

Miniature Square Inductive Proximity Sensor

E2S

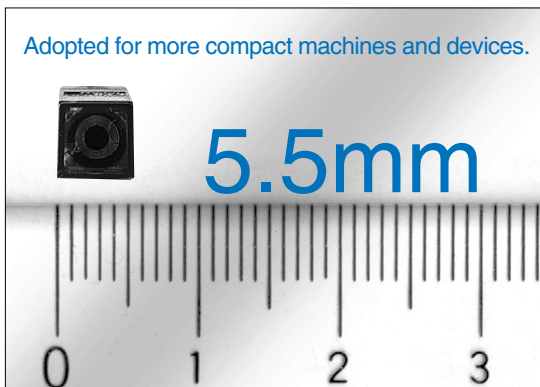
- Miniature housing with long sensing ranges
- Front and side facing sensing surfaces



Features

5.5 mm Ultra small housing

The 5.5 mm x 5.5 mm type permits smaller, space-saving machines and devices.



1 kHz High-Speed Response

IP67 Environment-Resistant Types

Full sealing structure housing, degree of protection IEC60529 IP67.

1/20 Low Current Consumption (Compared to conventional models)


Significantly lower current consumption. The 0.8 mA (for 24 VDC) leakage current for the DC 2-wire type has a ratio of approximately 1/20 compared to the conventional DC 3-wire type. Optimum solution for multiple-sensor applications such as cam switches.

E2S

Ordering Information


Sensors

DC 2-wire Models

Shape	Sensing surface	Sensing distance	Model	
			Operating status	
			NO	NC
 Unshielded	Front face	1.6mm	E2S-W11 *	E2S-W12
	End face		E2S-Q11 *	E2S-Q12
	Front face	2.5mm	E2S-W21 *	E2S-W22
	End face		E2S-Q21 *	E2S-Q22

* Models with different response frequency are available (NO only). These model numbers take the form E2S-□□□B (e.g., E2S-W11B)





DC 3-wire Models

Shape	Sensing surface	Sensing distance	Output specifications	Model	
				Operating status	
				NO	NC
 Unshielded	Front face	1.6mm	NPN	E2S-W13*	E2S-W14
	End face			E2S-Q13*	E2S-Q14
	Front face	2.5mm		E2S-W23*	E2S-W24
	End face			E2S-Q23*	E2S-Q24
	Front face	1.6mm	PNP	E2S-W15*	E2S-W16
	End face			E2S-Q15*	E2S-Q16
	Front face	2.5mm		E2S-W25*	E2S-W26
	End face			E2S-Q25*	E2S-Q26

* Models with different response frequency are available (NO only). These model numbers take the form E2S-□□□B (e.g., E2S-W11B)

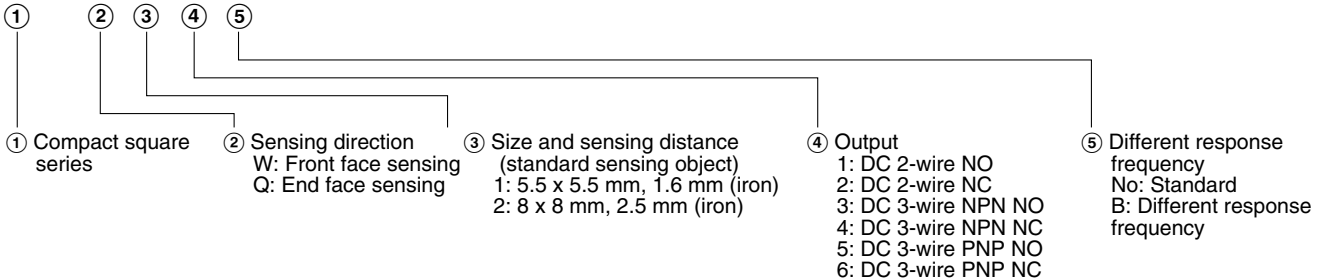
Accessories (Order Separately)

Mounting Brackets

Shape	Model	Quantity	Remarks
	Y92E-C1R6	1	Provided with E2S-□1□□
	Y92E-C2R5		Provided with E2S-□2□□
	Y92E-D1R6		---
	Y92E-D2R5		---

