



Line of Long-distance Photoelectric Sensors for Large Workpieces Includes Retro-reflective Models with Sensing Distance of 10 m and Distance Settings Up to 2 m.

- Compact Retro-reflective models require less wiring and less space with a sensing distance as long as 10 m.
- Distance-setting models feature a teaching function.
- Stability indicator shows at a glance when operating conditions are stable.
- Relay and selectable NPN/PNP transistor outputs provided.
- Cable, standard connector, and terminal board models available.



Be sure to read *Safety Precautions* on page 8.

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

Ordering Information

Sensors (Refer to *Dimensions* on page 10.)

Red light Infrared light

| Sensing method | Appearance | Connection method | Sensing distance | Timer function | Model | |
|--------------------------------------|------------|-------------------|--------------------------------|----------------|------------------|-----------------------|
| | | | | | NPN/PNP selector | Relay output |
| Retro-reflective (with MSR function) | | Pre-wired (2 m) | | --- | E3G-R13 2M | --- |
| | | Connector (M12) | | | E3G-R17 | |
| | | Terminal block | | | --- | |
| Distance-setting | | Pre-wired (2 m) | White paper (300 × 300 mm) | --- | E3G-L73 2M | --- |
| | | Connector (M12) | | | E3G-L77 | |
| | | Terminal block | | | --- | |
| | | | | Yes | | E3G-MR19 E3G-MR19T |
| | | | | Yes | | E3G-ML79 E3G-ML79T |

* Values in parentheses indicate the minimum required distance between the Sensor and Reflector.

Accessories (Order Separately)

Reflectors (Refer to *Dimensions* on E39-L/E39-S/E39-R.)

| Appearance | Sensing distance | | Model | Minimum order | Remarks |
|------------|------------------|-----------------|--------|---------------|------------------------------------|
| | Rated value | Reference value | | | |
| | 10 m (500 mm) * | --- | E39-R2 | 1 | Provided with the E3G-R1□/MR19(T). |
| | --- | 6 m (100 mm) * | E39-R1 | 1 | --- |



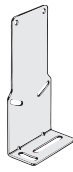
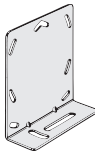
Note: If you use the Reflector at any distance other than the rated distance, make sure that the stability indicator lights properly when you install the Sensor.

* Values in parentheses indicate the minimum required distance between the Sensor and Reflector.

Terminal Protection Cover for Side-pullout Cable (Refer to *Dimensions* on page 12.)



| Appearance | Model | Minimum order | Applicable model | Remarks |
|------------|----------|---------------|----------------------------|--|
| | E39-L129 | 1 | E3G-MR19(T) E3G-ML79(T) | Provided with rubber bushing and cap for pullout prevention in vertical direction. |

Mounting Brackets (Refer to E39-L/E39-S/E39-R)

| Appearance | Model | Quantity | Applicable model | Remarks |
|---|----------|----------|----------------------------|--|
|  | E39-L131 | 1 | E3G-R1□ E3G-L7□ | --- |
|  | E39-L132 | 1 | | Rear-mounting use |
|  | E39-L135 | 1 | E3G-MR19(T) E3G-ML79(T) | Cable pulled out in the downward direction |
|  | E39-L136 | 1 | | --- |

Note: Mounting Brackets are not provided with Sensors and must be purchased separately.

Sensor I/O Connectors (M12) (Sockets on One Cable End) (Refer to Dimensions on XS2.)

| Cable | Appearance | Cable type | Model |
|----------|--|------------|-----------------|
| Standard | Straight  | 2 m | XS2F-D421-DC0-F |
| | | 5 m | XS2F-D421-GC0-F |
| | L-shaped  | 2 m | XS2F-D422-DC0-F |
| | | 5 m | XS2F-D422-GC0-F |

Note: Refer to Introduction to Sensor I/O Connectors for details.

