

Threaded, Cylindrical Sensor  
Detects Metallic and  
Non-metallic Objects

- Permits non-contact detection of metallic and non-metallic objects such as glass, wood, water, oil and plastic
- Allows indirect detection of materials inside non-metallic containers
- Built-in amplifier accepts a wide range of supply voltages and switches up to 200 mA
- LED indicator and fixed sensitivity for simple installation



## Ordering Information

### ■ 3-WIRE DC SENSORS

Size	M12		M18		M30	
Type	Unshielded					
Nominal detecting distance	4 mm (0.16 in)		8 mm (0.32 in)		15 mm (0.59 in)	
Part number	NPN-NO	E2K-X4ME1	E2K-X8ME1	E2K-X15ME1		
	NPN-NC	E2K-X4ME2	E2K-X8ME2	E2K-X15ME2		
	PNP-NO	E2K-X4MF1	E2K-X8MF1	E2K-X15MF1		
	PNP-NC	E2K-X4MF2	E2K-X8MF2	E2K-X15MF2		

### ■ 2-WIRE AC SENSORS

Size	M12		M18		M30	
Type	Unshielded					
Nominal detecting distance	4 mm (0.16 in)		8 mm (0.32 in)		15 mm (0.59 in)	
Part number	SCR-NO	E2K-X4MY1	E2K-X8MY1	E2K-X15MY1		
	SCR-NC	E2K-X4MY2	E2K-X8MY2	E2K-X15MY2		

### ■ ACCESSORIES

Description	Part number	
Mounting brackets for standard size sensors	Fits M12 size sensors	Y92E-B12
	Fits M18 size sensors	Y92E-B18
	Fits M30 size sensors	Y92E-B30

## REPLACEMENT PARTS

Description	Part number	
Mounting hardware includes one pair of plastic nuts	Fits M12 size sensors (supplied with each sensor)	<b>M12-PHWS</b>
	Fits M18 size sensors (supplied with each sensor)	<b>M18-PHWS</b>
	Fits M30 size sensors (supplied with each sensor)	<b>M30-PHWS</b>

## Specifications

### 3-WIRE DC SENSORS

Part number	E2K-X4M□□	E2K-X8M□□	E2K-X15M□□
Sensor type	Capacitive		
Body	Size	M12	M18
	Type	Unshielded	
Supply voltage	10 to 30 VDC		
Current consumption	8 mA at 12 VDC 15 mA at 24 VDC		
Detectable object type	Metallic and non-metallic objects		
Sensitivity	Fixed		
Effective maximum detecting distance (with standard target)	4 mm (0.16 in)	8 mm (0.32 in)	15 mm (0.59 in)
Standard target size (grounded mild steel, L x W x H)	50 x 50 x 1 mm (2.0 x 2.0 x 0.04 in)		
Differential travel	20% max. of effective maximum detecting distance		
Control output	DC solid-state	Type	NPN-NO open collector with pull-up (E2K-X□□ME1) NPN-NC open collector with pull-up (E2K-X□□ME2) PNP-NO open collector with pull-down (E2K-X□□MF1) PNP-NC open collector with pull-down (E2K-X□□MF2)
		Max. load	200 mA
		Max. on-state voltage drop	1 VDC
Response frequency	100 Hz		
Circuit protection	Output short-circuit	Not provided	
	DC power supply reverse polarity	Provided	
	Weld field immunity	Not provided	
	RFI immunity	Not provided	
Indicators	Target Present (red LED)		
Materials	Housing	ABS	
	Sensing face	ABS	
	Cable sheath	Polyethylene	
Mounting	Two metal lock washers and M12 nuts included. Bracket Y92E-B12 optional.	Two metal lock washers and M18 nuts included. Bracket Y92E-M18 optional.	Two metal lock washers and M30 nuts included. Bracket Y92E-M30 optional.
Connections	Three-conductor cable, 2 m (6.56 ft) length		
Weight with cable	Approx. 65 g (2.3 oz.)	Approx. 145 g (5.1 oz.)	Approx. 205 g (7.2 oz.)
Enclosure ratings	UL	—	
	NEMA	1, 4, 12, 13	
	IEC 144	IP66	
Approvals	UL	—	
	CSA	—	
Ambient operating temperature	-25° to 70°C (-13° to 158°F)		-10° to 55°C (14° to 131°F)
Vibration	10 to 55 Hz, 1.5 mm (0.06 in) double amplitude		
Shock	Approx. 50 G's		

