

SSF Series Fiber Photoelectric Amplifiers



M18 (18 mm) plastic with Teach function - DC

- 4 models available
- Sensitivity adjustment using Teach button
- NPN or PNP, Light-on/Dark-on selectable outputs
- Red LED with visible spot
- IP67 rated

Cables and Accessories

Cables and accessories can be found starting on page 18–64

SSF Series Fiber Photoelectric Amplifier Selection Chart

Part Number	Sensing Range	Output State	Logic	Connection	Wiring	Dimensions
SSF-0N-0A	Optical fiber dependent	Light-on, Dark-on selectable	NPN	2m (6.5') axial cable	Diagram 1	Figure 1
SSF-0N-0E				M12 (12mm) connector		Figure 2
SSF-0P-0A			PNP	2m (6.5') axial cable	Diagram 2	Figure 1
SSF-0P-0E				M12 (12mm) connector		Figure 2

Specifications

	SSF-0N-0*	SSF-0P-0*
Sensing Distance	See Optical Fibers Table	
Sensitivity Setting	Teach button	
Emission	red LED	
Differential Travel	≤10%	
Operating Voltage	10-30VDC	
Ripple	≤10%	
No-load Supply Current	≤20mA	
Load Current	≤100mA	
Leakage Current	≤10µA	
Voltage Drop	2V maximum	
Output Type	NPN	PNP
Output Function	Light On or Dark On Selectable	
Switching Frequency	800Hz	
(tv) Time Delay Before Availability	150ms	
Input Voltage Transients Protection	≤30 VDC	
Input Power Polarity Reversal Protection	Yes	
Output Power Short-Circuit Protection	Yes (switch autoresets after overload is removed)	
Temperature Range	-25° to +70°C (-13° to 158°F)	
Temperature Drift	10% Sr	
Interference to External Light	3,000 lux (incandescent lamp) 10,000 lux (sunlight)	
Protection Degree	IP67	
LED Output Indicator	Yellow (output energized)	
Housing Material	PBT	
Lens Materials	Acrylic	
Tightening Torque	40 N-m (29l lb-ft.)	
Weight (cable/connector)	100g (3.53oz)	

Wiring diagrams

Diagram 1

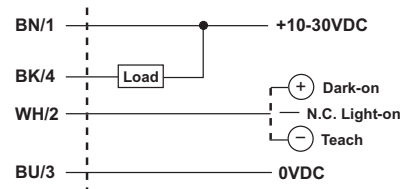
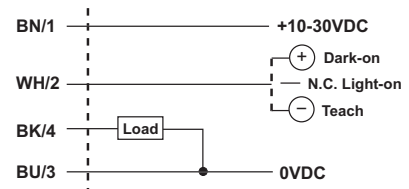
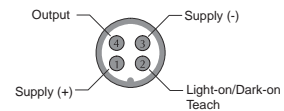


Diagram 2



Connector



Dimensions (mm)

Figure 1

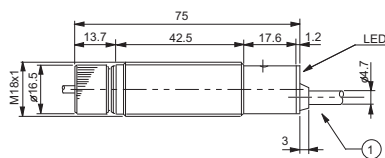
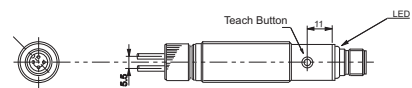
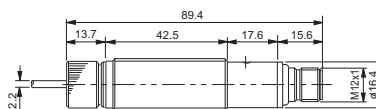


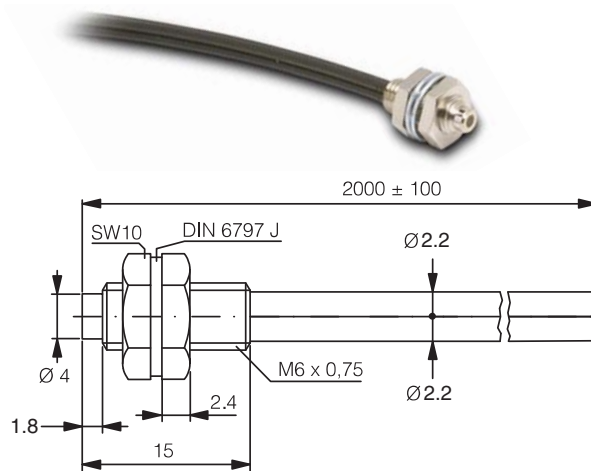
Figure 2



Cuttable Optical Fibers (2.2 mm Diameter)

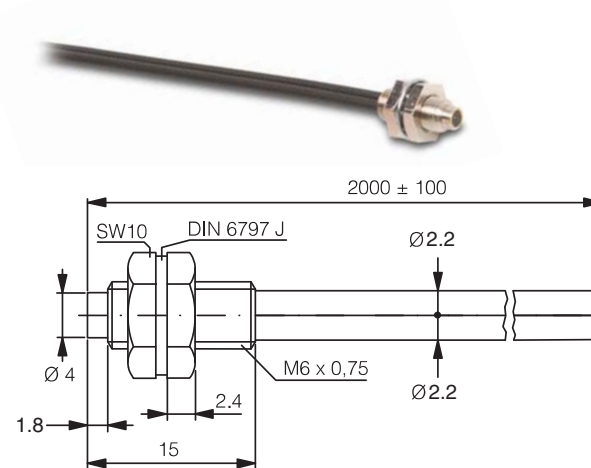
CF-DB1-20 diffuse reflection

Specifications	
Optical Fiber Core Ø	1mm (0.039in)
Sensing Distance with DFT and DFP series	200mm (7.87in)
Fiber Length (L)	2.0m (78.74in)
Fiber Bending Radius	25mm (0.98in)
Free Cut	Yes
Head Size	M6
Protection Degree	IEC IP67
Temperature Range	-25° to +70°C (-13° to 158°F)
Fiber Materials	PMMA
Sleeve Materials	Polyethylene
Head Materials	Nickel-plated brass