Ratings and Specifications

| Sensing method Item Model | | Retro-reflective (with MSR function) | | | | Distance-setting | | | |
|--|------------|--|-----------------|---|-----------|--|-----------------|---|-----------|
| | | E3G-R13 | E3G-R17 | E3G-MR19 | E3G-MR19T | E3G-L73 | E3G-L77 | E3G-ML79 | E3G-ML79T |
| Sensing distance | | 10 m (500 mm)*1 (when using E39-R2) | | | | White paper (300 x 300 mm): 0.2 to 2 m | | | |
| Setting distance | | --- | | | | White paper (300 x 300 mm): 0.5 to 2 m | | | |
| Standard sensing object | | Opaque: 80-mm dia. min. | | | | --- | | | |
| Differential travel | | --- | | | | 10% of setting distance | | | |
| Directional angle | | Sensor: 1° to 5° | | | | --- | | | |
| Reflectivity characteristics (black/white error) | | --- | | | | ±10% max. (at 1-m sensing distance) | | | |
| Light source (wavelength) | | Red LED (650 nm) | | | | Infrared LED (860 nm) | | | |
| Spot size | | --- | | | | 70 dia. max. (at 1-m sensing distance) | | | |
| Power supply voltage | | 10 to 30 VDC, ripple (p-p): 10% | | 12 to 240 VDC±10%, ripple (p-p): 10% max. 24 to 240 VAC±10% at 50/60 Hz | | 10 to 30 VDC, ripple (p-p): 10% (p-p) | | 12 to 240 VDC±10%, ripple (p-p): 10% max. 24 to 240 VAC±10% at 50/60 Hz | |
| Current/Power consumption | | 50 mA max. | | 2 W max. | | 60 mA max. | | 2 W max. | |
| Control output | | Load power supply voltage: 30 VDC max. Load current: 100 mA max. Residual voltage: NPN output: 1.2 V max. PNP output: 2.0 V max. Open collector output (NPN/PNP selectable) L.ON/D.ON selectable | | Relay output: SPDT, 3 A (cosφ= 1) max. at 250 VAC or 3 A max. at 30 VDC L.ON/D.ON selectable | | Load power supply voltage: 30 VDC max. Load current: 100 mA max. Residual voltage: NPN output: 1.2 V max. PNP output: 2.0 V max. Open collector output (NPN/PNP selectable) L.ON/D.ON selectable | | Relay output: SPDT, 3 A (cosφ= 1) max. at 250 VAC or 3 A max. at 30 VDC L.ON/D.ON selectable | |
| Life expectancy (relay output) | Mechanical | --- | | 50,000,000 operations min. (switching frequency: 18,000 operations/h) | | --- | | 50,000,000 operations min. (switching frequency: 18,000 operations/h) | |
| | Electrical | --- | | 100,000 operations min. (switching frequency: 1,800 operations/h) | | --- | | 100,000 operations min. (switching frequency: 1,800 operations/h) | |
| Protection circuits | | Power supply reverse polarity protection, Output short-circuit protection, Mutual interference prevention | | Mutual interference prevention | | Power supply reverse polarity protection, Output short-circuit protection, Mutual interference prevention | | Mutual interference prevention | |
| Response time | | Operate or reset: 1 ms | | Operate or reset: 30 ms max. | | Operate or reset: 5 ms | | Operate or reset: 30 ms max. | |
| Sensitivity adjustment | | One-turn adjuster | | | | Teaching (in NORMAL or ZONE mode) | | | |
| Timer function | | --- | | ON- or OFF-delay: 0 to 5 s (adjustable) | | --- | | ON- or OFF-delay: 0 to 5 s (adjustable) | |
| Ambient illumination (Receiver side) | | Incandescent lamp: 3,000 lx max. Sunlight: 10,000 lx max. | | | | | | | |
| Ambient temperature range | | Operating: -25° to 55°C, Storage: -30° to 70°C (with no icing or condensation) | | | | | | | |
| Ambient humidity range | | 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 | | 2,000 VAC, 50/60 Hz for 1 min. | | 1,000 VAC, 50/60 Hz for 1 min | | 2,000 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: 500 m/s ² 3 times each in X, Y, and Z directions | | | | | | | |
| Degree of protection | | IEC 60529 IP67 (with protective cover) | | | | | | | |
| Connection method | | Pre-wired (Standard length: 2 m) | Connector (M12) | Terminal block | | Pre-wired (Standard length: 2 m) | Connector (M12) | Terminal block | |
| Weight (packed state) | | Approx. 150 g | Approx. 50 g | Approx. 150 g | | | Approx. 50 g | Approx. 150 g | |
| Material | Case | PBT (polybutylene terephthalate) | | | | | | | |
| | Lens | Mechacrylic resin | | | | | | | |
| Accessories *2 | | Reflector, Adjustment screwdriver, and Instruction manual | | | | Adjustment screwdriver and Instruction manual | | | |

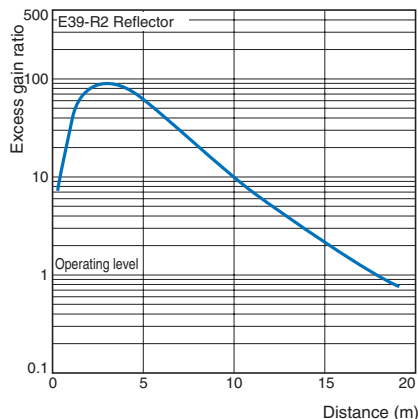
*1. Values in parentheses indicate the minimum required distance between the Sensor and Reflector.

*2. Mounting Brackets are sold separately.

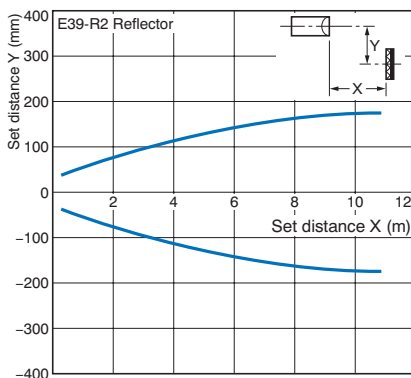
Engineering Data (Reference Value)

