

Capacitive Prox

E2K-X

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)	M12-PHWS
	Fits M18 size sensors (supplied with each sensor)	M18-PHWS
	Fits M30 size sensors (supplied with each sensor)	M30-PHWS

Specifications

3-WIRE DC SENSORS

Part number			E2K-X4M□□	E2K-X8M□□	E2K-X15M□□
Sensor type			Capacitive		
Body	Size		M12	M18	M30
	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		

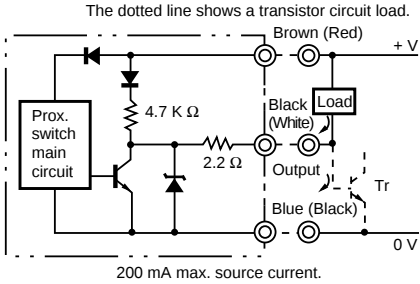
Operation

■ OUTPUT DIAGRAMS AND TIMING CHARTS

DC Switching Types

E2K-X□ME□

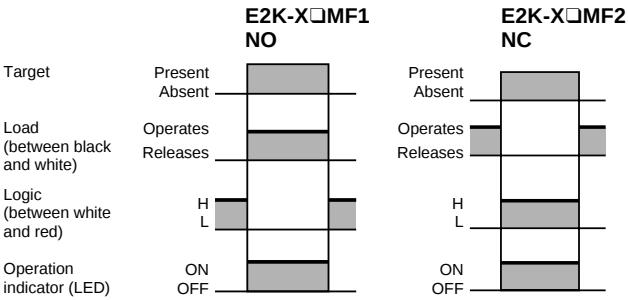
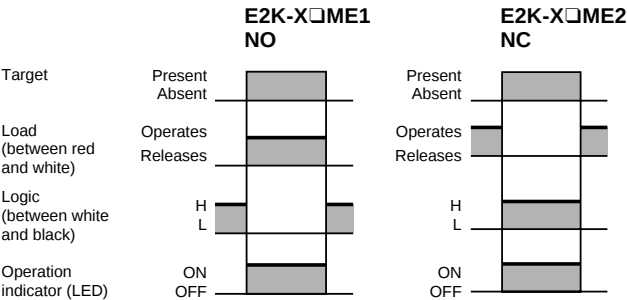
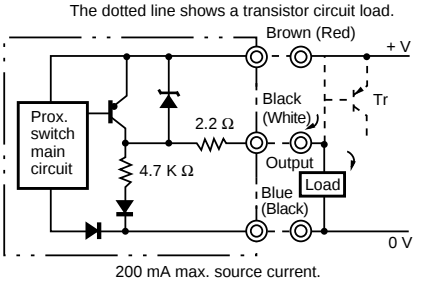
NPN



Note: IEC colors are shown in parentheses.

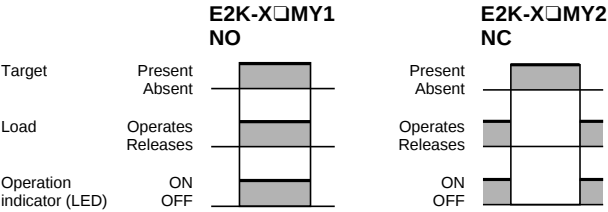
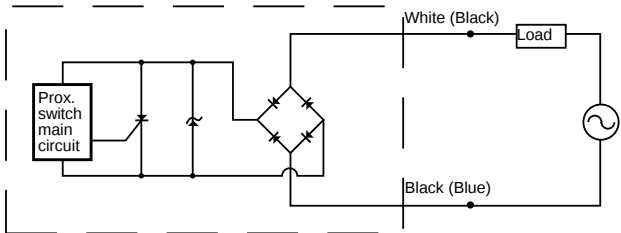
E2K-X□MF□

