E3S-GS/VS

CSM_E3S-GS_VS_DS_E_2_1

Both Red-light Models and Green-light Models to Detect a Wide Variety of Colors

Be sure to read *Safety Precautions* on page 5.

Ordering Information

Small Spot/Mark Sensor with Built-in Amplifier

Red light Green light

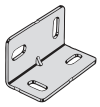
Sensing method	Appearance	Connection method	Sensing distance	Model	
				NPN Voltage output type	PNP Open collector output type
Grooved-type		Pre-wired	10 mm	**E3S-GS1E4**	**E3S-GS1B4**
Diffuse-reflective	Horizontal 		12±2 mm	**E3S-VS1E4**	**E3S-VS1B4**
	Vertical 		12±2 mm	**E3S-VS1E42**	**E3S-VS1B42**
			35±3 mm	**E3S-VS3E42G**	---
			30 to 50 mm	**E3S-VS5E42R**	**E3S-VS5B42R**

Accessories (Order Separately)

Sensitivity Adjuster

Model	Quantity	Remarks
E39-G1	1	Provided with the E3S-GS1E4 Grooved-type and E3S-V□□□□□ Diffuse-reflective Sensors.

Mounting Brackets

Appearance	Model	Quantity	Remarks
	**E39-L6**	1	Provided with the E3S-VS1E4□ Diffuse-reflective Sensors.
	**E3S-ZL3**	1	Provided with the E3S-VS3E42G and E3S-VS5E42R Diffuse-reflective Sensors.

Note: If a Through-beam Sensor is used, order two Mounting Brackets, one for the Emitter and one for the Receiver.

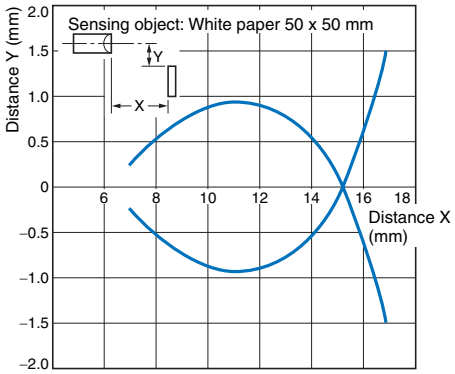
Ratings and Specifications

Item \ Sensing method		Grooved-type	Diffuse-reflective		
Item \ Model		E3S-GS1□4	E3S-VS1□4(2)	E3S-VS3E42G	E3S-VS5□42R
Sensing distance		10 mm	12±2 mm (white paper 30 × 30 mm)	35±3 mm (white paper 30 × 30 mm)	30 to 50 mm (white paper 30 × 30 mm)
Standard sensing object		Opaque:6-mm dia. min.	---		
Minimum detectable object		2 × 3 mm min. (black mark on transparent sheet)	2 × 2 mm min. (black mark on white)	3 × 3 mm min. (black mark on white)	3.5 × 3.5 mm min. (black mark on white)
Differential travel		---	20% max. of sensing distance		
Light source (wavelength)		Green LED (565 nm)			Red LED (680 nm)
Power supply voltage		12 to 24 VDC, including ripple (p-p) 10% max.			
Current consumption		40 mA max.			
Control output	Voltage output type	Load power supply voltage: 24 VDC max., Load current: 80 mA max., output current 1.5 to 4 mA (residual voltage: 2 V max.) NPN voltage output, Light-ON/Dark-ON cable connection selectable			
	Open collector output type	Load power supply voltage: 24 VDC max., Load current: 80 mA max. (residual voltage: 2 V max.) PNP Open-collector output, Light-ON/Dark-ON cable connection selectable			
Protection circuits		Power supply reverse polarity protection, Output short-circuit protection, Mutual interference prevention			
Response time		Operation or reset: 1 ms max.		Operation or reset: 5 ms max.	Operation or reset: 1 ms max.
Sensitivity adjustment		One-turn adjuster			
Ambient illumination (Receiver side)		Incandescent lamp: 3,000 lx max. Sunlight: 10,000 lx max.		Incandescent lamp: 1,000 lx max. Sunlight: 3,000 lx max.	Incandescent lamp: 3,000 lx max. Sunlight: 10,000 lx max.
Ambient temperature		Operating: –25°C to 55°C, Storage: –40°C to 70°C (with no icing or condensation)			
Ambient humidity		Operating: 35% to 85%, Storage: 35% to 95% (with no condensation)			
Insulation resistance		20 MΩ min. at 500 VDC			
Dielectric strength		1,000 VAC, 50/60 Hz for 1 min			
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)		Destruction: 500 m/s^2, 3 times each in X, Y, and Z directions			
Degree of protection		IEC IP65	IEC IP67		
Connection method		Pre-wired (standard length: 2 m)			
Weight (packed state)		Approx.130 g	Approx.170 g	Approx. 190 g	
Material	Case	ABS	Zinc die-cast		
	Lens	Polycarbonate		Glass	
	Display window	Polycarbonate			
Accessories		Adjustment screwdriver, Sensitivity adjuster, Instruction sheet	Mounting bracket (with screws), Adjustment screwdriver, Sensitivity adjuster, Instruction sheet		