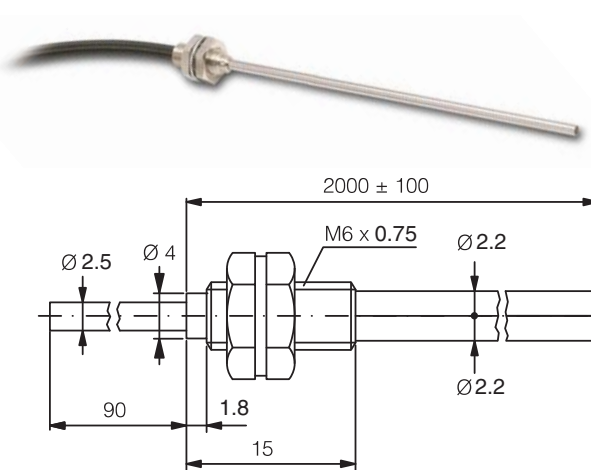
CF-DB2-20 diffuse reflection

Specifications	
Optical Fiber Core Ø	1.5mm (0.06in)
Sensing Distance with DFT and DFP Series	260mm (10.27in)
Fiber Length (L)	2.0m (78.74in)
Fiber Bending Radius	40mm (1.57in)
Free Cut	Yes
Head Size	M6
Protection Degree	IEC IP67
Temperature Range	-25° to +70°C (-13° to 158°F)
Fiber Materials	PMMA
Sleeve Materials	Polyethylene
Head Materials	Nickel-plated brass



CF-DB3-20 diffuse reflection

Specifications	
Optical Fiber Core Ø	1mm (0.039in)
Sensing Distance with DFT and DFP Series	200mm (7.87in)
Fiber Length (L)	2.0m (78.74in)
Fiber Bending Radius	25mm (0.98in)
Bendable light-outlet tube	Yes, 25mm (0.98in) radius
Free Cut	Yes
Head Size	M6
Protection Degree	IEC IP67
Temperature Range	-25° to +70°C (-13° to 158°F)
Fiber Materials	PMMA
Sleeve Materials	Polyethylene
Head Materials	Nickel-plated brass



PLC Overview

DL05/06 PLC

DL105 PLC

DL205 PLC

DL305 PLC

DL405 PLC

Field I/O

Software

C-more HMIs

Other HMI

AC Drives

Motors

Steppers/Servos

Motor Controls

Proximity Sensors

Photo Sensors

Limit Switches

Encoders

Current Sensors

Pushbuttons/Lights

Process

Relays/Timers

Comm.

TB's & Wiring

Power

Circuit Protection

Enclosures

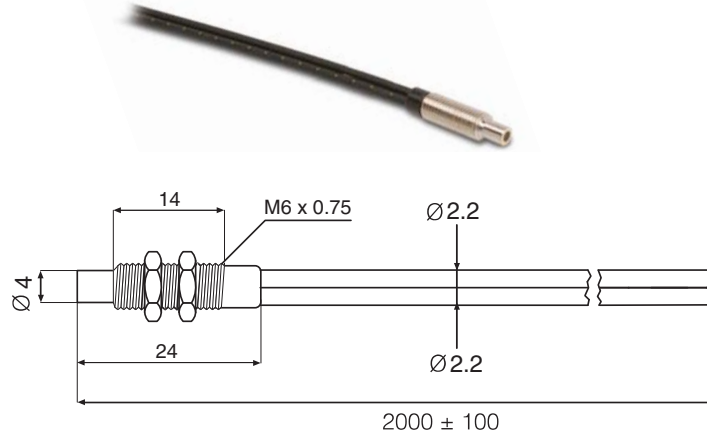
Appendix

Part Index

Cuttable Optical Fibers (2.2 mm Diameter)

CF-CB1-20 diffuse reflection

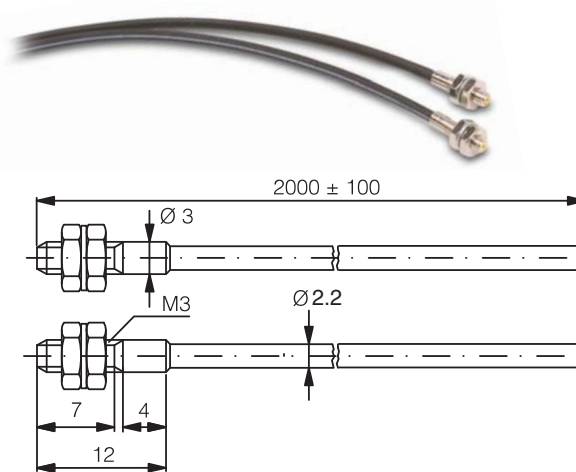
Specifications	
Optical Fiber Core Ø	1mm (0.039in)
Sensing Distance with SSF Series	50mm (1.97in)
Fiber Length (L)	2.0m (78.74in)
Fiber Bending Radius	25mm (0.98in)
Free Cut	Yes
Head Size	M6
Protection Degree	IEC IP67
Temperature Range	-40° to +70°C (-40° to 158°F)
Fiber Materials	PMMA
Sleeve Materials	Polyethylene
Head Materials	Nickel-plated brass



