

FA Series LED Photoelectric Sensors



M18 (18mm) plastic - DC

- Diffuse, polarized reflective, and through-beam models with long sensing distances
- Plastic housing
- Axial cable or M12 quick-disconnect models
- NPN or PNP; Complementary N.O./N.C. outputs
- IP67 rated



FA Series Photoelectric Sensors Selection Chart

| Part Number | | Price | Sensing Range | Output State | Logic | Connection | Wiring | Dimensions | Characteristic Curves |
|-----------------------------------|----------|---------|-------------------|----------------------------|-----------------------|-------------------------|-----------|------------|-----------------------|
| Diffuse | | | | | | | | | |
| <u>FAI8-BN-0A</u> | | Retired | 1m [39.37 in] | Complementary N.O./N.C. | NPN | 2m [6.5 ft] axial cable | Diagram 1 | Figure 1 | Chart 1 |
| <u>FAI8-BP-0A</u> | | Retired | | | PNP | 2m [6.5 ft] axial cable | Diagram 2 | Figure 1 | Chart 1 |
| <u>FAI8-BN-0E</u> | | Retired | | | NPN | M12 [12mm] connector | Diagram 1 | Figure 2 | Chart 1 |
| <u>FAI8-BP-0E</u> | | Retired | | | PNP | M12 [12mm] connector | Diagram 2 | Figure 2 | Chart 1 |
| Polarized reflective* | | | | | | | | | |
| <u>FARN-BN-0A</u> | | Retired | 3m [118.11 in] | Complementary N.O./N.C. | NPN | 2m [6.5 ft] axial cable | Diagram 1 | Figure 1 | Chart 2 |
| <u>FARN-BP-0A</u> | | Retired | | | PNP | 2m [6.5 ft] axial cable | Diagram 2 | Figure 1 | Chart 2 |
| <u>FARN-BN-0E</u> | | Retired | | | NPN | M12 [12mm] connector | Diagram 1 | Figure 2 | Chart 2 |
| <u>FARN-BP-0E</u> | | Retired | | | PNP | M12 [12mm] connector | Diagram 2 | Figure 2 | Chart 2 |
| Through-beam** | | | | | | | | | |
| <u>FAID-BN-0A</u> | Receiver | Retired | 20m [65.62 ft] | Complementary N.O./N.C. | NPN | 2m [6.5 ft] axial cable | Diagram 1 | Figure 1 | Chart 3 |
| <u>FAID-BP-0A</u> | Receiver | Retired | | | PNP | 2m [6.5 ft] axial cable | Diagram 2 | Figure 1 | Chart 3 |
| <u>FAID-BN-0E</u> | Receiver | Retired | | | NPN | M12 [12mm] connector | Diagram 1 | Figure 2 | Chart 3 |
| <u>FAID-BP-0E</u> | Receiver | \$43.00 | | | PNP | M12 [12mm] connector | Diagram 2 | Figure 2 | Chart 3 |
| <u>FAIH-00-0A</u> | Emitter | Retired | | | Receiver dependent | 2m [6.5 ft] axial cable | Diagram 3 | Figure 1 | Chart 3 |
| <u>FAIH-00-0E</u> | Emitter | Retired | | | | M12 [12mm] connector | Diagram 3 | Figure 2 | Chart 3 |

*Purchase reflectors separately.

**Purchase one receiver and one emitter for a complete set.

Wiring Diagrams

Diagram 1

NPN Output

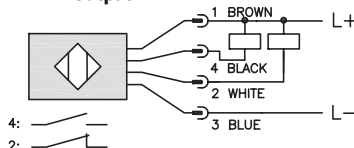


Diagram 2

PNP Output

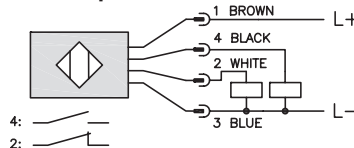
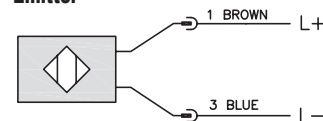


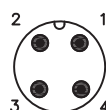
Diagram 3

Emitter



Connector

M12 connector



Note: N.O. = Signal ON when emitter is NOT sensing receiver.

