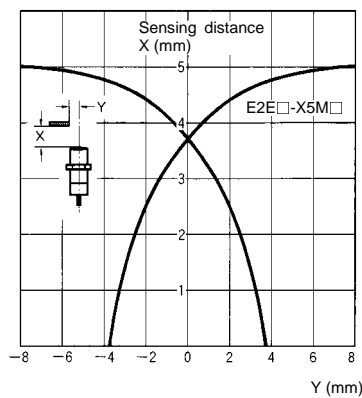


### Unshielded Models

E2E2-X□MD□

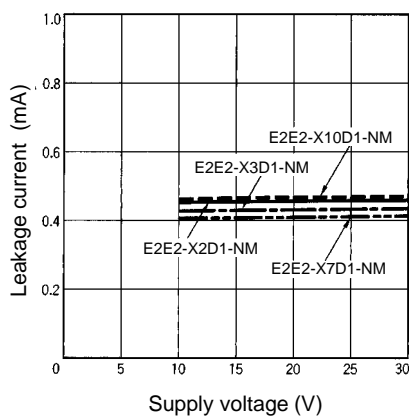


E2E2-X□MC□/B□  
E2E2-X□MY□

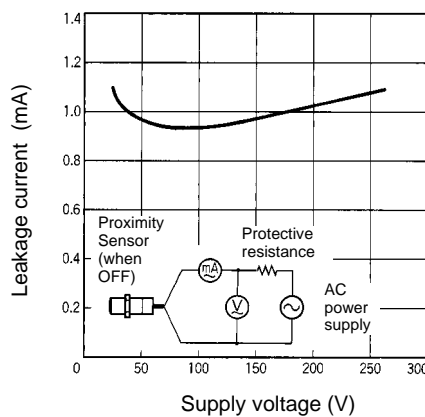


## LEAKAGE CURRENT (TYPICAL)

E2E2-X□D□

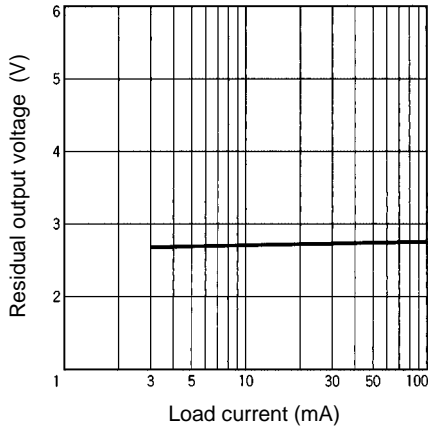


E2E2-X□Y□

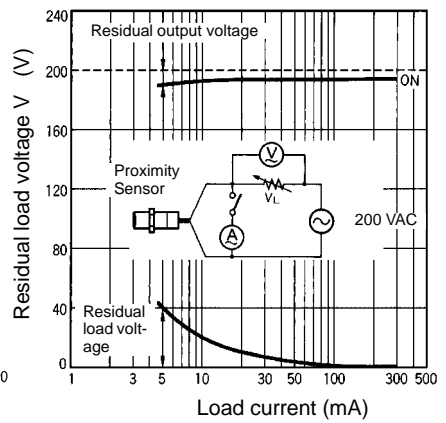
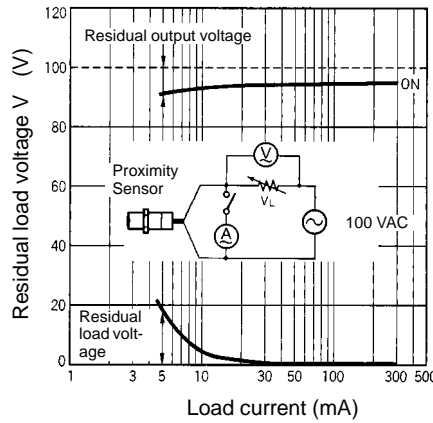
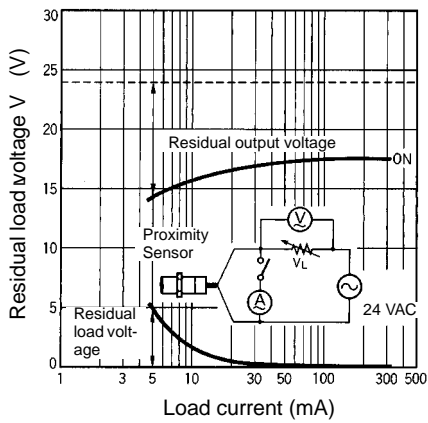


RESIDUAL OUTPUT VOLTAGE (TYPICAL)

