OMRON

# M18 Cylindrical Photoelectric Sensors

# E3F2

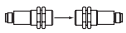
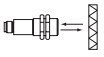
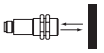
## Threaded Cylindrical Photoelectric Sensors with Built-in Amplifier and Axial or Right Angle optics

- Housing materials: plastic, nickel plated brass and stainless steel
- IP67 enclosure ratings
- Pre-wired or connector types
- Sensing distance separate type: 7 m
- Retro-reflective polarized type (MSR): 2 m
- Long detection distance (30 cm) with Adjustable sensitivity for diffuse type
- Wide-beam characteristics (10 cm) for diffuse type
- Wide operating voltage range (10 to 30 VDC or 24 to 240 VAC)
- Short-circuit and reverse connection protection (DC switching type)
- UL and CSA approved; CE rated

# Ordering Information

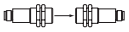
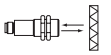
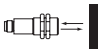
## ■ DC-Switching Models

### Housing material: Plastic

| Sensing method | | Appearance | Connection method | Sensing distance | Part number | |
|---|---|---|---|---|---|---|
| | | | | | PNP output | NPN output |
| Through-beam | |  axial | pre-wired | 7 m | **E3F2-7B4** | **E3F2-7C4** |
| | | | M12 connector | | **E3F2-7B4-P1** | **E3F2-7C4-P1** |
| Retro-reflective (incl. reflector E39-R1) | Non-polarizing (without MSR-function) |  axial | pre-wired | 0.1 - 2 m (with reflector E39-R1) | **E3F2-R2B4** | **E3F2-R2C4** |
| | | | M12 connector | | **E3F2-R2B4-P1** | **E3F2-R2C4-P1** |
| | Polarizing (with MSR-function) | radial | pre-wired | | **E3F2-R2RB41** | **E3F2-R2RC41** |
| | | | M12 connector | | **E3F2-R2RB41-P1** | **E3F2-R2RC41-P1** |
| Diffuse reflective | Fixed sensing distance Wide-beam characteristics |  axial | pre-wired | 100 mm | **E3F2-DS10B4-N** | **E3F2-DS10C4-N** |
| | | | M12 connector | | **E3F2-DS10B4-P1** | **E3F2-DS10C4-P1** |
| | Adjustable sensing distance | | pre-wired | 300 mm | **E3F2-DS30B4** | **E3F2-DS30C4** |
| | | | M12 connector | | **E3F2-DS30B4-P1** | **E3F2-DS30C4-P1** |
| | Adjustable sensing distance | radial | pre-wired | | **E3F2-DS30B41** | **E3F2-DS30C41** |
| | | | M12 connector | | **E3F2-DS30B41-P1** | **E3F2-DS30C41-P1** |

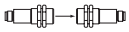
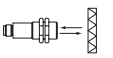
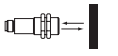
**Note:** Standard cable length is 2 m. Models provided with a 5 m long cable are available. When ordering, specify the cable length by adding the length of the cable (e.g. E3F2-R2RB4 5M). For other cable length please contact your OMRON sales representative.

### Housing material: Metal (Nickel plated brass)

| Sensing method | | Appearance | Connection method | Sensing distance | Part number | |
|---|---|---|---|---|---|---|
| | | | | | PNP output | NPN output |
| Through-beam | |  axial | pre-wired | 7 m | **E3F2-7B4-M** | **E3F2-7C4-M** |
| | | | M12 connector | | **E3F2-7B4-M1-M** | **E3F2-7C4-M1-M** |
| Retro-reflective (incl. reflector E39-R1) | Polarizing (with MSR-function) |  axial | pre-wired | 0.1 - 2 m (with reflector E39-R1) | **E3F2-R2RB4-M** | **E3F2-R2RC4-M** |
| | | | M12 connector | | **E3F2-R2RB4-M1-M** | **E3F2-R2RC4-M1-M** |
| | | radial | pre-wired | | **E3F2-R2RB41-M** | **E3F2-R2RC41-M** |
| | | | M12 connector | | **E3F2-R2RB41-M1-M** | **E3F2-R2RC41-M1-M** |
| Diffuse reflective | Fixed sensing distance Wide-beam characteristics |  axial | pre-wired | 100 mm | **E3F2-DS10B4-M** | **E3F2-DS10C4-M** |
| | | | M12 connector | | **E3F2-DS10B4-M1-M** | **E3F2-DS10C4-M1-M** |
| | Adjustable sensing distance | radial | pre-wired | 300 mm | **E3F2-DS30B4-M** | **E3F2-DS30C4-M** |
| | | | M12 connector | | **E3F2-DS30B4-M1-M** | **E3F2-DS30C4-M1-M** |
| | | | pre-wired | | **E3F2-DS30B41-M** | **E3F2-DS30C41-M** |
| | | | M12 connector | | **E3F2-DS30B41-M1-M** | **E3F2-DS30C41-M1-M** |

**Note:** Standard cable length is 2 m. Models provided with a 5 m long cable are available. When ordering, specify the cable length by adding the length of the cable (e.g. E3F2-R2RB4-M 5M). For other cable length please contact your OMRON sales representative.

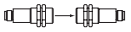
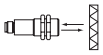
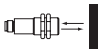
### Housing material: Metal (Stainless steel)

| Sensing method | | Appearance | Connection method | Sensing distance | Part number | |
|---|---|---|---|---|---|---|
| | | | | | PNP output | NPN output |
| Through-beam | |  axial | pre-wired | 7 m | **E3F2-7B4-S** | **E3F2-7C4-S** |
| | | | M12 connector | | **E3F2-7B4-M1-S** | **E3F2-7C4-M1-S** |
| Retro-reflective (incl. reflector E39-R1) | Polarizing (with MSR-function) |  axial | pre-wired | 0.1 - 2 m (with reflector E39-R1) | **E3F2-R2RB4-S** | **E3F2-R2RC4-S** |
| | | | M12 connector | | **E3F2-R2RB4-M1-S** | **E3F2-R2RC4-M1-S** |
| Diffuse reflective | Fixed sensing distance Wide-beam characteristics |  axial | pre-wired | 100 mm | **E3F2-DS10B4-S** | **E3F2-DS10C4-S** |
| | | | M12 connector | | **E3F2-DS10B4-M1-S** | **E3F2-DS10C4-M1-S** |
| | Adjustable sensing distance | | pre-wired | 300 mm | **E3F2-DS30B4-S** | **E3F2-DS30C4-S** |
| | | | M12 connector | | **E3F2-DS30B4-M1-S** | **E3F2-DS30C4-M1-S** |

**Note:** Standard cable length is 2 m. Models provided with a 5 m long cable are available. When ordering, specify the cable length by adding the length of the cable (e.g. E3F2-R2RB4-S 5M). For other cable length please contact your OMRON sales representative.

## ■ AC-Switching Models

### Housing material: Plastic

| Sensing method | | Appearance | Connection method | Sensing distance | Part number | |
|---|---|---|---|---|---|---|
| | | | | | Light-ON | Dark-ON |
| Through-beam | |  axial | pre-wired | 3 m | **E3F2-3Z1** | **E3F2-3Z2** |
| Retro-reflective (incl. reflector E39-R1) | Non-polarizing (without MSR-function) |  axial | pre-wired | 0.1 - 2 m (with reflector E39-R1) | **E3F2-R2Z1** | **E3F2-R2Z2** |
| Diffuse reflective | Fixed sensing distance Wide-beam characteristics |  axial | pre-wired | 100 mm | **E3F2-DS10Z1-N** | **E3F2-DS10Z2-N** |

**Note:** Standard cable length is 2 m. Models provided with a 5 m long cable are available. When ordering, specify the cable length by adding the length of the cable (e.g. E3F2-R2Z1 5M). For other cable length please contact your OMRON sales representative.

## ■ Accessories (Order Separately)

| Name | Sensing distance (typical) [See note.] | Part number | Remark |
|---|---|---|---|
| Reflectors | 0.1 - 3.7 m (axial)<br>0.1 - 2.4 m (radial) | **E39-R1** | 60 x 40 mm (included in some models) |
| | 0.1 - 4.2 m (axial)<br>0.1 - 2.7 m (radial) | **E39-R7** | ∅ 84 mm |
| | 0.1 - 5.3 m (axial)<br>0.1 - 3.1 m (radial) | **E39-R8** | 100 x 100 mm |
| Tape Reflectors | | **E39-RSA** | 35 x 10 mm |
| | | **E39-RSB** | 35 x 40 mm |
| | | **E39-RS3** | 80 x 70 mm |
| Lens Cap | | **E39-F31** | |
| Mounting Bracket | | **Y92E-B18** | |

**Note:** Typical sensing distance corresponds to 80 % of the max. sensing distance. For details, refer to the *Engineering Data* section.

