Spatter-resistant Proximity Sensor

E2EQ

CSM_E2EQ_DS_E_3_1

Spatter-resistant Fluororesin-coated Proximity Sensor

- Superior spatter resistance.
- Long Sensing-distance Models added for sensing distances up to 15 mm.
- DC 2-Wire Models.
- Pre-wired Connector Models also available.

⚠ Be sure to read Safety Precautions on page 6.

Ordering Information

Sensors [Refer to Dimensions on page 7.]

Pre-wired Models

Long Sensing-distance Models

Appearance		Sensing distance	Output configuration	Operation mode	Model
Shielded	M12	4 mm	DC 2-wire	NO	E2EQ-X4X1 2M
	M18	8 mm			E2EQ-X8X1 2M
	M30	15 mm			E2EQ-X15X1 2M

Standard Models

Appearance		Sensing distance	Output configuration	Operation mode	Model
Shielded	M12	3 mm	DC 2-wire	NO	E2EQ-X3D1 2M
	M18	7 mm			E2EQ-X7D1 2M
	M30	10 mm			E2EQ-X10D1 2M

Pre-wired Smartclick Connector Models (M12)

Long Sensing-distance Models

Appearance		Sensing distance	Output configuration	Operation mode	Model
Shielded	M12	4 mm	DC 2-wire (3)-(4) pin arrangement	NO	E2EQ-X4X1-M1TJ 0.3M
	M18	8 mm			E2EQ-X8X1-M1TJ 0.3M
	M30	15 mm			E2EQ-X15X1-M1TJ 0.3M

Standard Models

Standard Models		Sensing distance	Output configuration	Operation mode	Model
Shielded	M12	3 mm	DC 2-wire (1)-(4) pin arrangement	NO	E2EQ-X3D1-M1TGJ 0.3M
	M18	7 mm			E2EQ-X7D1-M1TGJ 0.3M
	M30				E2EQ-X10D1-M1TGJ 0.3M

Pre-wired Connector Models (M12)

Long Sensing-distance Models

Appearance		Sensing distance	Output configuration	Operation mode	Model
Shielded 	M12	4 mm	DC 2-wire (3)-(4) pin arrangement	NO	**E2EQ-X4X1-M1J 0.3M**
	M18	8 mm			**E2EQ-X8X1-M1J 0.3M**
	M30	15 mm			**E2EQ-X15X1-M1J 0.3M**

Standard Models

Standard Models		Sensing distance	Output configuration	Operation mode	Model
Shielded 	M12	3 mm	DC 2-wire (1)-(4) pin arrangement	NO	**E2EQ-X3D1-M1GJ 0.3M**
	M18	7 mm			**E2EQ-X7D1-M1GJ 0.3M**
	M30	10 mm			**E2EQ-X10D1-M1GJ 0.3M**

Accessories (Order Separately)

Sensor I/O Connectors (M12) [Refer to *XS2*.]

Appearance	Cable length	Sensor I/O Connector model number	Applicable Proximity Sensor model number
Straight 	2 m	**XS2F-D421-DC0-A**	E2EQ-X□X1-M1J
	5 m	**XS2F-D421-GC0-A**	
L-shape 	2 m	**XS2F-D422-DC0-A**	
	5 m	**XS2F-D422-GC0-A**	
Straight 	2 m	**XS2F-D421-DA0-A**	E2EQ-X□D1-M1GJ
	5 m	**XS2F-D421-GA0-A**	
L-shape 	2 m	**XS2F-D422-DA0-A**	
	5 m	**XS2F-D422-GA0-A**	

