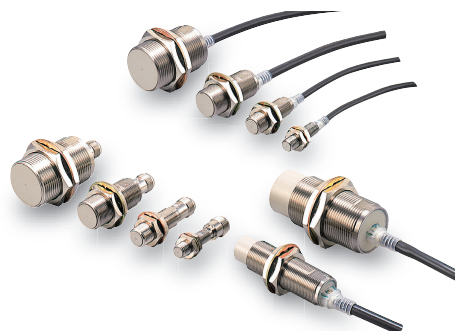


## Long-distance Proximity Sensor



- Long-distance detection at up to 30 mm enables secure mounting with reduced problems due to workpiece collisions.
- No polarity for easy wiring with DC 2-wire models.
- Cable protector provided as a standard feature.










For the most recent information on models that have been certified for safety standards, refer to your OMRON website.



Be sure to read *Safety Precautions* on page 6.

## Ordering Information






**Sensors** [Refer to *Dimensions* on page 7.]  
**DC 2-Wire, Pre-wired Models**

Appearance	Sensing distance	Model	
		NO	NC
 *1	M12  4 mm	E2EM-X4X1 2M *2	E2EM-X4X2 2M
	M18  8 mm	E2EM-X8X1 2M *2	E2EM-X8X2 2M
	M30  15 mm	E2EM-X15X1 2M *2	E2EM-X15X2 2M
	M18  16 mm	E2EM-X16MX1 2M	E2EM-X16MX2 2M
	M30  30 mm	E2EM-X30MX1 2M	E2EM-X30MX2 2M

\*1. There are installation restrictions that apply to Shielded Sensors. Refer to Reference *Influence of Surrounding Metal* in *Safety Precautions* on page 6.






\*2. Pre-wired M12 Connector Models with a cable length of 300 mm are also available. Add -M1J to the end of the model number (example: E2EM-X4X1-M1J).

## DC 3-Wire, Pre-wired Models

Appearance	Sensing distance	Model	
		Output configuration: NPN NO	Output configuration: NPN NC
 *	M8  2 mm	E2EM-X2C1 2M	E2EM-X2C2 2M
	M12  4 mm	E2EM-X4C1 2M	E2EM-X4C2 2M
	M18  8 mm	E2EM-X8C1 2M	E2EM-X8C2 2M
	M30  15 mm	E2EM-X15C1 2M	E2EM-X15C2 2M

\* There are installation restrictions that apply to Shielded Sensors. Refer to Reference *Influence of Surrounding Metal* in *Safety Precautions* on page 6.

## DC 3-Wire, M12 Connector Models



Appearance	Sensing distance	Model	
		Output configuration: NPN NO	Output configuration: NPN NC
 *	M8  2 mm	E2EM-X2C1-M1	E2EM-X2C2-M1
	M12  4 mm	E2EM-X4C1-M1	E2EM-X4C2-M1
	M18  8 mm	E2EM-X8C1-M1	E2EM-X8C2-M1
	M30  15 mm	E2EM-X15C1-M1	E2EM-X15C2-M1

\* There are installation restrictions that apply to Shielded Sensors. Refer to Reference *Influence of Surrounding Metal* in *Safety Precautions* on page 6.

**Accessories (Order Separately)**

**Sensor I/O Connectors (M12, Sockets on One Cable End)**

(Models for Connectors and with Pre-wired Connectors: A Connector is not provided with the Sensor. Be sure to order a Connector separately.) [Refer to XS2.]

Appearance	Cable length	Sensor I/O Connector model number	Applicable Proximity Sensor model number
 Straight	2 m	XS2F-D421-DC0-F	E2EM-X□C1-M1
	5 m	XS2F-D421-GC0-F	
	2 m	XS2F-D421-D80-F	E2EM-X□C□-M1
	5 m	XS2F-D421-G80-F	
 L-shape	2 m	XS2F-D422-DC0-F	E2EM-X□C1-M1
	5 m	XS2F-D422-GC0-F	
	2 m	XS2F-D422-D80-F	E2EM-X□C□-M1
	5 m	XS2F-D422-G80-F	

Note: Refer to *Introduction to Sensor I/O Connectors/Sensor Controllers* for details.  
Use the XS2F-D42□-□CO-A for the E2EM-X□X1-M1J. (Terminal 3: 0 V (+V), Terminal 4: +V (0 V))

