Standard Sensors for Detecting Ferrous Metals under Standard Conditions

- Wide array of variations. Ideal for a variety of applications.
- Lineup includes models with pre-wired connectors that use highly oil-resistant cables Additions to the Series
- Lineup includes models with 3-mm diameter and sensing distance of 0.6 mm Additions to the Series
- Cable protector provided as a standard feature.
- Sensing surface made from material that resists cutting oil for superior environment resistance.

⚠ Be sure to read *Safety Precautions* on page 22.

Cylindrical Proximity Sensor Selection Guide

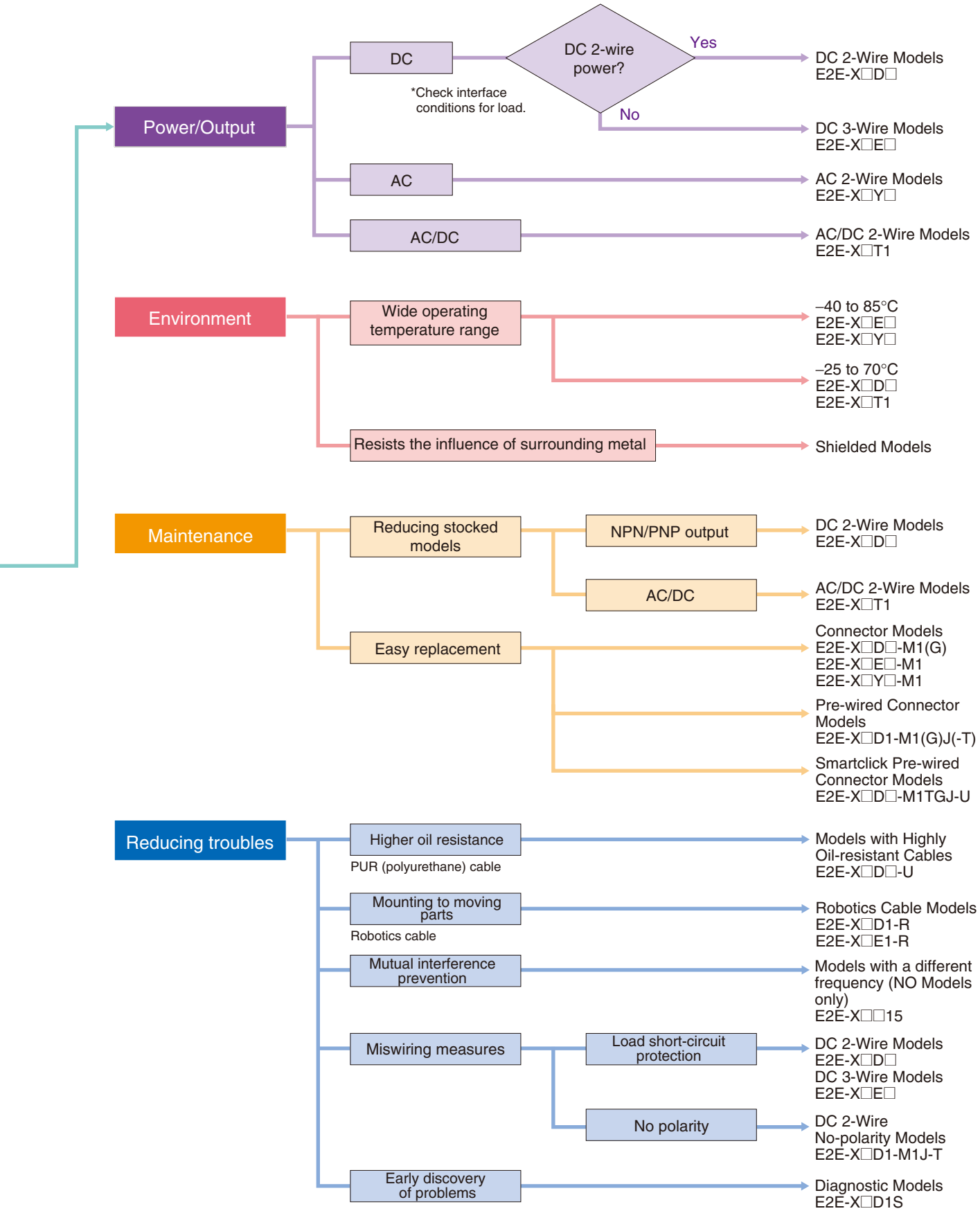
Size

Determine the size based on the installation space.

Diameter ↔ **Sensing distance**

The sensing distance depends on the diameter, shielding, and type of power supply.

Shielding	Diameter	Power supply	Sensing distance (mm) 0.6	0.8	1.0	1.5	2	3	4	5	7	8	10	14	18	20
Shielded (Resists the influence of surrounding metal)	3 dia.	DC 3-wire	○													
	4 dia.	DC 3-wire		○												
	M5	DC 3-wire			○											
	5.4 dia.	DC 3-wire			○											
	M8	DC 3-wire AC 2-wire				○										
		DC 2-wire					○									
	M12	DC 3-wire AC 2-wire					○									
		DC 2-wire AC/DC 2-wire						○								
	M18	DC 3-wire AC 2-wire								○						
		DC 2-wire AC/DC 2-wire									○					
	M30	DC 3-wire AC 2-wire DC 2-wire AC/DC 2-wire											○			
Unshielded (Long sensing distance)	M8	DC 3-wire AC 2-wire					○									
		DC 2-wire							○							
	M12	DC 3-wire AC 2-wire								○						
		DC 2-wire										○				
	M18	DC 3-wire AC 2-wire											○			
		DC 2-wire												○		
	M30	DC 3-wire AC 2-wire													○	
		DC 2-wire														○



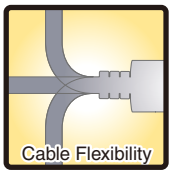
Note: Ask your OMRON sales representative for detail on Long Body Models, Transmission Couplers, and Power Couplers.

Features

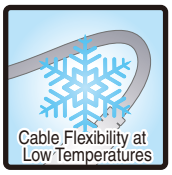
Additions to the Series

Proximity Sensors with Highly Oil-resistant Cables added to the lineup with the E2E-□-U

Oil Resistance (Insulation service life):
twice or three times
that of oil-resistant vinyl chloride

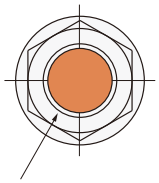


Cable Flexibility:
approximately twice
that of cinyl chloride cables

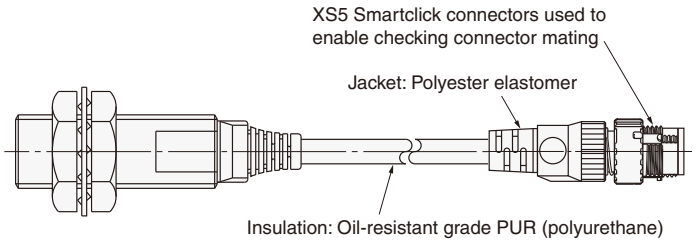


More Flexibility at -40°C

Models with Smartclick pre-wired connectors added to the E2E-□-U Series



Differentiation from standard models:
Orange Head



* The dimensions are the same as for standard models.

Ordering Information

Sensors

Higher Oil Resistance, DC 2-Wire, Pre-wired Models

Appearance		Sensing distance	Model	
			NO	NC
Shielded 	M8	2 mm	E2E-X2D1-U	E2E-X2D2-U
	M12	3 mm	E2E-X3D1-U	E2E-X3D2-U
	M18	7 mm	E2E-X7D1-U	E2E-X7D2-U
	M30	10 mm	E2E-X10D1-U	E2E-X10D2-U

Higher Oil Resistance, DC 2-Wire, M12 Smartclick Pre-wired Models

Appearance		Sensing distance	Model	
			NO	NC
Shielded 	M8	2 mm	E2E-X2D1-M1TGJ-U	E2E-X2D2-M1TGJ-U
	M12	3 mm	E2E-X3D1-M1TGJ-U	E2E-X3D2-M1TGJ-U
	M18	7 mm	E2E-X7D1-M1TGJ-U	E2E-X7D2-M1TGJ-U
	M30	10 mm	E2E-X10D1-M1TGJ-U	E2E-X10D2-M1TGJ-U

DC 2-Wire, Pre-wired Models (Models with self-diagnostic function are 3-wire.)

Self-diagnostic output	Appearance		Sensing distance	Model	
				NO	NC
Yes	Shielded	M12	3 mm	E2E-X3D1S *1	---
		M18	7 mm	E2E-X7D1S *1	---
		M30	10 mm	E2E-X10D1S *1	---
	Unshielded	M12	8 mm	E2E-X8MD1S *1	---
		M18	14 mm	E2E-X14MD1S *1	---
		M30	20 mm	E2E-X20MD1S *1	---
None	Shielded	M8	2 mm	E2E-X2D1-N *2*3	E2E-X2D2-N *3
		M12	3 mm	E2E-X3D1-N *1*2*3	E2E-X3D2-N *3
		M18	7 mm	E2E-X7D1-N *1*2*3	E2E-X7D2-N *3
		M30	10 mm	E2E-X10D1-N *1*2*3	E2E-X10D2-N
	Unshielded	M8	4 mm	E2E-X4MD1 *2*3	E2E-X4MD2
		M12	8 mm	E2E-X8MD1 *1*2*3	E2E-X8MD2
		M18	14 mm	E2E-X14MD1 *1*2*3	E2E-X14MD2
		M30	20 mm	E2E-X20MD1 *1*2*3	E2E-X20MD2

*1. Models with different frequencies are also available. The model numbers are E2E-X □D15 (example: E2E-X3D15-N).
*2. Models with robotics cables are also available. Add "-R" to the end of the model number (example: E2E-X4MD1-R).
The model number E2E-X2D1-N, however, becomes E2E-X2D1-R.
*3. Models are also available with 5-m cables. Add the cable length to the model number (example: E2E-X3D1-N 5M).

DC 2-Wire, Connector Models (Models with self-diagnostic function are 3-wire.)

Con-nector	Self-diag-nostic output	Appearance		Sensing distance	Model			
					NO	Applicable connector code *2	NC	Applicable connector code *2
M12	Yes	Shielded	M12	3 mm	E2E-X3D1S-M1	D	---	---
			M18	7 mm	E2E-X7D1S-M1	D	---	---
			M30	10 mm	E2E-X10D1S-M1	D	---	---
		Unshielded	M12	8 mm	E2E-X8MD1S-M1	D	---	---
			M18	14 mm	E2E-X14MD1S-M1	D	---	---
			M30	20 mm	E2E-X20MD1S-M1	D	---	---
	None	Shielded	M8	2 mm	E2E-X2D1-M1G	A	E2E-X2D2-M1G	D
			M12	3 mm	E2E-X3D1-M1G *1	A	E2E-X3D2-M1G	D
			M18	7 mm	E2E-X7D1-M1G *1	A	E2E-X7D2-M1G	D
			M30	10 mm	E2E-X10D1-M1G *1	A	E2E-X10D2-M1G	D
		Unshielded	M8	4 mm	E2E-X4MD1-M1G	A	E2E-X4MD2-M1G	D
			M12	8 mm	E2E-X8MD1-M1G *1	A	E2E-X8MD2-M1G	D
			M18	14 mm	E2E-X14MD1-M1G *1	A	E2E-X14MD2-M1G	D
			M30	20 mm	E2E-X20MD1-M1G *1	A	E2E-X20MD2-M1G	D
M8		Shielded	M8	2 mm	E2E-X2D1-M3G	G	E2E-X2D2-M3G	G
		Unshielded		4 mm	E2E-X4MD1-M3G	G	E2E-X4MD2-M3G	G

*1. Models with different frequencies are also available. The model numbers are E2E-X□D15-M1G (example: E2E-X3D15-M1G).
*2. Refer to page 19 for details.

DC 2-Wire, Pre-wired Connector Models

Appearance		Sensing distance	Operate Mode	Model			
				Polarity: Yes	Applicable connector code *	Polarity: None	Applicable connector code *
Shielded	M12	3 mm	NO	**E2E-X3D1-M1GJ**	A	**E2E-X3D1-M1J-T**	B
	M18	7 mm		**E2E-X7D1-M1GJ**	A	**E2E-X7D1-M1J-T**	B
	M30	10 mm		**E2E-X10D1-M1GJ**	A	**E2E-X10D1-M1J-T**	B
Unshielded	M12	8 mm		**E2E-X8MD1-M1GJ**	A	---	---
	M18	14 mm		**E2E-X14MD1-M1GJ**	A	---	---
	M30	20 mm		**E2E-X20MD1-M1GJ**	A	---	---

Note: 1. A model with no polarity has a residual voltage of 5 V, which must be taken into consideration together with the interface conditions (the PLC's ON voltage, for example) when connecting the Proximity Sensor to a load. Refer to page 19 for details.
2. The standard cable length is 300 mm. Models are also available with 500 mm and 1 m cables.

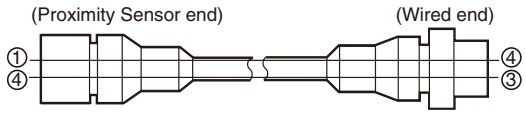
* Refer to page 19 for details.

Connector Pin Assignments of DC 2-Wire Models

- The connector pin assignments of each New E2E DC 2-Wire Model conform to IEC 947-5-2 Table III. (Only DC 2-Wire Models have been changed in comparison to the previous models.)
- The following models with conventional connector pin assignments are available as well. (Only NO Models can be used.)
  The cable at the right should also be used if the XW3A-P□45-G11 Connector Junction Box is already being used.

Cable length	Model
500 mm	**XS2W-D421-BY1**

Internal Wiring



Models with conventional connector pin assignments are available as well.

Appearance		Model			
		NO	Applicable connector code *	NC	Applicable connector code *
Shielded	M8	**E2E-X2D1-M1**	C	**E2E-X2D2-M1**	D
	M12	**E2E-X3D1-M1**	C	**E2E-X3D2-M1**	D
	M18	**E2E-X7D1-M1**	C	**E2E-X7D2-M1**	D
	M30	**E2E-X10D1-M1**	C	**E2E-X10D2-M1**	D
Unshielded	M8	**E2E-X4MD1-M1**	C	**E2E-X4MD2-M1**	D
	M12	**E2E-X8MD1-M1**	C	**E2E-X8MD2-M1**	D
	M18	**E2E-X14MD1-M1**	C	**E2E-X14MD2-M1**	D
	M30	**E2E-X20MD1-M1**	C	**E2E-X20MD2-M1**	D

Note: Refer to page 19 for details.

DC 3-Wire, Pre-Wired Models

Appearance		Sensing distance	Model	
			Output configuration: NPN NO	Output configuration: PNP NO
Shielded 	3 dia.	0.6 mm	E2E-CR6C1	E2E-CR6B1
	4 dia.	0.8 mm	E2E-CR8C1 *1*2	E2E-CR8B1 *2
	M5	1 mm	E2E-X1C1 *1*2	E2E-X1B1 *2
	5.4 dia.	1 mm	E2E-C1C1 *1*2	E2E-C1B1
	M8	1.5 mm	E2E-X1R5E1 *1*2	E2E-X1R5F1 *1*2
	M12	2 mm	E2E-X2E1 *1*2*3*4	E2E-X2F1 *1*2*3
	M18	5 mm	E2E-X5E1 *1*2*3*4	E2E-X5F1 *1*2*3
	M30	10 mm	E2E-X10E1 *1*2*3*4	E2E-X10F1 *2
Unshielded 	M8	2 mm	E2E-X2ME1 *2	E2E-X2MF1 *2
	M12	5 mm	E2E-X5ME1 *1*2*3*4	E2E-X5MF1 *2
	M18	10 mm	E2E-X10ME1 *1*2*3*4	E2E-X10MF1 *2
	M30	18 mm	E2E-X18ME1 *1*2*3*4	E2E-X18MF1 *2

Note: Models with NPN NC output configurations are also available for all of the above models.
*1. Models are also available with 5-m cables. Add the cable length to the model number (example: E2E-X2E1 5M).
*2. Models with robotics cables are also available. The model numbers are E2E-X □E1-R (example: E2E-X5E1-R).
*3. Models with different frequencies are also available. The model numbers are E2E-X □E□5 (example: E2E-X5E15).
*4. These models are also available with e-CON connectors (0.3-m cable). Add "-ECON" to the end of the model number (example: E2E-X2E1-ECON).

DC 3-Wire, Connector Models

Connector	Appearance		Sensing distance	Model		Applicable connector code *
				Output configuration: NPN NO	Output configuration: PNP NO	
M12	Shielded 	M8	1.5 mm	E2E-X1R5E1-M1	E2E-X1R5F1-M1	B
		M12	2 mm	E2E-X2E1-M1	E2E-X2F1-M1	B
		M18	5 mm	E2E-X5E1-M1	E2E-X5F1-M1	B
		M30	10 mm	E2E-X10E1-M1	E2E-X10F1-M1	B
	Unshielded 	M8	2 mm	E2E-X2ME1-M1	E2E-X2MF1-M1	B
		M12	5 mm	E2E-X5ME1-M1	E2E-X5MF1-M1	B
		M18	10 mm	E2E-X10ME1-M1	E2E-X10MF1-M1	B
		M30	18 mm	E2E-X18ME1-M1	E2E-X18MF1-M1	B
M8	Shielded 	M8	1.5 mm	E2E-X1R5E1-M3	E2E-X1R5F1-M3	G
	Unshielded 		2 mm	E2E-X2ME1-M3	E2E-X2MF1-M3	G

Note: Models with NPN NC output configurations are also available for all of the above models.
* Refer to page 19 for details.