PNP



AC Switching Types

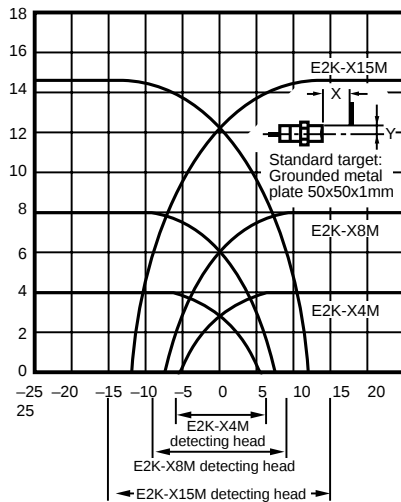
E2K-X□MY□



Engineering Data

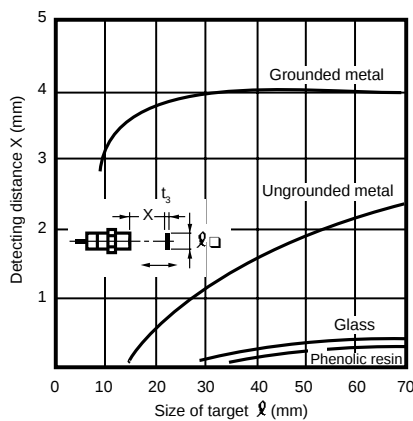
Operating Range

E2K-X□M□□

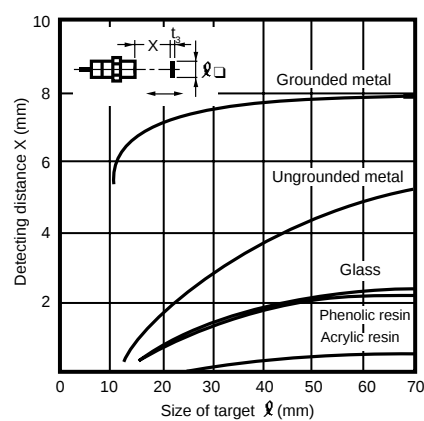


Detecting Distance vs. Size and Material of Target

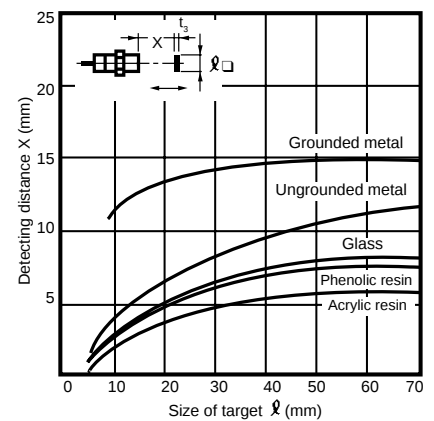
E2K-X4M□□



E2K-X8M□□

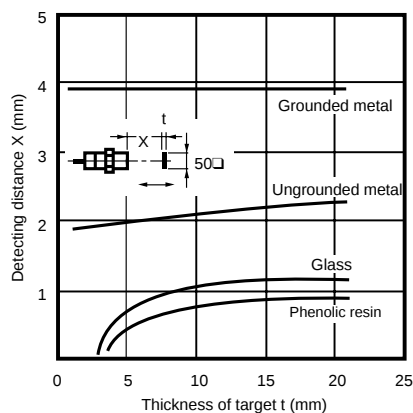


E2K-X15M□□

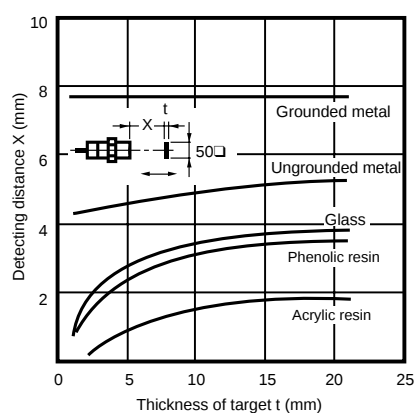


Detecting Distance vs. Thickness and Material of Target

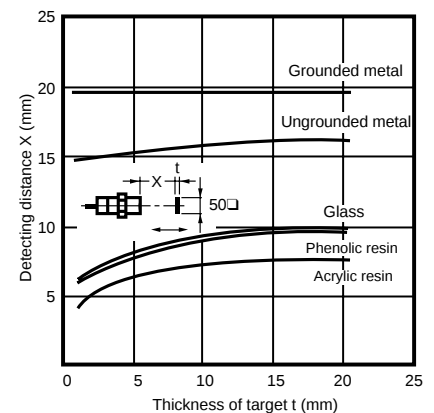
E2K-X4M□□



E2K-X8M□□



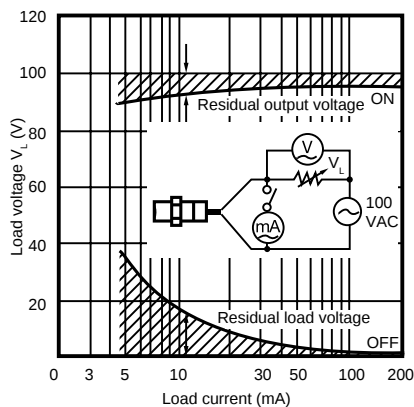
E2K-X15M□□



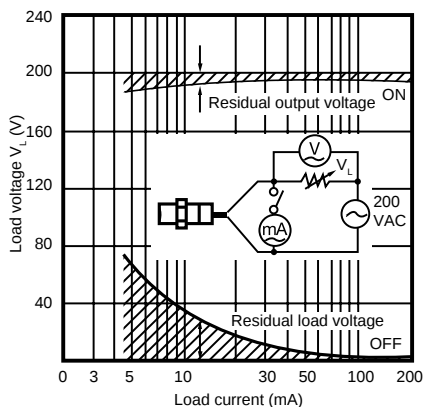
Residual Load Voltage Characteristics

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

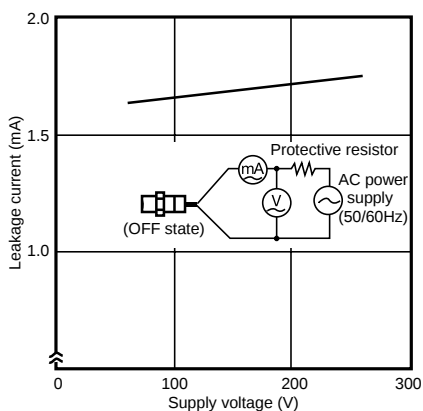
i : Load current (mA)

V_s : Supply voltage (V)

Leakage Current Characteristics

AC switching types

E2K-X□MY□

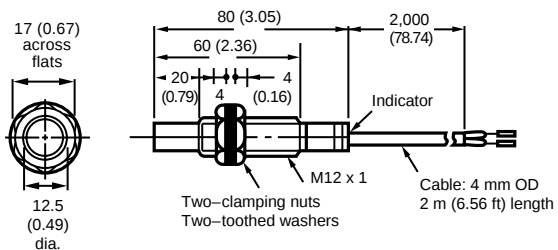


Dimensions

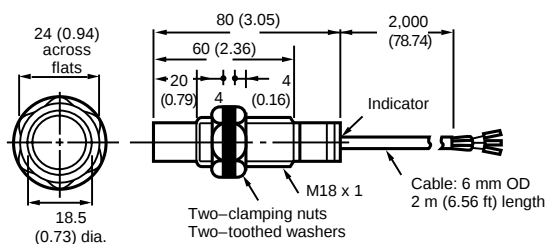
■ SENSORS

Unit: mm