## ■ Sensor I/O Connectors

| wire | Shape | Cable type | | Part number |
|---|---|---|---|---|
| Standard | Straight | 2 m | Four-wire type | **XS2F-D421-D80-A** |
| | | 5 m | | **XS2F-D421-G80-A** |
| | Right Angle | 2 m | | **XS2F-D422-D80-A** |
| | | 5 m | | **XS2F-D422-G80-A** |
| Robotic Cable | Straight | 2 m | | **XS2F-D421-D80-R** |
| | | 5 m | | **XS2F-D421-G80-R** |
| | Right Angle | 2 m | | **XS2F-D422-D80-R** |
| | | 5 m | | **XS2F-D422-G80-R** |

# Ordering Information: type list

## ■ DC-Switching Models, plastic

| Part number | Sensing method, sensing distance | Appearance | Connection (cable-length) | Control output | Comments |
|---|---|---|---|---|---|
| E3F2-7B4 | Through-beam, 7 m | axial | Pre-wired (2 m)* | PNP | Receiver and Emitter |
| E3F2-7B4-P1 | Through-beam, 7 m | axial | Connector | PNP | Receiver and Emitter |
| E3F2-7C4 | Through-beam, 7 m | axial | Pre-wired (2 m)* | NPN | Receiver and Emitter |
| E3F2-7C4-P1 | Through-beam, 7 m | axial | Connector | NPN | Receiver and Emitter |
| E3F2-7DB4 | Through-beam, 7 m | axial | Pre-wired (2 m)* | PNP | Receiver only |
| E3F2-7DB4-P1 | Through-beam, 7 m | axial | Connector | PNP | Receiver only |
| E3F2-7DC4 | Through-beam, 7 m | axial | Pre-wired (2 m)* | NPN | Receiver only |
| E3F2-7DC4-P1 | Through-beam, 7 m | axial | Connector | NPN | Receiver only |
| E3F2-7L | Through-beam, 7 m | axial | Pre-wired (2 m)* | N.A. | Emitter only |
| E3F2-7L -P1 | Through-beam, 7 m | axial | Connector | N.A. | Emitter only |
| E3F2-DS10B4-N | Diffuse reflective, 100 mm | axial | Pre-wired (2 m)* | PNP | Wide-beam characteristic |
| E3F2-DS10B4-P1 | Diffuse reflective, 100 mm | axial | Connector | PNP | Wide-beam characteristic |
| E3F2-DS10C4-N | Diffuse reflective, 100 mm | axial | Pre-wired (2 m)* | NPN | Wide-beam characteristic |
| E3F2-DS10C4-P1 | Diffuse reflective, 100 mm | axial | Connector | NPN | Wide-beam characteristic |
| E3F2-DS30B4 | Diffuse reflective, 300 mm | axial | Pre-wired (2 m)* | PNP | Adjustable sensitivity |
| E3F2-DS30B41 | Diffuse reflective, 300 mm | radial | Pre-wired (2 m)* | PNP | Adjustable sensitivity |
| E3F2-DS30B41-P1 | Diffuse reflective, 300 mm | radial | Connector | PNP | Adjustable sensitivity |
| E3F2-DS30B4-P1 | Diffuse reflective, 300 mm | axial | Connector | PNP | Adjustable sensitivity |
| E3F2-DS30C4 | Diffuse reflective, 300 mm | axial | Pre-wired (2 m)* | NPN | Adjustable sensitivity |
| E3F2-DS30C41 | Diffuse reflective, 300 mm | radial | Pre-wired (2 m)* | NPN | Adjustable sensitivity |
| E3F2-DS30C41-P1 | Diffuse reflective, 300 mm | radial | Connector | NPN | Adjustable sensitivity |
| E3F2-DS30C4-P1 | Diffuse reflective, 300 mm | axial | Connector | NPN | Adjustable sensitivity |
| E3F2-R2B4 | Retro-reflective, 2 m | axial | Pre-wired (2 m)* | PNP | Non-polarizing |
| E3F2-R2B4-E | Retro-reflective, 2 m | axial | Pre-wired (2 m)* | PNP | Non-polarizing, without reflector |
| E3F2-R2B4-P1 | Retro-reflective, 2 m | axial | Connector | PNP | Non-polarizing |
| E3F2-R2B4-P1-E | Retro-reflective, 2 m | axial | Connector | PNP | Non-polarizing, without reflector |
| E3F2-R2C4 | Retro-reflective, 2 m | axial | Pre-wired (2 m)* | NPN | Non-polarizing |
| E3F2-R2C4-E | Retro-reflective, 2 m | axial | Pre-wired (2 m)* | NPN | Non-polarizing, without reflector |
| E3F2-R2C4-P1 | Retro-reflective, 2 m | axial | Connector | NPN | Non-polarizing |
| E3F2-R2C4-P1-E | Retro-reflective, 2 m | axial | Connector | NPN | Non-polarizing, without reflector |
| E3F2-R2RB41 | Retro-reflective, 2 m | radial | Pre-wired (2 m)* | PNP | Polarizing |
| E3F2-R2RB41-E | Retro-reflective, 2 m | radial | Pre-wired (2 m)* | PNP | Polarizing, without reflector |
| E3F2-R2RB41-P1 | Retro-reflective, 2 m | radial | Connector | PNP | Polarizing |
| E3F2-R2RB41-P1-E | Retro-reflective, 2 m | radial | Connector | PNP | Polarizing, without reflector |
| E3F2-R2RC41 | Retro-reflective, 2 m | radial | Pre-wired (2 m)* | NPN | Polarizing |
| E3F2-R2RC41-E | Retro-reflective, 2 m | radial | Pre-wired (2 m)* | NPN | Polarizing, without reflector |
| E3F2-R2RC41-P1 | Retro-reflective, 2 m | radial | Connector | NPN | Polarizing |
| E3F2-R2RC41-P1-E | Retro-reflective, 2 m | radial | Connector | NPN | Polarizing, without reflector |

* Standard cable length is 2 m. Models provided with a 5 m long cable are available. When ordering, specify the cable length by adding the length of the cable (e.g. E3F2-R2RB41 5M). For other cable length please contact your OMRON sales representative.

## ■ DC-Switching Models, metal (nickel plated brass)

| Part number | Sensing method, sensing range | Appearance | Connection (cable-length) | Control output | Comments |
|---|---|---|---|---|---|
| E3F2-7B4-M | Through-beam, 7 m | axial | Pre-wired (2 m)* | PNP | Receiver and Emitter |
| E3F2-7B4-M1-M | Through-beam, 7 m | axial | Connector | PNP | Receiver and Emitter |
| E3F2-7C4-M | Through-beam, 7 m | axial | Pre-wired (2 m)* | NPN | Receiver and Emitter |
| E3F2-7C4-M1-M | Through-beam, 7 m | axial | Connector | NPN | Receiver and Emitter |
| E3F2-7DB4-M | Through-beam, 7 m | axial | Pre-wired (2 m)* | PNP | Receiver only |
| E3F2-7DB4-M1-M | Through-beam, 7 m | axial | Connector | PNP | Receiver only |
| E3F2-7DC4-M | Through-beam, 7 m | axial | Pre-wired (2 m)* | NPN | Receiver only |
| E3F2-7DC4-M1-M | Through-beam, 7 m | axial | Connector | NPN | Receiver only |
| E3F2-7L-M | Through-beam, 7 m | axial | Pre-wired (2 m)* | N.A | Emitter only |
| E3F2-7L-M1-M | Through-beam, 7 m | axial | Connector | N.A | Emitter only |
| E3F2-DS10B4-M | Diffuse reflective, 100 mm | axial | Pre-wired (2 m)* | PNP | Wide-beam characteristic |
| E3F2-DS10B4-M1-M | Diffuse reflective, 100 mm | axial | Connector | PNP | Wide-beam characteristic |
| E3F2-DS10C4-M | Diffuse reflective, 100 mm | axial | Pre-wired (2 m)* | NPN | Wide-beam characteristic |
| E3F2-DS10C4-M1-M | Diffuse reflective, 100 mm | axial | Connector | NPN | Wide-beam characteristic |
| E3F2-DS30B41-M | Diffuse reflective, 300 mm | radial | Pre-wired (2 m)* | PNP | Adjustable sensitivity |
| E3F2-DS30B41-M1-M | Diffuse reflective, 300 mm | radial | Connector | PNP | Adjustable sensitivity |
| E3F2-DS30B4-M | Diffuse reflective, 300 mm | axial | Pre-wired (2 m)* | PNP | Adjustable sensitivity |
| E3F2-DS30B4-M1-M | Diffuse reflective, 300 mm | axial | Connector | PNP | Adjustable sensitivity |
| E3F2-DS30C41-M | Diffuse reflective, 300 mm | radial | Pre-wired (2 m)* | NPN | Adjustable sensitivity |
| E3F2-DS30C41-M1-M | Diffuse reflective, 300 mm | radial | Connector | NPN | Adjustable sensitivity |
| E3F2-DS30C4-M | Diffuse reflective, 300 mm | axial | Pre-wired (2 m)* | NPN | Adjustable sensitivity |
| E3F2-DS30C4-M1-M | Diffuse reflective, 300 mm | axial | Connector | NPN | Adjustable sensitivity |
| E3F2-R2RB41-M | Retro-reflective, 2 m | radial | Pre-wired (2 m)* | PNP | Polarizing |
| E3F2-R2RB41-M1-M | Retro-reflective, 2 m | radial | Connector | PNP | Polarizing |
| E3F2-R2RB41-M1-M-E | Retro-reflective, 2 m | radial | Connector | PNP | Polarizing, without reflector |
| E3F2-R2RB41-M-E | Retro-reflective, 2 m | radial | Pre-wired (2 m)* | PNP | Polarizing, without reflector |
| E3F2-R2RB4-M | Retro-reflective, 2 m | axial | Pre-wired (2 m)* | PNP | Polarizing |
| E3F2-R2RB4-M1-M | Retro-reflective, 2 m | axial | Connector | PNP | Polarizing |
| E3F2-R2RB4-M1-M-E | Retro-reflective, 2 m | axial | Connector | PNP | Polarizing, without reflector |
| E3F2-R2RB4-M-E | Retro-reflective, 2 m | axial | Pre-wired (2 m)* | PNP | Polarizing, without reflector |
| E3F2-R2RC41-M | Retro-reflective, 2 m | radial | Pre-wired (2 m)* | NPN | Polarizing |
| E3F2-R2RC41-M1-M | Retro-reflective, 2 m | radial | Connector | NPN | Polarizing |
| E3F2-R2RC41-M1-M-E | Retro-reflective, 2 m | radial | Connector | NPN | Polarizing, without reflector |
| E3F2-R2RC41-M-E | Retro-reflective, 2 m | radial | Pre-wired (2 m)* | NPN | Polarizing, without reflector |
| E3F2-R2RC4-M | Retro-reflective, 2 m | axial | Pre-wired (2 m)* | NPN | Polarizing |
| E3F2-R2RC4-M1-M | Retro-reflective, 2 m | axial | Connector | NPN | Polarizing |
| E3F2-R2RC4-M1-M-E | Retro-reflective, 2 m | axial | Connector | NPN | Polarizing, without reflector |
| E3F2-R2RC4-M-E | Retro-reflective, 2 m | axial | Pre-wired (2 m)* | NPN | Polarizing, without reflector |

* Standard cable length is 2 m. Models provided with a 5 m long cable are available. When ordering, specify the cable length by adding the length of the cable (e.g. E3F2-R2RB41-M 5M). For other cable length please contact your OMRON sales representative.

