

## Advanced Performance and Wide Range of Selections in a Super-compact Size



- Only 5.5 × 5.5 mm with a built-in Amplifier.
- Maximum sensing distance: 2.5 mm. Stable detection even with workpiece fluctuations.
- Response frequency: 1 kHz.
- Low current consumption.



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



Be sure to read *Safety Precautions* on page 6.

### Ordering Information

**Sensors** [Refer to *Dimensions* on page 8.]

#### DC 2-Wire Models

| Appearance  | Sensing surface | Sensing distance | Model                  |                     |
|---|-----------------|------------------|------------------------|---------------------|
|   |                 |                  | Operation mode         |                     |
|   |                 |                  | NO                     | NC                  |
| Unshielded<br> | Top             | 1.6 mm           | E2S-W11 1M *1, 3, 4    | E2S-W12 1M *4       |
|   | Front           |                  | E2S-Q11 1M *1, 3       | E2S-Q12 1M          |
|   | Top             | 2.5 mm           | E2S-W21 1M *1, 3, 4    | E2S-W22 1M *3, 4    |
|   | Front           |                  | E2S-Q21 1M *1, 2, 3, 4 | E2S-Q22 1M *2, 3, 4 |

\*1. Models with a different frequency are also available to prevent mutual interference. The model numbers are E2S-□□□B (e.g., E2S-W11B).

\*2. Models with a different frequency are also available to prevent mutual interference. The model numbers are E2S-□□□C (e.g., E2S-Q21C).

\*3. Models are also available with robotics (bend resistant) cables. Add "-R" to the model number.(e.g., E2S-W11-R 1M)

\*4. Models are also available with M12 Pre-wired Smartclick Connector. Add "-M1TGJ 0.3M" to the model number. (e.g., E2S-W11-M1TGJ 0.3M)

#### DC 3-Wire Models

| Appearance  | Sensing surface | Sensing distance | Output configuration | Model            |               |
|---|-----------------|------------------|----------------------|------------------|---------------|
|   |                 |                  |                      | Operation mode   |               |
|   |                 |                  |                      | NO               | NC            |
| Unshielded<br> | Top             | 1.6 mm           | NPN                  | E2S-W13 1M *1 *2 | E2S-W14 1M    |
|   | Front           |                  |                      | E2S-Q13 1M *1 *2 | E2S-Q14 1M    |
|   | Top             | 2.5 mm           |                      | E2S-W23 1M *1 *2 | E2S-W24 1M *2 |
|   | Front           |                  |                      | E2S-Q23 1M *1 *2 | E2S-Q24 1M *2 |
|   | Top             | 1.6 mm           | PNP                  | E2S-W15 1M *1    | E2S-W16 1M    |
|   | Front           |                  |                      | E2S-Q15 1M *1    | E2S-Q16 1M    |
|   | Top             | 2.5 mm           |                      | E2S-W25 1M *1    | E2S-W26 1M    |
|   | Front           |                  |                      | E2S-Q25 1M *1    | E2S-Q26 1M    |

\*1. Models with a different frequency are also available to prevent mutual interference. The model numbers are E2S-□□□B (e.g., E2S-W13B).

\*2. Models are also available with robotics (bend resistant) cables. Add "-R" to the model number.(e.g., E2S-W13-R 1M)

**Accessories (Order Separately)**

**Mounting Brackets** Some Mounting Brackets are provided with the Sensor. Order other Mounting Brackets separately if required.

[Refer to *Dimensions* on page 8.]

| Appearance  | Model     | Quantity | Remarks   |
|---|-----------|----------|---|
|  | Y92E-C1R6 | 1        | Provided with E2S-□1□□.<br>(fixed with one screw) |
|  | Y92E-C2R5 |          | Provided with E2S-□2□□.<br>(fixed with one screw) |
|  | Y92E-D1R6 |          | For E2S-□1□□<br>(fixed with two screws)           |
|  | Y92E-D2R5 |          | For E2S-□2□□<br>(fixed with two screws)           |

**Model Number Legend**

E2S- □ (1) □ (2) □ (3) □ (4) □ (5) - □ (6) - □ (7)