E2E2-X□D□

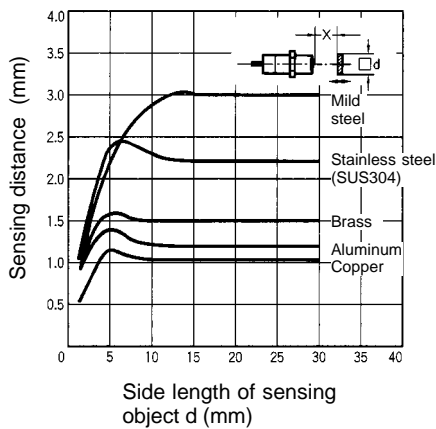


E2E2-X□Y□

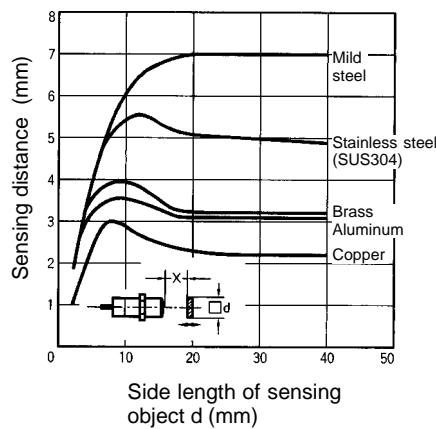


SENSING DISTANCE VS. SENSING OBJECT (TYPICAL)

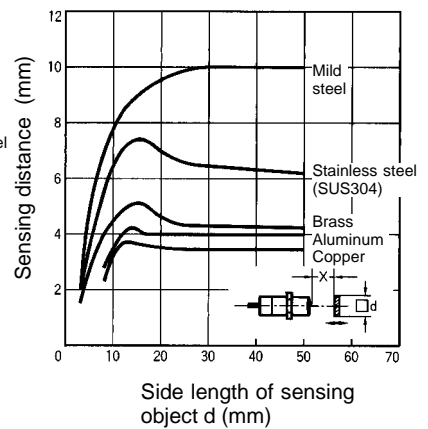
E2E2-X3D□



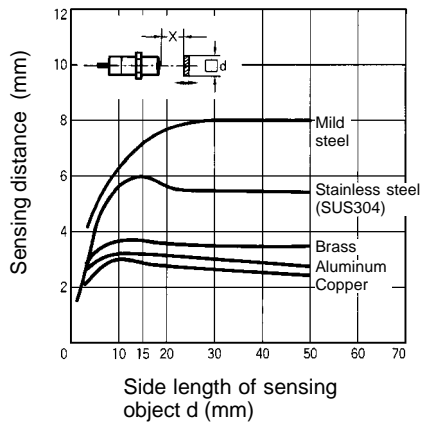
E2E2-X7D□



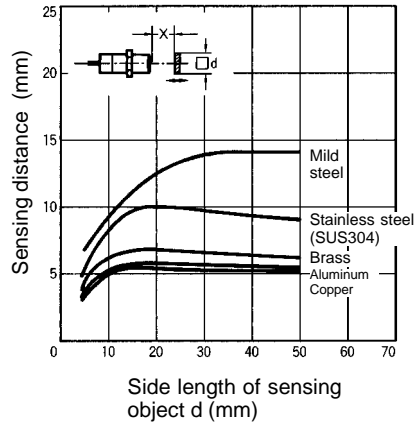
E2E2-X10D□



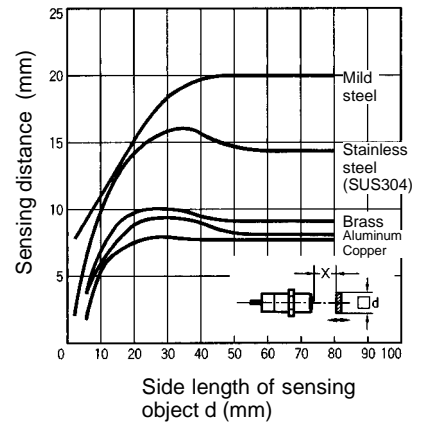
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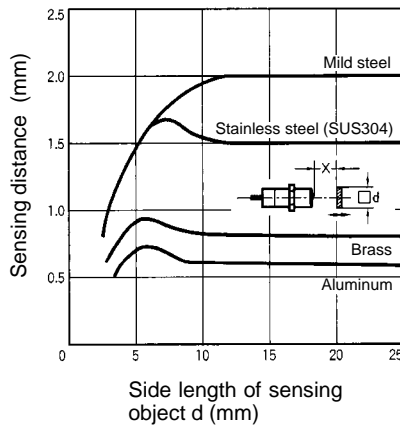
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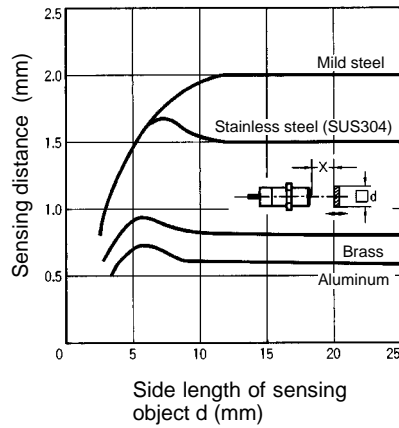
E2E2-X20MD □



