Color Mark Sensor

E3M-V

CSM_E3M-V_DS_E_4_1

Great for Irregularities and Lamination, an Easy-to-use Mark Sensor



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

Ordering Information

Sensors

Green

Appearance	Connection method	Sensing distance	Spot diameter	Model	
				NPN output	PNP output
	Connector (M12)*	10±3 mm	1 × 4 mm	**E3M-VG11**	**E3M-VG16**
			4 × 1 mm	**E3M-VG21**	**E3M-VG26**

* Switchable between vertical and horizontal directions with a rotation connector.

Accessories (Order Separately)

Mounting Brackets

Appearance	Model	Quantity	Remarks
	**E39-L131**	1	---
	**E39-L132**	1	For rear mounting

Sensor I/O Connectors

Cable	Appearance	Cable type		Model
Standard	Straight 	2 m	4-wire	**XS2F-D421-D80-A**
		5 m		**XS2F-D421-G80-A**
	L-shaped 	2 m		**XS2F-D422-D80-A**
		5 m		**XS2F-D422-G80-A**

Ratings and Specifications

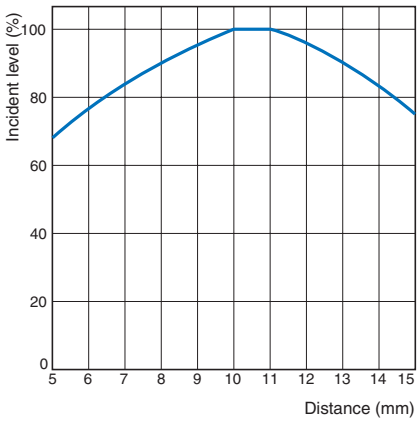
Item / Model	E3M-VG11	E3M-VG21	E3M-VG16	E3M-VG26
Sensing distance	10 ± 3 mm			
Spot size (horizontal × vertical) *4	1 × 4 mm ▮	4 × 1 mm ▬	1 × 4 mm ▮	4 × 1 mm ▬
Light source (wavelength)	Green LED (525 nm)			
Power supply voltage	10 to 30 VDC including 10% (p.p) ripple			
Current consumption	100 mA max.			
Control output	Load power supply voltage: 30 VDC max., Load current: 100 mA max. (Residual voltage: 1.2 V max.), NPN open collector output		Load power supply voltage: 30 VDC max., Load current: 100 mA max. (Residual voltage: 2 V max.), PNP open collector output	
Remote control input *1	ON: Short-circuit to 0 V or 1.5 V max. (Outflow current 1 mA max.) OFF: Open or Vcc-1.5 V to Vcc (Leakage current 0.1 mA max.)		ON: Vcc-1.5 V to Vcc (Inlet current 3 mA max.) OFF: Open or 1.5 V max. (Leakage current 0.1 mA max.)	
Remote control output *1	Load power supply voltage: 30 VDC max., Load current: 100 mA max. (Residual voltage: 1.2 V max.), NPN open collector output		Load power supply voltage: 30 VDC max., Load current: 100 mA max. (Residual voltage: 2 V max.), PNP open collector output	
Bank selection	2-bank selection (Performed by remote control only. Refer to the remote control function for details.)			
Protective circuits	Power supply reverse polarity protection, Load short-circuit protection			
Response time	ON: 50 μs max., OFF: 70 μs max.			
Sensitivity adjustment	Teaching system			
Ambient illumination (Receiver side)	Incandescent lamp: 3,000 lx max., Sunlight 10,000 lx max.			
Ambient temperature range	Operating: −20 to 55°C, Storage: −30 to 70°C (with no icing)			
Ambient humidity range	Operating: 35% to 85%, Storage: 35% to 95% (with no condensation)			
Insulation resistance	20 MΩmin. at 500 VDC			
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min			
Vibration resistance *2	Destruction: 10 to 55 Hz, 1-mm double amplitude or 150 m/s^2 for 2 hours each in X, Y and Z directions			
Shock resistance *3	Destruction: 500 m/s^2 3 times each in X, Y and Z directions			
Degree of protection	IEC 60529 IP67 (with Protective Cover attached)			
Connection method	M12 Connector			
Weight (packed state)	Approx. 100 g			
Material / **Case**	PBT (polybutylene terephthalate)			
Material / **Lens**	Mechacrylic resin			
Accessories	Instruction manual			

*1. A single cable is shared for remote control input and answer-back output.
*2. 0.75-mm double amplitude or 100 m/s^2 when using a Mounting Bracket.
*3. 300 m/s^2 when using a Mounting Bracket.
*4. The spot size is measured with the light emitter facing forward and the Sensor body standing vertically.