N.C. = Signal ON when emitter is sensing receiver.

Switching Element Function

| | Through-Beam and Reflective Models | Diffuse Models |
|----------|------------------------------------|----------------|
| Light-on | N.C. | N.O. |
| Dark-on | N.O. | N.C. |

FA Series LED Photoelectric Sensors

| FA LED Series Specifications | | | |
|-------------------------------------|---|-----------------------------------|--|
| Mounting Type | Diffuse Models | Reflective Models | Through-Beam Models |
| | Diffuse reflection | Polarized reflection ¹ | Through-beam ⁴ |
| Sensing Distance | 1m ¹ | 3m ² | 20m |
| Light Spot Diameter | 180mm @ 800mm | 200mm @ 4m | 600mm @ 20m |
| Emission | Infrared [880nm] | Red [660nm] | Infrared [880nm] |
| Sensitivity | Adjustable | | |
| Output Type | NPN or PNP - Complementary N.O./N.C. | | |
| Operating Voltage | 10-30 VDC | | |
| No-load Supply Current | < 30mA | | < 25mA |
| Operating (Load) Current | < 100mA | | |
| Off-state (Leakage) Current | < 10µA | | |
| Voltage Drop | 2V max at 100mA | | |
| Switching Frequency | 250Hz | | |
| Ripple | <10% | | |
| Time Delay Before Availability (tv) | 200ms | | |
| Short-Circuit Protection | Yes, switch auto-resets after load is removed | | |
| Operating Temperature | -25 to 70°C [-13 to 158°F]; Drift: 10% Sr | | |
| Protection Degree (DIN 40050) | IEC IP67 | | |
| LED Indicators/Switching Status | Yellow (output energized) | | Receiver: Yellow (output energized) Emitter: Green (power ON) |
| Housing Material | Polybutylene Terephthalate [PBT] | | |
| Lens Material | Polycarbonate [PC] | PMMA | Polycarbonate [PC] |
| Shock/Vibration | See terminology section | | |
| Tightening Torque | 1 Nm [0.737 lb-ft] | | |
| Weight (cable/M12 connector) | 100g [3.53 oz] | | Emitter + Receiver 200g [7.05 oz] |
| Connection | 2m [6.5 ft] axial cable; M12 [12mm] connector. Two lock nuts included | | |
| Agency Approvals | UL file E187310, CE | | |

¹ With 100x100mm white matte paper² With standard diameter 84mm RL110 reflector.³ Purchase reflectors separately.⁴ An emitter (FAIH) and receiver (FAID) pair must be ordered for a complete sensor set.

To obtain the most current agency approval information, see the Agency Approval Checklist section on the specific part number's web page.

Dimensions

mm

Figure 1

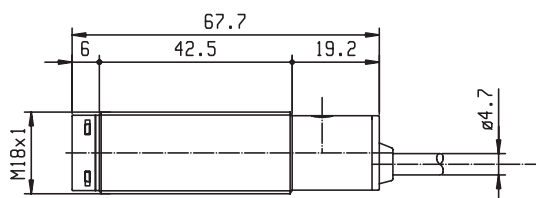
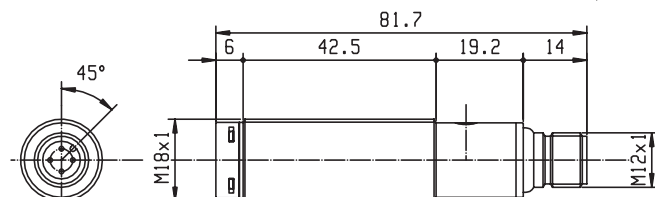


Figure 2



FA Series LED Photoelectric Sensors

Characteristic curves

Chart 1 (Diffuse)