## ■ DC-Switching Models, metal (stainless steel)

| Part number | Sensing method, sensing range | Appearance | Connection (cable-length) | Control output | Comments |
|---|---|---|---|---|---|
| E3F2-7B4-M1-S | Through-beam, 7 m | axial | Connector | PNP | Receiver and Emitter |
| E3F2-7B4-S | Through-beam, 7 m | axial | Pre-wired (2 m)* | PNP | Receiver and Emitter |
| E3F2-7C4-M1-S | Through-beam, 7 m | axial | Connector | NPN | Receiver and Emitter |
| E3F2-7C4-S | Through-beam, 7 m | axial | Pre-wired (2 m)* | NPN | Receiver and Emitter |
| E3F2-7DB4-M1-S | Through-beam, 7 m | axial | Connector | PNP | Receiver only |
| E3F2-7DB4-S | Through-beam, 7 m | axial | Pre-wired (2 m)* | PNP | Receiver only |
| E3F2-7DC4-M1-S | Through-beam, 7 m | axial | Connector | NPN | Receiver only |
| E3F2-7DC4-S | Through-beam, 7 m | axial | Pre-wired (2 m)* | NPN | Receiver only |
| E3F2-7L-M1-S | Through-beam, 7 m | axial | Connector | N.A. | Emitter only |
| E3F2-7L-S | Through-beam, 7 m | axial | Pre-wired (2 m)* | N.A. | Emitter only |
| E3F2-DS10B4-M1-S | Diffuse reflective, 100 mm | axial | Connector | PNP | Wide-beam characteristic |
| E3F2-DS10B4-S | Diffuse reflective, 100 mm | axial | Pre-wired (2 m)* | PNP | Wide-beam characteristic |
| E3F2-DS10C4-M1-S | Diffuse reflective, 100 mm | axial | Connector | NPN | Wide-beam characteristic |
| E3F2-DS10C4-S | Diffuse reflective, 100 mm | axial | Pre-wired (2 m)* | NPN | Wide-beam characteristic |
| E3F2-DS30B4-M1-S | Diffuse reflective, 300 mm | axial | Connector | PNP | Adjustable sensitivity |
| E3F2-DS30B4-S | Diffuse reflective, 300 mm | axial | Pre-wired (2 m)* | PNP | Adjustable sensitivity |
| E3F2-DS30C4-M1-S | Diffuse reflective, 300 mm | axial | Connector | NPN | Adjustable sensitivity |
| E3F2-DS30C4-S | Diffuse reflective, 300 mm | axial | Pre-wired (2 m)* | NPN | Adjustable sensitivity |
| E3F2-R2RB4-M1-S | Retro-reflective, 2 m | axial | Connector | PNP | Polarizing |
| E3F2-R2RB4-M1-S-E | Retro-reflective, 2 m | axial | Connector | PNP | Polarizing, without reflector |
| E3F2-R2RB4-S | Retro-reflective, 2 m | axial | Pre-wired (2 m)* | PNP | Polarizing |
| E3F2-R2RB4-S-E | Retro-reflective, 2 m | axial | Pre-wired (2 m)* | PNP | Polarizing, without reflector |
| E3F2-R2RC4-M1-S | Retro-reflective, 2 m | axial | Connector | NPN | Polarizing |
| E3F2-R2RC4-M1-S-E | Retro-reflective, 2 m | axial | Connector | NPN | Polarizing, without reflector |
| E3F2-R2RC4-S | Retro-reflective, 2 m | axial | Pre-wired (2 m)* | NPN | Polarizing |
| E3F2-R2RC4-S-E | Retro-reflective, 2 m | axial | Pre-wired (2 m)* | NPN | Polarizing, without reflector |

* Standard cable length is 2 m. Models provided with a 5 m long cable are available. When ordering, specify the cable length by adding the length of the cable (e.g. E3F2-R2RB41-S 5M). For other cable length please contact your OMRON sales representative.

## ■ AC-Switching Models, plastic

| Part number | Sensing method, sensing range | Appearance | Connection (cable-length) | Control output | Comments |
|---|---|---|---|---|---|
| E3F2-3LZ | Through-beam, 3 m | axial | Pre-wired (2 m)* | N.A. | Emitter only |
| E3F2-3DZ1 | Through-beam, 3 m | axial | Pre-wired (2 m)* | Light-ON | Receiver only |
| E3F2-3DZ2 | Through-beam, 3 m | axial | Pre-wired (2 m)* | Dark-ON | Receiver only |
| E3F2-3Z1 | Through-beam, 3 m | axial | Pre-wired (2 m)* | Light-ON | Receiver and Emitter |
| E3F2-3Z2 | Through-beam, 3 m | axial | Pre-wired (2 m)* | Dark-ON | Receiver and Emitter |
| E3F2-R2Z1 | Retro-reflective, 2 m | axial | Pre-wired (2 m)* | Light-ON | Non-polarizing |
| E3F2-R2Z2 | Retro-reflective, 2 m | axial | Pre-wired (2 m)* | Dark-ON | Non-polarizing |
| E3F2-R2Z1-E | Retro-reflective, 2 m | axial | Pre-wired (2 m)* | Light-ON | Non-polarizing, without reflector |
| E3F2-R2Z2-E | Retro-reflective, 2 m | axial | Pre-wired (2 m)* | Dark-ON | Non-polarizing, without reflector |
| E3F2-DS10Z1-N | Diffuse reflective, 100 mm | axial | Pre-wired (2 m)* | Light-ON | Wide-beam characteristic |
| E3F2-DS10Z2-N | Diffuse reflective, 100 mm | axial | Pre-wired (2 m)* | Dark-ON | Wide-beam characteristic |

* Standard cable length is 2 m. Models provided with a 5 m long cable are available. When ordering, specify the cable length by adding the length of the cable (e.g. E3F2-R2Z1 5M). For other cable length please contact your OMRON sales representative.

# Specifications

## ■ Ratings / Characteristics of DC Switching Models

| Item | | E3F2-7B4-☐<br>E3F2-7C4-☐ | E3F2-R2B4-☐<br>E3F2-R2C4-☐ | E3F2-R2RB4-☐<br>E3F2-R2RC4-☐<br>E3F2-R2RB41-☐<br>E3F2-R2RC41-☐ | E3F2-DS10B4-☐<br>E3F2-DS10C4-☐ | E3F2-DS30B4-☐<br>E3F2-DS30C4-☐<br>E3F2-DS30B41-☐<br>E3F2-DS30C41-☐ |
|---|---|---|---|---|---|---|
| Sensing method | | Through-beam | Retro-reflective | | Diffuse reflective | |
| | | | non-polarizing (without MSR function) | polarizing (with MSR function) | wide-beam characteristic | adjustable sensing distance |
| Power supply voltage | | 10 to 30 V DC | | | | |
| Current consumption | | 45 mA max. | 25 mA max. | 30 mA max. | 25 mA max. | 30 mA max. |
| Rated sensing distance (See note 1) | | 7m | 0.1 - 2 m (with reflector E39-R1) | 0.1 - 2 m (with reflector E39-R1) | 100 mm (5 x 5 cm white mat paper) | 300 mm (10 x 10 cm white mat paper) |
| Typical sensing distance for different reflector types (ref. to accessories) (See note 2) | | – | E39-R1:4.0 m<br>E39-R7:4.5 m<br>E39-R8:5.3 m | E39-R1: axial 3.7 m radial 2.4 m<br>E39-R7: axial 4.2 m radial 2.7 m<br>E39-R8: axial 5.3 m radial 3.1 m | – | |
| Standard object | | Opaque: 11 mm dia. min. | Opaque: 56 mm dia. min. | | – | |
| Directional angle | | 3° to 20° | 3° to 20° | 3° to 20° | – | |
| Differential travel (hysteresis) | | – | | | 20 % max. | |
| Response time | | Operation and Reset: 2.5 ms max. | | | | |
| Control output | | Transistor (open collector), load current: 100 mA max. (residual voltage: 2 V max.) | | | | |
| Power reset time | | 50 ms | | | | |
| Ambient illumination | | Incandescent lamp: 3000 lx max.<br>Sunlight: 10000 lx max. | | | | |
| Ambient temperature | | Operating: -25 to 55 °C (-13 to 131°F) / Storage: -30 to 70 °C (-22 to158°F) with no icing or condensation | | | | |
| Ambient humidity | | Operating: 35 % to 85 % / Storage: 35 % to 95 % without condensation | | | | |
| Insulation resistance | | 20 MΩ min. at 500 V DC between current carrying parts and case | | | | |
| Dielectric strength | | 1000 VAC max. , 50 / 60 Hz for 1 min between current carrying parts and case | | | | |
| Vibration resistance | | 10 to 55 Hz, 1.5 mm double amplitude for 2 hrs each direction (X, Y, Z) | | | | |
| Shock resistance | | Destruction: 500 $m/s^2$ each direction (X, Y, Z) | | | | |
| Enclosure ratings | | IP67 (See note 3); NEMA 1, 2, 4 | | | | |
| Light source | | Infrared LED (880 nm) | | Red LED (660 nm) | Infrared LED (880 nm) | |
| Indicators | | Light incident / power indicator for light source (red) | | | | |
| Sensitivity adjustment | | Fixed | | | | Adjustable |
| Connection method | | 2 m, 5 m pre-wired cable (PVC, dia. 4 mm (18 / 0.12)), wire or M12-connector | | | | |
| Operation mode | | Light-ON or Dark-ON selectable by wiring | | | | |
| Weight (approx.) | | | | | | |
| Plastic case | pre-wired (2 m) | 120 g (4.23 oz) | 60 g (2.12 oz) | | | |
| | connector | 40 g (1.41 oz) | 20 g (0.71 oz) | | | |
| Metal case | pre-wired (2 m) | 180 g (6.35 oz) | 90 g (3.17 oz) | | | |
| | connector | 120 g (4.23 oz) | 50 g (1.76 oz) | | | |
| Circuit protection | | Output short-circuit and power supply reverse polarity | | | | |
| Housing materials (See note 4) | | Plastic | Plastic | Plastic (only radial type) | Plastic | Plastic |
| | | Nickel brass | – | Nickel brass | Nickel brass | Nickel brass |
| | | Stainless steel | – | Stainless steel | Stainless steel | Stainless steel |