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

Ratings and Specifications

Long Sensing-distance Models

Item \ Model		E2EQ-X4X1 E2EQ-X4X1-M1(T)/(TG)J	E2EQ-X8X1 E2EQ-X8X1-M1(T)/(TG)J	E2EQ-X15X1 E2EQ-X15X1-M1(T)/(TG)J
Sensing distance		4 mm ±10%	8 mm ±10%	15 mm ±10%
Set distance *1		0 to 3.2 mm	0 to 6.4 mm	0 to 12 mm
Differential travel		15% max. of sensing distance		
Standard sensing object		Iron, 12 × 12 × 1 mm	Iron, 18 × 18 × 1 mm	Iron, 30 × 30 × 1 mm
Response frequency *2		1 kHz	0.5 kHz	0.25 kHz
Control output	**Load current**	3 to 100 mA		
	Residual voltage *3	5 V max. (Load current: 100 mA, Cable length: 2 m)		
Operation mode (with sensing object approaching)		Load ON: NO; For details, refer to the timing charts on page 5.		
Protection circuits		Load short-circuit protection, Surge suppressor		
Ambient temperature range		Operating: –25 to 70°C Storage: –40 to 85°C, (with no icing or condensation)		
Temperature influence		±15% max. of sensing distance at 23°C in the temperature range of –40 to 85°C ±10% max. of sensing distance at 23°C in the temperature range of –25 to 70°C		±15% max. of sensing distance at 23°C in the temperature range of –25 to 70°C
Voltage influence		±1% max. of sensing distance at rated voltage in the rated voltage ±15% range		
Shock resistance		Destruction: 1,000m/s^2 10 times each in X, Y, and Z directions		
Connection method		Pre-wired Models (Standard cable length: 2 m) Pre-wired Connector Models		
Weight (packed state)	**Pre-wired Models**	Approx. 65 g	Approx. 140 g	Approx. 190 g
	Pre-wired Connector Models	Approx. 20 g	Approx. 40 g	Approx. 90 g

*1. Use the Sensor within the range in which the green indicator is ON.
*2. The response frequency is an average value.
*3. The residual voltage is 5 V. Make sure that the device connected to the Sensor can withstand the residual voltage.

Standard Models

Item \ Model		E2EQ-X3D1 E2EQ-X3D1-M1GJ	E2EQ-X7D1 E2EQ-X7D1-M1GJ	E2EQ-X10D1 E2EQ-X10D1-M1GJ
Sensing distance		3 mm ±10%	7 mm ±10%	10 mm ±10%
Set distance		0 to 2.4 mm	0 to 5.6 mm	0 to 8 mm
Differential travel		10% max. of sensing distance		
Standard sensing object		Iron, 12 × 12 × 1 mm	Iron, 18 × 18 × 1 mm	Iron, 30 × 30 × 1 mm
Response frequency *		1 kHz	500 Hz	400 Hz
Control output	Load current	3 to 100 mA		
	Residual voltage	3 V max. (Load current: 100 mA, Cable length: 2 m)		
Operation mode (with sensing object approaching)		Load ON: NO; For details, refer to the timing charts on page 5.		
Protection circuits		Load short-circuit protection, Surge suppressor		
Ambient temperature range		Operating/Storage: –25 to 70°C (with no icing or condensation)		
Temperature influence		±10% max. of sensing distance at 23°C in the temperature range of –25 to 70°C		
Voltage influence		±2.5% max. of sensing distance at rated voltage in the rated voltage ±15% range		
Shock resistance		Destruction: 1,000 m/s^2 10 times each in X, Y, and Z directions		
Connection method		E2EQ-X□D1: Pre-wired Models (Standard cable length: 2 m) E2EQ-X□D1-M1GJ: Pre-wired Connector Models (Standard cable length: 300mm)		
Weight (packed state)	Pre-wired Models	Approx. 120 g	Approx. 160 g	Approx. 220 g
	Pre-wired Connector Models	Approx. 80 g	Approx. 110 g	Approx. 190 g

* The response frequency is an average value. Measurement conditions are as follows: standard sensing object, a distance of twice the standard sensing object, and a set distance of half the sensing distance.

