OMRON

Oil resistant Cylindrical Proximity Sensor (Automotive)

E2E

Designed and tested for Automotive assembly lines

- tested oil resistance on commonly used lubricants in Automotive industry

Ordering Information

DC 2-wire/Pre-wired Models - enhanced oil resistant PUR/PE cable

Self-diagnostic output function	Size		Sensing distance	Model	
				NO	NC
No	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

DC 2-wire/Pigtail-connector - enhanced oil resistant PUR/PE cable

Self-diagnostic output function	Size		Sensing distance	Model	
				NO	NC
No	Shielded	M8	2 mm	E2E-X2D1-M1TGJ-U 0.3 M	E2E-X2D2-M1TGJ-U 0.3 M
		M12	3 mm	E2E-X3D1-M1TGJ-U 0.3 M	E2E-X3D2-M1TGJ-U 0.3 M
		M18	7 mm	E2E-X7D1-M1TGJ-U 0.3 M	E2E-X7D2-M1TGJ-U 0.3 M
		M30	10 mm	E2E-X10D1-M1TGJ-U 0.3 M	E2E-X10D2-M1TGJ-U 0.3 M

DC 2-wire/Pre-wired Models - PVC cable

Self-diagnostic output function	Size		Sensing distance	Model	
				NO	NC
Yes	Shielded	M12	3 mm	E2E-X3D1S (See note 1.)	---
		M18	7 mm	E2E-X7D1S (See note 1.)	---
		M30	10 mm	E2E-X10D1S (See note 1.)	---
	Unshielded	M12	8 mm	E2E-X8MD1S (See note 1.)	---
		M18	14 mm	E2E-X14MD1S (See note 1.)	---
		M30	20 mm	E2E-X20MD1S (See note 1.)	---
No	Shielded	M8	2 mm	E2E-X2D1-N (See notes 2 and 3.)	E2E-X2D2-N (See note 3.)
		M12	3 mm	E2E-X3D1-N (See notes 1, 2 and 3.)	E2E-X3D2-N (See note 3.)
		M18	7 mm	E2E-X7D1-N (See notes 1, 2 and 3.)	E2E-X7D2-N (See note 3.)
		M30	10 mm	E2E-X10D1-N (See notes 1, 2 and 3.)	E2E-X10D2-N
	Unshielded	M8	4 mm	E2E-X4MD1 (See notes 2 and 3.)	E2E-X4MD2
		M12	8 mm	E2E-X8MD1 (See notes 1, 2 and 3.)	E2E-X8MD2
		M18	14 mm	E2E-X14MD1 (See notes 1, 2 and 3.)	E2E-X14MD2
		M30	20 mm	E2E-X20MD1 (See notes 1, 2 and 3.	E2E-X20MD2

*1. In addition to the above models, E2E-X□□15 models (e.g., E2E-X3D15-N), which are different in frequency from the above models, are available.
*2. E2E models with a robotics cable are available as well. The model number of a model with a robotics cable has the suffix "-R" (e.g., E2E-X3D1-R).
*3. Cables with a length of 5 m are also available. Specify the cable length at the end of the model number (e.g., E2E-X3D1-N 5M).

DC 2-wire/Connector Models

Connector	Self-diagnostic output function	Size		Sensing distance	Model	
					NO	NC
M12	Yes	Shielded	M12	3 mm	E2E-X3D1S-M1	---
			M18	7 mm	E2E-X7D1S-M1	---
			M30	10 mm	E2E-X10D1S-M1	---
		Unshielded	M12	8 mm	E2E-X8MD1S-M1	---
			M18	14 mm	E2E-X14MD1S-M1	---
			M30	20 mm	E2E-X20MD1S-M1	---
	No	Shielded	M8	2 mm	E2E-X2D1-M1G	E2E-X2D2-M1G
			M12	3 mm	E2E-X3D1-M1G (See note.)	E2E-X3D2-M1G
			M18	7 mm	E2E-X7D1-M1G (See note.)	E2E-X7D2-M1G
			M30	10 mm	E2E-X10D1-M1G (See note.)	E2E-X10D2-M1G
		Unshielded	M8	4 mm	E2E-X4MD1-M1G	E2E-X4MD2-M1G
			M12	8 mm	E2E-X8MD1-M1G (See note.)	E2E-X8MD2-M1G
			M18	14 mm	E2E-X14MD1-M1G (See note.)	E2E-X14MD2-M1G
			M30	20 mm	E2E-X20MD1-M1G (See note.)	E2E-X20MD2-M1G
M8		Shielded	M8	2 mm	E2E-X2D1-M3G	E2E-X2D2-M3G
		Unshielded		4 mm	E2E-X4MD1-M3G	E2E-X4MD2-M3G

Note: In addition to the above models, E2E-X□D15-M1G models (e.g., E2E-X3D15-M1G), which are different in frequency from the above models, are available.

DC 2-wire/Pre-wired Connector Models

Size		Sensing distance	Operation mode	Polarity	Model
Shielded	M12	3 mm	NO	Yes	E2E-X3D1-M1GJ
				No	E2E-X3D1-M1J-T
	M18	7 mm		Yes	E2E-X7D1-M1GJ
				No	E2E-X7D1-M1J-T
	M30	10 mm		Yes	E2E-X10D1-M1GJ
				No	E2E-X10D1-M1J-T
Unshielded	M12	8 mm		Yes	E2E-X8MD1-M1GJ
	M18	14 mm			E2E-X14MD1-M1GJ
	M30	20 mm			E2E-X20MD1-M1GJ

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

Connector Pin Assignments of DC 2-wire Model

The connector pin assignments of each new E2E DC 2-wire conforms to IEC947-5-2 Table III.
The following E2E models with conventional connector pin assignments are available as well.

Size		Operation mode	Model	Size		Operation mode	Model
Shielded	M8	NO	E2E-X2D1-M1	Unshielded	M8	NO	E2E-X4MD1-M1
		NC	E2E-X2D2-M1			NC	E2E-X4MD2-M1
	M12	NO	E2E-X3D1-M1		M12	NO	E2E-X8MD1-M1
		NC	E2E-X3D2-M1			NC	E2E-X8MD2-M1
	M18	NO	E2E-X7D1-M1		M18	NO	E2E-X14MD1-M1
		NC	E2E-X7D2-M1			NC	E2E-X14MD2-M1
	M30	NO	E2E-X10D1-M1		M30	NO	E2E-X20MD1-M1
		NC	E2E-X10D2-M1			NC	E2E-X20MD2-M1

DC 3-wire/Pre-wired Models

Size		Sensing distance	Output configuration	Model
Shielded	M8	1.5 mm	NPN NO	E2E-X1R5E1 (See notes 1 and 2.)
			NPN NC	E2E-X1R5E2
			PNP NO	E2E-X1R5F1
			PNP NC	E2E-X1R5F2
	M12	2 mm	NPN NO	E2E-X2E1 (See notes 1, 2, 3, and 4.)
			NPN NC	E2E-X2E2 (See notes 3 and 4.)
			PNP NO	E2E-X2F1
			PNP NC	E2E-X2F2
	M18	5 mm	NPN NO	E2E-X5E1 (See notes 1, 2, 3, and 4.)
			NPN NC	E2E-X5E2 (See notes 3 and 4.)
			PNP NO	E2E-X5F1
			PNP NC	E2E-X5F2
	M30	10 mm	NPN NO	E2E-X10E1 (See notes 1, 2, 3, and 4.)
			NPN NC	E2E-X10E2 (See notes 3 and 4.)
			PNP NO	E2E-X10F1
			PNP NC	E2E-X10F2
Unshielded	M8	2 mm	NPN NO	E2E-X2ME1 (See note 2.)
			NPN NC	E2E-X2ME2
			PNP NO	E2E-X2MF1
			PNP NC	E2E-X2MF2
	M12	5 mm	NPN NO	E2E-X5ME1 (See notes 1, 2, 3, and 4.)
			NPN NC	E2E-X5ME2 (See notes 3 and 4.)
			PNP NO	E2E-X5MF1
			PNP NC	E2E-X5MF2
	M18	10 mm	NPN NO	E2E-X10ME1 (See notes 1, 2, 3, and 4.)
			NPN NC	E2E-X10ME2 (see notes 3 and 4.)
			PNP NO	E2E-X10MF1
			PNP NC	E2E-X10MF2
	M30	18 mm	NPN NO	E2E-X18ME1 (See notes 1, 2, 3, and 4.)
			NPN NC	E2E-X18ME2 (See notes 3 and 4.)
			PNP NO	E2E-X18MF1
			PNP NC	E2E-X18MF2

Note: 1. Cables with a length of 5 m are also available. Specify the cable length at the end of the model number (e.g., E2E-X2E1 5M).
2. Models with a robotics cable are also available. These models are E2E-X□E1-R (e.g., E2E-X5E1-R).
3. Models with a different frequency are also available. These models are E2E-X□E□5 (e.g., E2E-X5E15).
4. These models have e-CON connectors (0.3 m cable length), which is indicated by the suffix "-ECON" (e.g., E2E-X2E1-ECON).

AC 2-wire/Pre-wired Models

Size		Sensing distance	Operation mode	Model
Shielded	M8	1.5 mm	NO	E2E-X1R5Y1
			NC	E2E-X1R5Y2
	M12	2 mm	NO	E2E-X2Y1 (See notes 1 and 2.)
			NC	E2E-X2Y2
	M18	5 mm	NO	E2E-X5Y1 (See notes 1 and 2.)
			NC	E2E-X5Y2
	M30	10 mm	NO	E2E-X10Y1 (See notes 1 and 2.)
			NC	E2E-X10Y2
Unshielded	M8	2 mm	NO	E2E-X2MY1
			NC	E2E-X2MY2
	M12	5 mm	NO	E2E-X5MY1 (See notes 1 and 2.)
			NC	E2E-X5MY2
	M18	10 mm	NO	E2E-X10MY1 (See note 1.)
			NC	E2E-X10MY2
	M30	18 mm	NO	E2E-X18MY1 (See note 1.)
			NC	E2E-X18MY2

Note: 1. Models with a different frequency are also available. These models are E2E-X□Y□5 (e.g., E2E-X5Y15).
2. Cables with a length of 5 m are also available. Specify the cable length at the end of the model number (e.g., E2E-X2Y1 5M).

DC 3-wire/Connector Models

Connector	Size		Sensing distance	Output configuration	Model
M12	Shielded	M8	1.5 mm	NPN NO	E2E-X1R5E1-M1
				NPN NC	E2E-X1R5E2-M1
				PNP NO	E2E-X1R5F1-M1
				PNP NC	E2E-X1R5F2-M1
		M12	2 mm	NPN NO	E2E-X2E1-M1
				NPN NC	E2E-X2E2-M1
				PNP NO	E2E-X2F1-M1
				PNP NC	E2E-X2F2-M1
		M18	5 mm	NPN NO	E2E-X5E1-M1
				NPN NC	E2E-X5E2-M1
				PNP NO	E2E-X5F1-M1
				PNP NC	E2E-X5F2-M1
		M30	10 mm	NPN NO	E2E-X10E1-M1
				NPN NC	E2E-X10E2-M1
				PNP NO	E2E-X10F1-M1
				PNP NC	E2E-X10F2-M1
	Unshielded	M8	2 mm	NPN NO	E2E-X2ME1-M1
				NPN NC	E2E-X2ME2-M1
				PNP NO	E2E-X2MF1-M1
				PNP NC	E2E-X2MF2-M1
		M12	5 mm	NPN NO	E2E-X5ME1-M1
				NPN NC	E2E-X5ME2-M1
				PNP NO	E2E-X5MF1-M1
				PNP NC	E2E-X5MF2-M1
		M18	10 mm	NPN NO	E2E-X10ME1-M1
				NPN NC	E2E-X10ME2-M1
				PNP NO	E2E-X10MF1-M1
				PNP NC	E2E-X10MF2-M1
		M30	18 mm	NPN NO	E2E-X18ME1-M1
				NPN NC	E2E-X18ME2-M1
				PNP NO	E2E-X18MF1-M1
				PNP NC	E2E-X18MF2-M1
M8	Shielded	M8	1.5 mm	NPN NO	E2E-X1R5E1-M3
				NPN NC	E2E-X1R5E2-M3
				PNP NO	E2E-X1R5F1-M3
				PNP NC	E2E-X1R5F2-M3
	Unshielded	M8	2 mm	NPN NO	E2E-X2ME1-M3
				NPN NC	E2E-X2ME2-M3
				PNP NO	E2E-X2MF1-M3
				PNP NC	E2E-X2MF2-M3

AC 2-wire/Connector Models

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

AC/DC 2-wire/Pre-wired Models

Size		Sensing distance	Operation mode	Model
Shielded	M12	3 mm	NO	E2E-X3T1
	M18	7 mm		E2E-X7T1 (See note 2.)
	M30	10 mm		E2E-X10T1

*1. These models do not conform to CE standards.
*2. Cables with a length of 5 m are also available as standard models. Specify the cable length at the end of the model number (e.g., E2E-X7T1 5M).