Nomenclature

E2S - □ □ □ □



Rating/Performance

DC 2-wire Models

Item	Model	E2S-W11 E2S-W12	E2S-Q11 E2S-Q12	E2S-W21 E2S-W22	E2S-Q21 E2S-Q22
Sensing surface		Front face	End face	Front face	End face
Sensing distance		1.6 mm ±10%		2.5 mm ±15%	
Setting distance		0 to 1.2 mm		0 to 1.9 mm	
Differential distance		10% max.			
Sensing object		Ferrous metal (Sensitivity lowers with non-ferrous metals)			
Standard sensing object		Iron, 12 x 12 x 1 mm		Iron, 15 x 15 x 1 mm	
Response frequency		1 kHz min.			
Rated supply voltage (operating voltage)		12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max.			
Leakage current		0.8 mA max.			
Control output	Switching capacity	3 to 50 mA DC max.			
	Residual voltage	3 V max. (under load current of 50 mA with cable length of 1 m)			
Indicator lamp		□□1 models: Operation indicator(red LED), Operation set indicator(green LED) □□2 models: Operation indicator(red LED)			
Operating status (with sensing object approaching)		□□1 models: NO □□2 models: NC			

* The response frequencies for DC switching are average values measured under the condition that the distance between each sensing object is twice as large as the size of the sensing object and the sensing distance set is half of the maximum sensing distance.

DC 3-wire Models

Item	Model	E2S-W13 E2S-W14	E2S-Q13 E2S-Q14	E2S-W23 E2S-W24	E2S-Q23 E2S-Q24	E2S-W15 E2S-W16	E2S-Q15 E2S-Q16	E2S-W25 E2S-W26	E2S-Q25 E2S-Q26
Sensing surface		Front face	End face	Front face	End face	Front face	End face	Front face	End face
Sensing distance		1.6 mm ±10%		2.5 mm ±15%		1.6 mm ±10%		2.5 mm ±15%	
Setting distance		0 to 1.2 mm		0 to 1.9 mm		0 to 1.2 mm		0 to 1.9 mm	
Differential distance		10% max.							
Sensing object		Ferrous metal							
Standard sensing object		Iron, 12 x 12 x 1 mm		Iron, 15 x 15 x 1 mm		Iron, 12 x 12 x 1 mm		Iron, 15 x 15 x 1 mm	
Response frequency		1 kHz min.							
Rated supply voltage (operating voltage)		12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max.							
Current consumption		13 mA max. (24 VDC, unload)							
Control output	Switching capacity	NPN open collector 100 mA max. (30 VDC max.)				PNP open collector 50 mA max. (30 VDC max.)			
	Residual voltage	1 V max. (under load current of 50 mA with cable length of 1 m)							
Indicator lamp		Operation indicator (orange)							
Operating status (with sensing object approaching)		□□3 models: NO □□4 models: NC				□□5 models: NO □□6 models: NC			

* The response frequencies for DC switching are average values measured under the condition that the distance between each sensing object is twice as large as the size of the sensing object and the sensing distance set is half of the maximum sensing distance.

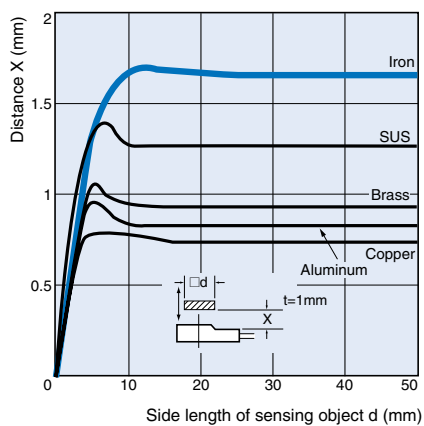
Specifications

Item	Model	E2S-□□□
Protective circuits	Reverse polarity connection and surge absorber	
Ambient temperature	Operating: -25°C to 70°C, Storage: -40°C to 85°C (with no icing or condensation)	
Ambient humidity	Operating: 35% to 90%RH, Storage: 35% to 95%RH (with no condensation)	
Temperature influence	±15% max. of sensing distance at 23°C in temperature range of -25°C to 70°C	
Voltage influence	±2.5% max. of sensing distance within a range of ±10% of rated supply voltage	
Insulation resistance	50 M min. (at 500 VDC) between energized parts and case	
Dielectric strength	1,000 VAC for 1 min between energized parts and case	
Vibration resistance	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 ² for 3 times each in X, Y, and Z directions	
Protective structure	IEC60529 IP67	
Connection method	Pre-wired models (Standard length: 3 m)	
Weight (Packed state)	Approx. 10 g	
Material	Case	Polyarylate
Accessories	Mounting Brackets	

