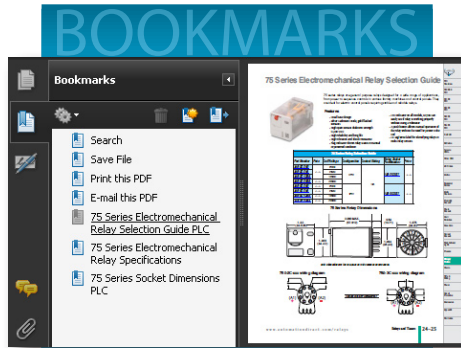


AUTOMATIONDIRECT.com

Photoelectric Sensors



In this interactive PDF you can:

- Use bookmarks to navigate by product category
- Use bookmarks to save, search, print or e-mail the catalog section
- Click on part #s to link directly to our online store for current pricing, specs, stocking information and more

Up-to-date price list:

www.automationdirect.com/pricelist

FREE Technical Support:

www.automationdirect.com/support

FREE Videos:

www.automationdirect.com/videos

FREE Documentation:

www.automationdirect.com/documentation

FREE CAD drawings:

www.automationdirect.com/cad



Photoelectric Sensor Technologies Expand Applications



What type of photoelectric sensor is best for me?

There are many different styles of photoelectric sensors, but really only four basic technologies: through-beam, reflective, diffuse, and background suppression. The chart describes some advantages and disadvantages of each technology.

Type	Advantages	Disadvantages
Through-beam	<ul style="list-style-type: none"> • Most accurate • Longest sensing range • Very reliable 	<ul style="list-style-type: none"> • Must install at two points on system: emitter and receiver • Costly - must purchase both emitter and receiver
Reflective	<ul style="list-style-type: none"> • Cost less than through-beam • Only slightly less accurate than through-beam • Sensing range better than diffuse • Very reliable 	<ul style="list-style-type: none"> • Must install at two points on system: sensor and reflector • Slightly more costly than diffuse • Sensing range less than through-beam
Diffuse	<ul style="list-style-type: none"> • Only install at one point • Cost less than through-beam or reflective 	<ul style="list-style-type: none"> • Less accurate than through-beam or reflective • More setup time involved
Background Suppression	<ul style="list-style-type: none"> • Effective with reflective backgrounds 	<ul style="list-style-type: none"> • Cost more than diffuse, reflective or through-beam • Most setup time required

How do these sensors benefit me?

Everybody wants to know how a particular product will help them. With AUTOMATIONDIRECT photoelectric sensors, you benefit from:

- Approximately 2-to-1 list pricing compared to the competition. This allows OEM-like pricing on single item purchases.
- Rectangular formats that provide mounting holes directly into the sensor. This eliminates the need for mounting plates and allows for easier installation.
- Quick-disconnect cable versions available for all sensors. The Q/D sensors make for fast and easy replacement. Troubleshooting is also much faster with Q/D devices as the user need only unscrew the connector and change out the sensor. This eliminates the need for disconnecting wires and cutting wire ties, thus speeding up the replacement process with much less room for error.
- Electrical protection against short circuit, reverse polarity, and transient noise. Even if the sensor is initially wired wrong, or wired into a noisy environment, the sensor will still operate properly.
- 30-day, money-back guarantee. Nothing else needs to be said. If you are not satisfied with the performance of your sensor, just send it back.

The Most Popular Photoelectric Sensor Styles

The most popular and widely-accepted photoelectric sensor mounting shape in the U.S. market is the 18 mm round format. From a standard through-beam (plastic) sensor to a unique right-angle, background suppression diffuse sensor, AUTOMATIONDIRECT has a model to fit your needs.

- Metal or plastic housing
- Diffuse, polarized retroreflective, through-beam, retroreflective for transparent objects and background suppression models
- Straight or unique right-angle optics
- 3-wire and 4-wire outputs
- NPN and PNP models
- Normally open and normally closed (light or dark operation) models

Also available are 5, 8 and 12 mm diameter models in various styles.



A photoelectric sensor must suit your application, and must also be easy to install, simple to set up, and operate flawlessly. AUTOMATIONDIRECT understands these needs and offers products that solve your application problems:

- **Unique right-angle mounting sensors.** Have you ever tried to install a right-angle sensor? Have you tried getting the mounting nut over the right-angle head of the sensor? It's not easy! We offer a right-angle sensor that a nut will fit directly over. Our competitors don't offer a product that's so easy to use. This technology will save you time and headaches during installation.
- **IP67 & IP69K ratings.** All of our sensors are watertight and some are designed to withstand the harsh conditions of washdown applications in food and beverage industries. Either way since you won't have to swap sensors out constantly you will ultimately save money.
- **Metal or plastic sensors.** Plastic sensors are great for corrosion resistance, while metal sensors are rugged and can absorb more punishment. We offer both.
- **Alignment LEDs.** With onboard indicators, our sensors simplify installation to save you time and money.

We are so confident of our sensors' quality, we offer a 30-day money-back guarantee if you don't like them.

Rectangular styles for unique mounting needs

Rectangular sensors are available as AC or DC-powered models, in varying sizes and sensing styles, including diffuse with background suppression, diffuse, retroreflective, retroreflective for transparent objects and through-beam.



Long-range distance measuring



- Short Range (CMOS) or Long Range (Transit)
- Analog and switching outputs available
- Measured value independent of target material, color and brightness
- Class 1 and 2 lasers available
- Measuring ranges up to 100 meters

Quick-disconnect cables and accessories



Quick-disconnect cables, reflectors, mounting brackets and other accessories available include:

- Micro (12mm) and pico (8mm) Q/D sizes from 2m to 15m
- Extension cables for quick-disconnect sensors
- LED sensor cables for signal confirmation
- Round and rectangular reflectors in many sizes
- Photoelectric shutters that focus your photoelectric sensor on small targets
- Right-angle adapters for special mounting applications

Photoelectric Sensor Lineup



from **\$76.00**

5 mm, C5 Series, and 8 mm, HE Series

- Power: 10-30 VDC
- Embedded cable or M8 Q/D
- 3-wire, NPN or PNP output
- Fixed sensitivity



from **\$66.00**

18 mm IP69K, FF & FFRS series

- Power: 10-30 VDC
- M12 Q/D
- Diffuse, Polarized reflective, Through beam, Retro-reflective
- Suitable for harsh environments



from **\$21.50**

18 mm Non-metal, SS/MS/MV, MQ, FB and FA series

- Power: 10-30 VDC or 20-250 VAC
- Embedded cable or M12 Q/D
- 4-wire, NPN or PNP output, LO/DO selectable
- Fixed sensitivity



from **\$41.00**

18 mm Metal, C18 Series

- Power: 10-30 VDC
- Embedded cable or M12 Q/D
- 3 or 4-wire, NPN or PNP output
- Adjustable sensitivity
- Axial or right-angle optics



from **\$40.00**

12 mm, DM series

- Power: 10-30 VDC
- Embedded cable or M12 Q/D
- 4-wire, NPN or PNP output, LO/DO selectable
- Teach auto calibration



from **\$295.00**

Short Range (CMOS) & Long Range (Transit) DC rectangular, OPT Series Distance Measuring

- Power: 10-30 VDC or 18-30 VDC
- Analog and switching outputs available
- Measured value independent of target material, color and brightness
- Class 1 and 2 lasers available
- Measuring ranges up to 100 meters



from **\$39.00**

M18 DC Rectangular, GX Series

- Power: 10 - 30 VDC
- 18 mm diameter threaded lens with rectangular base
- 12 models available
- Fixed sensing ranges
- NPN or PNP, Light-on, Dark-on output models
- M12 quick-disconnect



from **\$108.00**

18 mm, FAL series

- Power: 10-30 VDC
- Photoelectric laser sensor
- Plastic or metal
- Axial or right angle optical head models
- Axial Cable or M12 quick disconnect models



from **\$35.00**

DC Mini Rectangular, QM Series

- Power: 10-30 VDC
- Embedded cable or M8 Q/D
- 3-wire, NPN or PNP output, LO/DO selectable
- Adjustable sensitivity



from **\$42.00**

DC Rectangular, FM series

- 316L stainless steel housing
- IP69K
- Embedded cable or M8 or M12 Q/D
- 3-wire NPN or PNP output



from **\$79.00**

DIN Rail Fiber Amplifiers, OPT, DFT, DFP Series with Metal Jacket and Plastic Cuttable Fibers

- Power: 10-30 VDC
- Embedded cable or M8 Q/D
- 4-wire, NPN or PNP output, LO/DO selectable
- IO-Link compatible models available



from **\$48.50**

DC Rectangular, CX Series

- Embedded cable or M8 Q/D
- 3-wire, NPN or PNP output
- Adjustable sensitivity



from **\$59.00**

DC Compact Metal, FW Series

- 10 to 30 VDC
- 30 mm mount, metal, DC
- Diffuse models w/background suppression: 300 Hz
- Polarized retro-reflective models: 1000 Hz



from **\$86.00**

Fork Sensors

- Visible Red Light and Laser light options
- LO/DO Selectable
- Rugged metal one-piece housing
- Models for clear object detection



from **\$61.00**

Cutler-Hammer Enhanced 50 Series

- Drop-in replacement for AB 9000 series
- Diffuse, retroreflective, through-beam and clear object detection



from **\$45.50**

18 mm Fiber Amplifier, SSF Series

- Power: 10-30 VDC
- Embedded cable or M12 Q/D
- 4-wire, NPN or PNP output, LO/DO selectable
- Teach auto calibration



from **\$363.00** pair

Light Screens, BX Series

- Power: 12-24 VDC
- M12 Q/D
- 4-wire, NPN or PNP output, NO/NC selectable
- Screen measures 2 m x 70 mm
- 12 light beams, 5 mm resolution
- Emitter and receiver models



from **\$68.00**

Contrast Sensors, S8 & TL Series

- RGB Light Emission
- Switching frequencies up to 50kHz
- PNP or NPN

Photoelectric Sensors Selection Guide



Specification	FA Series LED DC	FA Series Laser DC	FB Series DC	SS Series DC
Description	18mm plastic, DC	18mm plastic or metal, DC	18mm plastic, DC	18mm plastic, DC
Sensing Distances	Diffuse models: 1m Reflective models: 3m Through-beam: 20m	Diffuse models: 300mm Reflective models: 20m Through-beam: 50m	Diffuse models: 400mm Reflective models: 2.5m Through-beam models: 8m	Diffuse models: 100mm, 200mm, 400mm Reflective models: 2m Through-beam models: 8m
Output State	Complementary N.O. / N.C.	Complementary N.O. / N.C.	Light-on, Dark-on	N.O. / N.C. selectable
Logic Output	NPN / PNP	NPN / PNP	NPN / PNP	NPN / PNP
Connection Type	Axial cable / M12 connector	Axial cable / M12 connector	M12 connector	Axial cable / M12 connector
Supply Voltage	10 to 30 VDC	10 to 30 VDC	10 to 30 VDC	10 to 30 VDC
Switching Frequency	250Hz	Diffuse and reflective models: 800Hz Through-beam models: 1kHz	1kHz	Diffuse and reflective models: 250Hz Through-beam models 25Hz
Rating	IEC IP67	IEC IP67	Diffuse: IEC IP65 Retro-reflective and Thru-beam: IEC IP67	IEC IP67



Specification	MS Series DC	FARS Series DC	FF Series	FFRS Series
Description	18mm plastic with background suppression, DC	18mm diffuse with background suppression	IP69K sensors, 18 mm stainless steel, DC	IP69K sensors, 18mm stainless steel diffuse with background suppression, DC
Sensing Distances	Diffuse Reflection Standard distance models: 50mm Extended distance models: 100mm	30 to 130 mm	Diffuse: 100m, 400m, 800mm Polarized reflective: 4m Through-beam: 20m Retro-reflective: 1m	Standard: 30 to 130mm Shiny object: 60 to 100mm
Output State	N.O. / N.C. selectable	N.O. / N.C. background suppression Light-on/Dark-on selectable Q/Qnot	N.O. / N.C. Complementary; Light-on/Dark-on selectable	N.O. / N.C. Complementary; Light-on/Dark-on selectable
Logic Output	NPN / PNP selectable	NPN/PNP	NPN / PNP	NPN / PNP
Connection Type	Axial cable M12 connector	Axial cable M12 connector	M12 connector	M12 connector
Supply Voltage	10 to 30 VDC	10 to 30 VDC	10 to 30 VDC	10 to 30 VDC
Switching Frequency	80Hz	1kHz	Diffuse, Polarized reflective and Retro-reflective: 500Hz, Through-beam: 250Hz	Standard: 1kHz Shiny: 400Hz
Rating	IEC IP67	IEC IP67	IEC IP68, IP69K	IEC IP68, IP69K

Photoelectric Sensors Selection Guide



Specification	MQ Series AC	MV Series AC	C5 Series DC	HE/HER Series DC	DM Series DC
Description	18mm diffuse with background suppression, 90° radial optic	18mm plastic, AC	5mm stainless steel, DC	8mm Thru-Beam	12mm nickel-plated brass with Teach operating distance function, DC
Sensing Distances	Standard distance models: 50mm Extended distance models: 100mm	Diffuse: 100mm, 200mm, 400mm Retroreflective: 3m Through-beam: 16m	Diffuse models: 50mm Through-beam models: 250mm	1000 mm / Ex. gain = 2	Diffuse models: 100mm, 300mm Retroreflective models: 2m Through-beam: 4m
Output State	N.O./ N.C. background suppression	N.O./ receiver dependent	N.O. / receiver dependent	N.O./ N.C.	Diffuse: N.O./ N.C. selectable Polarized retroreflective: N.O./ N.C. selectable Through-beam: N.O / N.C./ receiver dependent
Logic Output	Triac	Triac	NPN / PNP/ N.O. only	NPN / PNP	NPN / PNP
Connection Type	M12 quick disconnect	Axial cable M12 connector	Axial cable M8 connector	Axial cable M8 quick disconnect	Axial cable / M12 connector
Operating Voltage	20 – 253 VAC	20 – 253 VAC	10 – 30 VDC	10 – 30 VDC	10 – 30 VDC
Switching Frequency	25Hz	25Hz	250Hz	10kHz	Diffuse and retroreflective models: 400Hz Through-beam models: 250Hz
Rating	IEC IP67	IEC IP67	IEC IP67	IEC IP67	IEC IP67



Specification	C18 Series DC	GX Series DC	QM Series DC	FM Series DC
Description	18mm nickel-plated brass, DC	18mm rectangular plastic, DC	Mini-rectangular plastic, DC	Harsh Duty, rectangular metal, DC
Sensing Distances	Diffuse models: up to 600mm Diffuse models w/ background suppression: 10–120 mm Retroreflective models: Up to 2m Through-beam models: Up to 6m	Diffuse models w/ background suppression: Up to 150mm Retroreflective models: Up to 4m Through-beam models: Up to 20m	Diffuse models: 100mm, 400mm, 1m, 1.5 m Diffuse with background suppression: 200mm, 400mm Retroreflective models: 7m Polarized retroreflective: 5m Retroreflective transparent objects: 1m, 1.5m, 4m Through-beam : 20m, 30m	Diffuse models: 0.5 m Diffuse with background suppression: 0.2 m Polarized retroreflective: Up to 5m Through-beam: Up to 10m
Output State	Diffuse: Light-on / Dark-on selectable Diffuse models with background suppression: Light-on Polarized retroreflective: Dark-on Through-beam: Light-on / Dark-on / receiver dependent	Diffuse models w/ background suppression: Light-on Polarized retroreflective: Light-on / Dark-on Through-beam: Light-on / Dark-on / receiver dependent	Light-on/Dark-on selectable	Light-on/Dark-on selectable
Logic Output	NPN / PNP/ receiver dependent	NPN / PNP/ receiver dependent	NPN / PNP	NPN / PNP
Connection Type	Axial cable / M12 connector	M12 connector	Axial cable / M8 connector	Axial cable / M8 connector / 0.3 m cable with M12 QD connector
Operating Voltage	10–36 VDC	10–30 VDC	10–30 VDC	10–30 VDC
Switching Frequency	Diffuse models: 1kHz Diffuse models w/ background suppression: 500Hz Retroreflective models: 1kHz Through-beam models: 1kHz	1kHz	1kHz, 2kHz	1kHz
Rating	IEC IP67	IEC IP67	IEC IP67	IEC IP 65, 67, 68, 69K

Photoelectric Sensors Selection Guide



Specification	FE Series DC	CX Series DC	OPT Short Range (CMOS) Series	OPT Long Range (Transit Time) Series
Description	Mini-rectangular plastic, DC	Mini-rectangular plastic, DC	Photoelectric reflex laser distance measuring sensors. 50 x 50 mm rectangular housing.	Photoelectric transit time laser distance measuring sensors. 50 x 50 mm or 81 x 55 mm rectangular housing.
Sensing Distances	Diffuse models: 800mm Retroreflective models: 4m Through-beam: 12m	Diffuse models: up to 600mm Diffuse models w/ background suppression: 15–150 mm Retroreflective models: Up to 2m Through-beam models: Up to 6m	Diffuse models: 80mm, 160mm, 350mm, 660mm	Diffuse models: 3000mm, 3050mm, 6.2 m, 10.1 m Retroreflective models: 100.2 m
Output State	Light-on/Dark-on selectable	N.O.	Diffuse models: Analog N.O. / N.C. selectable (OPT2001-OPT2006) N.O. / N.C. selectable	Diffuse models: Analog N.O. / N.C. selectable N.O. / N.C. selectable Two selectable N.O. / N.C. Retroreflective models: 2 N.O. / N.C. selectable
Logic Output	NPN / PNP	NPN / PNP	PNP, NPN or Push-Pull	PNP or PNP/NPN
Connection Type	Axial cable / M8 connector	Axial cable / M8 connector	5-pin M12 connector 8-pin M12 connector	4-pin M12 connector 5-pin M12 connector 8-pin M12 connector
Operating Voltage	10–30 VDC	10–36 VDC	18–30 VDC, 10–30 VDC	18–30 VDC, 10–30 VDC
Switching Frequency	1kHz	Diffuse models: 1kHz Diffuse models w/ background suppression: 500Hz Retroreflective models: 1kHz Through-beam models: 1kHz	100Hz	50Hz, 250Hz, 1kHz
Rating	IEC IP67	IEC IP65	IEC IP67	IEC IP68



Specification	FW Series DC	CH Enhanced 50 Series
Description	30mm mount, metal, DC	Fiberglass-reinforced plastic
Sensing Distances	Diffuse w/background suppression models: Adjustable 50 to 800 mm; Fixed to 600mm Polarized retroreflective models: 0.1–15 m	Through-beam: 500 ft (152m) Diffuse models: 10 ft (3m) Polarized retroreflective: 16 ft (4.9 m) Clear /object detector: 45 in (1.2 m)
Output State	Diffuse w/background suppression models: Light-on Polarized retroreflective models: Light-on or Dark-on	Light-on/Dark-on selectable
Logic Output	PNP/NPN	Through-beam: NPN/PNP 250 mA, Solid-state relay 300 mA @ 240 VAC/ VDC, SPDT EM relay 3A @ 120 VAC Diffuse: NPN/PNP 250 mA, Solid-state relay 300 mA @ 240 VAC/VDC, SPDT EM relay 3A @ 120 VAC Polarized retroreflective: NPN/PNP 250 mA, Solid-state relay 300 mA @ 240 VAC/VDC, SPDT EM relay 3A @ 120 VAC Clear object detector: NPN/PNP 250 mA, Solid-state relay 300 mA @ 240 VAC/VDC, SPDT EM relay 3A @ 120 VAC
Connection Type	M12 (12mm) connector	Cable or mini/micro connection
Operating Voltage	10 to 30 VDC	10 to 40 VDC, 12 to 240 VDC, 24 to 240 VAC
Switching Frequency	Diffuse w/background suppression models: 300Hz Polarized retroreflective models: 1000Hz	various
Rating	IEC IP67	IEC IP67

Photoelectric Sensors Selection Guide



Specification	DFT Series Fiber Amp	DFP Series Fiber Amp	OPT Series Fiber Amp
Description	Compact rectangular plastic fiber optic amplifier with Teach operating distance function, DC	Compact rectangular plastic fiber optic amplifier, DC	Fiber optic amplifiers. Single and multi-fiber units.
Sensing Distances	See Optical Fiber Tables following the amplifier's specifications	See Optical Fiber Tables following the amplifier's specifications	See Fiber Optic Cable tables following the amplifier's specifications
Output State	Light-on / Dark-on selectable	Light-on / Dark-on selectable	Light-on / Dark-on selectable
Logic Output	NPN / PNP	NPN / PNP	NPN / PNP / Push Pull
Connection Type	Axial cable / M8 connector	Axial cable / M8 connector	OPT2040/OPT2041: M8 4 pole OPT2042: M12 4 pole, M12 8 pole
Supply Voltage	10 to 30 VDC	10 to 30 VDC	OPT2040: 10-30 VDC OPT2041: 18-30 VDC OPT2042: 18-30 VDC
Switching Frequency	1.5 kHz	1.5 kHz	OPT2040: 2kHz OPT2041: 4kHz OPT2042: 2kHz
Rating	IEC IP64	IEC IP64	OPT2040: IEC IP65 OPT2041: IEC IP65 OPT2042: IEC IP50 OPT2043: IEC IP50



Specification	SSF Series Fiber Amp	OPT Series Plastic Fibers	OPT Series Glass Fibers
Description	18mm plastic fiber optic amplifier, DC	Cutttable diffuse reflection and through-beam fiber optic cables (2.2 mm diameter)	Glass fiber optic cables diffuse reflection and through-beam (1.6 mm Diameter)
Sensing Distances	See Optical Fiber Tables following the amplifier's specifications	Amplifier dependent. Refer to fiber optic tables for sensing distances.	Amplifier dependent. Refer to Fiber Optic tables for sensing distances.
Output State	Light-on / Dark-on selectable	Amplifier dependent	Amplifier dependent
Logic Output	NPN / PNP	Amplifier dependent	Amplifier dependent
Connection Type	Axial cable / M12 connector	Amplifier dependent	Amplifier dependent
Supply Voltage	10 to 30 VDC	Amplifier dependent	Amplifier dependent
Switching Frequency	800Hz	Amplifier dependent	Amplifier dependent
Rating	IEC IP67	IEC IP67	IEC IP67

Photoelectric Sensors Selection Guide



Specification	CF Series Optical Fibers	PS Series Forks	S8 Series Contrast Print Mark Sensors
Description	Cutable diffuse reflection and through-beam fiber optic cables (2.2mm diameter)	Rugged Red and Laser Fork Sensors	Metal or plastic contrast print mark sensors
Sensing Distances	Amplifier dependent. Refer to fiber optic tables for sensing distances.	5mm (0.2 in) to 220mm (8.66 in)	6–12 mm [0.2–0.5 in]
Output State	N/A	Selectable Light on/Dark on	Selectable light on/dark on
Logic Output	N/A	NPN / PNP	NPN / PNP
Connection Type	N/A	M8 Connector	M8 Connector or 150mm M12 Connector
Supply Voltage	N/A	10 to 30 VDC	10–30 VDC
Switching Frequency	N/A	PSUL/PSTL - 5kHz PSUR 1F, 2F - 3000 Hz PSUR 3F-9F - 1500 Hz	25 kHz
Rating	IEC IP67	IEC IP67	IEC IP67 (S8-PR) / IEC IP69K (S8-MR)



Specification	TL Series Contrast Print Mark Sensors	BX Series Light Screen
Description	Basic, standard, or low jitter contrast sensor	Rectangular plastic high resolution area sensor, DC
Sensing Distances	6–12 mm [0.2–0.5 in]	Through-beam: 2m with 70mm height area
Output State	Selectable light on/dark on. Analog output on select models.	Selectable N.O / N.C.
Logic Output	NPN / PNP	NPN / PNP
Connection Type	M12 Connector	M12 connector
Supply Voltage	10–30 VDC	12 to 24 VDC
Switching Frequency	TL46-W - 15 kHz TL46-WL - 20 kHz TL46-WJ - 50 kHz	N/A
Rating	IEC IP67	IEC IP67

FA Series LED Photoelectric Sensors



M18 (18 mm) 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



FA Series Photoelectric Sensors Selection Chart									
Part Number	Price	Sensing Range	Output State	Logic	Connection	Wiring	Dimensions	Characteristic Curves	
Diffuse									
FAI8-BN-0A	\$44.50	1m (39.37in)	Complementary N.O./N.C.	NPN	2m (6.5) axial cable	Diagram 1	Figure 1	Chart 1	
FAI8-BP-0A	\$44.50			PNP	2m (6.5) axial cable	Diagram 2	Figure 1	Chart 1	
FAI8-BN-0E	\$43.50			NPN	M12 (12mm) connector	Diagram 1	Figure 2	Chart 1	
FAI8-BP-0E	\$43.50			PNP	M12 (12mm) connector	Diagram 2	Figure 2	Chart 1	
Polarized reflective*									
FARN-BN-0A	\$36.50	3m (118.11in)	Complementary N.O./N.C.	NPN	2m (6.5) axial cable	Diagram 1	Figure 1	Chart 2	
FARN-BP-0A	\$36.50			PNP	2m (6.5) axial cable	Diagram 2	Figure 1	Chart 2	
FARN-BN-0E	\$36.50			NPN	M12 (12mm) connector	Diagram 1	Figure 2	Chart 2	
FARN-BP-0E	\$36.50			PNP	M12 (12mm) connector	Diagram 2	Figure 2	Chart 2	
Through-beam**									
FAID-BN-0A	Receiver	\$37.50	Complementary N.O./N.C.	NPN	2m (6.5) axial cable	Diagram 1	Figure 1	Chart 3	
FAID-BP-0A	Receiver	\$37.50		PNP	2m (6.5) axial cable	Diagram 2	Figure 1	Chart 3	
FAID-BN-0E	Receiver	\$37.50		NPN	M12 (12mm) connector	Diagram 1	Figure 2	Chart 3	
FAID-BP-0E	Receiver	\$36.50		PNP	M12 (12mm) connector	Diagram 2	Figure 2	Chart 3	
FAIH-00-0A	Emitter	\$25.00		Receiver dependent		2m (6.5) axial cable	Diagram 3	Figure 1	Chart 3
FAIH-00-0E	Emitter	\$24.00				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