Specifications

Ratings/Characteristics

E2E

E2E-X□D□ DC 2-wire Models

Size		M8		M12		M18		M30	
Type		Shielded	Unshielded	Shielded	Unshielded	Shielded	Unshielded	Shielded	Unshielded
Item		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 (See note 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 8.0 mm	0 to 16.0 mm
Differential travel		15% max. of sensing distance		10% max. of sensing distance					
Sensing object		Ferrous metal (The sensing distance decreases with non-ferrous metal, refer to *Engineering Data*.)							
Standard sensing object		Iron, 8 x 8 x 1 mm	Iron, 20 x 20 x 1 mm	Iron,12 x 12 x 1 mm	Iron,30 x 30 x 1 mm	Iron, 18 x 18 x 1 mm	Iron, 30 x 30 x 1 mm	Iron,30 x 30 x 1 mm	Iron, 54 x 54 x 1 mm
Response speed (See note 2.)		1.5 kHz	1.0 kHz	1.0 kHz	0.8 kHz	0.5 kHz	0.4 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 (See note 3.)	3 V max. (Load current: 100 mA, Cable length: 2 m. M1J-T models only: 5 V max.)							
Indicator		D1 Models: Operation indicator (red LED), setting indicator (green LED) D2 Models: Operation indicator (red LED)							
Operation mode (with sensing object approaching)		D1 Models: NO D2 Models: NC For details, refer to *Timing Charts*.							
Diagnostic output delay		0.3 to 1 s							
Protection circuits		Surge suppressor, output load short-circuit protection (for control and diagnostic output)							
Ambient temperature		Operating: –25°C to 70°C, Storage: –40°C to 85°C (with no icing or condensation)							
Ambient humidity		Operating/Storage: 35% to 95% (with no condensation)							
Temperature influence		±15% max. of sensing distance at 23°C in the temperature range of –25°C to 70°C		±10% max. of sensing distance at 23°C in the temperature range of –25°C to 70°C					
Voltage influence		±1% max. of sensing distance in the rated voltage range ±15%							
Insulation resistance		50 MΩ min. (at 500 VDC) between current-carrying parts and case							
Dielectric strength		1,000 VAC at 50/60 Hz for 1 min between current-carrying parts and case							
Vibration resistance		10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions							
Shock resistance		500 m/s^2 10 times each in X, Y, and Z directions		1,000 m/s^2 10 times each in X, Y, and Z directions					
Degree of protection		IEC 60529 IP67 (Pre-wired models, pre-wired connector models: JEM standard IP67g (waterproof and oil-proof))							
Connection method		Pre-wired models (standard length: 2 m), connector models, pre-wired connector models (standard 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	
Material	Case	Stainless steel (SUS303)		Brass-nickel plated					
	Sensing surface	PBT (polybutylene terephthalate)							
	Cable	PVC (polyvinyl chloride) all E2E-□□□-U PUR/PE (polyurethane/polyethylene)							
	Clamping nuts	Brass-nickel plated							
	Toothed washer	Iron-zinc plated							
Accessories		Instruction manual							

Note: 1. Use the E2E within the range in which the setting indicator (green LED) is ON (except D2 models).
2. The response speed 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 E2E model with the model number suffix "-M1J-T" is 5 V. When connecting an E2E model with the suffix "-M1J-T" to a device, make sure that the device can withstand the residual voltage.

E2E-X□E□/F□ DC 3-wire Models

Size		M8		M12		M18		M30	
Type		Shielded	Unshielded	Shielded	Unshielded	Shielded	Unshielded	Shielded	Unshielded
Item		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%	2 mm ±10%	5 mm ±10%	5 mm ±10%	10 mm ±10%	10 mm ±10%	18 mm ±10%
Set distance		0 to 1.2 mm	0 to 1.6 mm	0 to 1.6 mm	0 to 4.0 mm	0 to 4.0 mm	0 to 8.0 mm	0 to 8.0 mm	0 to 14.0 mm
Differential travel		10% max. of sensing distance							
Sensing object		Ferrous metal (The sensing distance decreases with non-ferrous metal, refer to *Engineering Data*.)							
Standard sensing object		Iron, 8 x 8 x 1 mm	Iron, 12 x 12 x 1 mm	Iron, 12 x 12 x 1 mm	Iron, 15 x 15 x 1 mm	Iron, 18 x 18 x 1 mm	Iron, 30 x 30 x 1 mm	Iron, 30 x 30 x 1 mm	Iron, 54 x 54 x 1 mm
Response speed (See note 1.)		2.0 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) (See note 2.)		12 to 24 VDC (10 to 40 VDC), ripple (p-p): 10% max.							
Current consumption		13 mA max.							
Control output	Load current (See note 2.)	200 mA max.							
	Residual voltage	2 V max. (Load current : 200 mA, Cable length: 2 m)							
Indicator		Operation indicator (red LED)							
Operation mode (with sensing object approaching)		E1 F1 Models: NO E2 F2 Models: NC For details, refer to *Timing Charts*.							
Protection circuits		Power supply reverse polarity protection, surge suppressor, output load short-circuit protection							
Ambient temperature (See note 2)		Operating/Storage: –40°C to 85°C (with no icing or condensation)							
Ambient humidity		Operating/Storage: 35% to 95% (with no icing)							
Temperature influence		±15% max. of sensing distance at 23°C in the temperature range of –40°C to 85°C ±10% max. of sensing distance at 23°C in the temperature range of –25°C to 70°C							
Voltage influence		±1% max. of sensing distance in the rated voltage range ±15%							
Insulation resistance		50 MΩ min. (at 500 VDC) between current-carrying parts and case							
Dielectric strength		1,000 VAC at 50/60 Hz for 1 min between current-carrying parts and case							
Vibration resistance		10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions							
Shock resistance		500 m/s² 10 times each in X, Y, and Z directions		1,000 m/s² 10 times each in X, Y, and Z directions					
Degree of protection		IEC 60529 IP67 (Pre-wired models: JEM standard IP67g (waterproof and oil-proof))							
Connection method		Pre-wired models (standard length 2 m), connector models							
Weight (packed state)	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	
Material	Case	Stainless steel (SUS303)		Brass-nickel plated					
	Sensing surface	PBT (polybutylene terephthalate)							
	Cable	PVC (polyvinyl chloride)							
	Clamping nuts	Brass-nickel plated							
	Toothed washer	Iron-zinc plated							
Accessories		Instruction manual							

Note: 1. The response speed 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 E2E with an M8 connector at an ambient temperature range between 70°C and 85°C, supply 10 to 30 VDC to the E2E and make sure that the E2E has a control output of 100 mA maximum.

E2E-X□Y□ AC 2-wire Models

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

Note: 1. When supplying 24 VAC to any of the above models, make sure that the operating ambient temperature range is over –25°C.
2. When using an M18-or M30-sized E2E within an ambient temperature of 70°C to 85°C, make sure that the E2E has a control output of 5 to 200 mA max.

AC/DC 2-wire Models

Size		M12	M18	M30
Type		Shielded		
Item		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 8.0 mm
Differential travel		10% max. of sensing distance		
Sensing object		Ferrous metal (The sensing distance decreases with non-ferrous metal, refer to *Engineering Data*.)		
Standard sensing object		Iron, 12 x 12 x 1 mm	Iron, 18 x 18 x 1 mm	Iron, 30 x 30 x 1 mm
Response speed (See note 1.)	DC	1.0 kHz	0.5 kHz	0.4 kHz
	AC	25 Hz		
Power supply voltage (operating voltage range) (See note 2.)		24 to 240 VDC (20 to 264 VDC)/48 to 240 VAC (40 to 264 VAC)		
Leakage current		1 mA DC max., 2 mA AC max.		
Control output	Load current	5 to 100 mA		
	Residual voltage	6.0 VDC max. (Load current: 100 mA, Cable length: 2 m) 10 VAC max. (Load current: 5 mA , Cable length: 2 m)		
Indicator		Operation indicator (red LED), setting indicator (green LED)		
Operation mode (with sensing object approaching)		NO For details, refer to *Timing Charts*.		
Protection circuits		Output load short-circuit protection (at 20 to 40 VDC), Surge suppressor		
Ambient temperature		Operating: –25°C to 70°C, Storage: –40°C to 85°C (with no icing or condensation)		
Ambient humidity		Operating/Storage: 35% to 95% (with no condensation)		
Temperature influence		±10% max. of sensing distance at 23°C in the temperature range of –25°C to 70°C		
Voltage influence		±1% max. of sensing distance in the rated voltage range ±15%		
Insulation resistance		50 MΩ min. (at 500 VDC) between current-carrying parts and case		
Dielectric strength		4,000 VAC at 50/60 Hz for 1 min between current-carrying parts and case		
Vibration resistance		10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions		
Shock resistance		1,000 m/s^2 10 times each in X, Y, and Z directions		
Degree of protection		IEC 60529 IP67 (JEM standard IP67g (waterproof, oil-proof))		
Connection method		Pre-wired Models (standard length 2 m)		
Weight (packed state)		Approx. 80 g	Approx. 140 g	Approx. 190 g
Material	Case	Brass-nickel plated		
	Sensing surface	PBT (polybutylene terephthalate)		
	Cable	PVC (polyvinyl chloride)		
	Clamping nuts	Brass-nickel plated		
	Toothed washer	Iron-zinc plated		
Accessories		Instruction manual		

Note: 1. The response speed 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.

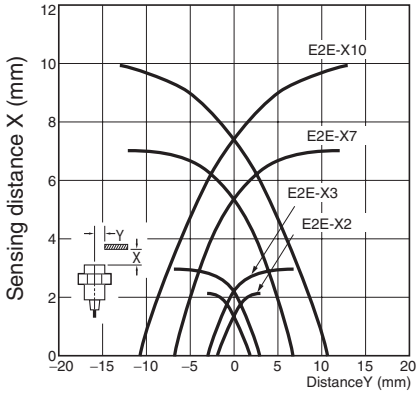
Engineering Data

E2E

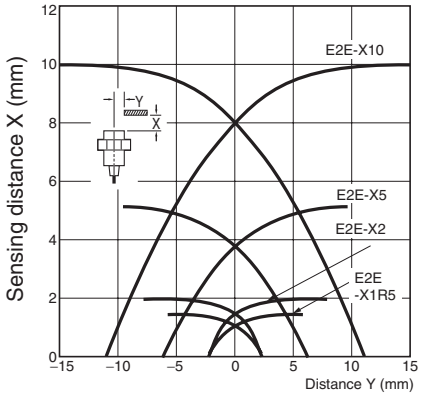
Operating Range (Typical)

Shielded Models

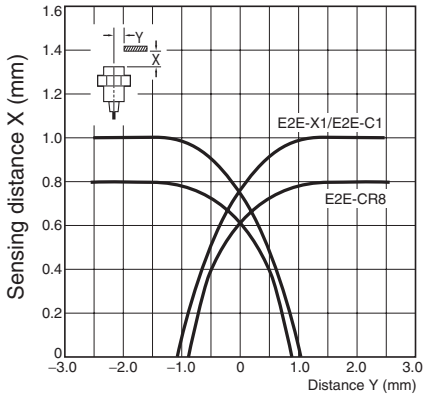
E2E-X□D□
E2E-X□T1



E2E-X□E□/F□
E2E-X□Y□

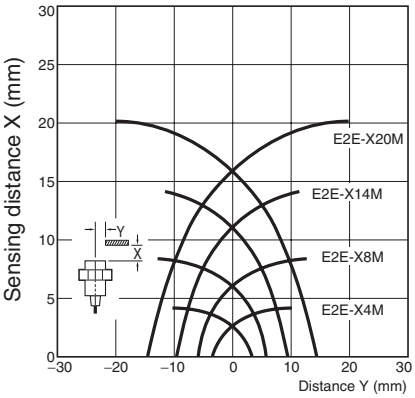


E2E-C□C□/B□
E2E-X□C□/B□

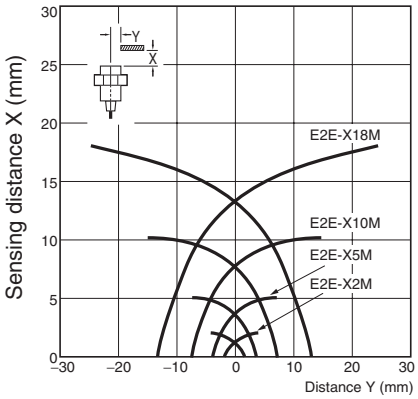


Unshielded Models

E2E-X□MD□

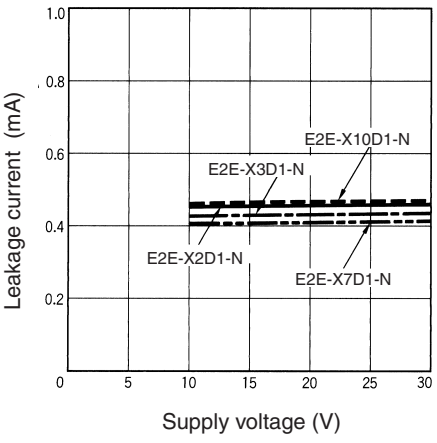


E2E-X□ME□/F□
E2E-X□MY□

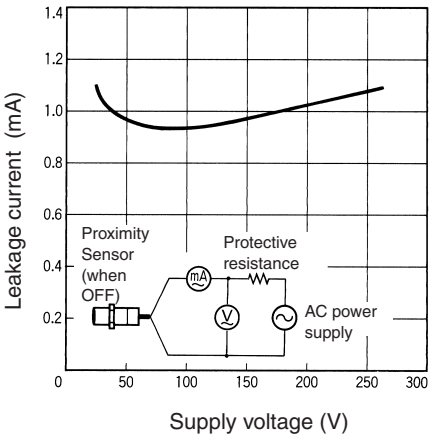


Leakage Current (Typical)

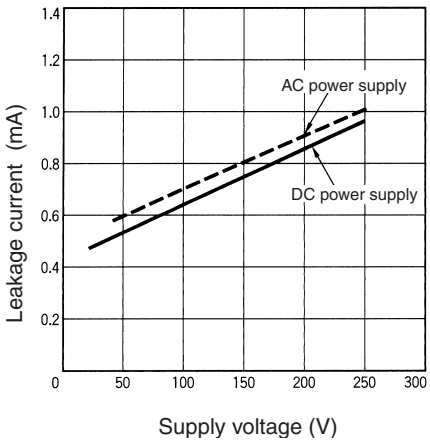
E2E-X□D□



E2E-X□Y□

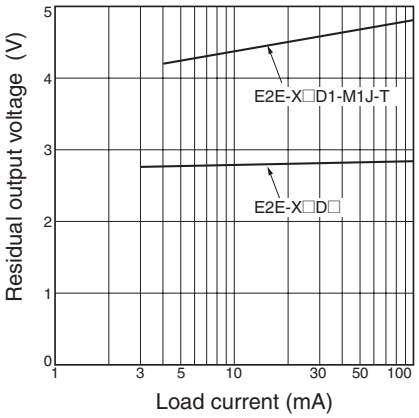


E2E-X□T1
DC/AC

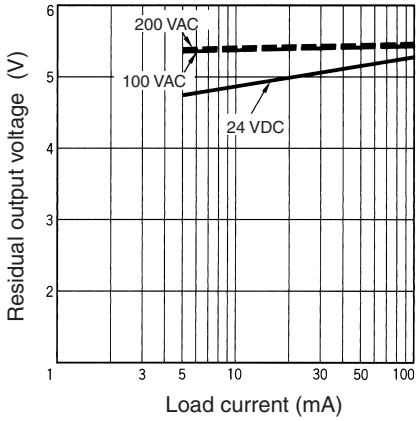


Residual Output Voltage (Typical)