- (1) Compact Series
- (2) Sensing Direction  
W: Top surface detection  
Q: Front surface detection
- (3) Size and Sensing Distance (Standard Sensing Object)  
1: 5.5 × 5.5 mm, 1.6 mm (iron)  
2: 8 × 8 mm, 2.5 mm (iron)
- (4) Output  
1: DC 2-wire NO  
2: DC 2-wire NC  
3: DC 3-wire NPN NO  
4: DC 3-wire NPN NC  
5: DC 3-wire PNP NO  
6: DC 3-wire PNP NC
- (5) Different Frequency  
Blank: Standard  
B/C: Different frequency
- (6) Connection method  
Blank: Pre-wired Model  
M1TGJ: M12 Pre-wired Smartclick Connector Model
- (7) Robotics (bend resistant) cables  
Blank: Standard  
R: Robotics (bend resistant) cables

## Ratings and Specifications

### DC 2-Wire Models

| Item   | Model            | E2S-W11<br>E2S-W12  | E2S-Q11<br>E2S-Q12 | E2S-W21<br>E2S-W22   | E2S-Q21<br>E2S-Q22 |
|--|------------------|---|--------------------|----------------------|--------------------|
| Sensing surface                                  |                  | Top   | Front              | Top                  | Front              |
| Sensing distance                                 |                  | 1.6 mm ±15%   |                    | 2.5 mm ±15%          |                    |
| Set distance                                     |                  | 0 to 1.2 mm   |                    | 0 to 1.9 mm          |                    |
| Differential travel                              |                  | 10% max. of sensing distance  |                    |                      |                    |
| Detectable object                                |                  | Ferrous metal (The sensing distance decreases with non-ferrous metal. Refer to <i>Engineering Data</i> on page 4.)  |                    |                      |                    |
| Standard sensing object                          |                  | Iron, 12 × 12 × 1 mm  |                    | Iron, 15 × 15 × 1 mm |                    |
| Response frequency *                             |                  | 1 kHz min.  |                    |                      |                    |
| Power supply voltage (operating voltage range)   |                  | 12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max.   |                    |                      |                    |
| Leakage current                                  |                  | 0.8 mA max.   |                    |                      |                    |
| Control output                                   | Load current     | 3 to 50 mA max.   |                    |                      |                    |
|  | Residual voltage | 3 V max. (under load current of 50 mA with cable length of 1 m)   |                    |                      |                    |
| Indicators                                       |                  | <input type="checkbox"/> 1 Models: Operation indicator (orange), Setting indicator (green)<br><input type="checkbox"/> 2 Models: Operation indicator (orange)         |                    |                      |                    |
| Operation mode (with sensing object approaching) |                  | <input type="checkbox"/> 1 Models: NO<br><input type="checkbox"/> 2 Models: NC<br>Refer to the timing charts under <i>I/O Circuit Diagrams</i> on page 5 for details. |                    |                      |                    |
| Protection circuits                              |                  | Output short-circuit protection, Surge suppressor   |                    |                      |                    |

\* The response frequency is an average value.

Measurement conditions are as follows: standard sensing object, a distance of twice the standard sensing object, and a set distance of half the sensing distance.