CF-TB1-20 through-beam

Specifications	
Optical Fiber Core Ø	0.5mm (0.02in)
Sensing Distance with DFT and DFP Series	200mm (7.87in)
Fiber Length (L)	2.0m (78.74in) ea. piece
Fiber Bending Radius	25mm (0.98in)
Free Cut	Yes
Head Size	M3
Protection Degree	IEC IP67
Temperature Range	-25° to +70°C (-13° to 158°F)
Fiber Materials	PMMA
Sleeve Materials	Polyethylene
Head Materials	Nickel-plated brass

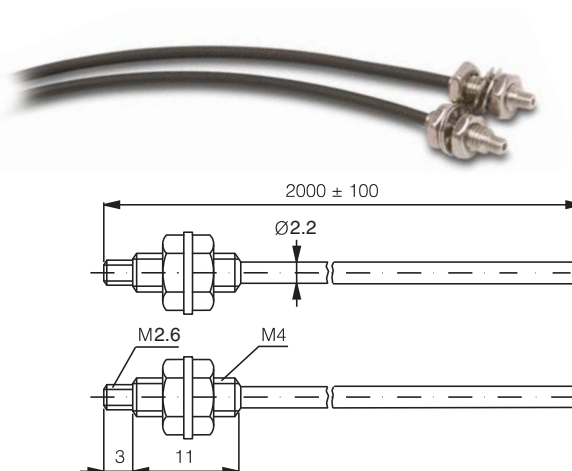
Includes 2 optical fiber cables



CF-TB2-20 through-beam

Specifications	
Optical Fiber Core Ø	1mm (0.039in)
Sensing Distance with DFT and DFP Series	700mm (27.56in)
Fiber Length (L)	2.0m (78.74in) ea. piece
Fiber Bending Radius	25mm (0.98in)
Free Cut	Yes
Head Size	M4
Protection Degree	IEC IP67
Temperature Range	-25° to +70°C (-13° to 158°F)
Fiber Materials	PMMA
Sleeve Materials	Polyethylene
Head Materials	Nickel-plated brass

Includes 2 optical fiber cables

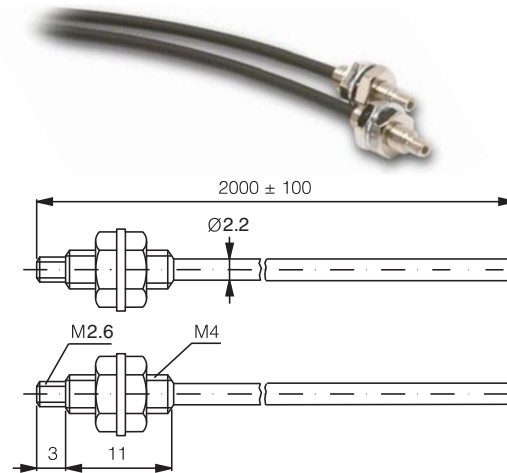


Cuttable Optical Fibers (2.2 mm Diameter)

CF-TB3-20 through-beam

Specifications	
Optical Fiber Core Ø	1.5mm (0.06in)
Sensing Distance with DFT and DFP Series	900mm (35.43in)
Fiber Length (L)	2.0m (78.74in) ea. piece
Fiber Bending Radius	40mm (1.57in)
Free Cut	Yes
Head Size	M4
Protection Degree	IEC IP67
Temperature Range	-25° to +70°C (-13° to 158°F)
Fiber Materials	PMMA
Sleeve Materials	Polyethylene
Head Materials	Nickel-plated brass

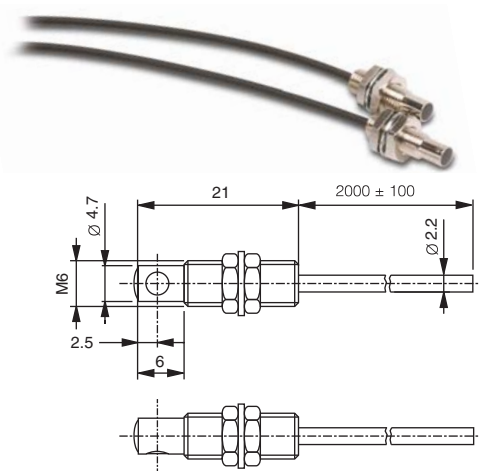
Includes 2 optical fiber cables



CF-TB4-20 90° through-beam

Specifications	
Optical Fiber Core Ø	1.0mm (0.039in)
Sensing Distance with DFT and DFP Series	1800mm (70.87in)
Fiber Length (L)	2.0m (78.74in) ea. piece
Fiber Bending Radius	25mm (0.98in)
Free Cut	Yes
Head Size	M6
Protection Degree	IEC IP67
Temperature Range	-25° to +70°C (-13° to 158°F)
Fiber Materials	PMMA
Sleeve Materials	Polyethylene
Head Materials	Nickel-plated brass