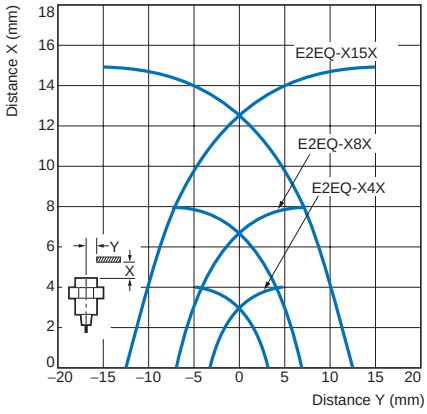
Common Ratings and Performance

Item \ Model		E2EQ-X4X1 E2EQ-X4X1-M1J E2EQ-X3D1 E2EQ-X3D1-M1GJ	E2EQ-X8X1 E2EQ-X8X1-M1J E2EQ-X7D1 E2EQ-X7D1-M1GJ	E2EQ-X15X1 E2EQ-X15X1-M1J E2EQ-X10D1 E2EQ-X10D1-M1GJ
Detectable object		Ferrous metal (The sensing distance decreases with non-ferrous metal. Refer to *Engineering Data* on page 4.)		
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.		
Indicators		Operation indicator (red), Setting indicator (green)		
Ambient humidity range		Operating/Storage: 35% to 95% (with no condensation)		
Insulation resistance		50 MΩ min. (at 500 VDC) between current-carrying parts and case		
Dielectric strength		1,000 VAC for 1 min between current-carrying parts and case		
Vibration resistance		Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions		
Degree of protection		IEC 60529 IP67, in-house standards: oil-resistant		
Materials	Case	Fluororesin coating (Base material: brass)		
	Sensing surface	Fluororesin		
	Clamping nuts	Fluororesin coating (Base material: brass)		
	Toothed washer	Zinc-plated iron		
Accessories		Instruction manual		

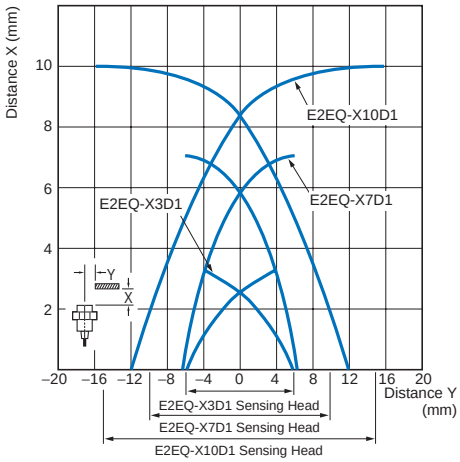
Engineering Data (Typical)

Sensing Area

E2EQ-X□X□(-M1J) Shielded Models

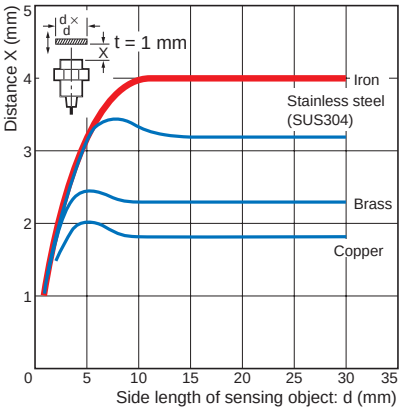


E2EQ-X□D□(-M1GJ)

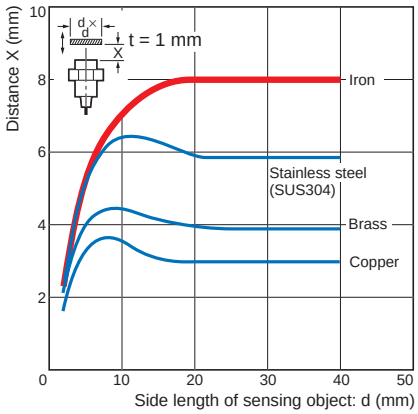


Influence of Sensing Object Size and Material

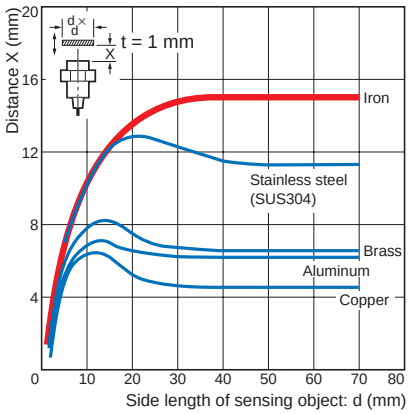
E2EQ-X4X1(-M1J)



