**Cylindrical Proximity Sensor** 



CSM\_E2K-X\_DS\_E\_9\_2

# General-purpose Threaded Capacitive Sensor

- Product lineup with M12, M18, and M30 models.
- Fixed sensing distance requires no sensitivity adjustment.



Be sure to read *Safety Precautions* on page 5.

# **Ordering Information**

#### Sensors [Refer to Dimensions on page 6.]

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

Appearance				Model		
		Sensing distance	Output configuration	Operation mode		
				NO	NC	
			DC 3-wire, NPN	E2K-X4ME1 2M	E2K-X4ME2 2M	
	M12	4 mm	DC 3-wire, PNP	E2K-X4MF1 2M	E2K-X4MF2 2M	
			AC 2-wire	E2K-X4MY1 2M	E2K-X4MY2 2M	
Unshielded	M18		DC 3-wire, NPN	E2K-X8ME1 2M	E2K-X8ME2 2M	
		8 mm	DC 3-wire, PNP	E2K-X8MF1 2M	E2K-X8MF2 2M	
			AC 2-wire	E2K-X8MY1 2M	E2K-X8MY2 2M	
	M30		DC 3-wire, NPN	E2K-X15ME1 2M	E2K-X15ME2 2M	
		15 mm	DC 3-wire, PNP	E2K-X15MF1 2M	E2K-X15MF2 2M	
			AC 2-wire	E2K-X15MY1 2M	E2K-X15MY2 2M	

### Accessories (Order Separately)

**Mounting Brackets** 

Refer to Y92 for details.

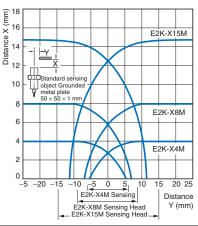
# **Ratings and Specifications**

Item Model		E2K-X4ME□, E2K-X4MF□, E2K-X4MY□	E2K-X8ME□, E2K-X8MF□, E2K-X8MY□	E2K-X15ME□, E2K-X15MF□, E2K-X15MY□			
Sensing distance		4mm ±10%	8 mm ±10%	15 mm ±10%			
Set distance *1		0 to 2.8 mm	0 to 5.6 mm	0 to 10 mm			
Differential travel		4% to 20% of sensing distance		•			
Detectable object		Conductors and dielectrics					
Standard	d sensing object	Grounded metal plate: $50 \times 50 \times 1$ mm					
Respons	se frequency	E and F Models: 100 Hz, Y Models: 10 Hz					
	upply voltage*2 ng voltage range)	E and F Models: 12 to 24 VDC (10 to 30 VDC) Y Models: 100 to 220 VAC (90 to 250 VAC)					
Current	consumption	E and F Models: 15 mA max.					
Leakage	current	Y Models: 2.2 mA max. (Refer to pag	e 4.)				
Control	Load current	E and F Models: 200 mA max.*2, Y M	Iodels: 10 to 200 mA				
Control output Residual voltage E and F Models: 2 V max. (Load current: 200 mA, Cable length: 2 m), Y Models: Refer to Enginee page 4.				odels: Refer to Engineering Data on			
Indicators		E and F Models: Detection indicator (red), Y Models: Operation indicator (red)					
Operation mode (with sensing object approaching)		E1, F1, and Y1 Models: NO E2, F2, and Y2 Models: NC Refer to the timing charts under <i>I/O Circuit Diagrams</i> on page 4 for details.					
Protection circuits E and F Models: Reverse polarity protection, Surge suppressor, load short-circuit protection, output rev ity protection, Y Models: Surge suppressor				sircuit protection, output reverse polar-			
Ambient temperature range		Operating/Storage: -25 to 70°C (with	Operating/Storage: -10 to 55°C (with no icing or condensation)				
Ambient humidity range		Operating/Storage: 35% to 95% (with no condensation)					
Temperature influence		$\pm$ 20% max. of sensing distance at 23°C in the operating temperature range					
Voltage i	influence	E and F Models: $\pm 2\%$ max. of sensing distance at rated voltage at rated voltage $\pm 20\%$ Y Models: $\pm 2\%$ max. of sensing distance at rated voltage at rated voltage $\pm 10\%$					
Insulation resistance		50 M $\Omega$ min. (at 500 VDC) between current-carrying parts and case					
Dielectric strength		E and F Models: 1,000 VAC, 50/60 Hz for 1 min between current-carrying parts and case Y Models: 2,000 VAC, 50/60 Hz for 1 min between current-carrying parts and case					
Vibration resistance		Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions					
Shock resistance		Destruction: 500 m/s <sup>2</sup> 3 times each in X, Y, and Z directions					
Degree of protection		IP66 (IEC), in-house standards: oil-resistant					
Connection method		Pre-wired Models (Standard cable length: 2 m)					
Weight (packed state)		Approx. 65 g	Approx. 145 g	Approx. 205 g			
	Case		·	•			
Materi- als	Sensing surface	- Heat-resistant ABS					
	Clamping nuts	Polyacetal					
Accessories		Instruction manual					
		l .					

