

Miniature Square Inductive Proximity Sensor

E2S

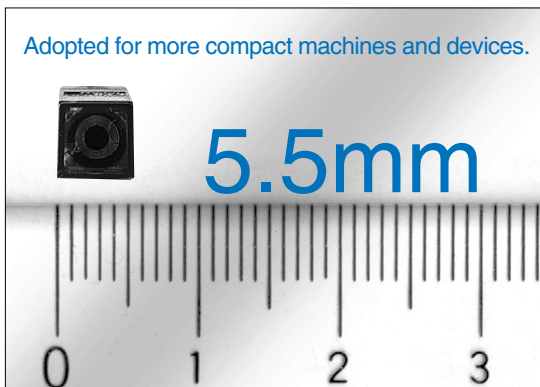
- Miniature housing with long sensing ranges
- Front and side facing sensing surfaces



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.

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)

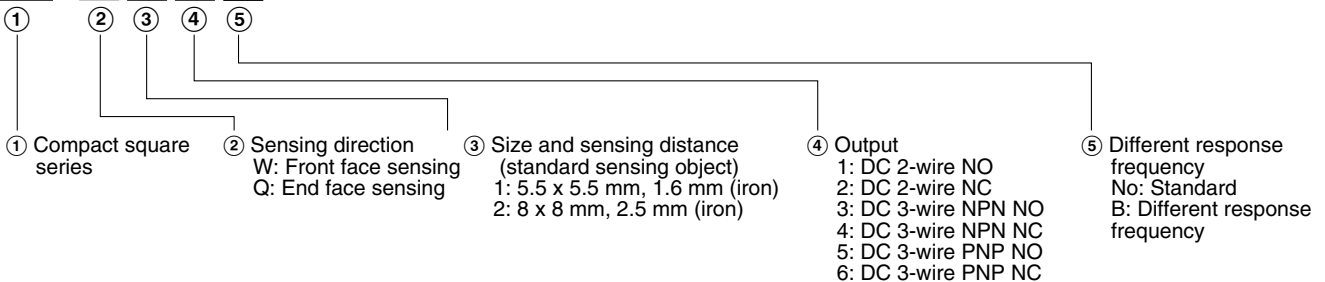
Accessories (Order Separately)

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.

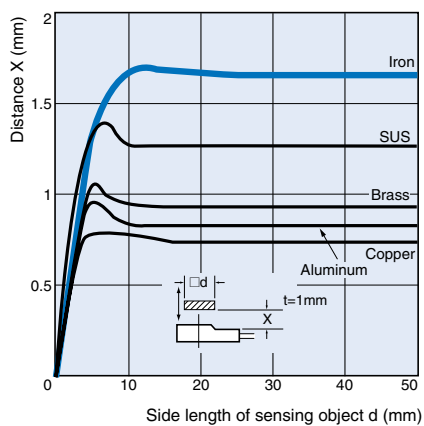
Specifications

| 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 | |

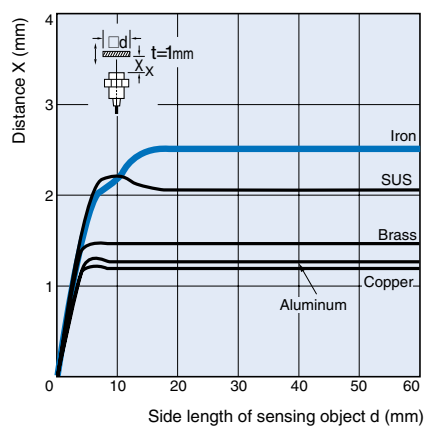
Characteristic data (typical)