## ■ 2-WIRE AC SENSORS

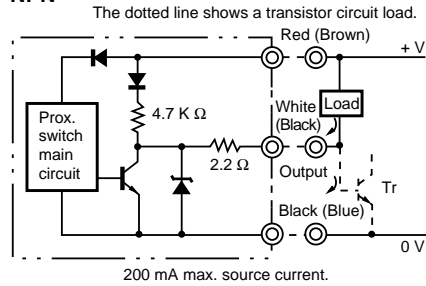
Part number		E2K-X4MY□	E2K-X8MY□	E2K-X15MY□
Sensor type		Capacitive		
Body	Size	M12	M18	M30
	Type	Unshielded		
Supply voltage		90 to 250 VAC, 50/60 Hz		
Current consumption		2.2 mA at 200 VAC		
Detectable object type		Metallic and non-metallic objects		
Sensitivity		Fixed		
Effective maximum detecting distance (with standard target)		4 mm (0.16 in)	8 mm (0.32 in)	15 mm (0.59 in)
Standard target size (grounded mild steel, L x W x H)		50 x 50 x 1 mm (2.0 x 2.0 x 0.04 in)		
Differential travel		20% max. of effective detecting distance		
Control output	AC solid-state	Type	SCR-NO (E2K-X□□Y1) SCR-NC (E2K-X□□Y2)	
		Max. load	200 mA	
		Max. off-state leakage current	See "Leakage Current Characteristics" graph in Engineering Data section	
		Max. on-state voltage drop	See "Residual Load Voltage Characteristics" graph in Engineering Data section	
Response frequency		10 Hz		
Circuit protection	Output short-circuit	Not provided		
	Weld field immunity	Not provided		
	RFI immunity	Not provided		
Indicators		Output Operation (red LED)		
Materials	Housing	ABS		
	Sensing face	ABS		
	Cable sheath	Polyethylene		
Mounting		Two metal lock washers and M12 nuts included. Bracket Y92E-B12 optional.	Two metal lock washers and M18 nuts included. Bracket Y92E-B18 optional.	Two metal lock washers and M30 nuts included. Bracket Y92E-B30 optional.
Connections		Two-connector cable, 2 m (6.56 ft) length		
Weight with cable		Approx. 65 g (2.3 oz.)	Approx. 145 g (5.1 oz.)	Approx. 205 g (7.2 oz.)
Enclosure ratings	UL	—		
	NEMA	1, 4, 12, 13		
	IEC 144	IP66		
Approvals	UL	Recognized, File Number E76675		
	CSA	Certified, File Number LR45951		
Ambient operating temperature		-25° to 70°C (-13° to 158°F)		-10° to 55°C (14° to 131°F)
Vibration		10 to 55 Hz, 1.5 mm (0.06 in) double amplitude		
Shock		Approx. 50 G's		