### DC 3-Wire Models

| Item   | Model            | E2S-W13<br>E2S-W14  | E2S-Q13<br>E2S-Q14 | E2S-W23<br>E2S-W24   | E2S-Q23<br>E2S-Q24 | E2S-W15<br>E2S-W16  | E2S-Q15<br>E2S-Q16 | E2S-W25<br>E2S-W26   | E2S-Q25<br>E2S-Q26 |
|--|------------------|---|--------------------|----------------------|--------------------|---|--------------------|----------------------|--------------------|
| Sensing surface                                  |                  | Top   | Front              | Top                  | Front              | Top   | Front              | Top                  | Front              |
| Sensing distance                                 |                  | 1.6 mm ±15%   |                    | 2.5 mm ±15%          |                    | 1.6 mm ±15%   |                    | 2.5 mm ±15%          |                    |
| Set distance                                     |                  | 0 to 1.2 mm   |                    | 0 to 1.9 mm          |                    | 0 to 1.2 mm   |                    | 0 to 1.9 mm          |                    |
| Differential travel                              |                  | 10% max. of sensing distance  |                    |                      |                    |   |                    |                      |                    |
| Detectable object                                |                  | Ferrous metal (The sensing distance decreases with non-ferrous metal. Refer to <i>Engineering Data</i> on page 4.)  |                    |                      |                    |   |                    |                      |                    |
| Standard sensing object                          |                  | Iron, 12 × 12 × 1 mm  |                    | Iron, 15 × 15 × 1 mm |                    | Iron, 12 × 12 × 1 mm  |                    | Iron, 15 × 15 × 1 mm |                    |
| Response frequency *                             |                  | 1 kHz min.  |                    |                      |                    |   |                    |                      |                    |
| Power supply voltage (operating voltage range)   |                  | 12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max.   |                    |                      |                    |   |                    |                      |                    |
| Current consumption                              |                  | 13 mA max. at 24 VDC (no-load)  |                    |                      |                    |   |                    |                      |                    |
| Control output                                   | Load current     | NPN open-collector output, 50 mA max. (30 VDC max.)   |                    |                      |                    | PNP open-collector output, 50 mA max. (30 VDC max.)   |                    |                      |                    |
|  | Residual voltage | 1.0 V max. (under load current of 50 mA with cable length of 1 m)   |                    |                      |                    |   |                    |                      |                    |
| Indicators                                       |                  | Operation indicator (orange)  |                    |                      |                    |   |                    |                      |                    |
| Operation mode (with sensing object approaching) |                  | <input type="checkbox"/> 3 Models: NO<br><input type="checkbox"/> 4 Models: NC<br>Refer to the timing charts under <i>I/O Circuit Diagrams</i> on page 5 for details. |                    |                      |                    | <input type="checkbox"/> 5 Models: NO<br><input type="checkbox"/> 6 Models: NC<br>Refer to the timing charts under <i>I/O Circuit Diagrams</i> on page 5 for details. |                    |                      |                    |
| Protection circuits                              |                  | Power supply reverse polarity protection, Surge suppressor  |                    |                      |                    |   |                    |                      |                    |

\* The response frequency is an average value.

Measurement conditions are as follows: standard sensing object, a distance of twice the standard sensing object, and a set distance of half the sensing distance.

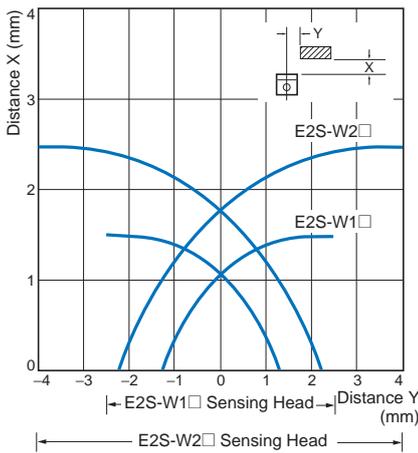
## Specifications

| Item                      | Model | E2S-□□□  |
|---------------------------|-------|--|
| Ambient temperature range |       | Operating: -25 to 70°C (with no icing or condensation), Storage: -40 to 85°C (with no icing or condensation) |
| Ambient humidity range    |       | Operating: 35% to 90% (with no condensation), Storage: 35% to 95% (with no condensation)                     |
| Temperature influence     |       | ±15% max. of sensing distance at 23°C in the temperature range of -25 to 70°C                                |
| Voltage influence         |       | ±2.5% max. of sensing distance at rated voltage in rated voltage ±10% range                                  |
| Insulation resistance     |       | 50 MΩ min. (at 500 VDC) between current-carrying parts and case  |
| Dielectric strength       |       | 1,000 VAC 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      |       | IEC 60529 IP67   |
| Connection method         |       | Pre-wired Models (Standard cable length: 1 m)  |
| Weight (packed state)     |       | Approx. 10 g   |
| Materials                 | Case  | Polyarylate resin  |
| Accessories               |       | Mounting Brackets  |

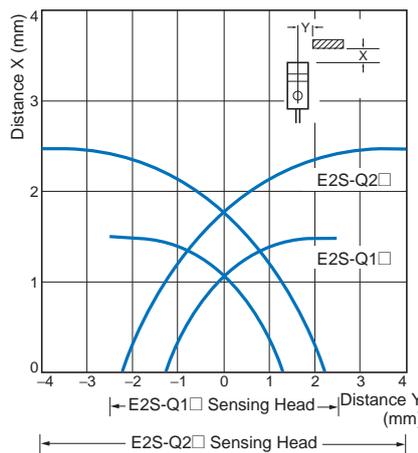
## Engineering Data (Reference Value)