**Ratings and Specifications**

**E2EM-X□X□ DC 2-Wire Models**

Item	Size Shielded Model	M12		M18		M30	
		Shielded	Shielded	Shielded	Unshielded	Shielded	Unshielded
		E2EM-X4X□	E2EM-X8X□	E2EM-X16MX□	E2EM-X15X□	E2EM-X30MX□	
<b>Sensing distance</b>		4 mm ±10%	8 mm ±10%	16 mm ±10%	15 mm ±10%	30 mm ±10%	
<b>Set distance *1</b>		0 to 3.2 mm	0 to 6.4 mm	0 to 12.8 mm	0 to 12 mm	0 to 24 mm	
<b>Differential travel</b>		15% max. of sensing distance					
<b>Detectable object</b>		Ferrous metal (The sensing distance decreases with non-ferrous metal. Refer to <i>Engineering Data</i> on page 4.)					
<b>Standard sensing object</b>		Iron, 12 × 12 × 1 mm	Iron, 18 × 18 × 1 mm	Iron, 45 × 45 × 1 mm	Iron, 30 × 30 × 1 mm	Iron, 70 × 70 × 1 mm	
<b>Response frequency *2</b>		1 kHz	0.5 kHz	0.4 kHz	0.25 kHz	0.1 kHz	
<b>Power supply voltage (operating voltage range)</b>		12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max.					
<b>Leakage current</b>		0.8 mA max.					
<b>Control output</b>	<b>Load current</b>	3 to 100 mA					
	<b>Residual voltage *3</b>	5 V max. (Load current: 100 mA, Cable length: 2 m)					
<b>Indicators</b>		X1 Models: Operation indicator (red), Setting indicator (green) X2 Models: Operation indicator (red)					
<b>Operation mode (with sensing object approaching)</b>		X1 Models: NO Refer to the timing charts under <i>I/O Circuit Diagrams</i> on page 5 for details. X2 Models: NC					
<b>Protection circuits</b>		Surge suppressor, Load short-circuit protection					
<b>Ambient temperature range</b>		Operating: -25 to 70°C, Storage: -40 to 85°C (with no icing or condensation)					
<b>Ambient humidity range</b>		Operating/Storage: 35% to 95% (with no condensation)					
<b>Temperature influence</b>		±15% max. of sensing distance at 23°C in the temperature range of -25 to 70°C					
<b>Voltage influence</b>		±1% max. of sensing distance at rated voltage in the rated voltage ±15% range					
<b>Insulation resistance</b>		50 MΩ min. (at 500 VDC) between current-carrying parts and case					
<b>Dielectric strength</b>		1,000 VAC, 50/60 Hz for 1 minute between current-carrying parts and case					
<b>Vibration resistance</b>		Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions					
<b>Shock resistance</b>		Destruction: 1,000 m/s <sup>2</sup> 10 times each in X, Y, and Z directions					
<b>Degree of protection</b>		IEC 60529 IP67, in-house standards: oil-resistant					
<b>Connection method</b>		Pre-wired Models (Standard cable length: 2 m)					
<b>Weight (packed state)</b>		Approx. 60 g	Approx. 130 g	Approx. 150 g	Approx. 180 g	Approx. 210 g	
<b>Materials</b>	<b>Case</b>	Nickel-plated brass					
	<b>Sensing surface</b>	PBT					
	<b>Clamping nuts</b>	Nickel-plated brass					
	<b>Toothed washer</b>	Zinc-plated iron					
<b>Accessories</b>		Instruction manual					

\*1. Use the Sensor within the range in which the setting indicator (green LED) is ON (except X2 Models).

\*2. The response frequency is an average value.

Measurement conditions are as follows: standard sensing object, a distance of twice the standard sensing object, and a set distance of half the sensing distance.

\*3. The residual voltage is 5 V. Make sure that the device connected to the Sensor can withstand the residual voltage. (Refer to page 6 for details.)