E2E-X□D□

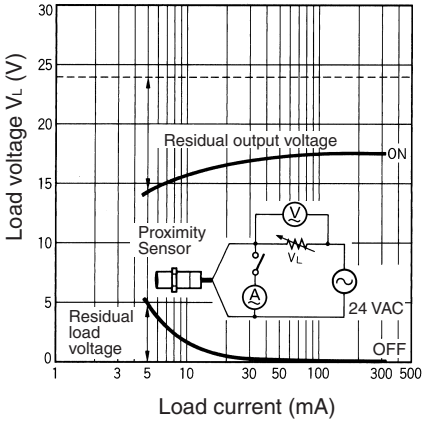


E2E-X□T1

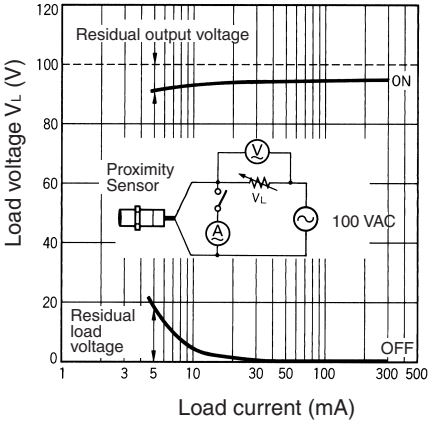


E2E-X□Y□

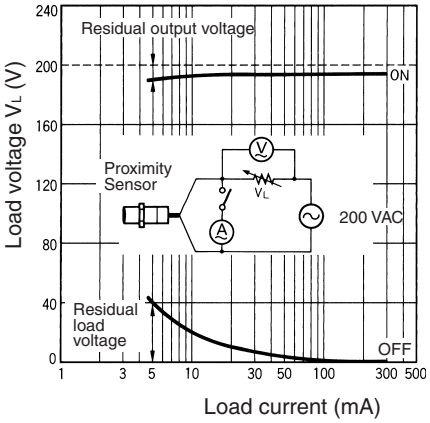
24 VAC



100 VAC

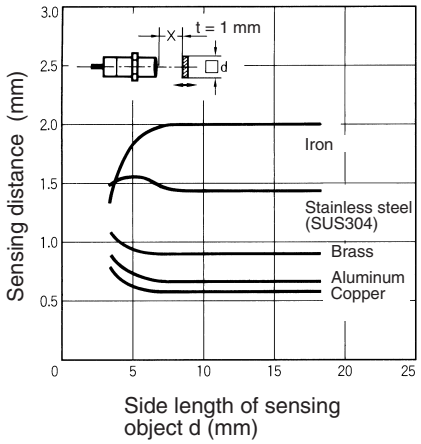


200 VAC

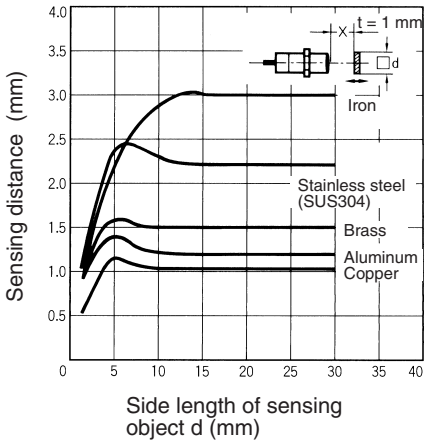


Sensing Distance vs. Sensing Object (Typical)

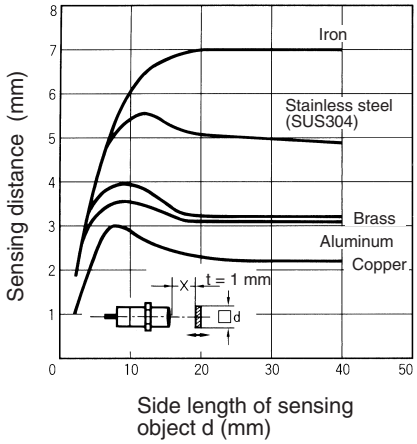
E2E-X2D□



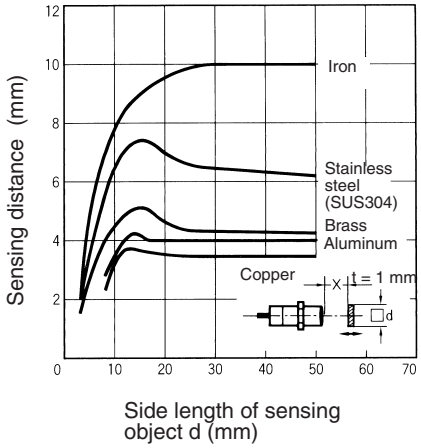
E2E-X3D□
E2E-X3T1



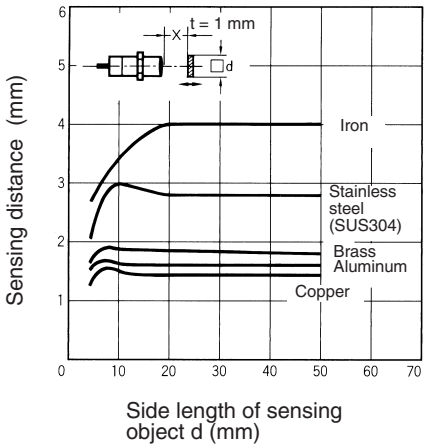
E2E-X7D□
E2E-X7T1



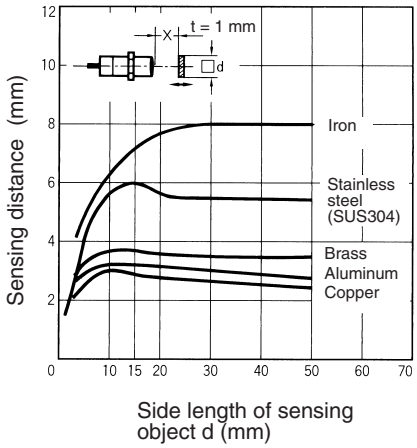
E2E-X10D□
E2E-X10T1



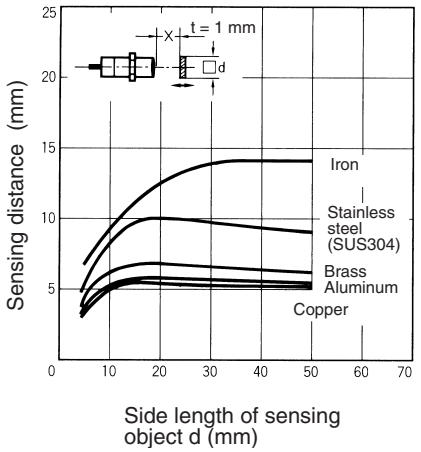
E2E-X4MD□



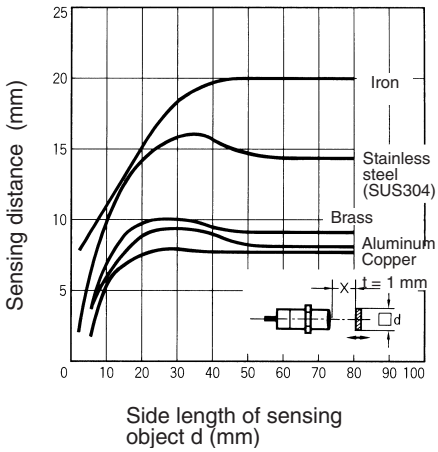
E2E-X8MD□



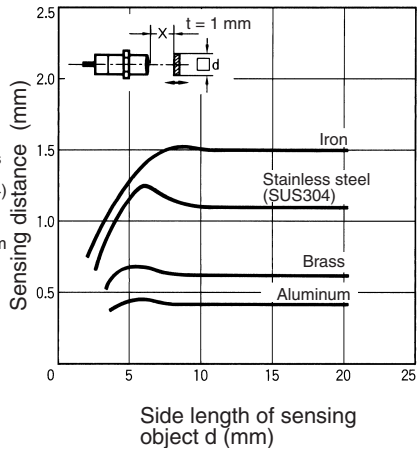
E2E-X14MD□



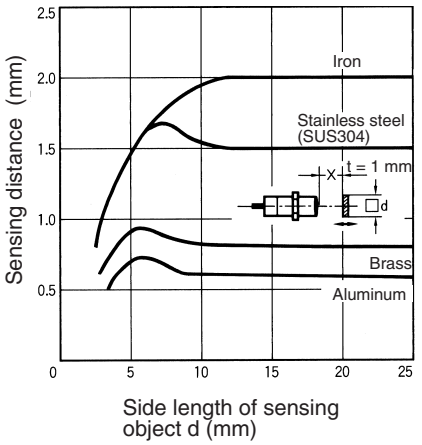
E2E-X20MD□



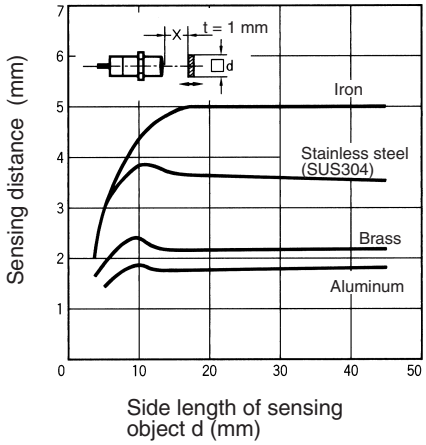
E2E-X1R5E□/F□
E2E-X1R5Y□



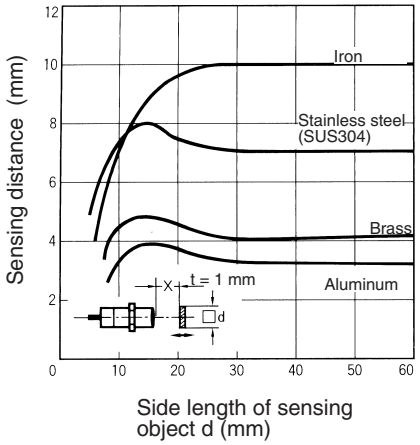
E2E-X2E□/F□
E2E-X2Y□



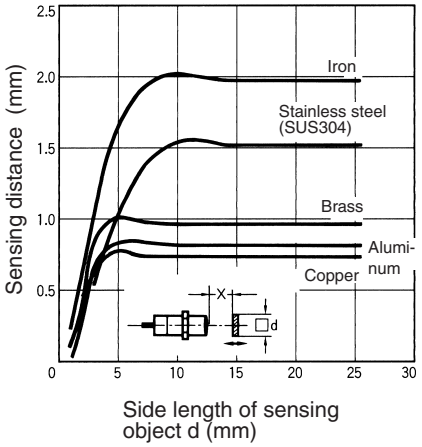
E2E-X5E□/F□
E2E-X5Y□



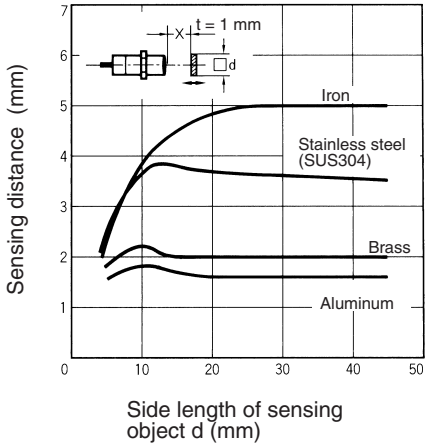
E2E-X10E□F□
E2E-X10Y□



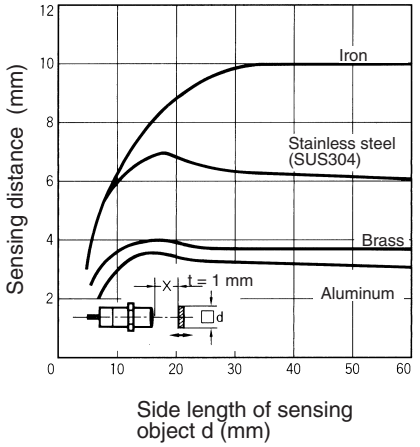
E2E-X2ME□/F□
E2E-X2MY□



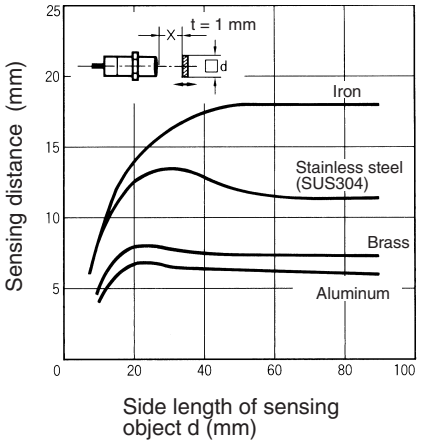
E2E-X5ME□/F□
E2E-X5MY□



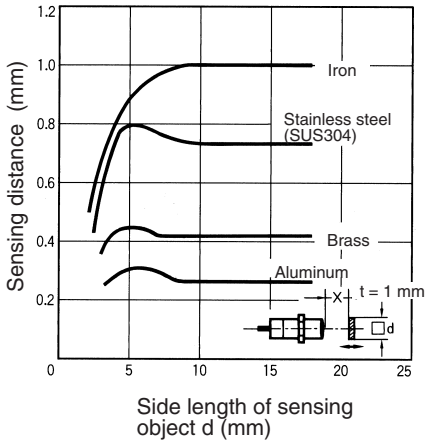
E2E-X10ME□/F□
E2E-X10MY



E2E-X18ME□/F□
E2E-X18MY□



E2E-X1□□



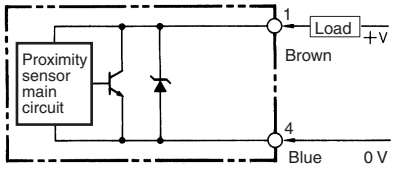
Output Circuits and Timing Charts

Output Circuits

E2E

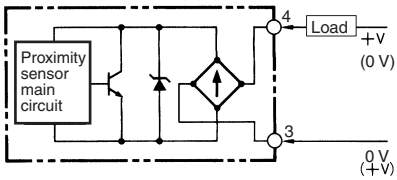
E2E-X□D□ DC 2-wire Models

E2E-X□D1
Without Diagnostic Output



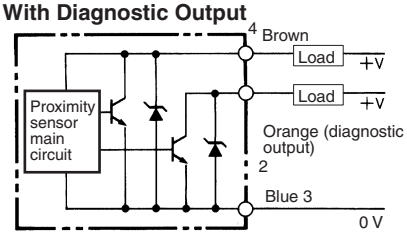
Note: 1. The load can be connected to either the +V or 0 V side.
2. The pin numbers in the above diagram are for the -M□G(J). For the -M1, pin 4 is +V and pin 3 is 0 V.