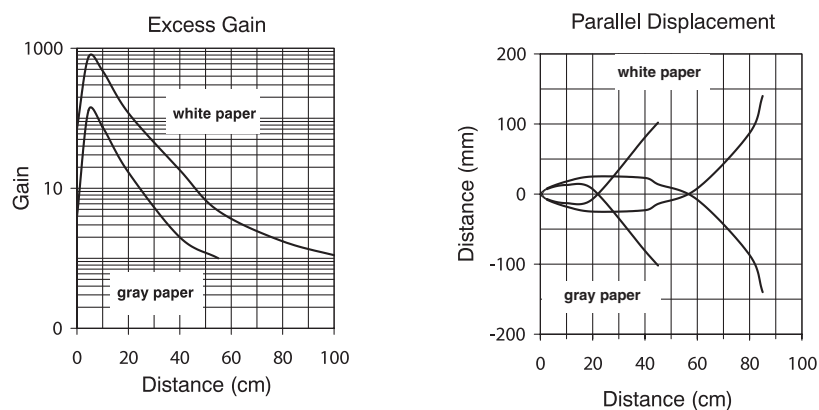


Chart 2 (Polarized Reflective)

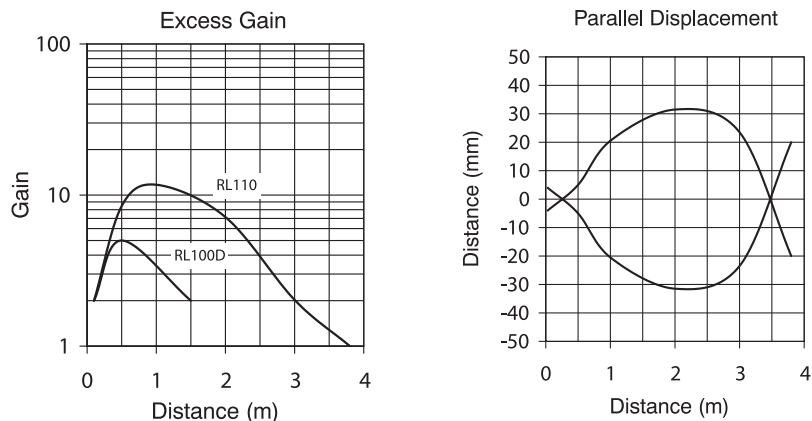
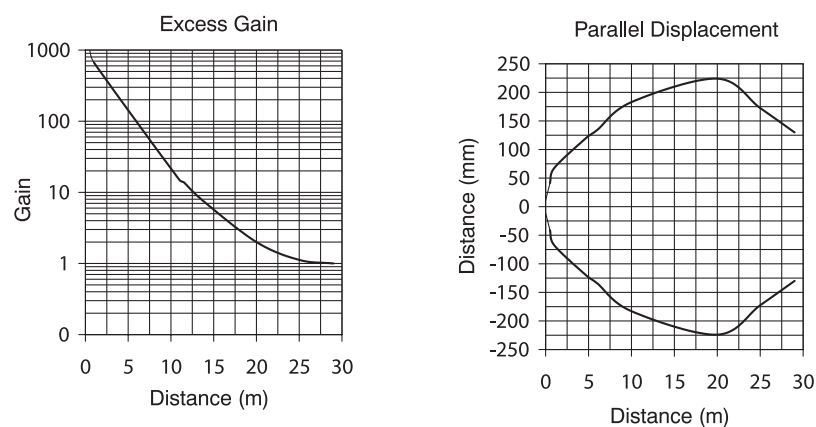


Chart 3 (Throughbeam)



Accessories for 18mm Sensors

Axial Mounting Bracket

Axial mounting bracket available in zinc plated steel or 316L stainless steel. Has two mounting holes (use 4mm screws) and allows for rotation of an optical axis for right-beam-angle-adaptor sensors. Hexagonal nuts not included. For use with 18mm sensors.

| Accessories for 18mm Sensors | | | |
|--------------------------------|--------|---|------------------|
| Part Number | Price | Description | Weight lb [g] |
| <u>ST18A</u> | \$2.00 | Micro Detectors mounting bracket, axial, zinc plated steel. For use with 18mm sensors. | 0.06 [27.2] |
| <u>ST18A7W</u> | \$7.25 | Micro Detectors mounting bracket, axial, 316L stainless steel. For use with 18mm sensors. | 0.06 [27.2] |



ST18A

Dimensions

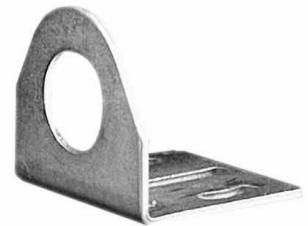
mm [inches]



Right-angle Mounting Bracket

Right-angle mounting bracket for use with 18mm sensors. Has two mounting holes (use 4mm screws) and allows the rotation of an optical axis for axial sensors. Hexagonal nuts not included.