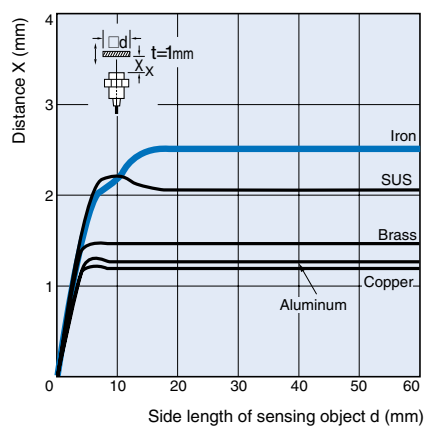
Characteristic data (typical)

Sensing Distance vs. Sensing Object

E2S-W1□/-Q1□



E2S-W2□/-Q2□



Output Circuit Diagram

DC 2-wire Models

Operating status	Model	Timing chart	Output circuit
NO	E2S-W11 E2S-W21 E2S-Q11 E2S-Q21	<p>The timing chart for NO models shows a proximity sensor with a sensing object. The sensing range is divided into a non-sensing zone, an unstable sensing zone, and a stable sensing zone. The setting position is indicated by a vertical line. The rated sensing distance is 100% at the setting position and 80% at the end of the stable sensing zone. The output signals are: Setting indicator (green) ON during the stable sensing zone; Operation indicator (red) ON during the stable sensing zone; and Control output ON during the stable sensing zone.</p>	<p>The output circuit diagram for NO models shows a main circuit connected to a transistor. The transistor's emitter is connected to 0V (Blue wire) and its collector is connected to +V (Brown wire) through a load. The transistor is controlled by the control output signal.</p>
NC	E2S-W12 E2S-W22 E2S-Q12 E2S-Q22	<p>The timing chart for NC models shows a proximity sensor with a sensing object. The sensing range is divided into a non-sensing zone and a sensing zone. The output signals are: Operation indicator (red) ON during the sensing zone; and Control output ON during the sensing zone.</p>	<p>The output circuit diagram for NC models shows a main circuit connected to a transistor. The transistor's emitter is connected to 0V (Blue wire) and its collector is connected to +V (Brown wire) through a load. The transistor is controlled by the control output signal.</p>

DC 3-wire Models

Operating status	Output specifications	Model	Timing chart	Output circuit
NO	NPN	E2S-W13 E2S-W23 E2S-Q13 E2S-Q23	<p>The timing chart for NPN NO models shows the sensing object (Yes/No), output transistor (load) (ON/OFF), and operation indicator (orange) (ON/OFF) signals. The output transistor is ON when the sensing object is present.</p>	<p>The output circuit diagram for NPN NO models shows a main circuit connected to an NPN transistor. The transistor's emitter is connected to 0V (Blue wire) and its collector is connected to +V (Brown wire) through a load. The transistor is controlled by the output signal. A note indicates: * Maximum load current: 50 mA.</p>
NC		E2S-W14 E2S-W24 E2S-Q14 E2S-Q24	<p>The timing chart for NPN NC models shows the sensing object (Yes/No), output transistor (load) (ON/OFF), and operation indicator (orange) (ON/OFF) signals. The output transistor is ON when the sensing object is absent.</p>	<p>The output circuit diagram for NPN NC models shows a main circuit connected to an NPN transistor. The transistor's emitter is connected to 0V (Blue wire) and its collector is connected to +V (Brown wire) through a load. The transistor is controlled by the output signal. A note indicates: * Maximum load current: 50 mA.</p>
NO	PNP	E2S-W15 E2S-W25 E2S-Q15 E2S-Q25	<p>The timing chart for PNP NO models shows the sensing object (Yes/No), output transistor (load) (ON/OFF), and operation indicator (orange) (ON/OFF) signals. The output transistor is ON when the sensing object is present.</p>	<p>The output circuit diagram for PNP NO models shows a main circuit connected to a PNP transistor. The transistor's emitter is connected to +V (Brown wire) and its collector is connected to 0V (Blue wire) through a load. The transistor is controlled by the output signal. A note indicates: * Maximum load current: 50 mA.</p>
NC		E2S-W16 E2S-W26 E2S-Q16 E2S-Q26	<p>The timing chart for PNP NC models shows the sensing object (Yes/No), output transistor (load) (ON/OFF), and operation indicator (orange) (ON/OFF) signals. The output transistor is ON when the sensing object is absent.</p>	<p>The output circuit diagram for PNP NC models shows a main circuit connected to a PNP transistor. The transistor's emitter is connected to +V (Brown wire) and its collector is connected to 0V (Blue wire) through a load. The transistor is controlled by the output signal. A note indicates: * Maximum load current: 50 mA.</p>