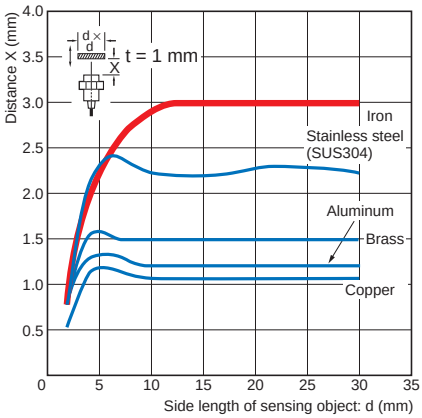
E2EQ-X8X1(-M1J)



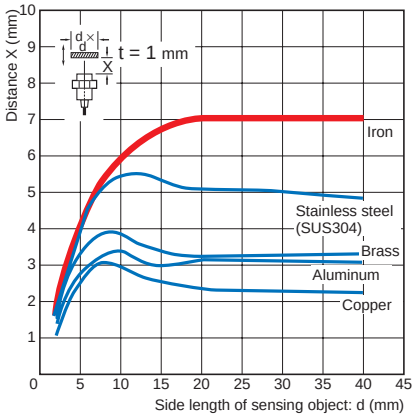
E2EQ-X15X1(-M1J)



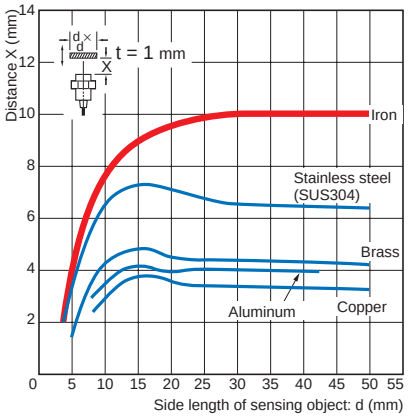
E2EQ-X3D1(-M1GJ)



E2EQ-X7D1(-M1GJ)

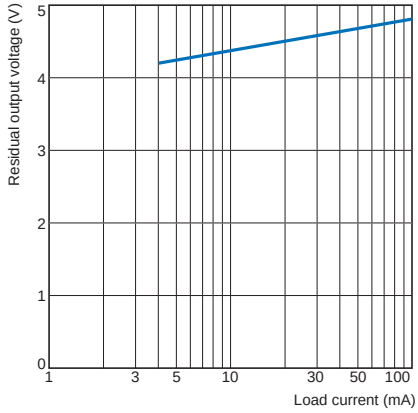


E2EQ-X10D1(-M1GJ)

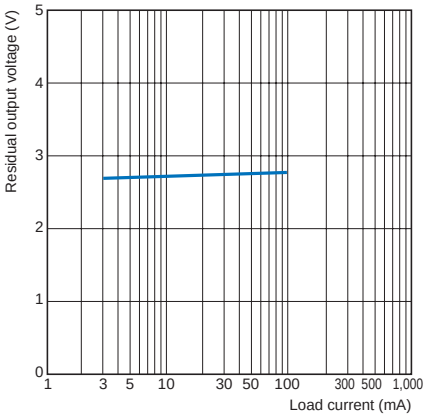


Residual Output Voltage

E2EQ-X□X□(-M1J)

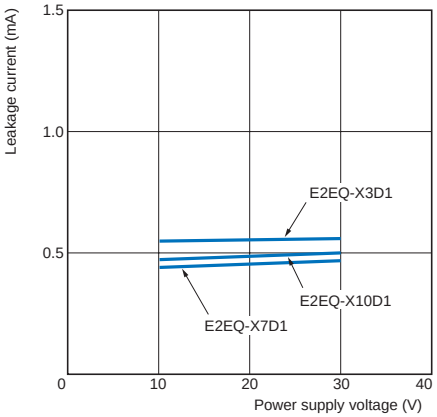


E2EQ-X□D□(-M1GJ)