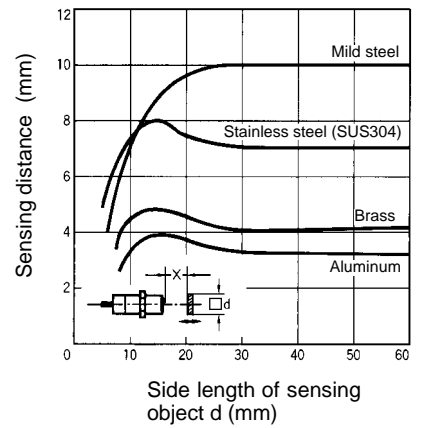
E2E2-X2C □/B □  
E2E2-X2Y □



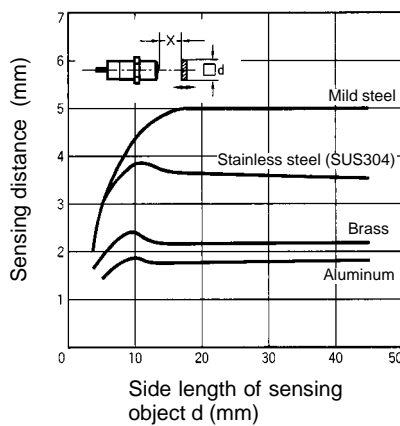
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E2E2-X5Y □



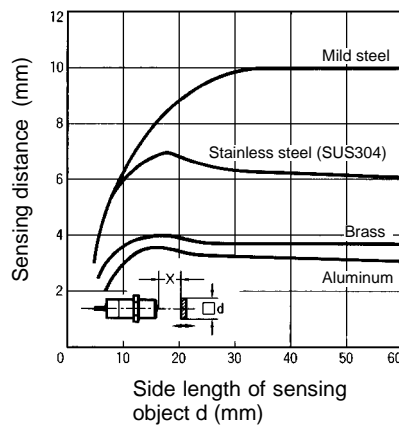
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E2E2-X10Y □



