E2EM

CSM_E2EM_DS_E_10_2

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

Annoaran	.00	Sensing distance	Model		
Appearan		Sensing distance	Sensing distance NO		
Shielded	M12	4 mm E2EM-X	4X1 2M *2	E2EM-X4X2 2M	
	M18	8 mm E2EM-X	8X1 2M *2	E2EM-X8X2 2M	
*1	M30	15 mm E2EM-X	15X1 2M *2	E2EM-X15X2 2M	
Unshielded	M18	16 mm E2EM-X	16MX1 2M	E2EM-X16MX2 2M	
	M30	30 mm E2EM-X	30MX1 2M	E2EM-X30MX2 2M	

DC 3-Wire, Pre-wired Models

Annearan	Appearance		Sensing distance		Model			
Appearance		Sensing distance			Output configuration: NPN NO	Output configuration: NPN NC		
	M8	2 mm			E2EM-X2C1 2M	E2EM-X2C2 2M		
Shielded	M12	4 mm	n		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			
Арреага	100	Sensing distance	,	Output configuration: NPN NO Output configuration: N			
	M8	2 mm		E2EM-X2C1-M1	E2EM-X2C2-M1		
Shielded	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.

^{*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).

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	LZEIVI-XIII	
	2 m	XS2F-D421-D80-F	E2EM-X□C□-M1	
	5 m	XS2F-D421-G80-F	LZLIVI-ALICH-IVI I	
L-shape	2 m	XS2F-D422-DC0-F	E2EM-X□C1-M1	
_ 5	5 m	XS2F-D422-GC0-F	LZLIVI-XIII	
	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 Mo	റനല	9

	Size	M12	M	18	M	30				
	Shielded	Shielded	Shielded	Unshielded	Shielded	Unshielded				
Item	Model	E2EM-X4X□	E2EM-X8X□	E2EM-X16MX□	E2EM-X15X□	E2EM-X30MX				
Sensing	distance	4 mm ±10%	8 mm ±10%	16 mm ±10%	15 mm ±10%	30 mm ±10%				
Set dista	nce *1	0 to 3.2 mm	0 to 6.4 mm	0 to 12.8 mm	0 to 12 mm	0 to 24 mm				
Different	tial travel	15% max. of sensing of	listance	!		!				
Detectab	ole object	Ferrous metal (The sensing distance decreases with non-ferrous metal. Refer to Engineering Data on page 4.)								
Standard	d sensing object	Iron, 12 × 12 × 1 mm	Iron, 18 × 18 × 1 mm	Iron, $45 \times 45 \times 1$ mm	Iron, $30 \times 30 \times 1$ mm	Iron, $70 \times 70 \times 1 \text{ mm}$				
Respons	se frequency *2	1 kHz	0.5 kHz	0.4 kHz	0.25 kHz	0.1 kHz				
	upply voltage ng voltage	12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max.								
Leakage	current	0.8 mA max.								
Con-	Load current	3 to 100 mA								
trol out- put	Residual volt- age *3	5 V max. (Load current: 100 mA, Cable length: 2 m)								
Indicators X1 Models: Operation indicator (red), Setting indicator (green) X2 Models: Operation indicator (red)										
Operation (with ser approach	nsing object	X1 Models: NO X2 Models: NC Refer to the timing charts under <i>I/O Circuit Diagrams</i> on page 5 for details.								
Protection	on circuits	Surge suppressor, Loa	ad short-circuit protection	n						
Ambient range	temperature	Operating: -25 to 70°C	C, Storage: -40 to 85°C	(with no icing or conde	nsation)					
Ambient	humidity range	Operating/Storage: 35	% to 95% (with no cond	densation)						
Tempera	ture influence	±15% max. of sensing	distance at 23°C in the	temperature range of -	-25 to 70°C					
Voltage	influence	±1% max. of sensing of	distance at rated voltage	e in the rated voltage ± 1	5% range					
Insulatio	n resistance	50 MΩ min. (at 500 VI	OC) between current-ca	rrying parts and case						
Dielectri	c strength	1,000 VAC, 50/60 Hz for 1 minute between current-carrying parts and case								
Vibration	n resistance	Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions								
Shock re	esistance	Destruction: 1,000 m/s² 10 times each in X, Y, and Z directions								
	of protection	IEC 60529 IP67, in-house standards: oil-resistant								
	ion method	,	ndard cable length: 2 m	,						
Weight (packed state)	Approx. 60 g	Approx. 130 g	Approx. 150 g	Approx. 180 g	Approx. 210 g				
	Case	Nickel-plated brass								
Materi-	Sensing sur- face	РВТ								
ais	Clamping nuts	Nickel-plated brass								
	Toothed washer	Zinc-plated iron								
Accessories 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**