### Sensing Area

E2S-W1□/-W2□

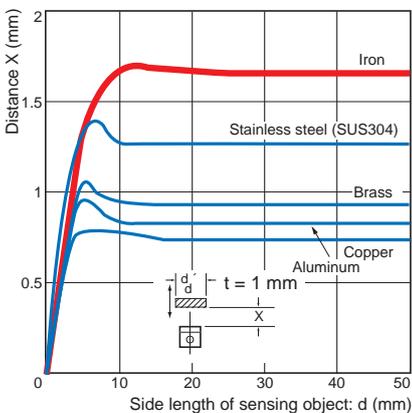


E2S-Q1□/-Q2□

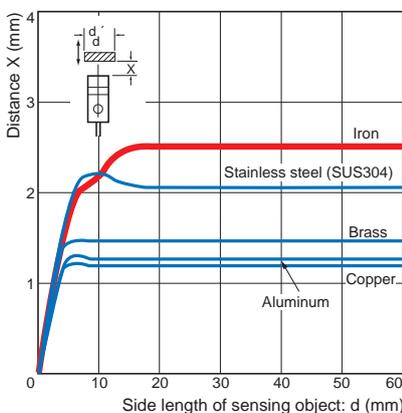


### Influence of Sensing Object Size and Material

E2S-W1□/-Q1□



E2S-W2□/-Q2□



# I/O Circuit Diagrams

## DC 2-Wire Models

| Operation mode | Model                                    | Timing chart   | Output circuit  |
|----------------|--|--|---|
| NO             | E2S-W11<br>E2S-W21<br>E2S-Q11<br>E2S-Q21 | <p>Non-sensing area   Unstable sensing area   Stable sensing area   Proximity Sensor</p> <p>Sensing object</p> <p>(%) 100 80 0</p> <p>Rated sensing distance</p> <p>ON OFF Setting indicator (green)</p> <p>ON OFF Operation indicator (orange)</p> <p>ON OFF Control output</p> | <p>Proximity Sensor main circuit</p> <p>Brown Load +V</p> <p>Blue 0 V</p> |
| NC             | E2S-W12<br>E2S-W22<br>E2S-Q12<br>E2S-Q22 | <p>Non-sensing area   Sensing area   Proximity Sensor</p> <p>Sensing object</p> <p>(%) 100 0</p> <p>Rated sensing distance</p> <p>ON OFF Operation indicator (orange)</p> <p>ON OFF Control output</p>   | <p>Note: The load can be connected to either the +V or 0 V side.</p>      |

## DC 3-Wire Models

| Operation mode | Output configuration | Model                                    | Timing chart  | Output circuit  |
|----------------|----------------------|--|---|---|
| NO             | NPN                  | E2S-W13<br>E2S-W23<br>E2S-Q13<br>E2S-Q23 | <p>Sensing object Present Not present</p> <p>Output transistor (load) ON OFF</p> <p>Operation indicator (orange) ON OFF</p> | <p>Proximity Sensor main circuit</p> <p>Brown +V</p> <p>Black Output Load</p> <p>Blue 0 V</p> <p>* Load current: 50 mA max.</p> |
| NC             |                      | E2S-W14<br>E2S-W24<br>E2S-Q14<br>E2S-Q24 | <p>Sensing object Present Not present</p> <p>Output transistor (load) ON OFF</p> <p>Operation indicator (orange) ON OFF</p> |   |
| NO             | PNP                  | E2S-W15<br>E2S-W25<br>E2S-Q15<br>E2S-Q25 | <p>Sensing object Present Not present</p> <p>Output transistor (load) ON OFF</p> <p>Operation indicator (orange) ON OFF</p> | <p>Proximity Sensor main circuit</p> <p>Brown +V</p> <p>Black Output Load</p> <p>Blue 0 V</p> <p>* Load current: 50 mA max.</p> |
| NC             |                      | E2S-W16<br>E2S-W26<br>E2S-Q16<br>E2S-Q26 | <p>Sensing object Present Not present</p> <p>Output transistor (load) ON OFF</p> <p>Operation indicator (orange) ON OFF</p> |   |

## Safety Precautions

Be sure to read the precautions for all models in the website at: <http://www.ia.omron.com/>.