AC 2-Wire, Pre-wired Models

Appearance		Sensing distance	Model	
			NO	NC
Shielded 	M8	1.5 mm	E2E-X1R5Y1	E2E-X1R5Y2
	M12	2 mm	E2E-X2Y1 *1*2	E2E-X2Y2
	M18	5 mm	E2E-X5Y1 *1*2	E2E-X5Y2
	M30	10 mm	E2E-X10Y1 *1*2	E2E-X10Y2
Unshielded 	M8	2 mm	E2E-X2MY1	E2E-X2MY2
	M12	5 mm	E2E-X5MY1 *1*2	E2E-X5MY2
	M18	10 mm	E2E-X10MY1 *1	E2E-X10MY2
	M30	18 mm	E2E-X18MY1 *1	E2E-X18MY2

*1. Models with different frequencies are also available. The model numbers are E2E-X □Y□5 (example: E2E-X5Y15).
*2. Models are also available with 5-m cables. Add the cable length to the model number (example: E2E-X2Y1 5M).

AC 2-wire, Connector Models

Connector	Appearance		Sensing distance	Model			
				NO	Applicable connector code *	NC	Applicable connector code *
M12	Shielded 	M12	2 mm	E2E-X2Y1-M1	E	E2E-X2Y2-M1	F
		M18	5 mm	E2E-X5Y1-M1	E	E2E-X5Y2-M1	F
		M30	10 mm	E2E-X10Y1-M1	E	E2E-X10Y2-M1	F
	Unshielded 	M12	5 mm	E2E-X5MY1-M1	E	E2E-X5MY2-M1	F
		M18	10 mm	E2E-X10MY1-M1	E	E2E-X10MY2-M1	F
		M30	18 mm	E2E-X18MY1-M1	E	E2E-X18MY2-M1	F

* Refer to page 19 for details.

AC/DC 2-Wire, Pre-wired Models

Appearance		Sensing distance	Operation mode	Model
Shielded 	M12	3 mm	NO	E2E-X3T1
	M18	7 mm		E2E-X7T1 *
	M30	10 mm		E2E-X10T1

Note: These models do not conform to CE standards.
* Models are also available with 5-m cables. Add the cable length to the model number (example: E2E-X7T1 5M).

Accessories (Order Separately)

Sensor I/O Connectors

Refer to *Introduction to Sensor I/O Connectors* for details.

Mounting Brackets
Protective Covers
Sputter Protective Covers
Refer to Y92□ for details.

Ratings and Specifications

E2E-X□D□ DC 2-Wire Models

Item	Size	M8		M12		M18		M30	
	Shielded	Shielded	Unshielded	Shielded	Unshielded	Shielded	Unshielded	Shielded	Unshielded
Model		E2E-X2D□	E2E-X4MD□	E2E-X3D□	E2E-X8MD□	E2E-X7D□	E2E-X14MD□	E2E-X10D□	E2E-X20MD□
Sensing distance		2 mm ±10%	4 mm ±10%	3 mm ±10%	8 mm ±10%	7 mm ±10%	14 mm ±10%	10 mm ±10%	20 mm ±10%
Set distance *1		0 to 1.6 mm	0 to 3.2 mm	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		15% max. of sensing distance		10% max. of sensing distance					
Detectable object		Ferrous metal (The sensing distance decreases with non-ferrous metal. Refer to *Engineering Data* on pages 13 and 14.							
Standard sensing object		Iron, 8 × 8 × 1 mm	Iron, 20 × 20 × 1 mm	Iron, 12 × 12 × 1 mm	Iron, 30 × 30 × 1 mm	Iron, 18 × 18 × 1 mm	Iron, 30 × 30 × 1 mm		Iron, 54 × 54 × 1 mm
Response frequency *2		1.5 kHz	1 kHz		0.8 kHz	0.5 kHz	0.4 kHz		0.1 kHz
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	Load current	3 to 100 mA, Diagnostic output: 50 mA for -D1(5)S Models							
	Residual voltage *3	3 V max. (Load current: 100 mA, Cable length: 2 m, M1J-T Models only: 5 V max.)							
Indicators		D1 Models: Operation indicator (red) and setting indicator (green) D2 Models: Operation indicator (red)							
Operation mode (with sensing object approaching)		D1 Models: NO D2 Models: NC Refer to the timing charts under *I/O Circuit Diagrams* on page 16 for details.							
Diagnostic output delay		0.3 to 1 s							
Protection circuits		Surge suppressor, Load short-circuit protection (for control and diagnostic output)							
Ambient temperature range		Operating: −25 to 70°C, Storage: −40 to 85°C (with no icing or condensation)							
Ambient humidity range		Operating/storage: 35% to 95% (with no condensation)							
Temperature influence		±15% max. of sensing distance at 23°C in the temperature range of −25 to 70°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		1000 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: 500 m/s² 10 times each in X, Y, and Z directions		Destruction: 1,000 m/s² 10 times each in X, Y, and Z directions					
Degree of protection		Pre-wired Models : IEC 60529 IP67, in-house standards: oil-resistant Connector Models : IEC 60529 IP67							
Connection method		Pre-wired Models (Standard cable length: 2 m), Connector Models, or Pre-wired Connector Models (Standard cable length: 0.3 m)							
Weight (packed state)	Pre-wired Models	Approx. 60 g		Approx. 70 g		Approx. 130 g		Approx. 175 g	
	Pre-wired Connector Models	---		Approx. 40 g		Approx. 70 g		Approx. 110 g	
	Connector Models	Approx. 15 g		Approx. 25 g		Approx. 40 g		Approx. 90 g	
Materials	Case	Stainless steel (SUS303)		Nickel-plated brass					
	Sensing surface	PBT							
	Clamping nuts	Nickel-plated brass							
	Toothed washer	Zinc-plated iron							
Accessories		Instruction manual							

*1. Use the E2E 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.
*3. The residual voltage of each M1J-T Model is 5 V. When connecting to a device, make sure that the device can withstand the residual voltage. (Refer to page 23 for details.)

E2E-X□E□/F□ DC 3-Wire Models

Item	Size	M8		M12		M18		M30	
	Shielded	Shielded	Unshielded	Shielded	Unshielded	Shielded	Unshielded	Shielded	Unshielded
Model		E2E -X1R5E□/F□	E2E -X2ME□/F□	E2E -X2E□/F□	E2E -X5ME□/F□	E2E -X5E□/F□	E2E -X10ME□/F□	E2E-X10E□/F□	E2E -X18ME□/F□
Sensing distance		1.5 mm ±10%	2 mm ±10%		5 mm ±10%		10 mm ±10%		18 mm ±10%
Set distance		0 to 1.2 mm	0 to 1.6 mm		0 to 4 mm		0 to 8 mm		0 to 14 mm
Differential travel		10% max. of sensing distance							
Detectable object		Ferrous metal (The sensing distance decreases with non-ferrous metal. Refer to *Engineering Data* on pages 13 and 14.)							
Standard sensing object		Iron, 8 × 8 × 1 mm	Iron, 12 × 12 × 1 mm		Iron, 15 ×15 × 1 mm	Iron, 18 × 18 × 1 mm	Iron, 30 × 30 × 1 mm		Iron, 54 × 54 × 1 mm
Response frequency *1		2 kHz	0.8 kHz	1.5 kHz	0.4 kHz	0.6 kHz	0.2 kHz	0.4 kHz	0.1 kHz
Power supply voltage (operating voltage range) *2		12 to 24 VDC (10 to 40 VDC), ripple (p-p): 10% max.							
Current consumption		13 mA max.							
Control output	Load current *2	200 mA max.							
	Residual voltage	2 V max. (Load current: 200 mA, Cable length: 2 m)							
Indicators		Operation indicator (red)							
Operation mode (with sensing object approaching)		E1 Models: NO E2 Models: Refer to the timing charts under *I/O Circuit Diagrams* on page 16 for details. F1 Models: NO							
Protection circuits		Load short-circuit protection, Surge suppressor, Reverse polarity protection							
Ambient temperature range *2		Operating/Storage: –40 to 85°C (with no icing or condensation)							
Ambient humidity range		Operating/Storage: 35% to 95%							
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		1,000 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: 500 m/s² 10 times each in X, Y, and Z directions		Destruction: 1,000 m/s² 10 times each in X, Y, and Z directions					
Degree of protection		Pre-wired Models : IEC 60529 IP67, in-house standards: oil-resistant Connector Models : IEC 60529 IP67							
Connection method		Pre-wired Models (Standard cable length: 2 m) and Connector Models							
Weight	Pre-wired Models	Approx. 65 g		Approx. 75 g		Approx. 150 g		Approx. 195 g	
	Connector Models	Approx. 15 g		Approx. 25 g		Approx. 40 g		Approx. 90 g	
Materials	Case	Stainless steel (SUS303)		Nickel-plated brass					
	Sensing surface	PBT							
	Clamping nuts	Nickel-plated brass							
	Toothed washer	Zinc-plated iron							
Accessories		Instruction manual							

*1. The response frequency is an average value. Measurement conditions are as follows: standard sensing object, a distance of twice the standard sensing object, and a set distance of half the sensing distance.
*2. When using an M8 Model at an ambient temperature between 70 and 85°C, supply 10 to 30 VDC to the Sensor and make sure that the Sensor has a control output of 100 mA maximum.

E2E-C□C/B□ and E2E-X1C/B□ DC 3-Wire Models

Item	Size	3 dia.	4 dia.	M5	5.4 dia.
	Shielded	Shielded			
	Model	E2E-CR6C/B□	E2E-CR8C/B□	E2E-X1C/B□	E2E-C1C/B□
Sensing distance		0.6 mm ±15%	0.8 mm ±15%	1 mm ±15%	
Set distance		0 to 0.4 mm	0 to 0.5 mm	0 to 0.7 mm	
Differential travel		15% max. of sensing distance			
Detectable object		Ferrous metal (The sensing distance decreases with non-ferrous metal. Refer to *Engineering Data* on page 14.)			
Standard sensing object		Iron, 3 × 3 × 1 mm	Iron, 5 × 5 × 1 mm		
Response frequency *		2 kHz	3 kHz		
Power supply voltage (operating voltage range)		12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max.			
Current consumption		10 mA max.	17 mA max.		
Control output	Load current	Open-collector output, 80 mA max. (30 VDC max.)	Open-collector output, 100 mA max. (30 VDC max.)		
	Residual voltage	1 V max. (Load current: 80 mA, Cable length: 2 m)	2 V max. (Load current: 100 mA, Cable length: 2 m)		
Indicators		Operation indicator (red)			
Operation mode (with sensing object approaching)		C1/B1 Models: NO C2 Models: NC	Refer to the timing charts under *I/O Circuit Diagrams* on page 17 for details.		
Protection circuits		Reverse polarity protection, Surge suppressor			
Ambient temperature range		Operating/Storage: –25 to 70°C (with no icing or condensation)			
Ambient humidity range		Operating/Storage: 35% to 95%			
Temperature influence		±15% max. of sensing distance at 23°C in the temperature range of –25 to 70°C			
Voltage influence		±5% max. of sensing distance at rated voltage in the rated voltage ±10% range	±2.5% 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		500 VAC, 50/60 Hz for 1 min between current-carrying parts and case			
Vibration resistance		Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions			
Shock resistance		Destruction: 500 m/s^2 10 times each in X, Y, and Z directions			
Degree of protection		IEC 60529 IP66	IEC 60529 IP67, in-house standards: oil-resistant		
Connection method		Pre-wired Models (Standard cable length: 2 m)			
Weight (packed state)		Approx. 60 g			
Materials	Case	Stainless steel (SUS303)		Nickel-plated brass	
	Sensing surface	Heat-resistant ABS			
	Clamping nuts	Nickel-plated brass (E2E-X1C/B□ only)			
	Toothed washer	Zinc-plated iron (E2E-X1C/B□ only)			
Accessories		Instruction manual			

* 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.

E2E-X□Y□ AC 2-Wire Models

Size		M8		M12		M18		M30	
Shielded		Shielded	Unshielded	Shielded	Unshielded	Shielded	Unshielded	Shielded	Unshielded
Item	Model	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%		5 mm ±10%		10 mm ±10%		18 mm ±10%
Set distance		0 to 1.2 mm	0 to 1.6 mm		0 to 4 mm		0 to 8 mm		0 to 14 mm
Differential travel		10% max. of sensing distance							
Detectable object		Ferrous metal (The sensing distance decreases with non-ferrous metal. Refer to *Engineering Data* on page 14.)							
Standard sensing object		Iron, 8 × 8 × 1 mm	Iron, 12 × 12 × 1 mm		Iron, 15 × 15 × 1 mm	Iron, 18 × 18 × 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 100 mA		5 to 200 mA		5 to 300 mA			
	Residual voltage	Refer to *Engineering Data* on page 15.							
Indicators		Operation indicator (red)							
Operation mode (with sensing object approaching)		Y1 Models: NO Y2 Models: NC	Refer to the timing charts under *I/O Circuit Diagrams* on page 18 for details.						
Protection circuits		Surge suppressor							
Ambient temperature range *1*2		Operating/Storage: –25 to 70°C (with no icing or condensation)		Operating/Storage: –40 to 85°C (with no icing or condensation)					
Ambient humidity range		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		±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 (M8 Models: 2,000 VAC), 50/60 Hz for 1 min between current-carrying parts and case							
Vibration resistance		Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions							
Shock resistance		Destruction: 500 m/s^2 10 times each in X, Y, and Z directions		Destruction: 1,000 m/s^2 10 times each in X, Y, and Z directions					
Degree of protection		Pre-wired Models : IEC 60529 IP67, in-house standards: oil-resistant Connector Models : IEC 60529 IP67							
Connection method		Pre-wired Models (Standard cable length: 2 m) and Connector Models							
Weight	Pre-wired Models Model	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	
Materials	Case	Stainless steel (SUS303)		Nickel-plated brass					
	Sensing surface	PBT							
	Clamping nuts	Nickel-plated brass							
	Toothed washer	Zinc-plated iron							
Accessories		Instruction manual							

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

AC/DC 2-Wire Models

Item	Size	M12	M18	M30
	Shielded	Shielded		
	Model	E2E-X3T1	E2E-X7T1	E2E-X10T1
Sensing distance		3 mm ±10%	7 mm ±10%	10 mm ±10%
Set distance		0 to 2.4 mm	0 to 5.6 mm	0 to 8 mm
Differential travel		10% max. of sensing distance		
Detectable object		Ferrous metal (The sensing distance decreases with non-ferrous metal. Refer to *Engineering Data* on page 13.)		
Standard sensing object		Iron, 12 × 12 × 1 mm	Iron, 18 × 18 × 1 mm	Iron, 30 × 30 × 1 mm
Response frequency *1	DC	1 kHz	0.5 kHz	0.4 kHz
	AC	25 Hz		
Power supply voltage (operating voltage range) *2		24 to 240 VDC (20 to 264 VDC) 48 to 240 VAC (40 to 264 VAC)		
Leakage current		DC: 1 mA max. AC: 2 mA max.		
Control output	Load current	5 to 100 mA		
	Residual voltage	DC: 6 V max. (Load current: 100 mA, Cable length: 2 m) AC: 10 V max. (Load current: 5 mA, Cable length: 2 m)		
Indicators		Operation indicator (red), Setting indicator (green)		
Operation mode (with sensing object approaching)		NO (Refer to the timing charts under *I/O Circuit Diagrams* on page 16 for details.)		
Protection circuits		Load short-circuit protection (20 to 40 VDC only), Surge suppressor		
Ambient temperature range		Operating: –25 to 70°C, Storage: –40 to 85°C (with no icing or condensation)		
Ambient humidity range		Operating/Storage: 35% to 95%		
Temperature influence		±10% max. of sensing distance at 23°C in the temperature range of –25 to 70°C		
Voltage influence		±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-carrying parts and case		
Vibration resistance		Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions		
Shock resistance		Destruction: 1,000 m/s^2 10 times each in X, Y, and Z directions		
Degree of protection		IEC 60529 IP67, in-house standards: oil-resistant		
Connection method		Pre-wired Models (Standard cable length: 2 m)		
Weight (packed state)		Approx. 80 g	Approx. 140 g	Approx. 190 g
Materials	Case	Nickel-plated brass		
	Sensing surface	PBT		
	Clamping nuts	Nickel-plated brass		
	Toothed washer	Zinc-plated iron		
Accessories		Instruction manual		

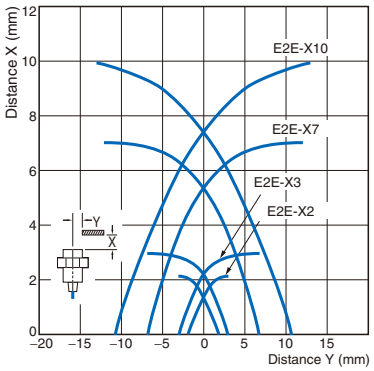
*1. The response frequency is an average value. Measurement conditions are as follows: standard sensing object, a distance of twice the standard sensing object, and a set distance of half the sensing distance.
*2. Power Supply Voltage Waveform:
Use a sine wave for the power supply. Using a rectangular AC power supply may result in faulty reset.