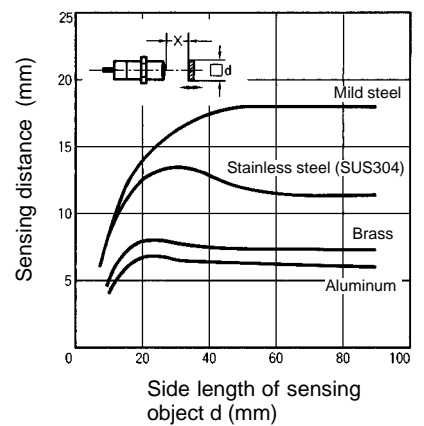
E2E2-X5MC □/B □  
E2E2-X5MY □



E2E2-X10MC □/B □  
E2E2-X10MY □



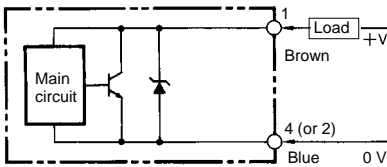
E2E2-X18MC □/B □  
E2E2-X18MY □



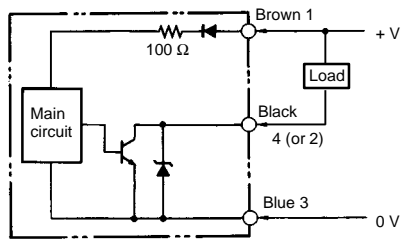
# Operation

## OUTPUT CIRCUITS

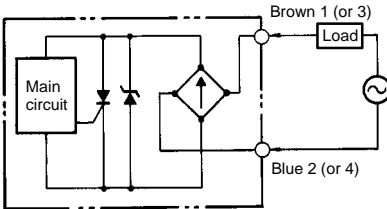
### E2E2-X□D□ DC 2-wire Models



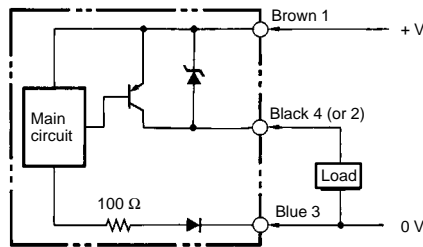
### E2E2-X□C□ DC 3-wire Models



### E2E2-X□Y□ AC 2-wire Models



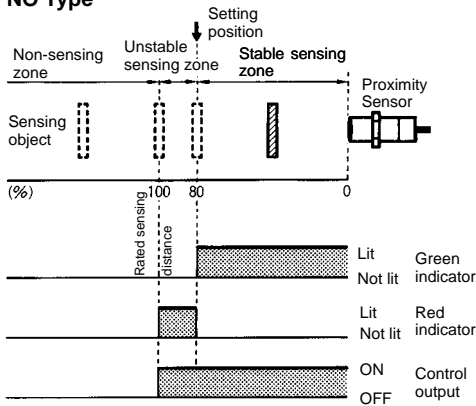
### E2E2-X□B□ DC 3-wire Models



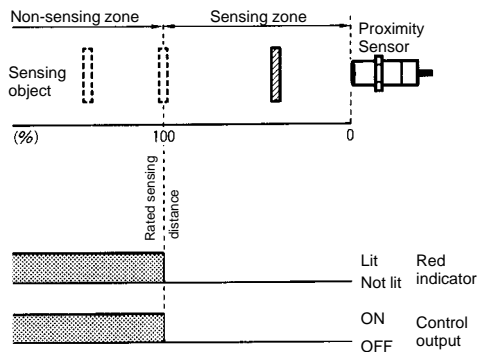
## OPERATING CHARTS

### E2E2-X□D□ DC 2-wire Models

#### NO Type

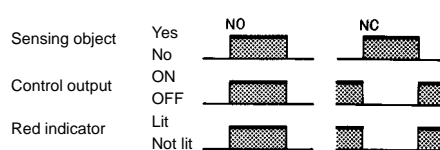


#### NC Type

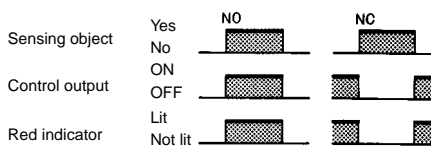


### E2E2-X□C□/B□ DC 3-wire Models

#### NPN/PNP Open Collector Output



### E2E2-X□Y□ AC 2-wire Models

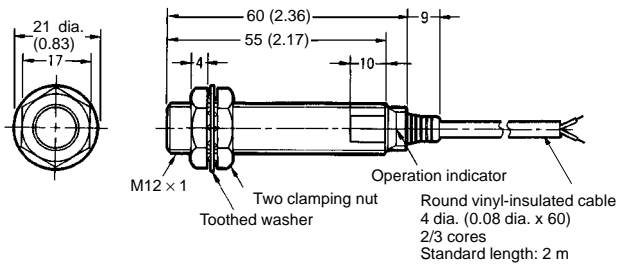


# Dimensions

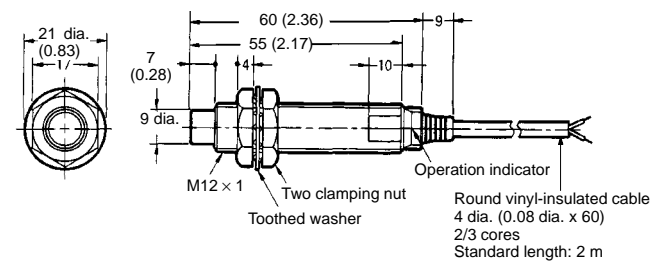
Unit: mm (inch)

## ■ PRE-WIRED MODELS

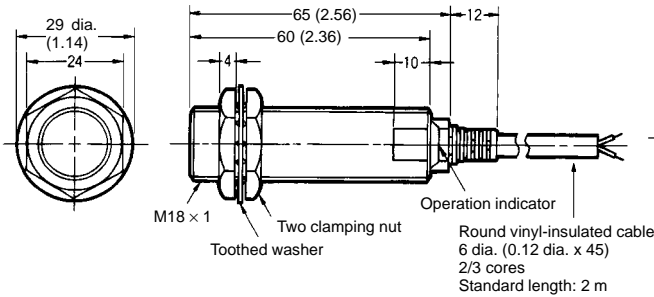
**E2E2-X3D** □  
**E2E2-X2** □ □



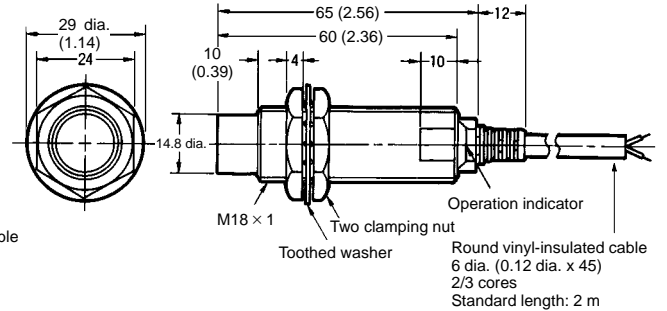
**E2E2-X8MD** □  
**E2E2-X5M** □ □



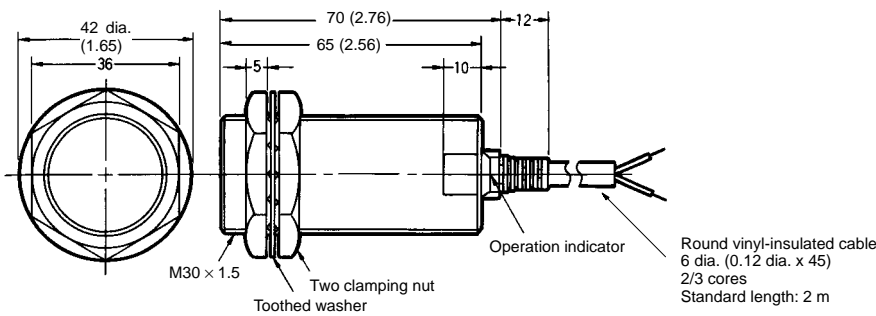
**E2E2-X7D** □  
**E2E2-X5** □ □



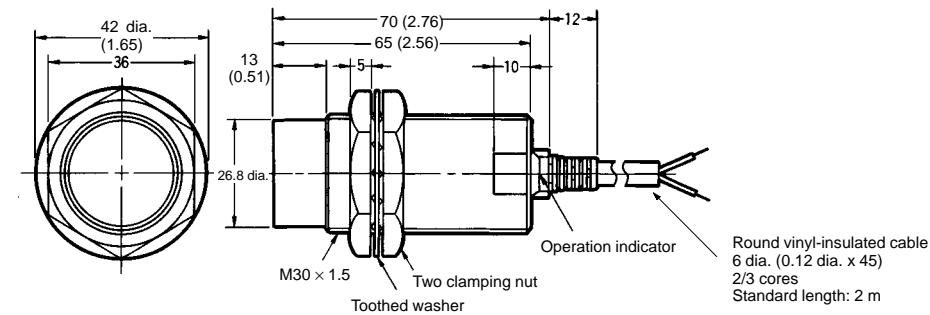
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**E2E2-X10M** □ □