E2EM-X□C□ DC 3-Wire Models

Item	Size	M8	M12	M18	M30
	Shielded	Shielded	Shielded	Shielded	Shielded
	Model	E2EM-X2C□(-M1)	E2EM-X4C□(-M1)	E2EM-X8C□(-M1)	E2EM-X15C□(-M1)
<b>Sensing distance</b>		2 mm ±10%	4 mm ±10%	8 mm ±10%	15 mm ±10%
<b>Set distance</b>		0 to 1.6 mm	0 to 3.2 mm	0 to 6.4 mm	0 to 12 mm
<b>Differential travel</b>		10% max. of sensing distance			
<b>Detectable object</b>		Ferrous metal (The sensing distance decreases with non-ferrous metal. Refer to <i>Engineering Data</i> on page 4.)			
<b>Standard sensing object</b>		Iron, 8 × 8 × 1 mm	Iron, 12 × 12 × 1 mm	Iron, 18 × 18 × 1 mm	Iron, 30 × 30 × 1 mm
<b>Response frequency *1</b>		1.5 kHz	0.5 kHz	0.3 kHz	0.1 kHz
<b>Power supply voltage (operating voltage range) *2</b>		12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max.			
<b>Current consumption</b>		13 mA max.			
<b>Control output</b>	<b>Load current *2</b>	200 mA max.			
	<b>Residual voltage</b>	2 V max. (Load current: 200 mA, Cable length: 2 m)			
<b>Indicators</b>		Operation indicator (yellow)			
<b>Operation mode (with sensing object approaching)</b>		C1 Models: NO C2 Models: NC Refer to the timing charts under <i>I/O Circuit Diagrams</i> on page 5 for details.			
<b>Protection circuits</b>		Reverse polarity protection, Load short-circuit protection, Surge suppressor			
<b>Ambient temperature range *1</b>		Operating/Storage: -40 to 85°C (with no icing or condensation)			Operating: -25 to 70°C Storage: -40 to 85°C (with no icing or condensation)
<b>Ambient humidity range</b>		Operating/Storage: 35% to 95% (with no condensation)			
<b>Temperature influence</b>		±15% max. of sensing distance at 23°C in the temperature range of -40 to 85°C ±10% max. of sensing distance at 23°C in the temperature range of -25 to 70°C			±15% max. of sensing distance at 23°C in the temperature range of -25 to 70°C
<b>Voltage influence</b>		±1% max. of sensing distance at rated voltage in the rated voltage ±15% range			
<b>Insulation resistance</b>		50 MΩ min. (at 500 VDC) between current-carrying parts and case			
<b>Dielectric strength</b>		1,000 VAC, 50/60 Hz for 1 minute between current-carrying parts and case			
<b>Vibration resistance</b>		Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions			
<b>Shock resistance</b>		Destruction: 500 m/s <sup>2</sup> 10 times each in X, Y, and Z directions		Destruction: 1,000 m/s <sup>2</sup> 10 times each in X, Y, and Z directions	
<b>Degree of protection</b>		Pre-wired Models: IEC 60529 IP67, in-house standards: oil-resistant Connector Models: IEC 60529 IP67			
<b>Connection method</b>		Pre-wired Models (Standard cable length: 2 m) Connector Models			
<b>Weight (packed state)</b>	<b>Pre-wired Models</b>	Approx. 65 g	Approx. 75 g	Approx. 150 g	Approx. 195 g
	<b>Connector Models</b>	Approx. 15 g	Approx. 25 g	Approx. 40 g	Approx. 90 g
<b>Materials</b>	<b>Case</b>	Stainless steel (SUS303)		Nickel-plated brass	
	<b>Sensing surface</b>	PBT			
	<b>Clamping nuts</b>	Nickel-plated brass			
	<b>Toothed washer</b>	Zinc-plated iron			
<b>Accessories</b>		Instruction manual			

\*1. The response frequency is an average value.

Measurement conditions are as follows: standard sensing object, a distance of twice the standard sensing object, and a set distance of half the sensing distance.

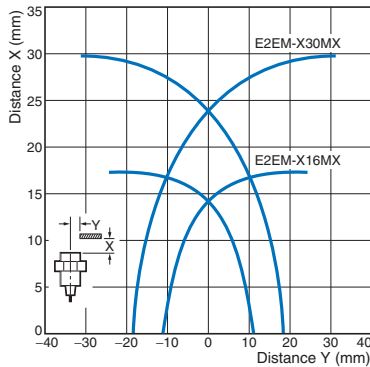
\*2. When using an M8 Model at an ambient temperature between 70 and 85°C, supply 10 to 30 VDC to the Sensor and make sure that the Sensor has a control output of 100 mA maximum.