Engineering Data (Typical)

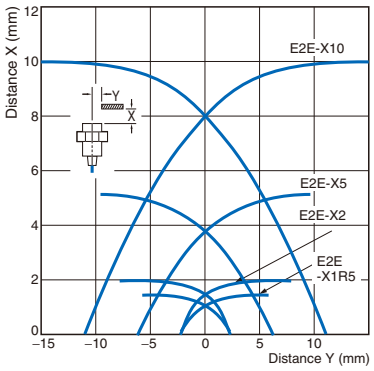
Sensing Area

Shielded Models

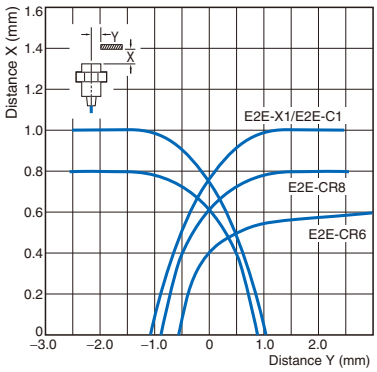
E2E-X□D□/-X□T1



E2E-X□E□/-X□Y□/-X□F1

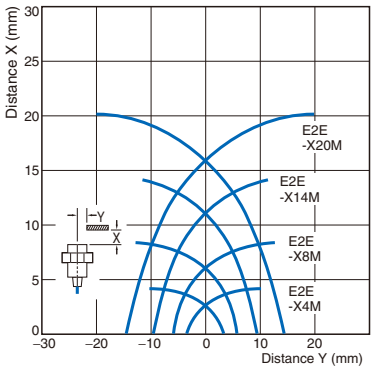


E2E-C□C□/-X□C□
E2E-C□B1/-X□B1

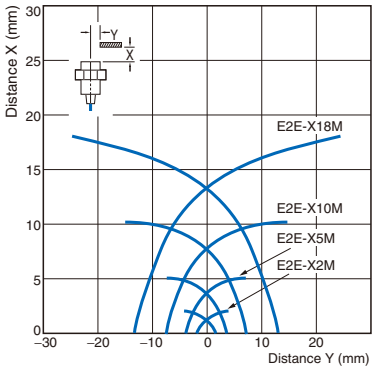


Unshielded Models

E2E-X□MD□

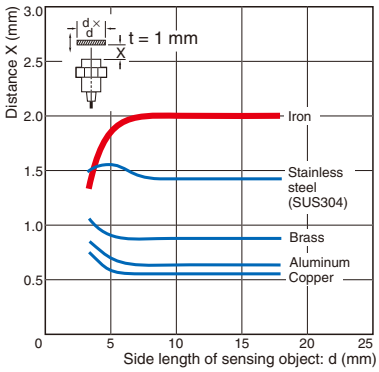


E2E-X□ME□/-X□MY□/-X□MF1

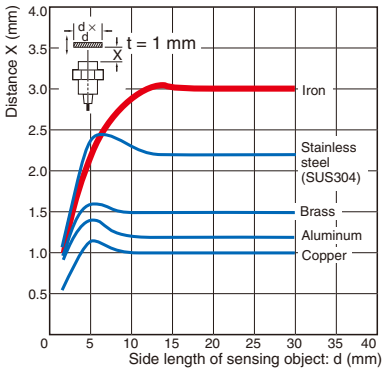


Influence of Sensing Object Size and Material

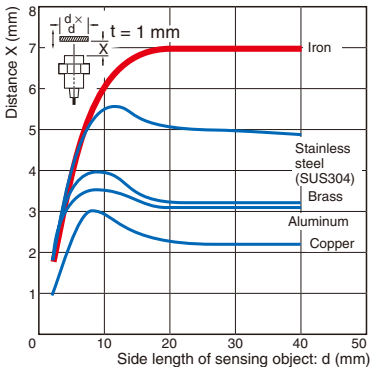
E2E-X2D□



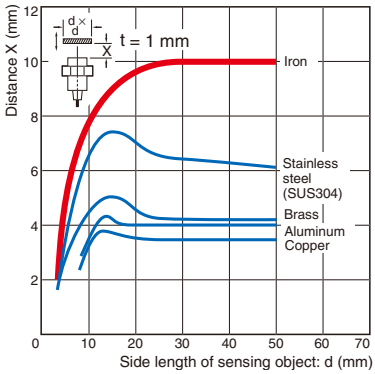
E2E-X3D□/-X3T1



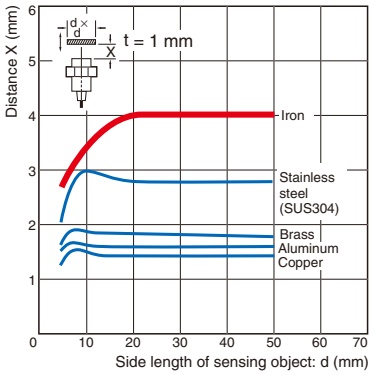
E2E-X7D□/-X7T1



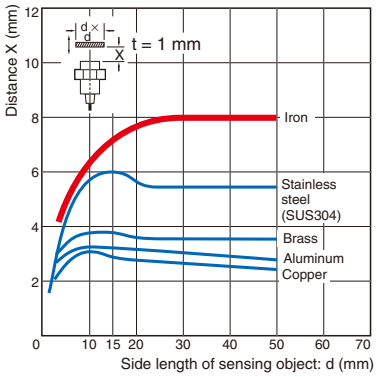
E2E-X10D□/-X10T1



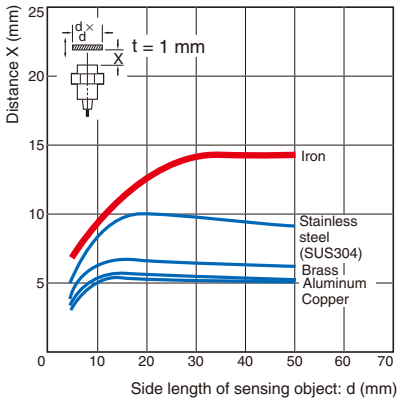
E2E-X4MD□



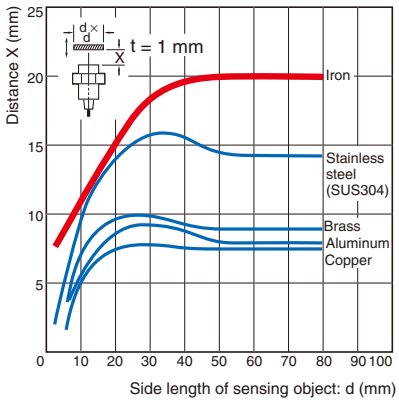
E2E-X8MD□



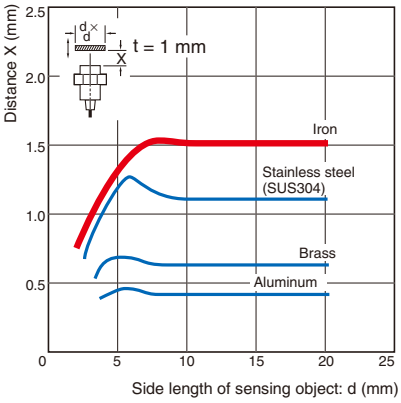
E2E-X14MD□



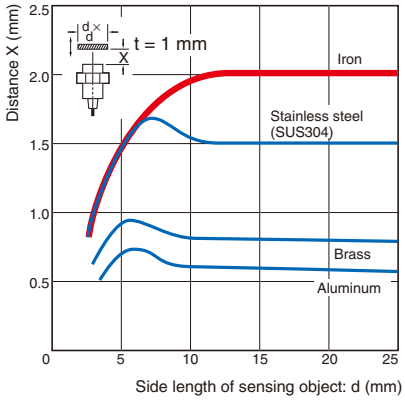
E2E-X20MD□



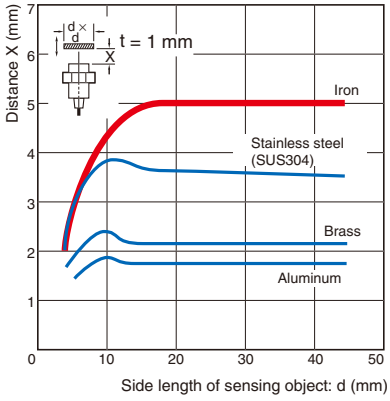
E2E-X1R5E□/-X1R5Y□/-X1R5F1



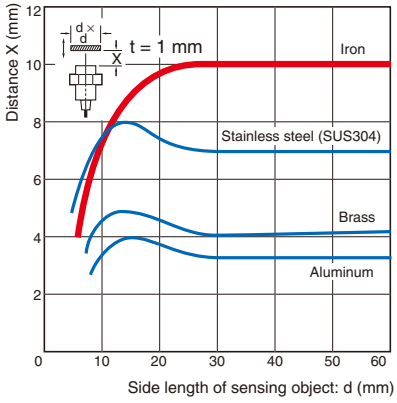
E2E-X2E□/-X2Y□/-X2F1



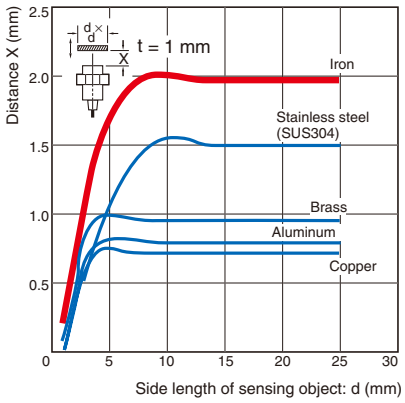
E2E-X5E□/-X5Y□/-X5F1



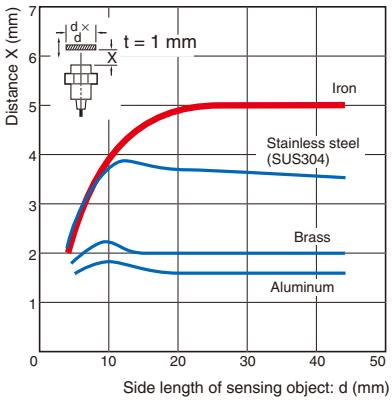
E2E-X10E□/-X10Y□/-X10F1



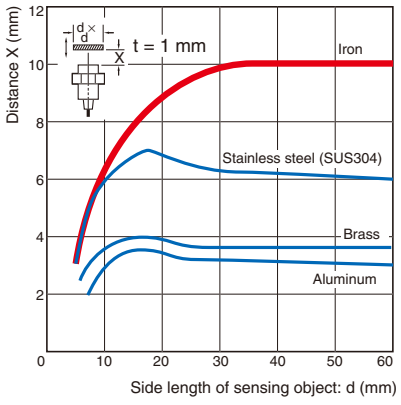
E2E-X2ME□/-X2MY□/-X2MF1



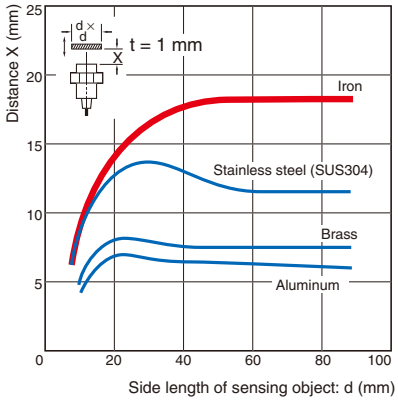
E2E-X5ME□/-X5MY□/-X5MF1



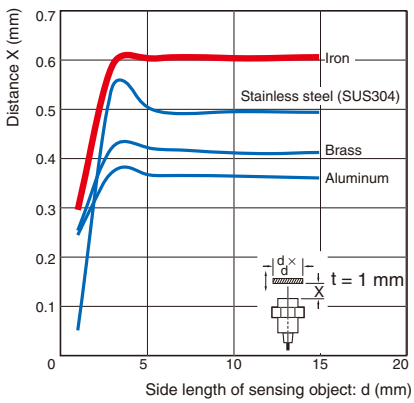
E2E-X10ME□/-X10MY□/-X10MF1



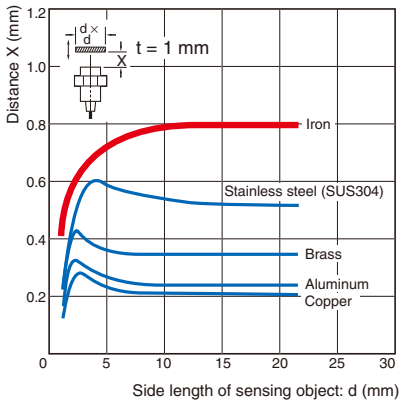
E2E-X18ME□/-X18MY□/-X18MF1



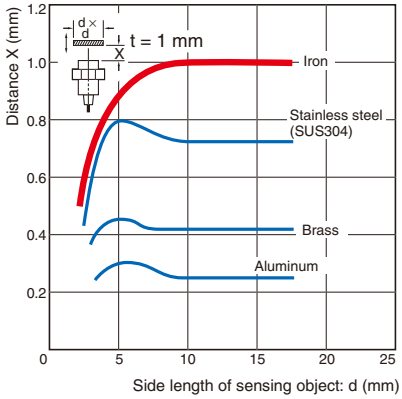
E2E-CR6□



E2E-CR8□

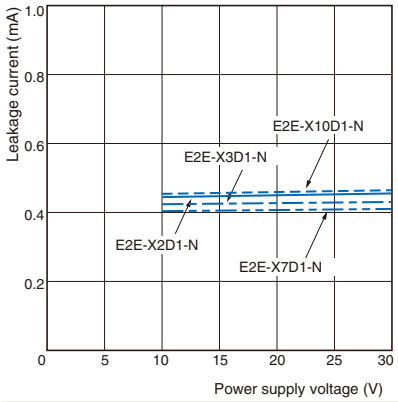


E2E-X1□/-C1□

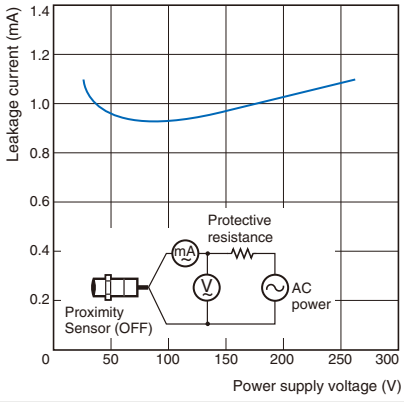


Leakage Current

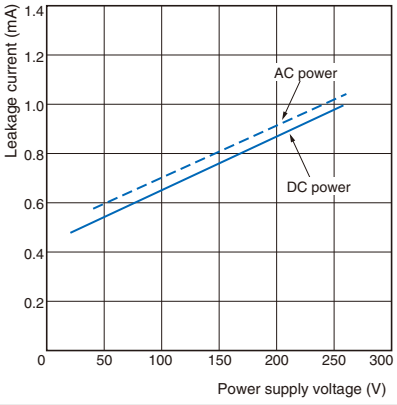
E2E-X□D□



E2E-X□Y□

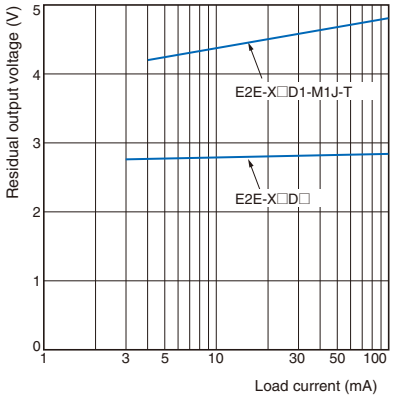


E2E-X□T1

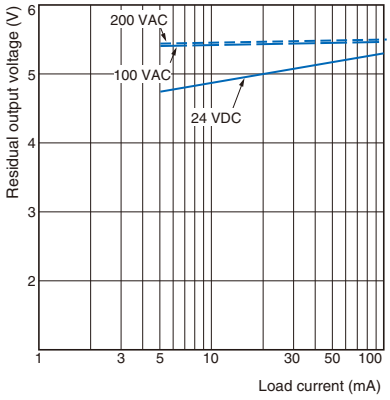


Residual Output Voltage

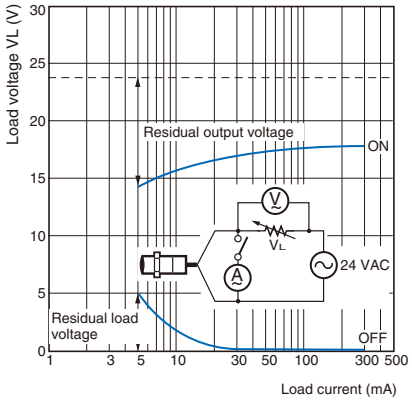
E2E-X□D□



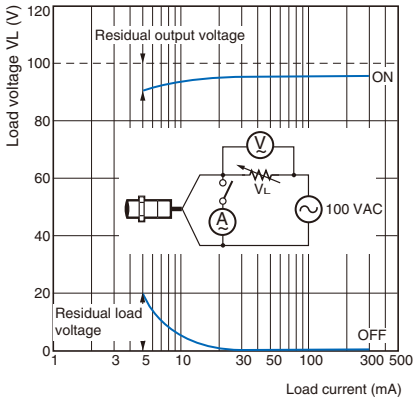
E2E-X□T1



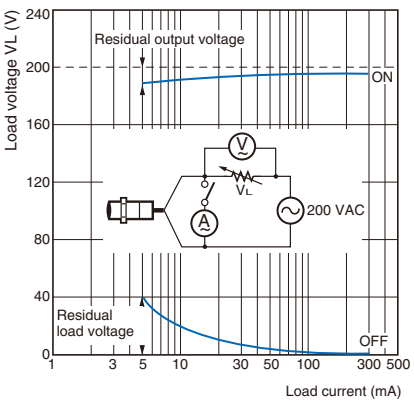
E2E-X□Y□ at 24 VAC



E2E-X□Y□ at 100 VAC

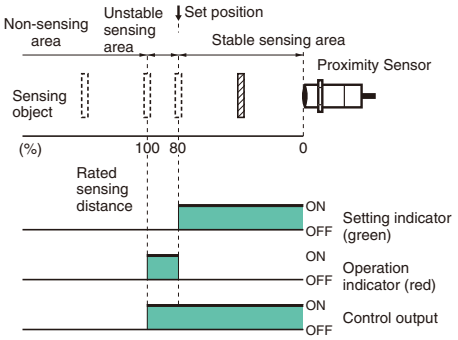
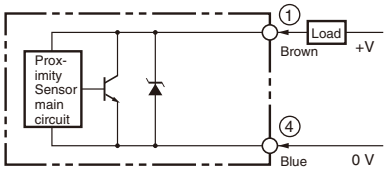