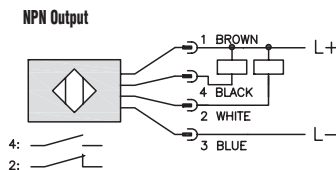


Diagram 2

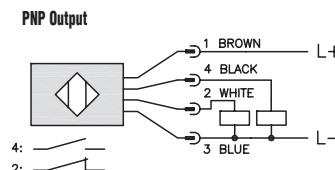
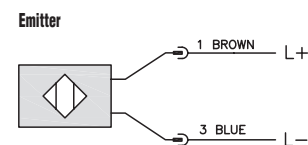


Diagram 3



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

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

Connector



Switching Element Function		
	Thru-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	180 mm @ 800 mm	200 mm @ 4 m	600 mm @ 20 m
Emission	Infrared (880 nm)	Red (660 nm)	Infrared (880 nm)
Sensitivity	Adjustable		
Output Type	NPN or PNP - Complementary NO/NC		
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 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

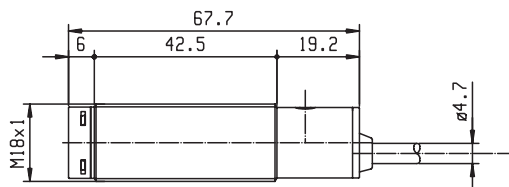
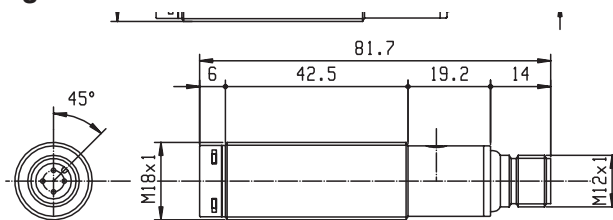


Figure 2



FA Series LED Photoelectric Sensors

Characteristic curves

Chart 1 (Diffuse)

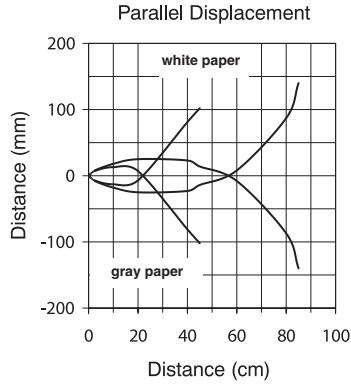
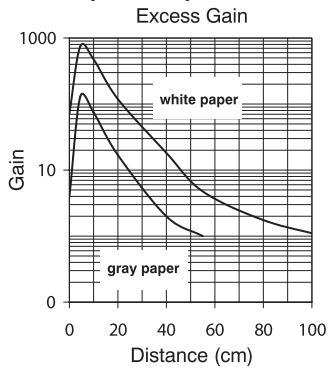


Chart 2 (Polarized Reflective)

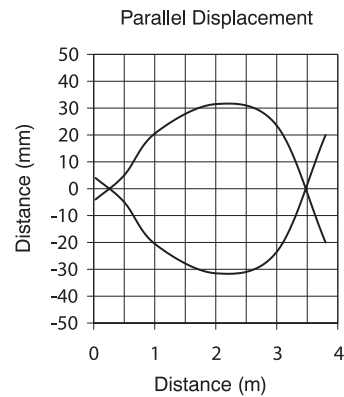
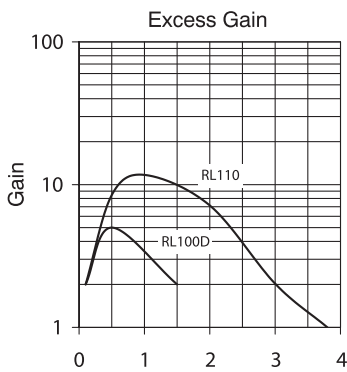
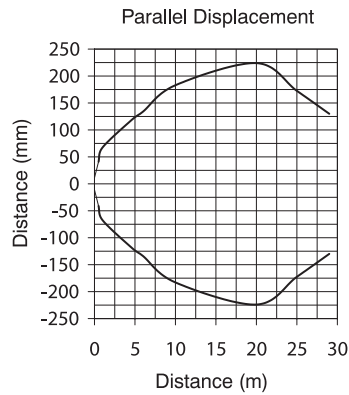
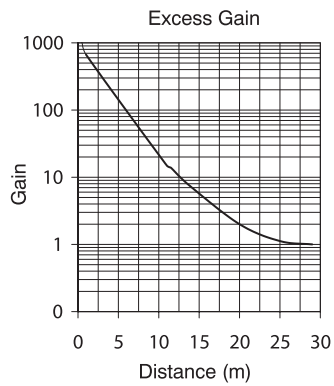


Chart 3 (Throughbeam)



FA Series Laser Photoelectric Sensors

M18 (18 mm) metal or plastic - DC



- 22 models available
- Diffuse, diffuse with background suppression, polarized reflective, and through-beam models
- Plastic or metal (diffuse with background suppression) housing
- Axial or right angle optical head models
- 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	Maximum Sensing Range	Output State	Logic	Connection	Wiring	Dimensions	Characteristic Curves	
Diffuse with Background Suppression Class 1 Laser										
FALS-BN-1E	Axial	\$124.00	100mm (3.94in)	Complementary N.O./N.C.	NPN	M12 (12mm) connector	Diagram 1	Figure 2	Chart 4	
FALS-BP-1E		\$124.00			PNP		Diagram 2	Figure 2	Chart 4	
FALS-BN-3E	Right angle	\$133.00	80mm (3.15in)		NPN		Diagram 1	Figure 4	Chart 5	
FALS-BP-3E		\$133.00			PNP		Diagram 2	Figure 4	Chart 5	
Diffuse with Background Suppression Class 2 Laser										
FALW-BN-1E	Axial	\$124.00	150mm (5.91in)	Complementary N.O./N.C.	NPN	M12 (12mm) connector	Diagram 1	Figure 2	Chart 6	
FALW-BP-1E		\$124.00			PNP		Diagram 2	Figure 2	Chart 6	
FALW-BN-3E	Right angle	\$133.00	130mm (5.12in)		NPN		Diagram 1	Figure 4	Chart 7	
FALW-BP-3E		\$133.00			PNP		Diagram 2	Figure 4	Chart 7	
Diffuse										
FAL4-BN-0A	Axial	\$107.00	300mm (11.81in)	Complementary N.O./N.C.	NPN	2m (6.5ft) axial cable	Diagram 1	Figure 1	Chart 1	
FAL4-BP-0A		\$108.00			PNP	2m (6.5ft) axial cable	Diagram 2	Figure 1	Chart 1	
FAL4-BN-0E		\$108.00			NPN	M12 (12mm) connector	Diagram 1	Figure 3	Chart 1	
FAL4-BP-0E		\$108.00			PNP	M12 (12mm) connector	Diagram 2	Figure 3	Chart 1	
Polarized reflective* Class 1 Laser										
FALN-BN-0A	Axial	\$108.00	20m (65.61ft) with RL110	Complementary N.O./N.C.	NPN	2m (6.5ft) axial cable	Diagram 1	Figure 1	Chart 2	
FALN-BP-0A		\$108.00			PNP	2m (6.5ft) axial cable	Diagram 2	Figure 1	Chart 2	
FALN-BN-0E		30m (98.43ft) with RL201	\$108.00		NPN	M12 (12mm) connector	Diagram 1	Figure 3	Chart 2	
FALN-BP-0E			\$108.00		PNP	M12 (12mm) connector	Diagram 2	Figure 3	Chart 2	
Through-beam** Class 1 Laser										
FALD-BN-0A	Receiver	\$37.50	50m (164.04ft)	Complementary N.O./N.C.	NPN	2m (6.5ft) axial cable	Diagram 1	Figure 1	Chart 3	
FALD-BP-0A	Receiver				PNP	2m (6.5ft) axial cable	Diagram 2	Figure 1	Chart 3	
FALD-BN-0E	Receiver				NPN	M12 (12mm) connector	Diagram 1	Figure 3	Chart 3	
FALD-BP-0E	Receiver				PNP	M12 (12mm) connector	Diagram 2	Figure 3	Chart 3	
FALH-X0-0A	Emitter				\$75.00	Receiver dependent	2m (6.5ft) axial cable	Diagram 3	Figure 1	Chart 3
FALH-X0-0E	Emitter				\$75.00	M12 (12mm) connector	Diagram 3	Figure 3	Chart 3	

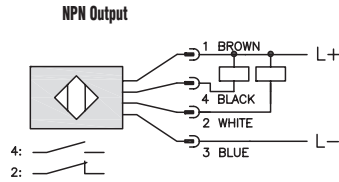
*Purchase reflectors separately.

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

FA Series Laser Photoelectric Sensors

Wiring diagrams

Diagram 1



Cable Assembly Wiring Colors:

Pin 1 - Brown

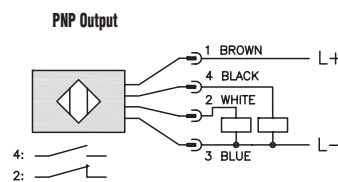
Pin 2 - White

Pin 3 - Blue

Pin 4 - Black

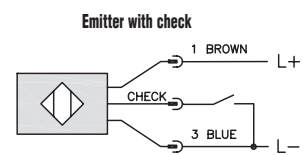
Note: Wiring colors are based on Automation Direct 4-pole cable assemblies.

Diagram 2



Switching Element Function		
	Thru-Beam and Reflective Models	Diffuse Models
Light-on	N.C.	N.O.
Dark-on	N.O.	N.C.

Diagram 3



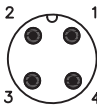
2-meter Axial Cable version: check is black

M12 Connector: check is Pin 2 (white).

Check input: This condition simulates the presence of a target within the detection range and forces the receiver output to switch. If switching does not occur, it indicates a fault in the system.

Connector

M12 connector



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

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

Dimensions

mm [inch]

Figure 1

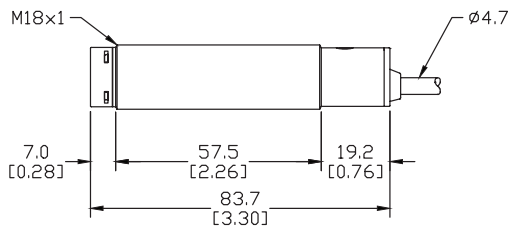


Figure 2

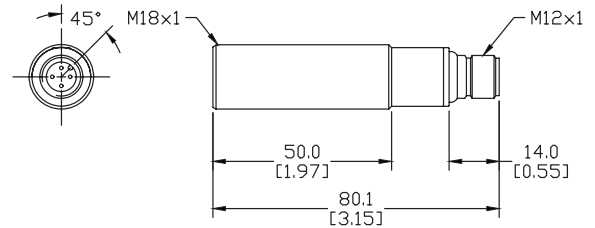


Figure 3

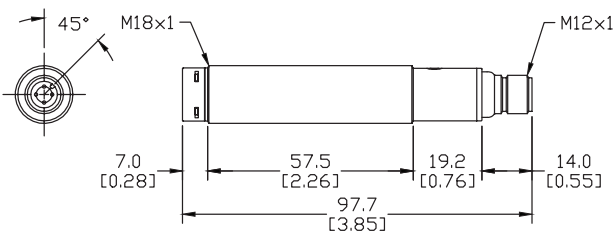
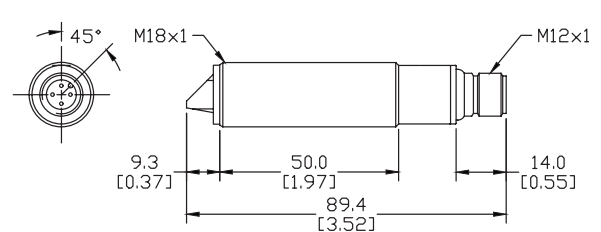


Figure 4



FA Series Laser Photoelectric Sensors

Specifications	Diffuse with Background Suppression	Diffuse Models	Reflective Models	Through-Beam Models
Type	Diffuse with background suppression	Diffuse reflection	Polarized reflection ³	Through-beam ⁴
Sensing Distance	100mm ⁵ 80mm ⁵ 150mm ⁵ 130mm ⁵	300mm ¹	20m with RL110 reflector ² 30m with RL201 reflector	50m
Light Spot Diameter	1mm @ 100mm		15mm @ 800mm	22x5 mm @ 20m
Emission	Visible red Class 1 or Class 2 Laser (650nm); see note below			
Sensitivity	Adjustable			
Output Type	NPN or PNP - Complementary NO/NC			
Operating Voltage	10-30 VDC			
No-load Supply Current	≤40mA	≤30mA	≤20mA	≤25mA
Operating (Load) Current	≤100mA			
Off-state (Leakage) Current	≤10µA			
Voltage Drop	2V max at 100mA			
Switching Frequency	1.5kHz	800Hz		1kHz
Ripple	≤10%			
Time Delay Before Availability (tv)	250ms	200ms		
Short-Circuit Protection	Yes, switch autoresets after load is removed			
Operating Temperature	-10 to 50°C (14° to 122°F)	-15 to 55°C (5° to 131°F)		
Protection Degree (DIN 40050)	IEC IP67			
LED Indicators/Switch Status	Yellow (output energized) Green (power ON)			Receiver: Yellow (output energized) Emitter: Green (power ON)
Housing Material	Nickel-plated brass (metallic)	Polybutylene Terephthalate (PBT)		
Lens Material	Polycarbonate (PC)			
Shock/Vibration	See terminology section			
Tightening Torque	25Nm (18.44 lb-ft)	1Nm (0.737 lb-ft)		
Weight	65g (2.29 oz)	100g (3.54 oz)		
Connectors	2m (6.5') axial cable; M12 (12mm) connector. Two lock nuts included.			
Agency Approvals	cULus E187310, CE			
1) With 100x100mm white matte paper 2) With standard Ø84mm RL110 reflector 3) Purchase reflector separately. 4) An emitter (FALH) and receiver (FALD) pair must be ordered for a complete sensor set. 5) Dependent on Axial and Right Angle and Laser class.				

IMPORTANT NOTE

The Laser Classification Systems for the standards IEC (EN) 60825-1 defines the following safety classes:

Class 1

This class is eye-safe under all operating conditions.

Class 2

These are visible lasers. This class is safe for accidental viewing under all operating conditions. However, it may not be safe for a person who deliberately stares into the laser beam for longer than 0.25 s, by overcoming their natural aversion response to the very bright light.

FA Series Laser Photoelectric Sensors

Characteristic curves

Chart 1 (Diffuse)

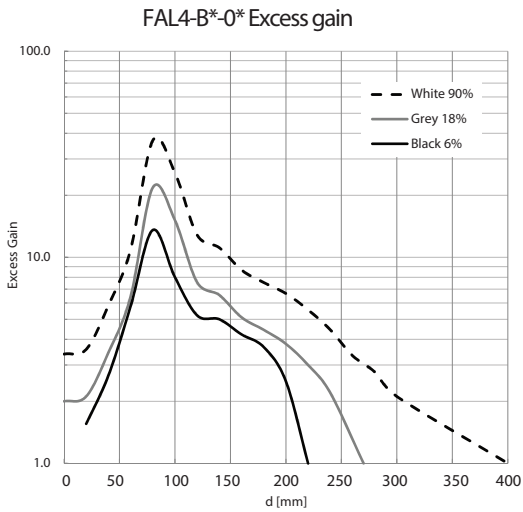
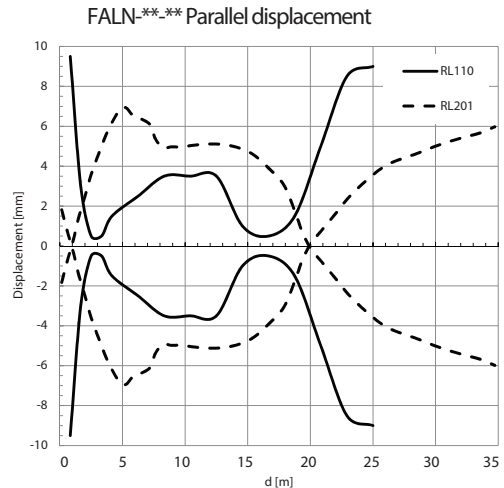
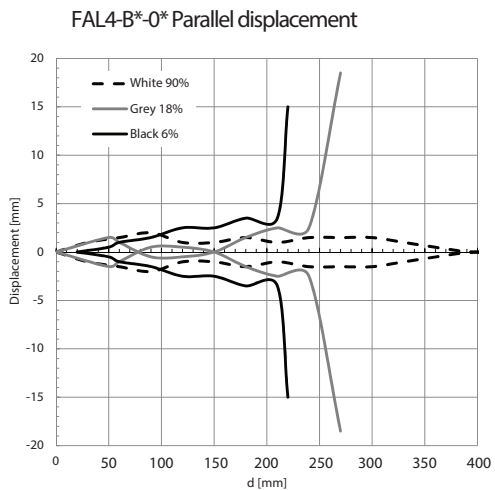
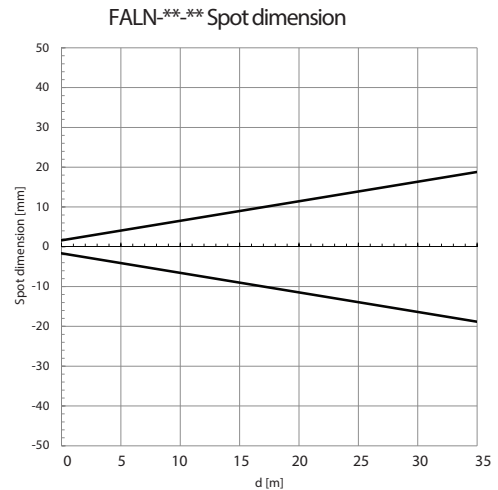
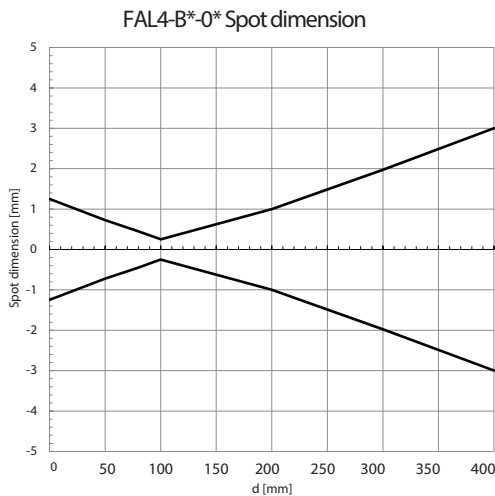
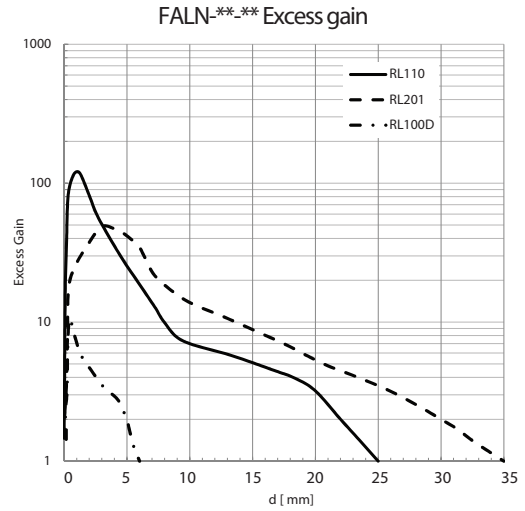


Chart 2 (Polarized Reflective)



FA Series Laser Photoelectric Sensors

Chart 3 (Through-Beam)

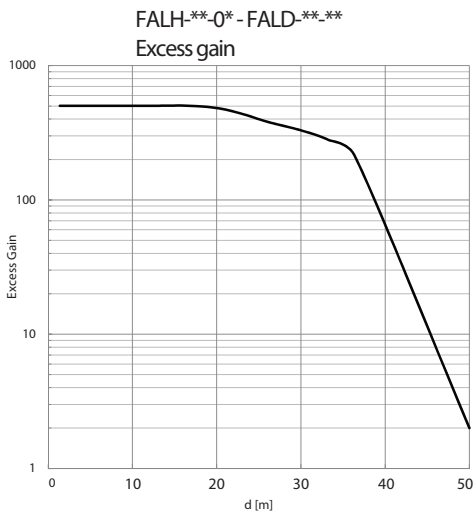


Chart 4 (Diffuse with Background Suppression Class 1)

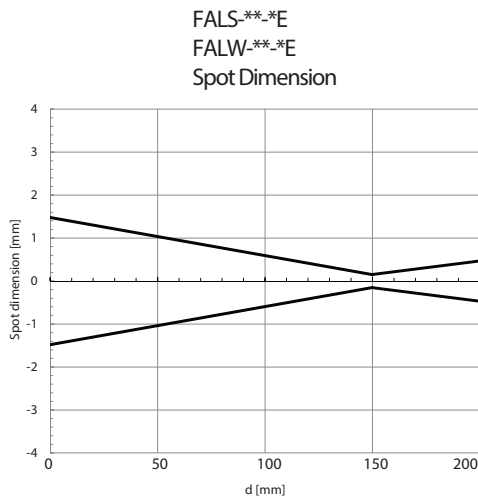
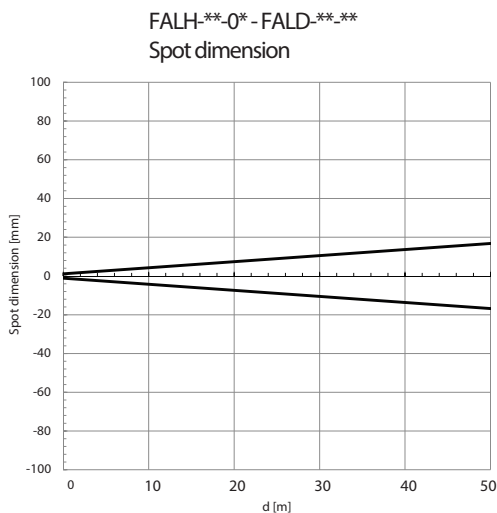
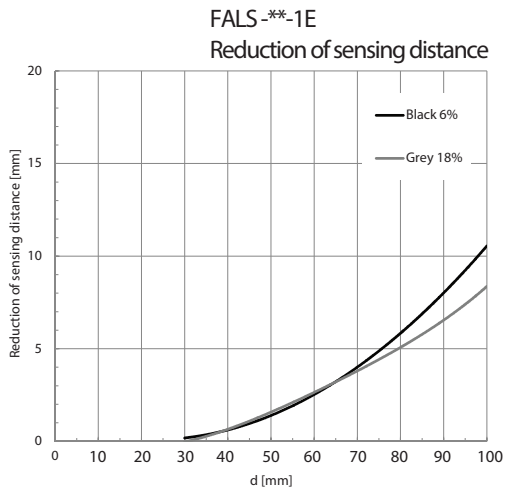
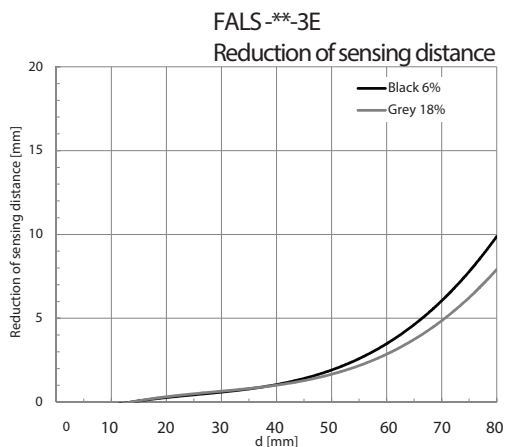
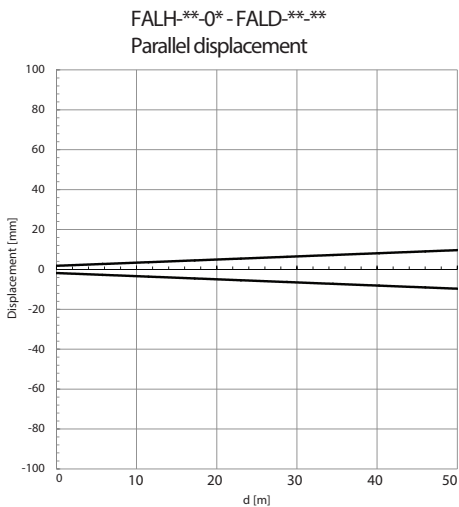


Chart 5 (Diffuse with Background Suppression Class 1)



FA Series Laser Photoelectric Sensors

Chart 6 (Diffuse with Background Suppression Class 2)

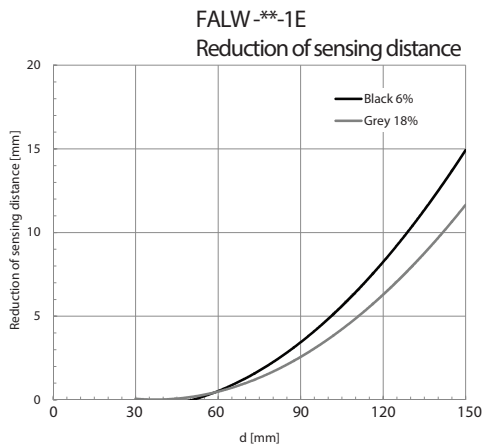
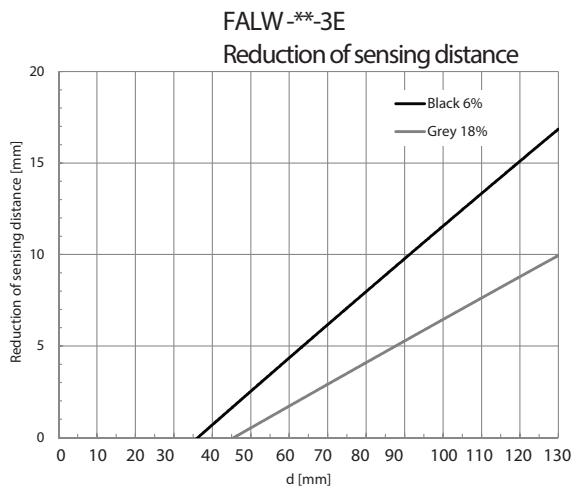


Chart 7 (Diffuse with Background Suppression Class 2)



FB Series Photoelectric Sensors



M18 (18 mm) plastic - DC

- Low cost/ high performance
- 13 models available
- Diffuse, polarized reflective, and through-beam models
- Compact plastic housing
- M12 quick-disconnect; order cable separately
- Potentiometer range adjustment on diffuse models



FB Series Photoelectric Sensors Selection Chart							
Part Number	Price	Sensing Range	Output State	Logic	Connection	Wiring	Dimensions
Diffuse							
FB6-LN-0E	\$21.50	70 to 400 mm (2.76 to 15.75 in)	N.O.	NPN	M12 (12mm) connector	Diagram 1	Figure 1
FB6-LP-0E	\$21.50			PNP	M12 (12mm) connector	Diagram 2	
FB6-DN-0E	\$21.50		N.C.	NPN	M12 (12mm) connector	Diagram 1	
FB6-DP-0E	\$21.50			PNP	M12 (12mm) connector	Diagram 2	
Polarized reflective*							
FBP-LN-0E	\$21.50	2.5 m (8.2 ft)	N.C.	NPN	M12 (12mm) connector	Diagram 1	Figure 1
FBP-LP-0E	\$21.50			PNP	M12 (12mm) connector	Diagram 2	
FBP-DN-0E	\$21.50		N.O.	NPN	M12 (12mm) connector	Diagram 1	
FBP-DP-0E	\$21.50			PNP	M12 (12mm) connector	Diagram 2	
Through-beam**							
FBR-LN-0E	Receiver	\$20.00	N.C.	NPN	M12 (12mm) connector	Diagram 1	Figure 1
FBR-LP-0E	Receiver	\$20.00		PNP	M12 (12mm) connector	Diagram 2	
FBR-DN-0E	Receiver	\$20.00	N.O.	NPN	M12 (12mm) connector	Diagram 1	
FBR-DP-0E	Receiver	\$20.00		PNP	M12 (12mm) connector	Diagram 2	
FBE-00-0E	Emitter	\$18.50	–	Receiver dependent	M12 (12mm) connector	Diagram 3	–

*Purchase reflectors separately.