## Engineering Data (Reference Value)

### Sensing Area

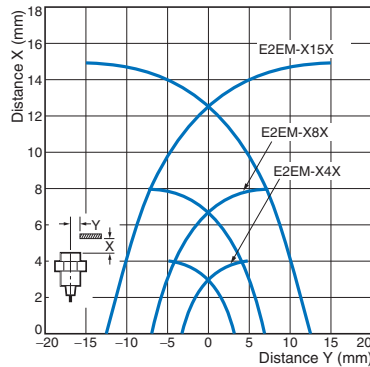
#### Unshielded Models

##### E2EM-X□MX□

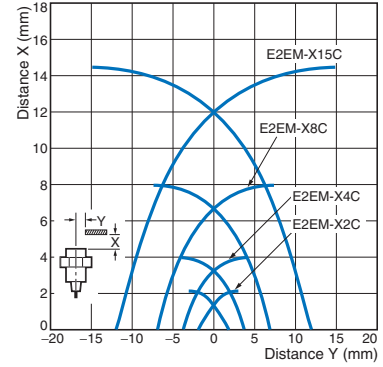


#### Shielded Models

##### E2EM-X□X□

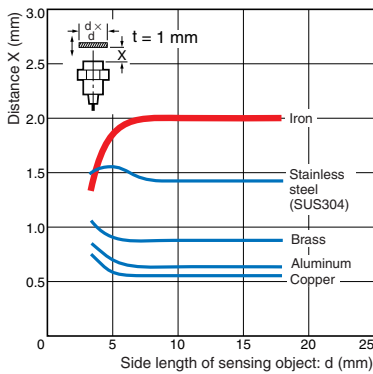


##### E2EM-X□C□

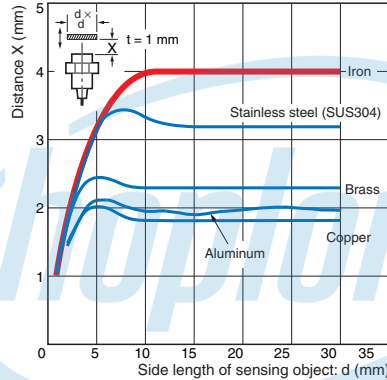


### Influence of Sensing Object Size and Material

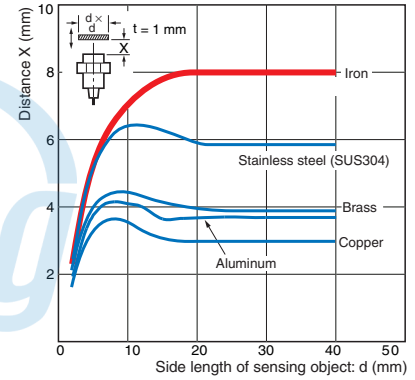
#### E2EM-X2□□(-M1)



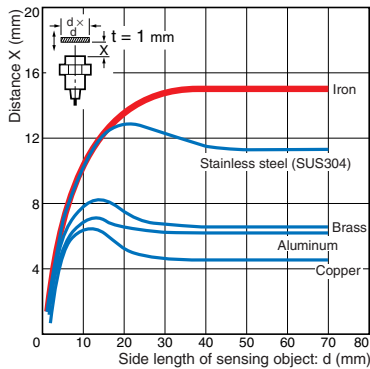
#### E2EM-X4□□(-M1)



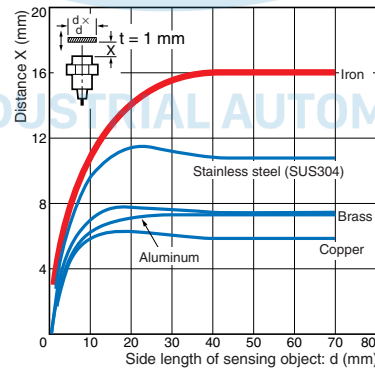
#### E2EM-X8□□(-M1)