E2E-X□D1-M1J-T
No Polarity



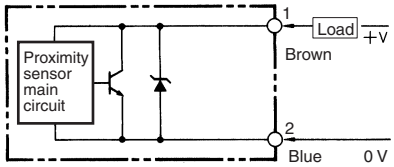
Note: 1. The load can be connected to either the +V or 0 V side.
2. The E2E-X□D1-M1J-T has no polarity. Therefore, terminals 3 and 4 have no polarity.

E2E-X□D1S
With Diagnostic Output



Note: Connect both the loads to the +V side of the control output and diagnostic output.

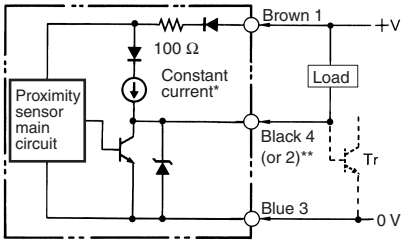
E2E-X□D2
Without Diagnostic Output



Note: 1. The load can be connected to either the +V or 0 V side.
2. The pin numbers in the above diagram are for the -M□G. For -M1 models, pin 2 is +V and pin 3 is 0 V.

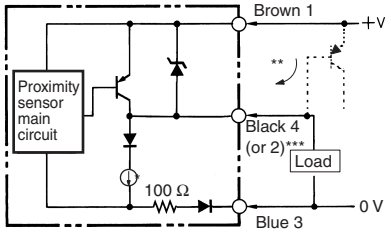
DC 3-wire Models

E2E-X□E□
NPN Output



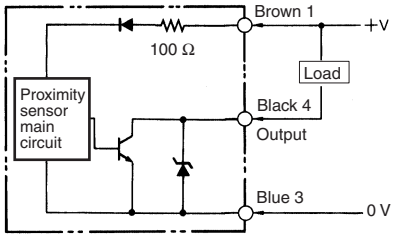
* Constant current output is 1.5 to 3 mA.
** Pin 4 is an NO contact, and pin 2 is an NC contact.

E2E-X□F□
PNP Output

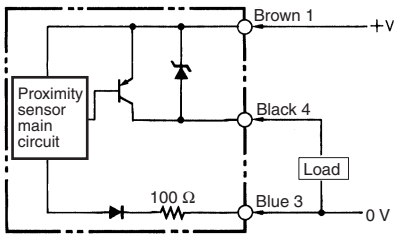


* Constant current output is 1.5 to 3 mA.
** When connecting to a Tr circuit.
*** Pin 4 is an NO contact, and pin 2 is an NC contact.

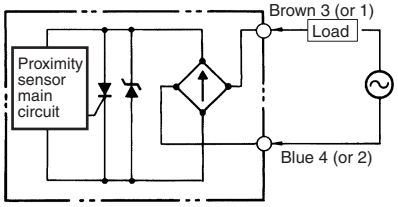
E2E-C/X□C□
NPN Open-collector Output



E2E-C/X□B□
PNP Open-collector Output

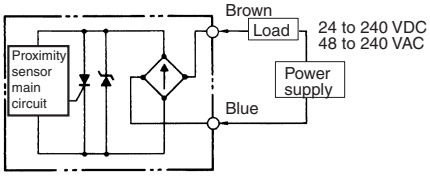


E2E-X□Y□ AC 2-wire Models



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.

E2E-X□T1 AC/DC 2-wire Models



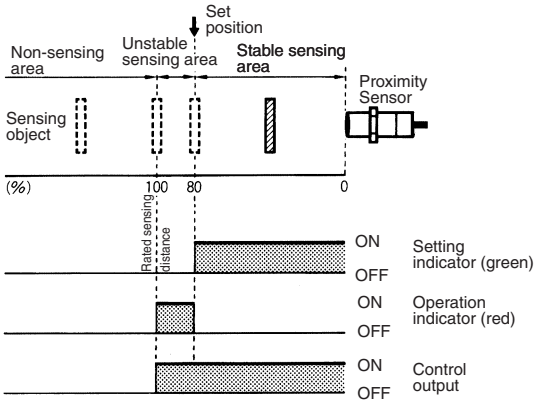
Note: The load can be connected to either the +V or 0 V side.
There is no need to be concerned about the polarity (Brown/Blue) of the Proximity Sensor.

Timing Charts

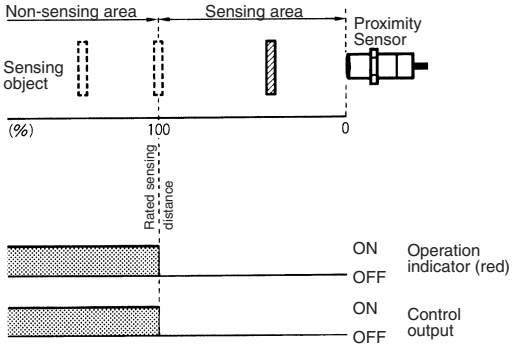
E2E

E2E-X□D□ DC 2-wire Models
E2E-X□T1 AC/DC 2-wire Models

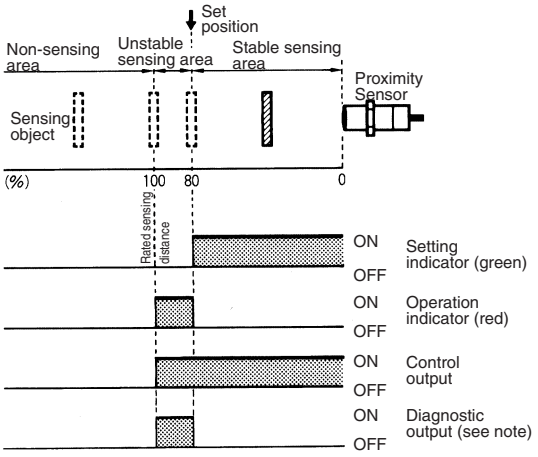
E2E-X□D1
E2E-X□T1
NO Models



E2E-X□D2
NC Models



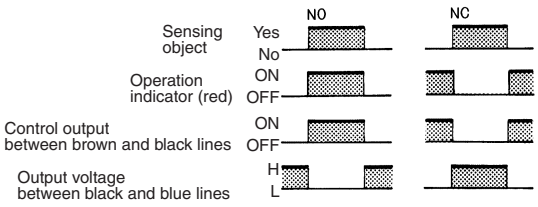
E2E-X□D1S



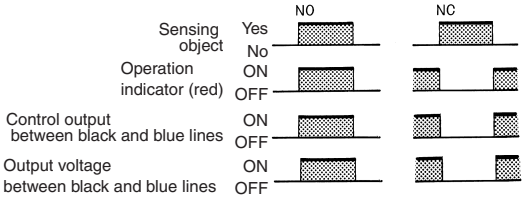
Note: The diagnostic output of the E2E-X□D1S is ON when there is a coil burnout or the sensing object is located in the unstable sensing range for 0.3 s or more.

DC 3-wire Models

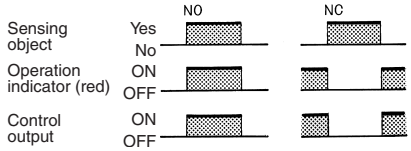
E2E-X□E□
NPN Output



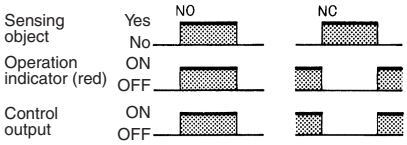
E2E-X□F□
PNP Output



E2E-C/X□C□/B□
NPN/PNP Open-collector Output



E2E-X□Y□ AC 2-wire Models



Installation

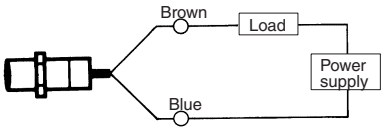
Connection

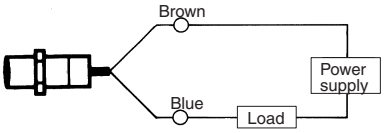
E2E

E2E-X□D□
DC 2-wire Models
(Without Diagnostic Output)

E2E-X□Y□
AC 2-wire Models

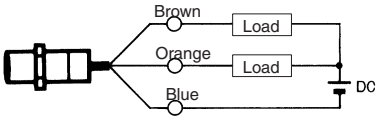
E2E-X□T1
AC/DC 2-wire Models





Note: The load can be connected as shown above.

E2E-X□D1S
DC 3-wire Models
(With Diagnostic Output)

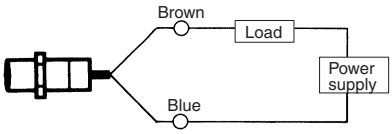


Note: The control output and diagnostic output share the negative common terminal. Therefore, the loads must be connected to the positive sides of the control output and diagnostic output.

E2E-X□D1-M1J-T
DC 2-wire Models
(No Polarity)

E2E-X□Y□
AC 2-wire Models

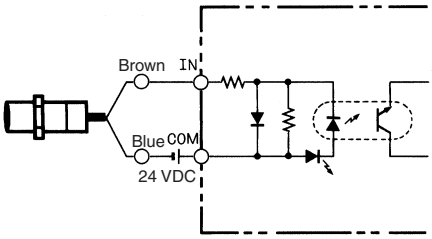
E2E-X□T1
AC/DC 2-wire Models



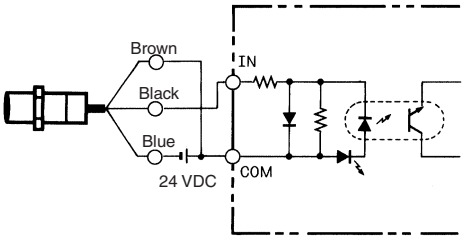
Note: There is no need to be concerned about the polarity (Brown/Blue) of the Proximity Sensor.

Connected to PC

E2E-X□D□
DC 2-wire Models

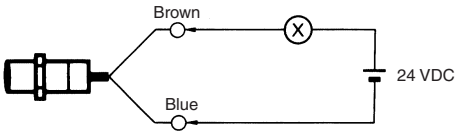


E2E-X□E□
DC 3-wire Models

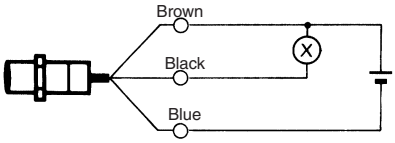


Connected to Relay Load

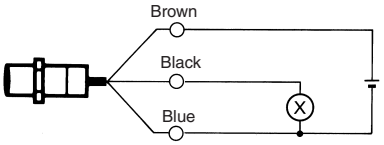
E2E-X□D□
DC 2-wire Models



E2E-X□E□
DC 3-wire Models

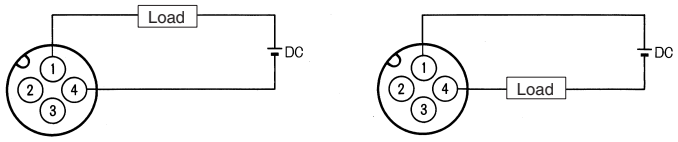
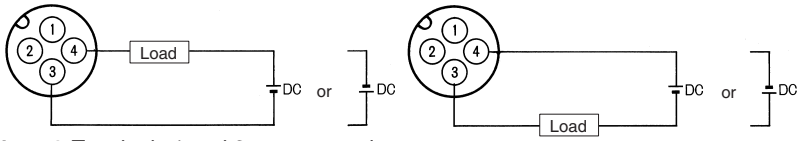
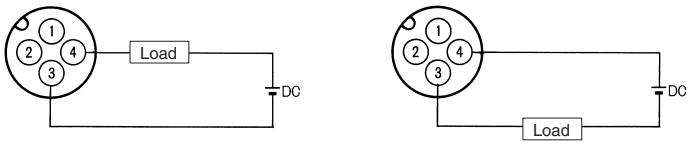
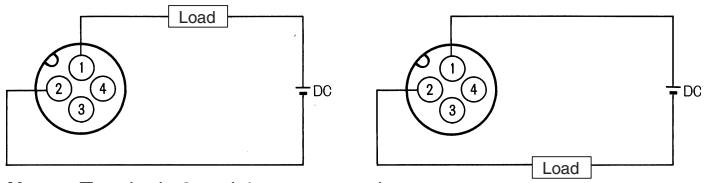
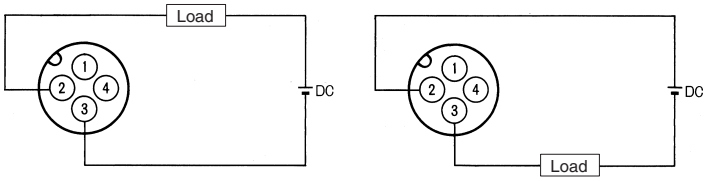
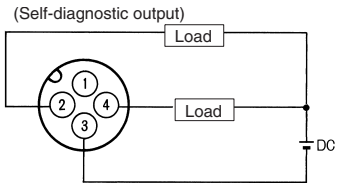
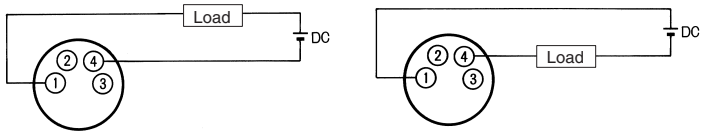
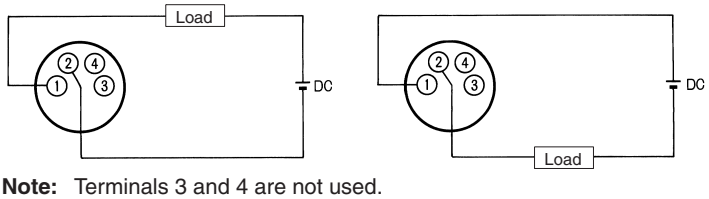