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

Wiring Diagrams

Diagram 1

NPN Output

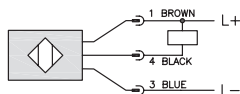


Diagram 2

PNPN Output

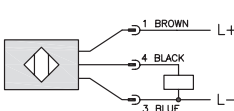
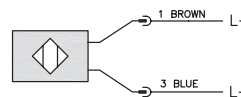


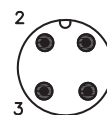
Diagram 3



Switching Element Function		
	Thru-Beam and Reflective Models	Diffuse Models
Light-on	N.C.	N.O.
Dark-on	N.O.	N.C.

Connector

M12 Connector

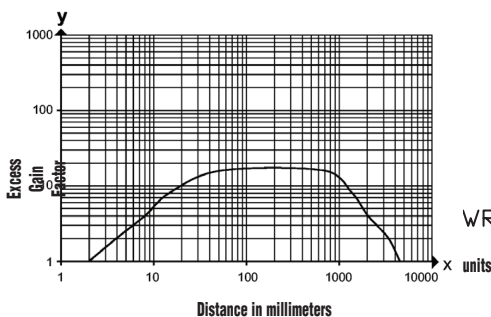


FB Series Photoelectric Sensors

Specifications	Diffuse Models	Reflective Models	Through-Beam Models
Type	Diffuse reflection	Polarized reflection ¹	Through-beam ²
Sensing Distance	400mm	2.5m	8m
Light Spot Diameter	25mm at maximum range	200mm at maximum range	600mm at maximum range
Emission	Red LED (visible), 645 nm		
Sensitivity	Adjustable 70 to 400 mm	Fixed	Fixed
Output Type	NPN or PNP - Light-on or Dark-on		
Operating Voltage	10-30 VDC		
No Load Supply Current	≤20 mA	≤20 mA	≤8 mA
Operating (Load) Current	≤200 mA		
Off-state (Leakage) Current	N/A		
Voltage Drop	<2.5V		
Switching Frequency	1kHz		
Ripple	N/A		
Time Delay Before Availability (tv)	N/A		
Short-Circuit Protection	Yes		
Operating Temperature Range	-25 to 60°C (-13° to 140°F)		
Protection Degree (DIN 40050)	IEC IP65	IEC IP67	
LED Indicators - Switching Status	Yellow (output energized)		
Housing Material	Acrylonitrile-butadienestyrene (ABS), black		
Lens Material	Polymethyl metacrylate (PMMA)		
Shock /Vibration	EN 60947-5-2 part 7, 4, 1/EN 60947-5-2 part 7, 4, 2		
Tightening Torque	2.25 Nm (1.66 lb-ft)		
Weight	8.50 g (0.3 oz)		
Connection	M12 connector. Two mounting hex nuts included		
Agency Approvals	cULus listed, UL file E328811, CE, RoHS		

Notes: ¹ With standard diameter 84mm RL110 reflector. Purchase reflectors separately.
² An emitter and receiver pair must be ordered for a complete sensor set.

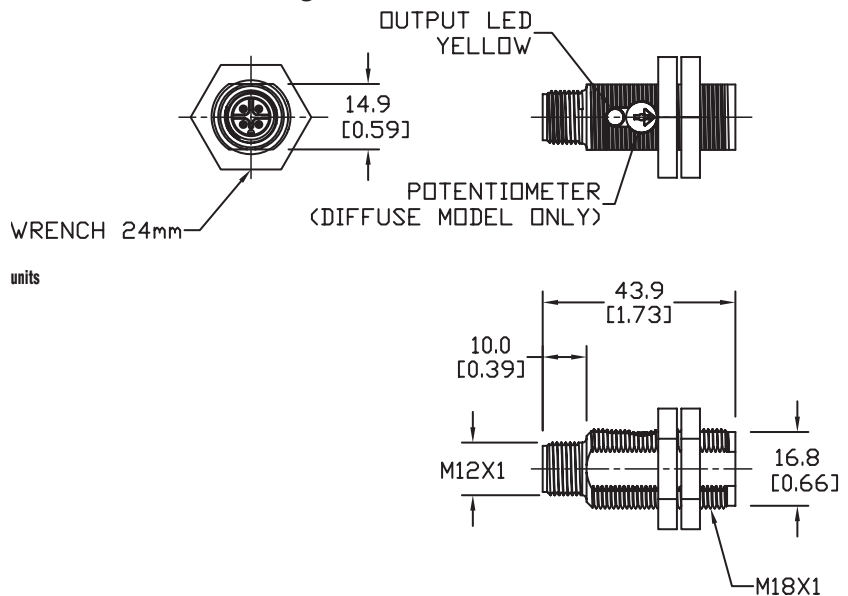
Curves FBP series



Dimensions

mm [inches]

Figure 1



SS Series Photoelectric Sensors



M18 (18 mm) plastic- DC

- 22 models available
- Diffuse, polarized reflective, and through-beam models
- Plastic housing
- Axial cable or M12 quick-disconnect models
- N.O./N.C. selectable output
- IP67 rated



SS Series Photoelectric Sensor Selection Chart									
Part Number	Price	Sensing Range	Output State*	Logic	Connection	Wiring	Dimensions	Characteristic Curves	
Diffuse									
SS2-0N-4A	\$33.50	100mm (3.9 in.)	N.O./N.C. selectable	NPN	2m (6.5') axial cable	Diagram 1	Figure 1	Chart Set 1	
SS2-0P-4A	\$33.50			PNP	2m (6.5') axial cable	Diagram 2	Figure 1	Chart Set 1	
SS2-0N-4E	\$33.50			NPN	M12 (12mm) connector	Diagram 1	Figure 2	Chart Set 1	
SS2-0P-4E	\$33.50			PNP	M12 (12mm) connector	Diagram 2	Figure 2	Chart Set 1	
SS5-0N-4A	\$33.50	200mm (7.9 in.)	N.O./N.C. selectable	NPN	2m (6.5') axial cable	Diagram 1	Figure 1	Chart Set 2	
SS5-0P-4A	\$33.50			PNP	2m (6.5') axial cable	Diagram 2	Figure 1	Chart Set 2	
SS5-0N-4E	\$33.50			NPN	M12 (12mm) connector	Diagram 1	Figure 2	Chart Set 2	
SS5-0P-4E	\$33.50			PNP	M12 (12mm) connector	Diagram 2	Figure 2	Chart Set 2	
SS6-0N-4A	\$33.50	400mm (15.7 in.)	N.O./N.C. selectable	NPN	2m (6.5') axial cable	Diagram 1	Figure 1	Chart Set 3	
SS6-0P-4A	\$33.50			PNP	2m (6.5') axial cable	Diagram 2	Figure 1	Chart Set 3	
SS6-0N-4E	\$33.50			NPN	M12 (12mm) connector	Diagram 1	Figure 2	Chart Set 3	
SS6-0P-4E	\$33.50			PNP	M12 (12mm) connector	Diagram 2	Figure 2	Chart Set 3	
Polarized reflective*									
SSP-0N-4A	\$38.00	3m (9.84 ft)	N.O./N.C. selectable	NPN	2m (6.5') axial cable	Diagram 1	Figure 1	Chart Set 4	
SSP-0P-4A	\$38.00			PNP	2m (6.5') axial cable	Diagram 2	Figure 1	Chart Set 4	
SSP-0N-4E	\$38.00			NPN	M12 (12mm) connector	Diagram 1	Figure 2	Chart Set 4	
SSP-0P-4E	\$38.00			PNP	M12 (12mm) connector	Diagram 2	Figure 2	Chart Set 4	
Through-beam**									
SSR-0N-4A	Receiver	\$29.00	8m (26.2 ft)	N.O./N.C. selectable	NPN	2m (6.5') axial cable	Diagram 1	Figure 1	Chart Set 5
SSR-0P-4A	Receiver	\$29.00			PNP	2m (6.5') axial cable	Diagram 2	Figure 1	Chart Set 5
SSR-0N-4E	Receiver	\$30.50			NPN	M12 (12mm) connector	Diagram 1	Figure 2	Chart Set 5
SSR-0P-4E	Receiver	\$30.50			PNP	M12 (12mm) connector	Diagram 2	Figure 2	Chart Set 5
SSE-00-4A	Emitter	\$23.00	Receiver- dependent	Receiver dependent	2m (6.5') axial cable	Diagram 3	Figure 1	Chart Set 5	
SSE-00-4E †	Emitter	\$23.00			M12 (12mm) connector	Diagram 3	Figure 2	Chart Set 5	

† Check function

*Purchase reflectors separately.

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

Switching Element Function		
	Thru-Beam and Reflective Models	Diffuse Models
Light-on	N.C.	N.O.
Dark-on	N.O.	N.C.

Wiring Diagrams

Diagram 1

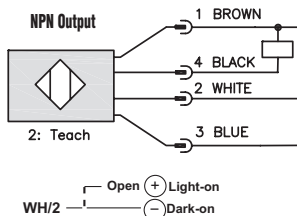


Diagram 2

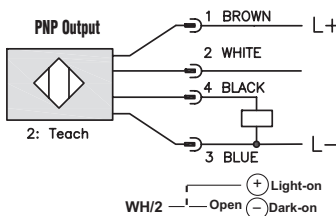
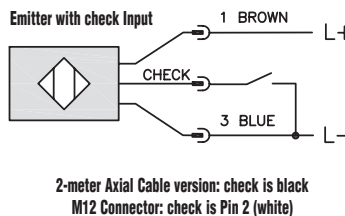


Diagram 3



Connector



SS Series Photoelectric Sensors

Specifications	Diffuse Models			Reflective Models	Through-Beam Models
Type	Diffuse reflection			Polarized reflection ⁴	Through-beam ⁵
Sensing Distance	100mm ¹	200mm ¹	400mm ²	2m ³	8M
Light Spot Diameter	50 mm @ 100 mm	90 mm @ 200 mm	240 mm @ 400 mm	80 mm @ 3 m	900 mm @ 10 m
Emission	Infrared (880nm)			Red (660nm)	Infrared (880nm)
Sensitivity	Fixed				
Output Type	NPN or PNP/N.O./N.C. selectable				
Operating Voltage	10-30VDC				
Ripple	≤10%				
No-load Supply Current	30mA				15mA (SSE), 20mA (SSR)
Operating (Load) Current	≤100mA				
Off-state (Leakage) Current	≤10µA				
Voltage Drop	≤1.2volt maximum at 100mA				
Switching Frequency	250Hz				25Hz
Ripple	N/A				
Time Delay Before Availability (tv)	200ms				
Short-Circuit Protection	Yes (switch autoresets after overload is removed)				
Operating Temperature	-25° to + 70° C (-13° to 158° F)				
Protection Degree (DIN 40050)	IEC IP67				
LED Indicators Switching Status	Yellow (output energized)				Red (output energized)
Housing Material	Polybutylene Terephthalate (PBT) plastic housing, polycarbonate (PC) cable exit				
Lens Material	Polymethyl metacrylate (PMMA)				
Shock/Vibration	See terminology section				
Tightening Torque	1 Nm (0.74 lb-ft)				
Weight	100g (3.53 oz)				200g (7.05oz)
Connectors	2m (6.5') axial cable; M12 (12mm) connector				
Agency Approvals	CE				
¹ With 100x100mm white matte paper ² With 200x200mm white matte paper ³ With standard Ø84mm RL110 reflector ⁴ Purchase reflectors separately.					⁵ An emitter (SSE) and receiver (SSR) pair must be ordered for a complete sensor set.

Dimensions

in/mm

Figure 1

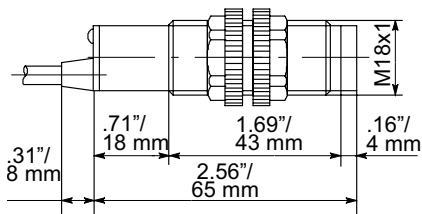
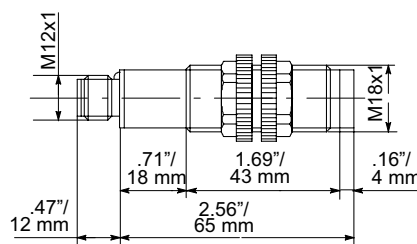


Figure 2



SS Series Photoelectric Sensors

Characteristic curves

Chart Set 1 (Diffuse SS2)

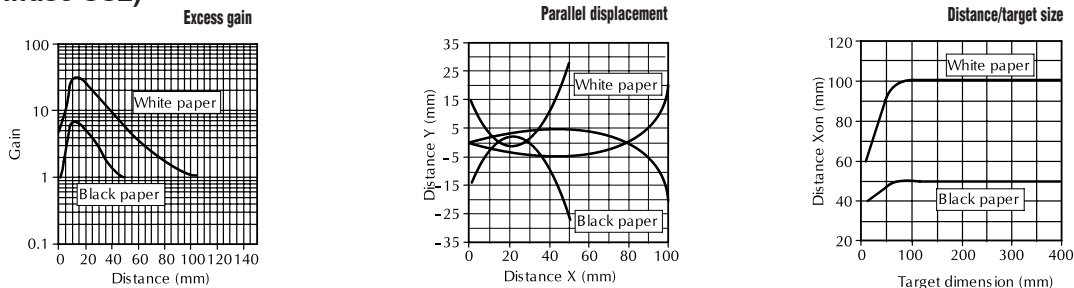


Chart Set 2 (Diffuse SS5)

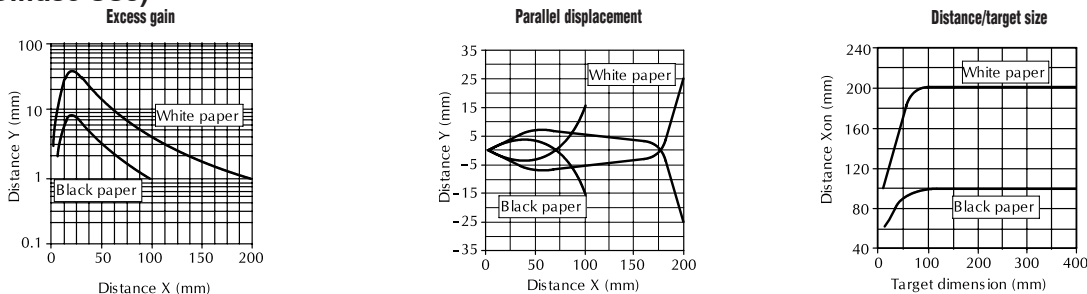


Chart Set 3 (Diffuse SS6)

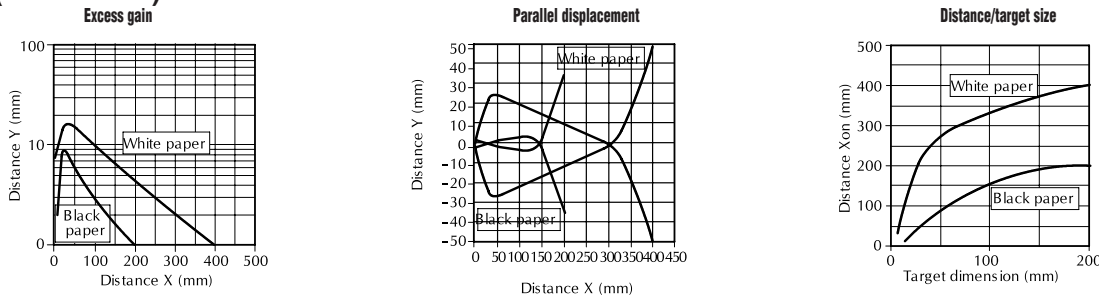


Chart Set 4 (Polarized Reflective)

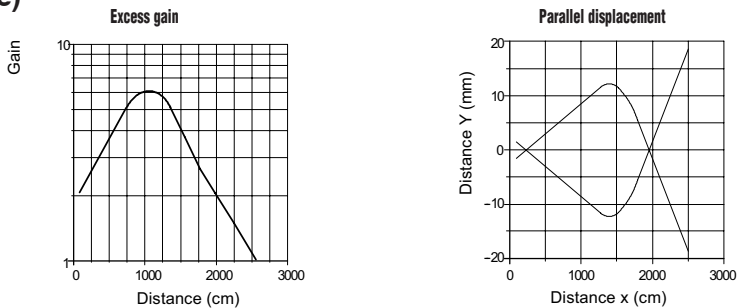
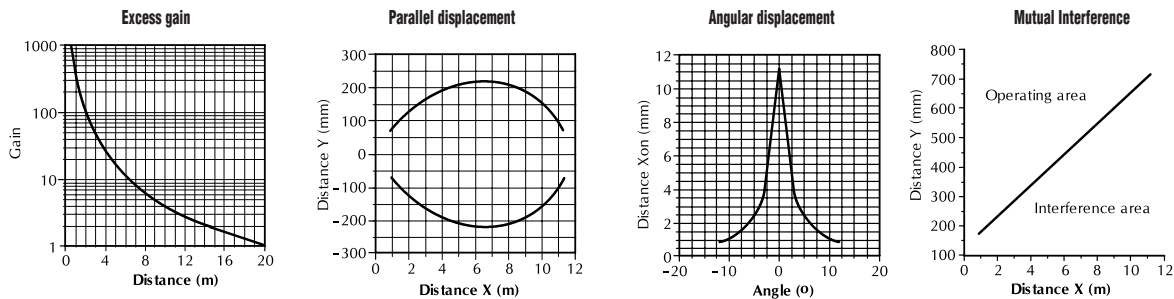


Chart Set 5 (Through-Beam)



MS Series Photoelectric Sensors

M18 (18 mm) plastic with back-ground suppression - DC



- 4 models available
- Diffuse reflection with background suppression
- Plastic housing
- Axial cable or M12 quick-disconnect models
- NPN, PNP, N.O./N.C. selectable output
- IP67 rated



MS Series Photoelectric Selection Chart								
Part Number	Price	Sensing Range	Output State	Logic	Connection	Wiring	Dimensions	Characteristic Curves
MS0-00-0A	\$60.00	50mm (1.97in)	N.O./N.C. selectable	NPN/PNP selectable	2m (6.5') axial cable	Diagram 1 or Diagram 2	Figure 1	Chart 1
MS0-00-0E	\$60.00				M12 (12mm) connector		Figure 2	Chart 1
MS1-00-0A	\$60.00	100mm (3.94in)	N.O./N.C. selectable	NPN/PNP selectable	2m (6.5') axial cable		Figure 1	Chart 2
MS1-00-0E	\$60.00				M12 (12mm) connector		Figure 2	Chart 2

Wiring diagrams

Diagram 1

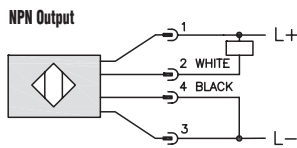
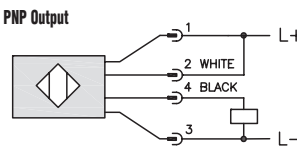


Diagram 2



Connector



Note For Diagram 1 and Diagram 2: For N.O. – Brown 1 to L+ and Blue 3 to L-
For N.C. – Blue 3 to L+ and Brown 1 to L-

Switching Element Function		
	Thru-beam and Reflective Models	Diffuse Reflective Models
Light on	N.C.	N.O.
Dark on	N.O.	N.C.

Dimensions

in/(mm)

Figure 1

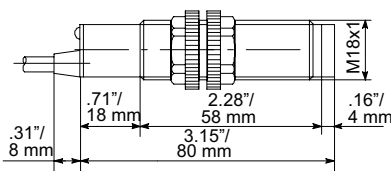
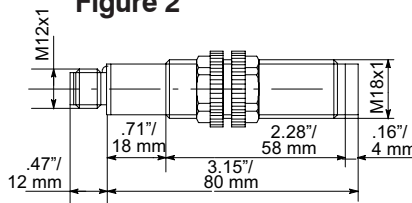


Figure 2



Characteristic curves

Chart 1 (MS0)

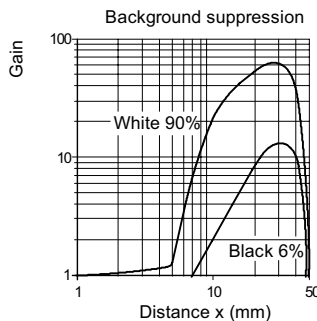
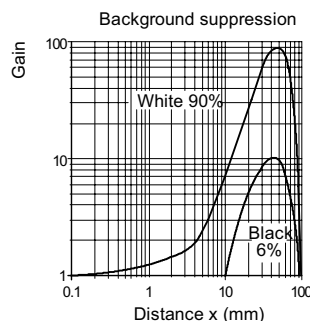


Chart 2 (MS1)



Warning: These products are not safety sensors and are not suitable for use in personal safety applications.

MS Series Photoelectric Sensors

MS Series Specifications	Standard Distance	Extended Distance
Type	Diffuse reflection with background suppression	
Sensing Distance	50mm ¹	100mm ¹
Light Spot Diameter	0.6 mm @50 mm	0.9 mm @ 100 mm
Emission	Infrared (880nm)	
Sensitivity	NPN/PNP selectable; N.O./N.C. selectable	
Output Type	5%	
Operating Voltage	10-30VDC	
No-load Supply Current	40mA	
Operating (Load) Current	≤100mA	
Off-state (Leakage) Current	≤10µA	
Voltage Drop	≤1.2volt maximum at 100mA	
Switching Frequency	80Hz	
Ripple	≤10%	
Time Delay Before Availability (tv)	200ms	
Short-Circuit Protection	Yes (switch autoresets after overload is removed)	
Operating Temperature	-25° to + 70° C (-13° to 158° F)	
Protection Degree (DIN 40050)	IEC IP67	
LED Indicators - Switching Status	Red (output energized)	
Housing Material	Polybutylene Terephthalate (PBT) plastic housing, polycarbonate (PC) cable exit	
Lens Material	Plexiglass 7N	
Shock/Vibration	See terminology section	
Tightening Torque	1 Nm (0.74 lb-ft)	
Weight	150g (5.29 oz)	
Connectors	2m (6.5') axial cable; M12 (12mm) connector	
Agency Approvals	CE	

¹ With 100x100mm white matte paper

FARS Series Photoelectric Sensors



M18 (18 mm) plastic - DC

The FARS series is a direct reflection diffuse sensor with adjustable background suppression. By using an embedded linear position sensor and a microprocessor, the FARS sensor has excellent capabilities in sensing targets of all shades of color, from a 90% reflective white target, all the way to a 6% reflective black target. The sensing distance can be adjusted between 30 mm and 130 mm using the lateral trimmer.