**Note:** **1.** For stable sensing distance in detail, refer to the *Engineering Data* section.

**2.** Typical sensing distance corresponds to 80 % of the max. sensing distance.

**3.** The enclosure rating IP67 of OMRON internal standards correspond to stricter test requirements than the standard IEC 60529 (refer to chapter “Precautions”).

**4.** Material-specification for stainless steel housing case: 1.4305 (W.-No.), 303 (AISI), 2346 (SS).

## ■ Ratings / Characteristics of AC Switching Models

| Item | E3F2-3Z1<br>E3F2-3Z2 | E3F2-R2Z1<br>E3F2-R2Z2 | E3F2-DS10Z1<br>E3F2-DS10Z2 |
|---|---|---|---|
| Sensing method | Through-beam | Non-polarizing retro-reflective | Diffuse reflective<br>(wide-beam characteristic) |
| Power supply voltage | 24 to 240 VAC ±10 %, 50 / 60 Hz | | |
| Current consumption | 10 mA max. | 5 mA max. | |
| Rated sensing distance<br>(See note 1) | 3 m | 0.1 - 2 m<br>(with reflector E39-R1) | 100 mm<br>(5 x 5 cm white mat paper) |
| Typical sensing distance for different reflector types<br>(See note 2) | – | E39-R1: 3,4 m<br>E39-R7: 3,9 m<br>E39-R8: 5,2 m | – |
| Detectable object | Opaque object: 11 mm min. | Opaque object: 56 mm min. | Opaque objects |
| Directional angle | 3° to 20° | | – |
| Differential travel | – | | 20 % max. |
| Response time | 30 ms max. | | |
| Control output | AC solid state (SCR) 200 mA max.; residual voltage: 5 V max. at 200 mA | | |
| Power reset time | 100 ms | | |
| Ambient illumination | Incandescent lamp: 3000 lx max. Sunlight: 10000 lx max. | | |
| Ambient temperature | Operating: -25 to 55 °C (-13 to 131°F) / Storage: -30 to 70 °C (-22 to158°F) with no icing or condensation | | |
| Ambient humidity | Operating: 35 % to 85 % / Storage: 35 % to 95 % without condensation | | |
| Insulation resistance | 20 MΩ min. at 500 V DC between current carrying parts and case | | |
| Dielectric strength | 1500 VAC, 50 / 60 Hz for 1 min between current carrying parts and case | | |
| Vibration resistance | 10 to 55 Hz, 1.5 mm double amplitude for 2 hrs each direction (X, Y, Z) | | |
| Shock resistance | 500 m/sqr (approx. 50 g) for each direction (X, Y, Z) | | |
| Enclosure rating | IP67 (See note 3); NEMA 1, 2, 4 | | |
| Light source | Infrared LED (880 nm) | | |
| Indicators | Light incident/power indicator for light source (red) | | |
| Sensitivity adjustment | Fixed | | |
| Connection method | 2 m, 5 m pre-wired cable (PVC dia. 4 mm (14 / 0.15)) | | |
| Operation mode | Light-ON or Dark-ON (fixed) | | |
| Circuit protection | None | | |
| Weight (approx.) | 110 g (3.88 oz) pre-wired 2 m cable | | |
| Housing materials | Case: ABS, lens: Acrylate resin | | |

**Note:** **1.** For stable sensing distance in detail, refer to the *Engineering Data* section.

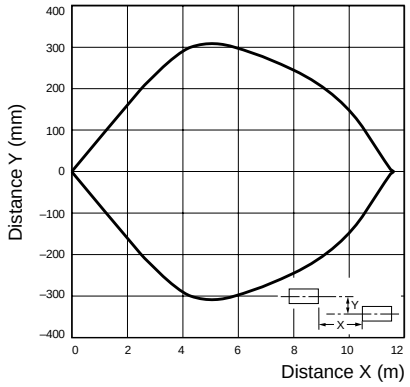
**2.** Typical sensing distance corresponds to 80 % of the max. sensing distance.

**3.** The enclosure rating IP67 of OMRON internal standards correspond to stricter test requirements than the standard IEC 60529 (refer to chapter “Precautions”).

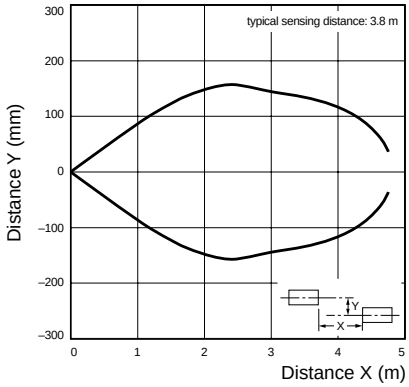
# Engineering Data (Typical)

## ■ Operating Range (typical)

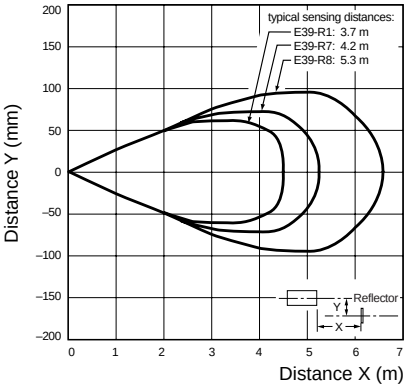
**Through-beam Models (axial)**
**E3F2-7□4-□**