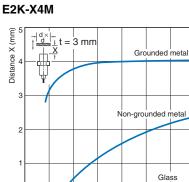
\*1. The above values are sensing distances for the standard sensing object. Refer to *Engineering Data* on page 3 for other materials. \*2. E and F Models (DC switching models): A full-wave rectification power supply of 24 VDC ±20% (average value) can be used.

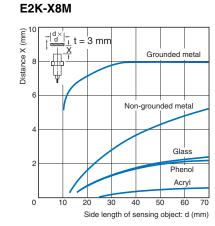
### Sensing Area (Grounded Metal Plate)

### E2K-X4M

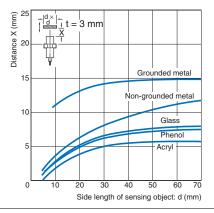


## Influence of Sensing Object Size and Material





# E2K-X15M



# Sensing Object Thickness and Material vs. Sensing Distance

Phenol

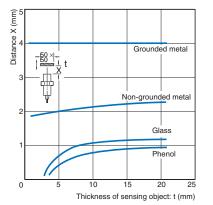
Side length of sensing object: d (mm)

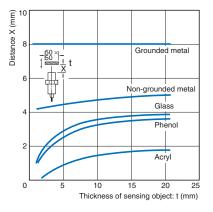
E2K-X4M

0

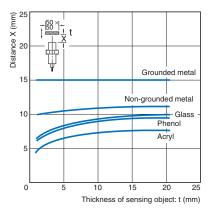
10 20 30 40 50 60 70





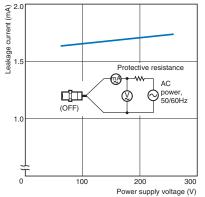


#### E2K-X15M

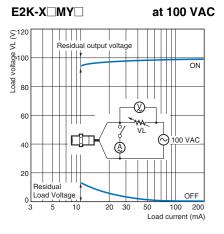


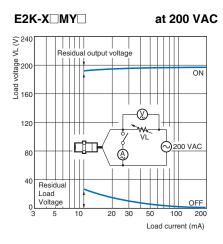
### Leakage Current





#### **Residual Output Voltage**



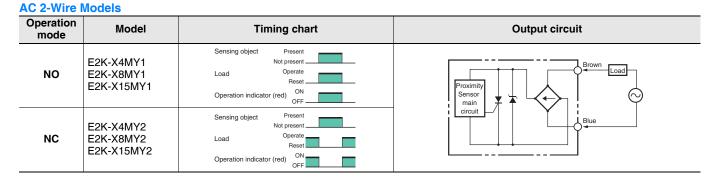


# I/O Circuit Diagrams

Operation mode	Model	Timing chart Output circuit	
NO	E2K-X4ME1 E2K-X8ME1 E2K-X15ME1	Sensing object Load (between brown and black leads) Output voltage (between black and blue leads) Detection indicator (red)	Proximity Sensor main circuit
NC	E2K-X4ME2 E2K-X8ME2 E2K-X15ME2	Sensing object Present Not present Load (between brown Operate and black leads) Reset Output voltage (between High black and blue leads) Low Detection indicator (red) OF	*1. Load current: 200 mA max. *2. When a transistor is connected.

#### DC 3-Wire Models (PNP)

Operation mode	Model	Timing chart	Output circuit
NO	E2K-X4MF1 E2K-X8MF1 E2K-X15MF1	Sensing Present object Not present Load (between blue Operate and black leads) Reset Output voltage (between High black and brown leads) Detection ON indicator (red) OFF	Proximity Sensor main circuit 2.2 Ω Black <sup>+1</sup>
NC	E2K-X4MF2 E2K-X8MF2 E2K-X15MF2	Sensing Present object Not present Load (between blue and black leads) Present Output voltage (between High black and brown leads) Low Detection ON indicator (red) OFF	<sup>3.9 kΩ</sup> <sup>47 kΩ</sup> <sup>blue</sup> 0 v *1. Load current: 200 mA max. *2. When a transistor is connected.