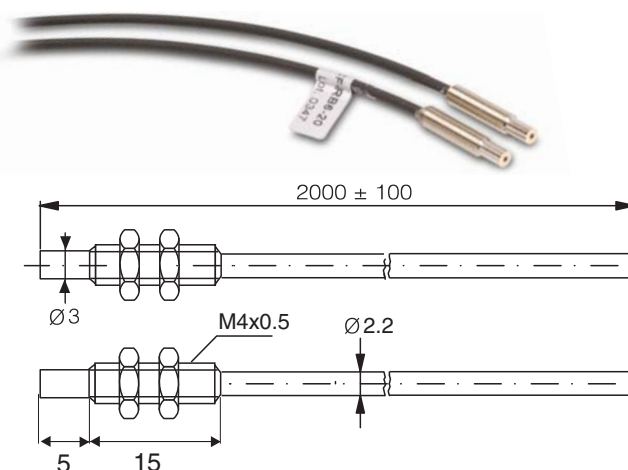
Includes 2 optical fiber cables



CF-RB6-20 through beam

Specifications	
Optical Fiber Core Ø	1.0mm (0.039in)
Sensing Distance with SSF Series	120mm (4.72in)
Fiber Length (L)	2.0m (78.74in) ea. piece
Fiber Bending Radius	25mm (0.98in)
Free Cut	Yes
Head Size	M4
Protection Degree	IEC IP67
Temperature Range	-40° to +70°C (-40° to 158°F)
Fiber Materials	PMMA
Sleeve Materials	Polyethylene
Head Materials	Nickel-plated brass

Includes 2 optical fiber cables

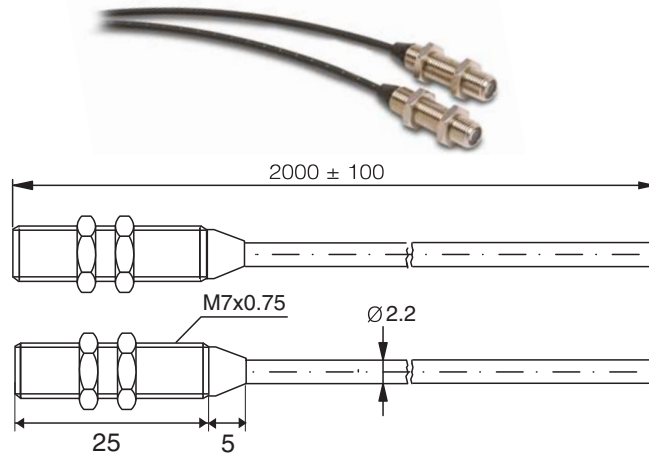


Cutable Optical Fibers (2.2 mm Diameter)

CF-RBA-20 through-beam with lenses

Includes 2 optical fiber cables

Specifications	
Optical Fiber Core Ø	1.0mm (0.039in)
Sensing Distance with SSF series	1200mm (47.24in)
Fiber Length (L)	2.0m (78.74in) ea. piece
Fiber Bending Radius	25mm (0.98in)
Free Cut	Yes
Head Size	M7
Protection Degree	IEC IP67
Temperature Range	-40° to +70°C (-40° to 158°F)
Fiber Materials	PMMA
Sleeve Materials	Polyethylene
Head Materials	Nickel-plated brass



Photoelectric Sensors Accessories: Cables

Cables with quick-disconnect plugs



- Industry standard axial and right-angle M8/M12 screw-lock connectors. The cables listed below can be used with extension cables
- 2m, 5m, and 7m cable lengths
- PVC (polyvinyl chloride) jacket for typical industrial applications
- PUR (polyurethane) jacket for oily and direct sunlight applications
- IP67 rated

Dimensions

Figure 1

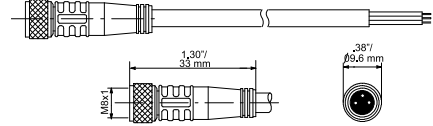


Figure 2

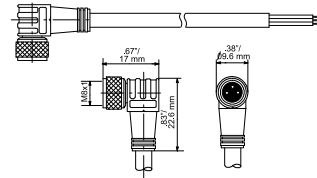


Figure 3

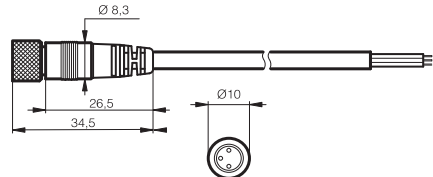


Figure 4

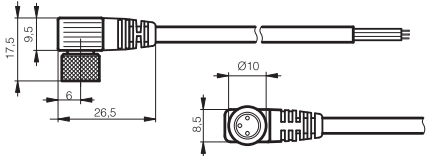


Figure 5

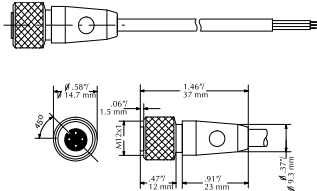


Figure 6

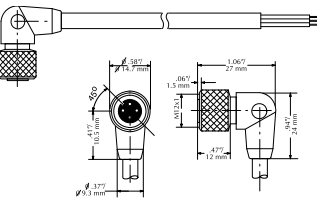


Figure 7

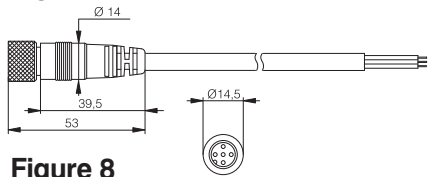
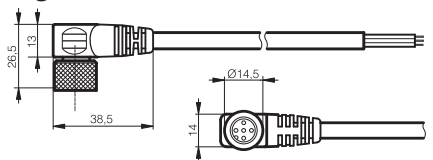