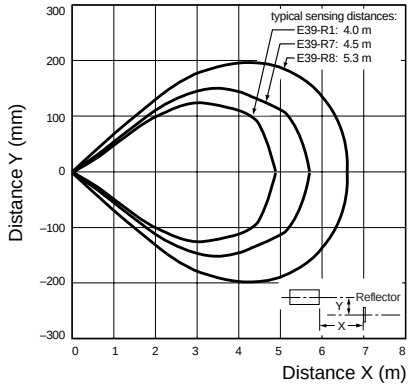

**Through-beam Models (axial)**
**E3F2-3Z□**



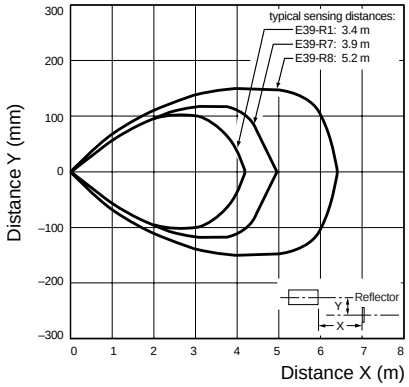

**Retro-reflective Models (axial)**
**E3F2-R2R□4-□ (polarizing) and reflectors**



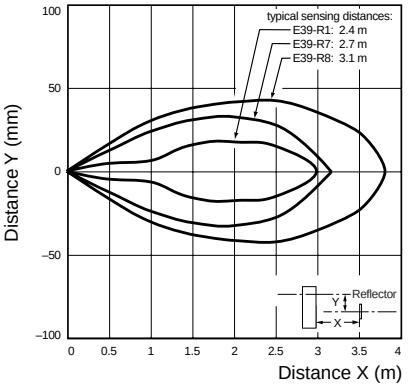

**Retro-reflective Models (axial)**
**E3F2-R2□4-□ (non polarizing)**
**and reflectors**



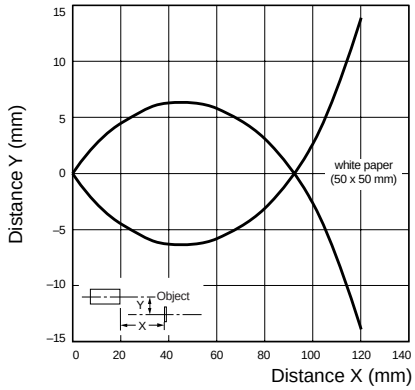

**Retro-reflective Models (axial)**
**E3F2-R2Z□ (non polarizing)**
**and reflectors**



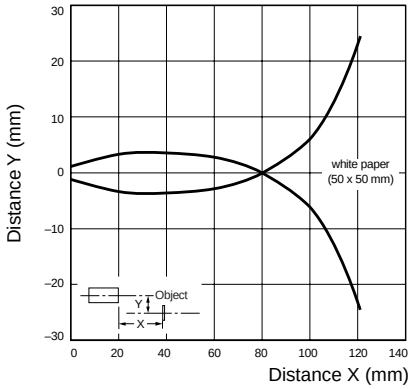

**Retro-reflective Models (radial)**
**E3F2-R2R□41-□ (polarizing)**
**and reflectors**



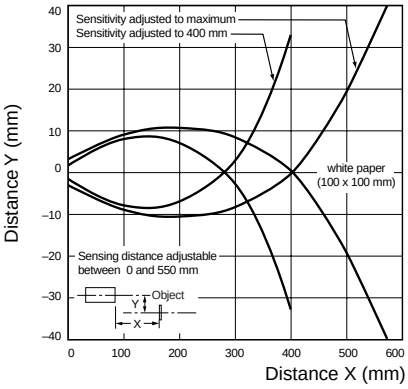

**Diffuse reflective Models (axial)**
**E3F2-DS10□4-□ (wide-beam type)**



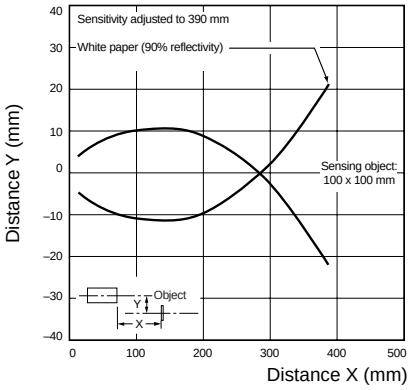

**Diffuse reflective Models (axial)**
**E3F2-DS10Z-□ (wide-beam type)**




**Diffuse reflective Models (axial)**
**E3F2-DS30□4-□**

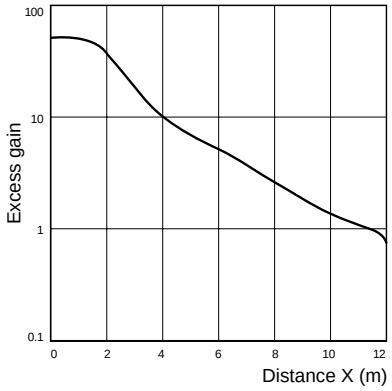


**Diffuse reflective Models (radial)**
**E3F2-DS30□41-□**

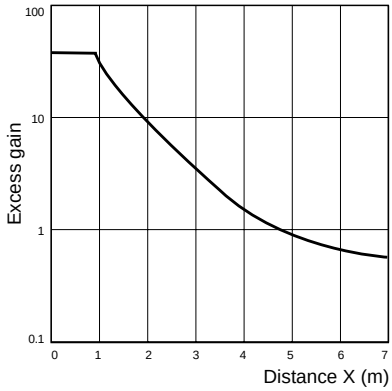



## ■ Excess Gain Ratio vs. Distance (typical)

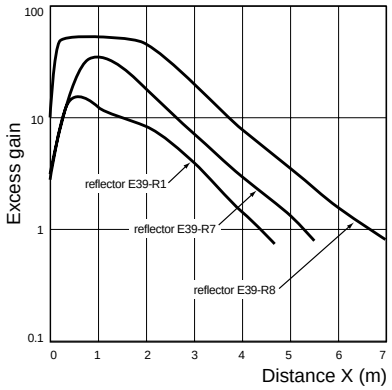
**Through-beam Models (axial) E3F2-7□4-□**



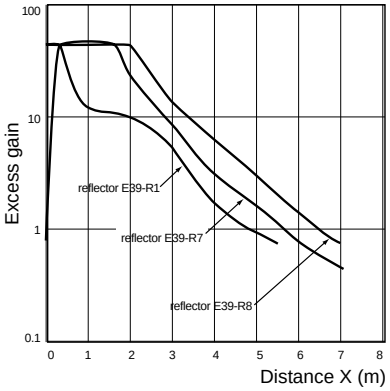

**Through-beam Models (axial) E3F2-3Z□**



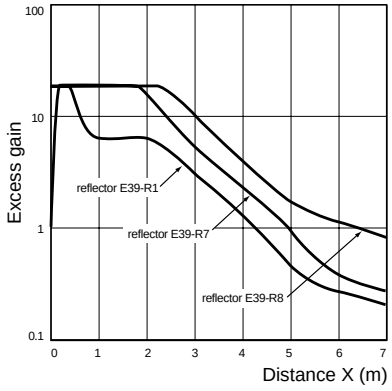

**Retro-reflective Models (axial)**
**E3F2-R2R□4-□ (polarizing)**
**and reflectors**



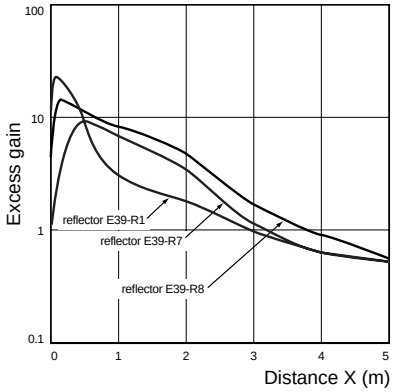

**Retro-reflective Models (axial)**
**E3F2-R2□4-□ (non polarizing)**
**and reflectors**



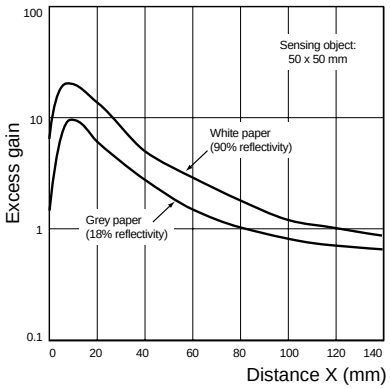

**Retro-reflective Models (axial)**
**E3F2-R2Z□ (non polarizing)**
**and reflectors**



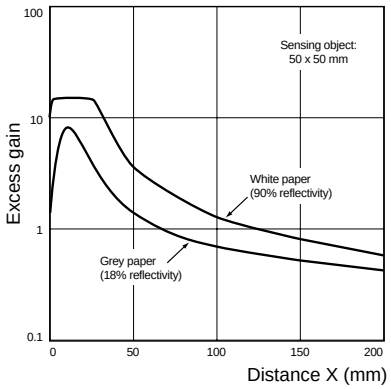

**Retro-reflective Models (radial)**
**E3F2-R2R□41-□ (polarizing)**
**and reflectors**



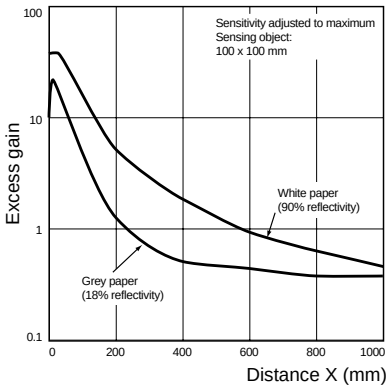
**Diffuse reflective Models (axial)**
**E3F2-DS10□4-□ (wide-beam type)**



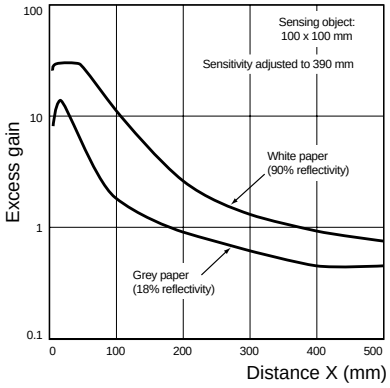

**Diffuse reflective Models (axial)**
**E3F2-DS10Z-□ (wide-beam type)**




**Diffuse reflective Models (axial)**
**E3F2-DS30□4-□**




**Diffuse reflective Models (radial)**
**E3F2-DS30□41-□**

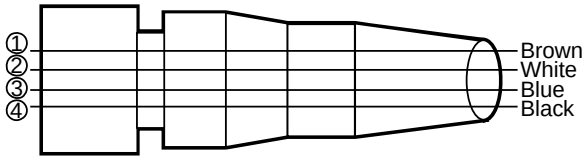


# Operation

## ■ Output Circuits

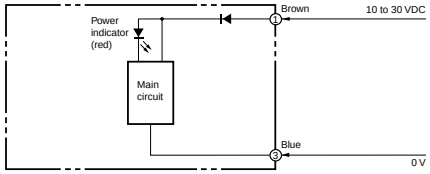
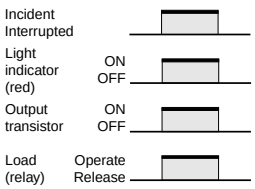
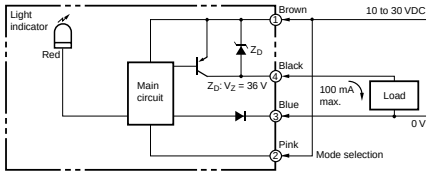
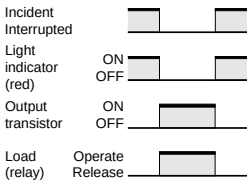
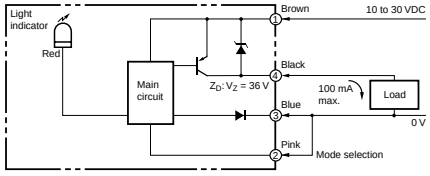
### Structure of Sensor I/O Connector

| Classification | Wire color | Connector pin No. | Use |
|---|---|---|---|
| DC | Brown | ① | Power supply (+V) |
| | White | ② | Mode selection Lon/Don |
| | Blue | ③ | Power supply (0 V) |
| | Black | ④ | Output |