	Size	M8	M12	M18	M30			
	Shielded	Shielded	Shielded	Shielded	Shielded			
Item	Model	E2EM-X2C□(-M1)	E2EM-X4C□(-M1)	E2EM-X8C□(-M1)	E2EM-X15C□(-M1)			
Sensing of	distance	2 mm ±10%	4 mm ±10%	8 mm ±10%	15 mm ±10%			
Set distar	nce	0 to 1.6 mm	0 to 3.2 mm	0 to 6.4 mm	0 to 12 mm			
Differenti	al travel	10% max. of sensing distar	ice	1				
Detectab	le object	Ferrous metal (The sensing	distance decreases with no	n-ferrous metal. Refer to <i>En</i>	gineering Data on page 4.)			
Standard	sensing object	Iron, $8 \times 8 \times 1$ mm	Iron, 12 × 12 × 1 mm	Iron, 18 × 18 × 1 mm	Iron, $30 \times 30 \times 1 \text{ mm}$			
Response	e frequency *1	1.5 kHz	0.5 kHz	0.3 kHz	0.1 kHz			
	pply voltage g voltage range) *2	12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max.						
Current c	onsumption	13 mA max.						
Onntrol	Load current *2	200 mA max.						
Control output	Residual voltage	2 V max. (Load current: 200	0 mA, Cable length: 2 m)					
Indicators	s	Operation indicator (yellow)						
	n mode (with sens- t approaching)	C1 Models: NO C2 Models: NC Refer to the timing charts under <i>I/O Circuit Diagrams</i> on page 5 for details.						
Protectio	n circuits	Reverse polarity protection, Load short-circuit protection, Surge suppressor						
Ambient t	temperature range	Operating/Storage: -40 to 85°C (with no icing or condensation) Operating: -25 to Storage: -40 to 85°C (with no icing or condensation) Operating: -25 to Storage: -40 to 85°C (with no icing or condensation)						
Ambient	humidity range	Operating/Storage: 35% to 95% (with no condensation)						
Temperat	ture influence	\pm 15% max. of sensing distance at 23°C in the temperature range of –40 to 85°C \pm 10% max. of sensing distance at 23°C in the temperature range of –25 to 70°C \pm 10% consists of sensing distance at 23°C in the temperature range of –25 to 70°C \pm 10% consists of sensing distance at 23°C in the temperature range of –25 to 70°C \pm 10% consists of sensing distance at 23°C in the temperature range of –25 to 70°C \pm 10% consists of sensing distance at 23°C in the temperature range of –25 to 70°C \pm 10% consists of sensing distance at 23°C in the temperature range of –25 to 70°C \pm 10% consists of sensing distance at 23°C in the temperature range of –25 to 70°C \pm 10% consists of sensing distance at 23°C in the temperature range of –25 to 70°C \pm 10% consists of sensing distance at 23°C in the temperature range of –25 to 70°C \pm 10% consists of sensing distance at 23°C in the temperature range of –25 to 70°C \pm 10% consists of sensing distance at 23°C in the temperature range of –25 to 70°C \pm 10% consists of sensing distance at 23°C in the temperature range of –25 to 70°C \pm 10% consists of sensing distance at 23°C in the temperature range of –25 to 70°C \pm 10% consists of sensing distance at 23°C in the temperature range of –25 to 70°C \pm 10% consists of sensing distance at 23°C in the temperature range of –25 to 70°C \pm 10% consists of sensing distance at 23°C in the temperature range of –25 to 70°C \pm 10% consists of sensing distance at 23°C in the temperature range of –25 to 70°C \pm 10% consists of sensing distance at 23°C in the temperature range of –25 to 70°C \pm 10% consists of sensing distance at 23°C in the temperature range of –25 to 70°C \pm 10% consists of sensing distance at 23°C in the temperature range of –25 to 70°C \pm 10% consists of sensing distance at 23°C in the temperature range of –25 to 70°C \pm 10% consists of sensing distance at 23°C in the temperature range of –25 to 70°C \pm 10% consists of sensing distance at 23°C in the temperature range of –25 to 70°C \pm 10% consists of sensing distance a						
Voltage in	nfluence	±1% max. of sensing distance at rated voltage in the rated voltage ±15% range						
Insulation	n resistance	50 MΩ min. (at 500 VDC) between current-carrying parts and case						
Dielectric	strength	1,000 VAC, 50/60 Hz for 1 minute between current-carrying parts and case						
Vibration	resistance	Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions						
Shock res	sistance	Destruction: 500 m/s ² 10 times each in X, Y, and Z directions	Destruction: 1,000 m/s² 10	times each in X , Y , and Z di	rections			
Degree o	f protection	Pre-wired Models: IEC 60529 IP67, in-house standards: oil-resistant Connector Models: IEC 60529 IP67						
Connecti	on method	Pre-wired Models (Standard cable length: 2 m) Connector Models						
Weight	Pre-wired Models	Approx. 65 g	Approx. 75 g	Approx. 150 g	Approx. 195 g			
(packed state)	Connector Mod- els	Approx. 15 g	Approx. 25 g	Approx. 40 g	Approx. 90 g			
	Case	Stainless steel (SUS303)	Nickel-plated brass					
Materials	Sensing surface	PBT						
Materials	Clamping nuts	Nickel-plated brass						
	Toothed washer	Zinc-plated iron						
Accessor	ries	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.