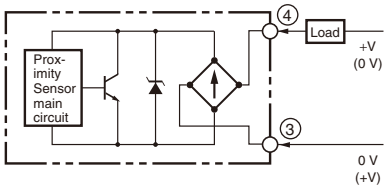
E2E-X□Y□ at 200 VAC

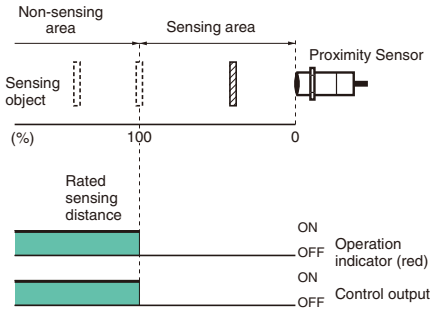
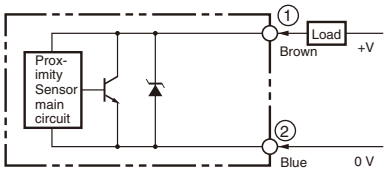


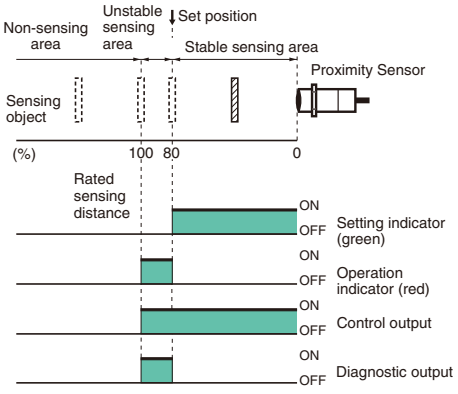
I/O Circuit Diagrams

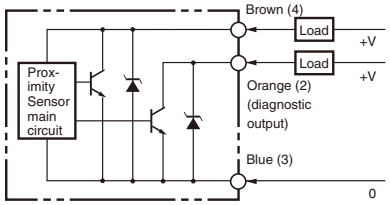
E2E-X□D□ DC 2-Wire Models

<table>
<tr><th>Operation mode</th><th>Model</th><th>Timing Chart</th><th>Output circuit</th></tr>
<tr><td rowspan="2">Without self-diagnostic output: NO</td><td>E2E-X□D1-N
E2E-X□D1-M1G(J)
E2E-X□D1-(M1TGJ)-U
E2E-X□D1-M3G</td><td rowspan="2"> 
</td><td>Polarity: Yes
 

Note: The load can be connected to either the +V or 0 V side.</td></tr>
<tr><td>E2E-X□D1-M1J-T</td><td>Polarity: None
 

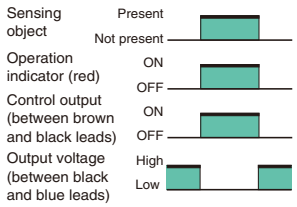
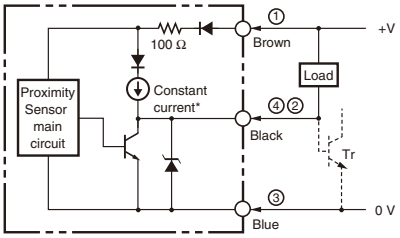
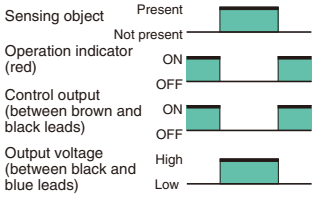
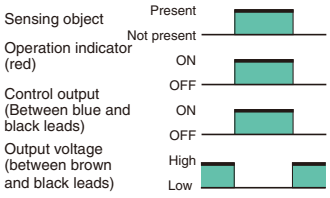
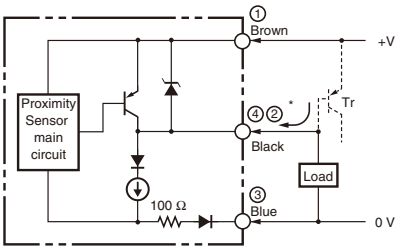
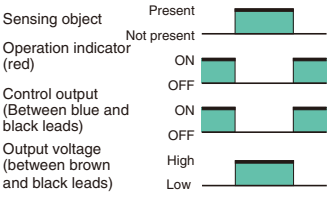
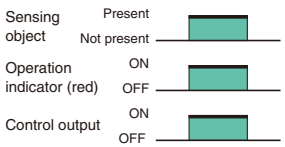
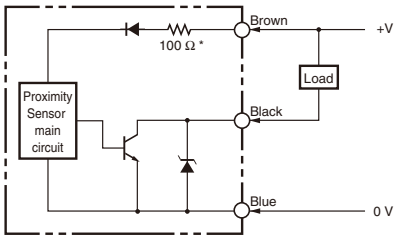
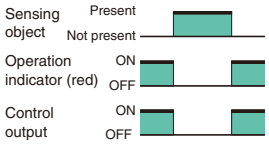
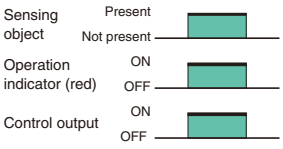
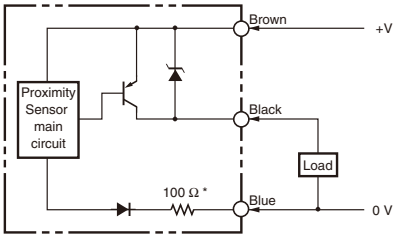
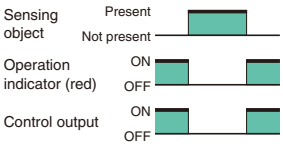
Note 1. The load can be connected to either the +V or 0 V side.
2. The E2E-X□D1-M1J-T has no polarity. Therefore, terminals 3 and 4 have no polarity.</td></tr>
<tr><td>Without self-diagnostic output: NC</td><td>E2E-X□D2-N
E2E-X□D2-M1G
E2E-X□D2-(M1TGJ)-U
E2E-X□D2-M3G</td><td> 
</td><td> 

Note: The load can be connected to either the +V or 0 V side.</td></tr>
<tr><td>With self-diagnostic output: NO</td><td>E2E-X□D1S
E2E-X□D1S-M1</td><td> 

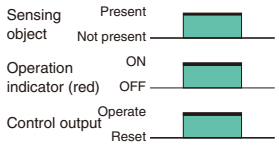
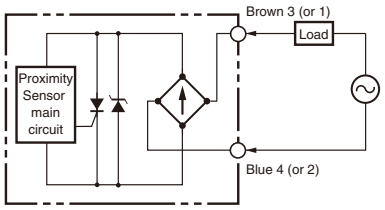
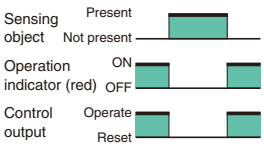
The diagnostic output is ON when there is a coil burnout or the sensing object is located in the unstable sensing area for 0.3 s or longer.</td><td> 

Note: Connect both the loads to the +V side of the control output and diagnostic output.</td></tr>
</table>

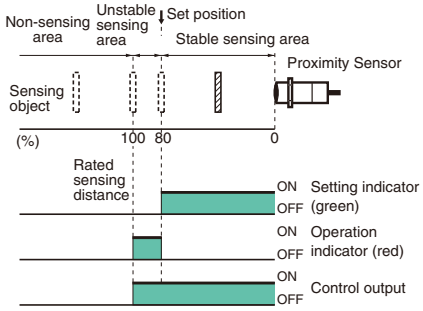
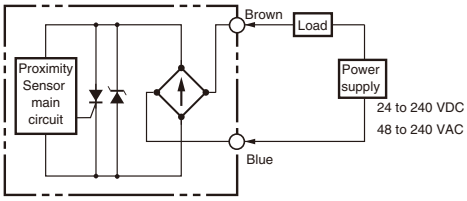
DC 3-Wire Models

Operation mode	Output specifications	Model	Timing Chart	Output circuit
NO	NPN output	E2E-X□E□ E2E-X□E□-M1 E2E-X□E□-M3		 *Constant current output is 1.5 to 3 mA. Note: For Connector Models, the connection between pins 1, 4 and 3 uses an NO contact, and the connection between pins 1, 2 and 3 uses an NC contact.
NC				
NO	PNP output	E2E-X□F□ E2E-X□F□-M1 E2E-X□F□-M3		 *When a transistor is connected Note: For Connector Models, the connection between pins 1, 4 and 3 uses an NO contact, and the connection between pins 1, 2 and 3 uses an NC contact.
NC				
NO	NPN open-collector output	E2E-C/X□C□		 *The E2E-CR6□ does not have 100-Ω resistance.
NC				
NO	PNP open-collector output	E2E-C/X□B□		 *The E2E-CR6□ does not have 100-Ω resistance.
NC				

AC 2-Wire Models

Operation mode	Model	Timing Chart	Output circuit
NO	E2E-X□Y□ E2E-X□Y□-M1		
NC			Note: For Connector Models, the connection between pins 3 and 4 uses an NO contact, and the connection between pins 1 and 2 uses an NC contact.

AC/DC 2-Wire Models

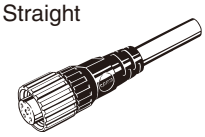
Operation mode	Model	Timing Chart	Output circuit
NO	E2E-X□T1		 Note: The load can be connected to either the +V or 0 V side. There is no need to be concerned about the polarity (brown/blue) of the Proximity Sensor.

Applicable e-CON Connector Models and Manufacturers

The companies and model number of e-CON connections that can be used with Sensor cables are listed in the following table. Confirm applicability when purchasing e-CON connectors for connection to Pre-wired Sensors.

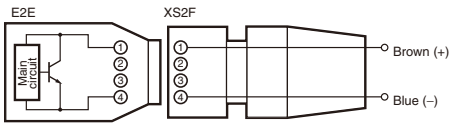
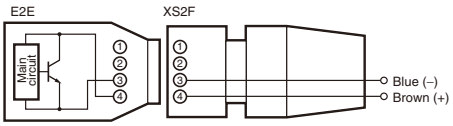
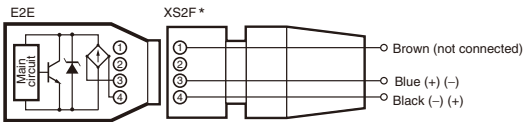
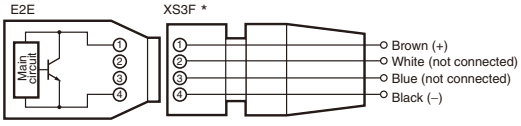
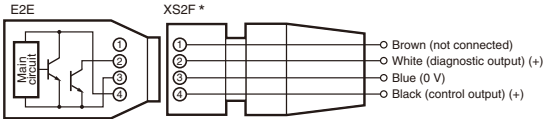
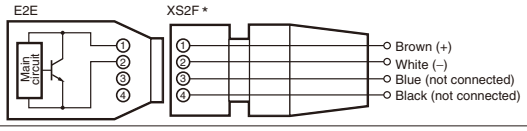
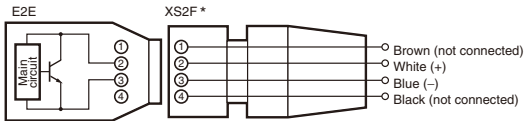
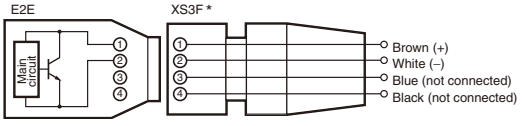
Model	Sumitomo 3M Co.	Tyco Electronics AMP K.K.
E2E-X1R5E/F□, E2E-X2ME□/F□	37104-3163-000FL (orange)	2-1473562-4 (blue)
E2E-X2E/F□, E2E-X5ME□/F□	37104-3163-000FL (orange)	2-1473562-4 (blue)
E2E-X5E/F□, E2E-X10ME□/F□	37104-2206-000FL (gray)	---
E2E-X10E/F□, E2E-X18ME/F□	37104-2206-000FL (gray)	---

Sensor I/O Connectors

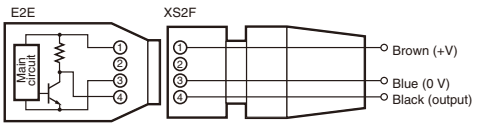
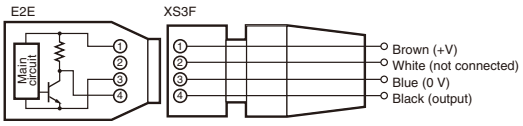
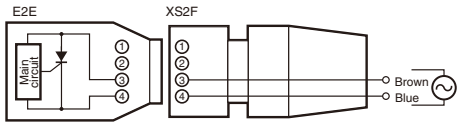
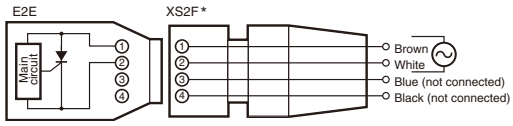
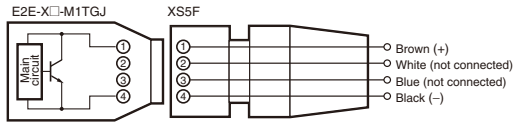
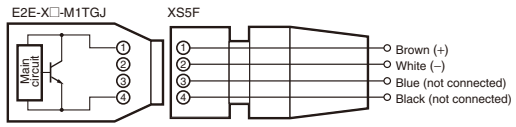
Connector			Applicable connector code	Connector model number	Applicable Proximity Sensor model number	Connection diagram No. *1
Screw	Appearance	Cable length				
M12	Straight 	2 m	A	**XS2F-D421-DA0-A**	E2E-X□D1-M1G	1
					E2E-X□D1-M1GJ	
			B	**XS2F-D421-DC0-A**	E2E-X□D1-M1J-T	3
					E2E-X□E/F1-M1	9
			C	**XS2F-D421-DD0**	E2E-X□D1-M1	2
			D	**XS2F-D421-D80-A**	E2E-X□D2-M1	7
					E2E-X□D2-M1(G)	6
					E2E-X□D1S-M1	5
			E	**XS2F-A421-DB0-A**	E2E-X□Y1-M1	11
			F	**XS2F-A421-D90-A**	E2E-X□Y2-M1	12
		5 m	A	**XS2F-D421-GA0-A**	E2E-X□D1-M1G	1
					E2E-X□D1-M1GJ	
			B	**XS2F-D421-GC0-A**	E2E-X□D1-M1J-T	3
					E2E-X□E/F1-M1	9
			C	**XS2F-D421-GD0**	E2E-X□D1-M1	2
			D	**XS2F-D421-G80-A**	E2E-X□D2-M1	7
					E2E-X□D2-M1(G)	6
					E2E-X□D1S-M1	5
			E	**XS2F-A421-GB0-A**	E2E-X□Y1-M1	11
			F	**XS2F-A421-G90-A**	E2E-X□Y2-M1	12
	L-shape 	2 m	A	**XS2F-D422-DA0-A**	E2E-X□D1-M1G	1
					E2E-X□D1-M1GJ	
			B	**XS2F-D422-DC0-A**	E2E-X□D1-M1J-T	3
					E2E-X□E/F1-M1	9
			C	**XS2F-D422-DD0**	E2E-X□D1-M1	2
			D	**XS2F-D422-D80-A**	E2E-X□D2-M1	7
					E2E-X□D2-M1(G)	6
					E2E-X□D1S-M1	5
			E	**XS2F-A422-DB0-A**	E2E-X□Y1-M1	11
		5 m	A	**XS2F-D422-GA0-A**	E2E-X□D1-M1G	1
					E2E-X□D1-M1GJ	
			B	**XS2F-D422-GC0-A**	E2E-X□D1-M1J-T	3
					E2E-X□E/F1-M1	9
			C	**XS2F-D422-GD0**	E2E-X□D1-M1	2
			D	**XS2F-D422-G80-A**	E2E-X□D2-M1	7
					E2E-X□D2-M1(G)	6
					E2E-X□D1S-M1	5
			E	**XS2F-A422-GB0-A**	E2E-X□Y1-M1	11
	Smartclick Connector, Straight 	2 m	H	**XS5F-D421-D80-P**	E2E-X□D□-M1TGJ-U	13, 14
		5 m		**XS5F-D421-G80-P**		
M8 *2	Straight 	2 m	G	**XS3F-M421-402-R**	E2E-X□D1-M3G	4
					E2E-X□D2-M3G	8
					E2E-X□E/F1-M3	10
		5 m		**XS3F-M421-405-R**	E2E-X□D1-M3G	4
					E2E-X□D2-M3G	8
					E2E-X□E/F1-M3	10
	L-shape 	2 m		**XS3F-M422-402-R**	E2E-X□D1-M3G	4
					E2E-X□D2-M3G	8
					E2E-X□E/F1-M3	10
		5 m		**XS3F-M422-405-R**	E2E-X□D1-M3G	4
					E2E-X□D2-M3G	8
					E2E-X□E/F1-M3	10

*1. Refer to *Connection Diagrams* on page 20 for information on Proximity Sensor and I/O Connector connections.
*2. Refer to *Introduction to Sensor I/O Connectors* for details and for information on Robotics Cables.