Figure 8



M8 Quick-Disconnect Cables						
Part Number	Length	Poles	Connector	Jacket	Dimensions	
M8 Quick-Disconnects						
CD08-0A-020-A1	2m (6.5ft.)	3	Axial	PVC	Figure 1	
CD08-0A-020-C1	2m (6.5ft.)	3	Right-angle	PVC	Figure 2	
CD08-0A-050-A1	5m (16.4ft.)	3	Axial	PVC	Figure 3	
CD08-0C-050-A1	5m (16.4ft.)	3	Axial	PUR	Figure 3	
CD08-0A-050-C1	5m (16.4ft.)	3	Right-angle	PVC	Figure 4	
CD08-0C-050-C1	5m (16.4ft.)	3	Right-angle	PUR	Figure 4	
CD08-0A-070-A1	7m (23ft.)	3	Axial	PVC	Figure 1	
CD08-0A-070-C1	7m (23ft.)	3	Right-angle	PVC	Figure 2	

M12 Quick-Disconnect Cables						
Part Number	Length	Poles	Connector	Jacket	Dimensions	
M12 Quick-Disconnects						
CD12L-0B-020-A0	2m (6.5ft.)	4	Axial	PVC	Figure 5	
CD12L-0B-020-C0	2m (6.5ft.)	4	Right-angle	PVC	Figure 6	
CD12M-0B-050-A1*	5m (16.4ft.)	3	Axial	PVC	Figure 7	
CD12M-0D-050-A1*	5m (16.4ft.)	3	Axial	PUR	Figure 7	
CD12M-0B-050-C1*	5m (16.4ft.)	3	Right-angle	PVC	Figure 8	
CD12M-0D-050-C1*	5m (16.4ft.)	3	Right-angle	PUR	Figure 8	
CD12M-0B-070-A1	7m (23ft.)	4	Axial	PVC	Figure 5	
CD12M-0B-070-C1	7m (23ft.)	4	Right-angle	PVC	Figure 6	

* Note: Do not use with: DM, FA, QX, SS, SSF, MS and MSF series photoelectric sensors. These sensors require 4-pole cables.

Cable Specifications	M8		M12	
	Length	2m (6.5ft.) / 7m (23ft.)	5m (16.4ft.)	2m (6.5ft.) / 7m (23ft.)
Nominal Voltage	50VAC/75VDC	60VAC/75VDC	300VAC	60VAC/75VDC
Nominal Current	4A	1.5A	4A	1.5A
Protection Degree	IEC IP67		IEC IP67	
Contact Body Material	ABS	PUR	ABS	PUR
Housing Material	PUR		PUR	
Contacts Material	CuSn	CuZn	CuSn	CuZn
Conductors Section	0.34mm ²		0.34mm ²	
Ø Outer Cable	5mm		5mm	
Temperature Range	-25° to +70°C (-13° to 158°F)		-25° to +70°C (-13° to 158°F)	

Photoelectric Sensors Accessories: Extension Cables

PLC Overview

DL05/06 PLC

DL105 PLC

DL205 PLC

DL305 PLC

DL405 PLC

Field I/O

Software

C-more HMIs

Other HMI

AC Drives

Motors

Steppers/Servos

Motor Controls

Proximity Sensors

Photo Sensors

Limit Switches

Encoders

Current Sensors

Pushbuttons/Lights

Process

Relays/Timers

Comm.

TB's & Wiring

Power

Circuit Protection

Enclosures

Appendix

Part Index

Extension cables with quick-disconnect plugs on each end

Available extension cables include:

- Industry standard M8 and M12 screw-lock connectors
- Axial and right-angle connector models
- 1m and 3m cable lengths
- PVC (polyvinyl chloride) jacket for typical industrial applications
- IP67 rated



Dimensions

Figure 1

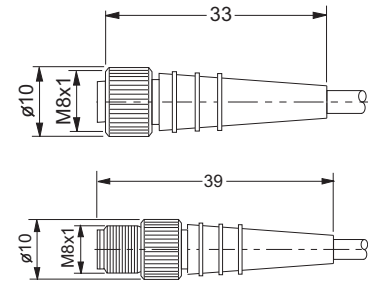


Figure 2

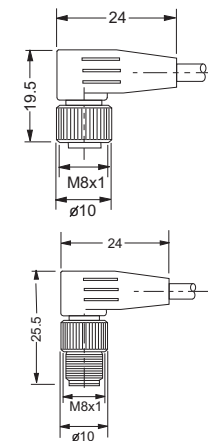


Figure 3

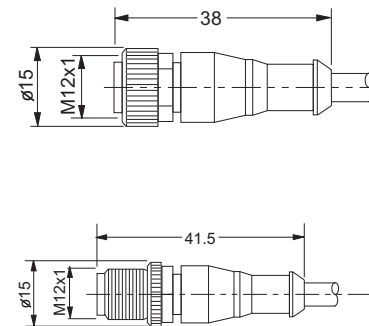
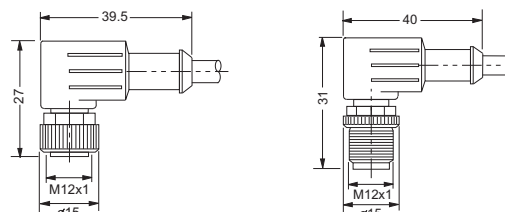