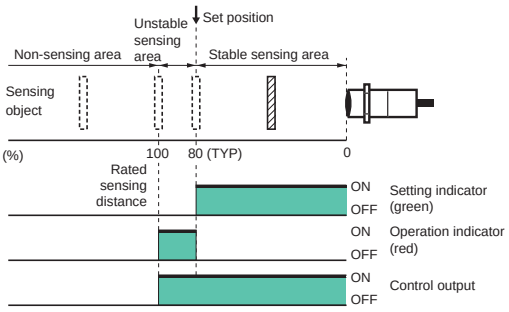
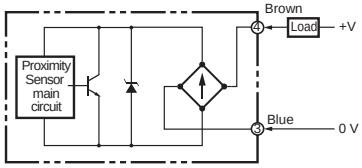
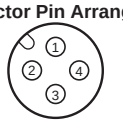
Leakage Current

E2EQ-X□D

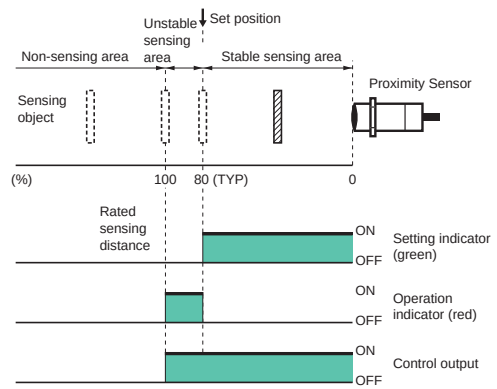
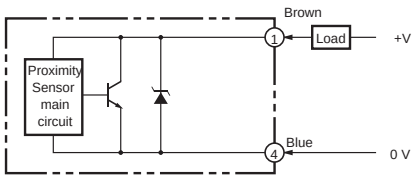
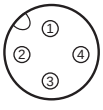


I/O Circuit Diagrams

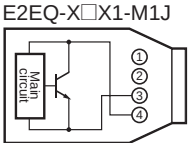
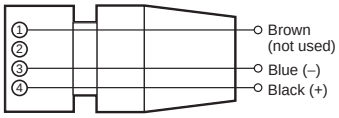
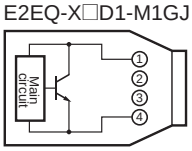
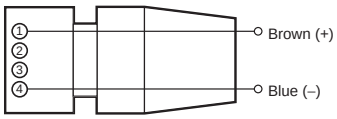
Long Sensing-distance Models

Model	Operation mode	Timing Chart	Output circuit
E2EQ-X4X1 E2EQ-X8X1 E2EQ-X15X1 E2EQ-X4X1-M1J E2EQ-X8X1-M1J E2EQ-X15X1-M1J	NO		 Note 1. The load can be connected to either the +V or 0 V side. Note 2. There is no polarity. Therefore, the brown and blue lines have no polarity. **Connector Pin Arrangement**  Note: Pins 1 and 2 are not used.

Standard Models

Model	Operation mode	Timing Chart	Output circuit
E2EQ-X3D1 E2EQ-X7D1 E2EQ-X10D1 E2EQ-X3D1-M1GJ E2EQ-X7D1-M1GJ E2EQ-X10D1-M1GJ	NO		 Note: The load can be connected to either the +V or 0 V side. **Connector Pin Arrangement**  Note: Pins 2 and 3 are not used.

Pre-wired Connector Model Connections

Model	E2EQ-X□X1-M1J	E2EQ-X□D1-M1GJ
Connections	Pre-wired Connector Model E2EQ-X□X1-M1J  Sensor I/O Connector XS2F-D42□-□C0-A  	Pre-wired Connector Model E2EQ-X□D1-M1GJ  Sensor I/O Connector XS2F-D42□-□A0-A 

Safety Precautions

Refer to *Warranty and Limitations of Liability*.