Connections for Sensor I/O Connectors

Connection diagram No.	Proximity Sensor			Sensor I/O Connector model number	Connections
	Type	Operation mode	Model		
1	DC 2-wire (IEC pin wiring)	NO	E2E-X□D1-M1G(J)	1: Straight 2: L-shape XS2F-D42□-□A0-A D: 2-m cable G: 5-m cable	
2	DC 2-wire (previous pin wiring)		E2E-X□D1-M1	1: Straight 2: L-shape XS2F-D42□-□D0 D: 2-m cable G: 5-m cable	
3	DC 2-wire (no polarity)		E2E-X□D1-M1J-T	1: Straight 2: L-shape XS2F-D42□-□C0-A D: 2-m cable G: 5-m cable	
4	DC 2-wire (M8 connector)		E2E-X□D1-M3G	1: Straight 2: L-shape XS3F-M42□-40□-R 2: 2-m cable 5: 5-m cable	
5	DC 2-wire (diagnostic type)		E2E-X□D1S-M1	1: Straight 2: L-shape XS2F-D42□-□80-A D: 2-m cable G: 5-m cable	
6	DC 2-wire (IEC pin wiring)	NC	E2E-X□D2-M1G	1: Straight 2: L-shape XS2F-D42□-□80-A D: 2-m cable G: 5-m cable	
7	DC 2-wire (previous pin wiring)		E2E-X□D2-M1	1: Straight 2: L-shape XS2F-D42□-□80-A D: 2-m cable G: 5-m cable	
8	DC 2-wire (M8 connector)		E2E-X□D2-M3G	1: Straight 2: L-shape XS3F-M42□-40□-R 2: 2-m cable 5: 5-m cable	

* Different from Proximity Sensor wire colors.

Connection diagram No.	Proximity Sensor			Sensor I/O Connector model number	Connections
	Type	Operation mode	Model		
9	DC 3-wire	NO	E2E-X□E/F1-M1	1: Straight 2: L-shape XS2F-D42□-□C0-A D: 2-m cable G: 5-m cable	
10	DC 3-wire (M8 connector)		E2E-X□E/F1-M3	1: Straight 2: L-shape XS3F-M42□-40□-R 2: 2-m cable 5: 5-m cable	
11	AC 2-wire	NO	E2E-X□Y1-M1	1: Straight 2: L-shape XS2F-A42□-□B0-A D: 2-m cable G: 5-m cable	
12		NC	E2E-X□Y2-M1	XS2F-A421-□90-A D: 2-m cable G: 5-m cable	
13	DC 2-wire (Smartclick connector)	NO	E2E-X□D1-M1TGJ-U	XS5F-D421-□80-P D: 2-m cable G: 5-m cable	
14	DC 2-wire (Smartclick connector)	NC	E2E-X□D2-M1TGJ-U	XS5F-D421-□80-P D: 2-m cable G: 5-m cable	

* Different from Proximity Sensor wire colors.

Refer to *Introduction to Sensor I/O Connectors* for details.

Safety Precautions

Refer to *Warranty and Limitations of Liability*.

⚠ WARNING

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

⚠ CAUTION

- Do not short the load. Explosion or burning may result.
- Do not supply power to the Sensor with no load, otherwise Sensor may be damaged.

Applicable Models

E2E-CR6□
E2E-CR8□
E2E-X1□
E2E-C1□

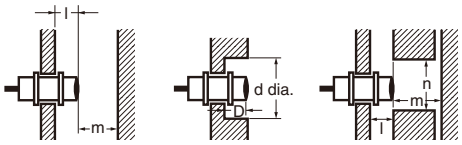
Precautions for Correct Use

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

● Design

Influence of Surrounding Metal

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



Influence of Surrounding Metal (Unit: mm)

Model		Item	M8	M12	M18	M30
DC 2-Wire Models E2E-X□D□ / AC/DC 2-Wire Models E2E-X□T1	Shielded	l	0			
		d	8	12	18	30
		D	0			
		m	4.5	8	20	40
		n	12	18	27	45
	Unshielded	l	12	15	22	30
		d	24	40	70	90
		D	12	15	22	30
		m	8	20	40	70
		n	24	40	70	90
DC 3-Wire Models E2E-X□E□ E2E-X□F1 / AC 2-Wire Models E2E-X□Y□	Shielded	l	0			
		d	8	12	18	30
		D	0			
		m	4.5	8	20	40
		n	12	18	27	45
	Unshielded	l	6	15	22	30
		d	24	40	55	90
		D	6	15	22	30
		m	8	20	40	70
		n	24	36	54	90

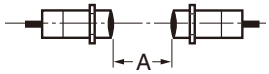
Model		Item	3 dia.	4 dia.	M5	5.4 dia.
DC 3-Wire Models E2E-X□C/B□ E2E-C□C/B□	Shielded	l	0			
		d	3	4	5	5.4
		D	0			
		m	2	2.4	3	
		n	6		8	

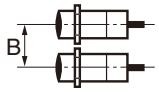
Relationship between Sizes and Models

Model		Model
3 dia.	Shielded	E2E-CR6C/B
4 dia.		E2E-CR8C□
		E2E-CR8B1
M5		E2E-X1C□
		E2E-X1B1
5.4 dia.		E2E-C1C□
		E2E-C1B1
M8	Shielded	E2E-X2D□
		E2E-X1R5E□
		E2E-X1R5F□
		E2E-X1R5Y□
	Unshielded	E2E-X4MD□
		E2E-X2ME□
		E2E-X2MF□
		E2E-X2MY□
M12	Shielded	E2E-X3D□
		E2E-X2E□
		E2E-X2F□
		E2E-X2Y□
		E2E-X3T1
	Unshielded	E2E-X8MD□
		E2E-X5ME□
		E2E-X5MF□
		E2E-X5MY□
M18	Shielded	E2E-X7D□
		E2E-X5E□
		E2E-X5F□
		E2E-X5Y□
		E2E-X7T1
	Unshielded	E2E-X14MD□
		E2E-X10ME□
		E2E-X10MF□
		E2E-X10MY□
M30	Shielded	E2E-X10D□
		E2E-X10E□
		E2E-X10F□
		E2E-X10Y□
		E2E-X10T1
	Unshielded	E2E-X20MD□
		E2E-X18ME□
		E2E-X18MF□

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	M8	M12	M18	M30
DC 2-Wire Models E2E-X□D□	Shielded	A	20	30 (20)	50 (30)	100 (50)
		B	15	20 (12)	35 (18)	70 (35)
AC/DC 2-Wire Models E2E-X□T1	Unshielded	A	80	120 (60)	200 (100)	300 (100)
		B	60	100 (50)	110 (60)	200 (100)
DC 3-Wire Models E2E-X□E□/X□F□	Shielded	A	20	30 (20)	50 (30)	100 (50)
		B	15	20 (12)	35 (18)	70 (35)
AC 2-Wire Models E2E-X□Y□	Unshielded	A	80	120 (60)	200 (100)	300 (100)
		B	60	100 (50)	110 (60)	200 (100)

Model		Item	3 dia.	4 dia.	M5	5.4 dia.
DC 3-Wire Models E2E-X□C/B□ E2E-C□C/B□	Shielded	A	20			
		B	15			

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

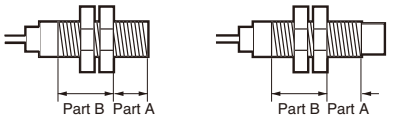
Loads with Large Surge Currents (E2E-X□T□)

If a load with a large surge current is connected, such as a relay, lamp, or motor, the surge current may cause the load short-circuit protection circuit to operate, resulting in operating errors.

● Mounting

Tightening Force

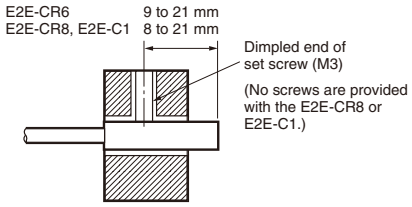
Do not tighten the nut with excessive force.
A washer must be used with the nut.



Note: 1. The allowable tightening strength depends on the distance from the edge of the head, as shown in the following table. (A is the distance from the edge of the head. B includes the nut on the head side. If the edge of the nut is in part A, the tightening torque for part A applies instead.)
2. The following strengths assume washers are being used.

Model		Part A		Part B
		Dimension	Torque	Torque
M5		1 N·m		
M8	Shielded	9	9 N·m	12 N·m
	Unshielded	3		
M12		30 N·m		
M18		70 N·m		
M30		180 N·m		

Refer to the following to mount the E2E-CR6, E2E-CR8 and E2E-C1 Unthreaded Cylindrical Models.



When using a set screw, tighten it to a torque of 0.2 N·m max. (E2E-C1: 0.4 N·m max.)

Connecting a DC 2-Wire Proximity Sensor to a PLC (Programmable Controller)

Required Conditions

Connection to a PLC is possible if the specifications of the PLC and the Proximity Sensor satisfy the following conditions. (The meanings of the symbols are given at the right.)

1. The ON voltage of the PLC and the residual voltage of the Proximity Sensor must satisfy the following.
   $V_{ON} \leq V_{CC} - V_R$
2. The OFF current of the PLC and the leakage current of the Proximity Sensor must satisfy the following.
   $I_{OFF} \geq I_{leak}$
   (If the OFF current is not listed in the PLC's input specifications, take it to be 1.3 mA.)
3. The ON current of the PLC and the control output of the Proximity Sensor must satisfy the following.
   I_{OUT} (min.) $\leq I_{ON} \leq I_{OUT}$ (max.)
   The ON current of the PLC will vary, however, with the power supply voltage and the input impedance, as shown in the following equation.
   $I_{ON} = (V_{CC} - V_R - \underline{V_{PC}})/R_{IN}$

V_{ON}: ON voltage of PLC (14.4 V)
I_{ON}: ON current of PLC (typically 7 mA)
I_{OFF}: OFF current of PLC (1.3 mA)
R_{IN}: Input impedance of PLC (3 kΩ)
$\underline{V_{PC}}$: Internal residual voltage of PLC (4 V)
V_R: Output residual voltage of Proximity Sensor (3 V)
I_{leak}: Leakage current of Proximity Sensor (0.8 mA)
I_{OUT} Control output of Proximity Sensor (3 to 100 mA)
V_{CC}: Power supply voltage (PLC: 20.4 to 26.4 V)
Values in parentheses apply to the following PLC model and Proximity Sensor model.
PLC: C200H-ID212
Sensor: E2E-X7D1-N

Example

In this example, the above conditions are checked when the PLC Unit is the C200H-ID212, the Proximity Sensor is the E2E-X7D1-N, and the power supply voltage is 24 V.

1. V_{ON} (14.4 V) $\leq V_{CC}$ (20.4 V) $- V_R$ (3 V) = 17.4 V:OK
2. I_{OFF} (1.3 mA) $\geq I_{leak}$ (0.8 mA): OK
3. $I_{ON} = [V_{CC}$ (20.4 V) $- V_R$ (3 V) $- \underline{V_{PLC}}$ (4 V)$]/R_{IN}$ (3 kΩ) = Approx. 4.5 mA
   Therefore, I_{OUT} (min.) (3 mA) $\leq I_{ON}$ (4.5 mA): OK
   Connection is thus possible.

Dimensions (Unit: mm)

Main Units

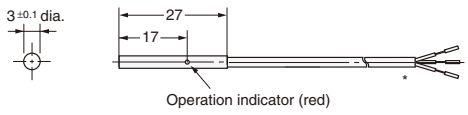
Model Number-Dimensions Drawing Number Lookup Table

Model	Shielded		DC 2-Wire Models		DC 3-Wire Models		AC 2-Wire Models		AC/DC 2-Wire Models	
			Model	No.	Model	No.	Model	No.	Model	No.
Pre-wired Models	Shielded	3 dia.	---		E2E-CR6□	1	---		---	
		4 dia.			E2E-CR8□	2				
		M5			E2E-X1□	4				
		5.4 dia.			E2E-C1□	3				
		M8	E2E-X2D□	5	E2E-X1R5E□/F□	5	E2E-X1R5Y□	7		
		M12	E2E-X3D□	9	E2E-X2E□/F□	9	E2E-X2Y□	11	E2E-X3T1	13
		M18	E2E-X7D□	14	E2E-X5E□/F□	14	E2E-X5Y□	14	E2E-X7T1	14
		M30	E2E-X10D□	16	E2E-X10E□/F□	16	E2E-X10Y□	16	E2E-X10T1	16
	Unshielded	M8	E2E-X4MD□	6	E2E-X2ME□/F□	6	E2E-X2MY□	8	---	
		M12	E2E-X8MD□	10	E2E-X5ME□/F□	10	E2E-X5MY□	12		
		M18	E2E-X14MD□	15	E2E-X10ME□/F□	15	E2E-X10MY□	15		
		M30	E2E-X20MD□	17	E2E-X18ME□/F□	17	E2E-X18MY□	17		
Connector Models (M12)	Shielded	M8	E2E-X2D□-M1(G)	18	E2E-X1R5E1-M1	18	---		---	
		M12	E2E-X3D□-M1(G)	20	E2E-X2E/F1-M1	20	E2E-X2Y□-M1	22		
		M18	E2E-X7D□-M1(G)	24	E2E-X5E/F1-M1	24	E2E-X5Y□-M1	24		
		M30	E2E-X10D□-M1(G)	26	E2E-X10E/F1-M1	26	E2E-X10Y□-M1	26		
	Unshielded	M8	E2E-X4MD□-M1(G)	19	E2E-X2ME/F1-M1	19	---		---	
		M12	E2E-X8MD□-M1(G)	21	E2E-X5ME/F1-M1	21	E2E-X5MY□-M1	23		
		M18	E2E-X14MD□-M1(G)	25	E2E-X10ME/F1-M1	25	E2E-X10MY□-M1	25		
		M30	E2E-X20MD□-M1(G)	27	E2E-X18ME/F1-M1	27	E2E-X18MY□-M1	27		
Connector Models (M8)	Shielded	M8	E2E-X2D□-M3G	28	E2E-X1R5E/F1-M3	28	---		---	
	Unshielded		E2E-X4MD□-M3G	29	E2E-X2ME/F1-M3	29				
Pre-wired Connector Models	Shielded	M8	E2E-X2D1-M1TGJ-U	30	---		---		---	
		M12	E2E-X3D1-M1(T)GJ(-U)	31						
		M18	E2E-X7D1-M1(T)GJ(-U)	33						
		M30	E2E-X10D1-M1(T)GJ(-U)	35						
	Unshielded	M12	E2E-X8MD1-M1GJ	32	---		---		---	
		M18	E2E-X14MD1-M1GJ	34						
		M30	E2E-X20MD1-M1GJ	36						
Pre-wired Connector Models (no polarity)	Shielded	M12	E2E-X3D1-M1J-T	31	---		---		---	
		M18	E2E-X7D1-M1J-T	33						
		M30	E2E-X10D1-M1J-T	35						

Note 1. Two clamping nuts and one toothed washer are provided with M8 to M30 Models.
2. The model numbers of M8 to M30 Pre-wired Models are laser-marked on the milled section and cable section. This does not apply, however, to models that end in -U.

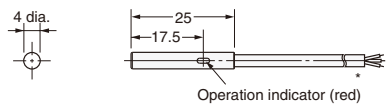
Pre-wired Models (Shielded)

Diagram 1 E2E-CR6□



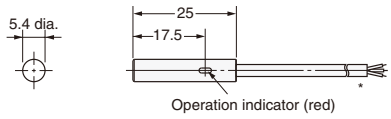
*2.4-dia. (7/0.127 dia.) vinyl-insulated round cable with 3 conductors, Standard length: 2 m

Diagram 2 E2E-CR8□



*2.9-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.14 mm^2, Insulator diameter: 0.9 mm), Standard length: 2 m
Robotics Cable Models:
2.9-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.15 mm^2, Insulator diameter: 1.05 mm), Standard length: 2 m
The cable can be extended up to 100 m (separate metal conduit).

Diagram 3 E2E-C1□

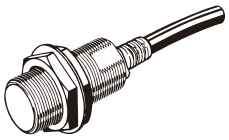


*2.9-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.14 mm^2, Insulator diameter: 0.9 mm), Standard length: 2 m
Robotics Cable Models:
2.9-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.15 mm^2, Insulator diameter: 1.05 mm), Standard length: 2 m
The cable can be extended up to 100 m (separate metal conduit).

Mounting Hole Dimensions

Dimension	3 dia.	4 dia.	5.4 dia.
F (mm)	$3.3^{+0.3}_{0}$ dia.	$4.2^{+0.5}_{0}$ dia.	$5.7^{+0.5}_{0}$ dia.

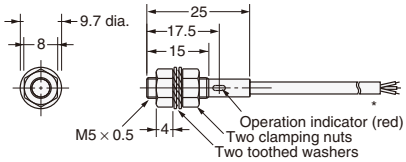
Pre-wired Models (Shielded)



Mounting Hole Dimensions

Dimension	M5	M8	M12
F (mm)	$5.5^{+0.5}_{0}$ dia.	$8.5^{+0.5}_{0}$ dia.	$12.5^{+0.5}_{0}$ dia.

Diagram 4 E2E-X1□



*2.9-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.14 mm², Insulator diameter: 0.9 mm), Standard length: 2 m
Robotics Cable Models:
2.9-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.15 mm², Insulator diameter: 1.05 mm), Standard length: 2 m
The cable can be extended up to 100 m (separate metal conduit).