Figure 4



M8 Extension Cables with Quick-Disconnect on each end						
Part Number	Length	Poles	Connectors	Jacket	Dimensions	
M8 Quick-Disconnect Extension Cables						
CDP08-0A-010-AA	1m (3.28ft.)	3	2 Axial	PVC	Figure 1	
CDP08-0A-010-BB	1m (3.28ft.)	3	2 Right-angle	PVC	Figure 2	
CDP08-0A-030-AA	3m (9.84ft.)	3	2 Axial	PVC	Figure 1	
CDP08-0A-030-BB	3m (9.84ft.)	3	2 Right-angle	PVC	Figure 2	

M12 Extension Cables with Quick-Disconnect on each end						
Part Number	Length	Poles	Connectors	Jacket	Dimensions	
M12 Quick-disconnect Extension Cables						
CDP12-0B-010-AA	1m (3.28ft.)	4	2 Axial	PVC	Figure 3	
CDP12-0B-010-BB	1m (3.28ft.)	4	2 Right-angle	PVC	Figure 4	
CDP12-0B-030-AA	3m (9.84ft.)	4	2 Axial	PVC	Figure 3	
CDP12-0B-030-BB	3m (9.84ft.)	4	2 Right-angle	PVC	Figure 4	

Cable Specifications	M8 / M12
Length	1m (3.28ft.) 3m (9.84ft.)
Nominal Voltage	50VAC/75VDC
Nominal Current	4A
Protection Degree	IEC IP67
Contact Body Material	ABS
Housing Material	PUR
Contacts Material	CuSn
Conductors Section	0.34mm ²
Ø Outer Cable	5mm
Temperature Range	-25° to +70°C (-13° to 158°F)

Photoelectric Sensors Accessories: Cables

Cables with quick-disconnect plugs for DFT/DFP Models

Do not use extension cables with the cable listed below. The physical pin configurations do not match.

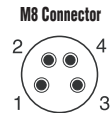
Available cables include:

- Industry standard M8 screw-lock connectors
- Axial and right-angle connector models
- 2m, 5m and 10m cable lengths
- PVC (polyvinyl chloride) jacket for typical industrial applications
- IP68 rated



M8 Cables with Quick-Disconnect						
Part Number	Length	Poles	Connectors	Jacket	Dimensions	
M8 Quick-Disconnects						
CD08-0G-020-A1	2m (6.56ft.)	4	Axial	PVC	Figure 1	
CD08-0W-020-C1	2m (6.56ft.)	4	Right-angle	PVC	Figure 2	
CD08-0G-050-A1	5m (16.4ft.)	4	Axial	PVC	Figure 1	
CD08-0W-050-C1	5m (16.4ft.)	4	Right-angle	PVC	Figure 2	
CD08-0G-100-A1	10m (32.8ft.)	4	Axial	PVC	Figure 1	
CD08-0W-100-C1	10m (32.8ft.)	4	Right-angle	PVC	Figure 2	

Use these cables if the sensor pin configuration looks like the connector pin-out below.



Cable Specifications	M8
Length	2m (6.56ft.) 5m (16.4ft.) 10m (32.8ft.)
Nominal Voltage	30VAC/30VDC
Nominal Current	4A
Protection Degree	IEC IP67
Contact Body Material	ABS
Housing Material	PUR
Contacts Material	CuSn
Conductors Section	0.25mm ²
Ø Outer Cable	4.5mm
Temperature Range	-5° to +70°C (23° to 158°F)

Dimensions (mm)

Figure 1

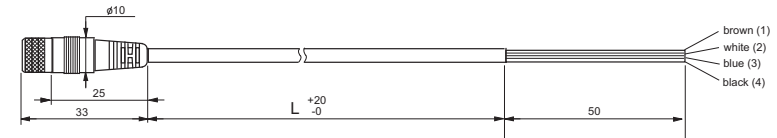
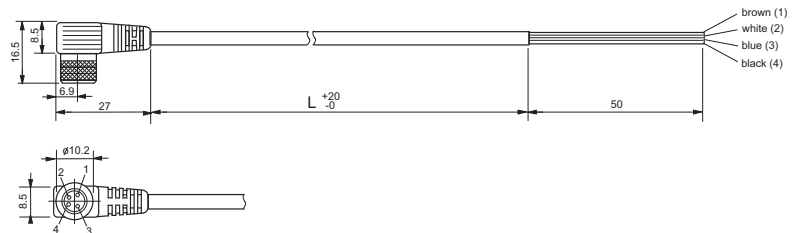