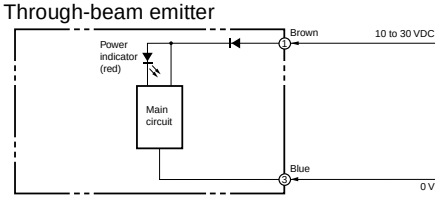
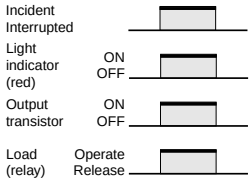
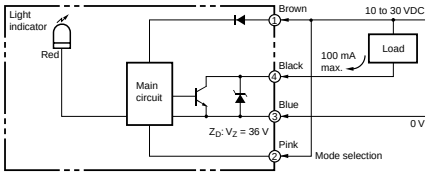
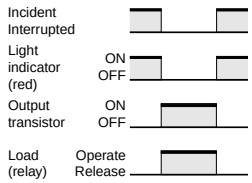
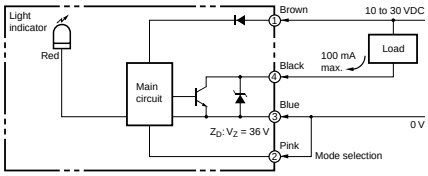



XS2F-D42□-D80-□
XS2F-G42□-G80-□

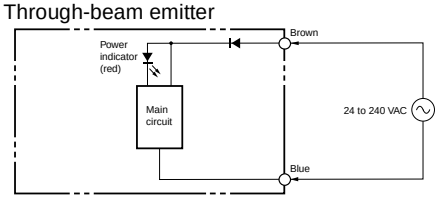
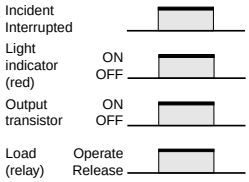
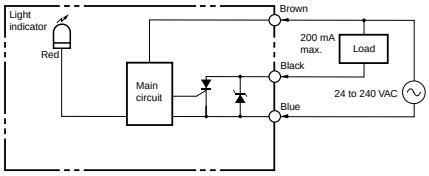
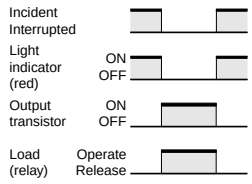
### PNP Output

| Part number | Output transistor status | Timing chart | Connection method | Output circuit |
|---|---|---|---|---|
| E3F2-7B4<br>E3F2-7B4-M<br>E3F2-7B4-M1-M<br>E3F2-7B4-M1-S<br>E3F2-7B4-P1<br>E3F2-7B4-S<br>E3F2-DS10B4-M<br>E3F2-DS10B4-M1-M<br>E3F2-DS10B4-M1-S<br>E3F2-DS10B4-N<br>E3F2-DS10B4-P1<br>E3F2-DS10B4-S<br>E3F2-DS30B4<br>E3F2-DS30B41<br>E3F2-DS30B41-M<br>E3F2-DS30B41-M1-M<br>E3F2-DS30B41-P1<br>E3F2-DS30B4-M<br>E3F2-DS30B4-M1-M<br>E3F2-DS30B4-M1-S<br>E3F2-DS30B4-P1<br>E3F2-DS30B4-S<br>E3F2-R2B4<br>E3F2-R2B4-P1<br>E3F2-R2RB41<br>E3F2-R2RB41-M<br>E3F2-R2RB41-M1-M<br>E3F2-R2RB41-P1<br>E3F2-R2RB4-M<br>E3F2-R2RB4-M1-M<br>E3F2-R2RB4-M1-S<br>E3F2-R2RB4-S | – | – | – | Through-beam emitter<br>  <br>**Connector Pin Arrangement**<br> |
| | ON when light is incident. (Light-ON) |  | Connect the pink (Pin ②) and brown (Pin ①) wires or open the pink wire (Pin ②). |  <br>**Connector Pin Arrangement**<br> |
| | ON when light is interrupted. (Dark-ON) |  | Connect the pink and blue wires. |  <br>**Connector Pin Arrangement**<br> |

## NPN Output

| Part number | Output transistor status | Timing chart | Connection method | Output circuit |
|---|---|---|---|---|
| E3F2-7C4<br>E3F2-7C4-M<br>E3F2-7C4-M1-M<br>E3F2-7C4-M1-S<br>E3F2-7C4-P1<br>E3F2-7C4-S<br>E3F2-DS10C4-M<br>E3F2-DS10C4-M1-M<br>E3F2-DS10C4-M1-S<br>E3F2-DS10C4-N<br>E3F2-DS10C4-P1<br>E3F2-DS10C4-S<br>E3F2-DS30C4<br>E3F2-DS30C41<br>E3F2-DS30C41-M<br>E3F2-DS30C41-M1-M<br>E3F2-DS30C41-P1<br>E3F2-DS30C4-M<br>E3F2-DS30C4-M1-M<br>E3F2-DS30C4-M1-S<br>E3F2-DS30C4-P1<br>E3F2-DS30C4-S<br>E3F2-R2C4<br>E3F2-R2C4-P1<br>E3F2-R2RC41<br>E3F2-R2RC41-M<br>E3F2-R2RC41-M1-M<br>E3F2-R2RC41-P1<br>E3F2-R2RC4-M<br>E3F2-R2RC4-M1-M<br>E3F2-R2RC4-M1-S<br>E3F2-R2RC4-S | – | – | – | Through-beam emitter<br>  <br>**Connector Pin Arrangement**<br> |
| | ON when light is incident. (Light-ON) |  | Connect the pink (Pin ②) and brown (Pin ①) wires or open the pink wire (Pin ②). |  <br>**Connector Pin Arrangement**<br> |
| | ON when light is interrupted. (Dark-ON) |  | Connect the pink and blue wires. |  <br>**Connector Pin Arrangement**<br> |

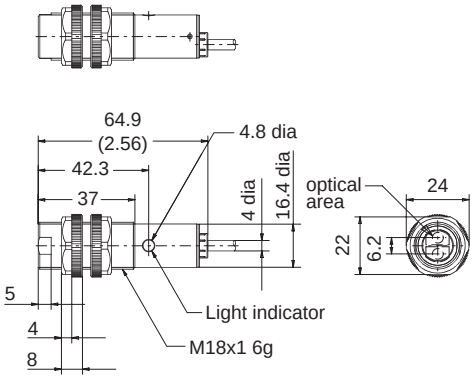
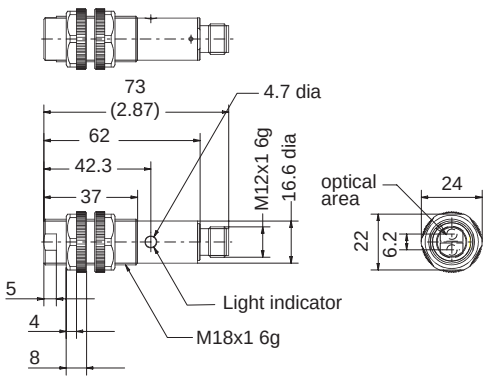
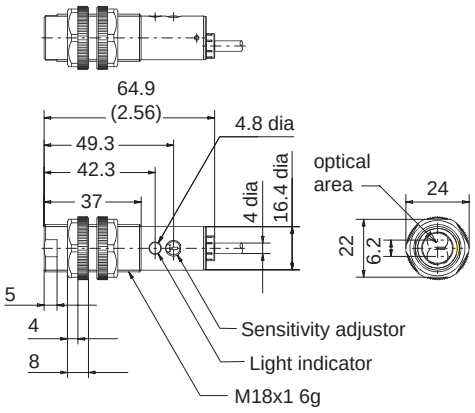
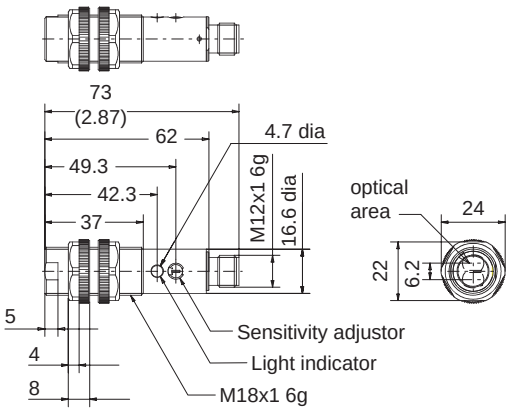
## AC Output

| Part number | Output transistor status | Timing chart | Connection method | Output circuit |
|---|---|---|---|---|
| E3F2-3LZ | – | – | – | Through-beam emitter   |
| E3F2-3Z1<br>E3F2-R2Z1<br>E3F2-DS10Z1-N | ON when light is incident. (Light-ON) |   | – |   |
| E3F2-3Z2<br>E3F2-R2Z2<br>E3F2-DS10Z2-N | ON when light is interrupted. (Dark-ON) |   | – | |