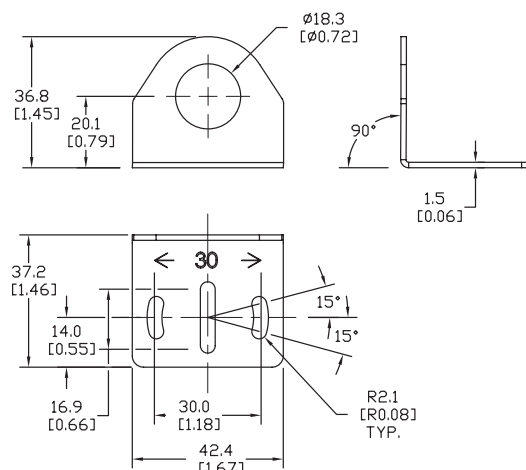
| Accessories for 18mm Sensors | | | |
|--------------------------------|--------|---|------------------|
| Part Number | Price | Description | Weight lb [g] |
| <u>ST18C</u> | \$2.00 | Micro Detectors mounting bracket, right-angle, zinc plated steel. For use with 18mm sensors. | 0.06 [27.2] |
| <u>ST18C7W</u> | \$7.25 | Micro Detectors mounting bracket, right-angle, 316L stainless steel. For use with 18mm sensors. | 0.06 [27.2] |



ST18C

Dimensions

mm [inches]

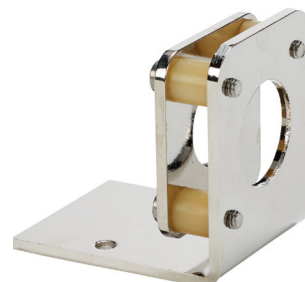


Accessories for 18mm Sensors

Right-angle Fine Tune Mounting Bracket

Mounting bracket, right-angle, fine tune vertical and horizontal adjustment, nickel-plated steel. For use with 18mm sensors. Allows for fine tuning vertical and horizontal placement.

| Accessories for 18mm Sensors | | | | |
|--------------------------------|---------|--|----------------------------|-------------|
| Part Number | Price | Description | Drawing Link | Weight [lb] |
| <u>OPT2036</u> | \$38.50 | Wenglor mounting bracket, right-angle, fine tune vertical and horizontal adjustment, nickel plated steel. For use with 18mm sensors. | <u>PDF</u> | 0.02 |

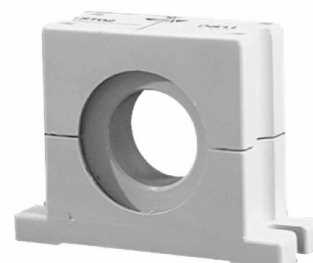


[OPT2036](#)

Swivel Mounting Bracket

Mounting bracket, ball swivel, plastic. For use with 18mm sensors. Has a ball-joint and set screws to adjust sensor orientation. Allows angular orientation up to 15 degrees (from center) in all directions for photoelectric sensors (Will not work with C18 series).

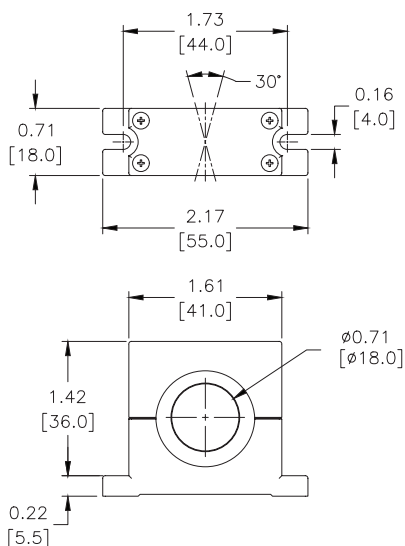
| Accessories for 18mm Sensors | | | |
|------------------------------|--------|--|-------------|
| Part Number | Price | Description | Weight [lb] |
| <u>ST02</u> | \$9.50 | Micro Detectors mounting bracket, ball swivel, plastic. For use with 18mm sensors. | 0.06 |