E3G-R/MR Retro-reflective Models

Excess Gain vs. Set Distance

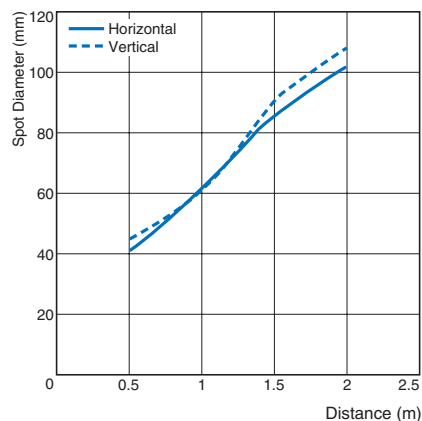


Parallel Operating Range



E3G-L/ML Distance-setting Models

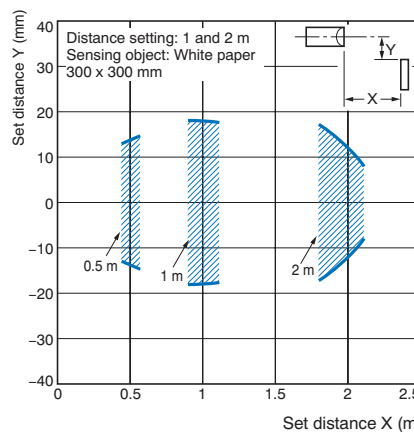
Spot Diameter vs. Sensing Distance



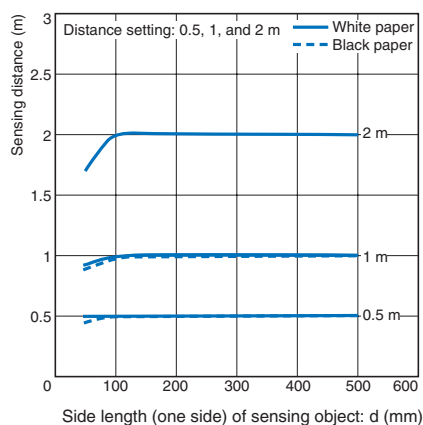
Operating Range in NORMAL Mode



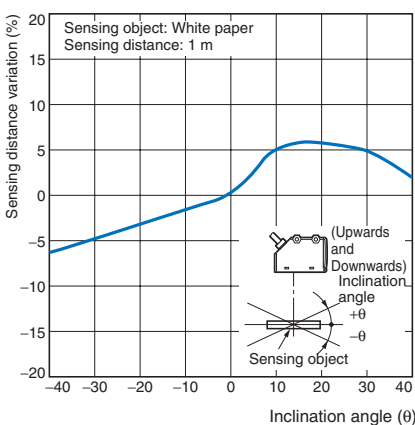
Operating Range in ZONE Mode



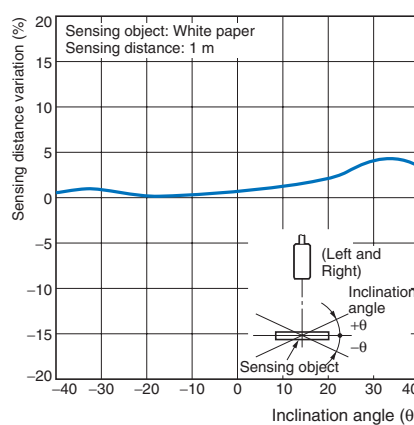
Sensing Object Size vs. Setting Distance



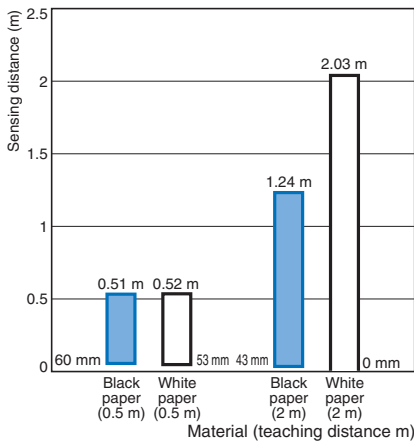
Sensing Object Angle Characteristics (Vertical)



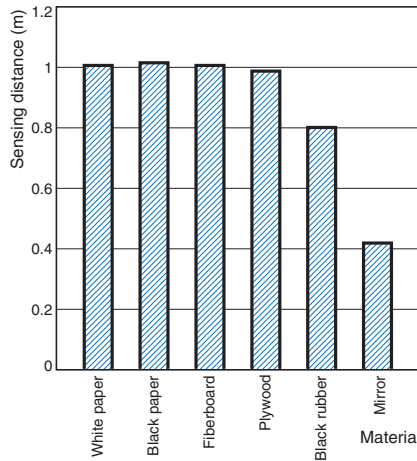
Sensing Object Angle (Horizontal)



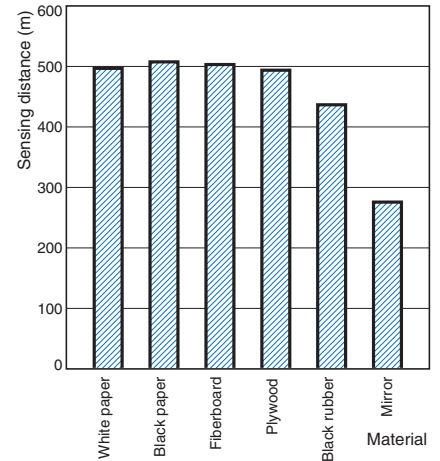
Close-range Characteristics



Sensing Distance vs. Sensing Object Material (at 1-m Setting Distance)



Sensing Distance vs. Sensing Object Material (at 500-mm Setting Distance)