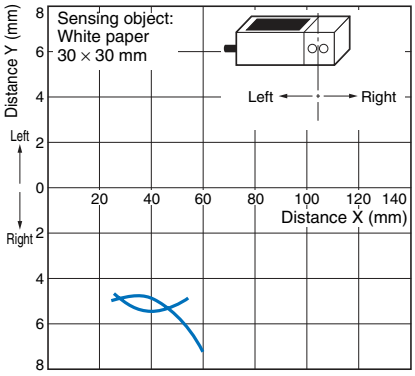
Engineering Data (Typical)

Operating Range

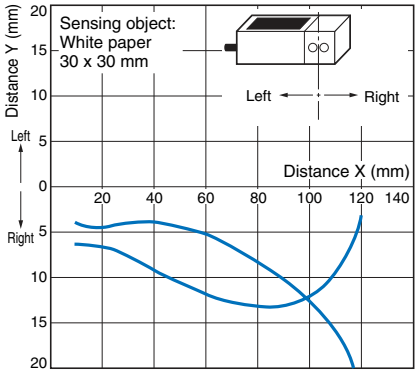
Diffuse-reflective Sensors
E3S-VS1□4(2)



Diffuse-reflective Sensors
E3S-VS3E42G

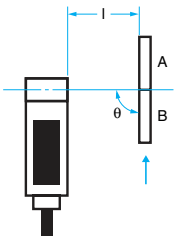


Diffuse-reflective Sensors
E3S-VS5□42R



Color Detection Capabilities

Measurement Method



Colors

Black	CM479	N1.1
Navy blue	CM344	1.5PB 2.3/7.3
Blue	CM341	4PB 4.3/14.4
Green	CM242	7G 3.9/15.2
Yellow	CM128	6Y 8.4/13.0
Orange	CM85	4.5YR 6.7/13.9
Red	CM10	6R 4.4/16.3
Purple	CM379	5P 5.0/10.0

Note: The amount of surface gloss will affect the detection capability. The tables on the right represent typical examples.

E3S-VS3E42G l = 35 mm θ = 90°

	Black	Silver	Red	Orange	Yellow	Green	Blue	Navy blue	Purple	White
Black		❍	❍	❍	❍	❍	×	×	❍	❍
Silver	❍		❍	×	×	❍	❍	❍	❍	×
Red	❍	❍		×	×	×	×	×	×	❍
Orange	❍	×	×		×	❍	❍	❍	×	❍
Yellow	❍	×	×	×		❍	❍	❍	×	×
Green	❍	❍	×	❍	❍		×	×	×	❍
Blue	×	❍	×	❍	❍	×		×	×	❍
Navy blue	×	❍	×	❍	❍	×	×		×	❍
Purple	❍	❍	×	×	×	×	×	×		❍
White	❍	❍	❍	❍	×	❍	❍	❍	❍	

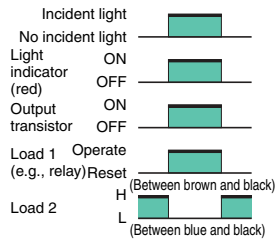
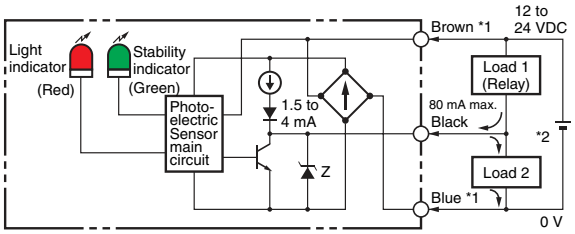
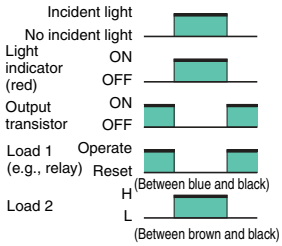
E3S-VS5E42R l = 50 mm θ = 100 to 105°