# **Safety Precautions**

#### Refer to Warranty and Limitations of Liability.

#### <u> WARNING</u>

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

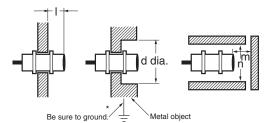
#### **Ambient Environment**

The Sensor may malfunction if subjected to water, oil, chemicals, or condensation by falsely detecting these as sensing objects. In addition, the sensing distance may vary when used in an environment with high temperatures or high humidity.

The E2K-X15M is highly sensitive to inductive objects and can thus be affected even by small quantities of water drops.

#### Influence of Surrounding Objects

If the Sensor is embedded in metal, maintain at least the following distances between the Sensor and the metal. The Sensor is also affected by other materials, such as resins. Separate the Sensor from other materials by the same distance as for metal.



\* Be sure to ground the metal object, otherwise Sensor operation will not be stable.

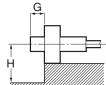
#### Influence of Surrounding Metal (Unit: mm)

Model Dimension	I	d	m	n
E2K-X4M	20	50	8	60
E2K-X8M			12	
E2K-X15M	10	Ī	25	

If a mounting bracket is used, be sure that at least the following distances are maintained.

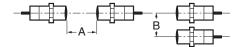
#### Influence of Surrounding Metal

(Unit: mm)				
Model	Dimension	G	Н	
E2K-X4M		20	30	
E2K-X8M				
E2K-X15M		10		



#### **Mutual Interference**

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



(Unit: mm)

Mutual Interference

Model Dimension	Α	В
E2K-X4M	80	70
E2K-X8M	150	110
E2K-X15M	300	200

#### **Sensing Objects**

The maximum sensing distance will decrease if the sensing object is a non-grounded metal object or dielectric object.

- Sensing Object Material
- The E2K-X can detect almost any type of object. The sensing distance of the E2K-X, however, will vary with the electrical characteristics of the object, such as the conductance and inductance of the object, and the water content and capacity of the object. The maximum sensing distance of the E2K-X will be obtained if the object is made of grounded metal.
- There are objects that cannot be detected indirectly. Therefore, be sure to test the E2K-X in a trial operation with the objects before using the E2K-X in actual applications.

#### Effects of a High-frequency Electromagnetic Field

The E2K-X may malfunction if there is an ultrasonic washer, highfrequency generator, transceiver, or inverter nearby. For major measures, refer to *Noise* of *Warranty and Limitations of Liability* for Photoelectric Sensors.

#### Mounting

Do not tighten the nut with excessive force. Always use washers when tightening the nuts and do not exceed the torque in the following table.



Model	Torque	
E2K-X4M	0.78 N·m	
E2K-X8M	2 N·m	
E2K-X15M	2 10.111	

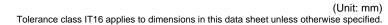
#### Miscellaneous

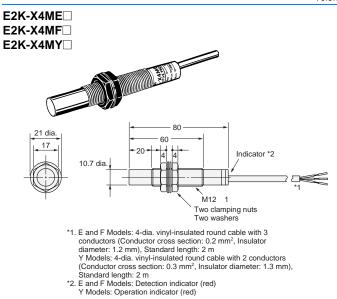
#### **Organic Solvents**

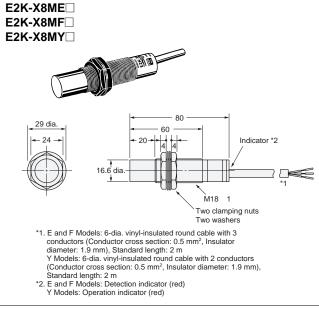
The Sensor has a case made of heat-resistant ABS resin. Be sure that the case is free from organic solvents or solutions containing organic solvents.

# E2K-X

# **Dimensions**







Model

E2K-X4M

E2K-X8M

E2K-X15M

F (mm) +0.5

0

dia. 0 +0.5

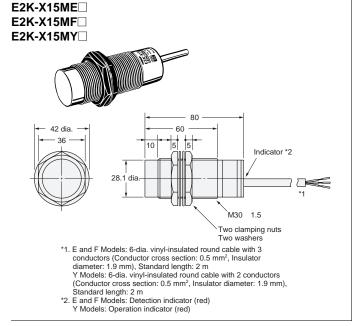
dia. 0 30.5 +0.5

dia.

12.5

18.5

#### **Mounting Hole Dimensions**



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