FA Series LED Photoelectric Sensors

M18 (18mm) plastic - DC

- 14 models available
- 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

NEED CABLES?

FA Series Photoelectric Sensors Selection Chart

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

*Purchase reflectors separately.

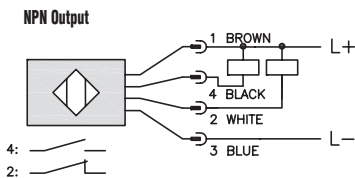**Purchase one receiver and one emitter for a complete set.
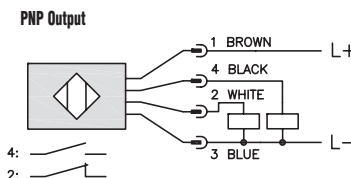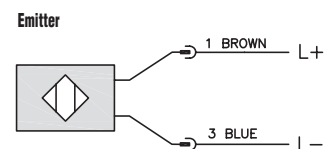
Wiring diagrams

Diagram 1

NPN Output

4:
2:

1 BROWN — L+
4 BLACK
2 WHITE
3 BLUE — L−

Diagram 2

PNP Output

4:
2:

1 BROWN — L+
4 BLACK
2 WHITE
3 BLUE — L−

Diagram 3

Emitter

1 BROWN — L+
3 BLUE — L−

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

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

Connector

M12 connector

2 1
3 4

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[3]	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	$\leq$ 30mA		$\leq$ 25mA
Operating (Load) Current	$\leq$ 100mA		
Off-state (Leakage) Current	$\leq$ 10µA		
Voltage Drop	2V max at 100mA		
Switching Frequency	250Hz		
Ripple	$\leq$ 10%		
Time Delay Before Availability (tv)	200ms		
Short-Circuit Protection	Yes, switch autoresets 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') axial cable; M12 (12mm) connector. Two lock nuts included		
Agency Approvals	UL file E187310, CE		

[1] With 100x100mm white matte paper
[2] 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.
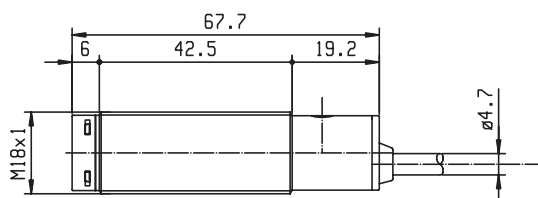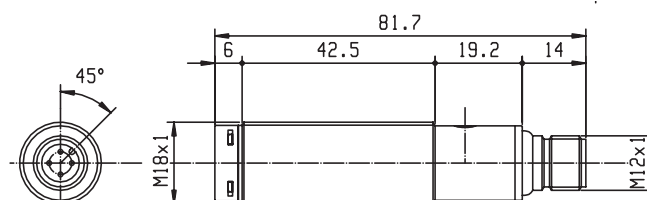
Dimensions

mm

Figure 1

Figure 2

FA Series LED Photoelectric Sensors

Characteristic curves

Chart 1 (Diffuse)

Excess Gain

Gain vs Distance (cm)

- white paper
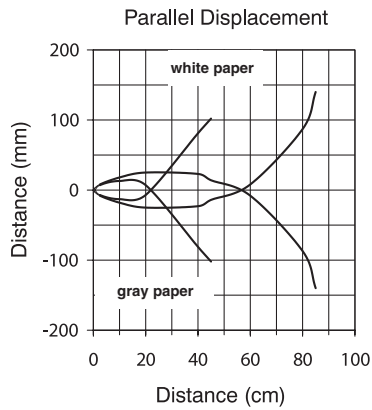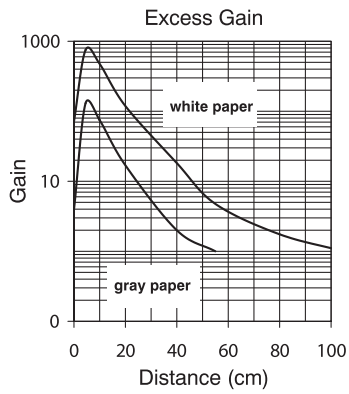- gray paper