I/O Circuit Diagrams

NPN Output

| Model | Operation mode | Timing charts | Operation selector | Output circuit |
|--|----------------|---|--------------------|---|
| E3G-R13 E3G-R17 E3G-L73 E3G-L77 | Light-ON | Incident light: ON No incident light: OFF Operation indicator (orange): OFF Output transistor: ON Load Operate (relay): OFF Reset: OFF | L side (L-ON) | <p>* Set the NPN or PNP selector to NPN.</p> <p>Connector Pin Arrangement</p> <p>Pin 2 is not used.</p> |
| | Dark-ON | Incident light: ON No incident light: OFF Operation indicator (orange): OFF Output transistor: ON Load Operate (relay): OFF Reset: OFF | D side (D-ON) | |

PNP Output

| Model | Operation mode | Timing charts | Operation selector | Output circuit |
|--|----------------|---|--------------------|---|
| E3G-R13 E3G-R17 E3G-L73 E3G-L77 | Light-ON | Incident light: ON No incident light: OFF Operation indicator (orange): OFF Output transistor: ON Load Operate (relay): OFF Reset: OFF | L side (L-ON) | <p>* Set the NPN or PNP selector to PNP.</p> <p>Connector Pin Arrangement</p> <p>Pin 2 is not used.</p> |
| | Dark-ON | Incident light: ON No incident light: OFF Operation indicator (orange): OFF Output transistor: ON Load Operate (relay): OFF Reset: OFF | D side (D-ON) | |

Relay Output

| Timer function | Model | Timing charts | Operation selector | Output circuit |
|----------------|--------------------------------|---------------|--------------------|----------------|
| None | E3G -MR19 E3G -ML79 | | L side (L-ON) | |
| | | | D side (D-ON) | |
| Yes | E3G -MR19T E3G -ML79T | | L side (L-ON) | |
| | | | D side (D-ON) | |

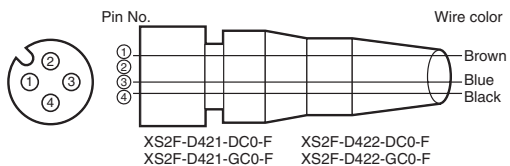
Note: Td1, Td2: Delay time (0 to 5 s)

T1: A period longer than the delay time.

T2: A period shorter than the delay time.

* For ON- and OFF-delay timers, Td1 and Td2 are independently variable.

Plug (Sensor I/O Connector)



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

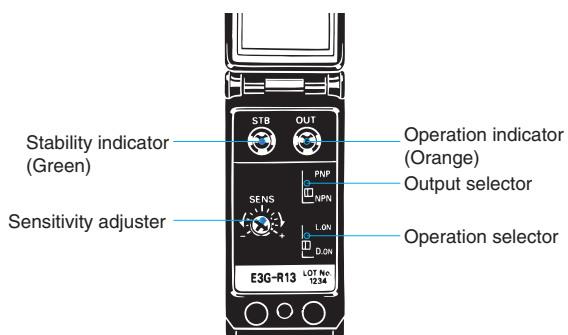
Note: Pin 2 is not used.

Nomenclature

Retro-reflective

E3G-R13 (Pre-wired Model)

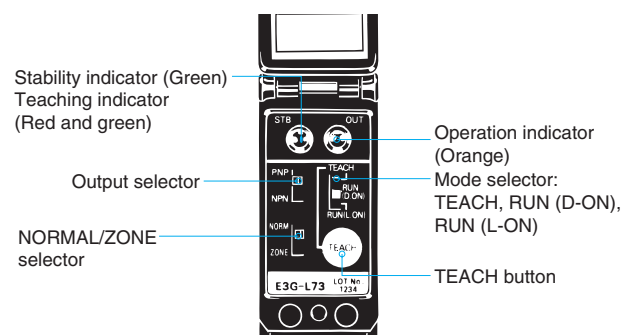
E3G-R17 (Standard Connector Model)



Distance-setting

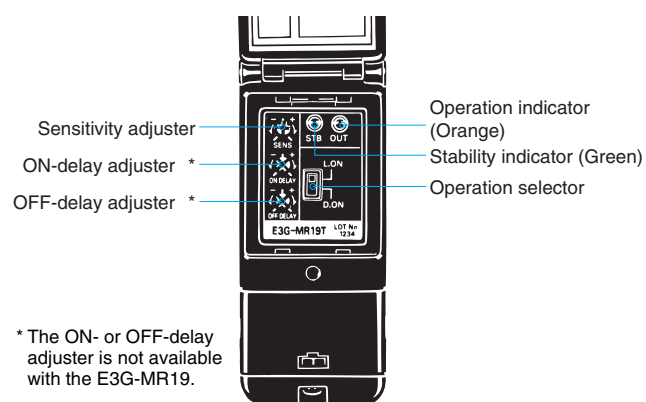
E3G-L73 (Pre-wired Model)

E3G-L77 (Standard Connector Model)



E3G-MR19 (Terminal Block Model)

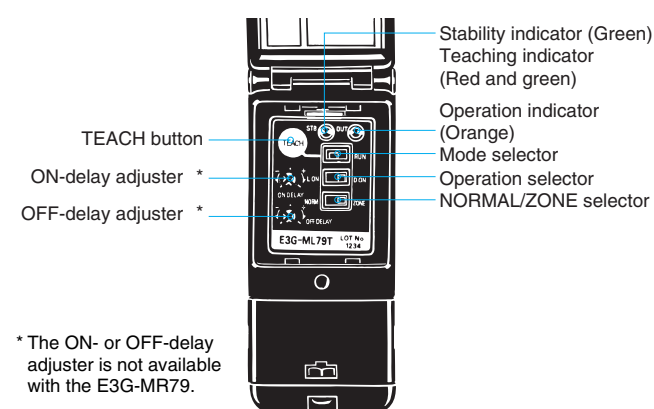
E3G-MR19T (Terminal Block Model with Timer)



* The ON- or OFF-delay adjuster is not available with the E3G-MR19.