⚠ WARNING

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

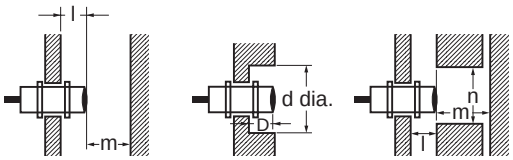
Precautions for Correct Use

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

● Design

Influence of Surrounding Metal

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

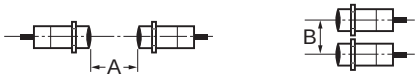


Influence of Surrounding Metal (Unit: mm)

Model / Item	l	d	D	m	n
E2EQ-X4X1(-M1J)	2.4	18	2.4	12	18
E2EQ-X8X1(-M1J)	3.6	27	3.6	24	27
E2EQ-X15X1(-M1J)	6	45	6	45	45
E2EQ-X3D1(-M1GJ)	0	12	0	8	18
E2EQ-X7D1(-M1GJ)		18		20	27
E2EQ-X10D1(-M1GJ)		30		40	45

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.

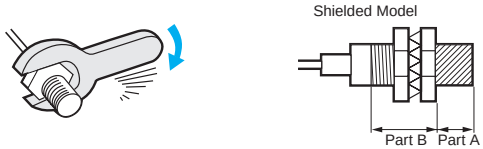


Mutual Interference (Unit: mm)

Model / Item	A	B
E2EQ-X4X1(-M1J)	30	20
E2EQ-X8X1(-M1J)	60	35
E2EQ-X15X1(-M1J)	110	90
E2EQ-X3D1(-M1GJ)	30	20
E2EQ-X7D1(-M1GJ)	50	35
E2EQ-X10D1(-M1GJ)	100	70

● Mounting

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



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

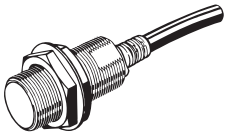
Model \ Torque	Part A		Part B
	Dimension (mm)	Torque	Torque
E2EQ-X4X1(-M1J)	---	30 N·m	
E2EQ-X8X1(-M1J)		70 N·m	
E2EQ-X15X1(-M1J)		180 N·m	
E2EQ-X3D1(-M1GJ)	24	15 N·m	---
E2EQ-X7D1(-M1GJ)	29		
E2EQ-X10D1(-M1GJ)	26	39 N·m	78 N·m

Dimensions

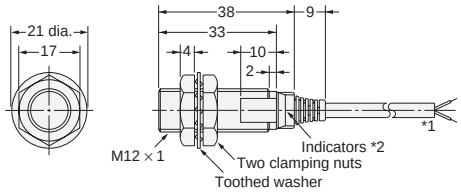
(Unit: mm)
Tolerance class IT16 applies to dimensions in this data sheet unless otherwise specified.

Pre-wired Models

Long Sensing-distance Models

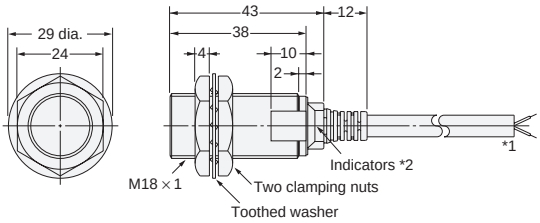


E2EQ-X4X1



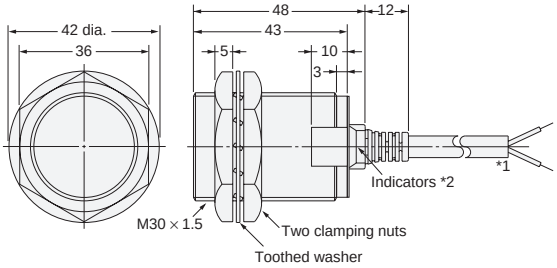
*1. 4-dia. vinyl-insulated round cable with 2 conductors (Flame-resistant, Conductor cross section: 0.3 mm^2, Insulator diameter: 1.3 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).
*2. Operation indicator (red), Setting indicator (green)