# Operation

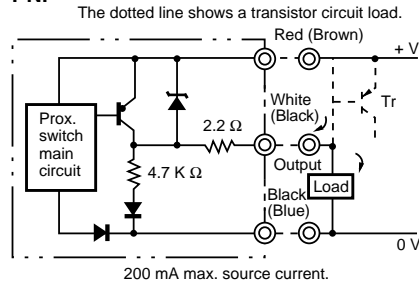
## ■ OUTPUT DIAGRAMS AND TIMING CHARTS

### DC Switching Types

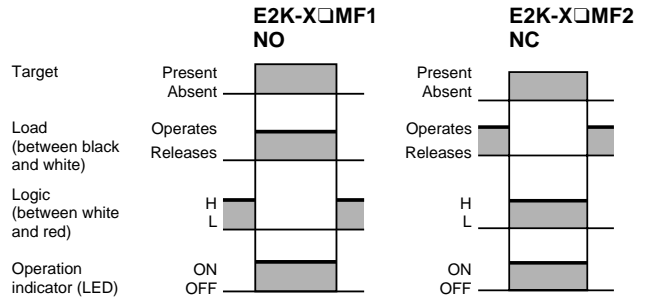
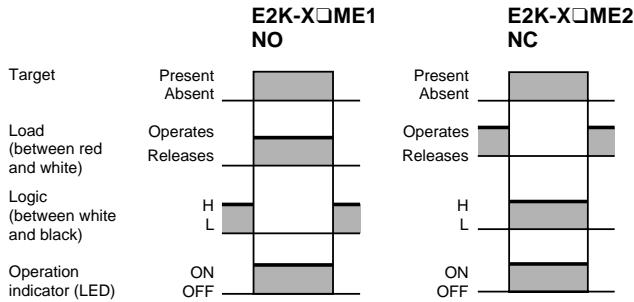
#### E2K-X□ME□ NPN



#### E2K-X□MF□ PNP

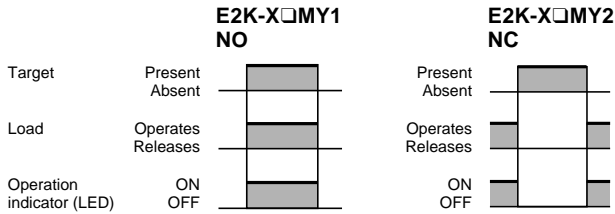
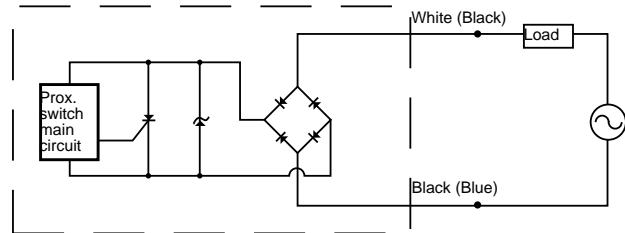


Note: IEC colors are shown in parentheses.