# Dimensions

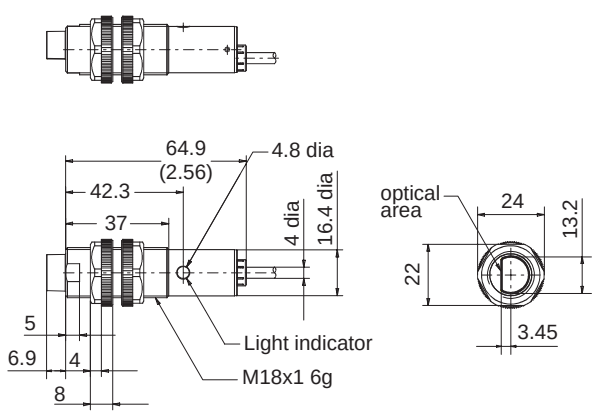
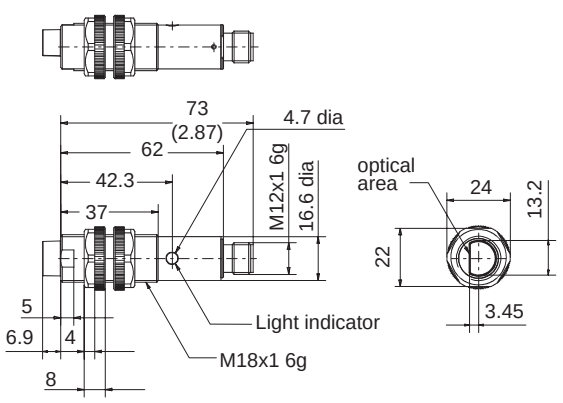
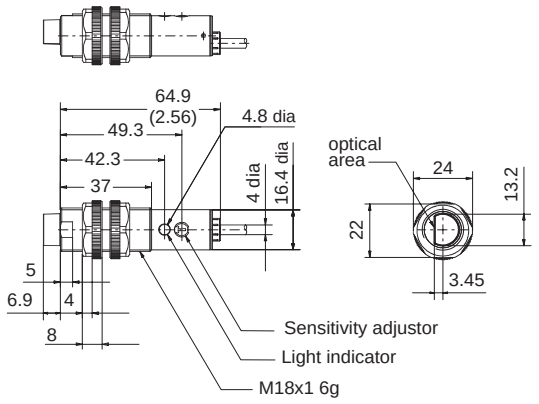
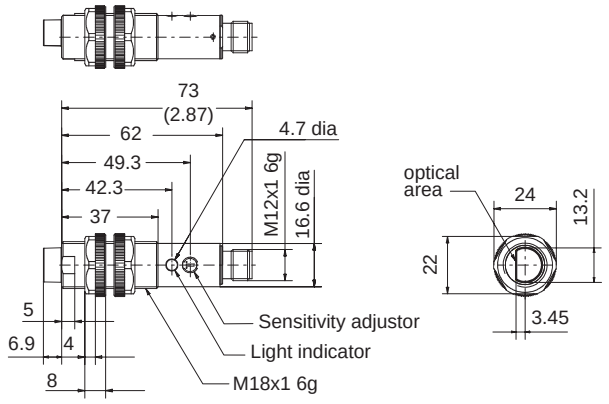
Unit: mm (inch)

## ■ DC-Switching Models, plastic, axial type

| Cable type | Connector type |
|---|---|
| Without potentiometer | |
| **E3F2-7L,**<br>**E3F2-7D□4,**<br>**E3F2-R2□4,**<br>**E3F2-DS10□4-N**<br>  | **E3F2-7L-P1,**<br>**E3F2-7D□4 –P1,**<br>**E3F2-R2□4-P1,**<br>**E3F2-DS10□4-P1**<br>  |
| With potentiometer | |
| **E3F2-DS30□4**<br>  | **E3F2-DS30□4-P1**<br>  |

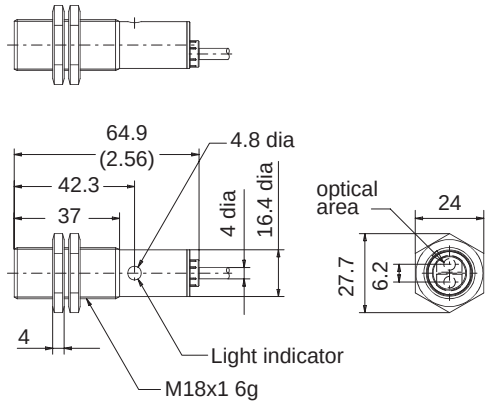
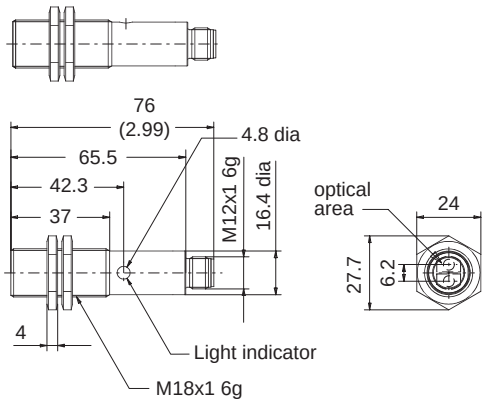
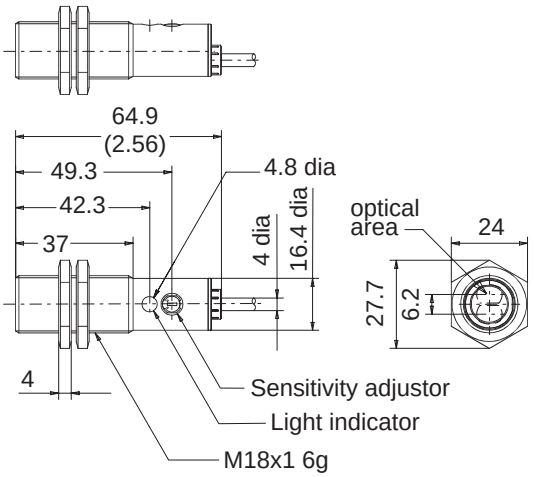
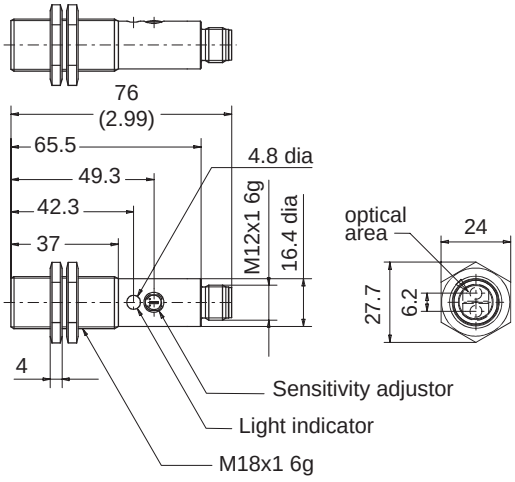
Unit: mm (inch)

## ■ DC-Switching Models, plastic, radial type

| Cable type | Connector type |
|---|---|
| Without potentiometer | |
| **E3F2-R2R□41**<br>  | **E3F2-R2R□41-P1**<br>  |
| With potentiometer | |
| **E3F2-DS30□41**<br>  | **E3F2-DS30□41-P1**<br>  |

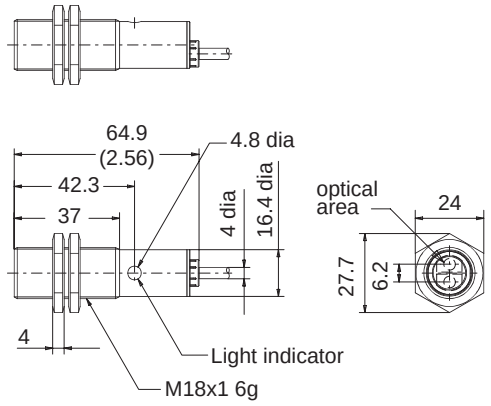
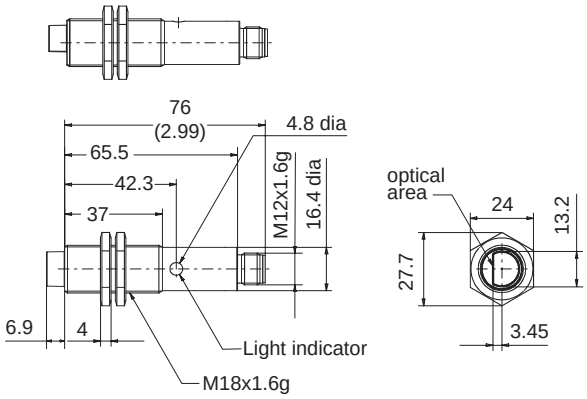
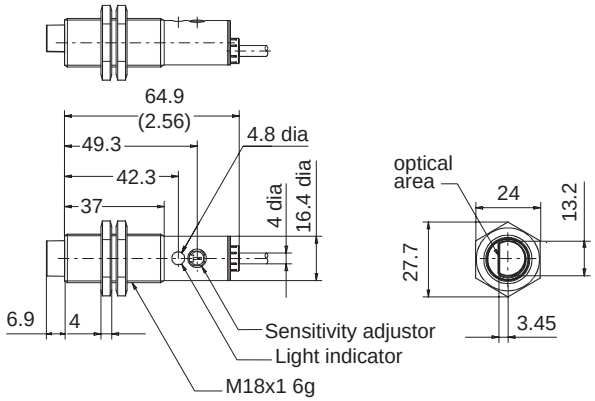
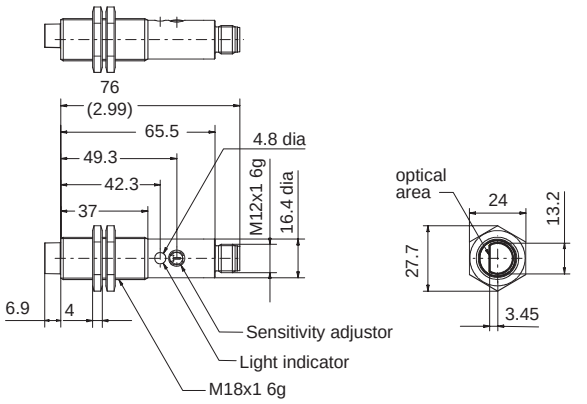
Unit: mm (inch)