Figure 2

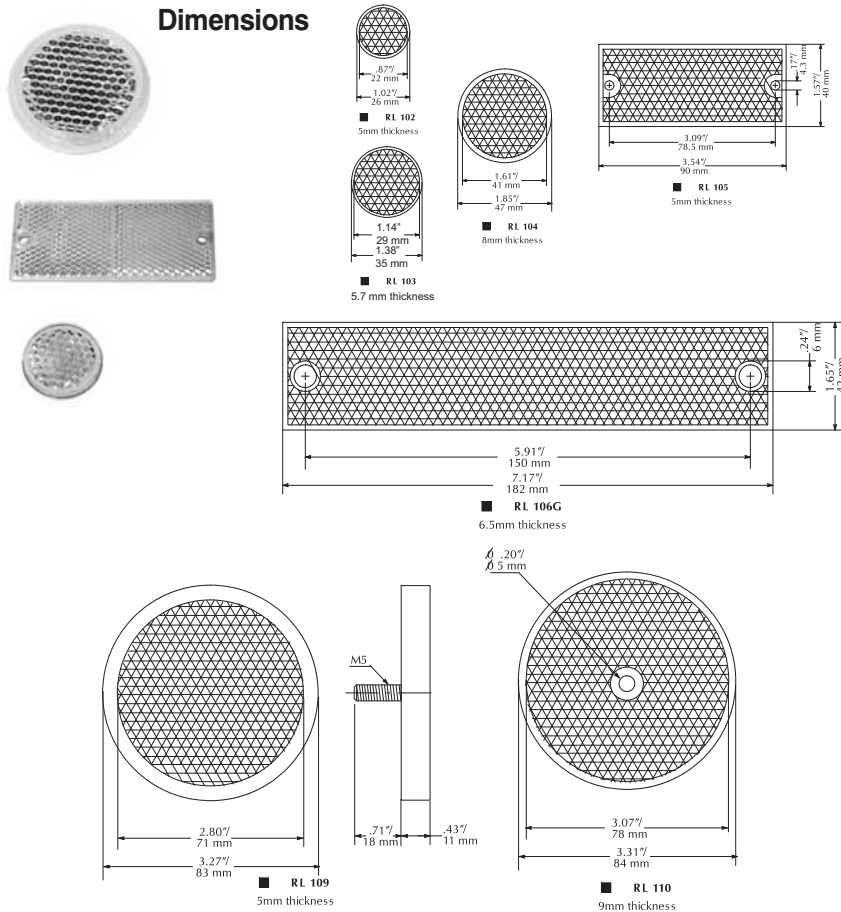


Accessories: Reflectors and Shutters

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 stud mounting types available
- 10 reflectors per package

Dimensions



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 $\pm 15^\circ$.

Specifications							
Model	RL102	RL103	RL104	RL105	RL106G	RL109	RL110 ³
% Sensing Range Using SSP ¹	50%	40%	50%	50%	50%	50%	100%
% Sensing Range Using QXP ¹	--	35%	60%	50%	45%	30%	100%
Dimensions	Ø26mm	Ø36mm	Ø47mm	90x40mm	182x42mm	Ø83mm	Ø84mm
Degree of Protection ²	IEC IP67						
Mounting	Customer-supplied adhesive or other mounting method required			two Ø4.3mm holes	two Ø6mm holes	one M5 stud	one Ø5mm hole
Materials	Acrylic/polycarbonate						
¹ Refer to individual catalog pages for detailed explanations of these photoelectric sensors.							
² Not recommended for applications involving moist air environments or water immersion.							
³ All reflective sensors are shipped with an RL110 reflector.							

ST0S1 through ST0S8 shutters for M18 (18 mm) through-beam sensors (SSE / SSR)



- Reduces the emitted beam, allowing the detection of small targets
- Shutter consists of a threaded ring-nut, a protective lens, an O-ring and an aperture, which can screw onto the optical head of either the emitter or receiver. The table above shows the sensing distance and minimal detectable object.

Sensing Distance (when used with SSE / SSR Model Photoelectric switches)						
Model	ST0S1	ST0S2	ST0S3	ST0S4	ST0S6	ST0S8
Pieces Per Pack	1	1	1	1	1	1
Ø x shutter (mm)	1	2	3	4	6	8
Distance (m)	N/A	N/A	1	1.5	3.5	6.5
object (mm)	N/A	N/A	1.5	2	3	4

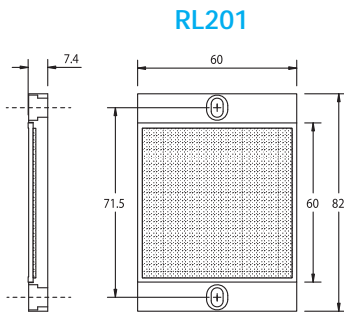
Accessories: Reflectors, Adapters & Mounting Brackets

RL series reflectors for polarized reflective Laser photoelectric sensors (FALN series)

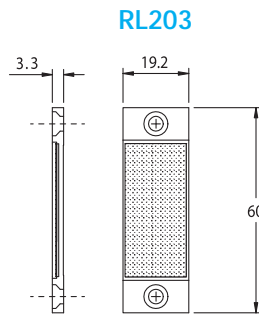
- Suitable for use with polarized light Laser photoelectric sensors
- Sizes for most applications
- Miniature types for close mounting in multiple sensor installations
- 5 reflectors per package

Specifications			
Model	RL201	RL203	RL204
Sensing Range Using FALN ¹	30m	7m	7m
Dimensions	60mm x 82mm	19mm x 60mm	20mm x 32mm
Mounting	two Ø4mm holes	two Ø6mm holes	two Ø3mm holes
Degree of Protection ²	IEC IP67		
Materials	Acrylic/polycarbonate		

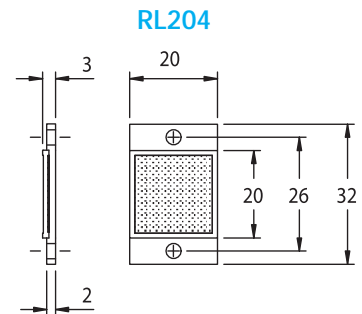
¹ Refer to individual catalog pages for detailed explanations of these photoelectric sensors.
² Not recommended for applications involving moist air environments or water immersion.
 Note: All reflective sensors are shipped with an RL110 reflector. Purchase additional reflectors separately.