### Warning Indications

|                                    |  |
|------------------------------------|--|
| <b>⚠ WARNING</b>                   | <b>Warning level</b><br>Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage. |
| <b>Precautions for Safe Use</b>    | Supplementary comments on what to do or avoid doing, to use the product safely.  |
| <b>Precautions for Correct Use</b> | Supplementary comments on what to do or avoid doing, to prevent failure to operate, malfunction or undesirable effect on product performance.  |

### Meaning of Product Safety Symbols

|  |  |
|--|--|
|  | <b>General prohibition</b><br>Indicates the instructions of unspecified prohibited action.     |
|  | <b>Caution, explosion</b><br>Indicates the possibility of explosion under specific conditions. |

**⚠ WARNING**

This product is not designed or rated for ensuring safety of persons either directly or indirectly. Do not use it for such purposes.

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Otherwise, explosion may result. Never use the product with an AC power supply.

**Precautions for Safe Use**

The following precautions must be observed to ensure safe operation.

- Do not use the product in an environment where flammable or explosive gas is present.
- Do not attempt to disassemble, repair, or modify the product.
- Do not use a voltage that exceeds the rated operating voltage range. Applying a voltage that is higher than the operating voltage range may result in damage or burnout.
- Be sure that the power supply polarity and other wiring is correct. Incorrect wiring may cause explosion or burnout.
- If the power supply is connected directly without a load, the internal elements may explode or burn. Be sure to insert a load when connecting the power supply.
- Dispose of the product according to applicable regulations (laws).

**Precautions for Correct Use**

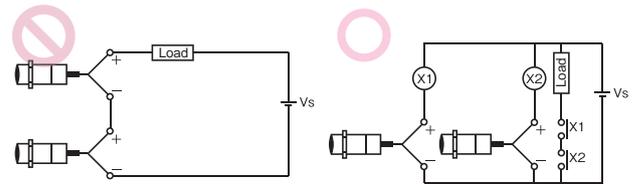
Do not use this product under ambient conditions that exceed the ratings.

#### Operating Environment

- Do not install the product in the following locations. Doing so may result in product failure or malfunction.
  - Outdoor locations directly subject to sunlight, rain, snow, water droplets, or oil.
  - Locations subject to atmospheres with chemical vapors, in particular solvents and acids.
  - Locations subject to corrosive gases.
- The Sensor may malfunction if used near ultrasonic cleaning equipment, high-frequency equipment, transceivers, cellular phones, inverters, or other devices that generate a high-frequency electric field. Please refer to the Precautions for Correct Use on the OMRON website ([www.ia.omron.com](http://www.ia.omron.com)) for typical measures.
- Laying the Proximity Sensor wiring in the same conduit or duct as high-voltage wires or power lines may result in incorrect operation and damage due to induction. Wire the Sensor using a separate conduit or independent conduit.
- Never use thinner or other solvents. Otherwise, the Sensor surface may be dissolved.

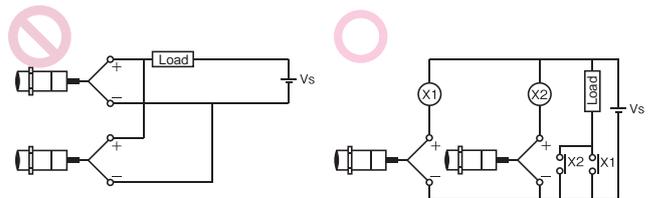
#### AND Connection of Proximity Sensors (DC 2-Wire)

Two or more sensors cannot be connected in series on the AND circuit. Use them via a relay as shown on the figure.



#### OR Wiring of Proximity Sensors (DC 2-Wire)

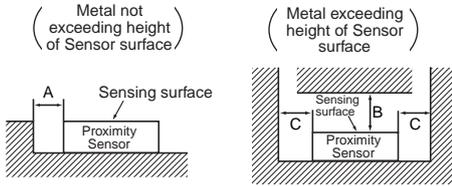
As a general principle, two or more sensors cannot be used in parallel on the OR circuit. It is possible only when sensors do not operate simultaneously and loads do not need to be maintained. When loads need to be maintained, use the sensors via a relay as shown on the figure.