### AC Switching Types

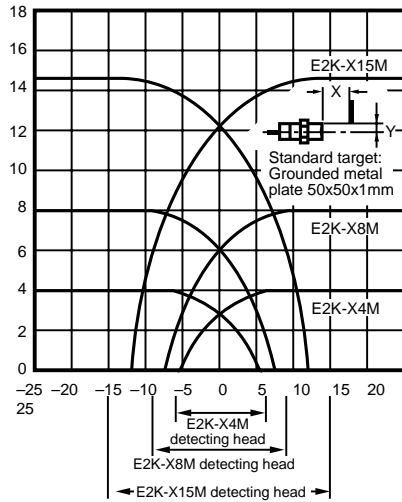
#### E2K-X□MY□



# Engineering Data

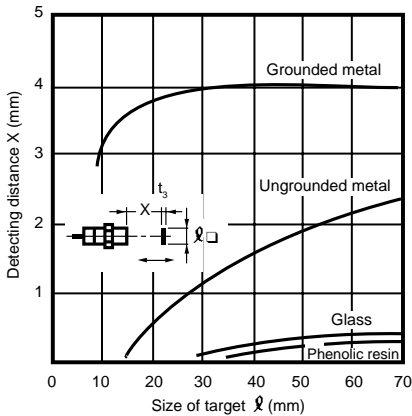
## Operating Range

### E2K-X□M□□

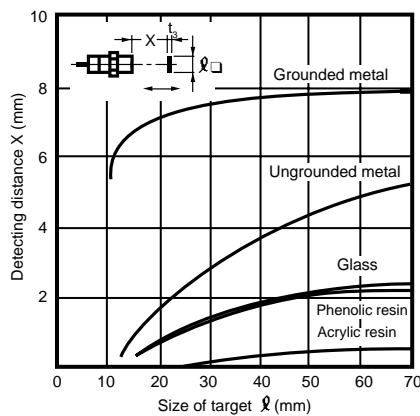


## Detecting Distance vs. Size and Material of Target

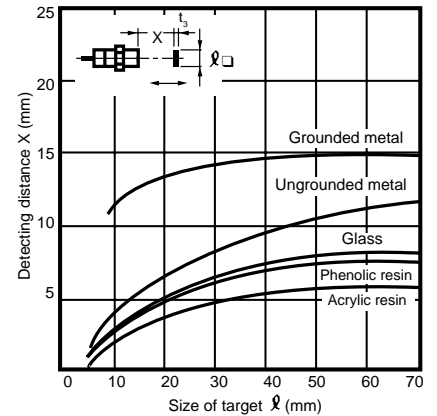
### E2K-X4M□□



### E2K-X8M□□

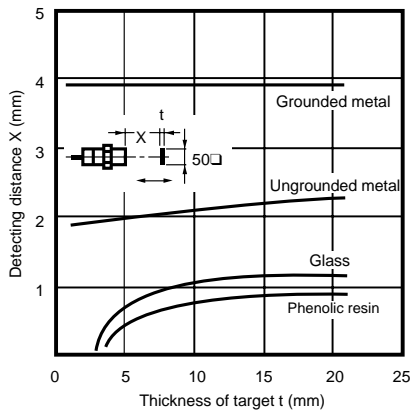


### E2K-X15M□□

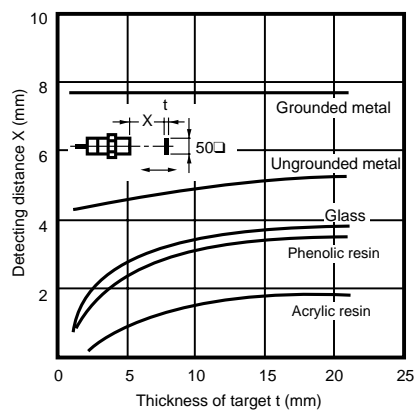


## Detecting Distance vs. Thickness and Material of Target

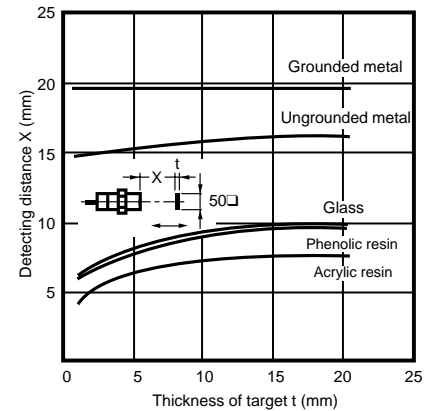
### E2K-X4M□□



### E2K-X8M□□



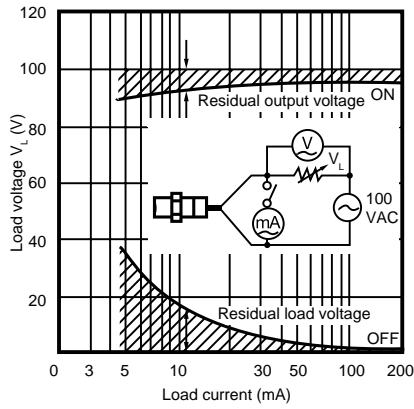
### E2K-X15M□□



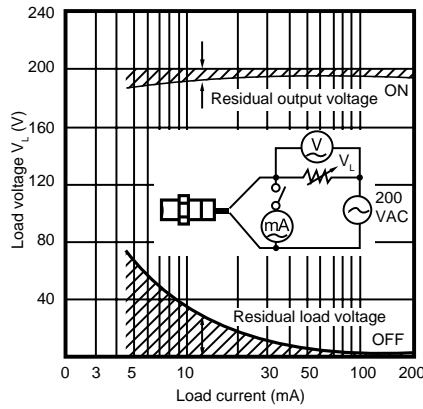
### Residual Load Voltage Characteristics

#### AC switching types

##### 100 VAC



##### 200 VAC



Note: When the current rating of the load is less than 10 mA, false operation may occur. This is normal, and the problem can be cured by installing a bleeder resistor in parallel with the load. Use the formulas given here to calculate the power rating and value of the resistor.