Engineering Data (Typical)

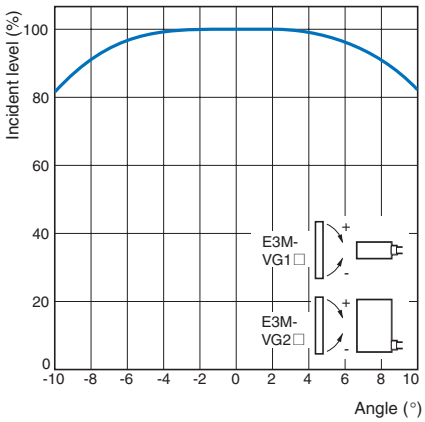
Sensing Distance vs Incident Level Characteristics

E3M-VG1□



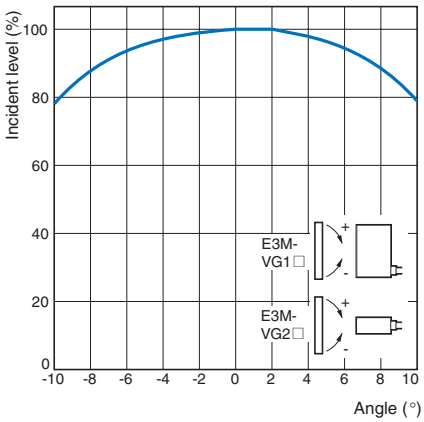
Angle - Incident Level Characteristics (X Direction)

E3M-VG1□/-VG2□



Angle - Incident Level Characteristics (Y Direction)

E3M-VG1□/-VG2□



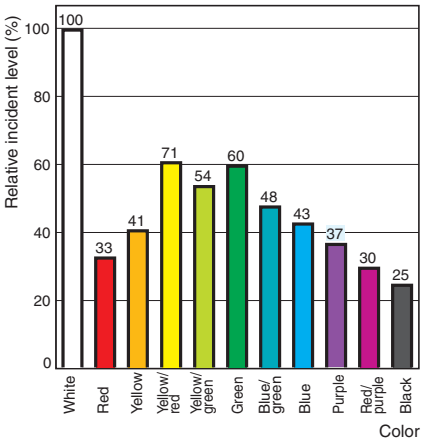
Color Detection

E3M-VG□□

	White	Red	Yellow/ red	Yellow	Yellow/ green	Green	Blue/ green	Blue	Purple	Red/ purple	Black
White		○	○	○	○	○	○	○	○	○	○
Red	○		○	○	○	○	○	○	○	×	△
Yellow/ red	○	○		○	○	○	○	○	×	○	○
Yellow	○	○	○		○	○	○	○	○	○	○
Yellow/ green	○	○	○	○		○	○	○	○	○	○
Green	○	○	○	○	○		○	○	○	○	○
Blue/ green	○	○	○	○	○	○		△	○	○	○
Blue	○	○	○	○	○	○	△		△	○	○
Purple	○	○	×	○	○	○	○	△		○	○
Red/ purple	○	×	○	○	○	○	○	○	○		×
Black	○	△	○	○	○	○	○	○	○	×	

○: Detectable △: Detectable but unstable ×: Not detectable

Difference in Incident Level by Color Conditions

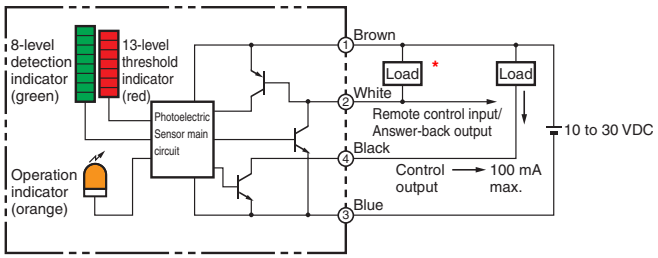


Standard Sensing Object and Colors (Standard Color Card (230 Colors) for Japan Color Enterprise Co., Ltd.)

Color (11 standard colors)	Munsell color notation
White	N9.5
Red	4R 4.5/12.0
Yellow/red	4YR 6.0/11.5
Yellow	5Y 8.5/11.0
Yellow/green	3GY 6.5/10.0
Green	3G 6.5/9.0
Blue/green	5BG 4.5/10.0
Blue	3PB 5.0/10.0
Purple	7P 5.0/10.0
Red/purple	6RP 4.5/12.5
Black	N2.0

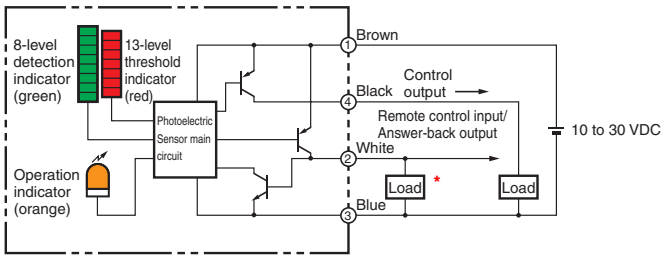
I/O Circuit Diagrams

NPN output

Model	Output circuit	
E3M-VG11 E3M-VG21		[Connector Pin Arrangement] 

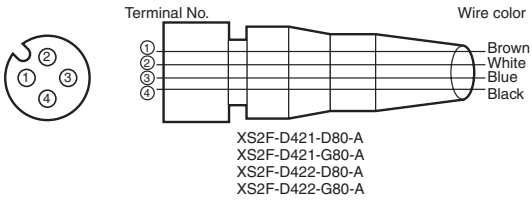
* A single cable is shared for remote control input and answer-back output. Be sure to install a load as shown in the diagram for the remote control function.