[ST02](#)

Dimensions

mm [inches]



Accessories for 18mm Sensors

Right-angle Mounting Brackets

Mounting bracket, right-angle, fixed insertion stop adjustment, plastic. For use with 18mm sensors. Available with or without fixed insertion stop.

| Accessories for 18mm Sensors | | | | |
|------------------------------|---------|---|---------------------|---------------|
| Part Number | Price | Description | Drawing Link | Weight lb [g] |
| OPT2104 | \$10.50 | Wenglor mounting bracket, right-angle, fixed insertion stop adjustment, plastic. For use with 18mm sensors. | PDF | 0.06 [27.2] |
| OPT2105 | \$10.50 | Wenglor mounting bracket, right-angle, plastic. For use with 18mm sensors. | PDF | 0.06 [27.2] |



[OPT2104](#), [OPT2105](#)

Right-angle Swivel Mounting Systems

Mounting bracket, right-angle swivel, 360 degree vertical and horizontal adjustment, 12mm rod mount. For use with 18mm sensors. Available in all 304 stainless steel or with an aluminum head and a stainless steel mounting plate.

| Accessories for 18mm Sensors | | | | | | |
|------------------------------|---------|--|---------------------|---------------------|---------------------|---------------|
| Part Number | Price | Description | Mounting Head | Mounting Plate | Drawing Link | Weight lb [g] |
| OPT2116 | \$11.50 | Wenglor mounting bracket, right-angle swivel, 360 degree vertical and horizontal adjustment, aluminum, 12mm rod mount. For use with 18mm sensors. | Aluminum | 304 Stainless steel | PDF | 0.15 [68.0] |
| OPT2117 | \$21.00 | Wenglor mounting bracket, right-angle swivel, 360 degree vertical and horizontal adjustment, 304 stainless steel, 12mm rod mount. For use with 18mm sensors. | 304 Stainless steel | 304 Stainless steel | PDF | 0.28 [127.0] |



[OPT2116](#), [OPT2117](#)

Note: 304 Stainless steel mounting rods sold separately: [OPT2109](#) (200mm [7.87 in] length), [OPT2110](#) (300mm [11.81 in] length), and [OPT2111](#) (500mm [19.69 in] length).

Mounting Rods and Brackets

Mounting Rods

304 Stainless steel rods for mounting swivel brackets [OPT2112](#) - [OPT2127](#). Available in three lengths: 200mm, 300mm, and 500mm. 12mm diameter.

| Mounting Rods for OPT2112-2127 Swivel Mounting Brackets | | | | |
|---|---------|---|---------------------|------------------|
| Part Number | Price | Description | Drawing Link | Weight lb (g) |
| OPT2109 | \$13.00 | Wenglor mounting rod, 12mm diameter, 200mm length, 304 stainless steel. | PDF | 0.41 [185.97] |
| OPT2110 | \$16.00 | Wenglor mounting rod, 12mm diameter, 300mm length, 304 stainless steel. | PDF | 0.60 [272.16] |
| OPT2111 | \$21.00 | Wenglor mounting rod, 12mm diameter, 500mm length, 304 stainless steel. | PDF | 0.98 [444.52] |



Right-angle Mounting Bracket

Mounting bracket, right-angle, nickel-plated brass. For use with 12mm mounting rods [OPT2109](#), [OPT2110](#) & [OPT2111](#).

| Right-angle Mounting Brackets for 12mm Sensors | | | | |
|--|---------|---|---------------------|----------------|
| Part Number | Price | Description | Drawing Link | Weight lb [g] |
| OPT2108 | \$16.00 | Wenglor mounting bracket, right-angle, nickel-plated brass. For use with 12mm mounting rods OPT2109, OPT2110 & OPT2111. | PDF | 0.07 [31.8] |