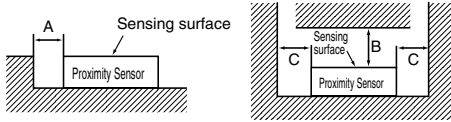
Precautions

Correct Use

Design

Effects of Surrounding Metal

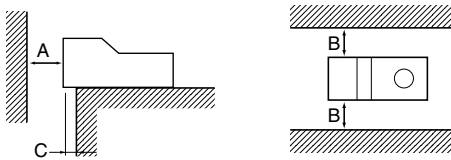
- Provide a minimum distance between the Sensor and the surrounding metal as shown in the table below.
- Front Surface Sensing Type (Not exceeding the sensor head height)



(Unit: mm)

Model	Length	A	B	C
E2S-W1□		0	8	2
E2S-W2□			15	10

- End Surface Sensing Type



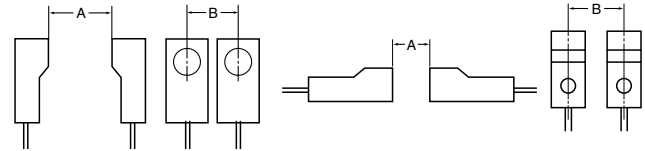
(Unit: mm)

Model	Length	A	B	C
E2S-Q1□		8	3	2
E2S-Q2□		15	10	3

Mutual Interference

If more than one Sensor is located face to face or in parallel, be sure to maintain enough space between adjacent Sensors to suppress mutual interference as provided in the following diagram,.

- Front Surface Sensing Type
- End Surface Sensing Type



(Unit: mm)

Model	Length	A	B
E2S-W(Q)1□		50 (40)	20 (5.5)
E2S-W1□		75 (50)	25 (8)

Note: The above values in parentheses are applicable when using two sensors with different frequencies.

Mounting

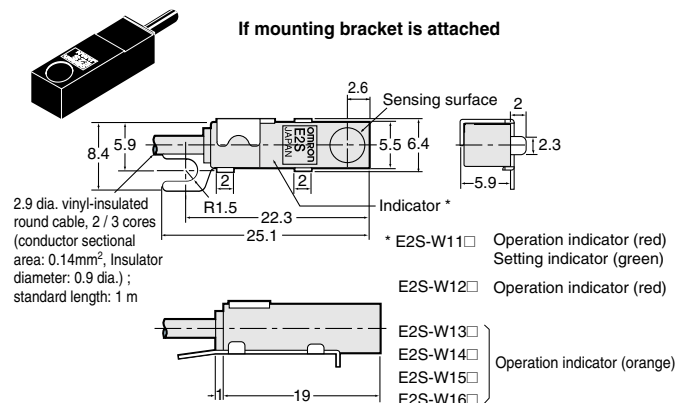
Tightening torques

Do not tighten the E2S-W(Q)2□ mounting screws to a torque exceeding 0.7 Nm.

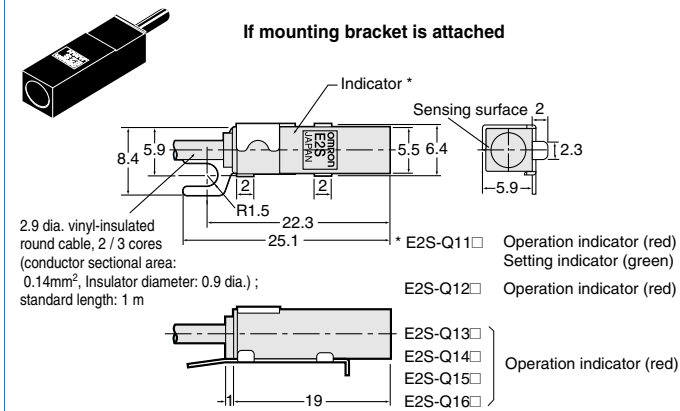
Dimensions (Unit: mm)