● Design

**Influence of Surrounding Metal**

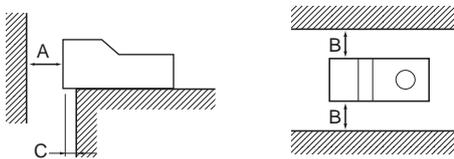
- When mounting the Sensor within a metal panel, ensure that the clearances given in the following table are maintained. Failure to maintain these distances may cause deterioration in the performance of the Sensor.
- Models with Top Sensing Surface



(Unit: mm)

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

- Models with Front Sensing Surface



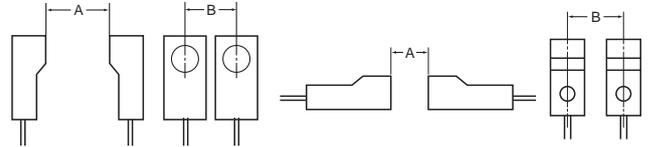
(Unit: mm)

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

**Mutual Interference**

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

- Models with Top Sensing Surface
- Models with Front Sensing Surface



(Unit: mm)

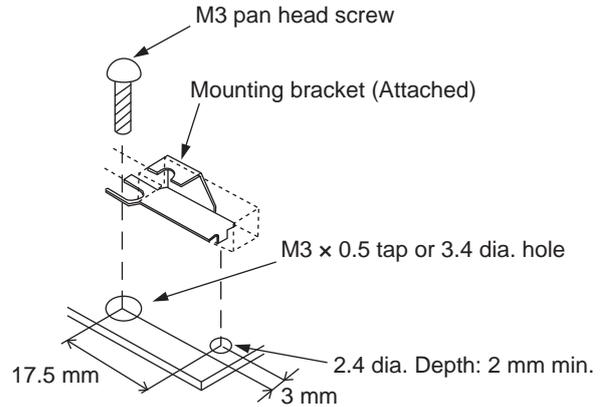
| Model      | Distance | A          | B               |
|------------|----------|------------|-----------------|
| E2S-W(Q)1□ |          | 50 (40) *1 | 20 (5.5) *1, *2 |
| E2S-W(Q)2□ |          | 75 (50) *1 | 25 (8) *1, *2   |

\*1. Values in parentheses apply to Sensors operating at different frequencies.  
\*2. Mutual interference will not occur for close-proximity mounting if models with different frequencies are used together.

● Mounting

**E2S-W1/Q1**

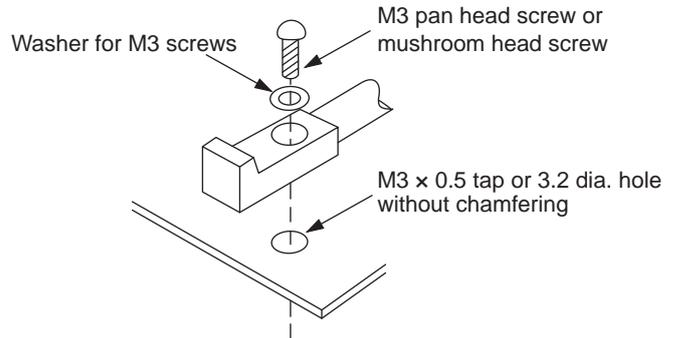
Please use the set distance within 1.2 mm.



**E2S-W2/Q2**

When mounting with screw, use washers and use a tightening torque of 0.7 N-m or less.

Please use the set distance within 1.9 mm.



**Applicable e-CON Connector Models and Manufacturers**

The companies and model number of e-CON connections that can be used with Sensor cables are listed in the following table. Confirm applicability when purchasing e-CON connectors for connection to Pre-wired Sensors.

| Model     | Applicable e-CON Connector     | Manufacturer |
|-----------|--------------------------------|--------------|
| E2S-W□3/4 | XN2A-1470 Cable Plug Connector | OMRON        |
| E2S-Q□3/4 |                                |              |

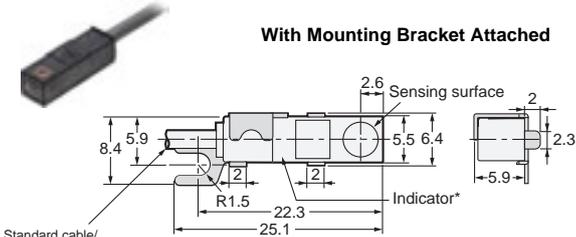
Dimensions

(Unit: mm)  
Tolerance class IT16 applies to dimensions in this data sheet unless otherwise specified.