E2E-X□F□
DC 3-wire Models



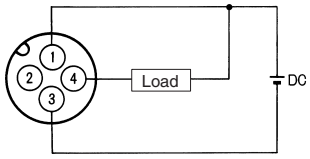
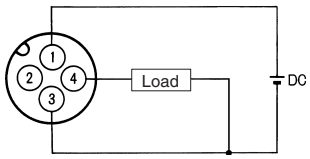
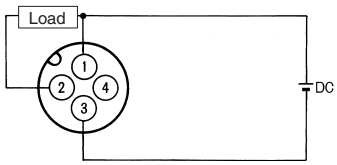
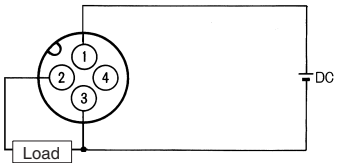
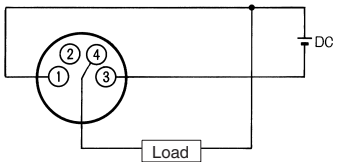
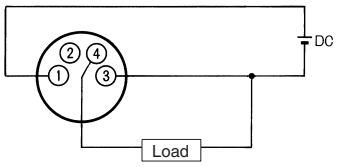
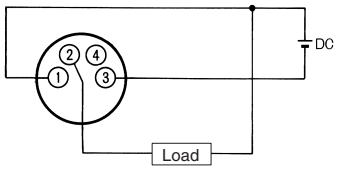
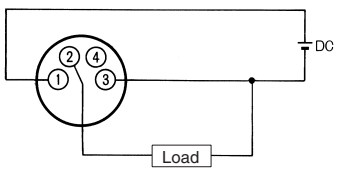
Pin Arrangement

E2E-X□D□-M□ DC 2-wire Models

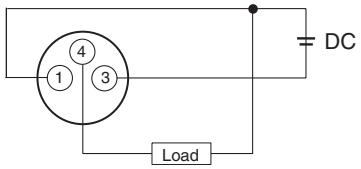
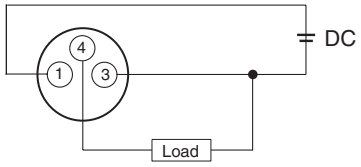
Connector	Self-diagnostic output	Operation mode	Applicable models	Pin arrangement
M12	No	NO	E2E-X□D1-M1G□ E2E-X□-D1-M1TGJ□U (See note.)	 **Note:** Terminals 2 and 3 are not used.
			E2E-X□D1-M1J-T	 **Note: 1.** Terminals 1 and 2 are not used. **2.** Terminals 3 and 4 has no polarity.
			E2E-X□D1-M1	 **Note:** Terminals 1 and 2 are not used.
		NC	E2E-X□D2-M1G E2E-X□-D2-M1TGJ□U (See note.)	 **Note:** Terminals 3 and 4 are not used.
			E2E-X□D2-M1	 **Note:** Terminal 1 is not used.
	Yes	NO	E2E-X□D1S-M1	 **Note:** Terminals 1 is not used.
M8	No	NO	E2E-X□D1-M3G	 **Note:** Terminals 2 and 3 are not used.
		NC	E2E-X□D2-M3G	 **Note:** Terminals 3 and 4 are not used.

Note: The above pin arrangements conform to IEC standards.

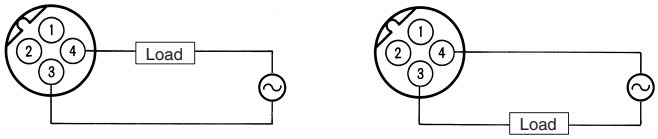
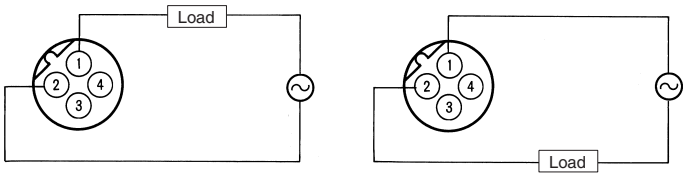
E2E-X□E/F□-M□ DC 3-wire Models

Connector	Operation mode	Applicable models	Pin arrangement
M12	NO	E2E-X□E1-M1	 **Note:** Terminal 2 is not used.
		E2E-X□F1-M1	 **Note:** Terminal 2 is not used.
	NC	E2E-X□E2-M1	 **Note:** Terminal 4 is not used.
		E2E-X□F2-M1	 **Note:** Terminal 4 is not used.
M8	NO	E2E-X□E1-M3	 **Note:** Terminal 2 is not used.
		E2E-X□F1-M3	 **Note:** Terminal 2 is not used.
	NC	E2E-X□E2-M3	 **Note:** Terminal 4 is not used.
		E2E-X□F2-M3	 **Note:** Terminal 4 is not used.

E2E-CR8C□/CR8B□/X1C□/X1B□-M5 DC 3-wire Models

Connector	Operation mode	Applicable models	Pin arrangement
M8-3pin	NO/NC	E2E-X1C□-M5	
	NO/NC	E2E-X1B□-M5	

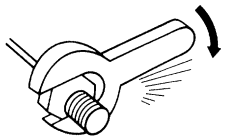
E2E-X□Y□-M1 AC 2-wire Models

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

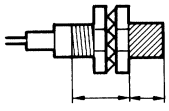
Precautions

Mounting

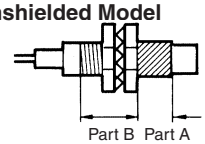
Do not tighten the nut with excessive force. A washer must be used with the nut.



Shielded Model



Unshielded Model

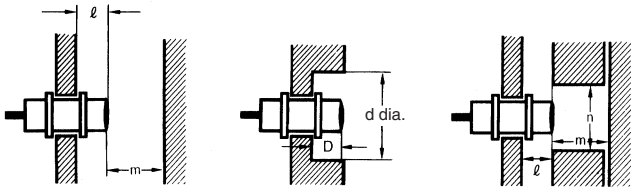


Note: The table below shows the tightening torques for part A and part B nuts. In the previous examples, the nut is on the sensor head side (part B) and hence the tightening torque for part B applies. If this nut is in part A, the tightening torque for part A applies instead.

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

Influence of Surrounding Metal

When mounting the E2E within a metal panel, ensure that the clearances given in the following table are maintained. Failure to maintain these distances may cause deterioration in the performance of the sensor.



Model		Item	M8	M12	M18	M30
E2E-X□D□ DC 2-wire E2E-X□T1 AC/DC 2-wire	Shielded	l	0 mm	0 mm	0 mm	0 mm
		d	8 mm	12 mm	18 mm	30 mm
		D	0 mm	0 mm	0 mm	0 mm
		m	4.5 mm	8 mm	20 mm	40 mm
		n	12 mm	18 mm	27 mm	45 mm
	Unshielded	l	12 mm	15 mm	22 mm	30 mm
		d	24 mm	40 mm	70 mm	90 mm
		D	12 mm	15 mm	22 mm	30 mm
		m	8 mm	20 mm	40 mm	70 mm
		n	24 mm	40 mm	70 mm	90 mm
E2E-X□E□ E2E-X□F□ DC 3-wire E2E-X□Y□ AC 2-wire DC 3-wire E2E2-X□Y□ AC 2-wire	Shielded	l	0 mm	0 mm	0 mm	0 mm
		d	8 mm	12 mm	18 mm	30 mm
		D	0 mm	0 mm	0 mm	0 mm
		m	4.5 mm	8 mm	20 mm	40 mm
		n	12 mm	18 mm	27 mm	45 mm
	Unshielded	l	6 mm	15 mm	22 mm	30 mm
		d	24 mm	40 mm	55 mm	90 mm
		D	6 mm	15 mm	22 mm	30 mm
		m	8 mm	20 mm	40 mm	70 mm
		n	24 mm	36 mm	54 mm	90 mm

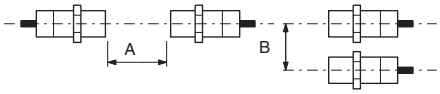
Relationship between Sizes and Models

E2E

Model		Model No.
M8	Shielded	E2E-X2D□ E2E-X1R5E□/F□ E2E-X1R5Y□
	Unshielded	E2E-X4MD□ E2E-X2ME□/F□ E2E-X2MY□
M12	Shielded	E2E-X3D□ E2E-X2E□/F□ E2E-X2Y□ E2E-X3T1
	Unshielded	E2E-X8MD□ E2E-X5ME□/F□ E2E-X5MY□
M18	Shielded	E2E-X7D□ E2E-X5E□/F□ E2E-X5Y□ E2E-X7T1
	Unshielded	E2E-X14MD□ E2E-X10ME□/F□ E2E-X10MY□
M30	Shielded	E2E-X10D□ E2E-X10E□/F□ E2E-X10Y□ E2E-X10T1
	Unshielded	E2E-X20MD□ E2E-X18ME□/F□ E2E-X18MY□

Mutual Interference

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



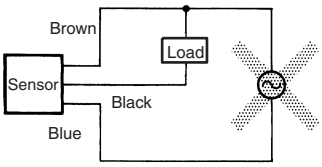
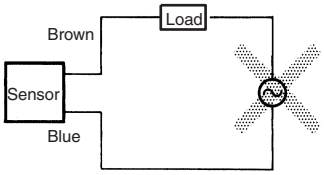
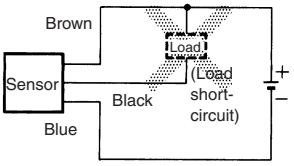
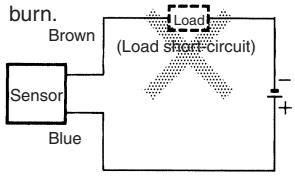
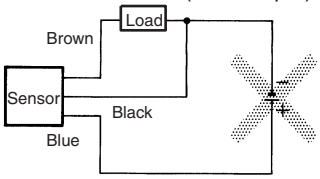
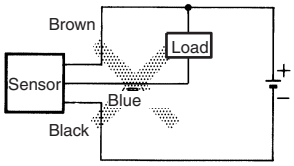
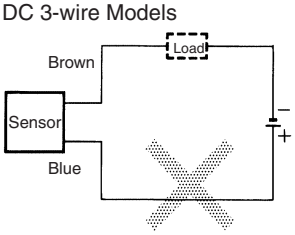
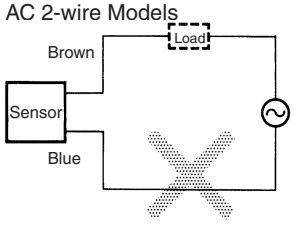
Model		Item	M8	M12	M18	M30
E2E-X□D□ DC 2-wire	Shielded	A	20 mm	30 (20) mm	50 (30) mm	100 (50) mm
		B	15 mm	20 (12) mm	35 (18) mm	70 (35) mm
E2E-X□T1 AC/DC 2-wire	Unshielded	A	80 mm	120 (60) mm	200 (100) mm	300 (100) mm
		B	60 mm	100 (50) mm	110 (60) mm	200 (100) mm
E2E-X□E□ E2E-X□F□ DC 3-wire	Shielded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

⚠ WARNING

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

Precautions for Safe Use

The colors in parentheses are previous wire colors.

Item	Examples	
Power supply Do not impose an excessive voltage on the E2E, otherwise it may explode or burn. Do not impose 100 VAC on any E2E DC Model, otherwise it may explode or burn.	DC 3-wire Models  **Incorrect**	DC 2-wire Models  **Incorrect**
Load short-circuit Do not short-circuit the load, or the E2E may explode or burn. The E2E short-circuit protection function is valid if the polarity of the supply voltage imposed is correct and within the rated voltage range.	DC 3-wire Models (NPN output)  **Incorrect**	DC 2-wire Models The following diagram shows that the load is short-circuited while the polarity of the supply voltage imposed on the E2E/E2E2 is wrong, in which case the E2E/E2E2 may explode or burn.  **Incorrect**
Wiring Be sure to wire the E2E and load correctly, otherwise it may explode or burn.	DC 3-wire Models (NPN output)  **Incorrect**  **Incorrect**	
Connection with no load Make sure to connect a proper load to the E2E in operation, otherwise it may explode or burn.	DC 3-wire Models  **Incorrect**	AC 2-wire Models  **Incorrect**

Precautions for Correct Use

Installation

Power Reset Time

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

Power OFF

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

Power Supply Transformer

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

Sensing Object

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

Wiring

High-tension Lines

Wiring through Metal Conduit

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

Connecting Load to AC/DC 2-wire Sensor

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

Surge Protection

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

Leakage Current

When the Proximity Sensor is OFF, the Proximity Sensor has leakage current. Refer to page 9 Leakage Current Characteristics. In this case, the load is imposed with a small voltage and the load may not be reset. Before using the Proximity Sensor, make sure that this voltage is less than the load reset voltage. The AC 2-wire Proximity Sensor cannot be connected to any card-lift-off relay (e.g., the G2A) because contact vibration of the relay will be caused by the leakage current and the life of the relay will be shortened.