	Black	Silver	Red	Orange	Yellow	Green	Blue	Navy blue	Purple	White
Black		❍	❍	❍	❍	×	×	×	❍	❍
Silver	❍		×	×	×	❍	❍	❍	×	×
Red	❍	×		×	×	❍	❍	❍	×	×
Orange	❍	×	×		×	❍	❍	❍	×	×
Yellow	❍	×	×	×		❍	❍	❍	×	×
Green	×	❍	❍	❍	❍		×	×	❍	❍
Blue	×	❍	❍	❍	❍	×		×	❍	❍
Navy blue	×	❍	❍	❍	❍	×	×		❍	❍
Purple	❍	×	×	×	×	❍	❍	❍		❍
White	❍	×	×	×	×	❍	❍	❍	❍	

❍: Capable of detection
×: Not capable of detection

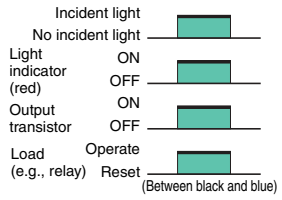
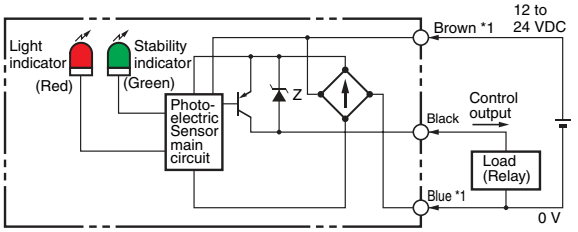
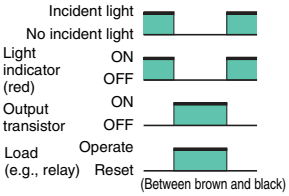
I/O Circuit Diagrams

NPN Output

Model	Operation mode *1	Timing charts	Connection method	Output circuit
E3S-GS1E4 E3S-VS1E4 E3S-VS1E42 E3S-VS3E42G E3S-VS5E42R	Light-ON		Brown cable: +V Blue cable: 0 V	
	Dark-ON		Brown cable: 0 V Blue cable: + V	

*1. Invert the connection to switch between Light-ON and Dark-ON.
*2. Voltage output (when connecting a transistor circuit, etc.)

PNP Output

Model	Operation mode *	Timing charts	Connection method	Output circuit
E3S-GS1B4 E3S-VS1B4 E3S-VS1B42 E3S-VS5B42R	Light-ON		Brown cable: +V Blue cable: 0 V	
	Dark-ON		Brown cable: 0 V Blue cable: + V	

*Invert the connection to switch between Light-ON and Dark-ON.

Safety Precautions

⚠ WARNING

This product is not designed or rated for ensuring safety of persons. Do not use it for such purpose.

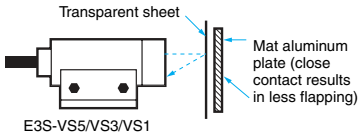
Precautions for Correct Use

Do not use the product in atmospheres or environments that exceed product ratings.

● **Mounting**

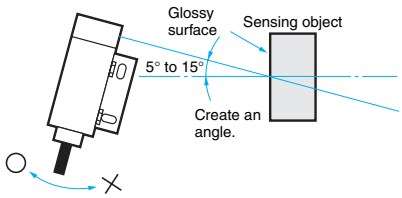
Marks on Transparent Sheets

- To detect marks on transparent sheets, place a reflective object underneath where the mark passes.



Maintaining Smooth Detection

- The Sensor may not function properly if the sensing object has a metallic or shiny surface. If this is the case, make sure that the Sensor is not perpendicular to the sensing object. This will help to correctly identify colors (especially for E3S-VS5).