Parallel Displacement

Distance (mm) vs Distance (cm)

- white paper
- gray paper

Chart 2 (Polarized Reflective)

Excess Gain

Gain vs Distance (m)

- RL110
- RL100D

Parallel Displacement

Distance (mm) vs Distance (m)

Chart 3 (Throughbeam)

Excess Gain

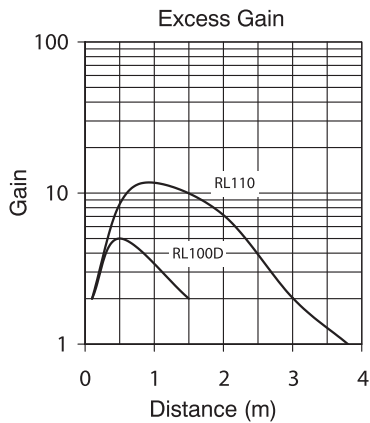Gain vs Distance (m)

Parallel Displacement
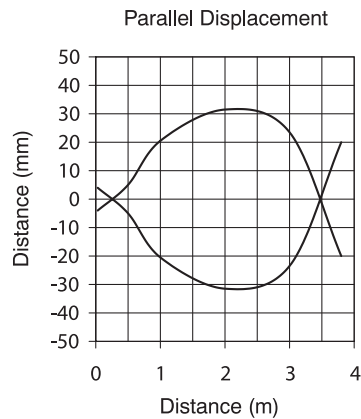
Distance (mm) vs Distance (m)
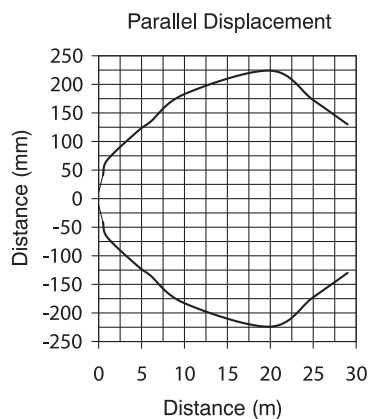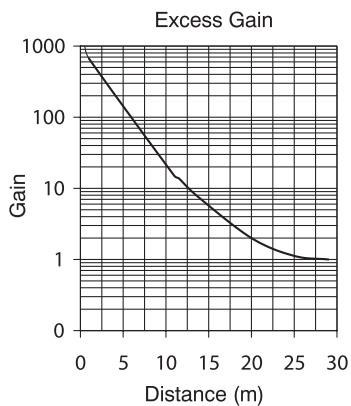
Accessories for 18mm Sensors

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-adapter sensors. Hexagonal nuts not included. For use with 18mm sensors.
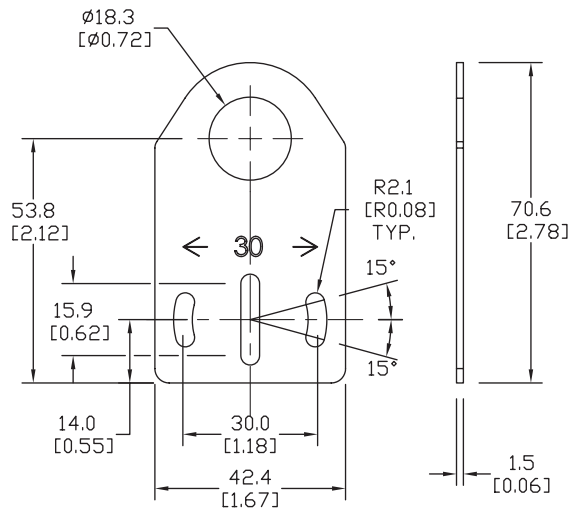
Accessories for 18mm Sensors			
Part Number	**Price**	**Description**	**Weight lb (g)**
ST18A		Mounting bracket, axial, zinc plated steel. For use with 18mm sensors.	0.06 (27.2)
ST18A7W		Mounting bracket, axial, 316L stainless steel. For use with 18mm sensors.	0.06 (27.2)

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)**
ST18C		Mounting bracket, right-angle, zinc plated steel. For use with 18mm sensors.	0.06 (27.2)
ST18C7W		Mounting bracket, right-angle, 316L stainless steel. For use with 18mm sensors.	0.06 (27.2)