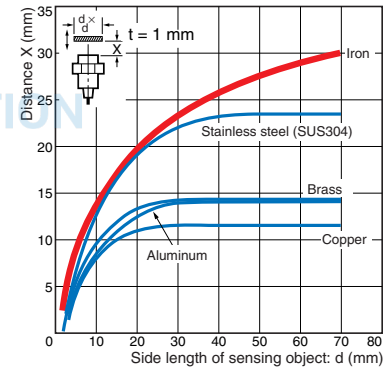
#### E2EM-X15□□(-M1)



#### E2EM-X16MX□

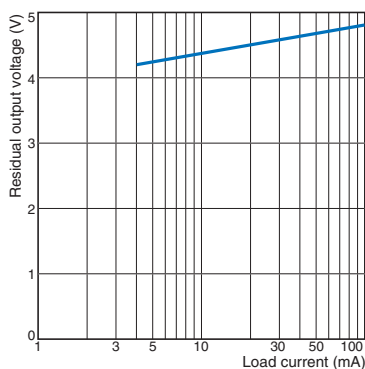


#### E2EM-X30MX□



### Residual Output Voltage

#### E2EM-X□X□



## I/O Circuit Diagrams

### E2EM-X□X□ DC 2-Wire Models

Operation mode	Model	Timing chart	Output circuit
NO	E2EM-X4X1 E2EM-X8X1 E2EM-X15X1 E2EM-X16MX1 E2EM-X30MX1		
NC	E2EM-X4X2 E2EM-X8X2 E2EM-X15X2 E2EM-X16MX2 E2EM-X30MX2		<p>Note 1. The load can be connected to either the +V or 0 V side.</p> <p>Note 2. There is no polarity. Therefore, the brown and blue lines have no polarity.</p> <p>Note 3. Use pins 4 and 3 for NO. Use pins 1 and 2 for NC.</p>

### E2EM-X□C□(-M1) DC 3-Wire Models

Operation mode	Output specifications	Model	Timing chart	Output circuit
NO	NPN Open-collector output	E2EM-X2C1 (-M1) E2EM-X4C□ 1-M1 E2EM-X8C1 (-M1) E2EM-X15C1 (-M1)		<p>Note: Use pin 4 for NO. Use pin 2 for NC.</p>
NC		E2EM-X2C2 (-M1) E2EM-X4C2 (-M1) E2EM-X8C2 (-M1) E2EM-X15C2 (-M1)		

## Connections for Sensor I/O Connectors

Proximity Sensor			Sensor I/O Connector model	Connections
Type	Operation mode	Model		
DC 2-wire	NO	E2EM-X□X1-M1J	XS2F-D42□-□C0-F 1: Straight 2: L-shape D: 2-m cable G: 5-m cable	
	NC	E2EM-X□X2-M1J	XS2F-D42□-□80-F 1: Straight 2: L-shape D: 2-m cable G: 5-m cable	
DC 3-wire	NO	E2EM-X□C1-M1	XS2F-D42□-□C0-F 1: Straight 2: L-shape D: 2-m cable G: 5-m cable	
	NC	E2EM-X□C2-M1	XS2F-D42□-□80-F 1: Straight 2: L-shape D: 2-m cable G: 5-m cable	

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

**Safety Precautions**

Refer to *Warranty and Limitations of Liability*.

**⚠ WARNING**

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



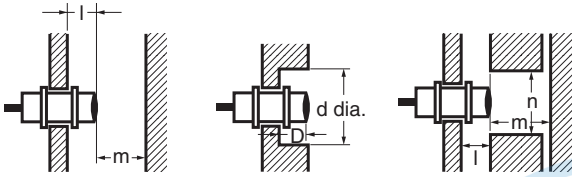
**Precautions for Correct Use**

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)

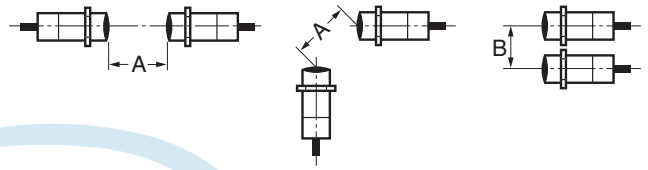
Type	Item	M8	M12	M18	M30	
DC 2-wire E2EM-X□X□	Shielded	l	2.4	3.6	6	
		d	18	27	45	
		D	2.4	3.6	6	
		m	12	24	45	
		n	18	27	45	
	Unshielded	l	---	---	25	45
		d	---	---	70	120
		D	---	---	25	45
		m	---	---	48	90
		n	---	---	70	120
DC 3-wire E2EM-X□C□	Shielded	l	0	2.4	3.6	6
		d	8	18	27	45
		D	0	2.4	3.6	6
		m	4.5	12	24	45
		n	12	18	27	45

**AND/OR Connections**

Error pulses and leakage current may prevent application in AND or OR circuits. Always confirm operation in advance to confirm if there are any problems in operation.