Features

- 8 models, diffuse with background suppression
- 30/130 mm adjustable maximum reading distance
- Cable or M12 quick disconnect
- Plastic or metal housing
- Supply voltage: 10 - 30 VDC, output current: 100 mA
- LED light status indicator
- IP67 housing protection
- Complete protection against electrical damage



18mm diameter Diffuse Sensors Selection Chart									
Part Number	Price	Voltage Range	Sensing Range	Switching Frequency	Sensing Beam	Thru-Beam Component	Output Type	Connection Type	Wiring
FARS-BN-0A	\$45.50	10 to 30 VDC	30 - 130 mm adjustable	1 kHz	Red light (660 nm)	NO/NC background suppression	NPN NO + NC complementary	2 meter axial cable	Diagram 1
FARS-BN-0E	\$45.50						NPN NO + NC complementary	M12 quick disconnect (purchase cable separately)	
FARS-BP-0A	\$45.00						PNP NO + NC complementary	2 meter axial cable	Diagram 2
FARS-BP-0E	\$45.50						PNP NO + NC complementary	M12 quick disconnect (purchase cable separately)	
FARS-ON-0A	\$45.50					NO/NC background suppression	NPN NO/NC selectable	2 meter axial cable	Diagram 3
FARS-ON-0E	\$45.50						NPN NO/NC selectable	M12 quick disconnect (purchase cable separately)	
FARS-OP-0A	\$45.50						PNP NO/NC selectable	2 meter axial cable	Diagram 4
FARS-OP-0E	\$45.50						PNP NO/NC selectable	M12 quick disconnect (purchase cable separately)	

Wiring Diagrams

Diagram 1

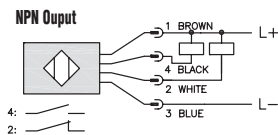
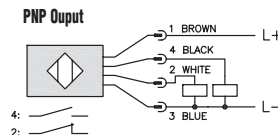


Diagram 2



Connector

M12 Connector

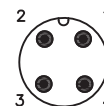


Diagram 3

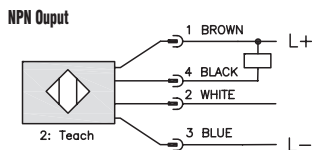
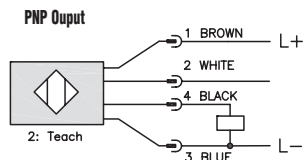


Diagram 4

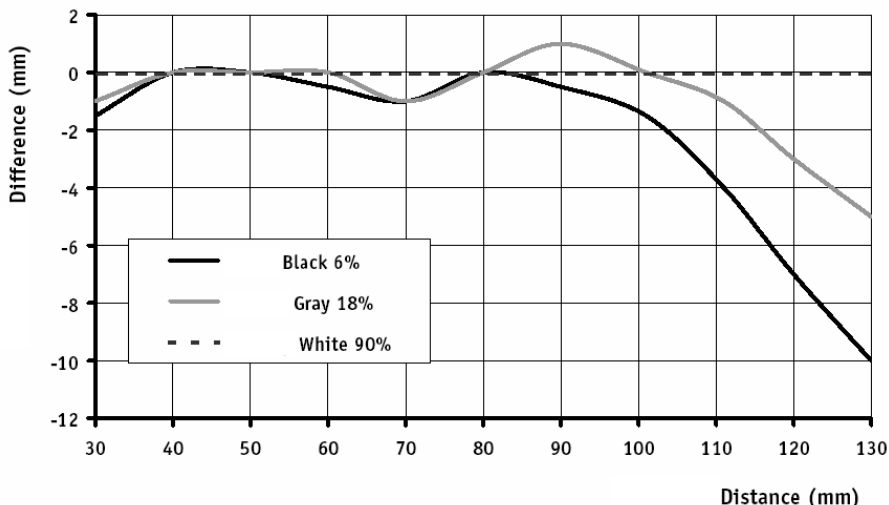


NO	Light ON
NC	Dark ON



FARS Series Photoelectric Sensors

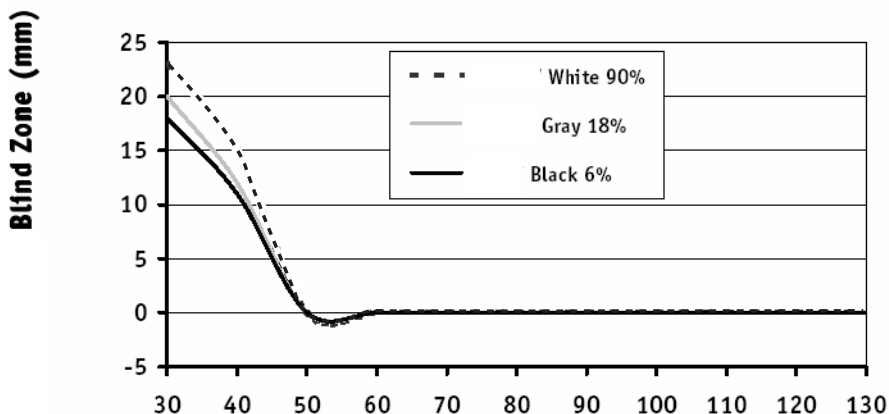
Black-White Differential Chart



Black-White Differential Graph

This graph shows the difference in distance between where the FARS series sensors detect a 90% reflective white card, versus a 6% reflective black test card under the same conditions. As the adjoining graph illustrates, the FARS series sensors provide practically a zero millimeter difference between the white and black target at a setup distance of 80 mm, 3 mm difference at a setup distance of 100 mm and 10 mm for a setup distance of 130 mm.

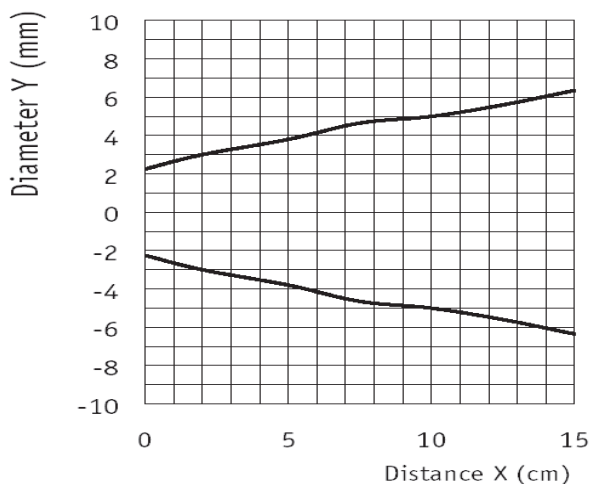
Blind zone chart



Blind Zone Graph

This graph shows the blind zone, which is where the FARS series sensors will not detect, depending on the setup distance. For setup sensing distance of 30 mm the FARS sensor will have a blind zone of 25 mm, so the effective sensing envelope is from 25 mm to 30 mm; but, as the setup sensing distance is increased, the blind zone decreases. The graph shows that from a setup sensing distance of 60 mm to 130 mm, the blind zone is zero millimeters.

Spot dimension chart



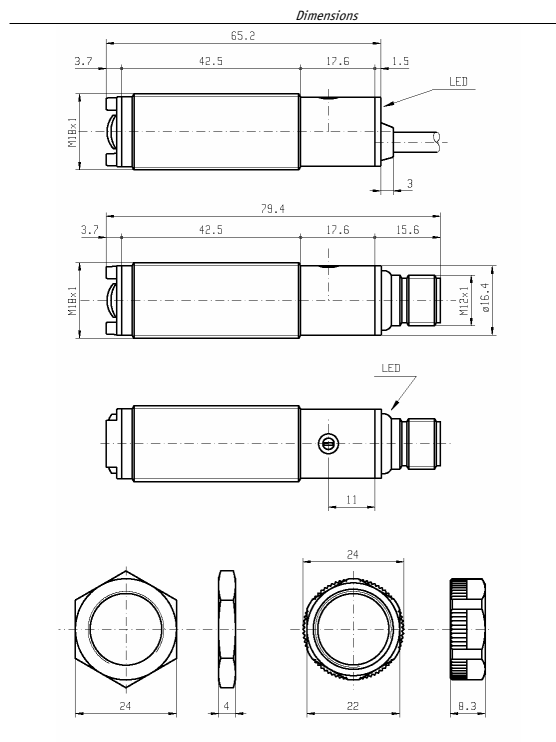
Switching Element Function		
	<i>Thru-beam and Reflective Models</i>	<i>Diffuse Reflective Models</i>
<i>Light on</i>	N.C.	N.O.
<i>Dark on</i>	N.O.	N.C.

FARS Series Photoelectric Sensors

FARS Series Photoelectric Sensors Specifications	
Type	18 mm Diffuse with Background Suppression
Sensing Distance	30 - 130 mm
Light Spot Diameter	13 mm @ 100 mm
Emission	Red Light (660 nm)
Sensitivity	Adjustable
Output Types	NPN / PNP Q/Qnot L-on/D-on, switch-selectable
Operating Voltage	10 to 30 VDC
No Load Supply Current	25 mA
Operating (Load) Current	100 mA
Off-state (Leakage) Current	≤ 10 μA @ 30 VDC
Voltage Drop	2V max @ 100 mA
Switching Frequency	1 kHz
Ripple	≤ 10%
Time Delay Before Availability (tv)	200 ms
Short-circuit Protection	Yes
Operating Temperature	13°F to 158°F (-25°C to +70°C)
Protection Degree(DIN 40050)	IP67
LED Indicators- Switching Status	Yellow Output/Short Circuit Status
Housing Material	Polybutylene Terephthalate (PBT)
Lens Material	Poly methyl methacrylate (PMMA),
Shock/Vibration	per IEC EN 60947-5-2
Tightening Torque	1 Nm (0.74 lb-ft)
Weight	28.576 g (1.008 oz)
Connectors	2m (6.5') axial cable; M12 (12mm) connector
Agency Approvals	UL, CE

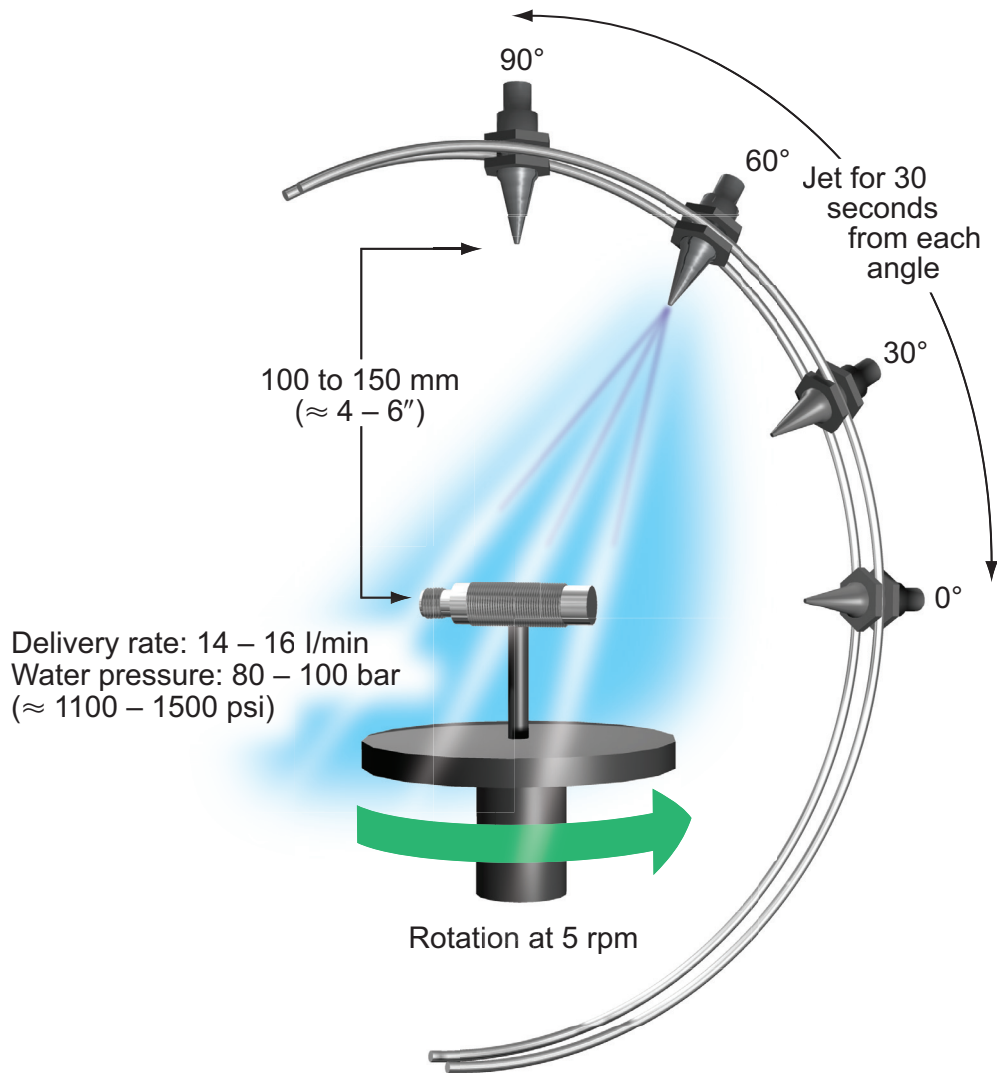
Dimensions

(mm)



Warning: These products are not safety sensors and are not suitable for use in personal safety applications.

IP69K-rated Photoelectric Sensors



Overview

IP69K high-pressure cleaning test

The ADC Food and Beverage products were tested in accordance with the IP69K standard, according to DIN 40050 part 9. The goal of this test was to duplicate pressure cleaning conditions on a plant floor. In the test fixture, the sensors were exposed to a 1500 psi spray of water at a temperature of 176 °F. The duration of each cleaning cycle was 30 seconds. The test was performed at specified angles using a spray nozzle located at a distance of 4" from the switch. The sensors withstood test conditions and were still operable, providing 100% of sensing range.

Thermal endurance

In pressure cleaning environments, proximity and photo sensors can be exposed to extreme temperature conditions. A thermal shock test was performed on the proximity sensors by cycling the temperature to ensure their consistent high reliability. All proximity and FFRS photoeyes can withstand temperatures up to 100°C (212°F).

FDA certified Materials

The ADC Food & Beverage sensors are manufactured from materials capable of withstanding solutions used during equipment cleaning. These materials are all approved by the FDA for use in food production environments:

- 316L (V4A) stainless steel
- PMMA (acrylic)
- PEEK (Polyether Ether Ketone)
- PPS (Techtron)

Third Party chemical testing companies such as ECOLAB and Johnson Diversey have tested these products with common cleaning agents, such as P3-clint KF and P3-topax 52, to assure continued operation.

FF Series IP69K-rated Photoelectric Sensors



FFR3-BN-1E

M18 (18 mm) stainless steel - DC

- 30 models - diffuse, polarized reflective, retro-reflective and through-beam
- 20 m maximum reading distance
- M12 quick disconnect (purchase cable separately)
- 316L stainless steel housing
- Supply voltage: 10 - 30 VDC

- LED light status indicators: yellow (output), green (teach-in function for some diffuse and reflective models)
- IP69K rated for food and beverage applications
- Complete protection against electrical damage
- M18 mounting hex nuts included



FF Series Photoelectric Sensor Selection Chart							
Part Number	Price	Sensing Range	Output State	Logic	Connection	Wiring	Characteristic Curves
Diffuse							
FFR3-BN-1E	\$66.00	100 mm (3.9 in.)	N.O./N.C. complementary	NPN	M12 (12 mm) connector (purchase cable separately)	Diagram 1	Chart Set 1
FFR3-BP-1E	\$66.00			PNP		Diagram 2	Chart Set 1
FFR3-ON-1E	\$66.00		N.O./N.C. selectable	NPN		Diagram 3	Chart Set 1
FFR3-OP-1E	\$66.00			PNP		Diagram 4	Chart Set 1
FFI7-BN-1E	\$66.00	400 mm (15.7 in.)	N.O./N.C. complementary	NPN		Diagram 1	Chart Set 2
FFI7-BP-1E	\$66.00			PNP		Diagram 2	Chart Set 2
FFI7-ON-1E	\$66.00		N.O./N.C. selectable	NPN		Diagram 3	Chart Set 2
FFI7-OP-1E	\$66.00			PNP		Diagram 4	Chart Set 2
FFI8-BN-1E	\$68.00	800 mm (31.5 in.)	N.O./N.C. complementary	NPN		Diagram 1	Chart Set 3
FFI8-BP-1E	\$68.00			PNP		Diagram 2	Chart Set 3
FFI8-ON-1E	\$68.00		N.O./N.C. selectable	NPN		Diagram 3	Chart Set 3
FFI8-OP-1E	\$68.00			PNP		Diagram 4	Chart Set 3
Polarized retro-reflective*							
FFRP-BN-1E •	\$68.00	4 m (13.1 ft)	N.O./N.C. complementary	NPN	M12 (12 mm) connector (purchase cable separately)	Diagram 1	Chart Set 4
FFRP-BP-1E •	\$68.00			PNP		Diagram 2	Chart Set 4
FFRP-ON-1E •	\$68.00		N.O./N.C. selectable	NPN		Diagram 3	Chart Set 4
FFRP-OP-1E •	\$68.00			PNP		Diagram 4	Chart Set 4
FFRN-BN-1E	\$70.00		N.O./N.C. complementary	NPN		Diagram 1	Chart Set 4
FFRN-BP-1E	\$70.00			PNP		Diagram 2	Chart Set 4
FFRN-ON-1E	\$70.00		N.O./N.C. selectable	NPN		Diagram 3	Chart Set 4
FFRN-OP-1E	\$70.00			PNP		Diagram 4	Chart Set 4
Retro-reflective for transparent objects*							
FFRL-BN-1E	\$70.00	1 m (3.3 ft)	N.O./N.C. complementary	NPN	M12 (12 mm) connector (purchase cable separately)	Diagram 1	Chart Set 5
FFRL-BP-1E	\$70.00			PNP		Diagram 2	Chart Set 5
FFRL-ON-1E	\$70.00		N.O./N.C. selectable	NPN		Diagram 3	Chart Set 5
FFRL-OP-1E	\$70.00			PNP		Diagram 4	Chart Set 5
Through-beam**							
FFIZ-BN-1E •	Receiver	\$49.50	N.O./N.C. complementary	NPN	M12 (12 mm) connector (purchase cable separately)	Diagram 1	Chart Set 6
FFIZ-BP-1E •	Receiver	\$49.50		PNP		Diagram 2	Chart Set 6
FFIZ-ON-1E •	Receiver	\$36.75	N.O./N.C. selectable	NPN		Diagram 3	Chart Set 6
FFIZ-OP-1E •	Receiver	\$49.50		PNP		Diagram 4	Chart Set 6
FFIH-00-1E	Emitter	\$47.50	Receiver dependent	Receiver dependent		Diagram 5	Chart Set 6
FFIH-X0-1E†	Emitter	\$48.50				Diagram 6	Chart Set 6

NOTES:

† Check function

*Purchase reflectors separately.

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

• Sensors without sensitivity adjustment

Switching Element Function		
	Thru-beam and Reflective Models	Diffuse Reflective Models
Light on	N.C.	N.O.
Dark on	N.O.	N.C.

FF Series IP69K-rated Photoelectric Sensors

Wiring Diagrams

Diagram 1

NPN Output

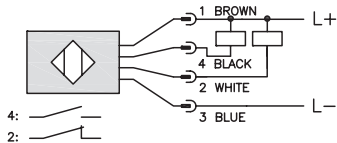


Diagram 2

PNP Output

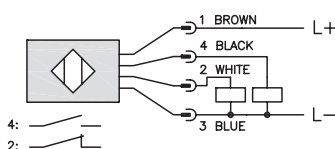


Diagram 3

NPN Output

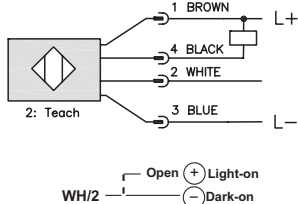
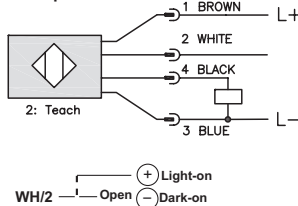


Diagram 4

PNP Output



Connector

M12 Connector

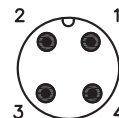


Diagram 5

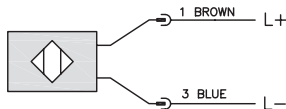
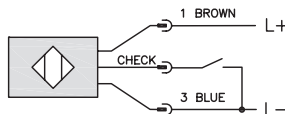


Diagram 6



2-meter Axial Cable version: check is black
M12 Connector: check is Pin 2 (white)

FF Series IP69K-rated Photoelectric Sensors

Characteristic curves

Chart Set 1 (Diffuse FFR3)

FFR3/**-1E

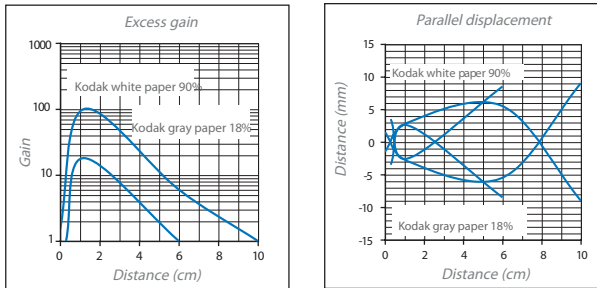


Chart Set 2 (Diffuse FF17)

FF17/**-1E

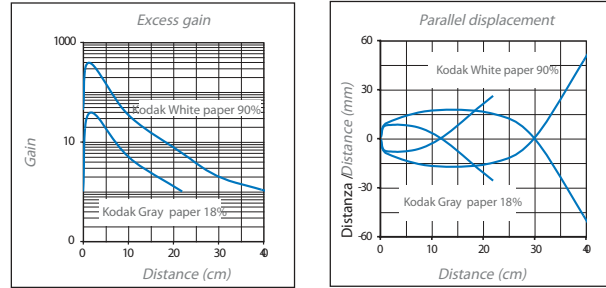


Chart Set 3 (Diffuse FF18)

FF18/**-1E

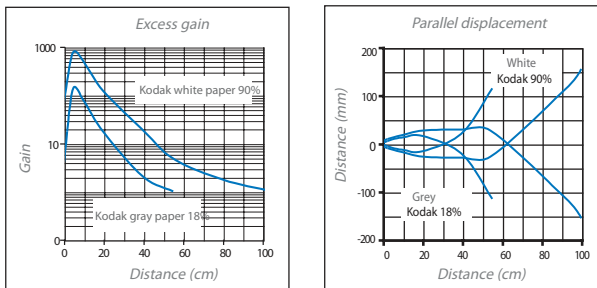


Chart Set 4 (Polarized retro-reflective)

FFRN/**-1E - FFRP/**-1E

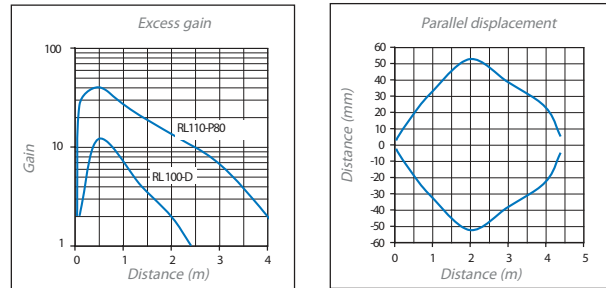


Chart Set 5 (Retro-reflective for transparent objects)

FFRL/**-1E

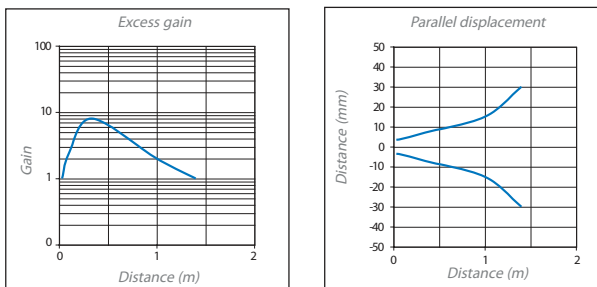
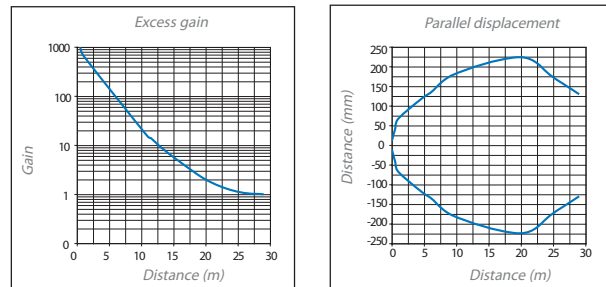


Chart Set 6 (Through-beam)

FFIH/**-1E + FFIZ/**-1E



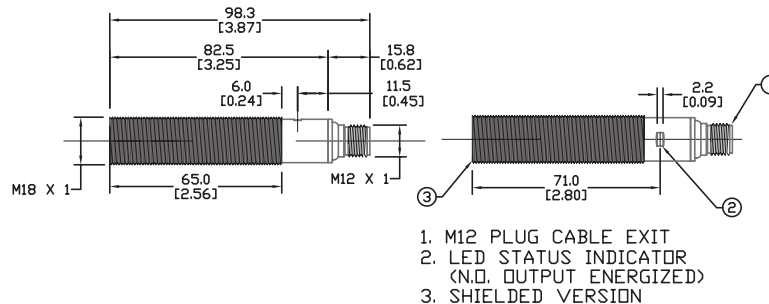
FF Series IP69K-rated Photoelectric Sensors

FF Series 18 mm Photoelectric Sensors Specifications								
Type	Diffuse Reflective			Polarized Reflective			Through-beam ⁵	
Model Series	FFR3	FFI7	FFI8	FFRL	FFRN	FFRP	FFIZ	FFIH
Sensing Distance	100 mm ¹	400 mm ²	800 mm ³	1 m	4 m ⁴		20 m	
Light Spot Diameter	10 mm @ 100 mm	50 mm @ 400 mm	180 mm @ 800 mm	80 mm @ 1 m	200 mm @ 4 m		600 mm @ 20 m	
Emission	Red (660 nm)	Infrared (660 nm)	Infrared (880 nm)	Red (660 nm)			–	Infrared (880 nm)
Sensitivity	Teach					None		
Output Type	See individual parts on Selection Chart							
Operating Voltage	10-30VDC							
No-load Supply Current	≤30mA					≤25mA	40mA	
Operating (Load) Current	≤100mA							
Off-state (Leakage) Current	≤10µA at 30 VDC							
Voltage Drop	2V max at 100mA							
Switching Frequency	500 Hz					250 Hz	–	
Ripple	≤10%							
Time Delay Before Availability (tv)	200ms							
Short-Circuit Protection	Yes, switch auto-resets after load is removed							
Operating Temperature	-13°F to 176°F (-25°C to 80°C)							
Protection Degree (DIN 40050)	IEC IP68, IP69K							
LED Indicators- Switching Status	Green ON: teach function available Green OFF: teach function blocked Green Fast flashing: fine teach active Green Slow Flashing: teach in progress Yellow ON: Output state - Excess gain O models*; Light state - Excess gain B models*					Yellow: Output state - O models Light state - B models		Yellow: Supply on
Housing Material	316L stainless steel							
Lens Material	Poly methyl methacrylate (PMMA), FDA certified							
Exit Connector	Grilamid							
Shock/Vibration	See terminology section							
Tightening Torque	50 Nm (36.88 lb-ft)							
Weight	120g (4.23 oz)							
Connection	M12 plug							
Agency Approvals	CE, cULus file E187310, ECOLAB, RoHS, Johnson Diversey							

¹With 100x100mm white matte paper
²With 200x200mm white matte paper
³With 400x400mm white matte paper
⁴With standard diameter 84mm RL110 reflector
⁵An emitter and receiver pair must be ordered for a complete sensor set.
 *Note: Yellow LED Fixed On: Excess Gain ≤2. Yellow LED Flashing: Excess Gain <2

Dimensions

mm(in)



Warning: These products are not safety sensors and are not suitable for use in personal safety applications.