Pre-wired Models (Unshielded)

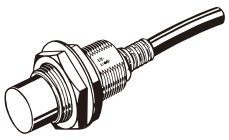
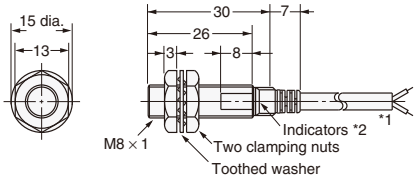
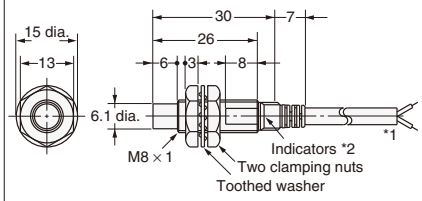


Diagram 5 E2E-X2D□ E2E-X1R5E□/F□



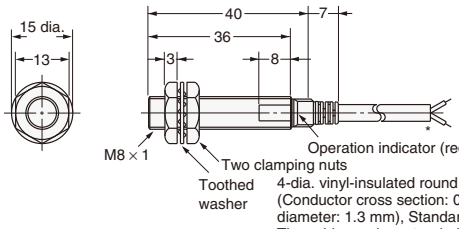
*1. 4-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.3 mm², Insulator diameter: 1.3 mm), Standard length: 2 m
4-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.3 mm², Insulator diameter: 1.3 mm), Standard length: 2 m
Robotics Cable Models:
4-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.3 mm², Insulator diameter: 1.27 mm), Standard length: 2 m
4-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.3 mm², Insulator diameter: 1.27 mm), Standard length: 2 m
Models with Highly Oil-resistant Cables:
4-dia. polyurethane-insulated round cable with 2 conductors (Conductor cross section: 0.3 mm², Insulator diameter: 1.3 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).
*2. D Models: Operation indicator (red) and setting indicator (green), E/F Models: Operation indicator (red)

Diagram 6 E2E-X4MD□ E2E-X2ME□/F□



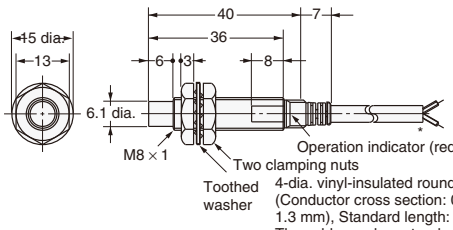
*1. 4-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.3 mm², Insulator diameter: 1.3 mm), Standard length: 2 m
4-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.3 mm², Insulator diameter: 1.3 mm), Standard length: 2 m
Robotics Cable Models:
4-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.3 mm², Insulator diameter: 1.27 mm), Standard length: 2 m
4-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.3 mm², Insulator diameter: 1.27 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).
*2. D Models: Operation indicator (red) and setting indicator (green), E/F Models: Operation indicator (red)

Diagram 7 E2E-X1R5Y□



4-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.3 mm², Insulator diameter: 1.3 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).

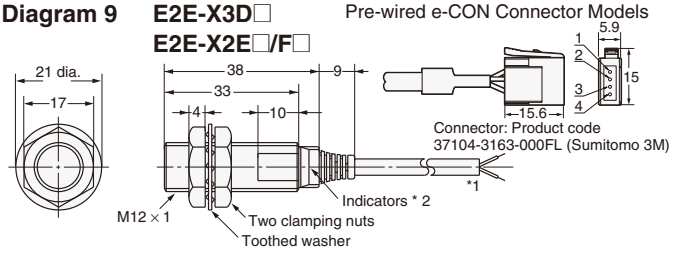
Diagram 8 E2E-X2MY□



4-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.3 mm², Insulator diameter: 1.3 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).

Diagram 9 E2E-X3D□ E2E-X2E□/F□

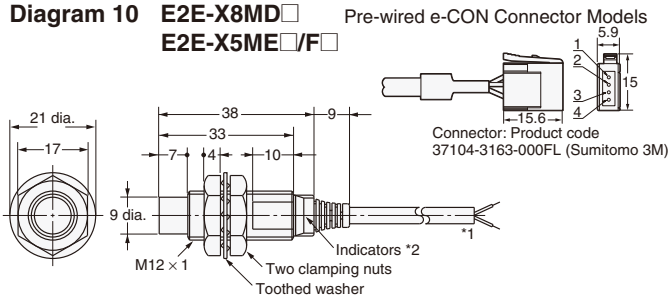
Pre-wired e-CON Connector Models



*1. 4-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.3 mm², Insulator diameter: 1.3 mm), Standard length: 2 m
4-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.3 mm², Insulator diameter: 1.3 mm), Standard length: 2 m
Robotics Cable Models:
4-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.3 mm², Insulator diameter: 1.27 mm), Standard length: 2 m
4-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.3 mm², Insulator diameter: 1.27 mm), Standard length: 2 m
Models with Highly Oil-resistant Cables:
4-dia. polyurethane-insulated round cable with 2 conductors (Conductor cross section: 0.3 mm², Insulator diameter: 1.3 mm), Standard length: 2 m
The cable can be extended (separate metal conduit) up to 200 m for the control output and up to 100 m for the diagnostic output.
*2. D Models: Operation indicator (red) and setting indicator (green), E/F Models: Operation indicator (red)

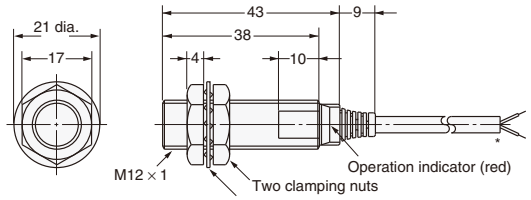
Diagram 10 E2E-X8MD□ E2E-X5ME□/F□

Pre-wired e-CON Connector Models



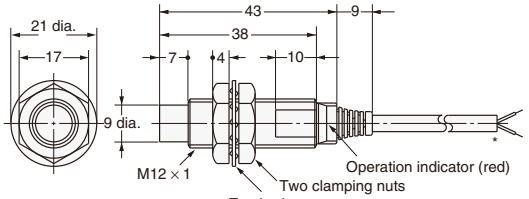
*1. 4-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.3 mm², Insulator diameter: 1.3 mm), Standard length: 2 m
4-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.3 mm², Insulator diameter: 1.3 mm), Standard length: 2 m
Robotics Cable Models:
4-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.3 mm², Insulator diameter: 1.27 mm), Standard length: 2 m
4-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.3 mm², Insulator diameter: 1.27 mm), Standard length: 2 m
The cable can be extended (separate metal conduit) up to 200 m for the control output and up to 100 m for the diagnostic output.
*2. D Models: Operation indicator (red) and setting indicator (green), E/F Models: Operation indicator (red)

Diagram 11 E2E-X2Y□



4-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.3 mm^2, Insulator diameter: 1.3 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).

Diagram 12 E2E-X5MY□



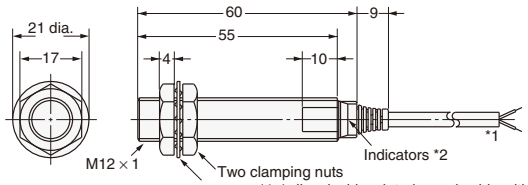
4-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.3 mm^2, Insulator diameter: 1.3 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).

Pre-wired Models (Shielded)

Mounting Hole Dimensions

Dimension	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.

Diagram 13 E2E-X3T1



*1 4-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.3 mm^2, Insulator diameter: 1.3 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).
*2 Operation indicator (red), Setting indicator (green)

Pre-wired Models (Unshielded)

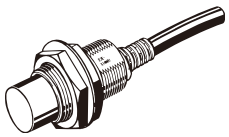
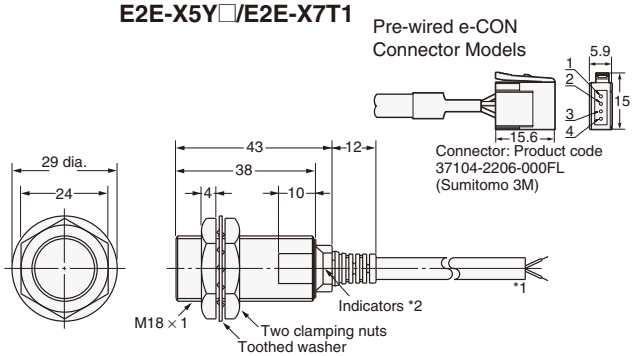
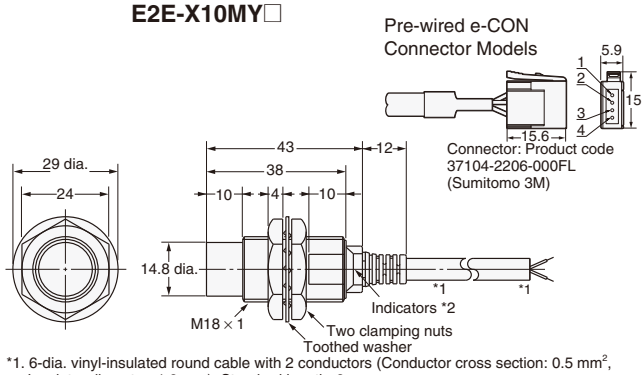


Diagram 14 E2E-X7D□/E2E-X5E□/F□ E2E-X5Y□/E2E-X7T1



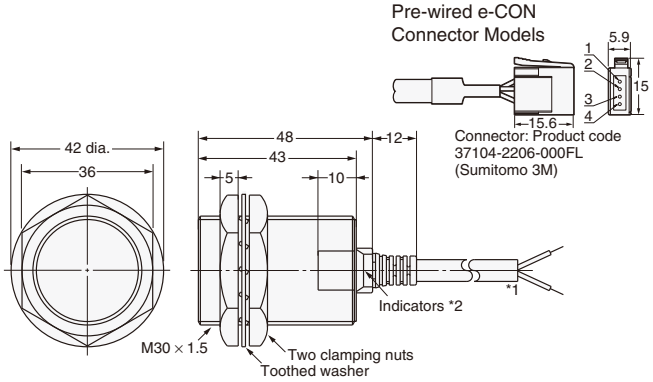
*1. 6-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.9 mm), Standard length: 2 m
6-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.9 mm), Standard length: 2 m
Robotics Cable Models:
6-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.74 mm), Standard length: 2 m
6-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.74 mm), Standard length: 2 m
Models with Highly Oil-resistant Cables:
6-dia. polyurethane-insulated round cable with 2 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.9 mm), Standard length: 2 m
The cable can be extended (separate metal conduit) up to 200 m for the control output and up to 100 m for the diagnostic output.
*2. D/T Models: Operation indicator (red), Setting indicator (green)
E/F/Y Models: Operation indicator (red)

Diagram 15 E2E-X14MD□/E2E-X10ME□/F□ E2E-X10MY□



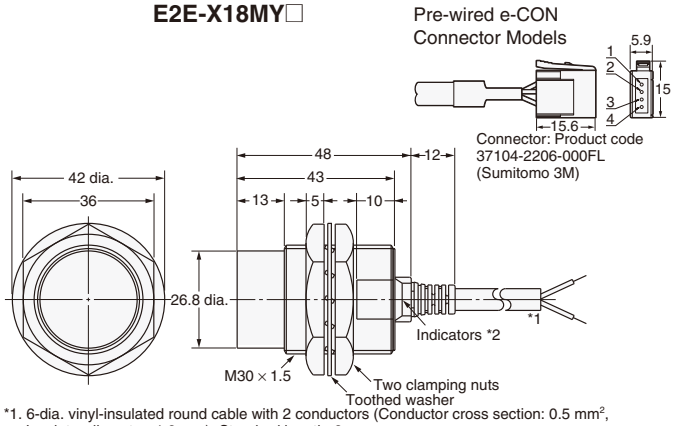
*1. 6-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.9 mm), Standard length: 2 m
6-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.9 mm), Standard length: 2 m
Robotics Cable Models:
6-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.74 mm), Standard length: 2 m
6-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.74 mm), Standard length: 2 m
The cable can be extended (separate metal conduit) up to 200 m for the control output and up to 100 m for the diagnostic output.
*2. D/T Models: Operation indicator (red), Setting indicator (green)
E/F/Y Models: Operation indicator (red)

Diagram 16 E2E-X10D□/E2E-X10E□/F□ E2E-X10Y□/E2E-X10T1



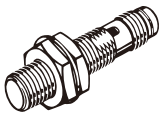
*1. 6-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.9 mm), Standard length: 2 m
6-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.9 mm), Standard length: 2 m
Robotics Cable Models:
6-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.74 mm), Standard length: 2 m
6-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.74 mm), Standard length: 2 m
Models with Highly Oil-resistant:
6-dia. polyurethane-insulated round cable with 2 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.9 mm), Standard length: 2 m
The cable can be extended (separate metal conduit) up to 200 m for the control output and up to 100 m for the diagnostic output.
*2. D/T Models: Operation indicator (red), Setting indicator (green)
E/F/Y Models: Operation indicator (red)

Diagram 17 E2E-X20MD□/E2E-X18ME□/F□ E2E-X18MY□



*1. 6-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.9 mm), Standard length: 2 m
6-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.9 mm), Standard length: 2 m
Robotics Cable Models:
6-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.74 mm), Standard length: 2 m
6-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.5 mm^2, Insulator diameter: 1.74 mm), Standard length: 2 m
The cable can be extended (separate metal conduit) up to 200 m for the control output and up to 100 m for the diagnostic output.
*2. D/T Models: Operation indicator (red), Setting indicator (green)
E/F/Y Models: Operation indicator (red)

M8 Connector Models (Shielded)



M8 Connector Models (Unshielded)

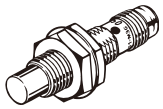
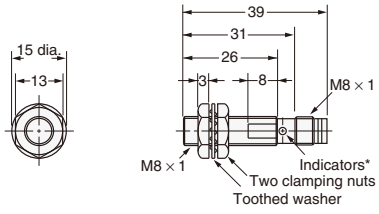
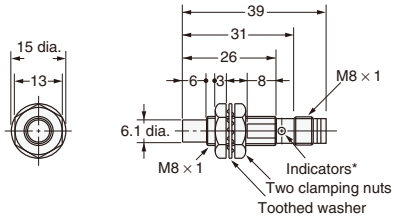


Diagram 28 E2E-X2D□-M3G/E2E-X1R5E1-M3/F□



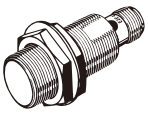
* D Models: Operation indicator (red), Setting indicator (green)
E/F Models: Operation indicator (red)

Diagram 29 E2E-X4MD□-M3G/E2E-X2ME1-M3/F□



* D Models: Operation indicator (red), Setting indicator (green)
E/F Models: Operation indicator (red)

M12 Connector Models (Shielded)



M12 Connector Models (Unshielded)

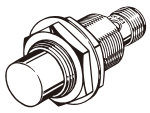
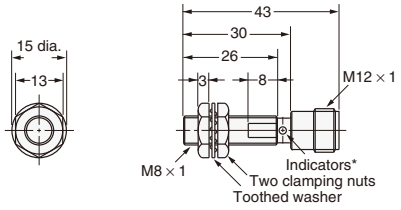
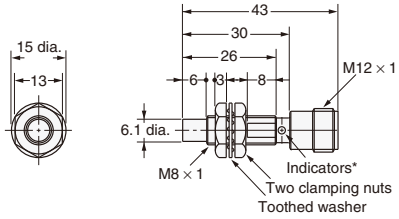


Diagram 18 E2E-X2D□-M1(G) E2E-X1R5E1-M1/F□



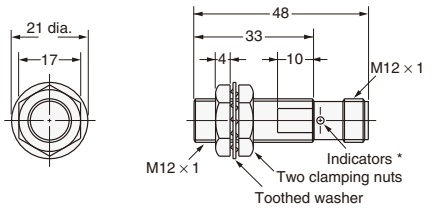
* D Models: Operation indicator (red), Setting indicator (green)
E/F Models: Operation indicator (red)

Diagram 19 E2E-X4MD□-M1(G) E2E-X2ME1-M1/F□



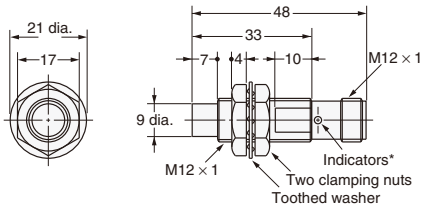
* D Models: Operation indicator (red), Setting indicator (green)
E/F Models: Operation indicator (red)

Diagram 20 E2E-X3D□-M1(G) E2E-X2E1-M1/F□



* D Models: Operation indicator (red), Setting indicator (green)
E/F Models: Operation indicator (red)

Diagram 21 E2E-X8MD□-M1(G) E2E-X5ME1-M1/F□



* D Models: Operation indicator (red), Setting indicator (green)
E/F Models: Operation indicator (red)

Diagram 22 E2E-X2Y□-M1

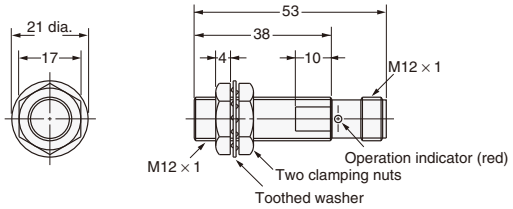


Diagram 23 E2E-X5MY□-M1

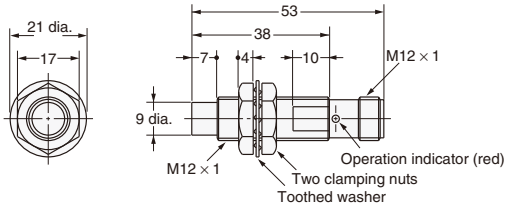
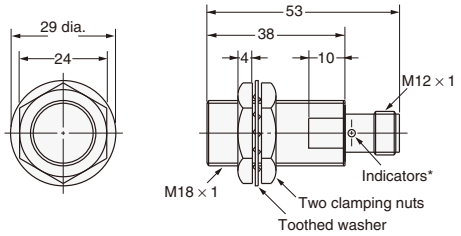
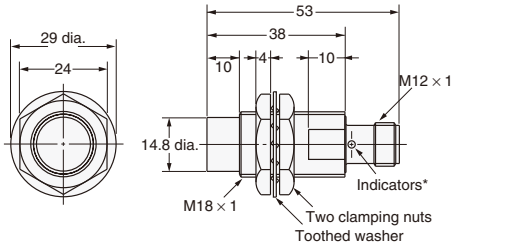


Diagram 24 E2E-X7D□-M1(G)/E2E-X5E1-M1 E2E-X5Y□-M1



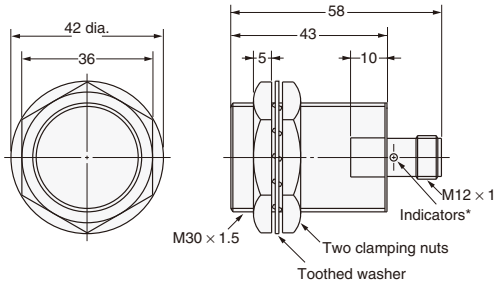
* D Models: Operation indicator (red), Setting indicator (green)
E/Y Models: Operation indicator (red)

Diagram 25 E2E-X14MD□-M1(G)/E2E-X10ME1-M1 E2E-X10MY□-M1



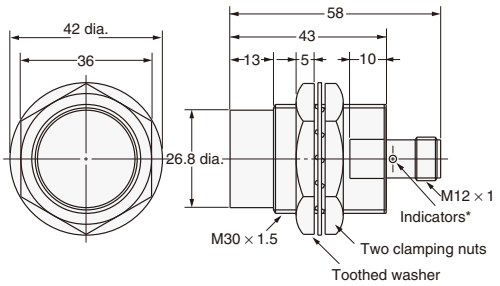
* D Models: Operation indicator (red), Setting indicator (green)
E/Y Models: Operation indicator (red)

Diagram 26 E2E-X10D□-M1(G)/E2E-X10E1-M1 E2E-X10Y□-M1



* D Models: Operation indicator (red), Setting indicator (green)
E/Y Models: Operation indicator (red)

Diagram 27 E2E-X20MD□-M1(G)/E2E-X18ME1-M1 E2E-X18MY□-M1

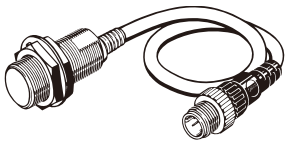


* D Models: Operation indicator (red), Setting indicator (green)
E/Y Models: Operation indicator (red)

Mounting Hole Dimensions

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.