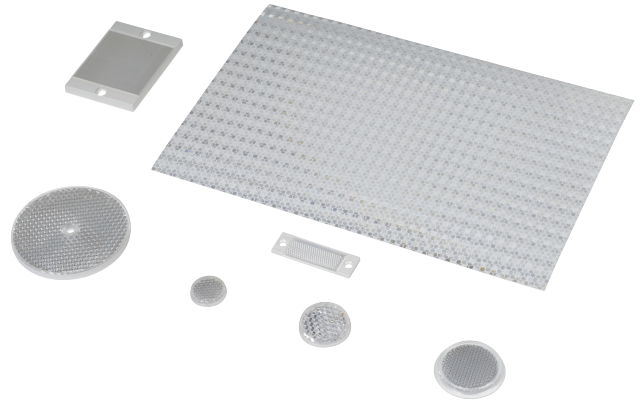
Reflectors

RL Series Reflectors for Polarized Reflective Photoelectric Sensors (All Models)

- Suitable for use with polarized light photoelectric sensors
- Shapes and sizes for most applications
- Miniature types for close mounting in multiple sensor installations
- Single hole, dual hole and self-adhesive mounting types available
- Single and 10-packs available

Installation Notes

- Keep the reflector surface clean to ensure peak detection performance. This is especially true when the maximum sensing range is being used. Clean using a damp cloth.
- When selecting a reflector, it is important to consider the ambient conditions it will be exposed to. Dusty or high humidity conditions may reduce the sensing range as much as 90%.
- Reflectors should be positioned at a 90° angle to the optical axis with a tolerance of $\pm 15^\circ$.



| Reflector Specifications | | | | | | | |
|--------------------------|---------|---------------------|----------|--------------------|----------------------|---|---|
| Part number | Price | Drawing Link | Quantity | Dimensions mm [in] | Degree of Protection | Mounting | Materials |
| RL102 | \$38.00 | PDF | 10 | 25 | IEC IP67 | Customer-supplied adhesive or other mounting method required | Reflective face: PMMA Polymethylmethacrylate (acrylic) Base material: ABS (Acrylonitrile-butadiene-styren) |
| RL102-1 | \$4.25 | | 1 | [0.98] | | | |
| RL103 | \$42.50 | PDF | 10 | 34.5 | | | |
| RL103-1 | \$4.75 | | 1 | [1.36] | | | |
| RL104 | \$42.50 | PDF | 10 | 46 | | | |
| RL104-1 | \$4.75 | | 1 | [1.81] | | | |
| RL105G | \$38.00 | PDF | 10 | 95 x 38 | | Two 4.3 mm holes | |
| RL105G-1 | \$4.25 | | 1 | [3.74 x 1.50] | | | |
| RL106G | \$42.50 | PDF | 10 | 182 x 42 | | Two 6mm holes | |
| RL106G-1 | \$4.75 | | 1 | [7.17 x 1.65] | | | |
| RL110 | \$19.00 | PDF | 10 | 84 | | One 5mm hole | |
| RL110-1 | \$2.00 | | 1 | [3.31] | | | |
| RL116 | \$19.00 | PDF | 10 | 41 x 60 | | Two 3mm holes | |
| RL116-1 | \$2.00 | | 1 | [3.54 x 2.36] | | | |
| RL100DA4 | \$38.50 | NA | 1 | 200 x 300 | Self-adhesive | Paper (Acrylic tape with micro prism) | |
| RL100DC4 | \$12.00 | NA | 1 | 50 x 300 | | | |
| RL100DQ1 | \$8.75 | NA | 1 | 100 x 100 | | | |
| RL111G | \$60.00 | PDF | 10 | 22.5 x 47 | Two 3mm slots | Reflective face: PMMA Polymethylmethacrylate (acrylic) Base material: ABS (Acrylonitrile-butadiene-styren) | |
| RL111G-1 | \$7.25 | | 1 | [0.89 x 1.85] | | | |
| RL112G | \$44.00 | PDF | 10 | 19 x 73 | | | |
| RL112G-1 | \$4.75 | | 1 | [0.75 x 2.87] | | | |
| RL113G | \$53.00 | PDF | 10 | 51.4 x 60.3 | Two 4mm slots | | |
| RL113G-1 | \$6.00 | | 1 | [2.02 x 2.37] | | | |

Not recommended for applications involving moist air environments or water immersion.