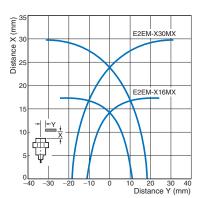
*2. When using an M8 Model at an ambient temperature between 70 and 85°C, supply 10 to 30 VDC to the Sensor and make sure that the Sensor has a control output of 100 mA maximum.

Engineering Data (Reference Value)

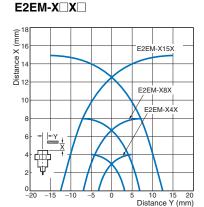
Sensing Area

Unshielded Models

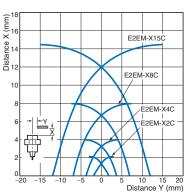
E2EM-X MX



Shielded Models

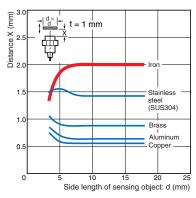


E2EM-XC

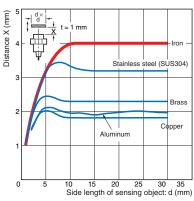


Influence of Sensing Object Size and Material

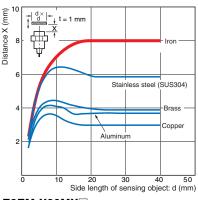
E2EM-X2□□(-M1)



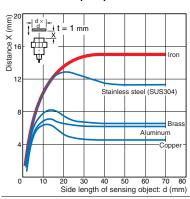
E2EM-X4□□(-M1)



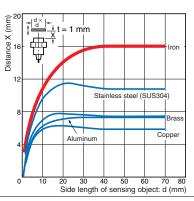
E2EM-X8□□(-M1)



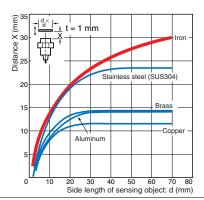
E2EM-X15 (-M1)



