

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



CE





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) | | | |
| | 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/s² when using a Mounting Bracket.

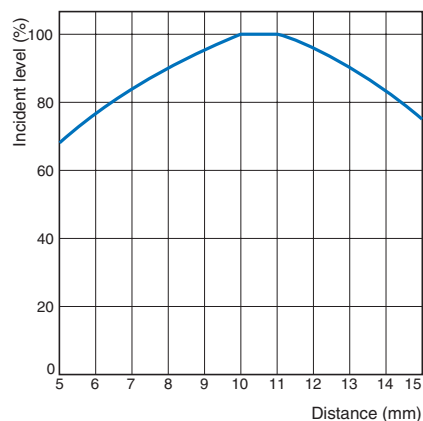
*3. 300 m/s² when using a Mounting Bracket.

*4. The spot size is measured with the light emitter facing forward and the Sensor body standing vertically.

Engineering Data (Typical)

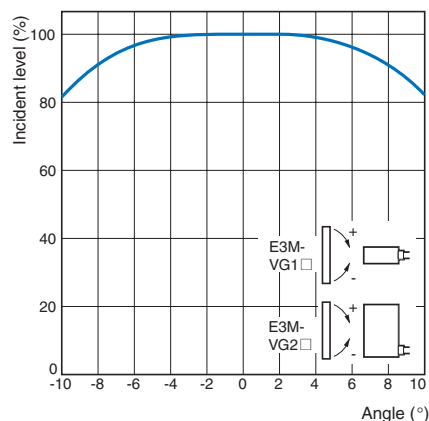
Sensing Distance vs Incident Level Characteristics

E3M-VG1□



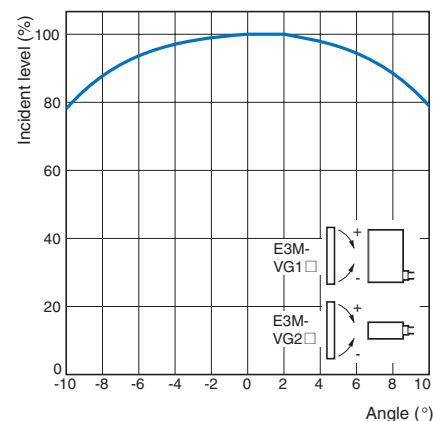
Angle - Incident Level Characteristics (X Direction)

E3M-VG1□/-VG2□



Angle - Incident Level Characteristics (Y Direction)

E3M-VG1□/-VG2□



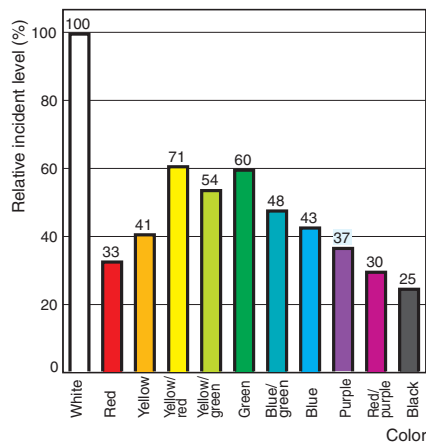
Color Detection

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

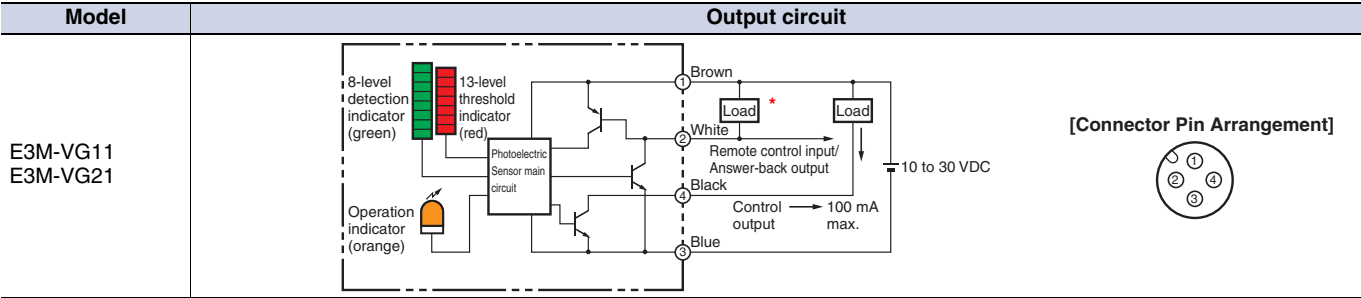


Standard Sensing Object and Colors
(Standard Color Card (230 Colors) for
Japan Color Enterprise Co., Ltd.)