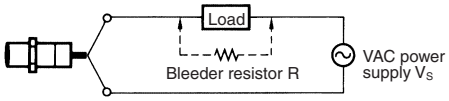
Loads with Large Inrush Currents (E2E-X□T□)

Connecting a load that has a large inrush current (e.g., a lamp or motor) may result in a malfunction due to the inrush current causing a load short-circuit.

Countermeasures Against Leakage Current

AC 2-wire Models

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



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

$R \leq V_S/(10 - I)$ (kΩ)

$P > V_S^2/R$ (mW)

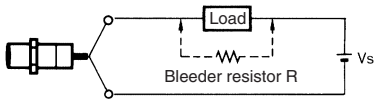
P: The allowable power of the bleeder resistor. (The actual power capacity of the bleeder resistor must be at least a few times as large as the allowable power of the bleeder resistor.)

I: Load current (mA)

The following resistors are recommended.
100 VAC (supply voltage): A resistor with a resistance of 10 kΩ maximum and an allowable power of 3 W minimum
200 VAC (supply voltage): A resistor with a resistance of 20 kΩ maximum and an allowable power of 10 W minimum
If these resistors generate excessive heat, use a resistor with a resistance of 10 kΩ maximum and an allowable power of 5 W minimum at 100 VAC and a resistor with a resistance of 20 kΩ maximum and an allowable power of 10 W minimum at 200 VAC instead.

DC 2-wire Models

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



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

$R \leq V_S/(i_R - i_{OFF})$ (kΩ)

$P > V_S^2/R$ (mW)

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

i_R: Leakage current of Sensors (mA)

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

The following resistors are recommended.
12 VDC (supply voltage): A resistor with a resistance of 15 kΩ maximum and an allowable power of 450 mW minimum
24 VDC (supply voltage): A resistor with a resistance of 30 kΩ maximum and an allowable power of 0.1 W minimum

Cable Tractive Force

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

Diameter	Tractive force
4 dia. max.	30 N max.
4 dia. min.	50 N max.

Mounting

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

Environment

Water Resistivity

The Proximity Sensors are tested intensively on water resistance, but in order to ensure maximum performance and life expectancy avoid immersion in water and provide protection from rain or snow.

Operating Enviroment

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

Connection to a PLC

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 below.)

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 specifications, take it to be 1.3 mA.)
3. The ON current of the PLC and the control output (I_{OUT}) 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 used as shown in the following equation.
   $I_{ON} = (V_{CC} - V_R - V_{PC})/R_{IN}$

Example

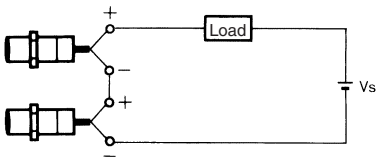
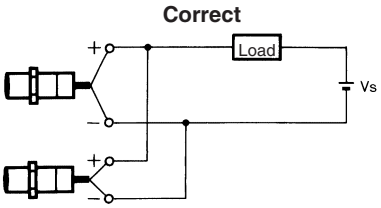
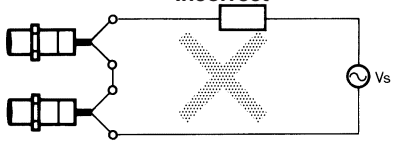
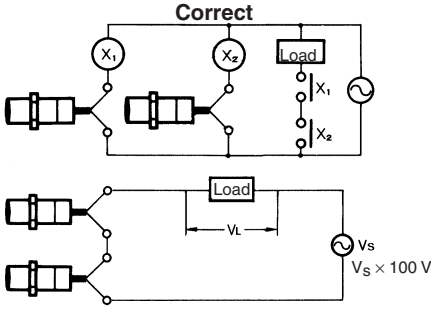
In this example, the above conditions are checked for when the PLC model is the C200H-ID212, the Proximity Sensor model is the E2E-X7D1-N, and the power supply voltage is 24 V.

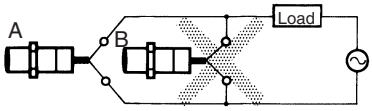
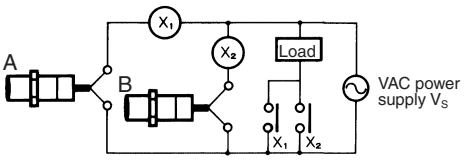
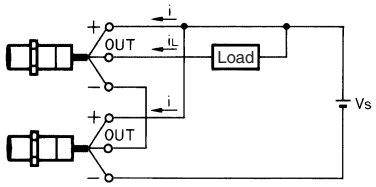
1. V_{ON} (14.4 V) $\leq V_{CC}$ (20.4 V) – V_R (3 V) = 17.4 V: OK
2. I_{OFF} (1.3 mA) ≥ I_{leak} (0.8 mA): OK
3. $I_{ON} = [V_{CC}$ (20.4 V) – V_R (3 V) – V_{PC} (4 V)]/R_{IN} (3 kΩ)
   ≈ 4.5 mA
   Therefore,
   $I_{OUT(min)}$ (3 mA) $\leq I_{ON}$ (4.5 mA): OK

V_{ON}: ON voltage of PLC (14.4 V)
I_{ON}: ON current of PLC (typ. 7 mA)
I_{OFF}: OFF current of PLC (1.3 mA)
R_{IN}: Input impedance of PLC (3 kΩ)
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 are for the following PLC model and Proximity Sensor model.
PLC: C200H-ID212
Proximity Sensor: E2E-X7D1-N

Precautions for AC/DC 2-wire Proximity Sensors in Operation

Connection

Model	Connection type	Method	Description
DC 2-wire	AND (serial connection)	Correct 	The Sensors connected together must satisfy the following conditions. $V_S - N \times V_R \geq$ Load operating voltage N: No. of Sensors V_R: Residual voltage of each Sensor V_S: Supply voltage If each Proximity Sensor is not supplied with the rated voltage and current, the indicator will not be lit properly or unnecessary pulses may be output for approximately 1 ms.
	OR (parallel connection)	Correct 	The Sensors connected together must satisfy the following conditions. N x i ≤Load reset current N: No. of Sensors i: Leakage current of each Sensor If the MY Relay, which operates at 24 VDC, is used as a load for example, a maximum of four Proximity Sensors can be connected to the load.
AC 2-wire	AND (serial connection)	Incorrect  Correct 	If 100 or 200 VAC is imposed on the Proximity Sensors, V_L (i.e., the voltage imposed on the load) will be obtained from the following. $V_L = V_S$ – (residual voltage x No. of Proximity Sensors) (V) Therefore, if V_L is lower than the load operating voltage, the load will not operate. A maximum of three Proximity Sensors can be connected in series provided that the supply voltage is 100 V minimum.

Model	Connection type	Method	Description
AC 2-wire	OR (parallel connection)	**Incorrect**  **Correct**  	In principle, more than two Proximity Sensors cannot be connected in parallel. Provided that Proximity Sensor A does not operate with Proximity Sensor B simultaneously and there is no need to keep the load operating continuously, the Proximity Sensors can be connected in parallel. In this case, however, due to the total leakage current of the Proximity Sensors, the load may not reset properly. It is not possible to keep the load operating continuously with Proximity Sensors A and B in simultaneous operation to sense sensing objects due to the following reason. When Proximity Sensor A is ON, the voltage imposed on Proximity Sensor A will drop to approximately 10 V and the load current flows into Proximity Sensor A, and when one of the sensing objects is close to Proximity Sensor B, Proximity Sensor B will not operate because the voltage imposed on Proximity Sensor B is 10 V, which is too low. When Proximity Sensor A is OFF, the voltage imposed on Proximity Sensor B will reach the supply voltage and Proximity Sensor B will be ON. Then, Proximity Sensor A as well as Proximity Sensor B will be OFF for approximately 10 ms, which resets the load for an instant. To prevent the instantaneous resetting of the load, use a relay as shown on the left.
DC 3-wire	AND (serial connection)	**Correct**  	The Sensors connected together must satisfy the following conditions. $i_L + (N - 1) \times i \leq$ Upper-limit of control output of each Sensor $V_S - N \times V_R \geq$ Load operating voltage N: No. of Sensors V_R: Residual voltage of each Sensor V_S: Supply voltage i: Current consumption of the Sensor i_L: Load current If the MY Relay, which operates at 24 VDC, is used as a load for example, a maximum of two Proximity Sensors can be connected to the load.

Dimensions

Note: All units are in millimeters unless otherwise indicated.

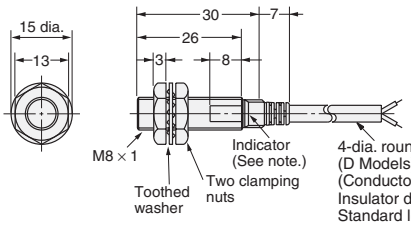
E2E

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

Note: 1. Two clamping nuts and one toothed washer are provided with M8 to M30 Models.
2. The model numbers of Pre-wired M8 to M30 Models are laser-marked on the milled section and cable section.

Pre-wired Models (Shielded)

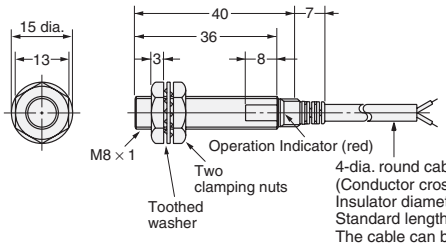
Fig. 4 : E2E-X2D□-N
E2E-X1R5E□/F□



Note: D Models: Operation indicator (red), setting indicator (green);
E, F Models: Operation indicator (red)

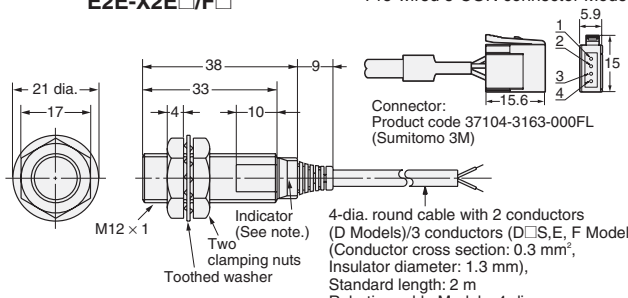
4-dia. round cable with 2 conductors (D Models)/3 conductors (E, F Models) (Conductor cross section: 0.3 mm^2, Insulator diameter: 1.3 mm), Standard length: 2 m
Robotics cable Models: 4-dia. vinyl-insulated round cable with 2 conductors (D Models)/3 conductors (E Models)(Conductor cross section: 0.3 mm^2, Insulator diameter: 1.27 mm), Standard length: 2 m
The cable can be exteded up to 200 m (separate metal conduit).

Fig. 6 : E2E-X1R5Y□



4-dia. 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 exteded up to 200 m (separate metal conduit).

Fig. 8 : E2E-X3D□-N
E2E-X2E□/F□

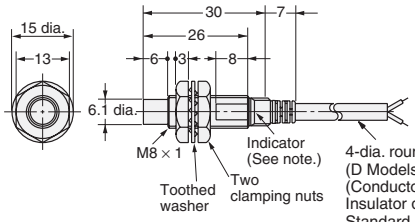


Note: D Models:
Operation indicator (red), setting indicator (green);
E, F Models:
Operation indicator (red)

4-dia. round cable with 2 conductors (D Models)/3 conductors (D□S,E, F Models) (Conductor cross section: 0.3 mm^2, Insulator diameter: 1.3 mm), Standard length: 2 m
Robotics cable Models: 4-dia. vinyl-insulated round cable with 2 conductors (D Models)/3 conductors (E Models) (Conductor cross section: 0.3 mm^2, Insulator diameter: 1.27 mm), Standard length: 2 m
The cable can be extended (separate metal conduit) up to 200 m (control output) or up to 100 m (diagnostic output).

Pre-wired Models (Unshielded)

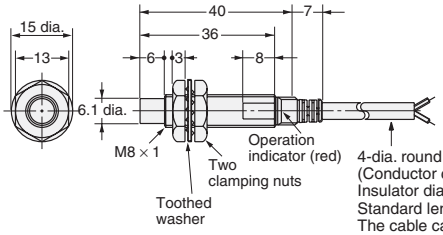
Fig. 5 : E2E-X4MD□
E2E-X2ME□/F□



Note: D Models: Operation indicator (red), setting indicator (green);
E, F Models: Operation indicator (red)

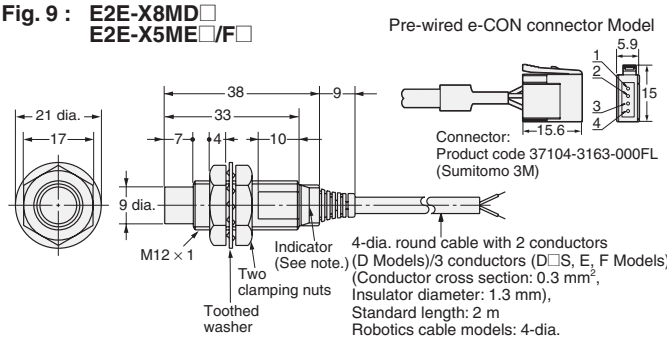
4-dia. round cable with 2 conductors (D Models)/3 conductors (E, F Models) (Conductor cross section: 0.3 mm^2, Insulator diameter: 1.3 mm), Standard length: 2 m
Robotics cable models: 4-dia. vinyl-insulated round cable with 2 conductors (D Models)/3 conductors (E Models)(Conductor cross section: 0.3 mm^2, Insulator diameter: 1.27 mm), Standard length: 2 m
The cable can be exteded up to 200 m (separate metal conduit).

Fig. 7 : E2E-X2MY□



4-dia. 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 exteded up to 200 m (separate metal conduit).

Fig. 9 : E2E-X8MD□
E2E-X5ME□/F□

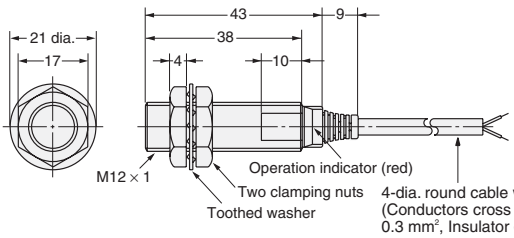


Note: D Models:
Operation indicator (red), setting indicator (green);
E, F Models:
Operation indicator (red)

4-dia. round cable with 2 conductors (D Models)/3 conductors (D□S, E, F Models) (Conductor cross section: 0.3 mm^2, Insulator diameter: 1.3 mm), Standard length: 2 m
Robotics cable models: 4-dia. vinyl-insulated round cable with 2 conductors (D Models)/3 conductors (E Models) (Conductor cross section: 0.3 mm^2, Insulator diameter: 1.27 mm), Standard length: 2 m
The cable can be extended (separate metal conduit) up to 200 m (control output) or up to 100 m (diagnostic output).