**E2E2-X10D** □ □

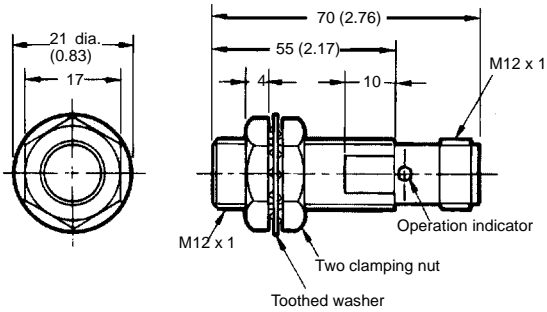


**E2E2-X20MD** □  
**E2E2-X18M** □ □

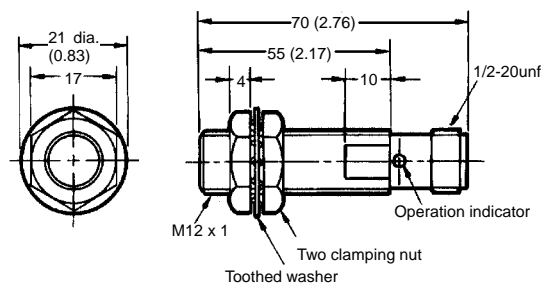


■ CONNECTOR MODELS  
(SHIELDED)

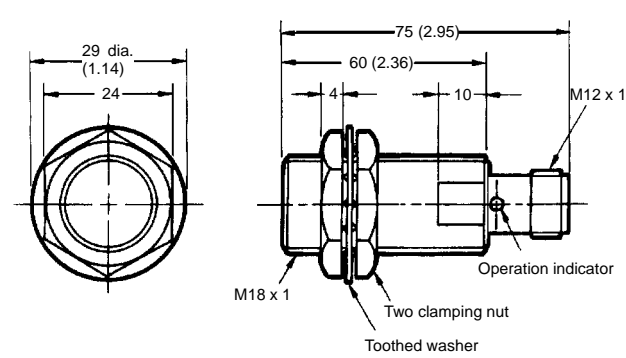
E2E2-X2C□-M1/B□-M1



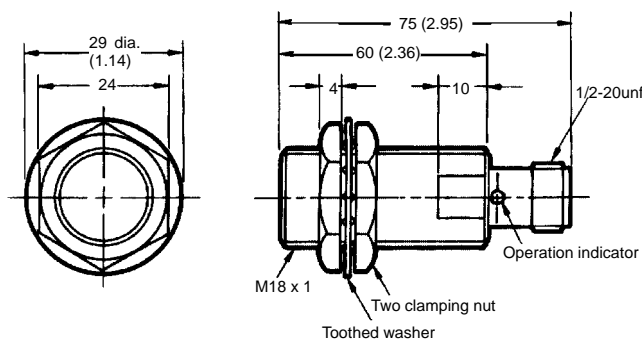
E2E2-X2Y□-M4



E2E2-X5C□-M1/B□-M1

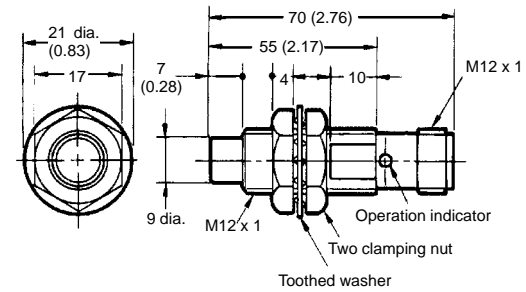


E2E2-X5Y□-M4

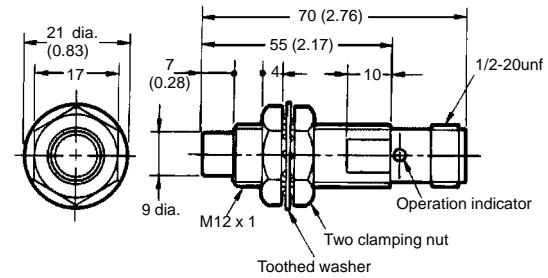


■ CONNECTOR MODELS  
(UNSHIELDED)