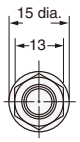
Pre-wired Connector Models (Shielded)

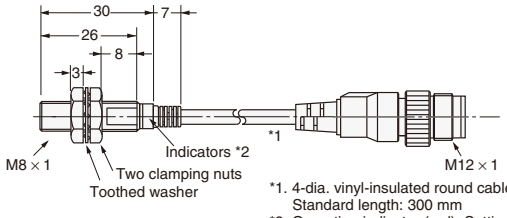


Mounting Hole Dimensions

Dimension	M12	M18	M30
F (mm)	$12.5^{+0.5}_{0}$ dia.	$18.5^{+0.5}_{0}$ dia.	$30.5^{+0.5}_{0}$ dia.

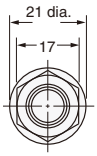
Diagram 30 E2E-X2D1-M1TGJ-U *3

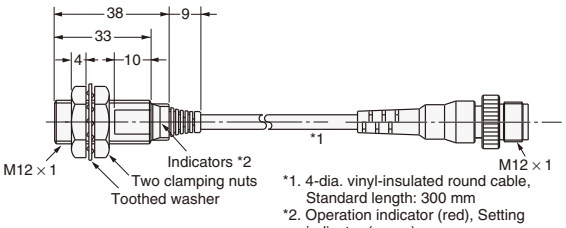




*1. 4-dia. vinyl-insulated round cable, Standard length: 300 mm
*2. Operation indicator (red), Setting indicator (green)
*3. The connectors for M1TGJ models are XS5 Smartclick connectors

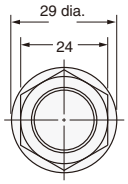
Diagram 31 E2E-X3D1-M1GJ / E2E-X3D1-M1J-T / E2E-X3D1-M1TGJ-U *3

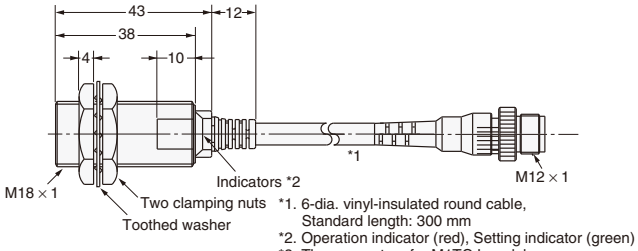




*1. 4-dia. vinyl-insulated round cable, Standard length: 300 mm
*2. Operation indicator (red), Setting indicator (green)
*3. The connectors for M1TGJ models are XS5 Smartclick connectors

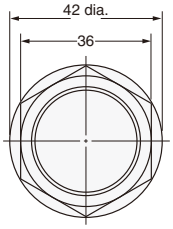
Diagram 33 E2E-X7D1-M1GJ / E2E-X7D1-M1J-T / E2E-X7D1-M1TGJ-U *3

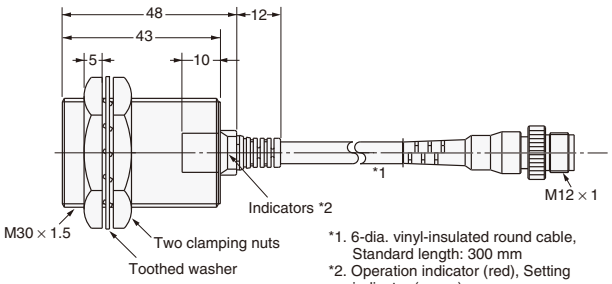




*1. 6-dia. vinyl-insulated round cable, Standard length: 300 mm
*2. Operation indicator (red), Setting indicator (green)
*3. The connectors for M1TGJ models are XS5 Smartclick connectors

Diagram 35 E2E-X10D1-M1GJ / E2E-X10D1-M1J-T / E2E-X10D1-M1TGJ-U *3

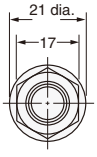


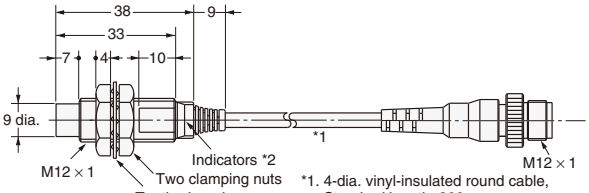


*1. 6-dia. vinyl-insulated round cable, Standard length: 300 mm
*2. Operation indicator (red), Setting indicator (green)
*3. The connectors for M1TGJ models are XS5 Smartclick connectors

Pre-wired Connector Models (Unshielded)

Diagram 32 E2E-X8MD1-M1GJ





*1. 4-dia. vinyl-insulated round cable, Standard length: 300 mm
*2. Operation indicator (red), Setting indicator (green)

Diagram 34 E2E-X14MD1-M1GJ

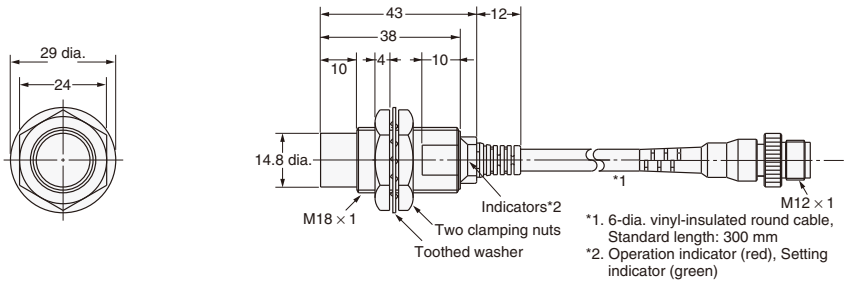
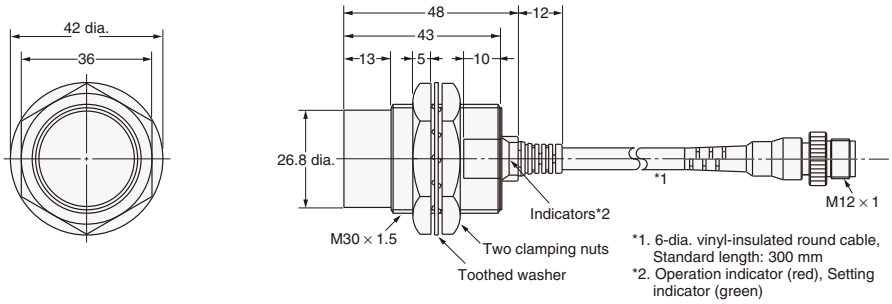


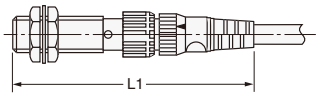
Diagram 36 E2E-X20MD1-M1GJ



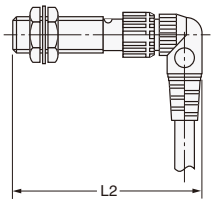
Dimensions for Proximity Sensors with Sensor I/O Connectors

Shielded Models

Straight Connectors

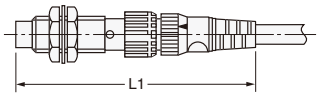


L-shape Connectors

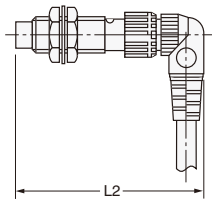


Unshielded Models

Straight Connectors



L-shape Connectors



Dimensions with the XS2F Connected (Unit: mm)

Dimension / Sensor diameter		L1	L2
M8		Approx. 75	Approx. 62
M12*	DC	Approx. 80	Approx. 67
	AC	Approx. 85	Approx. 72
M18		Approx. 85	Approx. 72
M30		Approx. 90	Approx. 77

* The overall length of the Sensor is different between AC and DC Models for Sensors with diameters of M12. This will change the dimension when the I/O Connector is connected.

Dimensions with the XS3F Connected (Unit: mm)

Dimension / Sensor diameter	L1	L2
M8	Approx. 65	Approx. 54

Accessories (Order Separately)

Sensor I/O Connectors

Refer to *Introduction to Sensor I/O Connectors* for details.

Mounting Brackets
Protective Covers
Sputter Protective Covers
Refer to Y92□ for details.

General Precautions

For precautions on individual products, refer to the *Safety Precautions* in individual product information.

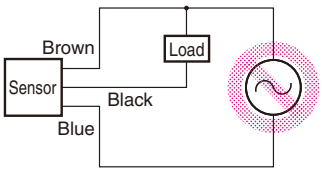
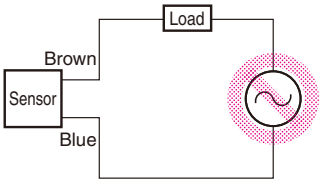
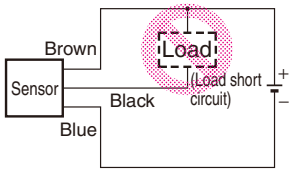
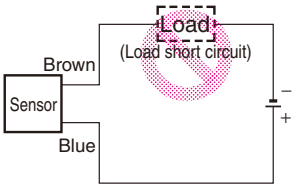
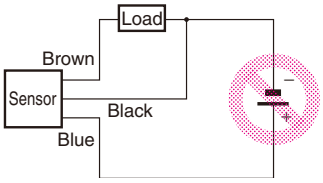
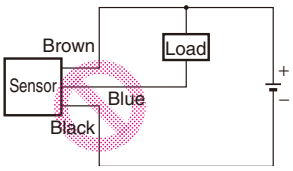
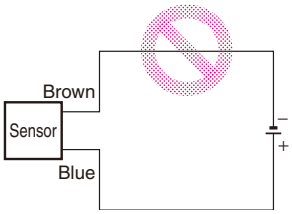
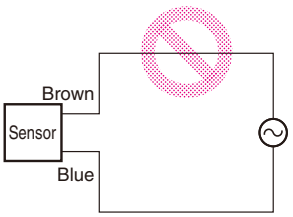
⚠ WARNING

These products cannot be used in safety devices for presses or other safety devices used to protect human life.
These products are designed for use in applications for sensing workpieces and workers that do not affect safety.

Precautions for Safe Use

To ensure safety, always observe the following precautions.

●Wiring Considerations

Item	Typical examples	
Power Supply Voltage Do not use a voltage that exceeds the operating voltage range. Applying a voltage that is higher than the operating voltage range, or using an AC power supply (100 VAC or higher) for a Sensor that requires a DC power supply may cause explosion or burning.	DC 3-Wire NPN Output Sensors 	DC 2-Wire Sensors 
Load short-circuiting • Do not short-circuit the load. Explosion or burning may result. • The load short-circuit protection function operates when the power supply is connected with the correct polarity and the power is within the rated voltage range.	DC 3-Wire NPN Output Sensors 	• DC 2-Wire Sensors • Even with the load short-circuit protection function, protection will not be provided when a load short circuit occurs if the power supply polarity is not correct. 
Incorrect Wiring Be sure that the power supply polarity and other wiring is correct. Incorrect wiring may cause explosion or burning.	DC 3-Wire NPN Output Sensors 	
Connection without a Load If the power supply is connected directly without a load, the internal elements may explode or burn. Be sure to insert a load when connecting the power supply.	• DC 2-Wire Sensors • Even with the load short-circuit protection function, protection will not be provided if both the power supply polarity is incorrect and no load is connected. 	AC 2-Wire Sensors 

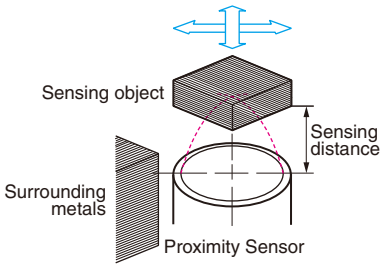
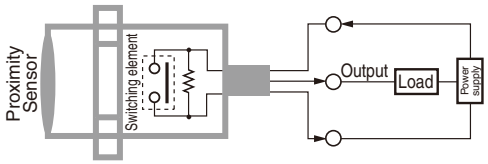
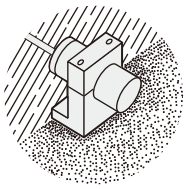
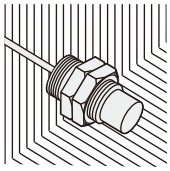
●Operating Environment

Do not use the Sensor in an environment where there are explosive or combustible gases.

Precautions for Correct Use

The following conditions must be considered to understand the conditions of the application and location as well as the relation to control equipment.

●Model Selection

Item	Points of consideration
Sensing object and operating condition of Proximity Sensor	Check the relation between the sensing object and the Proximity Sensor.  Specific conditions of object → Material, size, shape, existence of plating, etc. Direction of object movement → Transit interval, speed, existence of vibration, etc. Peripheral metal → Material, distance to Sensor, orientation, etc. Sensing distance → Fluctuation in transit point, allowable error, etc. Sensing (set) distance, shape of Sensor (rectangular, cylindrical, through-beam, grooved), influence of peripheral metal (Shielded Sensors, Non-shielded Sensors), response speed (response frequency), influence of temperature, influence of voltage, etc.
Electrical conditions	Verify the electrical conditions of the control system to be used and the electrical performance of the Proximity Sensor.  Power supply: DC (voltage fluctuation, current capacity value); AC (voltage fluctuation, frequency, etc.); Need for S3D2 Controller → Selecting the power supply type: DC / DC + S3D2 Controller / AC Load: Resistive load - Non-contact control system; Inductive load - Relay, solenoid, etc. • Steady-state current, inrush current • Operating, reset voltage (current); Lamp load • Steady-state current, inrush current; Open/close frequency → Selecting the power supply type: DC / DC + S3D2 Controller / AC; Control output Maximum current (voltage); Leakage current; Residual load voltage
Environmental conditions	 The environmental tolerance of the Proximity Sensor is better than that of other types of Sensors. However, investigate carefully before using a Proximity Sensor under harsh temperatures or in special atmospheres. Temperature and humidity — Highest or lowest values, existence of direct sunlight, etc. → Temperature influence, high-temperature use, low temperature use, need for shade, etc. Atmosphere — Water, oil, iron powder, or other special chemicals → Need for water resistance or oil resistance, need for explosion-proof structure Vibration and shock — Size, duration → Need for strength, mounting method • Water Resistance Do not use the Sensor in water, rain, or outdoors. • Ambient Conditions To maintain reliability of operation, do not use the Sensor outside the specified temperature range or outdoors. Even though the Proximity Sensor has a water-resistant structure, it must be covered to prevent direct contact with water or water-soluble cutting oil. Do not use the Sensor in atmospheres with chemical vapors, in particular, strong alkalis or acids (nitric acid, chromic acid, or hot concentrated sulfuric acid). • Explosive Atmospheres Do not use the Sensor in atmospheres where there is a danger of explosion. Use an Explosion-proof Sensor.
Mounting conditions	 When deciding the mounting method, take into consideration not only restrictions due to mechanical devices, but also ease of maintenance and inspection, and interference between Sensors. Wiring method, existence of inductance surges — Wires: Wire type, length, oil-resistant cable, shielded cable, robot cable, etc. Connection — Conduits, ducts, pre-wired, terminal wiring, ease of maintenance and inspection Mounting procedure — Existence of mounting brackets, direct mounting, secured with bolts or screws Installation location — Ease of maintenance and inspection, mounting space
Influence of external electromagnetic fields	• The influence within a DC magnetic field is 20 mT* max. Do not use the Sensor at a level higher than 20 mT. • Sudden changes in the DC magnetic field may cause malfunction. Do not use the Sensor for applications that involve turning a DC electromagnet ON and OFF. • Do not place a transceiver near the Sensor or its wiring. Doing so may cause malfunction.
Other considerations	Cost feasibility: Price/delivery time Life: Power-ON time/frequency of use

* mT (millitesla) is a unit for expressing magnetic flux density. One tesla is the equivalent of 10,000 gauss.

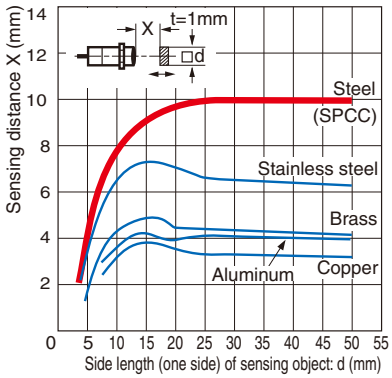
●Design

Sensing Object Material

The sensing distance varies greatly depending on the material of the sensing object. Study the engineering data for the influence of sensing object material and size and select a distance with sufficient leeway.