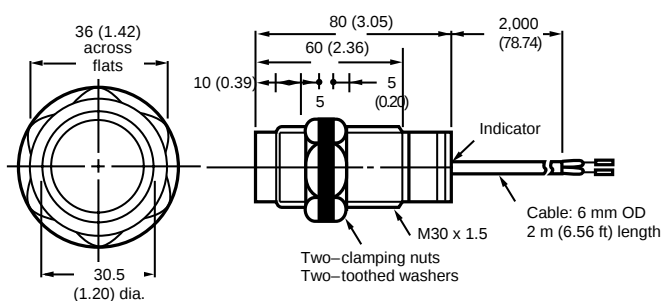
E2K-X4M□□



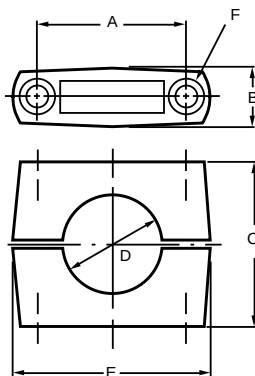
E2K-X8M□□



E2K-X15M□□



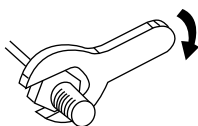
■ OPTIONAL MOUNTING BRACKETS



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.

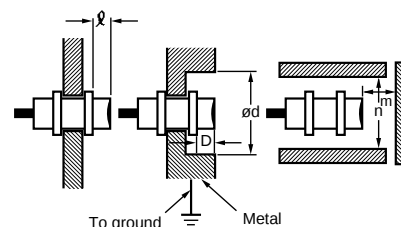
Part number	Maximum torque	
	kg-cm	in-lbs
E2K-X4M□□	8	7
E2K-X8M□□	20	17
E2K-X15M□□	20	17

■ 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.

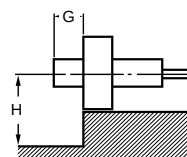
When Mounting Directly to Metal Panel or Object

Drawing dimension	Sensor model		
	E2K-X4M□□	E2K-X8M□□	E2K-X15M□□
ℓ	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

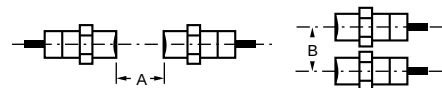
Drawing dimension	Sensor model		
	E2K-X4M□□	E2K-X8M□□	E2K-X15M□□
G	20 mm (0.79 in)	20 mm (0.79 in)	10 mm (0.39 in)
H	30 mm (1.18 in)	30 mm (1.18 in)	30 mm (1.18 in)



■ 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.



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11/01

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