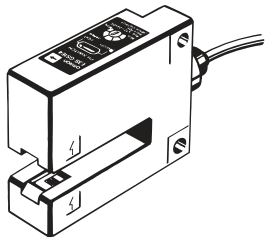
(Unit: mm)

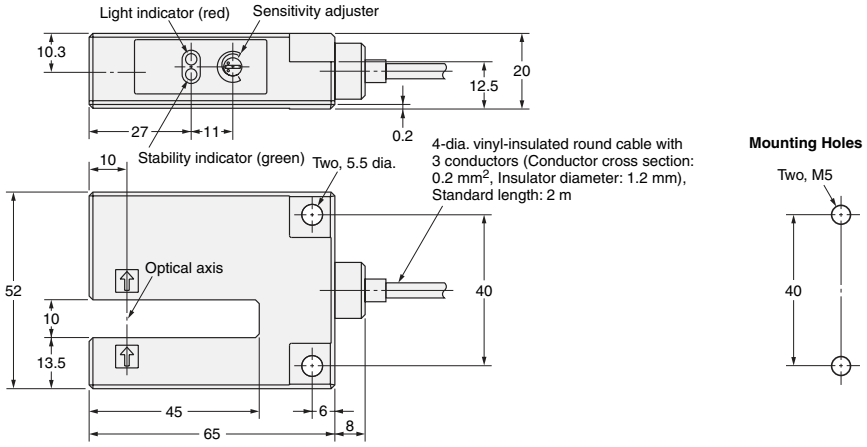
Dimensions

Unless otherwise specified, the tolerance class IT16 is used for dimensions in this data sheet.