E2EM-X16MX

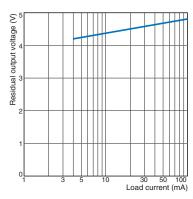


E2EM-X30MX



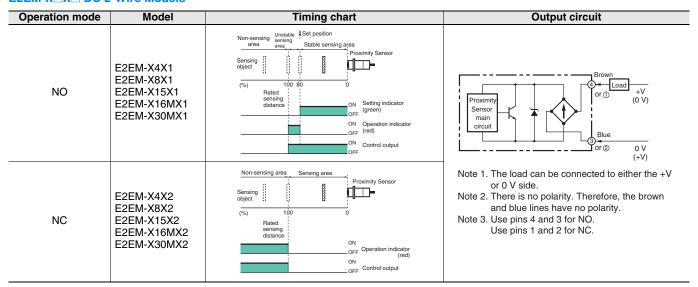
Residual Output Voltage

E2EM-X□X□



I/O Circuit Diagrams

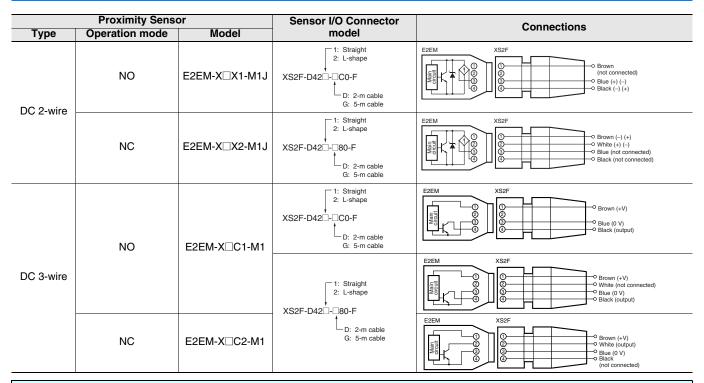
E2EM-X DC 2-Wire Models



E2EM-X□C□(-M1) DC 3-Wire Models

Operation mode	Output specifi- cations	Model	Timing chart	Output circuit
NO	NPN Open-collector	E2EM-X2C1 (-M1) E2EM-X4C 1-M1) E2EM-X8C1 (-M1) E2EM-X15C1 (-M1)	Sensing Present object Not present Operation ON indicator (yellow) OFF Control output OFF	Proximity Sensor main or ② or ②
NC	output	E2EM-X2C2 (-M1) E2EM-X4C2 (-M1) E2EM-X8C2 (-M1) E2EM-X15C2 (-M1)	Sensing Present object Not present Operation ON indicator (yellow) OFF Control output OFF	Note: Use pin 4 for NO. Use pin 2 for NC.

Connections for Sensor I/O Connectors



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

Safety Precautions

Refer to Warranty and Limitations of Liability.



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



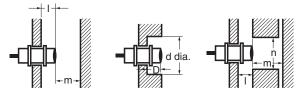
Precautions for Correct Use

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)

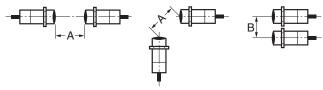
Туре		Item	M8	M12	M18	M30
		ı		2.4	3.6	6
		d		18	27	45
	Shielded	D		2.4	3.6	6
		m		12	24	45
DC 2-wire		n		18	27	45
E2EM-X□X□	Unshielded	I			25	45
		d			70	120
		D			25	45
		m			48	90
		n			70	120
		I	0	2.4	3.6	6
B00 :		d	8	18	27	45
DC 3-wire E2EM-X□C□	Shielded	D	0	2.4	3.6	6
		m	4.5	12	24	45
		n	12	18	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)

Туре	Item	M8	M12	M18	M30	
	Shielded	Α		30	60	110
DC 2-wire	Silielueu	В		20	35	90
E2EM-X□X□	Unshield- ed	Α			200	350
		В			120	300
DC 3-wire	Shielded	Α	20	30	60	110
E2EM-X□C□	Sillelueu	В	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.)

1. The ON voltage of the PLC and the residual voltage of the Proximity Sensor must satisfy the following.

 $V_{\text{ON}} \leq V_{\text{CC}} - V_{\text{R}}$

The OFF current of the PLC and the leakage current of the Proximity Sensor must satisfy the following.

loff ≥ 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.

lout (min.) \leq lon \leq lout (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.

 $Ion = (Vcc - V_R - V_{PC}) / R_{IN}$

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.

- 1. Von $(14.4 \text{ V}) \leq \text{Vcc} (20.4 \text{ V}) \text{Vr} (5 \text{ V}) = 15.4 \text{ V}$: OK
- 2. Ioff (1.3 mA) ≥ Ileak (0.8 mA): OK
- 3. Ion = [Vcc (20.4 V) Vr (5 V) $\frac{\text{Vpc (4 V)}}{\text{In (3 k}\Omega)}$ = Approx. 3.8 mA

Therefore, lout (min.) (3 mA) \leq lon (3.8 mA): OK Connection is thus possible.

Connection Example (Reference)

PLC	Von: ON voltage (14.4 V) Ion: ON current (typ. 7 mA) IoFF: OFF current (1.3 mA) Input impedance (3 kΩ) VPc: Internal residual voltage (4 V)
Proximity Sensor	Vn: Output residual voltage (5 V) Ileak: Leakage current (0.8 mA) Iou⊤: Control output (3 to 100 mA) Vcc: Power supply voltage (PLC: 20.4 to 26.4 V)

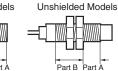
Mounting

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

2. The following strengths assume washers are being used.

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

(Unit: mm)

Tolerance class IT16 applies to dimensions in this data sheet unless otherwise specified.