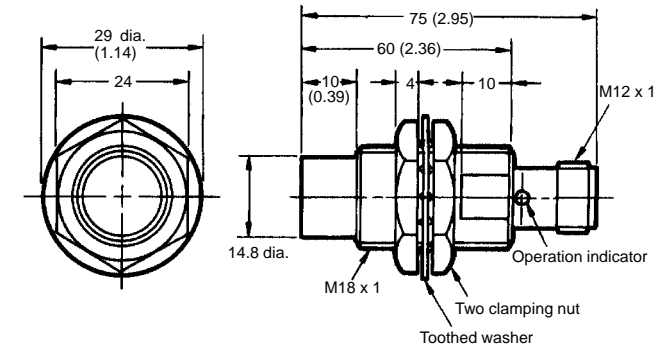
E2E2-X5MC□-M1/B□-M1



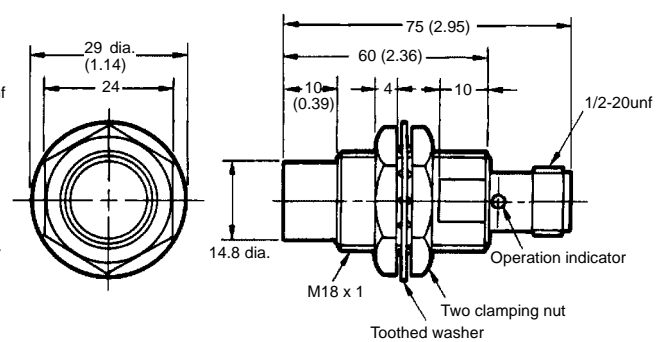
E2E2-X5MY□-M4



E2E2-X10MC□-M1/B□-M1



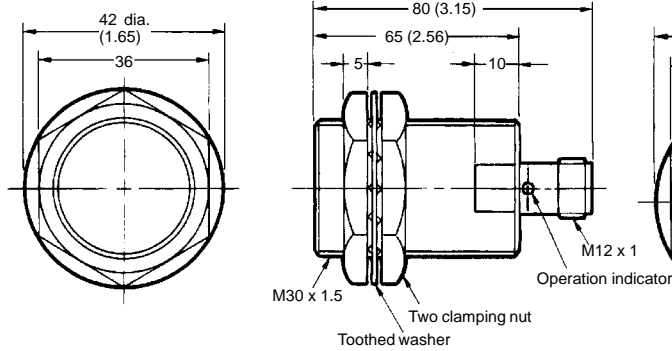
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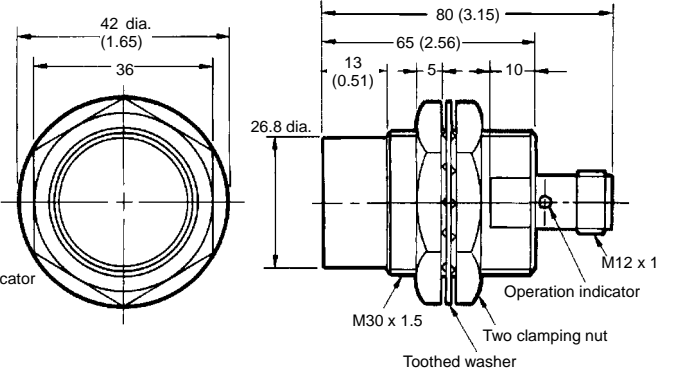
■ CONNECTOR MODELS  
(SHIELDED)

■ CONNECTOR MODELS  
(UNSHIELDED)

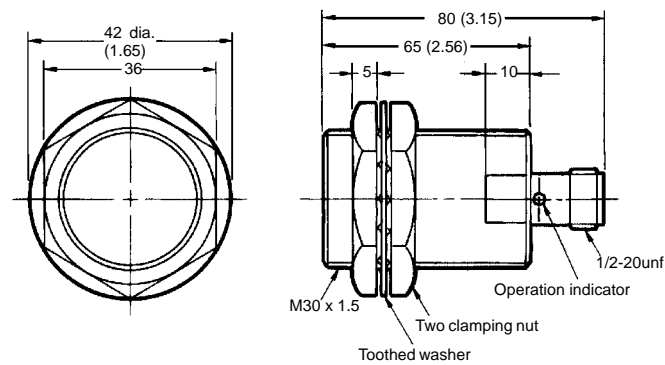
E2E2-X10C□-M1/B□-M1



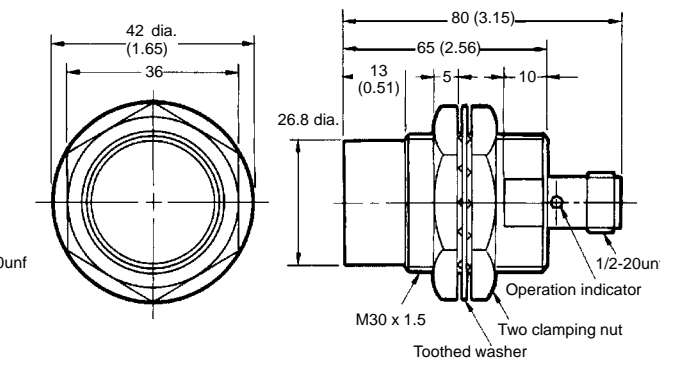
E2E2-X18MC□-M1/B□-M1



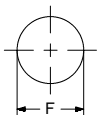
E2E2-X10Y□-M4



E2E2-X18MY□-M4



Mounting Holes



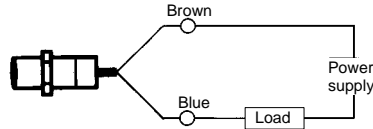
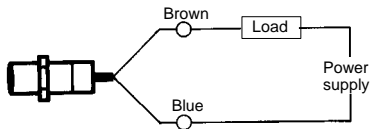
Dimensions	M12	M18	M30
F (mm)	12.5 dia.	18.5 dia.	30.5 dia.