- In general, if the sensing object is a non-magnetic metal (for example, aluminum), the sensing distance decreases.

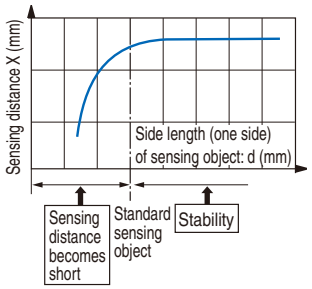
Example: E2-X10D□



Size of Sensing Object

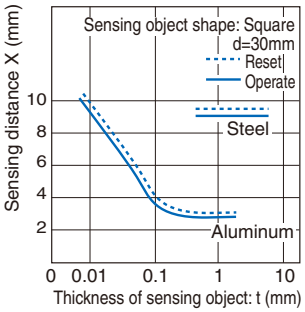
In general, if the object is smaller than the standard sensing object, the sensing distance decreases.

- Design the setup for an object size that is the same or greater than the standard sensing object size from the graphs showing the sensing object size and sensing distance.
- When the size of the standard sensing object is the same or less than the size of the standard sensing object, select a sensing distance with sufficient leeway.



Thickness of Sensing Object

- The thickness of ferrous metals (iron, nickel, etc.) must be 1 mm or greater.
- When the coating thickness is 0.01 mm or less, a sensing distance equivalent to a magnetic body can be obtained. When the coating is extremely thin and is not conductive, such as a vacuum deposited film, detection is not possible.
- Influence of Plating If the sensing object is plated, the sensing distance will change (see the table below).



Effect of Plating (Typical)
(Reference values: Percent of non-plated sensing distance)

Thickness and base material of plating	Steel	Brass
No plating	100	100
Zn 5 to 15 μm	90 to 120	95 to 105
Cd 5 to 15 μm	100 to 110	95 to 105
Ag 5 to 15 μm	60 to 90	85 to 100
Cu 10 to 20 μm	70 to 95	95 to 105
Cu 5 to 15 μm	-	95 to 105
Cu (5 to 10 μm) + Ni (10 to 20 μm)	70 to 95	-
Cu (5 to 10 μm) + Ni (10 μm) + Cr (0.3 μm)	75 to 95	-

Mutual Interference

- Mutual interference refers to a state where a Sensor is affected by magnetism (or static capacitance) from an adjacent Sensor and the output is unstable.
- One means of avoiding interference when mounting Proximity Sensors close together is to alternate Sensors with different frequencies. The model tables indicate whether different frequencies are available. Please refer to the tables.
- When Proximity Sensors with the same frequency are mounted together in a line or face-to-face, they must be separated by a minimum distance. For details, refer to *Mutual Interference* in the *Safety Precautions* for individual Sensors.

Power Reset Time

A Sensor is ready for detection within 100 ms after turning ON the power. If the load and Sensor are connected to separate power supplies, design the system so that the Sensor power turns ON first.

Turning OFF the Power

An output pulse may be generated when the power is turned OFF, so design the system so that the load or load line power turns OFF first.

Influence of Surrounding Metal

The existence of a metal object other than the sensing object near the sensing surface of the Proximity Sensor will affect detection performance, increase the apparent operating distance, degrade temperature characteristics, and cause reset failures. For details, refer to the influence of surrounding metal table in *Safety Precautions* for individual Sensors.
The values in the table are for the nuts provided with the Sensors. Changing the nut material will change the influence of the surrounding metal.

Power Transformers

Be sure to use an insulated transformer for a DC power supply. Do not use an auto-transformer (single-coil transformer).

Precautions for AC 2-Wire/DC 2-Wire Sensors

Surge Protection

Although the Proximity Sensor has a surge absorption circuit, if there is a device (motor, welder, etc.) that causes large surges near the Proximity Sensor, insert a surge absorber near the source of the surges.

Influence of Leakage Current

Even when the Proximity Sensor is OFF, a small amount of current runs through the circuit as leakage current.
For this reason, a small current may remain in the load (residual voltage in the load) and cause load reset failures. Verify that this voltage is lower than the load reset voltage (the leakage current is less than the load reset current) before using the Sensor.

Using an Electronic Device as the Load for an AC 2-Wire Sensor

When using an electronic device, such as a Timer, some types of devices use AC half-wave rectification. When a Proximity Sensor is connected to a device using AC half-wave rectification, only AC half-wave power will be supplied to the Sensor. This will cause the Sensor operation to be unstable. Also, do not use a Proximity Sensor to turn the power supply ON and OFF for electronic devices that use DC half-wave rectification. In such a case, use a relay to turn the power supply ON and OFF, and check the system for operating stability after connecting it.

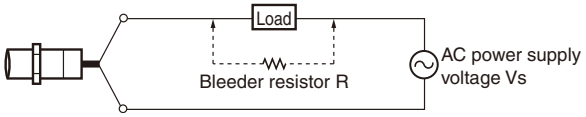
Examples of Timers that Use AC Half-wave Rectification
Timers: H3Y, H3YN, H3RN, H3CA-8, RD2P, and H3CR (-A, -A8, -AP, -F, -G)

Countermeasures for Leakage Current (Examples)

AC 2-Wire Sensors

Connect a bleeder resistor to bypass the leakage current flowing in the load so that the current flowing through the load is less than the load reset current.

> When using an AC 2-Wire Sensor, connect a bleeder resistor so that the Proximity Sensor current is at least 10 mA, and the residual load voltage when the Proximity Sensor is OFF is less than the load reset voltage.



Calculate the bleeder resistance and allowable power using the following equation.

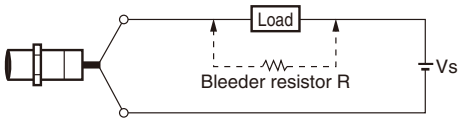
$$R \leq \frac{Vs}{10 - I}\ (k\Omega) \qquad P > \frac{Vs^2}{R}\ (mW)$$

P : Watts of bleeder resistance (the actual number of watts used should be several times this number)
I : Load current (mA)

It is recommend that leeway be included in the actual values used. For 100 VAC, use 10 kΩ or less and 3 W (5 W) or higher, and for 200 VAC, use 20 kΩ or less and 10 W (20 W) or higher. If the effects of heat generation are a problem, use the number of watts in parentheses ( ) or higher.

DC 2-Wire Sensors

Connect a bleeder resistor to bypass the leakage current flowing in the load, and design the load current so that (leakage current) × (load input impedance) < reset voltage.



Calculate the bleeder resistance and allowable power using the following equation.

$$R \leq \frac{Vs}{i_R - i_{OFFR}}\ (k\Omega) \qquad P > \frac{Vs^2}{R}\ (mW)$$

P : Watts of bleeder resistance (the actual number of watts used should be several times this number)
i_R : Leakage current of Proximity Sensor (mA)
i_{OFF} : Load reset current (mA)

It is recommend that leeway be included in the actual values used. For 12 VDC, use 15 kΩ or less and 450 mW or higher, and for 24 VDC, use 30 kΩ or less and 0.1 W or higher.

Loads with Large Inrush Current

Loads, such as lamps or motors, that cause a large inrush current* will weaken or damage the switching element. In this situation, use a relay.

* E2K, TL-N□Y: 1 A or higher

●Mounting

Mounting the Sensor

When mounting a Sensor, do not tap it with a hammer or otherwise subject it to excessive shock. This will weaken water resistance and may damage the Sensor. If the Sensor is being secured with bolts, observe the allowable tightening torque. Some models require the use of toothed washers.

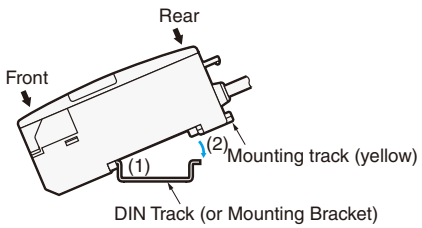
For details, refer to the mounting precautions in *Precautions for Correct Use* in individual product information.

Mounting/Removing Using DIN Track (Example for E2CY)

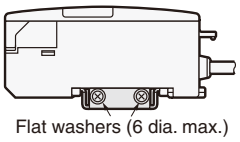
<Mounting>

(1) Insert the front of the Sensor into the special Mounting Bracket (included) or DIN Track.

(2) Press the rear of the Sensor into the special Mounting Bracket or DIN Track.

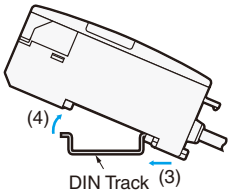


- When mounting the side of the Sensor using the special Mounting Bracket, first secure the Amplifier Unit to the special Mounting Bracket, and then mount the special Mounting Bracket with M3 screws and flat washers with a diameter of 6 mm maximum.



<Removing>

- While pressing the Amplifier Unit in the direction of (3), lift the fiber plug in the direction of (4) for easy removal without a screwdriver.

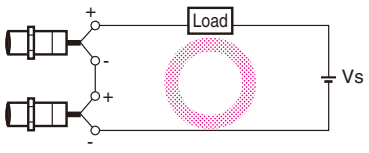
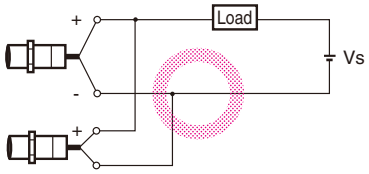
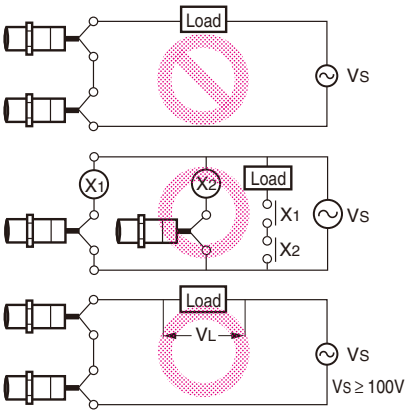
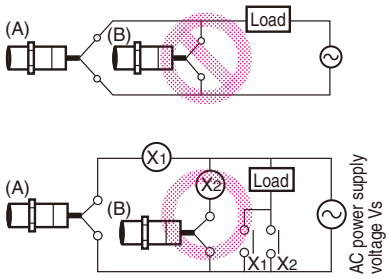


Set Distance

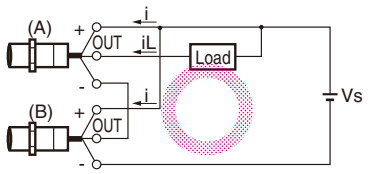
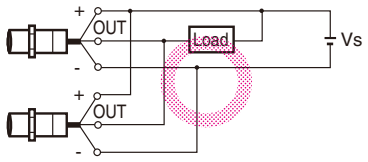
The sensing distance may vary due to fluctuations in temperature and voltage. When mounting the Sensor, it is recommend that installation be based on the set distance.

●Wiring Considerations

AND/OR Connections for Proximity Sensors

Model	Type of connection	Connection	Description
DC 2-Wire	AND (series connection)		Keep the number of connected Sensors (N) within the range of the following equation. $V_S - N \times V_R \geq$ Operating load voltage (N : Number of Sensors that can be connected V_R: Residual output voltage of Proximity Sensor V_S: Power voltage) It is possible, however, that the indicators may not light correctly and error pulses (of approximately 1 ms) may be generated because the rated power supply voltage and current are not supplied to individual Proximity Sensors. Verify that this is not a problem before operation.
	OR (parallel connection)		Keep the number of connected Sensors (N) within the range of the following equation. $N \times i \leq$ Load reset current (N: Number of Sensors that can be connected i: Leakage current of Proximity Sensor) Example: When an MY (24-VDC) Relay is used as the load, the maximum number of Sensors that can be connected is 4.
AC 2-wire	AND (series connection)		<TL-NY, TL-MY, E2K-□MY□, TL-T□Y> The above Proximity Sensors cannot be used in a sereis connection. If needed, connect through relays. <E2E-X□Y> For the above Proximity Sensors, the voltage VL that can be applied to the load when ON is $V_L = V_S$ - (Output residual voltage × Number of Sensors), for both 100 VAC and 200 VAC. The load will not operate unless V_L is higher than the load operating voltage. This must be verified before use. When using two or more Sensors in series with an AND circuit, the limit is three Sensors. (Be careful of the VS value in the diagram at left.)
	OR (parallel connection)		In general it is not possible to use two or more Proximity Sensors in parallel with an OR circuit. A parallel connection can be used if A and B will not be operated simultaneously and there is no need to hold the load. The leakage current, however, will be n times the value for each Sensor and reset failures will frequently occur. ("n" is the number of Proximity Sensors.) If A and B will be operated simultaneously and the load is held, a parallel connection is not possible. If A and B operate simultaneously and the load is held, the voltages of both A and B will fall to about 10 V when A turns ON, and the load current will flow through A causing random operation. When the sensing object approaches B, the voltage of both terminals of B is too low at 10 V and the switching element of B will not operate. When A turns OFF again, the voltages of both A and B rise to the power supply voltage and B is finally able to turn ON. During this period, there are times when A and B both turn OFF (approximately 10 ms) and the loads are momentarily restored. In cases where the load is to be held in this way, use a relay as shown in the diagram at left.

Note: When AND/OR connections are used with Proximity Sensors, the effects of erroneous pulses or leakage current may prevent use. Verify that there are no problems before use.

Model	Type of connection	Connection	Description
DC 3-wire	AND (series connection)		Keep the number of connected Sensors (N) within the range of the following equation. iL + (N - 1) × i ≤ Upper limit of Proximity Sensor control output Vs - N × VR ≥ Operating load voltage N : Number of Sensors that can be connected VR: Residual output voltage of Sensor Vs: Power supply voltage i : Current consumption of Sensor iL: Load current Example: A maximum of two Sensors can be used when an MY (24-VDC) Relay is used for the load. Note: When an AND circuit is connected, the operation of Proximity Sensor B causes power to be supplied to Proximity Sensor A, and thus erroneous pulses (approximately 1 ms) may be generated in A when the power is turned ON. For this reason, take care when the load has a high response speed because malfunction may result.
	OR (parallel connection)		For Sensors with a current output, a minimum of three OR connections is possible. Whether or not four or more connections is possible depends on the model.

Note: When AND/OR connections are used with Proximity Sensors, the effects of erroneous pulses or leakage current may prevent use. Verify that there are no problems before use.

Extending Cable Length

The cable of a Built-in Amplifier Sensor can be extended to a maximum length of 200 m with each of the standard cables (excluding some models).
For Separate Amplifier Sensors (E2C-EDA, E2C, E2J, E2CY), refer to the specific precautions for individual products.

Bending the Cable

If you need to bend the cable, we recommend a bend radius that is at least 3 times the outer diameter of the cable (with the exception of coaxial and shielded cables).

Cable Tensile Strength

In general, do not subject the cable to a tension greater than that indicated in the following table.

Cable diameter	Tensile strength
Less than 4 mm	30 N max.
4 mm min.	50 N max.

Note: Do not subject a shielded cable or coaxial cable to tension.

Separating High-voltage Lines

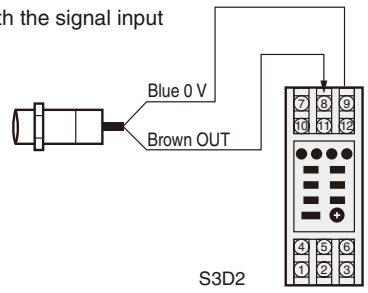
Using Metal Conduits
If a power line is to be located near the Proximity Sensor cable, use a separate metal conduit to prevent malfunction or damage. (Same for DC models.)

Example of Connection with S3D2 Sensor Controller

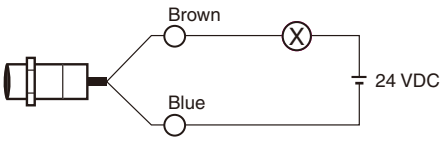
DC 2-Wire Sensors

Using the S3D2 Sensor Controller

Operation can be reversed with the signal input switch on the S3D2.



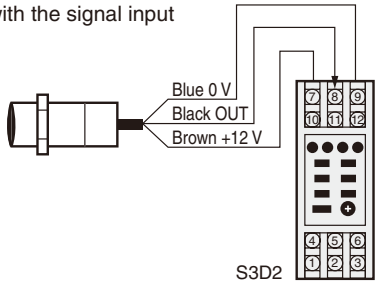
Connecting to a Relay Load



Note: DC 2-Wire Sensors have a residual voltage of 3 V. Check the operating voltage of the relay before use.
The residual voltage of the E2E-XD-M1J-T is 5 V.

DC 3-Wire Sensors

Operation can be reversed with the signal input switch on the S3D2.



●Operating Environment

Water Resistance

Do not use the Sensor in water, rain, or outdoors.

Ambient Conditions

Do not use the Sensor in the following environments.
Doing so may cause malfunction or failure of the Sensor.

1. To maintain operational reliability and service life, use the Sensor only within the specified temperature range and do not use it outdoors.
2. The Sensor has a water resistant structure, however, attaching a cover to prevent direct contact with water will help improve reliability and prolong product life.
3. Avoid using the Sensor where there are chemical vapors, especially strong alkalis or acids (nitric acid, chromic acid, or hot concentrated sulfuric acid).

●Maintenance and inspection

Periodic Inspection

To ensure long-term stable operation of the Proximity Sensor, inspect for the following on a regular basis. Conduct these inspections also for control devices.

1. Shifting, loosening, or deformation of the sensing object and Proximity Sensor mounting
2. Loosening, bad contact, or wire breakage in the wiring and connections
3. Adherence or accumulation of metal powder
4. Abnormal operating temperature or ambient conditions
5. Abnormal indicator flashing (on setting indicator types)

Disassembly and Repair

Do not under any circumstances attempt to disassemble or repair the product.

Quick Failure Check

You can conveniently check for failures by connecting the E39-VA Handy Checker to check the operation of the Sensor.

Read and Understand This Catalog

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2007.12

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