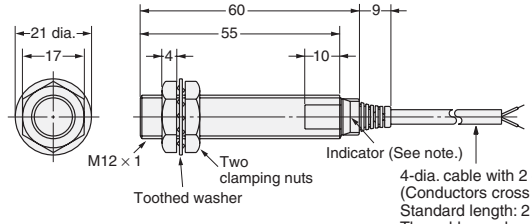
Pre-wired Models (Shielded)

Fig. 10 : E2E-X2Y□



4-dia. round cable with 2 conductors (Conductors 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).

Fig. 12 : E2E-X3T1

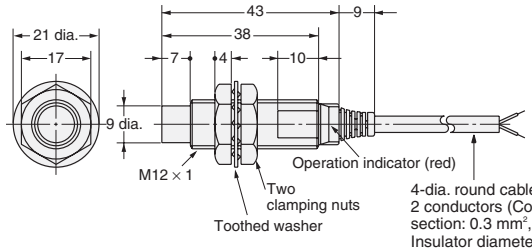


4-dia. cable with 2 conductors (Conductors cross section: 0.3 mm², Insulator diameter: 1.3 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).

Note: Operation indicator (red), setting indicator (green)

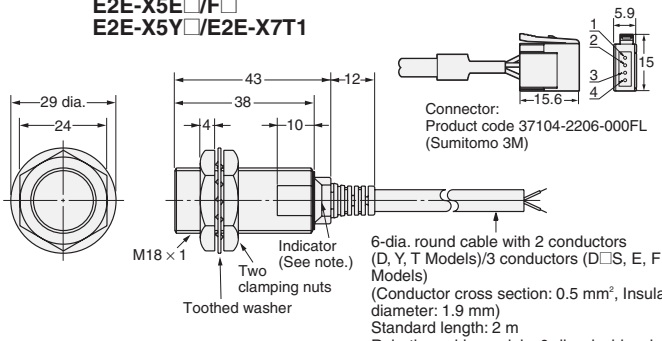
Pre-wired Models (Unshielded)

Fig. 11 : E2E-X5MY□



4-dia. round cable with 2 conductors (Conductors 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).

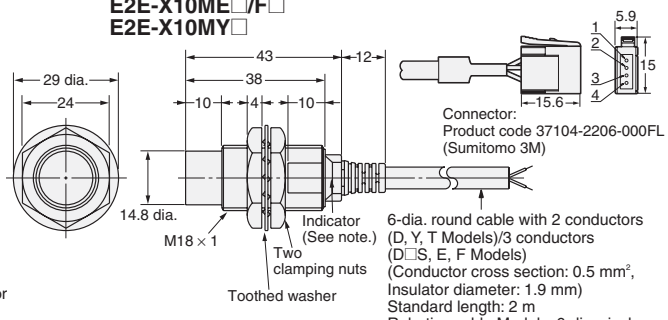
Fig. 13 : E2E-X7D□-N/ E2E-X5E□/F□ E2E-X5Y□/E2E-X7T1



6-dia. round cable with 2 conductors (D, Y, T Models)/3 conductors (D□S, E, F Models)
(Conductor cross section: 0.5 mm², Insulator diameter: 1.9 mm)
Standard length: 2 m
Robotics cable models: 6-dia. vinyl-insulated round cable with 2 conductors (D Models)/ 3 conductors (E Models) (Conductor cross section: 0.5 mm², Insulator diameter: 1.74 mm)
Standard length: 2 m
The cable can be extended (separate metal conduit) up to 200 m (control output) or up to 100 m (diagnostic output).

Note: D, T Models: Operation indicator (red), setting indicator (green);
E, F, Y Models: Operation indicator (red)

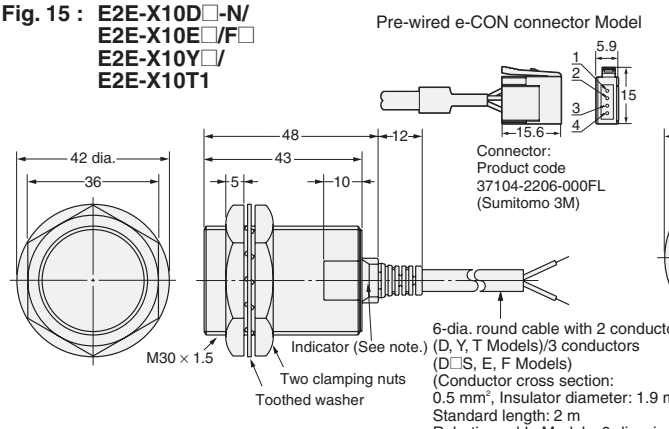
Fig. 14 : E2E-X14MD□/ E2E-X10ME□/F□ E2E-X10MY□



6-dia. round cable with 2 conductors (D, Y, T Models)/3 conductors (D□S, E, F Models)
(Conductor cross section: 0.5 mm², Insulator diameter: 1.9 mm)
Standard length: 2 m
Robotics cable Models: 6-dia. vinyl-insulated round cable with 2 conductors (D Models)/3 conductors (E Models) (Conductor cross section: 0.5 mm², Insulator diameter: 1.74 mm)
Standard length: 2 m
The cable can be extended (separate metal conduit) up to 200 m (control output) or up to 100 m (diagnostic output).

Note: D Models: Operation indicator (red), setting indicator (green);
E, F, Y Models: Operation indicator (red)

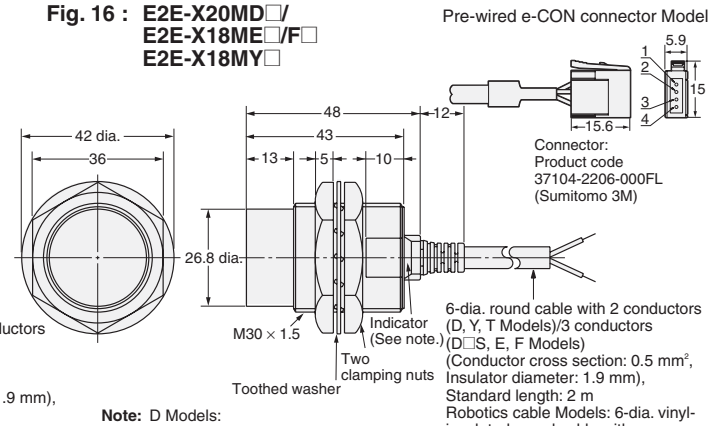
Fig. 15 : E2E-X10D□-N/ E2E-X10E□/F□ E2E-X10Y□/ E2E-X10T1



6-dia. round cable with 2 conductors (D, Y, T Models)/3 conductors (D□S, E, F Models)
(Conductor cross section: 0.5 mm², Insulator diameter: 1.9 mm),
Standard length: 2 m
Robotics cable Models: 6-dia. vinyl-insulated round cable with 2 conductors (D Models)/3 conductors (E Models)
(Conductor cross section: 0.5 mm², Insulator diameter: 1.74 mm),
Standard length: 2 m
The cable can be extended (separate metal conduit) up to 200 m (control output) or up to 100 m (diagnostic output).

Note: D, T Models: Operation indicator (red), setting indicator (green);
E,F,Y Models: Operation indicator (red)

Fig. 16 : E2E-X20MD□/ E2E-X18ME□/F□ E2E-X18MY□

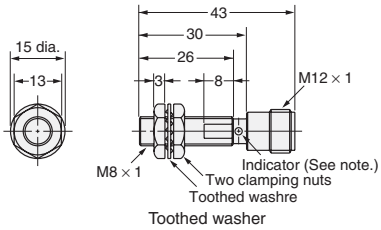


6-dia. round cable with 2 conductors (D, Y, T Models)/3 conductors (D□S, E, F Models)
(Conductor cross section: 0.5 mm², Insulator diameter: 1.9 mm),
Standard length: 2 m
Robotics cable Models: 6-dia. vinyl-insulated round cable with 2 conductors (D Models)/ 3 conductors (E Models) (Conductor cross section: 0.5 mm², Insulator diameter: 1.74 mm),
Standard length: 2 m
The cable can be extended (separate metal conduit) up to 200 m (control output) or up to 100 m (diagnostic output).

Note: D Models: Operation indicator (red), setting indicator (green);
E, F, Y Models: Operation indicator (red)

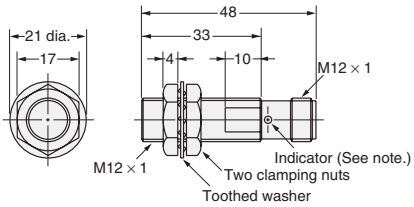
M12 Connector Models (Shielded)

Fig. 17 : E2E-X2D□-M1(G)
E2E-X1R5E□-M1/F□-M1



Note: D Models: Operation indicator (red), setting indicator (green)
E, F Model: Operation indicator (red)

Fig. 19 : E2E-X3D□-M1(G)
E2E-X2E□-M1/F□-M1



Note: D Models: Operation indicator (red), setting indicator (green)
E, F Model: Operation indicator (red)

Fig. 21 : E2E-X2Y□-M1

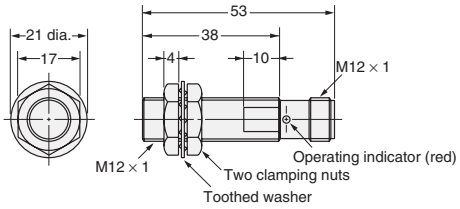
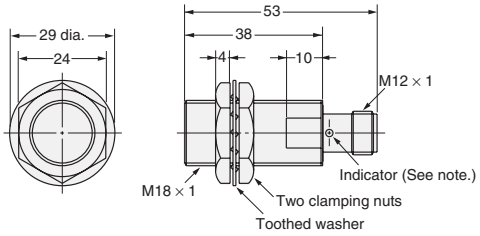
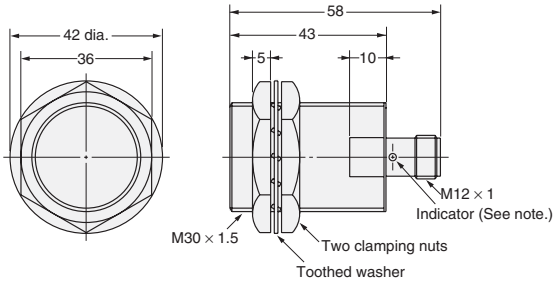


Fig. 23 : E2E-X7D□-M1(G)/E2E-X5E□-M1/F□-M1
E2E-X5Y□-M1



Note: D Models: Operation indicator (red), setting indicator (green)
E, F, Y Model: Operation indicator (red)

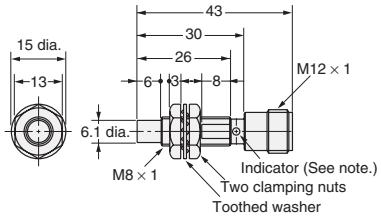
Fig. 25 : E2E-X10D□-M1(G)/E2E-X10E□-M1/F□-M1
E2E-X10Y□-M1



Note: D Models: Operation indicator (red), setting indicator (green)
E, F, Y Model: Operation indicator (red)

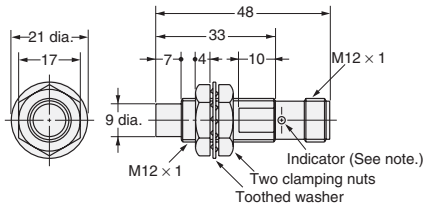
M12 Connector Models (Unshielded)

Fig. 18 : E2E-X4MD□-M1(G)
E2E-X2ME□-M1/F□-M1



Note: D Models: Operation indicator (red), setting indicator (green)
E, F Model: Operation indicator (red)

Fig. 20 : E2E-X8MD□-M1(G)
E2E-X5ME□-M1/F□-M1



Note: D Models: Operation indicator (red), setting indicator (green)
E, F Model: Operation indicator (red)

Fig. 22 : E2E-X5MY□-M1

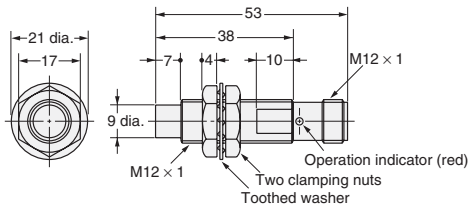
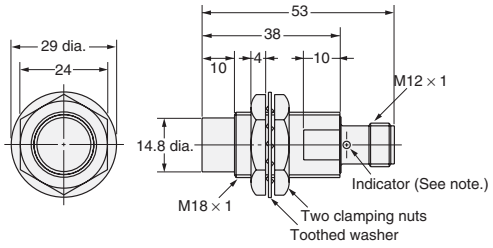
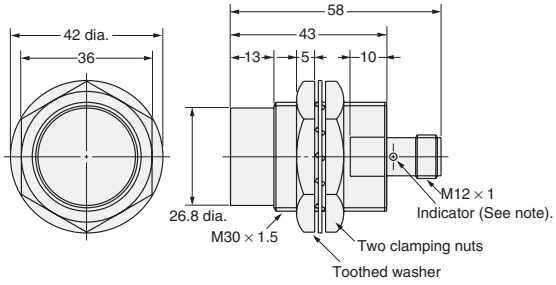


Fig. 24 : E2E-X14MD□-M1(G)/E2E-X10ME□-M1/F□-M1
E2E-X10MY□-M1



Note: D Models: Operation indicator (red), setting indicator (green)
E, F, Y Model: Operation indicator (red)