# Installation

## CONNECTION

E2E2-X□D□  
DC 2-wire Models

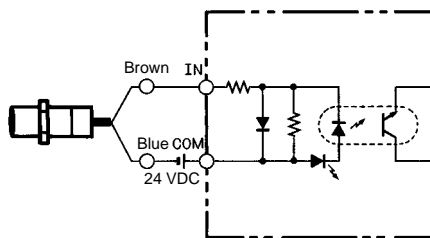
E2E2-X□Y□  
AC 2-wire Models



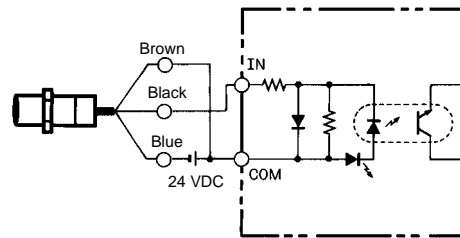
Note: The load can be connected as shown in the above diagrams.

## Connected to PC

E2E2-X□D□  
DC 2-wire Models



E2E2-X□C□  
DC 3-wire Models



## PIN ARRANGEMENT

### E2E2-X□B□-M1 DC 3-wire Models

Output Configuration	Applicable Models	Pin Arrangement
NO	E2E2-X□B1-M1	<p>Note: Terminal 2 is not used.</p>
	E2E2-X□C1-M1	<p>Note: Terminal 2 is not used.</p>
NC	E2E2-X□B2-M1	<p>Note: Terminal 4 is not used.</p>
	E2E2-X□C2-M1	<p>Note: Terminal 4 is not used.</p>

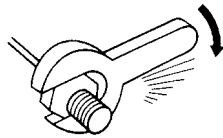
**E2E2-X□Y□-M4 AC 2-wire Model**

Applicable Models	Pin Arrangement
E2E2-X□Y□-M4	

**■ MOUNTING**

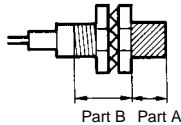
Do not tighten the nut with excessive force. A washer must be used with the nut.

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.

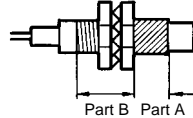


Type	Torque
M12	30 N • m (310 kgf • cm)
M18	70 N • m (710 kgf • cm)
M30	180 N • m (1,800 kgf • cm)

Shielded Model

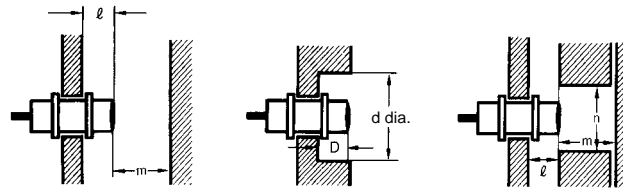


Unshielded Model



**Effects of Surrounding Metal**

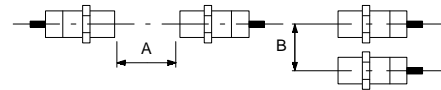
When mounting the E2E2 within a metal panel, ensure that the clearances given in the table below are maintained. Failure to maintain these distances may cause deterioration in the performance of the sensor.



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



Type	Item	M12	M18	M30	
E2E2-X□D□ DC 2-wire	Shielded	A	30 (20) mm	50 (30) mm	100 (50) mm
		B	20 (12) mm	35 (18) mm	70 (35) mm
	Unshielded	A	120 (60) mm	200 (100) mm	300 (100) mm
		B	100 (50) mm	110 (60) mm	200 (100) mm
E2E2-X□B□ E2E2-X□C□ DC 3-wire	Shielded	A	30 mm	50 mm	100 mm
		B	20 mm	35 mm	70 mm
	Unshielded	A	120 mm	200 mm	300 mm
		B	100 mm	110 mm	200 mm

Note: The figures in parentheses refer to Sensors operating at different frequencies.

**Caution**

The colors in parentheses are previous wire colors.

Item	Examples
<p><b>Power supply</b></p> <p>Do not impose an excessive voltage on the E2E, otherwise it may explode or burn. Do not impose 100 VAC on any E2E DC model, otherwise it may explode or burn.</p>	<p>DC 3-wire models</p> <p>Incorrect</p> <p>DC 2-wire models</p> <p>Incorrect</p>
<p><b>Wiring</b></p> <p>Be sure to wire the E2E and load correctly, otherwise it may explode or burn.</p>	<p>DC 3-wire models</p> <p>Incorrect</p> <p>Incorrect</p>
<p><b>Connection with no load</b></p> <p>Make sure to connect a proper load to the E2E in operation, otherwise it may explode or burn.</p>	<p>DC 2-wire models</p> <p>Incorrect</p>

# Precautions

## ■ 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 cord of the Proximity Sensor, wire the cord through an independent metal conduit to prevent against Proximity Sensor damage or malfunctioning.

## ■ CONNECTING LOAD TO AC OR DC 2-WIRE SENSOR

Refer to the following before using AC or DC 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

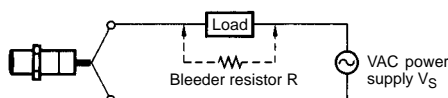
When the Proximity Sensor is OFF, the Proximity Sensor has leakage current. Refer to Leakage Current Characteristics. In this case, the load is imposed with a small voltage and the load may not be reset. Before using the Proximity Sensor, make sure that this voltage is less than the load reset voltage. 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.