FFRS Series IP69K-rated Photoelectric Sensors



FFRS-BN-1E

M18 (18 mm) stainless steel - DC

- 8 models, diffuse with background suppression
- Choose from 30/130 mm adjustable maximum reading distance, or 60/100 mm adjustable maximum reading distance for shiny objects
- M12 quick disconnect (purchase cable separately)
- 316L stainless steel housing
- Supply voltage: 10 - 30 VDC

- LED light status indicators: yellow (output), green (teach function)
- IP69K rated for food and beverage applications
- Complete protection against electrical damage
- M18 mounting hex nuts included



18 mm FFRS Series Photoelectric Sensors Selection								
Part Number	Price	Voltage Range	Sensing Range	Switching Frequency	Sensing Beam	Output Type	Connection Type	Wiring
FFRS-BN-1E	\$80.00	10 to 30 VDC	30 to 130 mm adjustable	1 kHz	Red (660 nm)	NPN NO + NC complementary	M12 quick disconnect (purchase cable separately)	Diagram 3
FFRS-BP-1E	\$80.00					PNP NO + NC complementary		Diagram 4
FFRS-ON-1E	\$59.00					NPN NO + NC selectable		Diagram 1
FFRS-OP-1E	\$80.00					PNP NO + NC selectable		Diagram 2
FFRS-BN-1E77	\$64.00		For shiny objects 60 to 100 mm adjustable	400 Hz		NPN NO + NC complementary		Diagram 3
FFRS-BP-1E77	\$86.00					PNP NO + NC complementary		Diagram 4
FFRS-ON-1E77	\$64.00					NPN NO + NC selectable		Diagram 1
FFRS-OP-1E77	\$64.75					PNP NO + NC selectable		Diagram 2

Wiring Diagrams

N.O.	Light ON
N.C.	Dark ON

Diagram 1

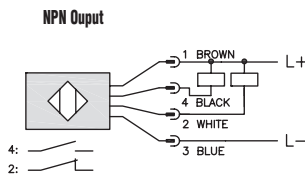
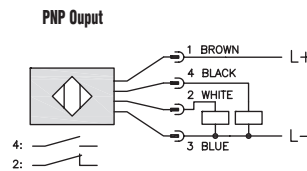


Diagram 2



Connector

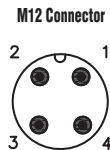


Diagram 3

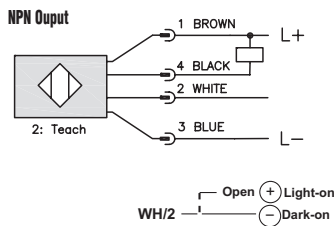
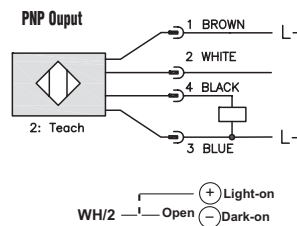


Diagram 4



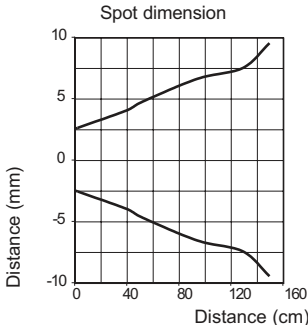
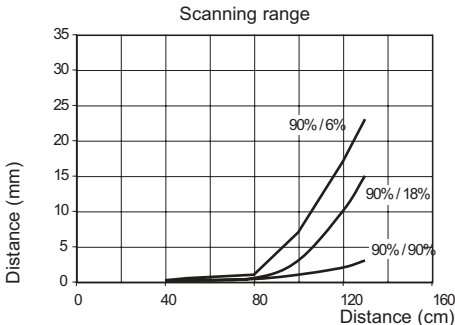
Note: In case of combined load, resistive and capacitive, the maximum admissible capacity (C) is 0.1 µF for maximum output voltage and current.

NOTE: CLASS 2 POWER SUPPLY REQUIRED

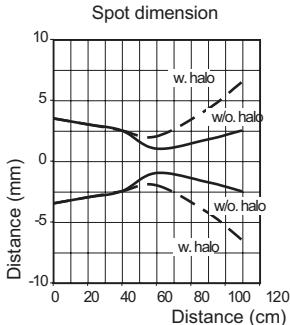
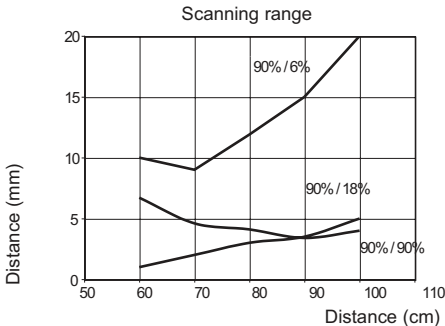
FPRS Series IP69K-rated Photoelectric Sensors

Characteristic curves

FPRS-**-** Standard Version



FPRS-**-**77 Special model for shiny object

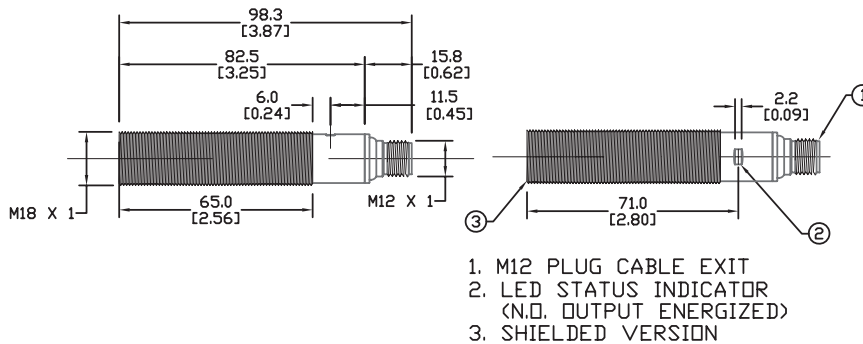


FFRS Series IP69K-rated Photoelectric Sensors

FFRS Series 18 mm Photoelectric Sensors Specifications		
Type	Background Suppression	
	Standard	For Shiny Objects
Model Series	FFRS	FFRS**77
Sensing Distance	30 to 130 mm	60 to 100 mm
Light Spot Diameter	13 mm @ 100 mm	
Emission	Red 660 nm	
Sensitivity	Teach	
Output Type	See individual parts in Selection Guide	
Operating Voltage	10-30VDC	
No-load Supply Current	≤50mA	
Operating (Load) Current	≤100mA	
Off-state (Leakage) Current	≤10mA at 30 VDC	
Voltage Drop	2V max at 100mA	
Switching Frequency	1 KHz	400 Hz
Ripple	≤10%	
Time Delay Before Availability (tv)	200ms	
Short-Circuit Protection	Yes, switch autoresets after load is removed	
Operating Temperature	-13°F to 176°F (-25°C to 80°C); short exposure 15 minutes, to 212°F (100°C)	
Protection Degree (DIN 40050)	IEC IP68, IP69K	
LED Indicators - Switching Status	Green ON: teach function available Green OFF: teach function blocked Green Slow Flashing: teach in progress Output state - O models*; Yellow ON: Light state - B models*	
Housing Material	316L stainless steel	
Lens Material	Poly methyl methacrylate (PMMA), FDA certified	
Exit Connector Material	Grilamid	
Shock/Vibration	See terminology section	
Tightening Torque	50 Nm (36.88 lb-ft)	
Weight	200g (7.05 oz)	
Connectors	M12 plug	
Approvals	CE, cULus file E187310, ECOLAB, RoHS, Johnson Diversey	

Dimensions

mm(in)



Warning: These products are not safety sensors and are not suitable for use in personal safety applications.

MQ Series Photoelectric Sensors

M18 (18 mm) plastic - AC



The MQ series is an AC diffuse photoelectric with a unique 90° optic package for mounting in space-limited applications. This series fits in a standard 18 mm mounting bracket or mounting hole, and is available in a choice of 20-250 VAC outputs in NO or NC configurations with an M12 disconnect. All MQ models include background suppression with maximum available sensing distances of 50 mm or 100 mm.

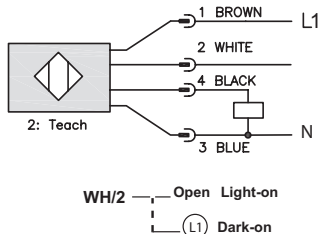
Features

- Diffuse with background suppression
- Models with 50 mm or 100 mm maximum reading distance
- M12 plug connection
- Plastic housing
- Supply voltage 20 - 253 VAC
- LED output status indicator
- Light - ON, Dark - ON selectable
- IP67 housing protection



18mm AC Photoelectric Reflection Sensors with Background Suppression Selection Chart								
Part Number	Price	Voltage Range	Sensing Range	Switching Frequency	Sensing Beam	Thru-Beam Component	Output Type	Connection Type
MQ0-00-0E	\$59.00	20 to 253 VAC	50 mm	25 Hz	Infrared	NO/NC background suppression	TRIAC LO/DO selectable	M12 quick disconnect (purchase cable separately)
MQ1-00-0E	\$59.00		100 mm					M12 quick disconnect (purchase cable separately)

Wiring Diagram



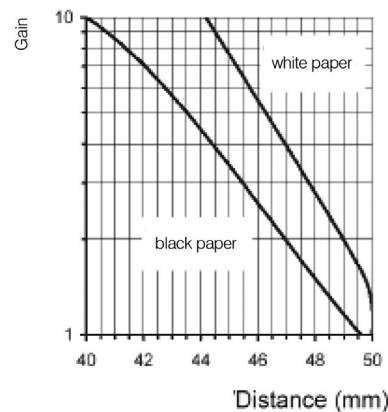
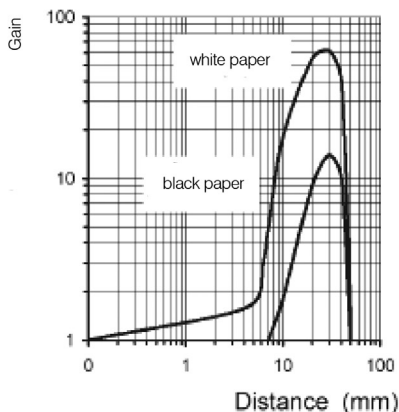
Connector



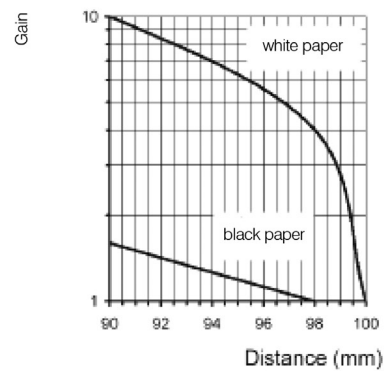
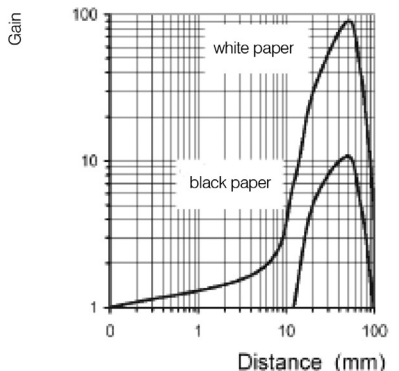
NO	Light ON
NC	Dark ON

Characteristic Curves

MQ0-00-0E



MQ1-00-0E

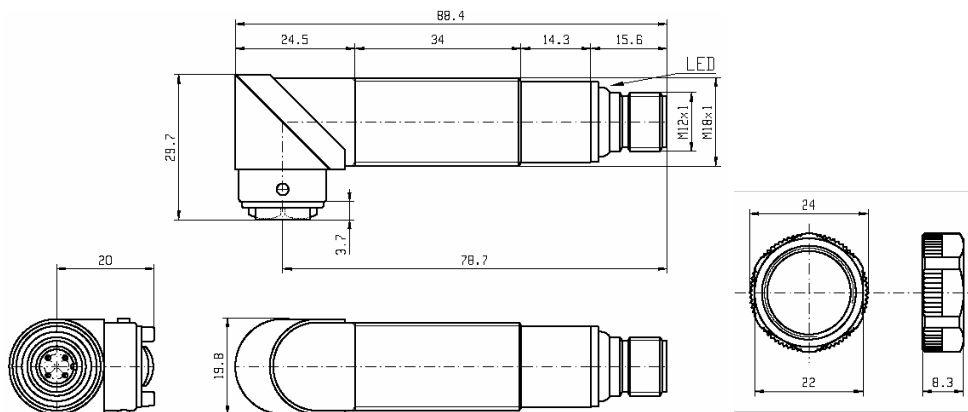


MQ Series Photoelectric Sensors

MQ Series Photoelectric Sensors Specifications	
Type	18 mm Diffuse with Background Suppression, 90° Radial Optic
Model Series	MQ0/MQ1
Sensing Distance	50 mm / 100 mm
LightSpot Diameter	0.6 mm @ 50 mm/0.9 mm @ 100 mm
Emission	Infrared (C880nm)
Sensitivity	Fixed
Output Types	TRIAC
Operating Voltage	20 - 253 VAC
No Load Supply Current	40 mA
Operating (Load) Current	<300 mA
Off-state (Leakage) Current (max)	≤ 1.5 mA @ 250 VAC
Voltage Drop	3V @ 300 mA
Switching Frequency	25 Hz
Ripple	≤10%
Time Delay Before Availability (tv)	200 ms
Short-circuit Protection	Yes
Operating Temperature	13°F to 158°F (-25°C to +70°C)
Protection Degree (DIN 40050)	IP67
LED Indicators - Switching Status	Yellow Output State
Housing Material	Polybutylene Terephthalate (PBT)
Lens Material	Poly methyl methacrylate (PMMA)
Shock/Vibration	See terminology section
Tightening Torque	1 Nm (0.74 lb-ft)
Weight	34.473 g (1.216 oz)
Connectors	M12 quick disconnect
Agency Approvals	UL Recognized E130644, CE

Dimensions

(mm)



Warning: These products are not safety sensors and are not suitable for use in personal safety applications.

MV Series AC Powered Photoelectric Sensors



M18 (18 mm) plastic- AC

- 12 models available
- Diffuse, polarized reflective, and through-beam models
- Plastic housing
- Axial cable or M12 quick-disconnect models
- Operates on 20 to 253 VAC
- IP67 rated



MV Series Photoelectric Selection Chart							
Part Number	Price	Sensing Range	Output State	Connection	Wiring	Dimensions	Characteristic Curves
Diffuse							
MV2-A0-0A	\$38.00	100mm (3.9 in.)	N.O.	2m (6.5 ft) axial cable	Diagram1	Figure 1	Chart 1
MV2-A0-0E	\$38.00			M12 (12mm) connector	Diagram1	Figure 2	
MV4-A0-0A	\$38.00	200mm (7.9 in.)		2m (6.5 ft) axial cable	Diagram1	Figure 1	Chart 2
MV4-A0-0E	\$38.00			M12 (12mm) connector	Diagram1	Figure 2	
MV6-A0-0A	\$38.00	400mm (15.7 in.)		2m (6.5 ft) axial cable	Diagram1	Figure 1	Chart 3
MV6-A0-0E	\$38.00			M12 (12mm) connector	Diagram1	Figure 2	
Polarized reflective*							
MVP-A0-0A	\$40.00	3m (9.8 ft)	N.O.	2m (6.5 ft) axial cable	Diagram1	Figure 1	Chart 4
MVP-A0-0E	\$40.00			M12 (12mm) connector	Diagram1	Figure 2	
Through-beam**							
MVE-00-0A	Emitter	16m (52.5 ft)	Receiver dependent	2m (6.5 ft) axial cable	Diagram 2	Figure 1	Chart 5
MVE-00-0E	Emitter			M12 (12mm) connector	Diagram 2	Figure 2	
MVR-A0-0A	Receiver		N.O.	2m (6.5 ft) axial cable	Diagram1	Figure 1	Chart 5
MVR-A0-0E	Receiver		N.O.	M12 (12mm) connector	Diagram1	Figure 2	

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

Wiring diagrams

Diagram 1 Receiver

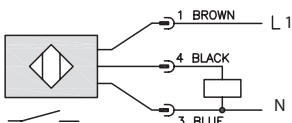
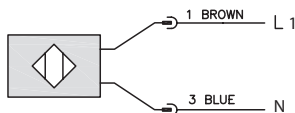
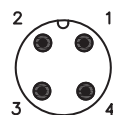


Diagram 2 Emitter



Connector

M12 Connector



Dimensions

(mm)

Figure 1

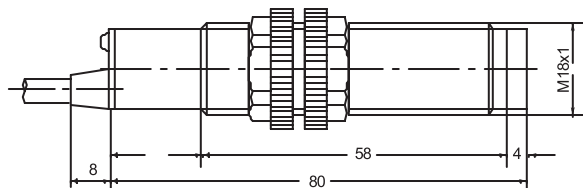
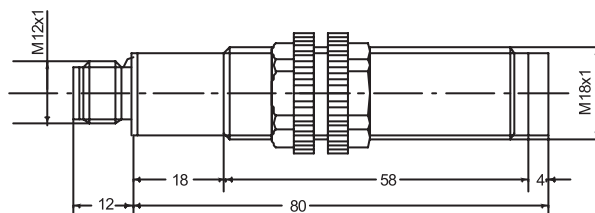


Figure 2



MV Series AC Powered Photoelectric Sensors

Specifications	Diffuse Models	Reflective Models	Through-Beam Models
Type	Diffuse reflection	Polarized reflective ⁴	Through-beam ⁵
Sensing Distance	MV2 models: 100mm ¹ MV4 models: 200mm ¹ MV6 models: 400mm ²	3m ³	16m
Light Spot Diameter	MV2 models: 50 mm @ 100 mm MV4 models 90 mm @ 200 mm MV6 models: 240mm @ 400 mm	80 mm @ 3 m	1200 mm @ 20 m
Emission	Infrared (880nm)	Red (660nm)	Infrared (880nm)
Tolerance	+15/ -5% Sn		N/A
Sensitivity	Fixed		
Output Type	TRIAC		
Operating Voltage	20-253VAC, 50/60Hz		
No-load Supply Current	30mA (rms)	Emitter: 30mA (rms) Receiver: 15mA (rms)	
Operating (Load) Current	5-300mA (rms) (Ta=50°C)		
Off-state (Leakage) Current	1.5mA (rms) max. at 250VAC		
Voltage Drop	3V max. I _L =300mA		
Switching Frequency	25Hz		
Ripple	≤10%		
Time Delay Before Availability (tv)	200 ms		
Short-Circuit Protection	Yes		
Operating Temperature	-25° to +70°C (-13° to +158°F)		
Protection Degree (DIN 40050)	IEC IP67		
LED Indicators - Switching Status	red (output energized)		
Housing Material	Polybutylene Terephthalate (PBT) plastic housing, polycarbonate (PC) cable exit		
Lens Material	Plexiglas 7N		
Shock/Vibration	See terminology section		
Tightening Torque	1 Nm (0.737 lb-ft)		
Weight	35-100g	70-200g	
Connectors	2m (6.5') axial cable; M12 (12mm) connector		
Agency Approvals	UL Recognized E130644, CE		

¹With 100x100mm white matte paper
² With 200x200mm white matte paper
³With standard Ø84mm RL110 reflector
⁴Purchase reflectors separately.
⁵An emitter (SSE) and receiver (SSR) pair must be ordered for a complete sensor set.

Switching Element Function		
	Thru-beam and Reflective Models	Diffuse Reflective Models
Light on	N.C.	N.O.
Dark on	N.O.	N.C.

Warning: These products are not safety sensors and are not suitable for use in personal safety applications.

MV Series AC Powered Photoelectric Sensors

Characteristic curves

Chart 1 (Diffuse MV2)

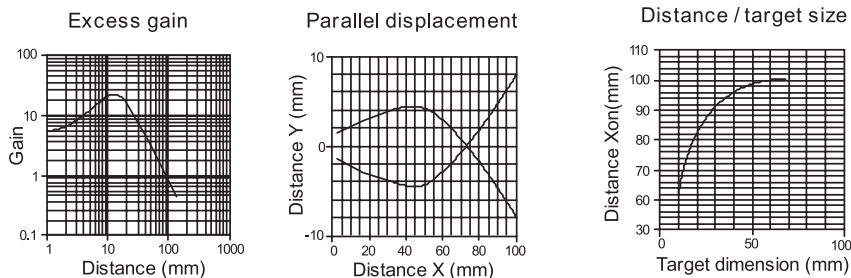


Chart 2 (Diffuse MV4)

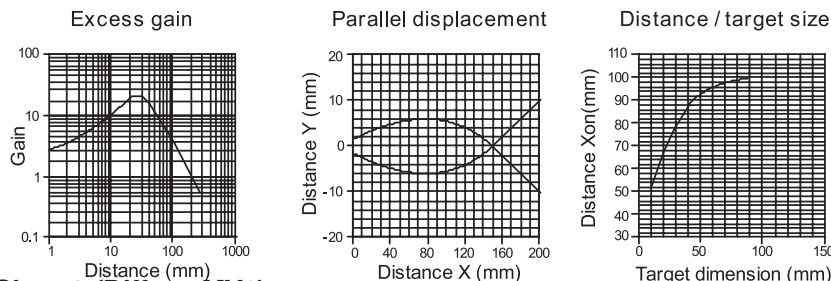


Chart 3 (Diffuse MV6)

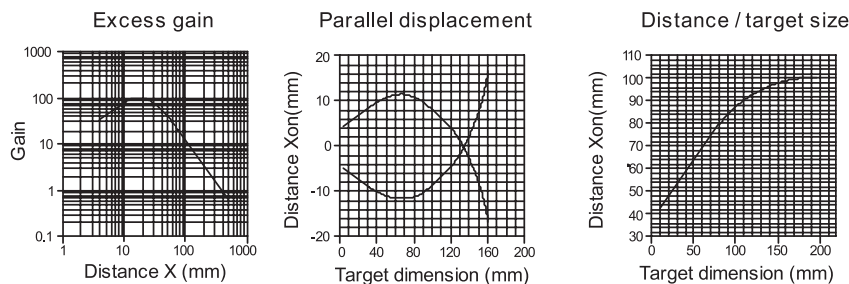


Chart 4 (Polarized reflective)

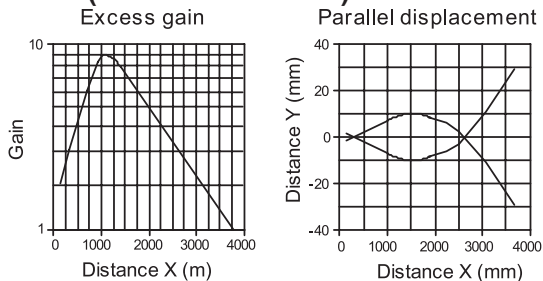
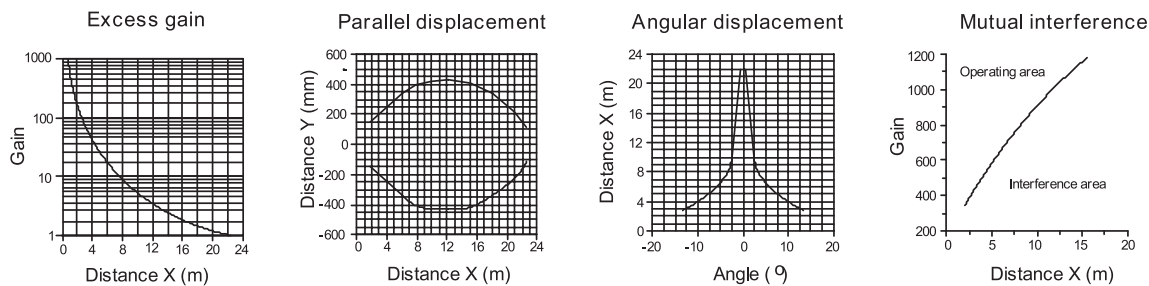


Chart 5 (Through-beam)



C5 Series Stainless Steel Photoelectric Sensors

M5 (5 mm) stainless steel - DC



- 14 models available
- Diffuse and through-beam styles
- Long operating distances
- Compact stainless steel housing
- Scratch resistant and easy to clean glass lens
- Axial cable or M8 quick-disconnect models
- Complete overload protection
- IP67 rated



C5 Series M5 Photoelectric Sensors Selection Chart															
Part Number	Price	Sensing Range	Output State	Logic	Connection	Wiring	Dimensions	Characteristic Curves							
Diffuse															
C5D-AN-1A	\$76.00	50 mm, (1.97 in) ¹	N.O.	NPN	2 m (6.5') axial cable	Diagram 1	Figure 1	Chart 1							
C5D-AP-1A	\$76.00			PNP	2 m (6.5') axial cable	Diagram 2	Figure 1	Chart 1							
C5D-AN-1F	\$76.00			NPN	M8 (8 mm) connector	Diagram 1	Figure 2	Chart 1							
C5D-AP-1F	\$76.00			PNP	M8 (8 mm) connector	Diagram 2	Figure 2	Chart 1							
C5D-AN-2A	\$103.00	10 mm (0.40 in)		NPN	2 m (6.5') axial cable	Diagram 1	Figure 1	Chart 3							
C5D-AP-2A	\$103.00			PNP	2 m (6.5') axial cable	Diagram 2	Figure 1	Chart 3							
C5D-AN-3A	\$103.00	20 mm, (0.79 in) ¹		NPN	2 m (6.5') axial cable	Diagram 1	Figure 1	Chart 4							
C5D-AP-3A	\$103.00			PNP	2 m (6.5') axial cable	Diagram 2	Figure 1	Chart 4							
Through-beam*															
C5R-AN-1A	Receiver	\$58.00	250 mm (9.84 in)	N.O.	NPN	2 m (6.5') axial cable	Diagram 1	Figure 1	Chart 2						
C5R-AP-1A	Receiver	\$58.00								PNP	2 m (6.5') axial cable	Diagram 2	Figure 1	Chart 2	
C5R-AN-1F	Receiver	\$58.00								NPN	M8 (8 mm) connector	Diagram 1	Figure 2	Chart 2	
C5R-AP-1F	Receiver	\$58.00												PNP	M8 (8 mm) connector
C5E-ON-1A	Emitter	\$46.00	Receiver dependent	Receiver dependent	2 m (6.5') axial cable	Diagram 3	Figure 1	Chart 2							
C5E-ON-1F	Emitter	\$46.00						M8 (8 mm) connector	Diagram 3	Figure 2	Chart 2				

¹ With 100x100mm white matte paper

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

Wiring diagrams

Diagram 1

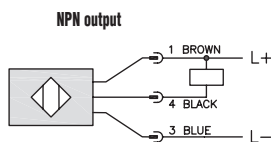


Diagram 2

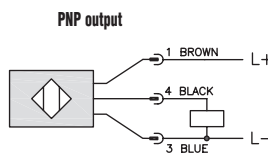
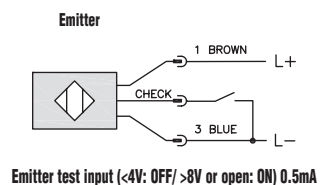
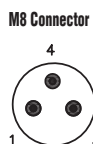


Diagram 3



Connector



Warning: These products are not safety sensors and are not suitable for use in personal safety applications.