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 edge of the stable sensing zone. The output signals are: Setting indicator (green) ON during the stable sensing zone; Operation indicator (red) ON during the non-sensing zone and OFF during the sensing zone; Control output ON during the non-sensing zone and OFF during the sensing zone.</p> | <p>The output circuit diagram for NO models shows a main circuit with a transistor and a diode. The output is connected to a load between the Brown (+V) and Blue (0V) terminals.</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 non-sensing zone and OFF during the sensing zone; Control output ON during the non-sensing zone and OFF during the sensing zone.</p> | <p>The output circuit diagram for NC models shows a main circuit with a transistor and a diode. The output is connected to a load between the Brown (+V) and Blue (0V) terminals.</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.</p> | <p>The output circuit diagram for NPN NO models shows a main circuit with a transistor and a diode. The output is connected to a load between the Brown (+V) and Blue (0V) terminals. 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.</p> | <p>The output circuit diagram for NPN NC models shows a main circuit with a transistor and a diode. The output is connected to a load between the Brown (+V) and Blue (0V) terminals. 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.</p> | <p>The output circuit diagram for PNP NO models shows a main circuit with a transistor and a diode. The output is connected to a load between the Brown (+V) and Blue (0V) terminals. 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.</p> | <p>The output circuit diagram for PNP NC models shows a main circuit with a transistor and a diode. The output is connected to a load between the Brown (+V) and Blue (0V) terminals. A note indicates: * Maximum load current: 50 mA.</p> |

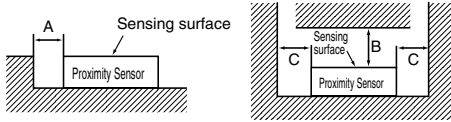
Precautions

Correct Use

Design

Effects of Surrounding Metal

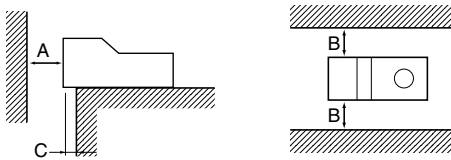
- Provide a minimum distance between the Sensor and the surrounding metal as shown in the table below.
- Front Surface Sensing Type (Not exceeding the sensor head height)



(Unit: mm)

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

- End Surface Sensing Type



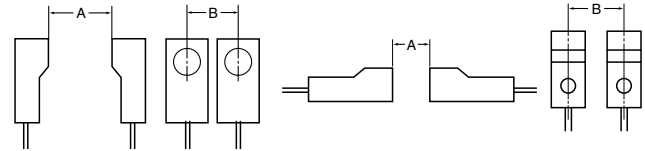
(Unit: mm)

| 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

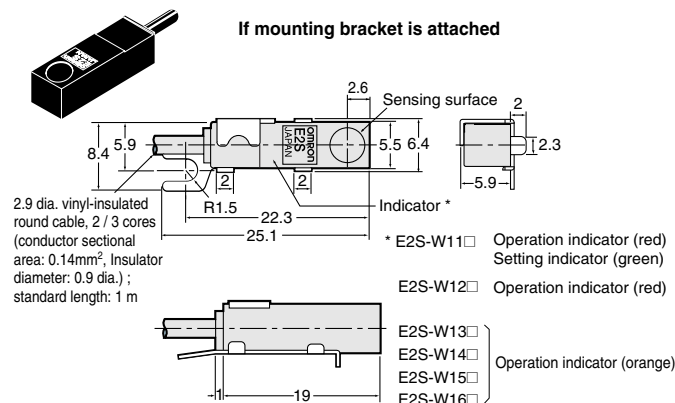
Tightening torques

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

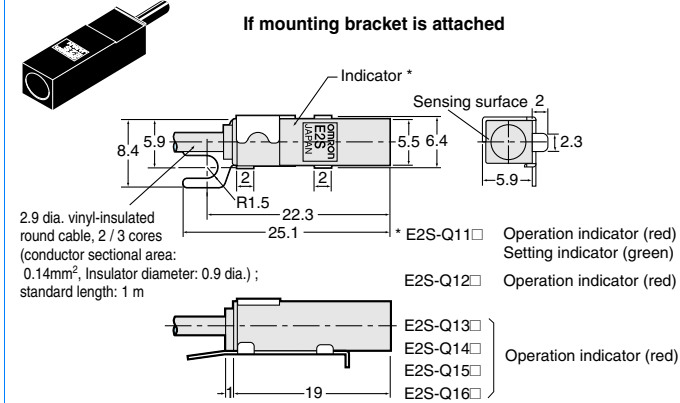
Dimensions (Unit: mm)