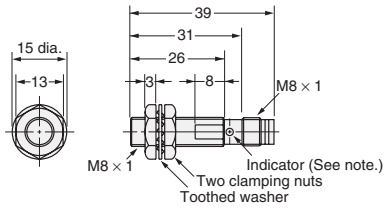
Fig. 26 : E2E-X20MD□-M1(G)/E2E-X18ME□-M1/F□-M1
E2E-X18MY□-M1



Note: D Models: Operation indicator (red), setting indicator (green)
E, F, Y Model: Operation indicator (red)

M8 Connector Models (Shielded)

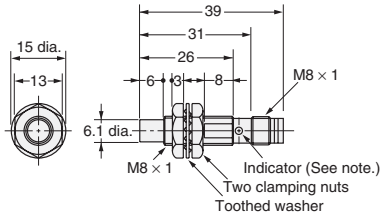
Fig. 27 : E2E-X2D□-M3G/E2E-X1R5E□-M3/F□-M3



Note: D models: Operation indicator (red), setting indicator (green)
E, F model: Operation indicator (red)

M8 Connector Models (Unshielded)

Fig. 28 : E2E-X4MD□-M3G/E2E-X2ME□-M3/F□-M3



Note: D models: Operation indicator (red), setting indicator (green)
E, F model: Operation indicator (red)

Pre-wired M12 Connector Models

Fig. 29 : E2E-X2D□-M1TGJ-U

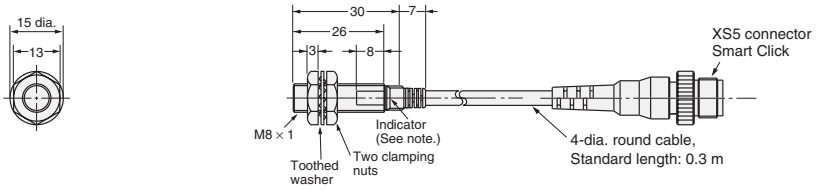


Fig. 30: E2E-X3D1-M1GJ
E2E-X3D1-M1J-T
E2E-X3D□-M1TGJ-U

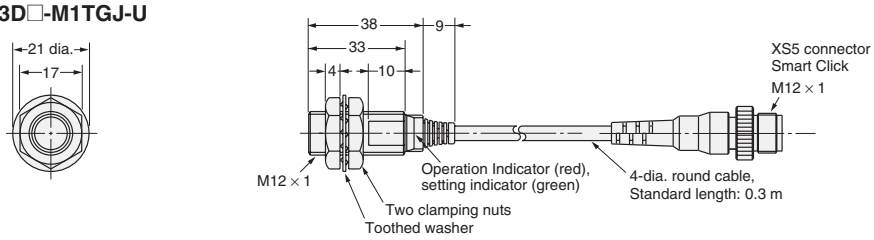


Fig. 31: E2E-X8MD1-M1GJ

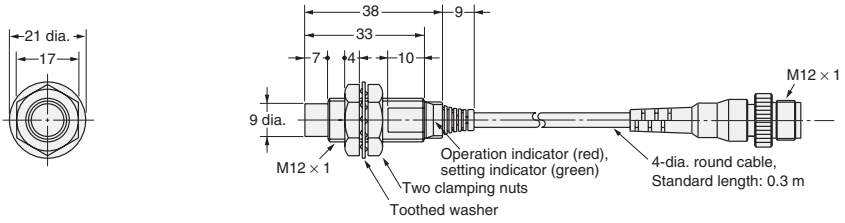
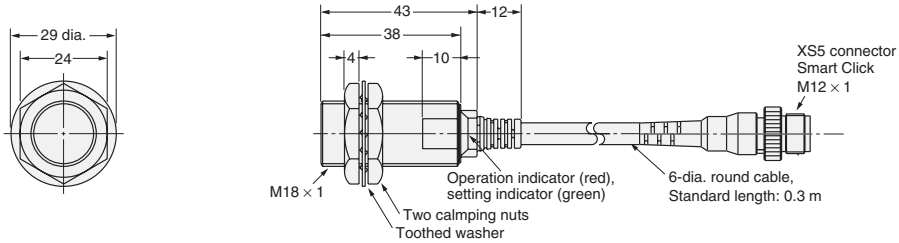


Fig. 32 : E2E-X7D1-M1GJ
E2E-X7D1-M1J-T
E2E-X7D□-M1TGJ-U



Pre-wired M12 Connector Models

Fig. 33 : E2E-X14MD1-M1GJ

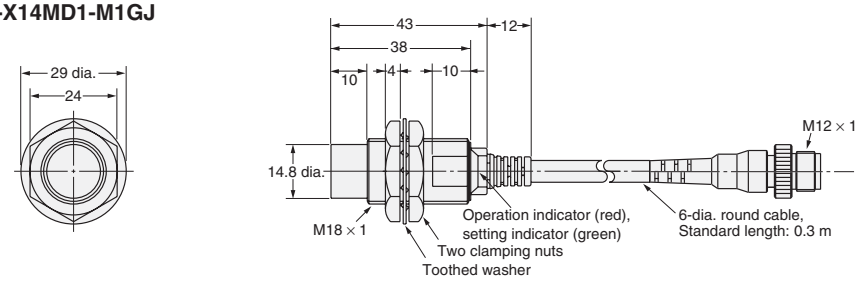


Fig. 34 : E2E-X10D1-M1GJ
E2E-X10D1-M1J-T
E2E-X10D□-M1TGJ-U

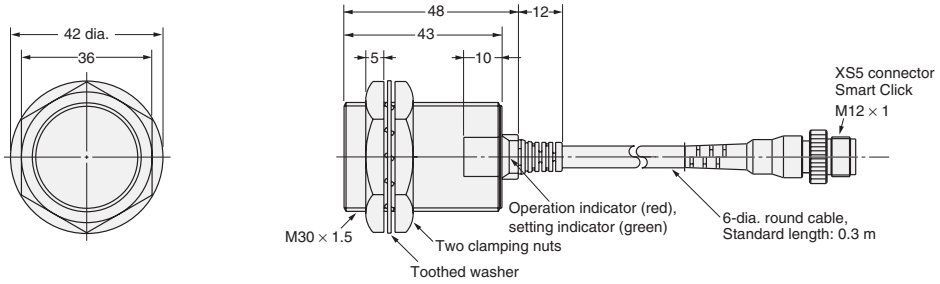
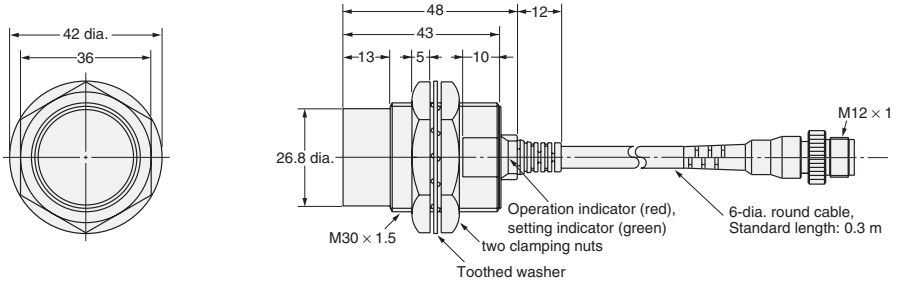
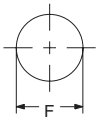


Fig. 35 : E2E-X20MD1-M1GJ



Mounting Holes



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.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

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

Terms and Conditions of Sale

1. Offer; Acceptance. These terms and conditions (these "Terms") are deemed part of all quotes, agreements, purchase orders, acknowledgments, price lists, catalogs, manuals, brochures and other documents, whether electronic or in writing, relating to the sale of products or services (collectively, the "Products") by Omron Electronics LLC and its subsidiary companies ("Omron"). Omron objects to any terms or conditions proposed in Buyer's purchase order or other documents which are inconsistent with, or in addition to, these Terms.
2. Prices; Payment Terms. All prices stated are current, subject to change without notice by Omron. Omron reserves the right to increase or decrease prices on any unshipped portions of outstanding orders. Payments for Products are due net 30 days unless otherwise stated in the invoice.
3. Discounts. Cash discounts, if any, will apply only on the net amount of invoices sent to Buyer after deducting transportation charges, taxes and duties, and will be allowed only if (i) the invoice is paid according to Omron's payment terms and (ii) Buyer has no past due amounts.
4. Interest. Omron, at its option, may charge Buyer 1-1/2% interest per month or the maximum legal rate, whichever is less, on any balance not paid within the stated terms.
5. Orders. Omron will accept no order less than $200 net billing.
6. Governmental Approvals. Buyer shall be responsible for, and shall bear all costs involved in, obtaining any government approvals required for the importation or sale of the Products.
7. Taxes. All taxes, duties and other governmental charges (other than general real property and income taxes), including any interest or penalties thereon, imposed directly or indirectly on Omron or required to be collected directly or indirectly by Omron for the manufacture, production, sale, delivery, importation, consumption or use of the Products sold hereunder (including customs duties and sales, excise, use, turnover and license taxes) shall be charged to and remitted by Buyer to Omron.
8. Financial. If the financial position of Buyer at any time becomes unsatisfactory to Omron, Omron reserves the right to stop shipments or require satisfactory security or payment in advance. If Buyer fails to make payment or otherwise comply with these Terms or any related agreement, Omron may (without liability and in addition to other remedies) cancel any unshipped portion of Products sold hereunder and stop any Products in transit until Buyer pays all amounts, including amounts payable hereunder, whether or not then due, which are owing to it by Buyer. Buyer shall in any event remain liable for all unpaid accounts.
9. Cancellation; Etc. Orders are not subject to rescheduling or cancellation unless Buyer indemnifies Omron against all related costs or expenses.
10. Force Majeure. Omron shall not be liable for any delay or failure in delivery resulting from causes beyond its control, including earthquakes, fires, floods, strikes or other labor disputes, shortage of labor or materials, accidents to machinery, acts of sabotage, riots, delay in or lack of transportation or the requirements of any government authority.
11. Shipping; Delivery. Unless otherwise expressly agreed in writing by Omron:
    a. Shipments shall be by a carrier selected by Omron; Omron will not drop ship except in "break down" situations.
    b. Such carrier shall act as the agent of Buyer and delivery to such carrier shall constitute delivery to Buyer;
    c. All sales and shipments of Products shall be FOB shipping point (unless otherwise stated in writing by Omron), at which point title and risk of loss shall pass from Omron to Buyer; provided that Omron shall retain a security interest in the Products until the full purchase price is paid;
    d. Delivery and shipping dates are estimates only; and
    e. Omron will package Products as it deems proper for protection against normal handling and extra charges apply to special conditions.
12. Claims. Any claim by Buyer against Omron for shortage or damage to the Products occurring before delivery to the carrier must be presented in writing to Omron within 30 days of receipt of shipment and include the original transportation bill signed by the carrier noting that the carrier received the Products from Omron in the condition claimed.
13. Warranties. (a) Exclusive Warranty. Omron's exclusive warranty is that the Products will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Omron (or such other period expressed in writing by Omron). Omron disclaims all other warranties, express or implied. (b) Limitations. OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCTS. BUYER ACKNOWLEDGES THAT IT ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. Omron further disclaims all warranties and responsibility of any type for claims or expenses based on infringement by the Products or otherwise of any intellectual property right. (c) Buyer Remedy. Omron's sole obligation hereunder shall be, at Omron's election, to (i) replace (in the form originally shipped with Buyer responsible for labor charges for removal or replacement thereof) the non-complying Product, (ii) repair the non-complying Product, or (iii) repay or credit Buyer an amount equal to the purchase price of the non-complying Product; provided that in no event shall Omron be responsible for warranty, repair, indemnity or any other claims or expenses regarding the Products unless Omron's analysis confirms that the Products were properly handled, stored, installed and maintained and not subject to contamination, abuse, misuse or inappropriate modification. Return of any Products by Buyer must be approved in writing by Omron before shipment. Omron Companies shall not be liable for the suitability or unsuitability or the results from the use of Products in combination with any electrical or electronic components, circuits, system assemblies or any other materials or substances or environments. Any advice, recommendations or information given orally or in writing, are not to be construed as an amendment or addition to the above warranty. See http://www.omron247.com or contact your Omron representative for published information.
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16. Property; Confidentiality. Any intellectual property in the Products is the exclusive property of Omron Companies and Buyer shall not attempt to duplicate it in any way without the written permission of Omron. Notwithstanding any charges to Buyer for engineering or tooling, all engineering and tooling shall remain the exclusive property of Omron. All information and materials supplied by Omron to Buyer relating to the Products are confidential and proprietary, and Buyer shall limit distribution thereof to its trusted employees and strictly prevent disclosure to any third party.
17. Export Controls. Buyer shall comply with all applicable laws, regulations and licenses regarding (i) export of products or information; (iii) sale of products to "forbidden" or other proscribed persons; and (ii) disclosure to non-citizens of regulated technology or information.
18. Miscellaneous. (a) Waiver. No failure or delay by Omron in exercising any right and no course of dealing between Buyer and Omron shall operate as a waiver of rights by Omron. (b) Assignment. Buyer may not assign its rights hereunder without Omron's written consent. (c) Law. These Terms are governed by the law of the jurisdiction of the home office of the Omron company from which Buyer is purchasing the Products (without regard to conflict of law principles). (d) Amendment. These Terms constitute the entire agreement between Buyer and Omron relating to the Products, and no provision may be changed or waived unless in writing signed by the parties. (e) Severability. If any provision hereof is rendered ineffective or invalid, such provision shall not invalidate any other provision. (f) Setoff. Buyer shall have no right to set off any amounts against the amount owing in respect of this invoice. (g) Definitions. As used herein, "including" means "including without limitation"; and "Omron Companies" (or similar words) mean Omron Corporation and any direct or indirect subsidiary or affiliate thereof.

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1. Suitability of Use. Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases but the following is a non-exhaustive list of applications for which particular attention must be given:
   (i) Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.
   (ii) Use in consumer products or any use in significant quantities.
   (iii) Energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
   (iv) Systems, machines and equipment that could present a risk to life or property. Please know and observe all prohibitions of use applicable to this Product.
   NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY OR IN LARGE QUANTITIES WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON'S PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.
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