E3G-ML79 (Terminal Block Model)

E3G-ML79T (Terminal Block Model with Timer)



* The ON- or OFF-delay adjuster is not available with the E3G-MR79.

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.

E3G-R/MR

● **Designing**

Power Supply

A power supply with full-wave rectification can be connected to the E3G-MR19(T).

● **Wiring**

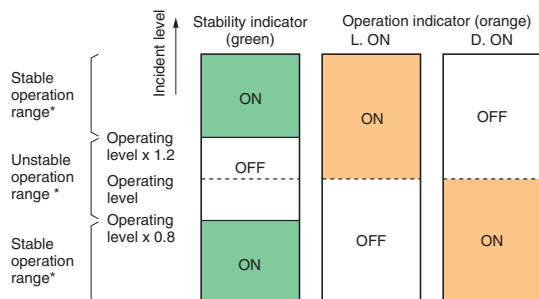
The tensile strength of the cable during operation should not exceed the values shown below.

| Model | Tensile strength (torque) |
|------------------------|---------------------------|
| E3G-R13 E3G-MR19(T) | 50 N max. |
| E3G-R17 | 10 N max. |

● **Adjusting**

Indicators

- The following illustration indicates the operating levels of the E3G.
- Set the E3G so that it will work within the stable operation range.



*If the operating level is set to the stable operation range, the E3G will operate with the highest reliability and without being influenced by temperature change, voltage fluctuation, dust, or setting change. If the operating level cannot be set to the stable operation range, pay close attention to environmental changes while operating the E3G.

E3G-L/ML

● **Designing**

Power Supply

A power supply with full-wave rectification can be connected to the E3G-ML79(T).

● **Wiring**

The tensile strength of the cable during operation should not exceed the values shown below.

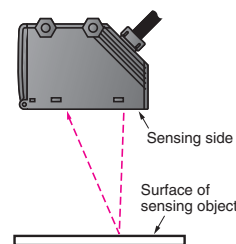
| Model | Tensile strength (torque) |
|------------------------|---------------------------|
| E3G-L73 E3G-ML79(T) | 50 N max. |
| E3G-L77 | 10 N max. |

● **Mounting**

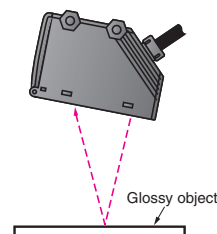
Mounting

Mounting Directions

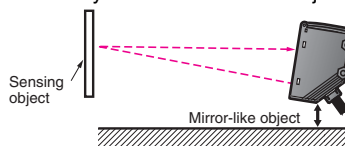
- Make sure that the sensing side of the Sensor is parallel with the surface of each sensing object. Do not incline the Sensor towards the sensing object.



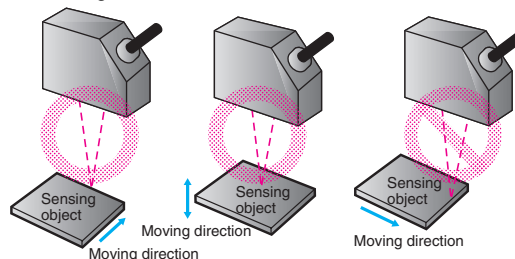
- If the sensing object has a glossy surface, incline the Sensor by 5° to 10° as shown below, provided that the Sensor is not influenced by any background objects.



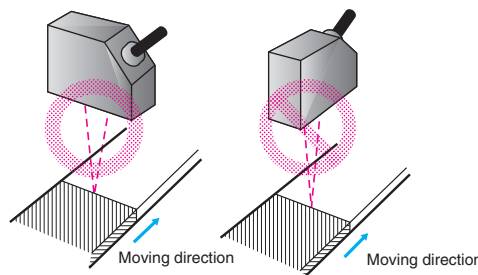
- If there is a mirror-like object below the Sensor, the Sensor may not be in stable operation. Therefore, incline the Sensor or keep the Sensor a distance away from the mirror-like object as shown below.



- Make sure not to install the Sensor in the incorrect direction. Refer to the following.



Install the Sensor as shown in the following if each sensing object greatly differs in color or material.



● **Others**

EEPROM Write Errors

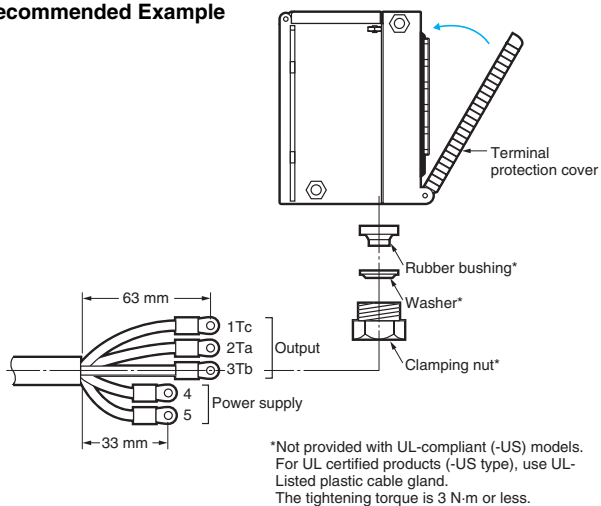
If a teaching data error occurs with the operation indicator flashing due to a power failure or static noise, perform the teaching operation of the Sensor again.