| 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 |

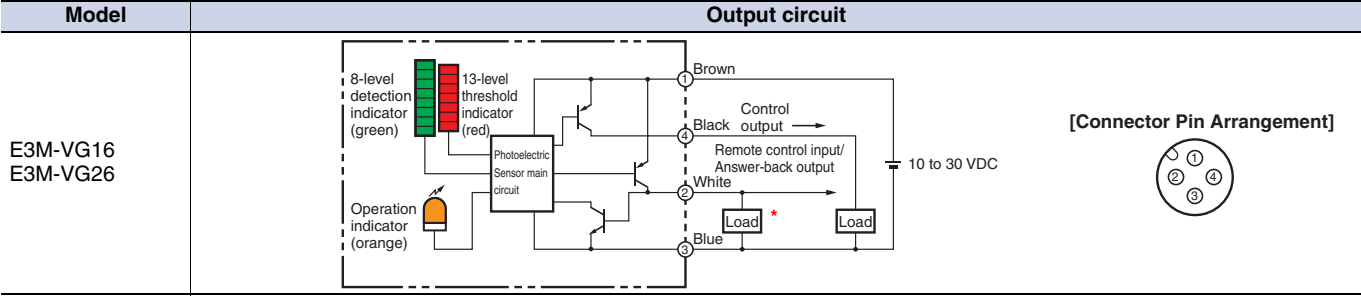
I/O Circuit Diagrams

NPN output



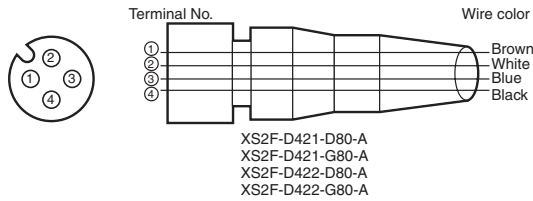
* A single cable is shared for remote control input and answer-back output. Be sure to install a load as shown in the diagram for the remote control function.

PNP output



* 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)



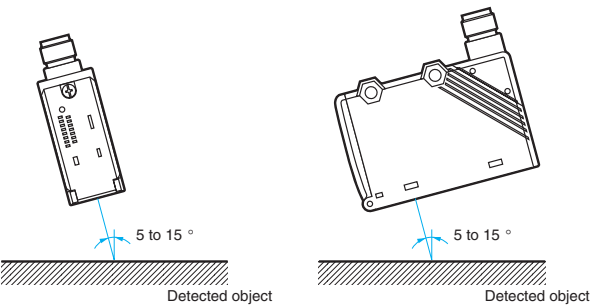
| Class | Wire color | Connector pin No. | Application |
|-------|------------|-------------------|--------------------|
| DC | Brown | 1 | Power supply (+V) |
| | White | 2 | * |
| | Blue | 3 | Power supply (0 V) |
| | Black | 4 | Output |

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

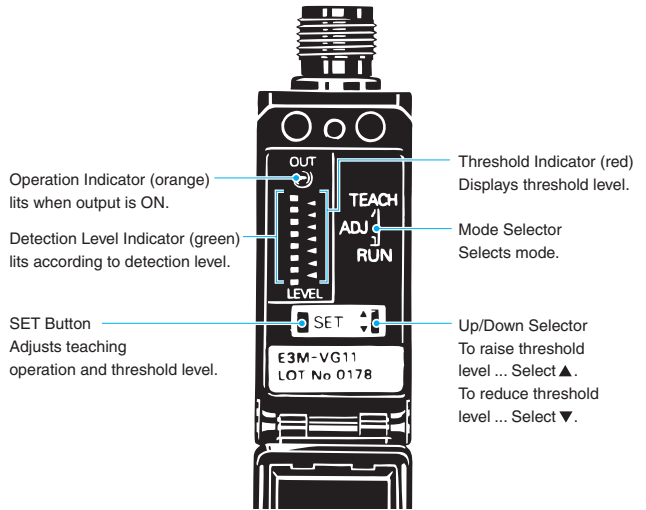
Technical Guide

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.

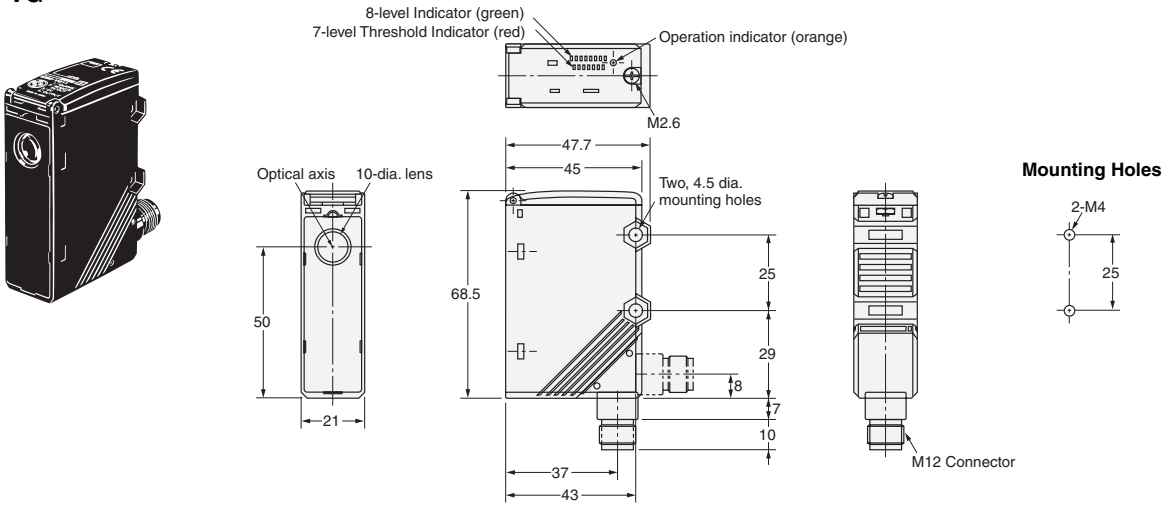
(Unit: mm)

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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Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru

moschip.ru_4

moschip.ru_6

moschip.ru_9