### Cord Tractive Force

Do not pull cords with the tractive forces exceeding the following.

Diameter	Tractive force
4 mm dia. max.	30 N max.
4 mm dia. min.	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-resistance.

## ■ ENVIRONMENT

### Water Resistance

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 resistant, 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).

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.

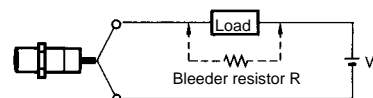
100 VAC (supply voltage): A resistor with a resistance of 10 k $\Omega$  maximum and an allowable power of 3 W minimum

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

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

#### DC 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.



**DC 2-wire Models, continued**

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

$$R \cong V_S / (i_R - i_{OFF}) \text{ (k}\Omega\text{)}$$

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

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.)

$i_R$ : Leakage current of Sensors (mA)

$i_{OFF}$ : Release current of load (mA)

The following resistors are recommended.

12 VDC (supply voltage): A resistor with a resistance of 15 k $\Omega$  maximum and an allowable power of 450 mW minimum

24 VDC (supply voltage): A resistor with a resistance of 30 k $\Omega$  maximum and an allowable power of 0.1 W minimum

**Inrush Current**

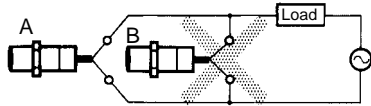
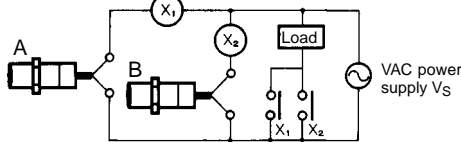
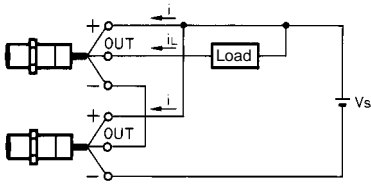
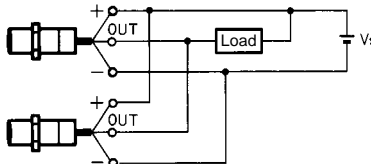
A load that has a large inrush current (e.g., a lamp or motor) will damage the Proximity Sensor, in which case connect the load to the Proximity Sensor through a relay.

**PRECAUTIONS FOR AC OR DC 2-WIRE PROXIMITY SENSORS IN OPERATION**

**Connection**

Model	Connection Type	Method	Description
DC 2-wire	AND (serial connection)	<p><b>Correct</b></p>	<p>The Sensors connected together must satisfy the following conditions.</p> $V_S - N \times V_R \geq \text{Load operating voltage}$ <p>N: No. of Sensors  <math>V_R</math>: Residual voltage of each Sensor  <math>V_S</math>: Supply voltage</p> <p>If each Proximity Sensor is not supplied with the rated voltage and current, the indicator will not be lit properly or unnecessary pulses may be output for approximately 1 ms.</p>
	OR (parallel connection)	<p><b>Correct</b></p>	<p>The Sensors connected together must satisfy the following conditions.</p> $N \times i \leq \text{Load operating voltage}$ <p>N: No. of Sensors  <i>i</i>: Leakage current of each Sensor</p> <p>If the MY Relay, which operates at 24 VDC, is used as a load for example, a maximum of four Proximity Sensors can be connected to the load.</p>
AC 2-wire	AND (serial connection)	<p><b>Incorrect</b></p>	<p>If 100 or 200 VAC is imposed on the Proximity Sensors, <math>V_L</math> (i.e., the voltage imposed on the load) will be obtained from the following.</p> $V_L = V_S - (\text{residual voltage} \times \text{no. of Proximity Sensors}) \text{ (V)}$ <p>Therefore, if <math>V_L</math> 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>
		<p><b>Correct</b></p>	
		<p><math>V_S \cong 100 \text{ V}</math></p>	

■ PRECAUTIONS FOR AC OR DC 2-WIRE PROXIMITY SENSORS IN OPERATION, CONTINUED

Model	Connection Type	Method	Description
AC 2-wire	OR (parallel connection)	<p><b>Incorrect</b></p>  <p><b>Correct</b></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>
DC 3-wire	AND (serial connection)	<p><b>Correct</b></p> 	<p>The Sensors connected together must satisfy the following conditions.</p> <p><math>i_L + (N - 1) \times i \leq</math> Upper-limit of control output of each Sensor</p> <p><math>V_S - N \times V_R \geq</math> Load operating voltage</p> <p>N: No. of Sensors</p> <p><math>V_R</math>: Residual voltage of each Sensor</p> <p><math>V_S</math>: Supply voltage</p> <p>i: Current consumption of the Sensor</p> <p><math>i_L</math>: Load current</p> <p>If the MY Relay, which operates at 24 VDC, is used as a load for example, a maximum of two Proximity Sensors can be connected to the load.</p>
	OR (parallel connection)	<p><b>Correct</b></p> 	<p>A minimum of three Sensors with current outputs can be connected in parallel. The number of Sensors connected in parallel varies with the Proximity Sensor model.</p>

**E2E2** \_\_\_\_\_ **OMRON** \_\_\_\_\_ **E2E2**

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**NOTE: DIMENSIONS SHOWN ARE IN MILLIMETERS. To convert millimeters to inches divide by 25.4.**

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