Switching Element Function

	Thru-beam and Reflective Models	Diffuse Reflective Models
Light on	N.C.	N.O.
Dark on	N.O.	N.C.

C5 Series Stainless Steel Photoelectric Sensors

Specifications	Diffuse and Through-beam Models	
Type	Diffuse	Through-beam
Sensing Distance	10 to 50 mm (0.39 to 1.97 in)	250 mm (9.84 in)
Light Spot Diameter	See charts	
Emission	Infrared (880nm)	
Sensitivity	Fixed	
Output Type	NPN or PNP; N.O. only	
Operating Voltage	10-30VDC	
No-load Supply Current	Emitter: 10mA Receiver: 5mA	
Operating (Load) Current	≤100mA	
Off-state (Leakage) Current	≤10μA	
Voltage Drop	≤2.0V	
Switching Frequency	250Hz	
Ripple	≤20%	
Time Delay Before Availability (tv)	20ms	
Short-Circuit Protection	Yes (switch autoresets after overload is removed)	
Operating Temperature	0° to + 55° C (32° to 131° F)	
Protection Degree (DIN 400050)	IEC IP67	
LED Indicators - Switching Status	Yellow (output energized), yellow flashing (excess light indication)	
Housing Material	Stainless steel	
Lens Material	Glass	
Shock/Vibration	See terminology section	
Tightening Torque	1.5 Nm (13.3 lb-in)	
Weight (cable/connector)	76g (2.68 oz)/18g (0.63 oz)	
Connectors	2m (6.5') axial cable; M12 (12mm) connector	
Agency Approvals	UL file E328811	

Dimensions

(mm)

Figure 1

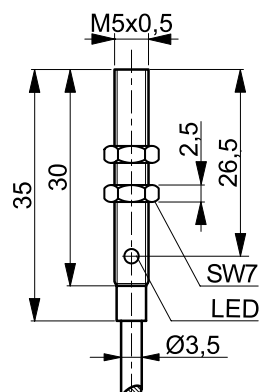
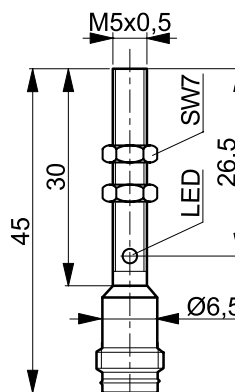


Figure 2



Characteristic curves

Chart 1 (Diffuse C50*-1*)

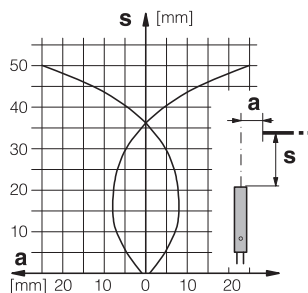


Chart 2 (Through-Beam)

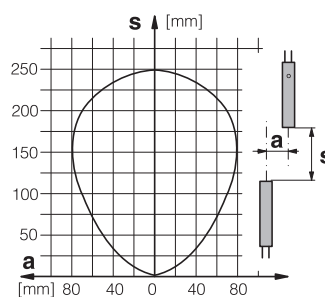


Chart 3 (Diffuse c5D-*-2*)

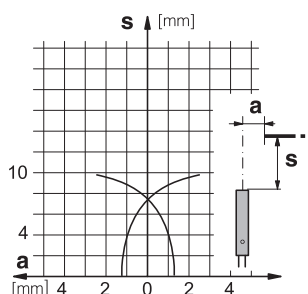
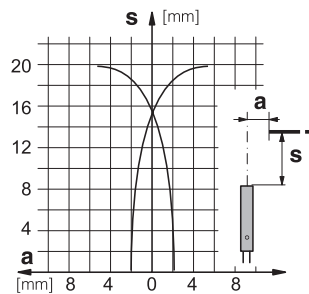


Chart 4 (Diffuse C5D-X-3*)



HE Series Photoelectric Sensors

M8 (8 mm) thru-beam series



M8 miniaturized HEE and HER series thru-beam sensors are available with NPN or PNP, and NO or NC outputs.

In the PNP models, the load is connected between the output (black wire) and the negative (blue wire).

In the NPN models, the load is connected between the output (black wire) and the positive (brown wire).

In the Normally Open models, the output is ON when the target is present (beam interrupted); in the Normally Closed models, the output is On when the target is absent (beam free).

Features

- M8 small dimension housing
- LED status indicator for all models
- Complete protection against electrical damage
- IP67 protection
- Strong stainless steel housing
- Fast switching frequency 10 kHz
- Sensing distance: 1 meter
- Supply voltage: 10 - 30 VDC
- NPN or PNP, NO or NC models



8mm diameter Thru-beam Photoelectric Sensors Selection Chart									
Part Number	Price	Voltage Range	Sensing Range	Switching Frequency	Sensing Beam	Thru-Beam Component	Output Type	Connection Type	Wiring
HEE-00-3A	\$32.50	10 to 30 VDC	3.28 ft. (1 m)	10 kHz	Infrared	Emitter		1 meter cable	Diagram 3
HER-AP-3A	\$48.00					Receiver	PNP NO		Diagram 2
HER-CP-3A	\$52.00					Receiver	PNP NC		Diagram 2
HER-AN-3A	\$52.00					Receiver	NPN NO		Diagram 1
HER-CN-3A	\$52.00					Receiver	NPN NC		Diagram 1
HEE-00-3F	\$33.50					Emitter			M8 quick disconnect (purchase separately)
HER-AP-3F	\$49.50					Receiver	PNP NO	Diagram 2	
HER-CP-3F	\$42.00					Receiver	PNP NC	Diagram 2	
HER-AN-3F	\$49.50					Receiver	NPN NO	Diagram 1	
HER-CN-3F	\$52.00					Receiver	NPN NC	Diagram 1	

Wiring diagram

Diagram 1
NPN output

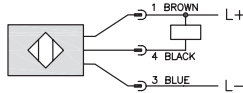


Diagram 2
PNP output

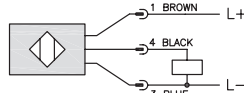
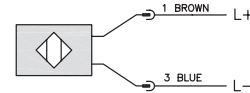
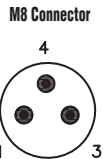


Diagram 3
Emitter



Connector



Switching Element Function		
	Thru-beam and Reflective Models	Diffuse Reflective Models
Light on	N.C.	N.O.
Dark on	N.O.	N.C.

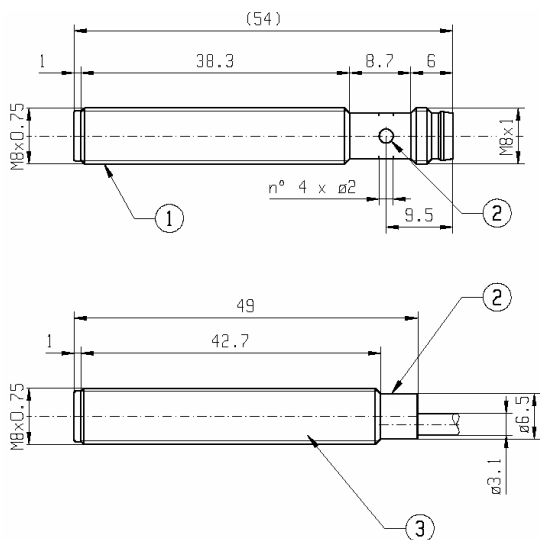
Warning: These products are not safety sensors and are not suitable for use in personal safety applications.

HE Series Photoelectric Sensors

HEE/HER Series Photoelectric Sensors Specifications	
Type	Through-Beam
Sensing Distance	1 m (3.28 ft) / Ex. Gain = 2
Light Spot Diameter	See chart
Emission	Infrared
Sensitivity	Fixed
Output Types	PNP/NPN NO/ NC
Operating Voltage	10 - 30 VDC
No Load Supply Current	25 mA
Operating (Load) Current	100 mA
Off-state (Leakage) Current (max)	<10 μ A @ 30 VDC
Voltage Drop	1 Volt
Switching Frequency	10 kHz
Ripple	\leq 10%
Time Delay Before Availability (tv)	100 ms
Short-circuit Protection	Yes
Operating Temperature	13°F to 122°F (-25°C to +50°C)
Protection Degree	IP67
LED Indicators - Switching Status	Yellow Output State
Housing Material	Stainless Steel
Lens Material	Poly methyl methacrylate (PMMA)
Shock/Vibration	See terminology section
Tightening Torque	5 Nm (3.69 lb-ft)
Weight	30.9 g (1.09 oz)
Connectors	1 meter cable; 8 mm quick disconnect
Agency Approvals	CE

Dimensions

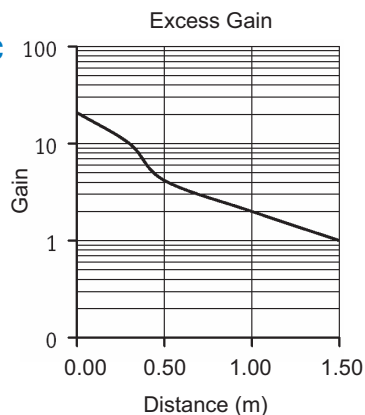
(mm)



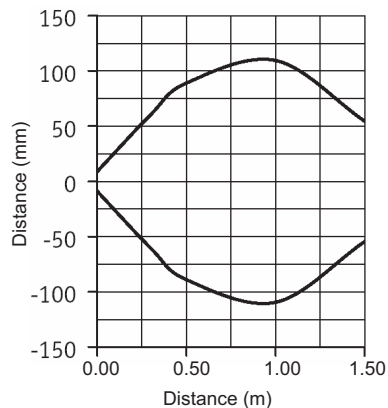
- ① M8 x 0.75 threaded cylindrical housing M8 connector exit
- ② Yellow LED (output state indicator HER - Supply Indicator HEE)
- ③ M8 x 0.75 threaded cylindrical housing cable exit

Warning: These products are not safety sensors and are not suitable for use in personal safety applications.

Characteristic curve chart



Spot dimension chart



DM Series Photoelectric Sensors

M12 (12 mm) metal with Teach function - DC



- 18 models available
- Metal housing
- Teach function available on diffuse and polarized reflective models
- Adjustable sensitivity on through-beam models
- Axial cable or M12 quick-disconnect models
- Multifunction LED status indicator
- Operates on 10-30 VDC
- IP67 rated



DM Series Photoelectric Sensors Selection Chart											
Part Number	Price	Sensing Range	Output State	Logic	Connection	Wiring	Dimensions	Characteristic Curves			
Diffuse											
DM3-ON-1A	\$40.00	Up to 100mm (3.9 in.)	NO + NC Selectable	NPN	2m (6.5) axial cable	Diagram 1	Figure 1	Chart 1			
DM3-OP-1A	\$40.00			PNP	2m (6.5) axial cable	Diagram 2	Figure 1	Chart 1			
DM3-ON-1H	\$40.00			NPN	M12 (12mm) connector	Diagram 1	Figure 2	Chart 1			
DM3-OP-1H	\$40.00			PNP	M12 (12mm) connector	Diagram 2	Figure 2	Chart 1			
DM7-ON-1A	\$40.00	Up to 300mm (11.8 in.)	NO + NC Selectable	NPN	2m (6.5) axial cable	Diagram 1	Figure 1	Chart 2			
DM7-OP-1A	\$40.00			PNP	2m (6.5) axial cable	Diagram 2	Figure 1	Chart 2			
DM7-ON-1H	\$40.00			NPN	M12 (12mm) connector	Diagram 1	Figure 2	Chart 2			
DM7-OP-1H	\$40.00			PNP	M12 (12mm) connector	Diagram 2	Figure 2	Chart 2			
Polarized reflective*											
DMP-ON-1A	\$47.00	Up to 2m (6.6 ft)	NO + NC Selectable	NPN	2m (6.5) axial cable	Diagram 1	Figure 1	Chart 3			
DMP-OP-1A	\$47.00			PNP	2m (6.5) axial cable	Diagram 2	Figure 1	Chart 3			
DMP-ON-1H	\$47.00			NPN	M12 (12mm) connector	Diagram 1	Figure 2	Chart 3			
DMP-OP-1H	\$47.00			PNP	M12 (12mm) connector	Diagram 2	Figure 2	Chart 3			
Through-beam**											
DMR-ON-1A	Receiver	\$34.00	Up to 4m (13.1 ft)	NO + NC Selectable	NPN	2m (6.5) axial cable	Diagram 1	Figure 1	Chart 4		
DMR-OP-1A	Receiver	\$34.00			PNP	2m (6.5) axial cable	Diagram 2	Figure 1	Chart 4		
DMR-ON-1H	Receiver	\$34.00			NPN	M12 (12mm) connector	Diagram 1	Figure 2	Chart 4		
DMR-OP-1H	Receiver	\$34.00			PNP	M12 (12mm) connector	Diagram 2	Figure 2	Chart 4		
DME-00-1A	Emitter	\$28.00			Receiver dependent	2m (6.5) axial cable		Diagram 3	Figure 1	Chart 4	
DME-00-1H	Emitter	\$28.00				M12 (12mm) connector		Diagram 3	Figure 2	Chart 4	

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

Wiring diagrams

Diagram 1

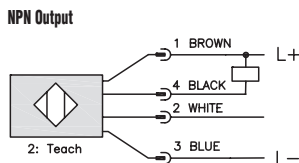


Diagram 2

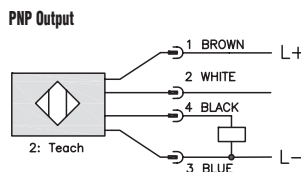
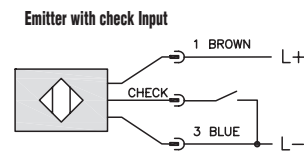
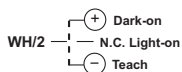


Diagram 3

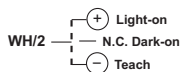


2-meter Axial Cable version: check is black
M12 Connector: check is Pin 2 (white)

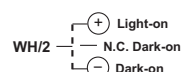
Diffuse models



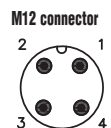
Polarized reflective models



Through-beam models



Connector



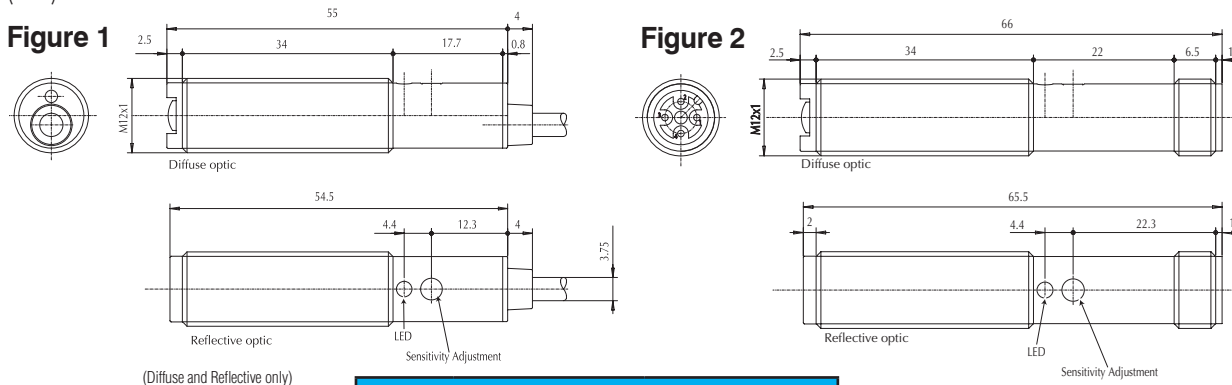
DM Series Photoelectric Sensors

Specifications	Diffuse Models	Reflective Models	Through-Beam Models
Type	Diffuse reflection	Polarized reflection ⁴	Through-beam ⁵
Sensing Distance	DM3: 100mm ¹ DM7: 300mm ²	2m ³	4m
Light Spot Diameter	DM3: 80 mm @ 100 mm DM7: 200 mm @ 300 mm	100 mm @ 2.5 m	350 mm @ 4 m
Emission	100mm: Infrared (880nm) 300mm: Red (660nm)	Infrared (880nm)	
Sensitivity	Teach function (see product data sheet for details)		Fixed
Output Type	NPN or PNP - Light on / Dark on selectable		
Operating Voltage	10-30VDC		
No-load Supply Current	≤20mA		
Operating (Load) Current	≤100mA		
Off-state Leakage Current	≤10µA		
Voltage Drop	2V max at 100mA		
Switching Frequency	400Hz	250Hz	
Ripple	≤10%		
Time Delay Before Availability (tv)	150ms		
Short-Circuit Protection	Yes, switch autoresets after load is removed		
Operating Temperature	-25 to +70°C (-13° to 158°F)		
Protection Degree (DIN 40050)	IEC IP67		
LED Indicators - Switching Status	Yellow		
Housing Material	Nickel-plated brass		
Lens Material	Poly methyl methacrylate (PMMA)		
Shock/Vibration	See terminology section		
Tightening Torque	10 Nm (7.37 lb-ft)		
Weight	Axial cable models: 54g (1.9 oz) M12 connector models: 18g (0.63 oz)		
Connectors	2m (6.5') axial cable; M12 (12mm) connector		
Agency Approvals	cULus F187310, CE		

¹With 100x100mm white matte paper
²With 200x200mm white matte paper
³With standard Ø84mm RL110 reflector
⁴Purchase reflectors separately.
⁵An emitter (DME) and receiver (DMR) pair must be ordered for a complete sensor set.

Dimensions

(mm)



Switching Element Function		
	Thru-beam and Reflective Models	Diffuse Reflective Models
Light on	N.C.	N.O.
Dark on	N.O.	N.C.

DM Series Photoelectric Sensors

Characteristic curves

Chart 1 (Diffuse DM3)

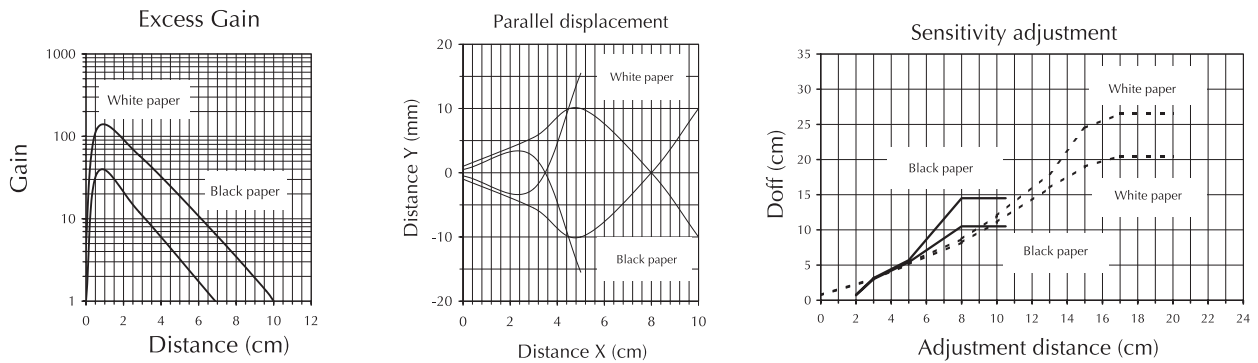


Chart 2 (Diffuse DM7)

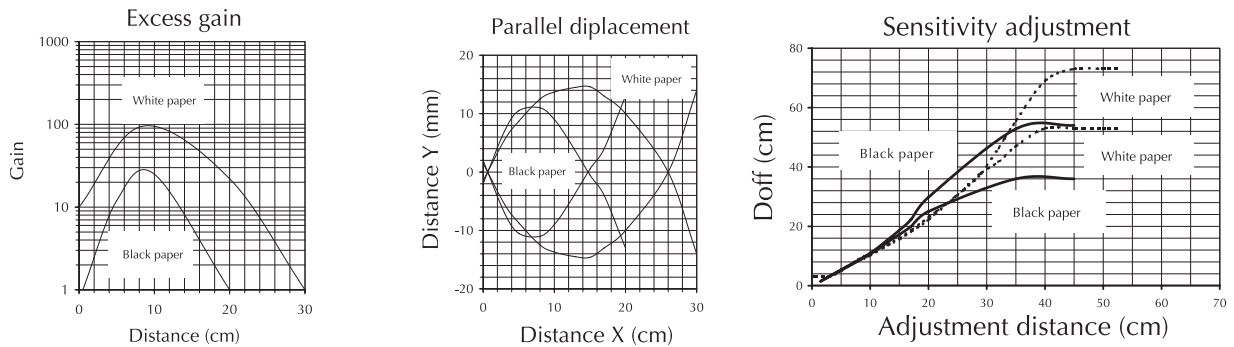
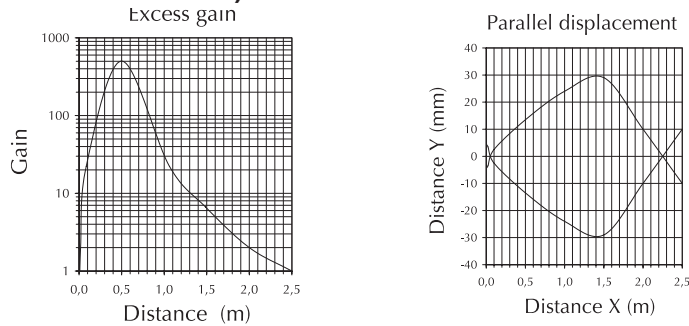
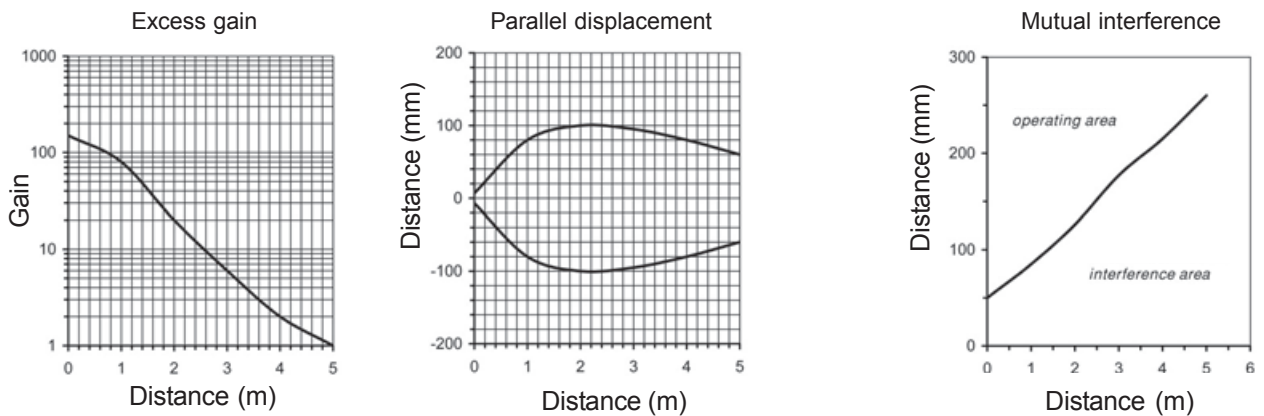


Chart 3 (Polarized reflective)



Warning: These products are not safety sensors and are not suitable for use in personal safety applications.