**ST18C**

Dimensions

mm [inches]
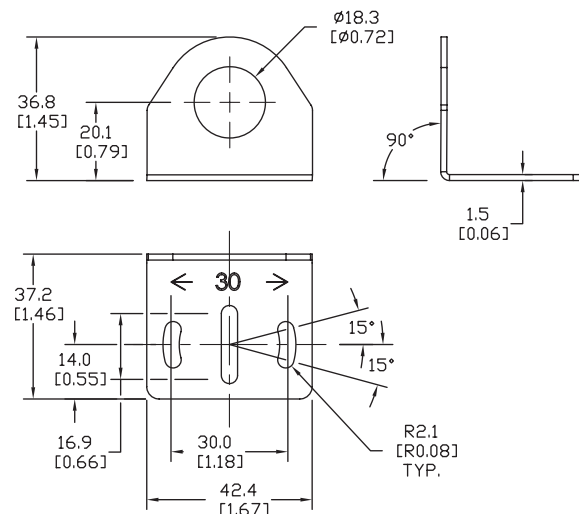
Accessories for 18mm Sensors

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]
OPT2036		Wenglor mounting bracket, right-angle, fine tune vertical and horizontal adjustment, nickel plated steel. For use with 18mm sensors.	PDF	0.02
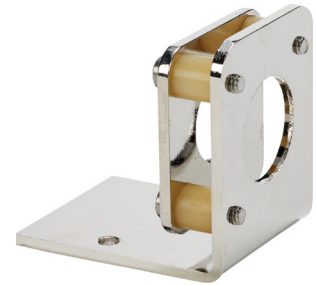
OPT2036

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]
ST02		Mounting bracket, ball swivel, plastic. For use with 18mm sensors.	0.06

Dimensions

mm [inches]

ST02

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.

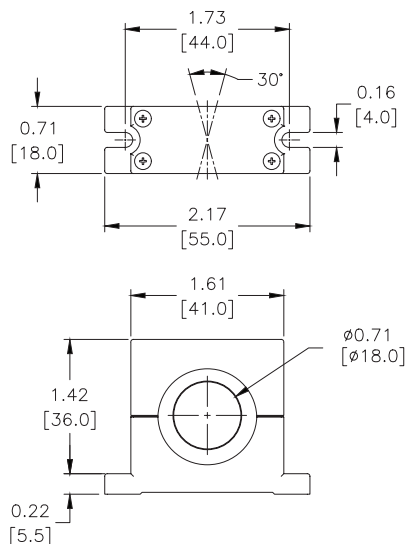| Accessories for 18mm Sensors				
Part Number	Price	Description	Drawing Link	Weight lb (g)
OPT2104		Wenglor mounting bracket, right-angle, fixed insertion stop adjustment, plastic. For use with 18mm sensors.	PDF	0.06 (27.2)
OPT2105		Wenglor mounting bracket, right-angle, plastic. For use with 18mm sensors.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

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).

OPT2116, OPT2117

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		Wenglor mounting rod, 12mm diameter, 200mm length, 304 stainless steel.	PDF	0.41 (185.97)
OPT2110		Wenglor mounting rod, 12mm diameter, 300mm length, 304 stainless steel.	PDF	0.60 (272.16)
OPT2111		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		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
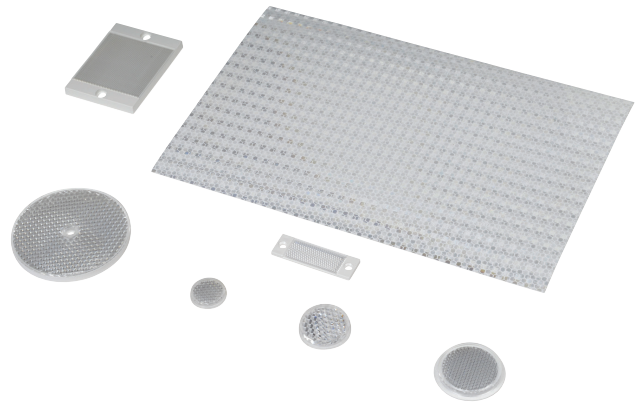
Installation Notes

• 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 ±15°.