E2EQ-X8X1



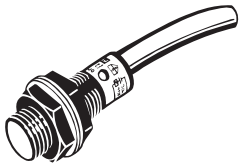
*1. 4-dia. vinyl-insulated round cable with 2 conductors (Flame-resistant, Conductor cross section: 0.3 mm^2, Insulator diameter: 1.3 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).
*2. Operation indicator (red), Setting indicator (green)

E2EQ-X15X1

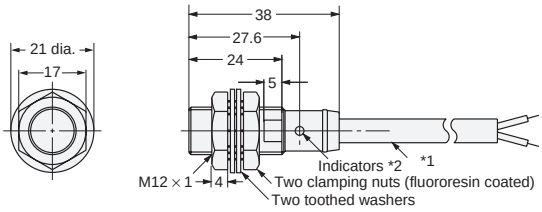


*1. 6-dia. vinyl-insulated round cable with 2 conductors (Flame-resistant, Conductor cross section: 0.5 mm^2, Insulator diameter: 1.9 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).
*2. Operation indicator (red), Setting indicator (green)

Standard Models

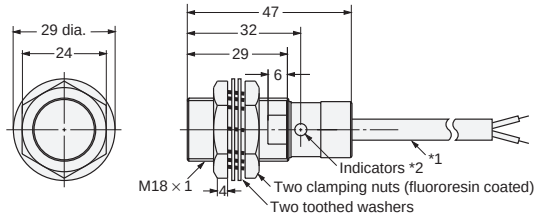


E2EQ-X3D1



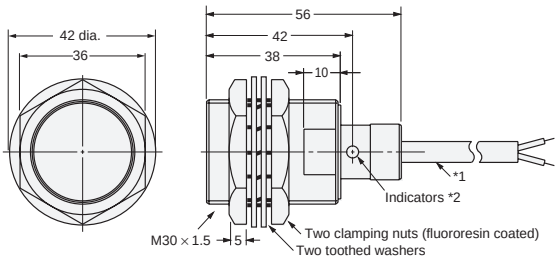
*1. 6-dia. vinyl-insulated round cable with 2 conductors (Flame-resistant, Conductor cross section: 0.5 mm^2, Insulator diameter: 1.9 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).
*2. Operation indicator (red), Setting indicator (green)

E2EQ-X7D1



*1. 6-dia. vinyl-insulated round cable with 2 conductors (Flame-resistant, Conductor cross section: 0.5 mm^2, Insulator diameter: 1.9 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).
*2. Operation indicator (red), Setting indicator (green)

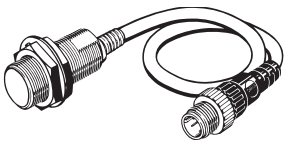
E2EQ-X10D1



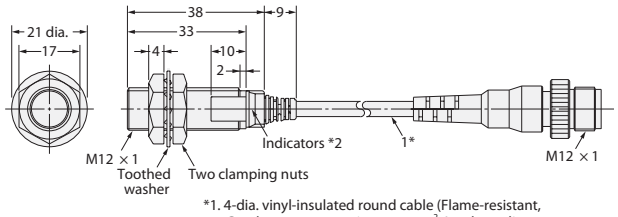
*1. 6-dia. vinyl-insulated round cable with 2 conductors (Flame-resistant, Conductor cross section: 0.5 mm^2, Insulator diameter: 1.9 mm), Standard length: 2 m
The cable can be extended up to 200 m (separate metal conduit).
*2. Operation indicator (red), Setting indicator (green)