Sensors

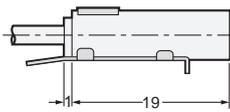
E2S-W1□

With Mounting Bracket Attached



Standard cable/  
Robot (bending-resistant) cable  
2.9-dia. vinyl-insulated round cable  
Standard length: 1 m  
2 conductors  
(Conductor cross section: 0.15 mm<sup>2</sup>, Insulator diameter: 0.9 mm)  
3 conductors  
(Conductor cross section: 0.15 mm<sup>2</sup>, Insulator diameter: 1.05 mm)

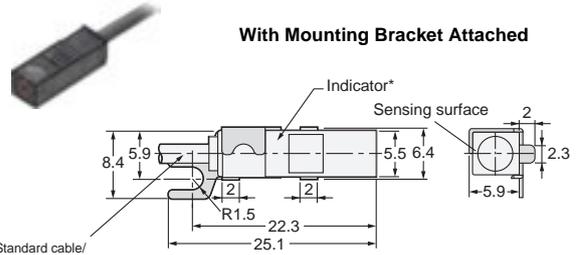
\*E2S-W11□ Operation indicator (orange), Setting indicator (green)



E2S-W12□ Operation indicator (orange)  
E2S-W13□ Operation indicator (orange)  
E2S-W14□ Operation indicator (orange)  
E2S-W15□ Operation indicator (orange)  
E2S-W16□ Operation indicator (orange)

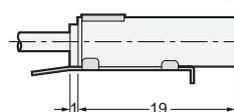
E2S-Q1□

With Mounting Bracket Attached



Standard cable/  
Robot (bending-resistant) cable  
2.9-dia. vinyl-insulated round cable  
Standard length: 1 m  
2 conductors  
(Conductor cross section: 0.15 mm<sup>2</sup>, Insulator diameter: 0.9 mm)  
3 conductors  
(Conductor cross section: 0.15 mm<sup>2</sup>, Insulator diameter: 1.05 mm)

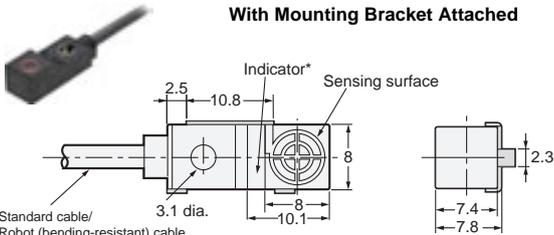
\*E2S-Q11□ Operation indicator (orange), Setting indicator (green)



E2S-Q12□ Operation indicator (orange)  
E2S-Q13□ Operation indicator (orange)  
E2S-Q14□ Operation indicator (orange)  
E2S-Q15□ Operation indicator (orange)  
E2S-Q16□ Operation indicator (orange)

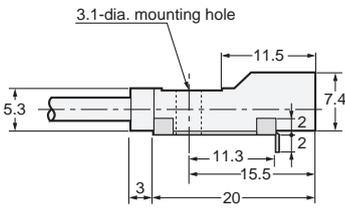
E2S-W2□

With Mounting Bracket Attached



Standard cable/  
Robot (bending-resistant) cable  
2.9-dia. vinyl-insulated round cable  
Standard length: 1 m  
2 conductors  
(Conductor cross section: 0.15 mm<sup>2</sup>, Insulator diameter: 0.9 mm)  
3 conductors  
(Conductor cross section: 0.15 mm<sup>2</sup>, Insulator diameter: 1.05 mm)

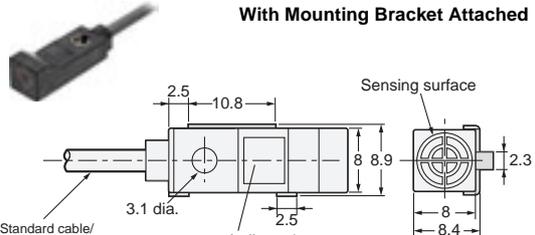
\*E2S-W21□ Operation indicator (orange), Setting indicator (green)



E2S-W22□ Operation indicator (orange)  
E2S-W23□ Operation indicator (orange)  
E2S-W24□ Operation indicator (orange)  
E2S-W25□ Operation indicator (orange)  
E2S-W26□ Operation indicator (orange)

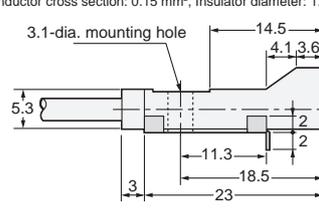
E2S-Q2□

With Mounting Bracket Attached



Standard cable/  
Robot (bending-resistant) cable  
2.9-dia. vinyl-insulated round cable  
Standard length: 1 m  
2 conductors  
(Conductor cross section: 0.15 mm<sup>2</sup>, Insulator diameter: 0.9 mm)  
3 conductors  
(Conductor cross section: 0.15 mm<sup>2</sup>, Insulator diameter: 1.05 mm)