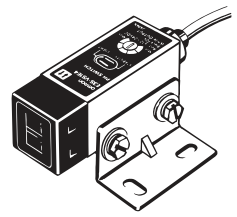
Sensor with Built-in Amplifier

E3S-GS1□4

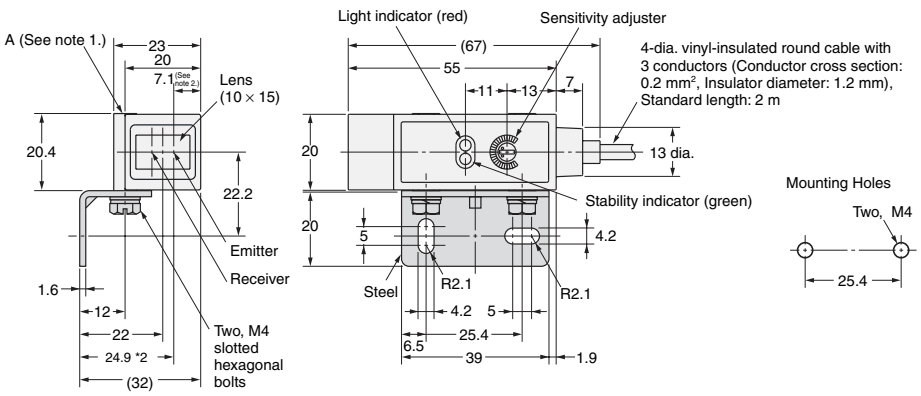




E3S-VS1□4



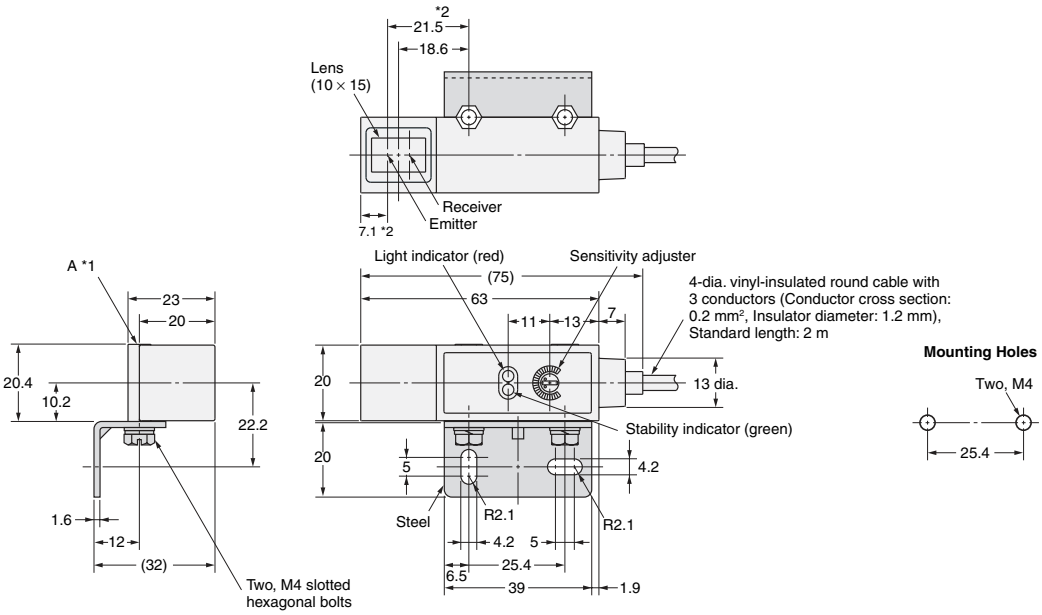
With Mounting Bracket Attached



*1.The mounting bracket can be attached to side A.
*2. Shows the spot position of E3S-VS1E4.

E3S-VS1□42

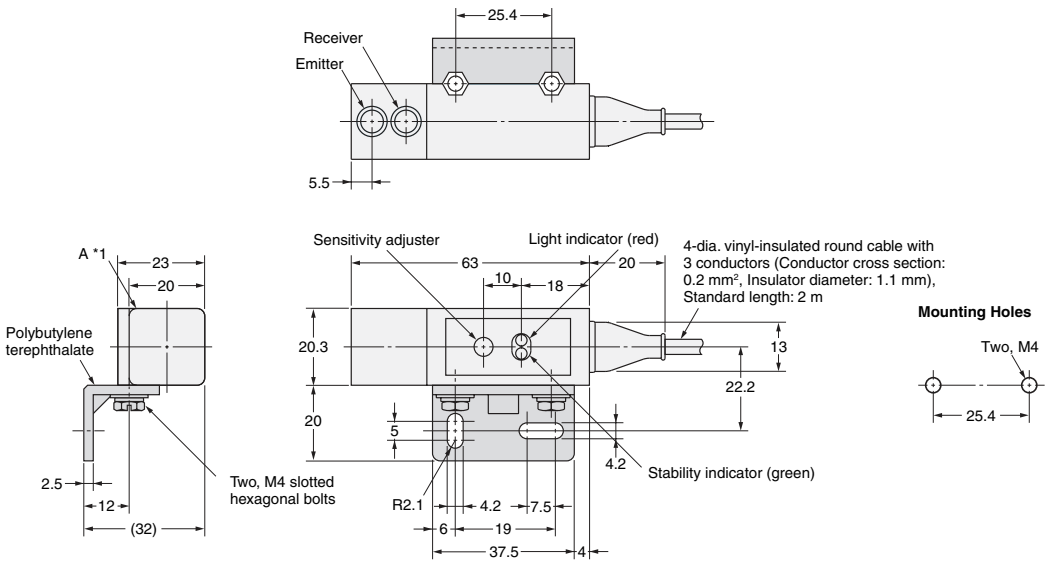
With Mounting Bracket Attached



*1. The mounting bracket can be attached to side A.
*2. Shows the spot position of E3S-VS1E4.

E3S-VS3E42G
E3S-VS5□42R

With Mounting Bracket Attached

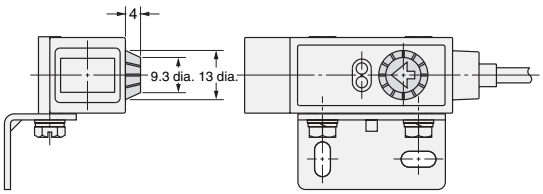


*The mounting bracket can be attached to side A.

Accessories (Order Separately)

Sensitivity Adjuster

E39-G1

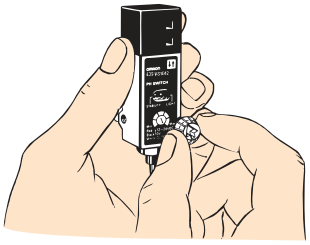


Material: Polycarbonate

*Provided with the product.

Attaching the Sensitivity Adjustment Knob

- Align the needle of the knob with the unit as shown in the figure and insert it.
- The needle cannot be removed once it has been attached.



Mounting Brackets

In the interest of product improvement, specifications are subject to change without notice.

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- Systems, machines, and equipment that could present a risk to life or property.

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