Pre-wired Connector Models

Long Sensing-distance Models

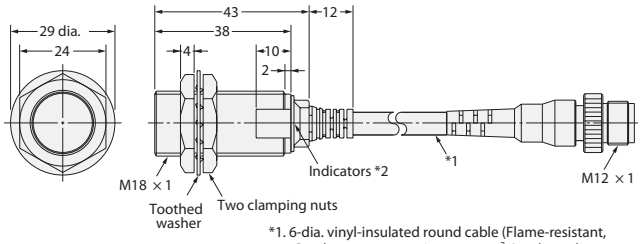


E2EQ-X4X1-M1J



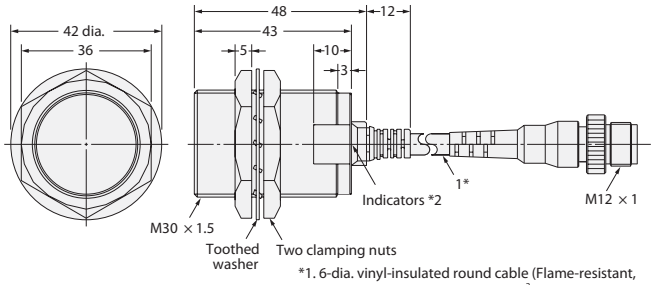
*1. 4-dia. vinyl-insulated round cable (Flame-resistant, Conductor cross section: 0.3 mm ^{2}, Insulator diameter: 1.3 mm), Standard length: 300 mm
*2. Operation indicator (red), Setting indicator (green)

E2EQ-X8X1-M1J



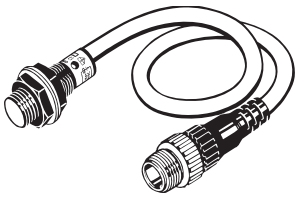
*1. 6-dia. vinyl-insulated round cable (Flame-resistant, Conductor cross section: 0.5 mm ^{2}, Insulator diameter: 1.9 mm), Standard length: 300 mm
*2. Operation indicator (red), Setting indicator (green)

E2EQ-X15X1-M1J

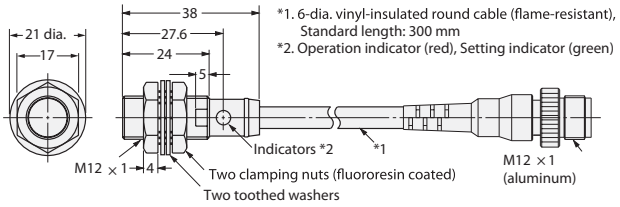


*1. 6-dia. vinyl-insulated round cable (Flame-resistant, Conductor cross section: 0.5 mm^2, Insulator diameter: 1.9 mm), Standard length: 300 mm
*2. Operation indicator (red), Setting indicator (green)

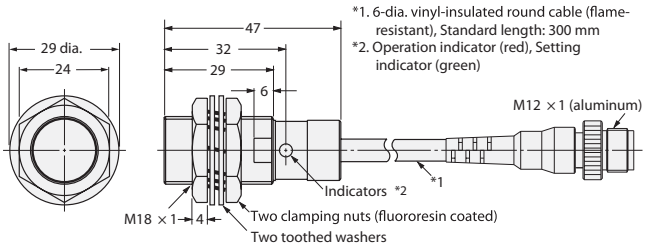
Standard Models



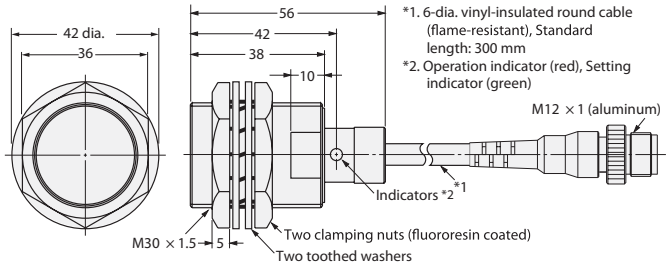
E2EQ-X3D1-M1GJ



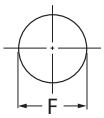
E2EQ-X7D1-M1GJ



E2EQ-X10D1-M1GJ



Mounting Hole Dimensions



Model	E2EQ-X4X☐ E2EQ-X3☐	E2EQ-X8X☐ E2EQ-X7☐	E2EQ-X15X☐ E2EQ-X10☐
F (mm)	12.5 $^{+0.5}_{0}$ dia.	18.5 $^{+0.5}_{0}$ dia.	30.5 $^{+0.5}_{0}$ dia.