**Mutual Interference**

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



**Mutual Interference** (Unit: mm)

Type	Item	M8	M12	M18	M30	
DC 2-wire E2EM-X□X□	Shielded	A	---	30	60	110
		B	---	20	35	90
	Unshielded	A	---	---	200	350
		B	---	---	120	300
DC 3-wire E2EM-X□C□	Shielded	A	20	30	60	110
		B	15	20	35	90

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

**Required Conditions**

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

- The ON voltage of the PLC and the residual voltage of the Proximity Sensor must satisfy the following.  
 $V_{ON} \leq V_{CC} - V_R$
- The OFF current of the PLC and the leakage current of the Proximity Sensor must satisfy the following.  
 $I_{OFF} \geq I_{leak}$   
(If the OFF current is not listed in the PLC's input specifications, take it to be 1.3 mA.)
- The ON current of the PLC and the control output of the Proximity Sensor must satisfy the following.  
 $I_{OUT} (min.) \leq I_{ON} \leq I_{OUT} (max.)$

The ON current of the PLC will vary, however, with the power supply voltage and the input impedance, as shown in the following equation.

$$I_{ON} = (V_{CC} - V_R - \underline{V_{PC}}) / R_{IN}$$

**Example**

In this example, the above conditions are checked when the Proximity Sensor is the E2EM-X8X1 and the power supply voltage is 24 V.

- $V_{ON} (14.4 V) \leq V_{CC} (20.4 V) - V_R (5 V) = 15.4 V$ : OK
- $I_{OFF} (1.3 mA) \geq I_{leak} (0.8 mA)$ : OK
- $I_{ON} = [V_{CC} (20.4 V) - V_R (5 V) - \underline{V_{PC}} (4 V)] / R_{IN} (3 k\Omega) = \text{Approx. } 3.8 mA$

Therefore,  $I_{OUT} (min.) (3 mA) \leq I_{ON} (3.8 mA)$ : OK  
Connection is thus possible.

**Connection Example (Reference)**

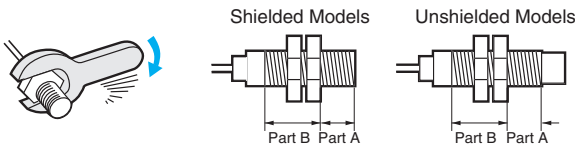
<b>PLC</b>	$V_{ON}$ : ON voltage (14.4 V) $I_{ON}$ : ON current (typ. 7 mA) $I_{OFF}$ : OFF current (1.3 mA) $R_{IN}$ : Input impedance (3 kΩ) $V_{PC}$ : Internal residual voltage (4 V)
<b>Proximity Sensor</b>	$V_R$ : Output residual voltage (5 V) $I_{leak}$ : Leakage current (0.8 mA) $I_{OUT}$ : Control output (3 to 100 mA) $V_{CC}$ : Power supply voltage (PLC: 20.4 to 26.4 V)



## ● Mounting

### Tightening Force

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



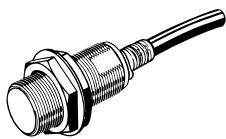
Note: 1. The allowable tightening strength depends on the distance from the edge of the head, as shown in the following table. (A is the distance from the edge of the head. B includes the nut on the head side. If the edge of the nut is in part A, the tightening torque for part A applies instead.)  
2.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

Torque		Part A		Part B
Model		Dimension (mm)	Torque	Torque
M8	Shielded	9	9 N·m	12 N·m
M12			30 N·m	
M18			70 N·m	
M30			180 N·m	