Dimensions

Pre-wired Models (Shielded)

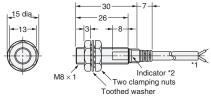






Dimensions	M8	M12	M18	M30
F (mm)	8.5 ^{+0.5} dia.	12.5 ^{+0.5} ₀ dia.	18.5 ^{+0.5} ₀ dia.	30.5 ^{+0.5} ₀ dia.

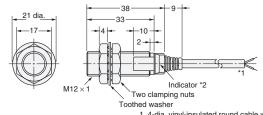
E2EM-X2C



- 4-dia. vinyl-insulated round cable with 2/3 conductors (Conductor cross section: 0.3 mm², Insulator diameter: 1.3 mm), Standard length: 2 m The cable can be extended up to 200 m (separate metal conduit).

 2. Operation indicator (yellow)

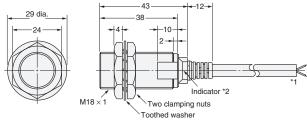
E2EM-X4□□



- 1. 4-dia. vinyl-insulated round cable with 2/3 conductors
- 1. 4-cia. Vinyl-insulated round cable win 2/3 conducti (Conductor cross section: 0.3 mm², Insulator diameter: 1.3 mm), Standard length: 2 m

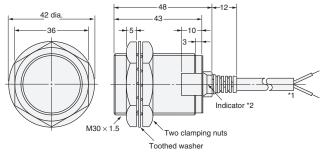
 2. X1 Models: Operation indicator (red)
 Setting indicator (green)
 X2 Models: Operation indicator (red)
 C Models: Operation indicator (yellow)

E2EM-X8□□



- 6-dia. vinyl-insulated round cable with 2/3 conductors (Conductor cross section: 0.5 mm², Insulator diameter: 1.9 mm), Standard length: 2 m
- 2. X1 Models: Operation indicator (red) Setting indicator (green)
 X2 Models: Operation indicator (red)
 C Models: Operation indicator (yellow)

E2EM-X15□□

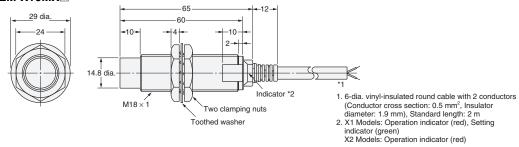


- 1. 6-dia, vinvl-insulated round cable with 2/3 conductors (Conductor cross section: 0.5 mm², Insulator diameter: 1.9 mm), Standard length: 2 m 2. X1 Models: Operation indicator (red) Setting

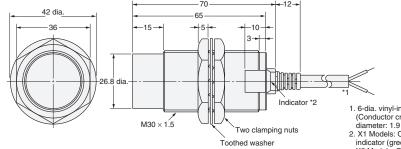
Pre-wired Models (Unshielded)



E2EM-X16MX



E2EM-X30MX



- 6-dia. vinyl-insulated round cable with 2 conductors (Conductor cross section: 0.5 mm², Insulator diameter: 1.9 mm), Standard length: 2 m
 2. X1 Models: Operation indicator (red), Setting indicator (green)
 X2 Models: Operation indicator (red)

Connector Models (Shielded)



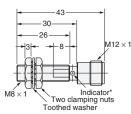
Mounting Hole Dimensions



Dimensions	M8	M12	M18	M30
F (mm)	8.5 ^{+0.5} dia.	12.5 ^{+0.5} ₀ dia.	18.5 ^{+0.5} ₀ dia.	30.5 ^{+0.5} ₀ dia.

E2EM-X2C□-M1

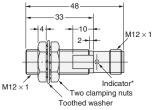




* Operation indicator (yellow)

E2EM-X4C□-M1

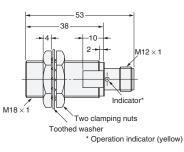




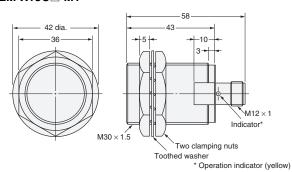
* Operation indicator (yellow)

E2EM-X8C□-M1





E2EM-X15C□-M1



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