(5 per pack)



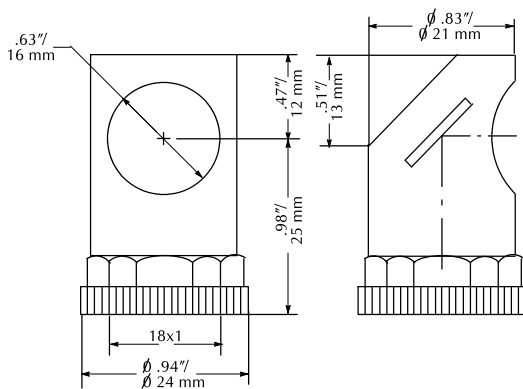
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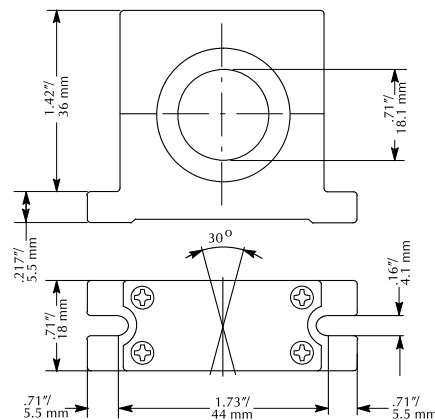
ST03 right-angle M18 (18 mm) beam adapter

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%.



ST02 plastic swivel bracket M18 (18 mm)

Plastic mounting bracket for use with M18 photoelectric switches. Has a ball-joint and set screws to adjust sensor orientation. Allows orientation in all directions for retroreflective and through-beam sensors. (Will not work with C18 series).



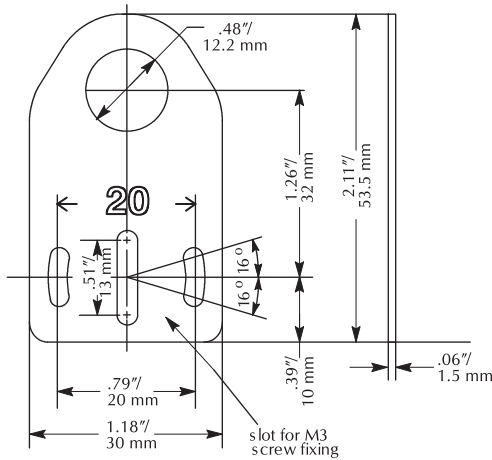
Accessories: Mounting Brackets

ST12A metal axial bracket

For mounting M12 (12 mm) sensors. Has two mounting holes (use 3 mm screws) and allows the rotation of an optical axis for right-beam angle adapter sensors.



(1 per pack)

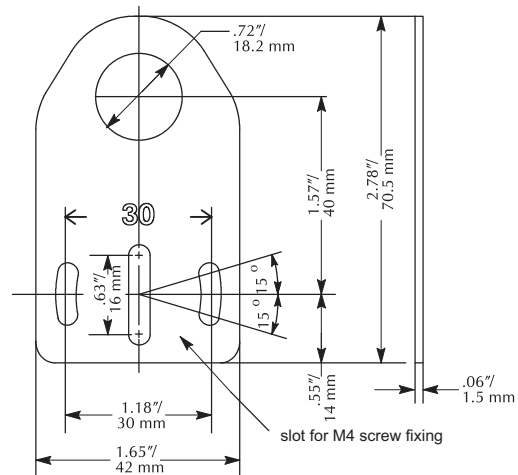


ST18A metal axial bracket

Metal mounting bracket for M18 (18mm) sensors. Has two mounting holes (use 4 mm screws) and allows the rotation of an optical axis for right-beam-angle-adapters sensors.



(1 per pack)

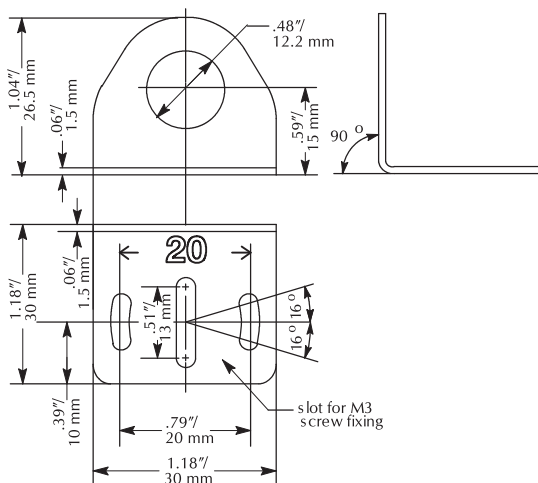


ST12C metal right-angle bracket

Metal angular mounting bracket for use with M12 (12 mm) sensors. Has two mounting holes (use 3 mm screws) and allows the rotation of an optical axis for axial sensors.



(1 per pack)



ST18C metal right-angle bracket

Metal angular mounting bracket for M18 (18 mm) sensors. Has two mounting holes (use 4 mm screws) and allows the rotation of an optical axis for axial sensors.



(1 per pack)