Sensors

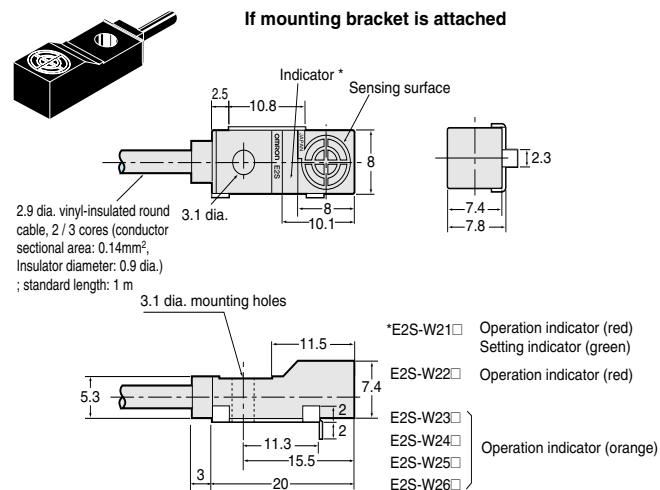
E2S-W1□



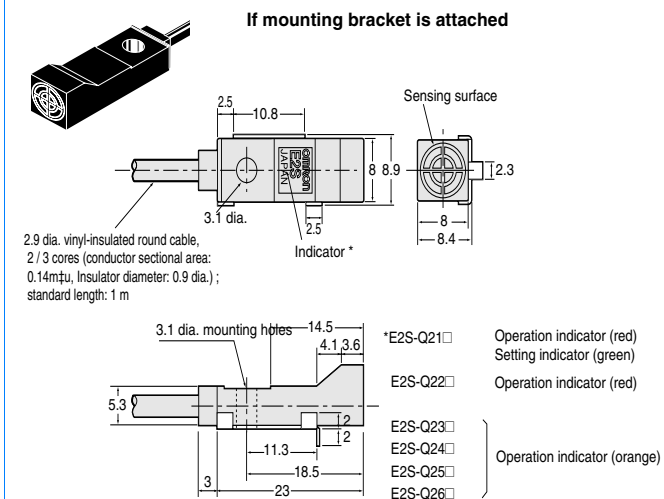
E2S-Q1□



E2S-W2□



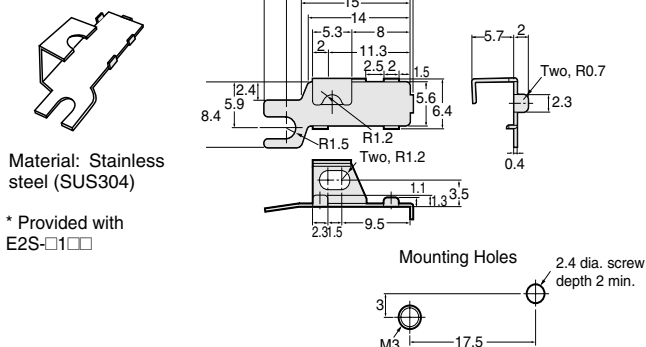
E2S-Q2□



Accessories (Order Separately*)

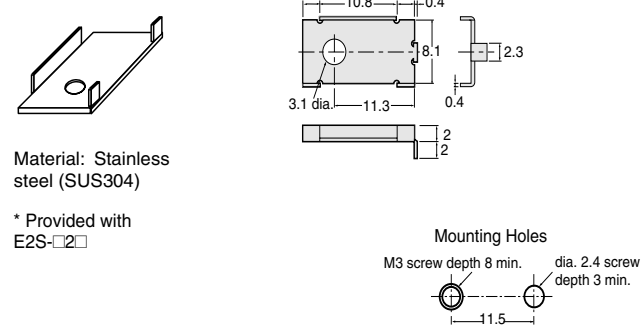
Mounting Brackets

Y92E-C1R6



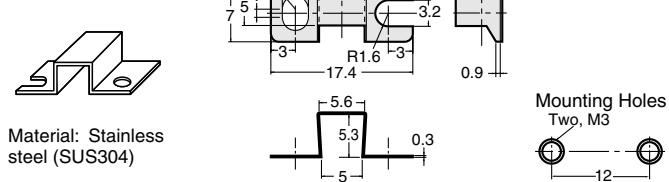
Mounting Brackets

Y92E-C2R5



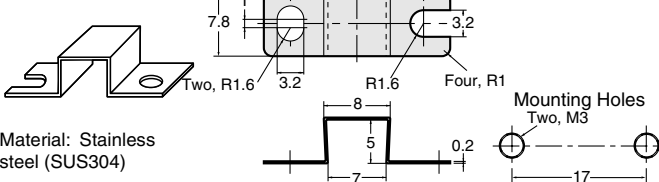
Mounting Brackets

Y92E-D1R6



Mounting Brackets

Y92E-D2R5



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.