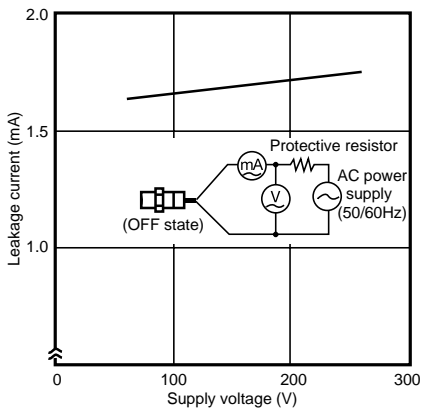
$$R \leq \frac{V_s}{10 - i} \text{ (k}\Omega\text{)} \quad P > \frac{V_s^2}{R} \text{ (mW)}$$

- P : Power rating of bleeder resistor
- i : Load current (mA)
- Vs : Supply voltage (V)

### Leakage Current Characteristics

#### AC switching types

##### E2K-X□MY□

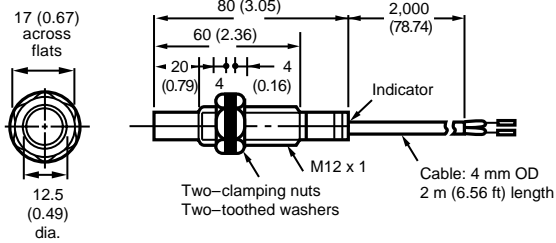


# Dimensions

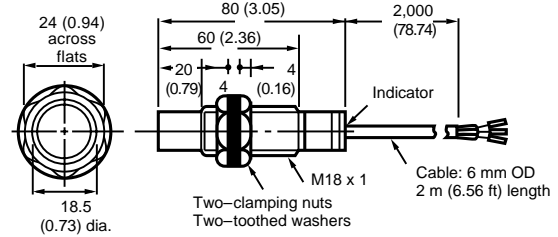
## ■ SENSORS

Unit: mm

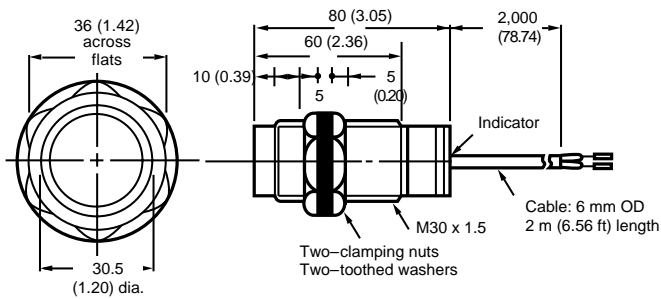
### E2K-X4M□□



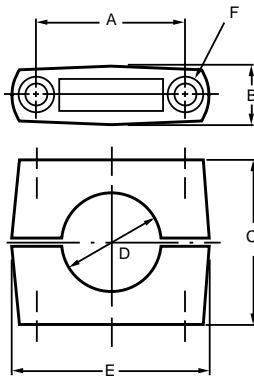
### E2K-X8M□□



### E2K-X15M□□



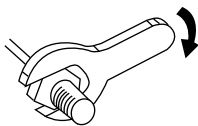
## ■ OPTIONAL MOUNTING BRACKETS



Part number	Drawing dimensions						Applicable sensor models
	A	B	C	D	E	F	
Y92E-B12	24 ± 0.2	12.5 max.	20	12 dia.	37 max.	M4 x 25 bolt	E2K-X4M□□
Y92E-B18	32 ± 0.2	17 max.	30	18 dia.	37 max.	M5 x 32 bolt	E2K-X8M□□
Y92E-B30	45 ± 0.2	17 max.	50	30 dia.	60 max.	M5 x 50 bolt	E2K-X15M□□

# Precautions

## ■ TIGHTENING FORCE



Do not exceed the torque listed in the table at right when tightening the mounting nuts.