## ■ DC-Switching Models, metal (brass and stainless steel), axial type

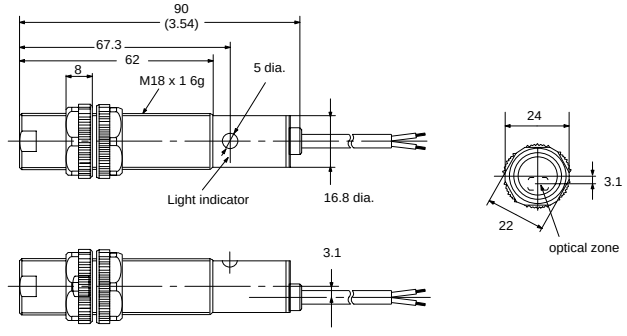
| Cable type | Connector type |
|---|---|
| Without potentiometer | |
| **E3F2-7L-M,** **E3F2-DS10□4-S**<br>**E3F2-7L-S,** **E3F2-7D□4-S,**<br>**E3F2-7D□4-M,** **E3F2-R2R□4-S,**<br>**E3F2-R2R□4-M,** **E3F2-DS10□4-M,** | **E3F2-7L-M1-M,** **E3F2-R2R□4-M1-M,**<br>**E3F2-7L-M1-S,** **E3F2-R2R□4-M1-S,**<br>**E3F2-7D□4-M1-M,** **E3F2-DS10□4-M1-M,**<br>**E3F2-7D□4-M1-S,** **E3F2-DS10□4-M1-S** |
|  |  |
| With potentiometer | |
| **E3F2-DS30□4-M**,<br>**E3F2-DS30□4-S** | **E3F2-DS30□4-M1-M**,<br>**E3F2-DS30□4-M1-S** |
|  |  |

Unit: mm (inch)

## ■ DC-Switching Models, metal (brass and stainless steel), radial type

| Cable type | Connector type |
|---|---|
| Without potentiometer | |
| **E3F2-R2R□41-M**,<br>**E3F2-R2R□41-S**<br>  | **E3F2-R2R□41-M1**,<br>**E3F2-R2R□41-M1-S**<br>  |
| With potentiometer | |
| **E3F2-DS30□41-M**,<br>**E3F2-DS30□41-S**<br>  | **E3F2-DS30□41-M1-M**,<br>**E3F2-DS30□41-M1-S**<br>  |

## ■ AC-Switching Models, plastic, axial type

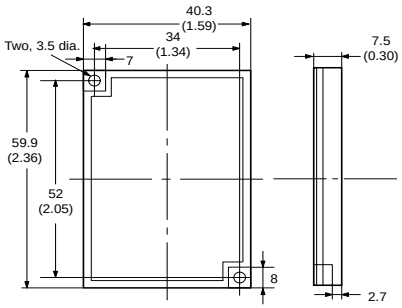
| Cable type |
|---|
| Without potentiometer |
| **E3F2-3Z□**,<br>**E3F2-R2Z□**,<br>**E3F2-DS10Z□-N**<br>  |

Unit: mm (inch)

## ■ Accessories (Order Separately)

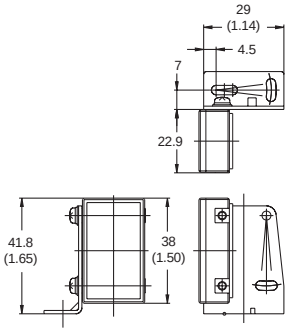
Reflectors

**E39-R1**



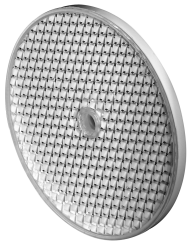

**Material: Surface: Acrylic resin Backside: ABS resin**

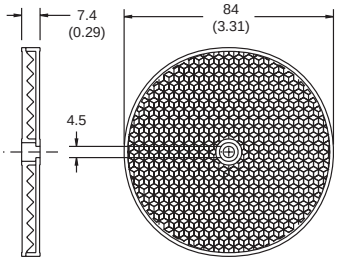
**E39-R3 (incl. mounting bracket)**



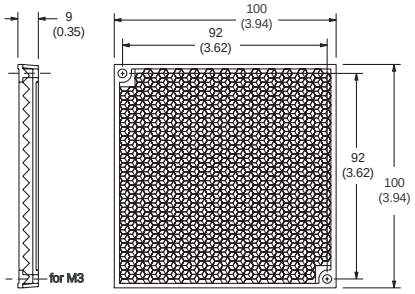

**Material: Surface: Acrylic resin Backside: ABS resin**

**E39-R7**



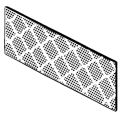


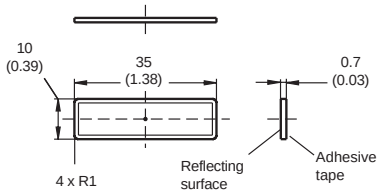

**E39-R8**



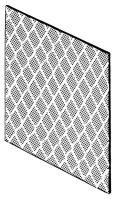

Tape Reflectors

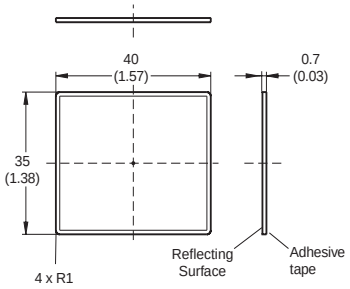
**E39-RSA**



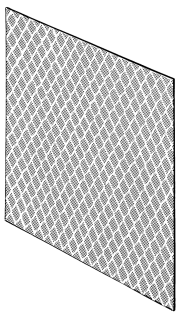


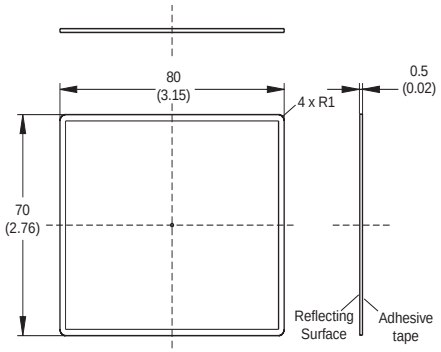

**E39-RSB**






**E39-RS3**



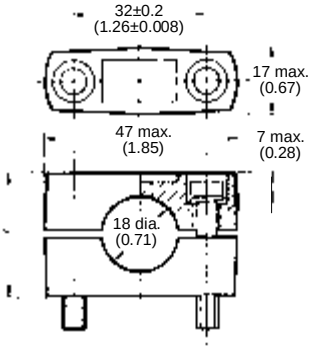



**Material:** Acrylic resin

Unit: mm (inch)

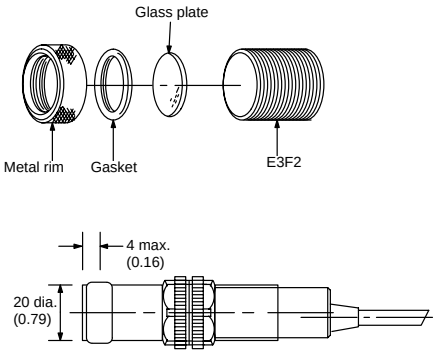
Mounting

**Mounting Bracket**
**Y92E-B18**




**Note: Hexagonal bolt: M5 x 32** **Material: plastic**

**Lens Cap**
**E39-F31**




# Precautions

**⚠ WARNING**

The E3F2 Photoelectric Sensor is not a safety component for ensuring the safety of people which is defined in EC directive (91/368/EEC) and covered by separate European standards or by any other regulations or standards.

## ■ Degree of protection

The E3F2 photoelectric sensors have a degree of protection rated with IP67. In this case, the sensors have passed the OMRON heat shock test before the IP67-test of IEC 60529 (submersion at 1m water depth for 30 min). Afterwards the sensors have been tested according to the OMRON waterproof test.

**Heat shock:** Alternating, fast temperature changes between -25°C and +55°C are executed for 5 cycles and 1 hour for each temperature. Function and isolation is checked.

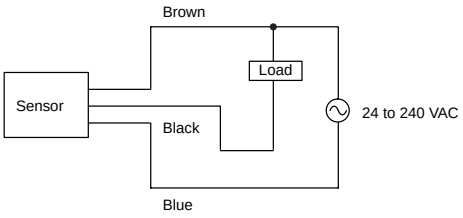
**Water proof:** The sensors are submersed alternating in water of +2°C and +55°C. 20 cycles with 1 hour for each temperature are executed. Function, water tightness and electrical isolation is checked.

Do not subject the photoelectric sensor to excessive shock when mounting, keeping within IP 67 standards.

## ■ Wiring

If the input/output lines of the photoelectric sensor are placed in the same conduit or duct as power lines or high-voltage lines, the photo-electric sensor could be induced to malfunction, or even be damaged, by electrical noise. Separate the wiring, or use shielded lines as input/output lines to the photoelectric sensor.

Do not connect the black wire to the brown wire without a load. Direct connection of these wires may damage the photoelectric sensor (AC switching type).

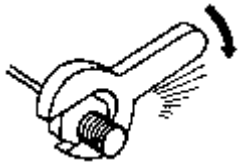



When you use the photoelectric sensor in the vicinity of an inverter motor, be sure to connect the protective earth ground wire of the motor to earth. Failure to ground the motor may result in malfunction of the sensor.

## ■ Mounting

Do not exceed a torque of

- 2.0 Nm ( 20 kgf cm) when tightening mounting nuts for plastic models
- 20.0 Nm (200 kgf cm) when tightening mounting nuts for metal models



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