PNP output

Model	Output circuit	
E3M-VG16 E3M-VG26		[Connector Pin Arrangement] 

* A single cable is shared for remote control input and answer-back output. Be sure to install a load as shown in the diagram for the remote control function.

Plug (Sensor I/O Connector)



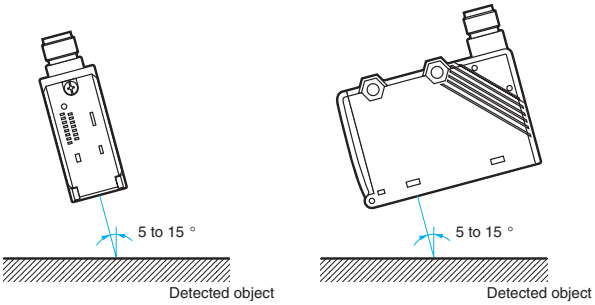
Class	Wire color	Connector pin No.	Application
DC	Brown	1	Power supply (+V)
	White	2	*
	Blue	3	Power supply (0 V)
	Black	4	Output

* Used for both of remote control input and answer-back output

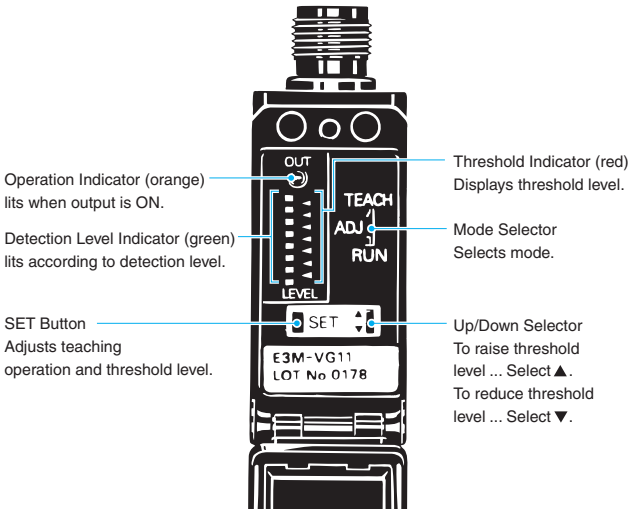
Technical Guide

Detection of Metal or Glossy Objects

Color detection can be improved by inclining the Sensor to prevent it from picking up regular reflection.



Nomenclature



Safety Precautions

Refer to *Warranty and Limitations of Liability*.

⚠ WARNING

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



Precautions for Correct Use

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

● **Designing**

Power Supply

A power supply with full- or half-wave rectification cannot be connected.

● **Wiring**

Tensile Strength of Cables

The tensile strength of the cable should not exceed 50 N.

● **Mounting**

Tightening Force

The tightening force applied to the Fiber Unit should not exceed 1.2 N·m.

Mounting the Sensor

If Sensors are mounted face-to-face, make sure that the optical axes are not in opposition to each other. Otherwise, mutual interference may result.

● **Others**

EEPROM Writing Error

An EEPROM error may result if the power supply to the Sensor fails or the Sensor is influenced by static noise. The threshold indicators will flash if there is an EEPROM error, in which case perform teaching and make threshold level settings again.

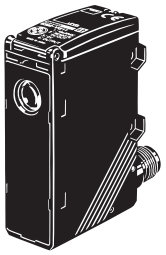
(Unit: mm)

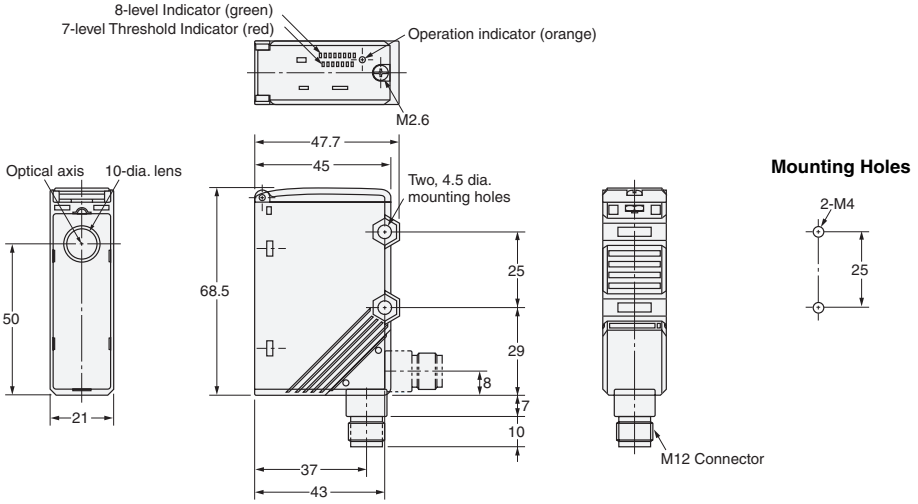
Dimensions

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

Sensors

E3M-VG





Accessories (Order Separately)

Mounting Brackets

Read and Understand This Catalog

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

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- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this catalog.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

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Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

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