E3G-M□(T)

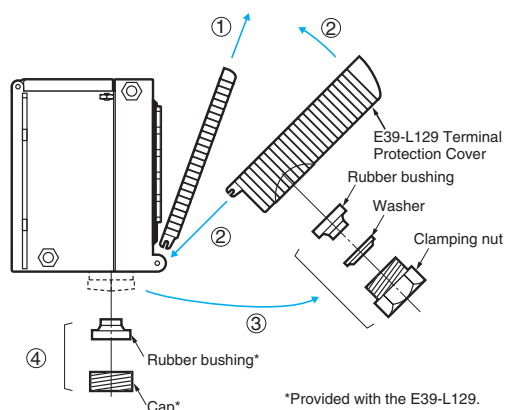
● Wiring

- The cable with an external diameter of 6 to 8 mm is recommended.
- Be sure to attach the cover with screws securely in order to maintain the water- and dust-resistive properties of the product. The size of the conduit opening is PF1/2 in accordance with JIS B0202.
- Do not tighten the Terminal Protection Cover with wires pinched between the Sensor and the cover in order to maintain the water- and dust-resistive properties of the product.

Recommended Example



● Changing to Side-pullout Cable from Vertical-pullout Cable



| Procedure | Operation |
|-----------|--|
| 1 | Remove the present cover. |
| 2 | Attach the E39-L129 Terminal Protection Cover for side-pullout cable. |
| 3 | Remove the clamping nut, washer, and rubber bushing of the E3G. These are used for the side-pullout cable. |
| 4 | Attach the rubber bushing and cap provided with the E39-L129 to the E3G as replacements. |

All E3G Models

● Designing

Load Relay Contact

If E3G is connected to a load with contacts that spark when the load is turned OFF (e.g., a contactor or valve), the normally-closed side may be turned ON before the normally-open side is turned OFF or vice-versa. If both normally-open output and normally-closed output are used simultaneously, apply an surge suppressor to the load. Refer to *OMRON's PCB Relays Catalog (X33)* for typical examples of surge suppressors.

● Wiring

Connecting and Wiring

The E3G has a built-in function to protect the E3G from load shortcircuiting. If load shortcircuiting results, the output will be turned OFF. In that case, check the wiring and turn ON the E3G again so that the short-circuit protection circuit will be reset. This function will operate if the output current flow is at least 2.0 times the rated load current. If a capacitive load is connected to the E3G, make sure that the inrush current does not exceed 1.2 times the rated load current.

● Mounting

Mounting Conditions

- If Sensors are mounted face-to-face, make sure that no optical axes cross each other. Otherwise, mutual interference may result.
- Be sure to install the Sensor carefully so that the directional angle range of the Sensor will not be directly exposed to intensive light, such as sunlight, fluorescent light, or incandescent light.
- Do not strike the Photoelectric Sensor with a hammer or any other tool during the installation of the Sensor, or the Sensor will lose its water-resistive properties.
- Use M4 screws to mount the Sensor.
- When mounting the case, make sure that the tightening torque applied to each screw does not exceed 1.2 N-m.

● Water Resistance

Tighten the operation cover screws and terminal block cover screws to a torque of 0.3 to 0.5 N-m in order to ensure water resistivity.

Dimensions

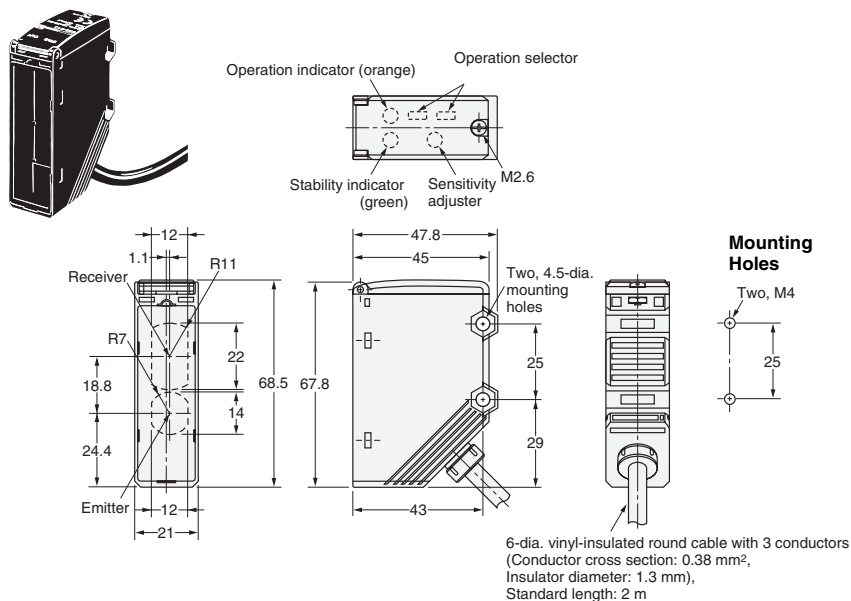
(Unit: mm)

Tolerance class IT16 applies to dimensions in this datasheet unless otherwise specified.