Reflectors

RL Series Reflectors for Polarized Reflective Laser Photoelectric Sensors (FALN series)

- Suitable for use with polarized light laser photoelectric sensors
- Sizes for most applications
- Miniature types for close mounting in multiple sensor installations
- Single and 5-packs available

| Specifications | | | | | | |
|-----------------------------------|------------------------------|--------------------------------|------------------------------|--------------------------------|----------------------------------|--------------------------------|
| Part Number | <i>RL201</i> | <i>RL201-1</i> | <i>RL203</i> | <i>RL203-1</i> | <i>RL204</i> | <i>RL204-1</i> |
| Price | \$38.00 | \$8.25 | \$35.50 | \$7.75 | \$30.00 | \$6.75 |
| Quantity | 5 | 1 | 5 | 1 | 5 | 1 |
| Drawing Link | PDF | | PDF | | PDF | |
| Dimensions | 60 x 82 mm 2.36 x 3.23 in | | 19 x 6mm 0.75 x 2.36 in | | 20mm x 32mm 0.80 in x 1.26 in | |
| Degree of Protection ¹ | IEC IP67 | | | | | |
| Mounting | Two 0.4 mm holes | | Two 0.4 mm holes | | Two 0.3 mm holes | |
| Materials | Acrylic/polycarbonate | | | | | |

¹ Not recommended for applications involving moist air environments or water immersion.

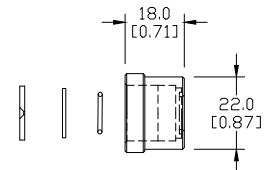
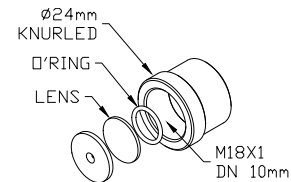
Shutters and Adapters

Shutters for M18 (18mm) Through-beam Sensors (SSE / SSR)

- Reduces the emitted beam, allowing the detection of small targets
- Shutter consists of an aluminum cap and aperture with an O-ring and glass lens, which can screw onto the optical head of either the emitter or receiver



Dimensions mm [inches]



| Sensing Distance (When Used with SSE / SSR Model Photoelectric Switches) | | | | | | |
|---|---------|---------|---------|----------|----------|----------|
| Model | ST0S1 | ST0S2 | ST0S3 | ST0S4 | ST0S6 | ST0S8 |
| Price | Retired | Retired | Retired | Retired | Retired | Retired |
| Ø x shutter (mm) | 1 | 2 | 3 | 4 | 6 | 8 |
| Distance (m) Object (mm) | N/A | N/A | N/A | 1.5 2 | 3.5 3 | 6.5 4 |

Table shows sensing distance and minimal detectable object.

| Shutter Accessory for QM Series Sensors | | | | |
|---|--------|---------------------|---|-------------|
| Part Number | Price | Drawing Link | Description | Weight [lb] |
| STQM0 | \$6.00 | PDF | Micro Detectors shutter, plastic. Package of 2. For use with through beam QM series photoelectric sensors. Vertical and horizontal diaphragms (0.5, 1, 2mm) included. | 0.1 |

| Shutter STQM0 Sensing Distances | | | |
|------------------------------------|--------|--------|--------|
| Shutter Size | 0.5 mm | 1mm | 2mm |
| Maximum Sensing Distance | 1.5 m | 2 m | 4.5 m |
| Minimum Detectable Object Diameter | 0.8 mm | 1.5 mm | 2.5 mm |

Note: With shutters on emitter and receiver in same vertical or horizontal orientation.

Right-angle M18 (18 mm) Beam Adapter

For use with M18 retroreflective and through-beam photoelectric switches (not for use with diffuse reflection sensors). Allows 90° light detection using an internal mirror set at 45° to the optical axis. Sensitivity loss is about 20-30%.



ST03

| Beam Adapters | | | |
|----------------------|---------|--|-------------|
| Part Number | Price | Description | Weight [lb] |
| ST03 | \$16.00 | Micro Detectors right-angle beam adapter, for use with 18mm sensors (except diffuse reflection models), mirror allows 90 degree light detection. | 0.06 |

Dimensions mm [inches]

