

## 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.




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



### Ordering Information


#### Sensors

##### DC 2-Wire Models

Appearance	Sensing surface	Sensing distance	Model	
			Operation mode	
			NO	NC
Unshielded 	Top	1.6 mm	E2S-W11 *	E2S-W12
	Front		E2S-Q11 *	E2S-Q12
	Top	2.5 mm	E2S-W21 *	E2S-W22
	Front		E2S-Q21 *	E2S-Q22

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





##### DC 3-Wire Models

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

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

## Accessories (Order Separately)

### Mounting Brackets \*

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

\* Refer to page 8 for mounting dimensions.

## Model Number Legend

E2S - □ □ □ □

(1) (2) (3) (4) (5)

(1) Compact  
Square  
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, 2.5mm (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: Different frequency

## Ratings and Specifications

### DC 2-Wire Models

Item	Model	E2S-W11 E2S-W12	E2S-Q11 E2S-Q12	E2S-W21 E2S-W22	E2S-Q21 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 1m)			
Indicators		<input type="checkbox"/> <input type="checkbox"/> 1 Models: Operation indicator (red), Setting indicator (green) <input type="checkbox"/> <input type="checkbox"/> 2 Models: Operation indicator (red)			
Operation mode (with sensing object approaching)		<input type="checkbox"/> <input type="checkbox"/> 1 Models: NO <input type="checkbox"/> <input type="checkbox"/> 2 Models: NC Refer to the timing charts under <i>I/O Circuit Diagrams</i> on page 5 for details.			

\* 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 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		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"/> <input type="checkbox"/> 3 Models: NO <input type="checkbox"/> <input type="checkbox"/> 4 Models: NC Refer to the timing charts under <i>I/O Circuit Diagrams</i> on page 5 for details.				<input type="checkbox"/> <input type="checkbox"/> 5 Models: NO <input type="checkbox"/> <input type="checkbox"/> 6 Models: NC Refer to the timing charts under <i>I/O Circuit Diagrams</i> on page 5 for details.			

\* 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.

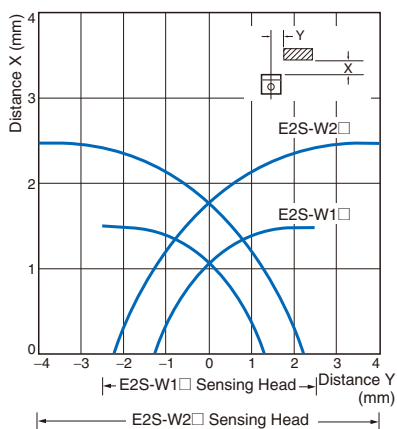
## Specifications

Item	Model	E2S-□□□
Protection circuits		Reverse polarity protection, Surge suppressor
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: 1m)
Weight (packed state)		Approx. 10 g
Materials	Case	Polyarylate resin
Accessories		Mounting Brackets

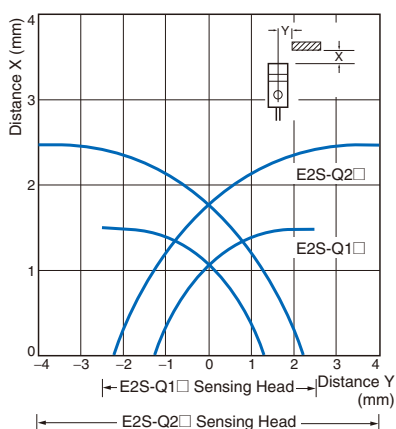
## Engineering Data (Typical)

### Sensing Area

E2S-W1□/-W2□

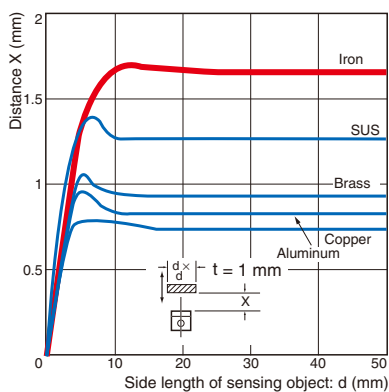


E2S-Q1□/-Q2□

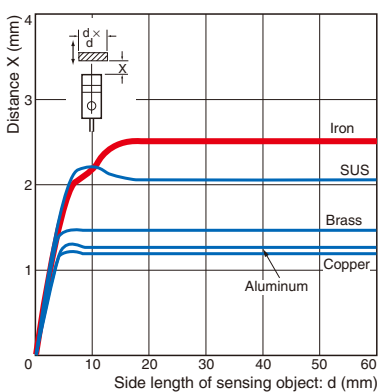


### Influence of Sensing Object Size and Material

E2S-W1□/-Q1□



E2S-W2□/-Q2□



# I/O Circuit Diagrams

## DC 2-Wire Models

Operation mode	Model	Timing chart	Output circuit
NO	E2S-W11 E2S-W21 E2S-Q11 E2S-Q21	<p>Non-sensing area    Unstable sensing area    Stable sensing area</p> <p>Sensing object</p> <p>(%)    100    80    0</p> <p>Rated sensing distance</p> <p>Proximity Sensor</p> <p>ON    OFF    Setting indicator (green)</p> <p>ON    OFF    Operation indicator (red)</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 E2S-W22 E2S-Q12 E2S-Q22	<p>Non-sensing area    Sensing area</p> <p>Sensing object</p> <p>(%)    100    0</p> <p>Rated sensing distance</p> <p>Proximity Sensor</p> <p>ON    OFF    Operation indicator (red)</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 E2S-W23 E2S-Q13 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</p> <p>Blue 0 V</p> <p>* Load current: 50 mA max.</p>
NC		E2S-W14 E2S-W24 E2S-Q14 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 E2S-W25 E2S-Q15 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</p> <p>Blue 0 V</p> <p>* Load current: 50 mA max.</p>
NC		E2S-W16 E2S-W26 E2S-Q16 E2S-Q26	<p>Sensing object    Present    Not present</p> <p>Output transistor (load)    ON    OFF</p> <p>Operation indicator (orange)    ON    OFF</p>	