Sensors

Retro-reflective Models

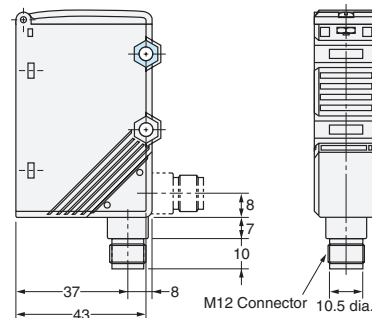
Pre-wired Model E3G-R13



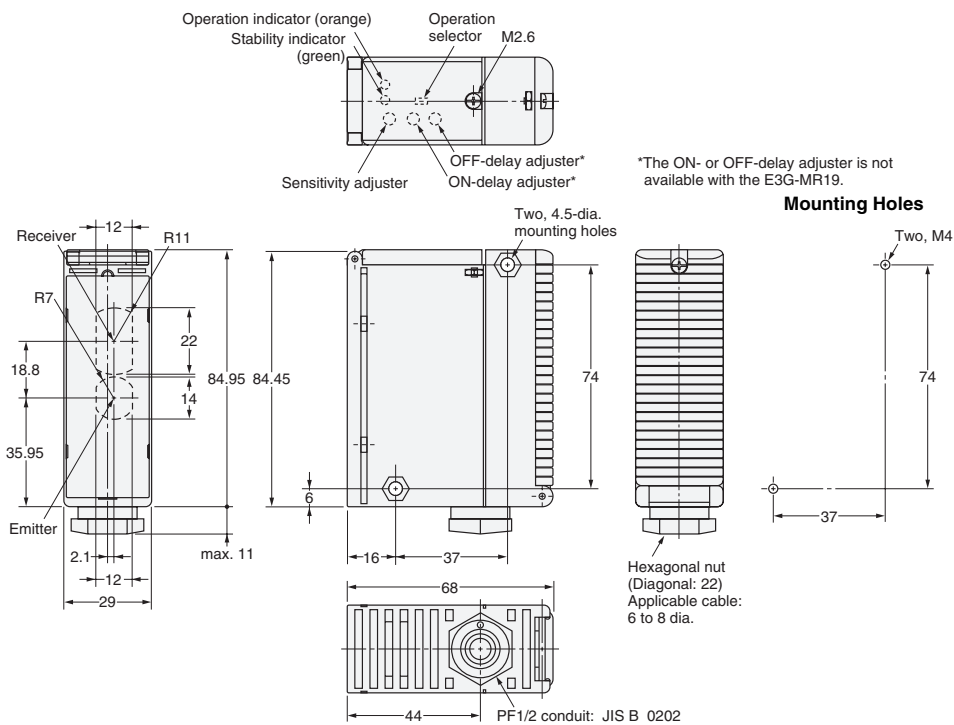
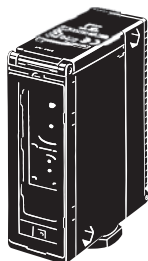
Standard Connector Model E3G-R17



Note: All dimensions other than the ones specified below are the same as the corresponding dimensions of E3G-R13.