## Dimensions

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

### Pre-wired Models (Shielded)

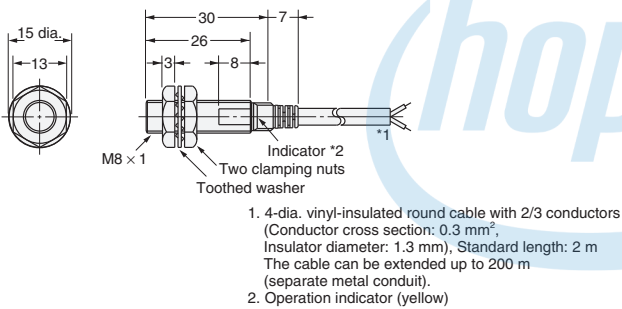


### Mounting Hole Dimensions

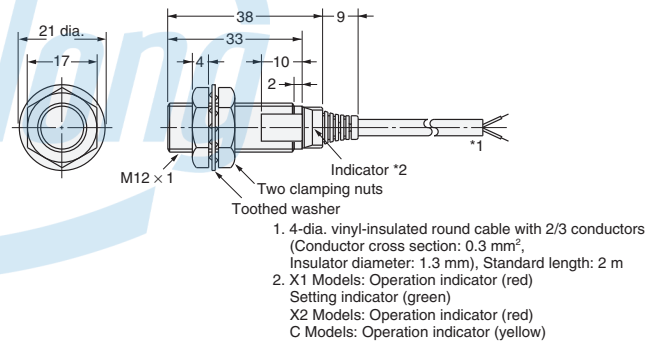


Dimensions	M8	M12	M18	M30
F (mm)	8.5 <sup>+0.5</sup> <sub>0</sub> dia.	12.5 <sup>+0.5</sup> <sub>0</sub> dia.	18.5 <sup>+0.5</sup> <sub>0</sub> dia.	30.5 <sup>+0.5</sup> <sub>0</sub> dia.