Chart 4 (Through-beam)



C18 Series Photoelectric Sensors

M18 (18 mm) metal – DC



- 36 models available
- Diffuse, Polarized reflective, Through-beam, and Diffuse with background suppression models
- Long operating distances
- Scratch resistant and easy-to-clean glass lens
- Adjustable sensitivity (diffuse models only)
- Axial cable or 12 mm quick-disconnect models
- Complete overload protection
- IP67 rated



C18 Series Photoelectric Sensor Selection Chart

Part Number	Price	Sensing Range	Output State	Optics	Logic	Connection	Wiring	Dimensions	Characteristic Curves		
Diffuse											
C18D-ON-1A	\$41.00	Up to 600 mm (23.62 in)	1 N.O. and 1 N.C.	Axial	NPN	2 m (6.5') axial cable	Diagram 3	Figure 1	Chart 5		
C18D-OP-1A	\$41.00		1 N.O. and 1 N.C..	Axial	PNP	2 m (6.5') axial cable	Diagram 4	Figure 1	Chart 5		
C18D-ON-1E	\$41.00		1 N.O. and 1 N.C.	Axial	NPN	M12 (12 mm) connector	Diagram 3	Figure 2	Chart 5		
C18D-OP-1E	\$41.00		1 N.O. and 1 N.C.	Axial	PNP	M12 (12 mm) connector	Diagram 4	Figure 2	Chart 5		
C18D-ON-2A	\$36.25		1 N.O. and 1 N.C..	Right-angle	NPN	2 m (6.5') axial cable	Diagram 3	Figure 3	Chart 6		
C18D-OP-2A	\$54.00		1 N.O. and 1 N.C.	Right-angle	PNP	2 m (6.5') axial cable	Diagram 4	Figure 3	Chart 6		
C18D-ON-2E	\$54.00		1 N.O. and 1 N.C.	Right-angle	NPN	M12 (12 mm) connector	Diagram 3	Figure 4	Chart 6		
C18D-OP-2E	\$54.00		1 N.O. and 1 N.C..	Right-angle	PNP	M12 (12 mm) connector	Diagram 4	Figure 4	Chart 6		
Diffuse with background suppression											
C18B-AN-1A	\$67.00	10-120 mm (0.39 to 4.72 in)	N.O.	Axial	NPN	2 m (6.5') axial cable	Diagram 1	Figure 1	Chart 1		
C18B-AP-1A	\$67.00			Axial	PNP	2 m (6.5') axial cable	Diagram 2	Figure 1	Chart 1		
C18B-AN-1E	\$67.00			Axial	NPN	M12 (12 mm) connector	Diagram 1	Figure 2	Chart 1		
C18B-AP-1E	\$67.00			Axial	PNP	M12 (12 mm) connector	Diagram 2	Figure 2	Chart 1		
C18B-AN-2A	\$71.75	10-120 mm (0.39 to 4.72 in)	N.O.	Right-angle	NPN	2 m (6.5') axial cable	Diagram 1	Figure 3	Chart 2		
C18B-AP-2A	\$104.00			Right-angle	PNP	2 m (6.5') axial cable	Diagram 2	Figure 3	Chart 2		
C18B-AN-2E	\$71.75			Right-angle	NPN	M12 (12 mm) connector	Diagram 1	Figure 4	Chart 2		
C18B-AP-2E	\$104.00			Right-angle	PNP	M12 (12 mm) connector	Diagram 2	Figure 4	Chart 2		
Polarized reflective *Purchase reflectors separately.											
C18P-AN-1A	\$43.50	Up to 2 m (6.6 ft)	N.O.	Axial	NPN	2 m (6.5') axial cable	Diagram 1	Figure 1	Chart 3		
C18P-AP-1A	\$43.50			Axial	PNP	2 m (6.5') axial cable	Diagram 2	Figure 1	Chart 3		
C18P-AN-1E	\$43.50			Axial	NPN	M12 (12 mm) connector	Diagram 1	Figure 2	Chart 3		
C18P-AP-1E	\$43.50			Axial	PNP	M12 (12 mm) connector	Diagram 2	Figure 2	Chart 3		
C18P-AN-2A	\$57.00	Up to 2 m (6.6 ft)	N.O.	Right-angle	NPN	2 m (6.5') axial cable	Diagram 1	Figure 3	Chart 4		
C18P-AP-2A	\$57.00			Right-angle	PNP	2 m (6.5') axial cable	Diagram 2	Figure 3	Chart 4		
C18P-AN-2E	\$57.00			Right-angle	NPN	M12 (12 mm) connector	Diagram 1	Figure 4	Chart 4		
C18P-AP-2E	\$57.00			Right-angle	PNP	M12 (12 mm) connector	Diagram 2	Figure 4	Chart 4		
Through-beam **Purchase one receiver and one emitter for a complete set.											
C18R-ON-1A	\$38.00	Up to 6 m (19.7 ft)	1 N.O. and 1 N.C.	Axial	NPN	2 m (6.5') axial cable	Diagram 3	Figure 1	Chart 7		
C18R-OP-1A	\$38.00			Axial	PNP	2 m (6.5') axial cable	Diagram 4	Figure 1	Chart 7		
C18R-ON-1E	\$38.00			Axial	NPN	M12 (12 mm) connector	Diagram 3	Figure 2	Chart 7		
C18R-OP-1E	\$38.00			Axial	PNP	M12 (12 mm) connector	Diagram 4	Figure 2	Chart 7		
C18E-00-1A	\$28.00	Receiver dependent	Receiver dependent	Axial	Receiver dependent	2 m (6.5') axial cable	Diagram 5	Figure 5	Chart 7		
C18E-00-1E	\$28.00			Axial		M12 (12 mm) connector	Diagram 5	Figure 6	Chart 7		
C18R-ON-2A	\$50.00	Up to 6 m (19.7 ft.)	1 N.O. and 1 N.C.	Right-angle	NPN	2 m (6.5') axial cable	Diagram 3	Figure 3	Chart 8		
C18R-OP-2A	\$50.00			Right-angle	PNP	2 m (6.5') axial cable	Diagram 4	Figure 3	Chart 8		
C18R-ON-2E	\$50.00			Right-angle	NPN	M12 (12 mm) connector	Diagram 3	Figure 4	Chart 8		
C18R-OP-2E	\$41.00			Right-angle	PNP	M12 (12 mm) connector	Diagram 4	Figure 4	Chart 8		
C18E-00-2A	\$38.00			Receiver dependent	Receiver dependent	Right-angle	Receiver dependent	2 m (6.5') axial cable	Diagram 5	Figure 7	Chart 8
C18E-00-2E	\$38.00					Right-angle		M12 (12 mm) connector	Diagram 5	Figure 8	Chart 8

C18 Series Photoelectric Sensors

Specifications	Diffuse Models	Diffuse Models with Background Suppression	Reflective Models	Through-beam Models
Type	Diffuse	Diffuse with background suppression	Polarized reflection	Through-beam ¹
Sensing Distance	600 mm (23.62in) ²	10 to 120 mm (0.39 to 4.72 in) ³	2 m (6.6 ft)	6 m (19.7 ft)
Emission	LED red (660nm)	LED red (660nm)	LED red polarized (660 nm)	LED red (660nm)
Light Spot Diameter	See charts			
Sensitivity	Adjustable one-turn pot.			—
Output Type	NPN or PNP; 1 L.O. and 1 D.O.	NPN or PNP; L.O. only	NPN or PNP; D.O. only	NPN or PNP; 1 L.O. and 1 D.O.
Operating Voltage	10-36 VDC			
No Load Supply Current	20 mA	25 mA	15 mA	Receiver: 10 mA Emitter: 15 mA
Operating (Load) Current	≤200 mA			
Off-state (Leakage) Current	≤10μ A			
Voltage Drop	≤2.0 V			
Switching Frequency	1kHz	500Hz	1kHz	1kHz
Ripple	≤20%			
Time Delay Before Availability (tv)	60ms	20ms	20ms	20ms
Short-Circuit Protection	Yes (switch autoresets after overload is removed)			
Operating Temperature Range	-25° to +55°C (-13° to 131°F)			
Protection Degree (DIN 40050)	IEC IP67			
LED Indicators - Switching Status	Yellow (output state, output energized), green (excess light indication). Emitter has no LED			
Housing Material	Chrome-plated brass			
Lens Material	Glass			
Shock/Vibration	See terminology section			
Tightening Torque	50 Nm (36.88 lb-ft)			
Weight	65.22 g (2.3 oz).			
Connectors	2m (6.5') axial cable; M12 (12mm) connector			
Agency Approvals	UL file E328811			

Notes: ¹Through-beam sensors must be used in pairs consisting of one receiver and one emitter. ²With 200x200mm white matte paper. ³With 100x100mm white matte paper.

Wiring diagrams

Warning: These products are not safety sensors and are not suitable for use in personal safety applications.

Diagram 1

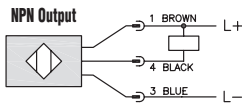
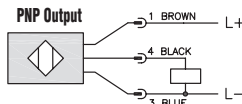


Diagram 2



Connector

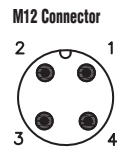


Diagram 3

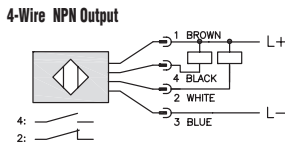


Diagram 4

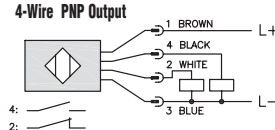
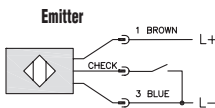


Diagram 5



Emitter test input (<4V: OFF / >8V or open: ON) 0.5mA

Switching Element Function		
	Thru-beam and Reflective Models	Diffuse Models
Light on	N.C.	N.O.
Dark on	N.O.	N.C.

C18 Series Photoelectric Sensors

Dimensions

(mm)

Figure 1

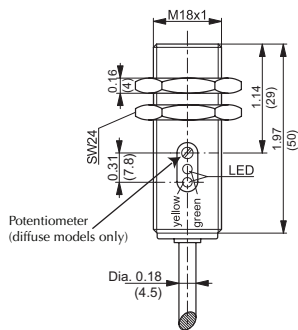


Figure 2

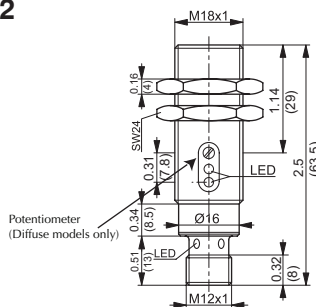


Figure 3

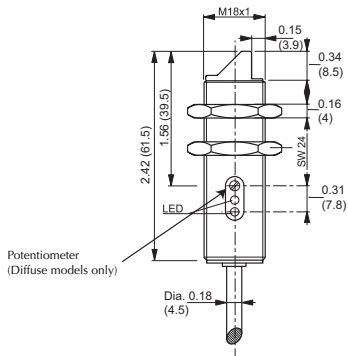


Figure 4

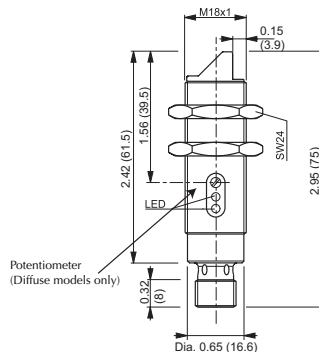


Figure 5

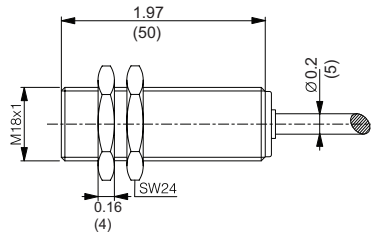


Figure 6

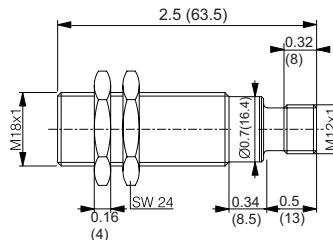


Figure 7

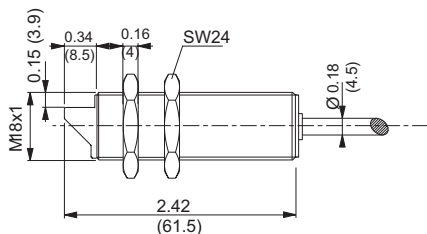
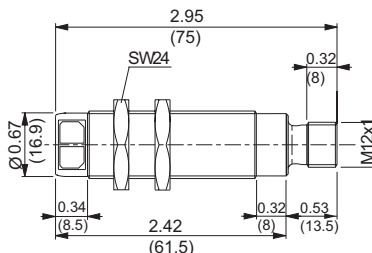


Figure 8



Note: Dimensions are in inches (millimeters).

C18 Series Photoelectric Sensors

Characteristic Curves

Chart 1 (Diffuse with background suppression C18B-*-1*)

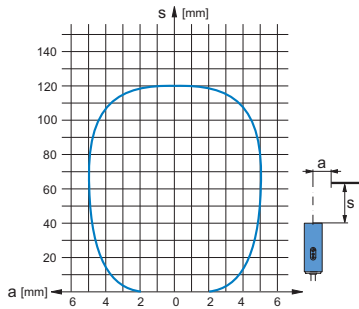


Chart 2 (Diffuse with Background Suppression C18B-*-2*)

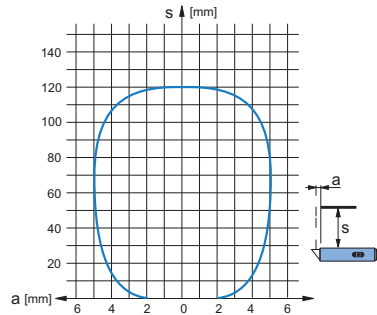


Chart 3 (Polarized reflective C18P-*-1*)

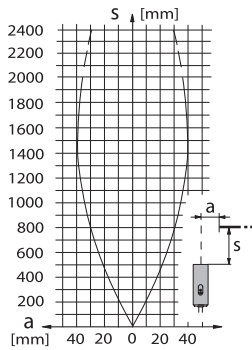


Chart 4 (Polarized reflective C18P-*-2*)

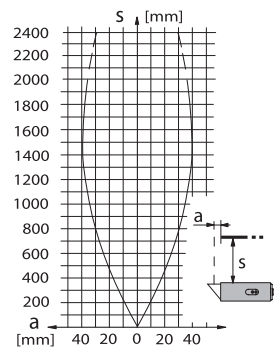


Chart 5 (Diffuse c18D-*-1*)

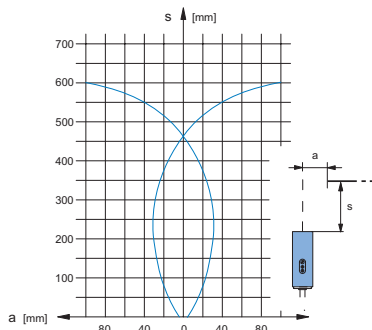


Chart 6 (Diffuse c18D-*-2*)

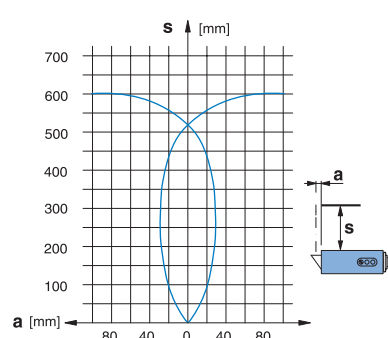


Chart 7 (Through-beam C18R-*-1*)

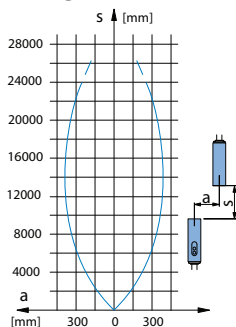
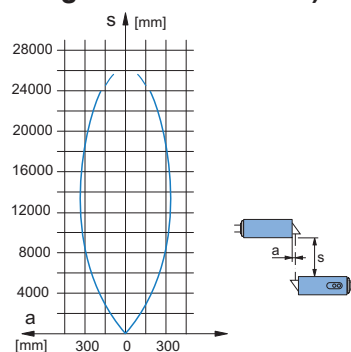


Chart 8 (Through-beam C18R-*-2*)



GX Series Photoelectric Sensors



GX3-AP-2E

M18 (18 mm) rectangular plastic - DC

- 12 models available
- Diffuse with background suppression, polarized reflective, and through-beam models
- Fixed sensing ranges, no adjustment required
- 18 mm diameter threaded lens with mounting hex nut included
- NPN or PNP, Light-on, Dark-on output models
- Visible red LED emission
- M12 quick-disconnect; order cable separately
- IP67 rated



GX Series Photoelectric Sensors Selection Chart							
Part Number	Price	Sensing Range	Output State	Logic	Connection	Wiring	Characteristic Curves
Diffuse with background suppression							
GX3-AN-1E	\$49.00	Up to 100 mm (3.93 in)	N.O.	NPN	M12 (12 mm) connector	Diagram 1	N/A
GX3-AP-1E	\$49.00			PNP	M12 (12 mm) connector	Diagram 2	
GX3-AN-2E	\$49.00	Up to 150 mm (5.90 in)	N.O.	NPN	M12 (12 mm) connector	Diagram 1	
GX3-AP-2E	\$49.00			PNP	M12 (12 mm) connector	Diagram 2	
Polarized reflective *							
GXP-AN-1E	\$39.00	Up to 4 m (13.12 ft) with RL110 reflector	N.C.	NPN	M12 (12 mm) connector	Diagram 1	Chart 1
GXP-AP-1E	\$39.00			PNP	M12 (12 mm) connector	Diagram 2	
GXP-CN-1E	\$39.00		N.O.	NPN	M12 (12 mm) connector	Diagram 1	
GXP-CP-1E	\$39.00			PNP	M12 (12 mm) connector	Diagram 2	
Through-beam							
GXR-AP-1E	\$35.00	Up to 20 m (65.62 ft)	N.C.	PNP	M12 (12 mm) connector	Diagram 2	Chart 2
GXR-CN-1E	\$35.00		N.O.	NPN	M12 (12 mm) connector	Diagram 1	
GXR-CP-1E	\$35.00			PNP	M12 (12 mm) connector	Diagram 2	
GXE-00-1E	\$30.00		Emitter	Receiver dependent	Receiver dependent	M12 (12 mm) connector	

*Note: Purchase reflectors separately.

Wiring Diagrams

Diagram 1

NPN Output

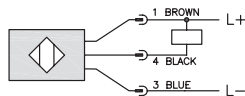


Diagram 2

PNP Output

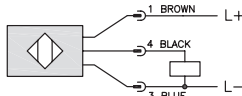
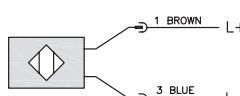


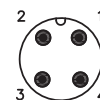
Diagram 3

Emitter



Connector

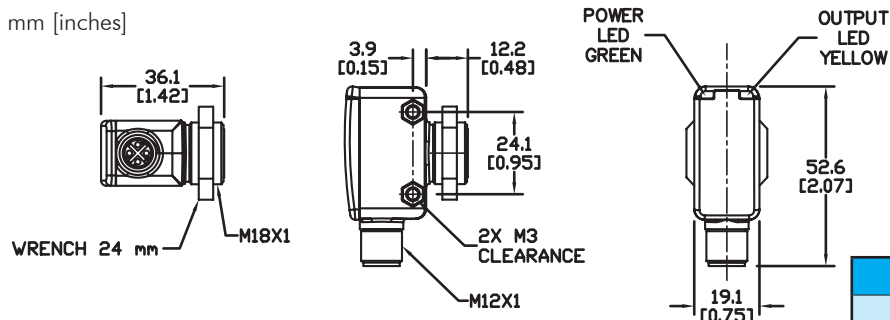
M12 connector



NOTE: CLASS 2 POWER SOURCE REQUIRED

Dimensions

mm [inches]



	Switching Element Function	
	Thru-Beam and Reflective Models	Diffuse Models
Light-on	N.C.	N.O.
Dark-on	N.O.	N.C.

GX Series Photoelectric Sensors

Specifications	Diffuse Models with Background Suppression	Reflective Models	Through-Beam Models
Type	Diffuse reflection	Polarized reflection	Through-beam ³
Sensing Distance	GX3-AN-1E, GX3-AP-1E: up to 100 mm ¹ GX3-AN-2E, GX3-AP-2E: up to 150 mm ¹	4m with RL110 ²	20m
Light Spot Diameter	GX3-AN-1E, GX3-AP-1E: 7mm at maximum range GX3-AN-2E, GX3-AP-2E: 11mm at maximum range	160mm at maximum range	GXE-00-1E: 800mm at maximum range
Emission	Red LED (visible)		
Sensitivity	Fixed		
Output Type	NPN or PNP - Light-on or Dark-on		
Operating Voltage	10 to 30 VDC		
No Load Supply Current	30 mA	25 mA	20 mA
Operating (Load) Current	<200 mA		
Off-state (Leakage) Current	N/A		
Voltage Drop	<2.5 V		
Switching Frequency	1kHz		
Ripple	-		
Time Delay Before Availability (tv)	Minimal		
Short-Circuit Protection	Yes (non-latching)		
Operating Temperature	-25 to 60°C (-13° to 140°F)		
Protection Degree (DIN 40050)	IEC IP67		
LED Indicators - Switching Status	Yellow (output energized)		
LED Indicators - Power	Green		
Housing Material	LCP (Liquid Crystal Polymer); PEI (Polyether imide)		
Lens Material	(Polymethyl methacrylate PMMA)		
Shock/Vibration	See terminology section		
Tightening Torque	2.25 Nm (1.66 lb-ft)		
Weight (cable/connector)	45.36 g (1.6 oz)		
Connectors	M12 connector		
Accessories	1 mounting hex nut included		
Agency Approvals	cULus listed UL file E328811, CE		
¹ With 200x200mm white matte paper, 90% remission			
² With standard diameter 84mm RL110 reflector included with sensor			
³ An emitter and receiver pair must be ordered for a complete sensor set.			

Characteristic Curves

Chart 1 - GXP

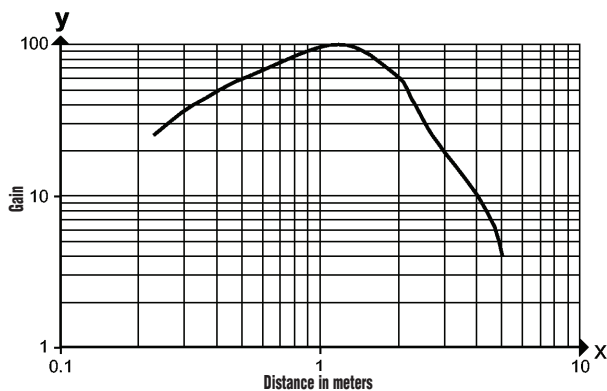
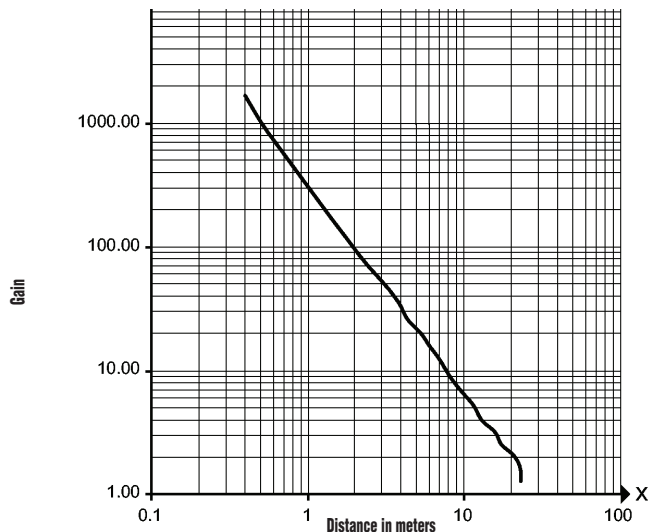


Chart 2 - GXE, GXR



Warning: These products are not safety sensors and are not suitable for use in personal safety applications.

QM Series Photoelectric Sensors

Mini-rectangular plastic - DC



2m Output



M8 Quick-Disconnect

- 56 models available
- Rectangular photoelectric sensor (photo eye)
- Plastic housing
- Selectable Light-on/Dark-on output
- Diffuse, diffuse with background suppression, polarized retroreflective, retroreflective for clear objects, through-beam, and retroreflective models
- 3-wire NPN or PNP
- Easy-to-use potentiometer for setting switchpoint distance on select models
- Through-beam models include emitter and receiver pair
- 2m output cable or M8 quick-disconnect. Purchase cable separately
- IP67 rated
- Mounting brackets and shutter accessories available



QM Series Photoelectric Sensors (Diffuse)								
Part Number	Price	Sensing Distance	Emission Type	Logic	Connection	Wiring	Characteristic Curves	
QMRB-ON-0A	\$35.00	5 – 100 mm (0.2 – 3.94 in)	Visible Red 630nm	NPN	2-meter cable	Diagram 1	QMRBx	
QMRB-ON-0F	\$35.00			NPN	4-pin M8 quick-disconnect	Diagram 2		
QMRB-OP-0A	\$35.00			PNP	2-meter cable	Diagram 1		
QMRB-OP-0F	\$35.00			PNP	4-pin M8 quick-disconnect	Diagram 2		
QMR7-ON-0A	\$35.00	0 – 400 mm (0 – 15.75 in)		Infrared 850nm	NPN	2-meter cable	Diagram 1	QMR7x
QMR7-ON-0F	\$35.00				NPN	4-pin M8 quick-disconnect	Diagram 2	
QMR7-OP-0A	\$35.00				PNP	2-meter cable	Diagram 1	
QMR7-OP-0F	\$35.00				PNP	4-pin M8 quick-disconnect	Diagram 2	
QMI7-ON-0A	\$35.00				NPN	2-meter cable	Diagram 1	QMI7x
QMI7-ON-0F	\$35.00				NPN	4-pin M8 quick-disconnect	Diagram 2	
QMI7-OP-0A	\$35.00				PNP	2-meter cable	Diagram 1	
QMI7-OP-0F	\$35.00				PNP	4-pin M8 quick-disconnect	Diagram 2	
QMR8-ON-0A	\$38.00	0 – 1 m (0 – 3.28 ft)		Visible Red 630nm	NPN	2-meter cable	Diagram 1	QMR8x
QMR8-ON-0F	\$38.00				NPN	4-pin M8 quick-disconnect	Diagram 2	
QMR8-OP-0A	\$38.00				PNP	2-meter cable	Diagram 1	
QMR8-OP-0F	\$38.00				PNP	4-pin M8 quick-disconnect	Diagram 2	
QMI9-ON-0A	\$39.00	0 – 1.5 m (0 – 4.9 ft)	Infrared 850nm		NPN	2-meter cable	Diagram 1	QMI9x
QMI9-ON-0F	\$39.00				NPN	4-pin M8 quick-disconnect	Diagram 2	
QMI9-OP-0A	\$39.00				PNP	2-meter cable	Diagram 1	
QMI9-OP-0F	\$39.00				PNP	4-pin M8 quick-disconnect	Diagram 2	

QM Series Photoelectric Sensors

QM Series Photoelectric Sensors (Diffuse with Background Suppression)							
Part Number	Price	Sensing Distance	Emission Type	Logic	Connection	Wiring	Characteristic Curves
QMRS-ON-0A	\$49.00	30 – 200 mm (1.2 – 7.87 in)	Visible Red 630nm	NPN	2-meter cable	Diagram 1	QMRSx
QMRS-ON-0F	\$49.00			NPN	4-pin M8 quick-disconnect	Diagram 2	
QMRS-OP-0A	\$49.00			PNP	2-meter cable	Diagram 1	
QMRS-OP-0F	\$49.00			PNP	4-pin M8 quick-disconnect	Diagram 2	
QMIS-ON-0A	\$50.00	30 – 400 mm (1.2 – 15.75 in)	Infrared 850nm	NPN	2-meter cable	Diagram 1	QMISx
QMIS-ON-0F	\$50.00			NPN	4-pin M8 quick-disconnect	Diagram 2	
QMIS-OP-0A	\$50.00			PNP	2-meter cable	Diagram 1	
QMIS-OP-0F	\$50.00			PNP	4-pin M8 quick-disconnect	Diagram 2	

QM Series Photoelectric Sensors (Retroreflective)							
Part Number	Price	Sensing Distance	Emission Type	Logic	Connection	Wiring	Characteristic Curves
QMIC-ON-0A	\$43.00	0.1 – 7 m (0.004 – 22.96 ft)	Infrared 850nm	NPN	2-meter cable	Diagram 1	QMICx
QMIC-ON-0F	\$43.00			NPN	4-pin M8 quick-disconnect	Diagram 2	
QMIC-OP-0A	\$43.00			PNP	2-meter cable	Diagram 1	
QMIC-OP-0F	\$43.00			PNP	4-pin M8 quick-disconnect	Diagram 2	

Note: Purchase reflectors separately.

QM Series Photoelectric Sensors (Polarized Retroreflective)							
Part Number	Price	Sensing Distance	Emission Type	Logic	Connection	Wiring	Characteristic Curves
QMRN-ON-0A	\$43.00	0.1 – 5 m (0.033 – 16.4 ft)	Visible Red 630nm	NPN	2-meter cable	Diagram 1	QMRNx
QMRN-ON-0F	\$43.00			NPN	4-pin M8 quick-disconnect	Diagram 2	
QMRN-OP-0A	\$43.00			PNP	2-meter cable	Diagram 1	
QMRN-OP-0F	\$43.00			PNP	4-pin M8 quick-disconnect	Diagram 2	

Note: Purchase reflectors separately.