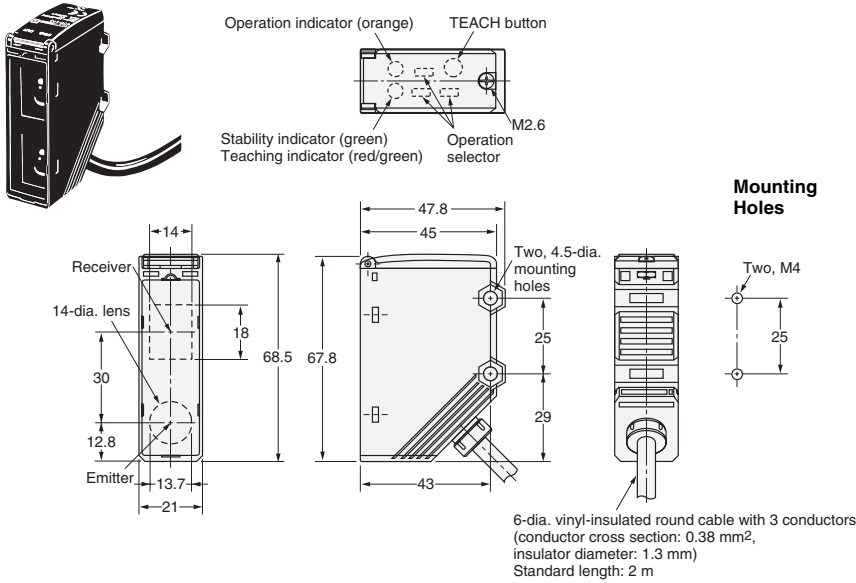


Terminal Block Models E3G-MR19 E3G-MR19T

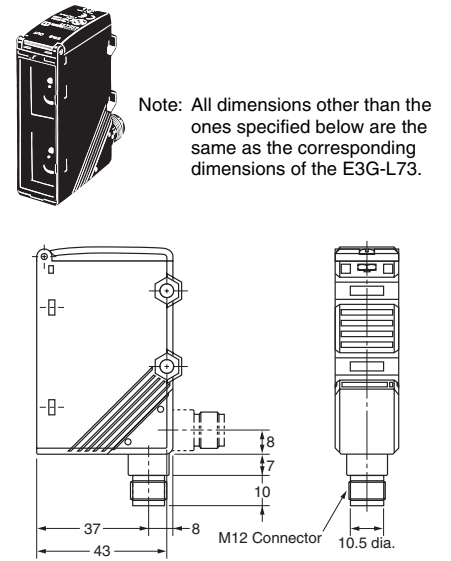


Distance-setting Models

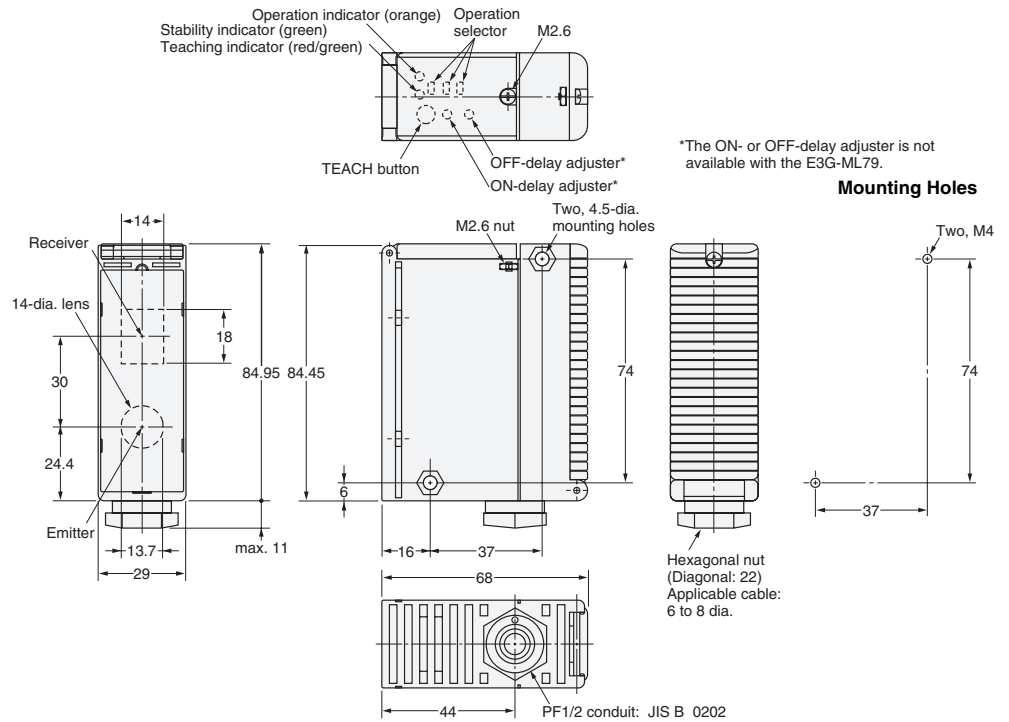
Pre-wired Model
E3G-L73



Standard Connector Model
E3G-L77



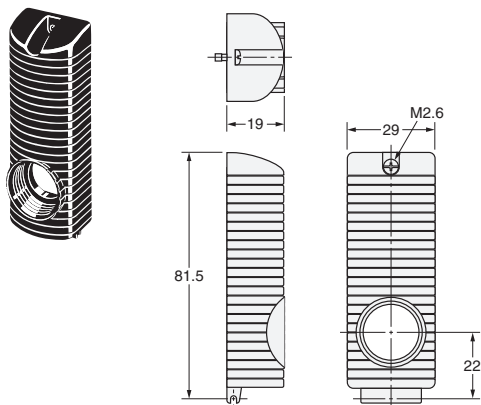
Terminal Block Models
E3G-ML79
E3G-ML79T



Accessories (Order Separately)

Terminal Protection Cover for Side-pullout Cable

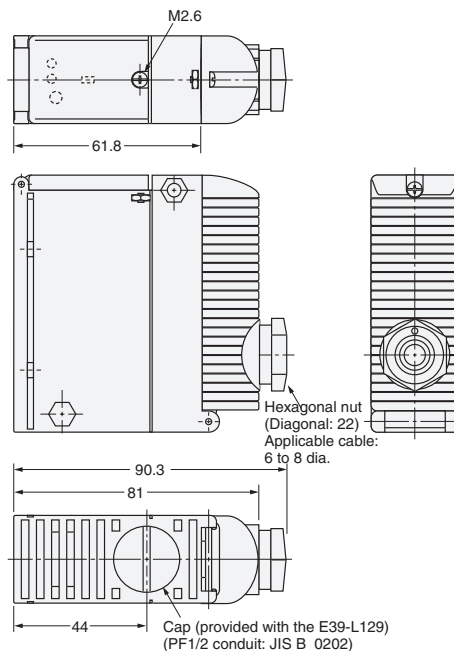
E39-L129



- Note: 1. The cover is provided with a rubber bushing and cap to prevent the cable from being pulled out vertically.
 2. Refer to page 9 for the mounting method of the product.

Terminal Protection Cover for Side-pullout Cable

(Example: E3G-MR19)



Reflectors

Refer to E39-L/E39-S/E39-R for details.

Mounting Brackets

Refer to E39-L/E39-S/E39-R for details.

Sensor I/O Connectors

Refer to Introduction to Sensor I/O Connectors for details.

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.

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