Sensors

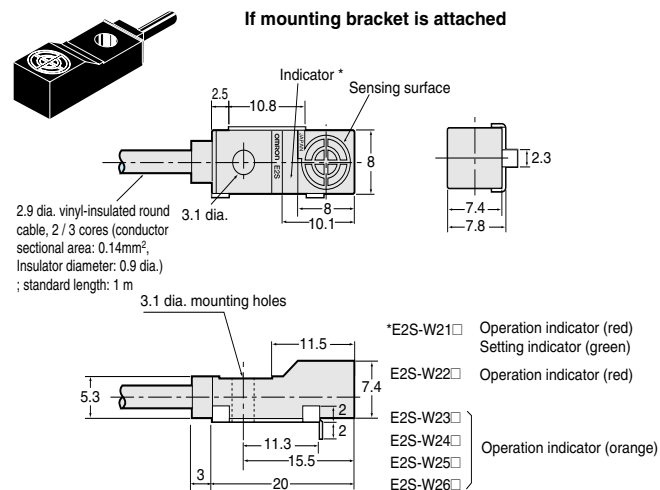
E2S-W1□



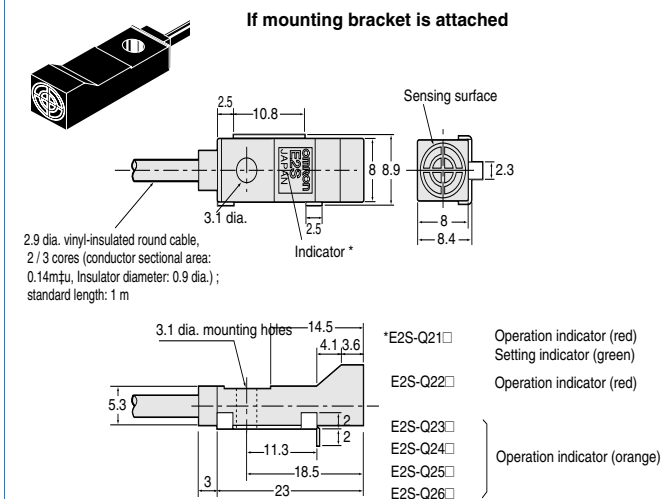
E2S-Q1□



E2S-W2□



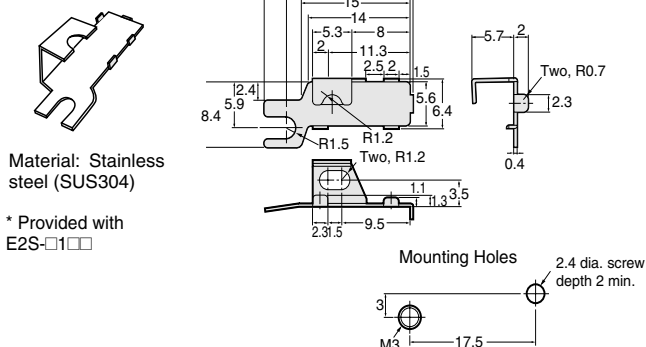
E2S-Q2□



Accessories (Order Separately*)

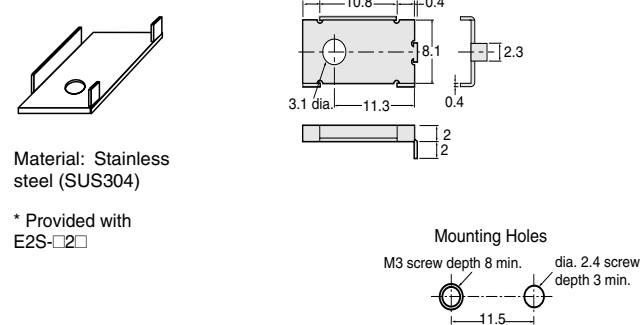
Mounting Brackets

Y92E-C1R6



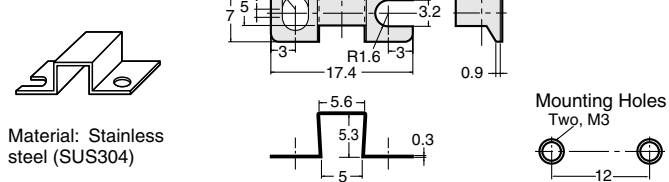
Mounting Brackets

Y92E-C2R5



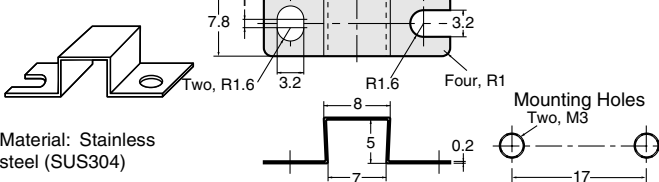
Mounting Brackets

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.