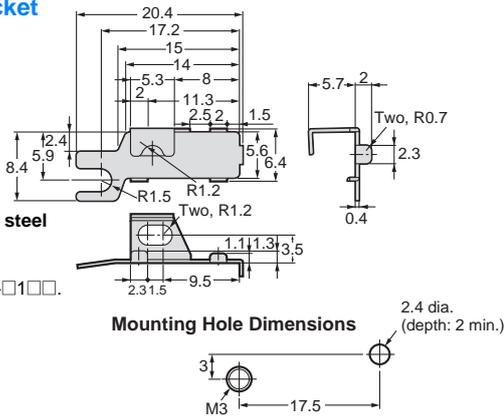
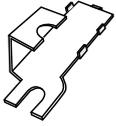
\*E2S-Q21□ Operation indicator (orange), Setting indicator (green)



E2S-Q22□ Operation indicator (orange)  
E2S-Q23□ Operation indicator (orange)  
E2S-Q24□ Operation indicator (orange)  
E2S-Q25□ Operation indicator (orange)  
E2S-Q26□ Operation indicator (orange)

Accessories (Order Separately)

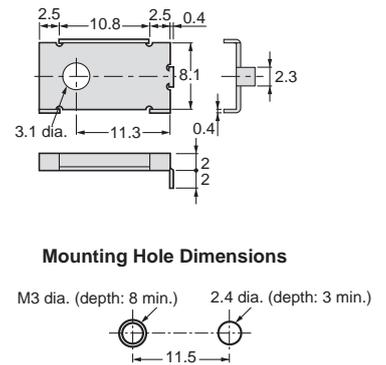
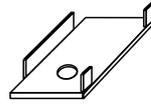
**Mounting Bracket**  
Y92E-C1R6



Material: Stainless steel (SUS304)

\*Provided with E2S-□1□□.

**Mounting Bracket**  
Y92E-C2R5

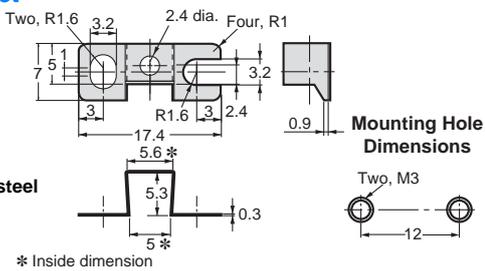
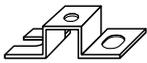


Material: Stainless steel (SUS304)

\* Provided with E2S-□2□□.

Mounting Hole Dimensions

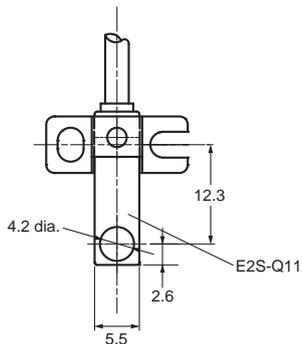
**Mounting Bracket**  
Y92E-D1R6



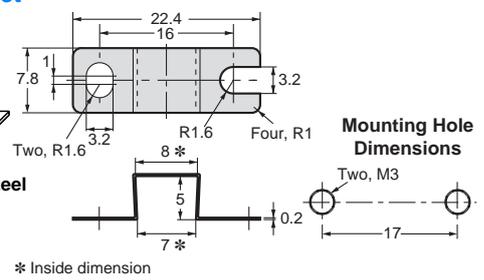
Material: Stainless steel (SUS304)

\* Inside dimension

Photoelectric Sensor  
Accessory is installed  
(Example of E2S-Q11)



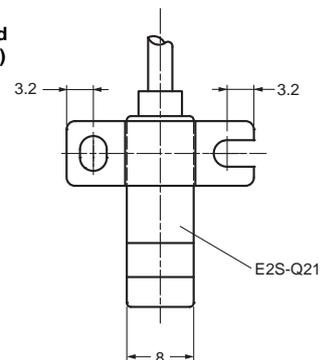
**Mounting Bracket**  
Y92E-D2R5



Material: Stainless steel (SUS304)

\* Inside dimension

Photoelectric Sensor  
Accessory is installed  
(Example of E2S-Q21)



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