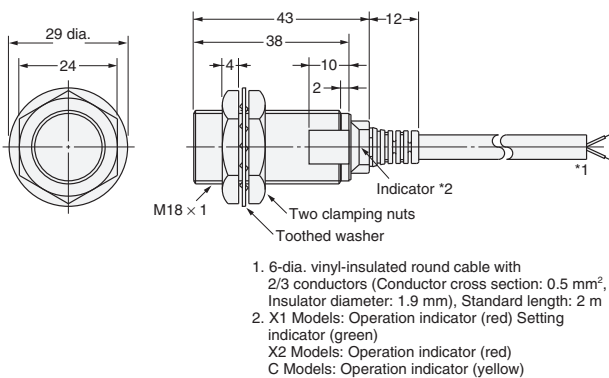
### E2EM-X2C □



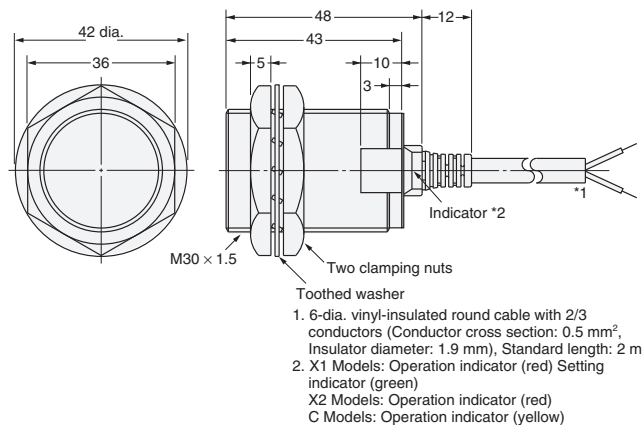
### E2EM-X4 □



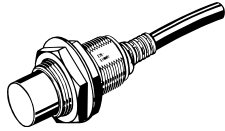
### E2EM-X8 □



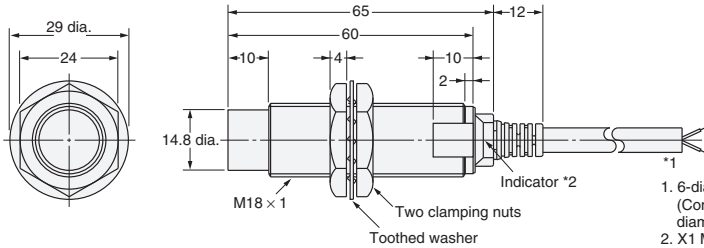
### E2EM-X15 □



## Pre-wired Models (Unshielded)

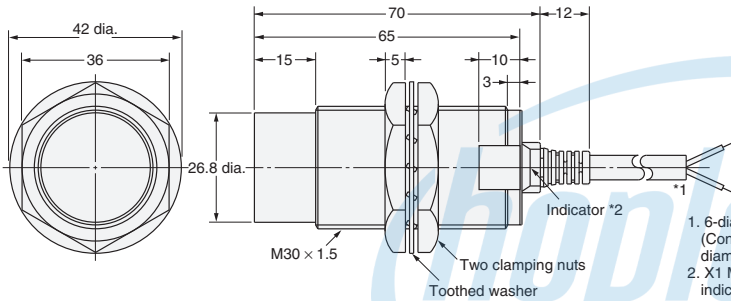


### E2EM-X16MX□



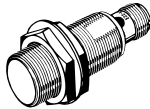
- 6-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.5 mm<sup>2</sup>, Insulator diameter: 1.9 mm), Standard length: 2 m
- X1 Models: Operation indicator (red), Setting indicator (green)  
X2 Models: Operation indicator (red)

### E2EM-X30MX□

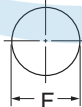


- 6-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.5 mm<sup>2</sup>, Insulator diameter: 1.9 mm), Standard length: 2 m
- X1 Models: Operation indicator (red), Setting indicator (green)  
X2 Models: Operation indicator (red)

## Connector Models (Shielded)

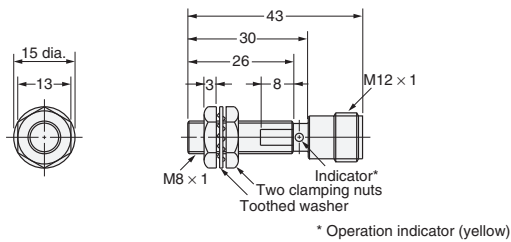


### Mounting Hole Dimensions

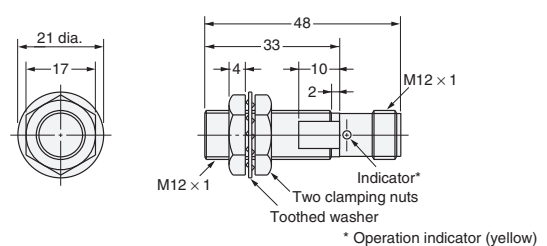


Dimensions	M8	M12	M18	M30
F (mm)	8.5 <sup>+0.5</sup> <sub>0</sub> dia.	12.5 <sup>+0.5</sup> <sub>0</sub> dia.	18.5 <sup>+0.5</sup> <sub>0</sub> dia.	30.5 <sup>+0.5</sup> <sub>0</sub> dia.

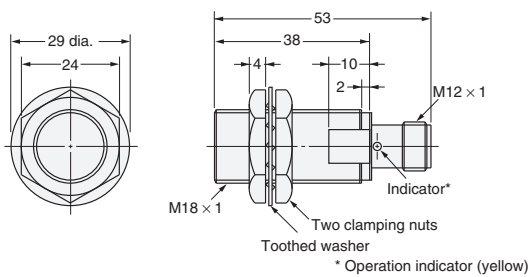
### E2EM-X2C□-M1



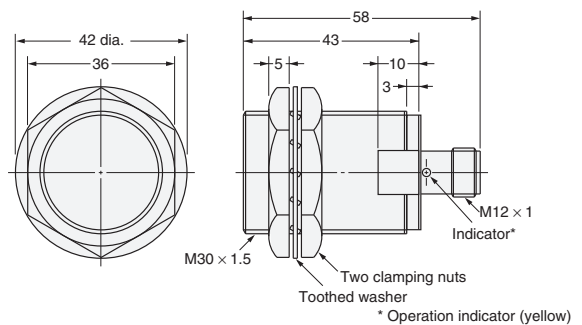
### E2EM-X4C□-M1



### E2EM-X8C□-M1



### E2EM-X15C□-M1





# CÔNG TY CỔ PHẦN CÔNG NGHỆ HỢP LONG

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