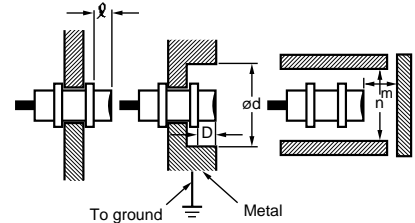
Part number	Maximum torque	
	kg-cm	in-lbs
E2K-X4M□□	8	7
E2K-X8M□□	20	17
E2K-X15M□□	20	17

## ■ EFFECTS OF SURROUNDING METAL

When mounting the proximity sensor in or near a metallic panel, be sure to provide a minimum distance as shown in the tables below. This prevents the sensor from being affected by metallic objects other than the target.

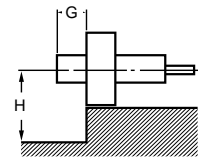
### When Mounting Directly to Metal Panel or Object

Drawing dimension	Sensor model		
	E2K-X4M□□	E2K-X8M□□	E2K-X15M□□
$\lambda$	20 mm (0.79 in)	20 mm (0.79 in)	10 mm (0.39 in)
d (dia.)	50 mm (1.97 in)	50 mm (1.97 in)	50 mm (1.97 in)
D	20 mm (0.79 in)	20 mm (0.79 in)	10 mm (0.39 in)
m	8 mm (0.32 in)	12 mm (0.47 in)	25 mm (0.98 in)
n	60 mm (2.36 in)	60 mm (2.36 in)	60 mm (2.36 in)



### When Using Optional Mounting Brackets

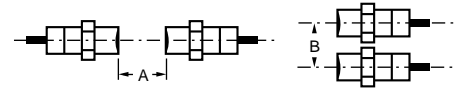
Drawing dimension	Sensor model		
	E2K-X4M□□	E2K-X8M□□	E2K-X15M□□
G	20 mm (0.79 in)	20 mm (0.79 in)	10 mm (0.39 in)
H	30 mm (1.18 in)	30 mm (1.18 in)	30 mm (1.18 in)



## ■ MUTUAL INTERFERENCE

To prevent mutual interference between two sensors, be sure to space the two sensors at a distance greater than that shown in the table below.

Drawing dimension	Sensor model		
	E2K-X4M□□	E2K-X8M□□	E2K-X15M□□
A	80 mm (3.15 in)	150 mm (5.91 in)	300 mm (11.81 in)
B	70 mm (2.76 in)	110 mm (4.33 in)	200 mm (7.87 in)



## ■ REQUIRED WARM-UP TIME BEFORE OPERATION

### DC Switching Sensors

In applying any of the E2K-X□ME series proximity sensors as a voltage output type, note that an unwanted output may be produced momentarily (50 ms max.) when power is applied with a target moving toward the E2K-X□ME1(F1) or with a target moving away from the E2K-X□ME2(F2). After the power application, a minimum of 50 ms is required before the sensor circuit can operate. Move the target toward or away from the proximity sensor after this time period.

### AC Switching Sensors

After applying power to a proximity sensor, a minimum of 100 ms is required before the sensor circuit reaches its steady state. The load is in the OFF state during this period. Do not move the target toward or away from the proximity sensor until the sensor circuit enters the steady state. The operation indicator (LED) will illuminate momentarily when the power is turned ON or OFF, but the output stage circuit is in a normal operating state.

## ■ USING METAL CONDUIT

If a high voltage or power line runs near the proximity sensor cable, be sure to wire the sensor cable through a metal conduit to protect the sensor from malfunctioning or damage.

## ■ SURGE PROTECTION

The proximity sensor is provided with a surge suppressor circuit. However, if any large surge generation source (i.e. motor, welding machine, etc.) exists in the vicinity of the proximity sensor, insert a surge suppressor (such as a varistor) into the surge generating source.



NOTE: DIMENSIONS ARE SHOWN IN MILLIMETERS. To convert millimeters to inches divide by 25.4.



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