Reflector Specifications							
Part number	Price	Drawing Link	Quantity	Dimensions mm [in]	Degree of Protection	Mounting	Materials
RL102		PDF	10	25 [0.98]	IEC IP67	Customer-supplied adhesive or other mounting method required	Reflective face: PMMA Polymethylmethacrylate (acrylic) Base material: ABS (Acrylonitrile-butadiene-styren)
RL102-1			1				
RL103		PDF	10	34.5 [1.36]			
RL103-1			1				
RL104		PDF	10	46 [1.81]			
RL104-1			1				
RL105G		PDF	10	95 x 38 [3.74 x 1.50]		Two 4.3 mm holes	
RL105G-1			1				
RL106G		PDF	10	182 x 42 [7.17 x 1.65]		Two 6mm holes	
RL106G-1			1				
RL110		PDF	10	84 [3.31]		One 5mm hole	
RL110-1			1				
RL116		PDF	10	41 x 60 [3.54 x 2.36]		Two 3mm holes	
RL116-1			1				
RL100DA4		NA	1	200 x 300 [7.87 x 11.81]		Self-adhesive	Paper (Acrylic tape with micro prism)
RL100DC4		NA	1	50 x 300 [1.97 x 11.81]			
RL100DQ1		NA	1	100 x 100 [3.94 x 3.94]			
RL111G		PDF	10	22.5 x 47 [0.89 x 1.85]		Two 3mm slots	Reflective face: PMMA Polymethylmethacrylate (acrylic) Base material: ABS (Acrylonitrile-butadiene-styren)
RL111G-1			1				
RL112G		PDF	10	19 x 73 [0.75 x 2.87]			
RL112G-1			1				
RL113G		PDF	10	51.4 x 60.3 [2.02 x 2.37]		Two 4mm slots	
RL113G-1			1				

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	*RL201*	*RL201-1*	*RL203*	*RL203-1*	*RL204*	*RL204-1*
Price						
Drawing Link	PDF		PDF		PDF	
Quantity	5	1	5	1	5	1
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.**
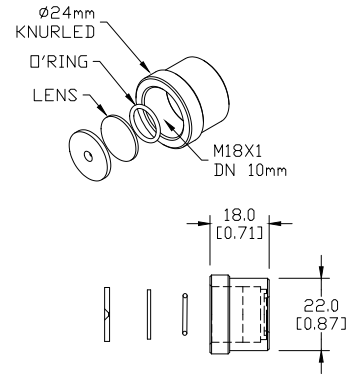
Shutters and Adapters

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

ST0S1-ST0S8

Sensing Distance (When Used with SSE / SSR Model Photoelectric Switches)						
Model	ST0S1	ST0S2	ST0S3	ST0S4	ST0S6	ST0S8
Price						
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.

Dimensions
mm [inches]

Shutter Accessory for QM Series Sensors					
Part Number	Price	Drawing Link	Description		Weight [lb]
STQM0		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%.

Dimensions
mm [inches]

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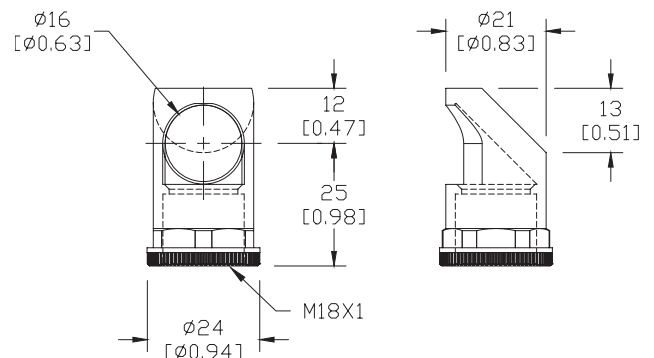
Beam Adapters			
Part Number	Price	Description	Weight [lb]
ST03		Right-angle beam adapter, for use with 18mm sensors (except diffuse reflection models), mirror allows 90 degree light detection.	0.06