QM Series Photoelectric Sensors (Retroreflective for Transparent Objects)							
Part Number	Price	Sensing Distance	Emission Type	Logic	Connection	Wiring	Characteristic Curves
QMRL-ON-0A	\$49.00	0.4 – 4 m (0.02 – 13.12 ft)	Visible Red 630nm	NPN	2-meter cable	Diagram 1	QMRLx
QMRL-ON-0F	\$49.00			NPN	4-pin M8 quick-disconnect	Diagram 2	
QMRL-OP-0A	\$49.00			PNP	2-meter cable	Diagram 1	
QMRL-OP-0F	\$49.00			PNP	4-pin M8 quick-disconnect	Diagram 2	
QMRG-ON-0A	\$49.00	0.1 – 1.5 m (0.05 – 4.9 ft)		NPN	2-meter cable	Diagram 1	QMRGx
QMRG-ON-0F	\$49.00			NPN	4-pin M8 quick-disconnect	Diagram 2	
QMRG-OP-0A	\$49.00			PNP	2-meter cable	Diagram 1	
QMRG-OP-0F	\$49.00			PNP	4-pin M8 quick-disconnect	Diagram 2	
QMIG-ON-0A	\$49.00	0.1 – 1 m (0.05 – 3.28 ft)	Infrared 850nm	NPN	2-meter cable	Diagram 1	QMIGx
QMIG-ON-0F	\$49.00			NPN	4-pin M8 quick-disconnect	Diagram 2	
QMIG-OP-0A	\$49.00			PNP	2-meter cable	Diagram 1	
QMIG-OP-0F	\$49.00			PNP	4-pin M8 quick-disconnect	Diagram 2	

Note: Purchase reflectors separately.

QM Series Photoelectric Sensors

QM Series Photoelectric Sensors (Through-beam)							
Part Number	Price	Sensing Distance	Emission Type	Logic	Connection	Wiring	Characteristic Curves
QMRHD-ON-OA	\$57.00	0.0 – 20 m (.33 – 65.62 ft)	Visible Red 630nm	NPN	2-meter cable	Diagram 1/3	QMRHDx
QMRHD-ON-OF	\$57.00			NPN	4-pin M8 quick-disconnect	Diagram 2/3	
QMRHD-OP-OA	\$57.00			PNP	2-meter cable	Diagram 1/3	
QMRHD-OP-OF	\$57.00			PNP	4-pin M8 quick-disconnect	Diagram 2/3	
QMIHD-ON-OA	\$59.00	0.0 – 30 m (.33 – 98.43 ft)	Infrared 850nm	NPN	2-meter cable	Diagram 1/3	QMIHDx
QMIHD-ON-OF	\$59.00			NPN	4-pin M8 quick-disconnect	Diagram 2/3	
QMIHD-OP-OA	\$59.00			PNP	2-meter cable	Diagram 1/3	
QMIHD-OP-OF	\$59.00			PNP	4-pin M8 quick-disconnect	Diagram 2/3	

Note: Through-beam models include emitter and receiver pair.

QM Series Photoelectric Sensor Accessories			
Part Number	Price	Description	Weight [lb]
ST101	\$3.00	Mounting bracket, for QM series photoelectric sensors, 304 stainless steel, right-angle vertical mount. Mounting hardware included.	0.04
ST102	\$3.00	Mounting bracket, for QM series photoelectric sensors, 304 stainless steel, right-angle horizontal mount. Mounting hardware included.	0.05
ST103	\$4.00	Mounting bracket, for prewired QM series photoelectric sensors only, 304 stainless steel, protective vertical mount. Mounting hardware included.	0.06
ST104	\$4.00	Mounting bracket, for prewired QM series photoelectric sensors only, 304 stainless steel, protective horizontal mount. Mounting hardware included.	0.05
STQMO	\$5.00	Shutter, for through-beam QM series photoelectric sensors, plastic, vertical and horizontal diaphragms (0.5, 1, 2 mm). Package of 2.	0.01

Switching Element Function		
	Thru-Beam and Reflective Models	Diffuse Models
Light-on	N.C.	N.O.
Dark-on	N.O.	N.C.

Shutter (STQMO) 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.

Wiring Diagrams

Diagram 1

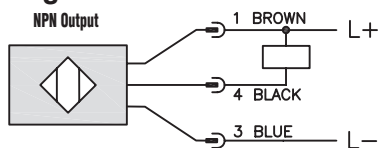


Diagram 2

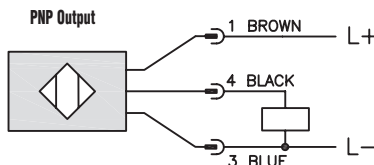
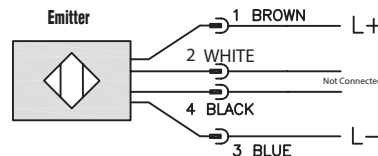
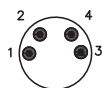


Diagram 3

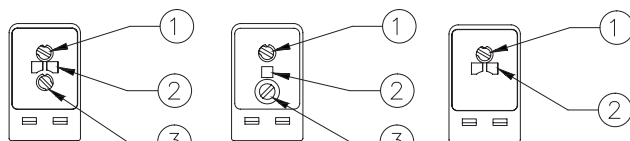


Connector

M8 Connector



LED Indicators and Adjustments



- 1: Output Adjustment (Light On/Dark On)
- 2: Status LED(s)
- 3: Sensing Adjustment

Diffuse, Retro-Reflective, Polarized
Retroreflective, Retroreflective for
Transparent Objects

Diffuse with Background
Suppression

Through-Beam

QM Series Photoelectric Sensors

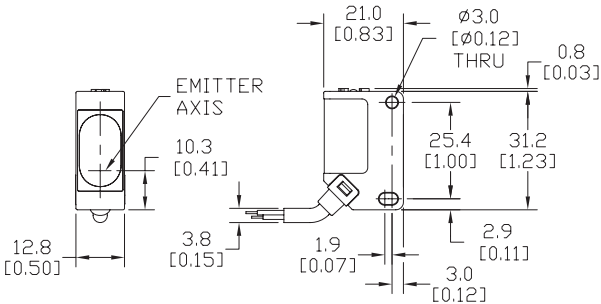
Specifications	QM Series					
Type	Diffuse	Background suppression	Retroreflective for transparent objects	Polarized Retroreflective	Retroreflective	Through-beam
Sensing Distance	Refer to QM Series in the Photoelectric Sensors Selection Guide					
Light Spot Diameter	Refer to Characteristic Curves					
Emission	Refer to QM Series in the Photoelectric Sensors Selection Guide					
Sensitivity	Adjustable (270°)	Adjustable (4 turns)	Adjustable (270°)			
Output Type	Light-on or Dark-on					
Operating Voltage	10 – 30 VDC					
No Load Supply Current	Visible Red: 30mA, Infrared: 45mA					
Operating (Load) Current	≤100mA					
Off-state (Leakage) Current	≤10uA					
Voltage Drop	2V max @ 100mA					
Switching Frequency	QMRBx, QMR8, QMI9 (1kHz) QMRx7 (2kHz)	1kHz	2kHz			
Ripple	≤10%					
Time Delay Before Availability (tv)	≤100ms					
Short-Circuit Protection	short circuit (auto reset), over voltage pulses					
Operating Temperature	-25 to 70 °C (-13 to 158 °F)					
Thermal Drift	-30 to 80 °C (-22 to 176 °F)					
Protection Degree (DIN 40050)	IP67 (EN60529)					
LED Indicators - Light On/Dark On	Yellow					
LED Indicators - Excess Gain	Green	–	Green			
Housing Material	PA66					
Lens Material	Polymethyl methacrylate (PMMA)					
Shock/Vibration	See terminology section					
Tightening Torque	1Nm					
Weight	M8: 10g [.35 oz]; Cable: 52g [1.83 oz]					
Connectors	Refer to QM Series in the Photoelectric Sensors Selection Guide					
Accessories	–	–	–			
Agency Approvals	CE, cULus E187310					

QM Series Photoelectric Sensors

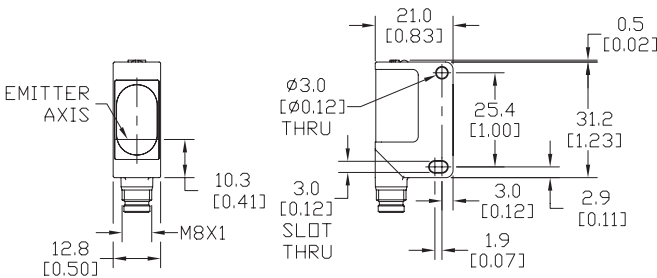
Dimensions

mm [inches]

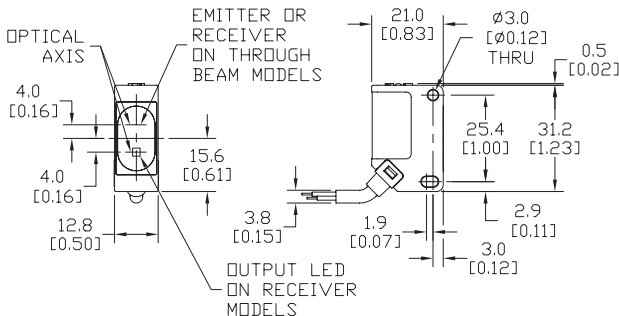
QM*S Background Suppression Model - 2m Output



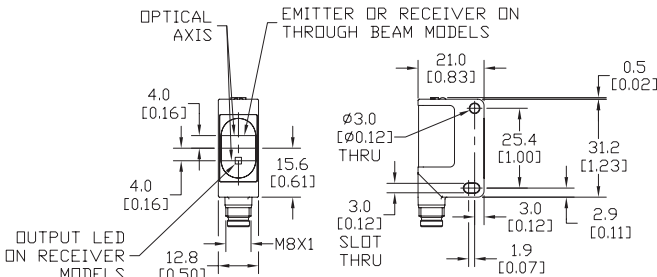
QM*S Background Suppression Model - M8 Quick Disconnect



All Other QM Series - 2m Output



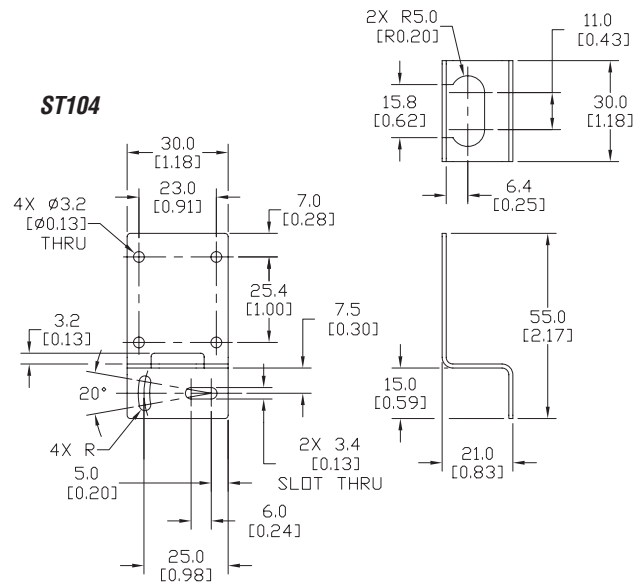
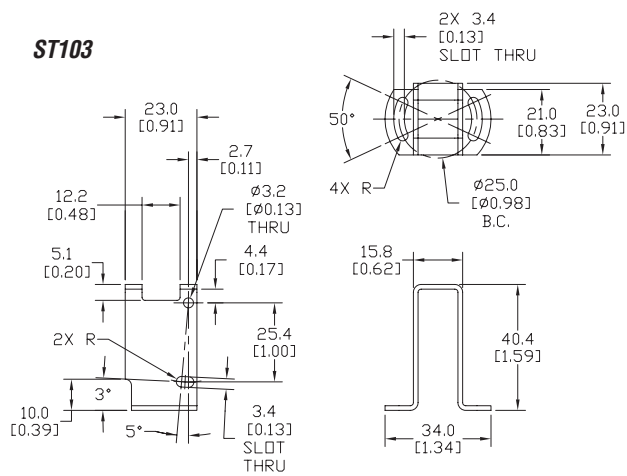
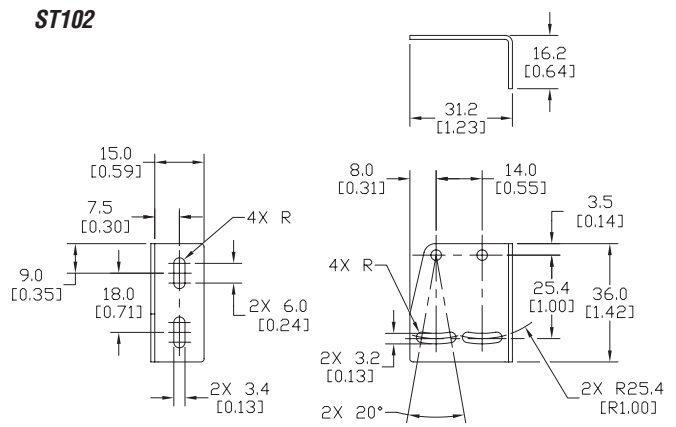
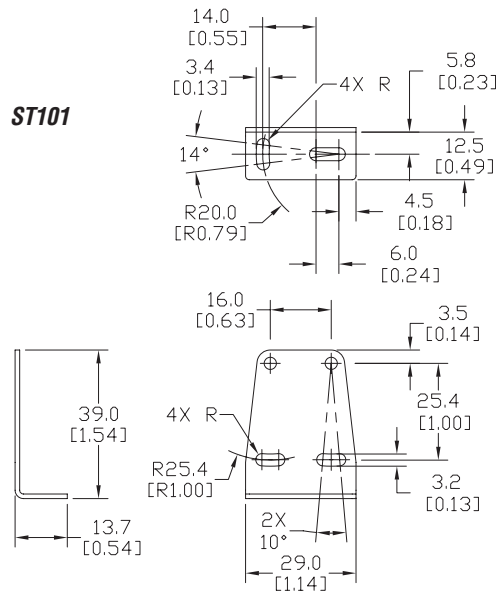
All Other QM Series - M8 Quick-Disconnect



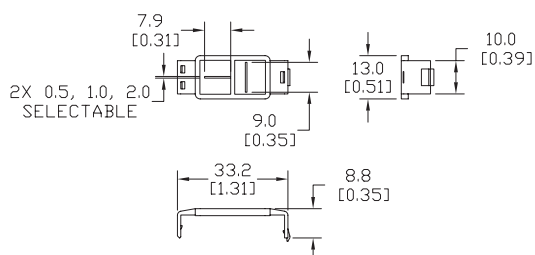
QM Series Photoelectric Sensors

Dimensions

mm [inches]



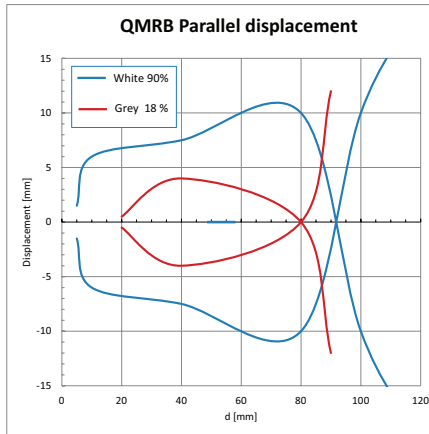
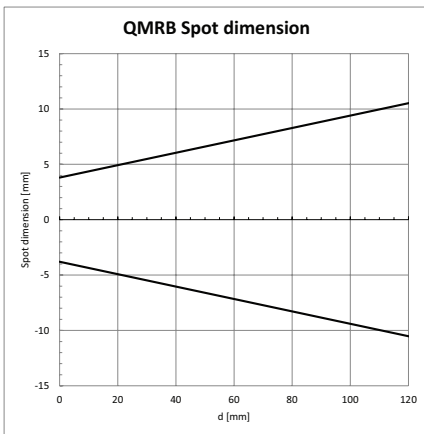
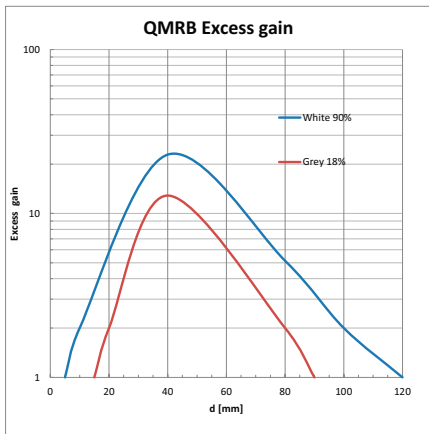
STQMO



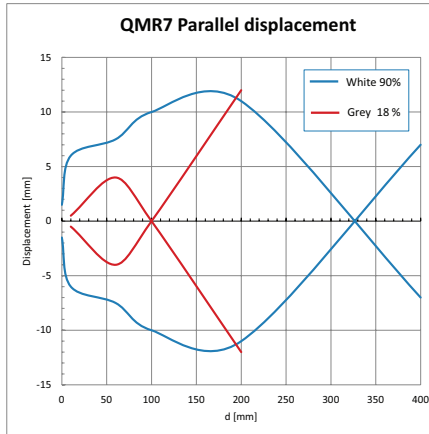
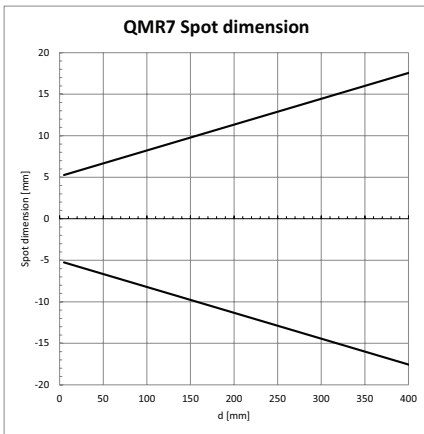
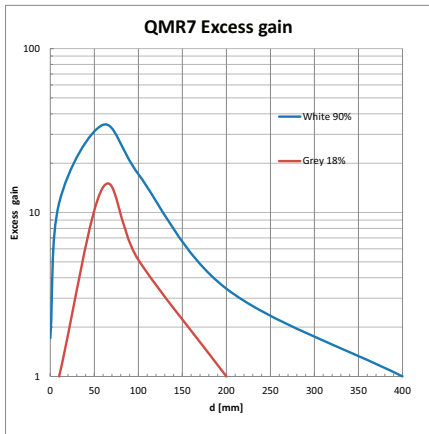
QM Series Photoelectric Sensors

Characteristic Curves

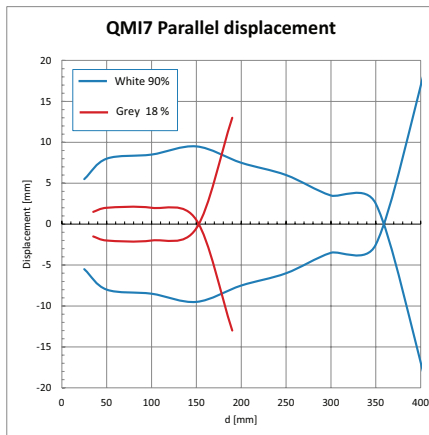
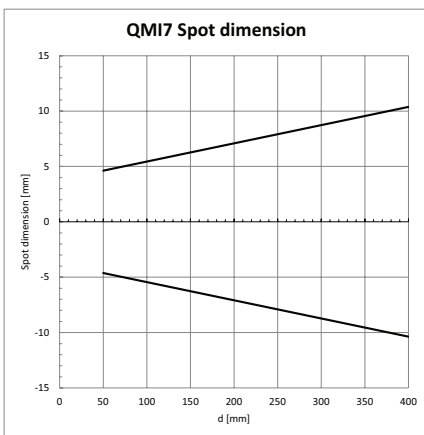
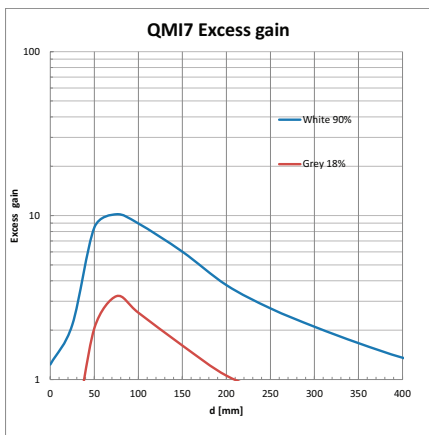
QMRBx



QMR7x



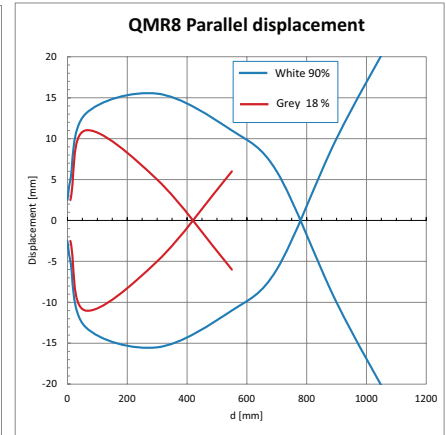
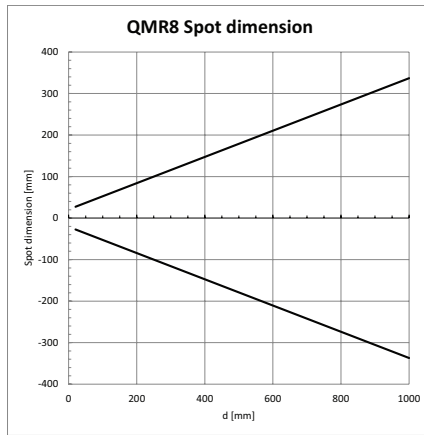
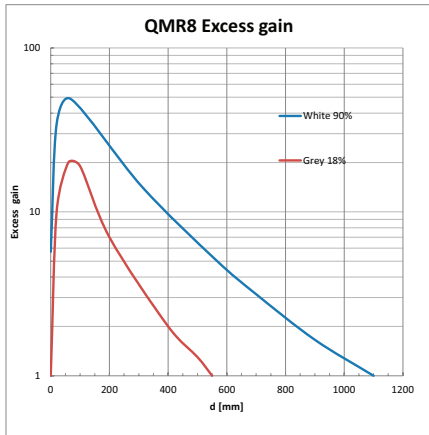
QMI7x



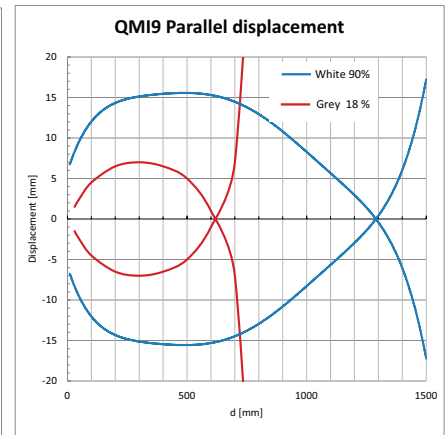
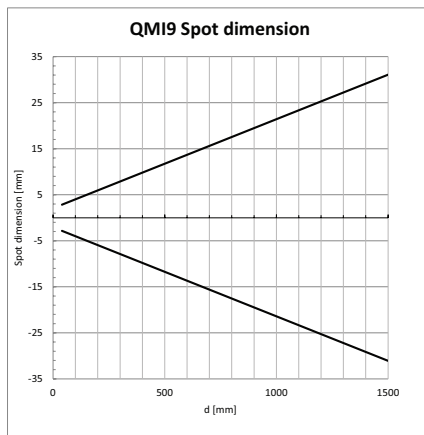
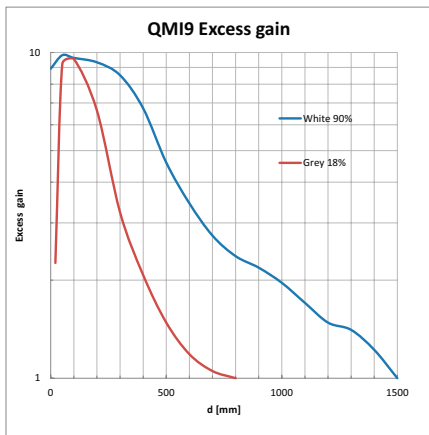
QM Series Photoelectric Sensors

Characteristic Curves

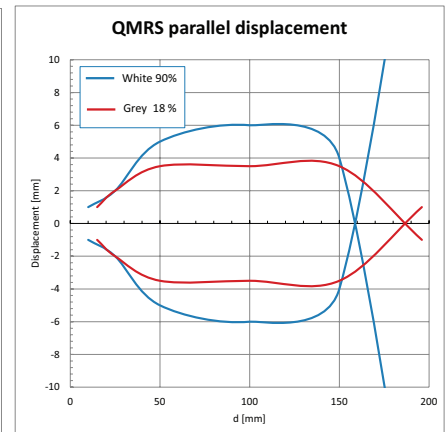
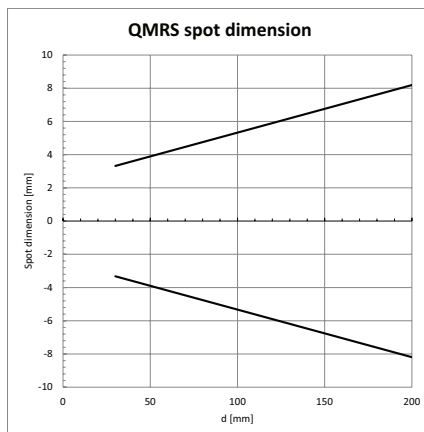
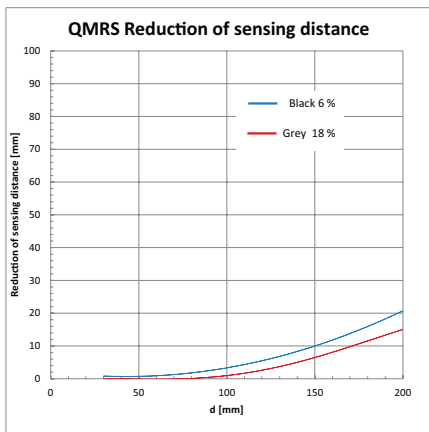
QMR8x



QMI9x



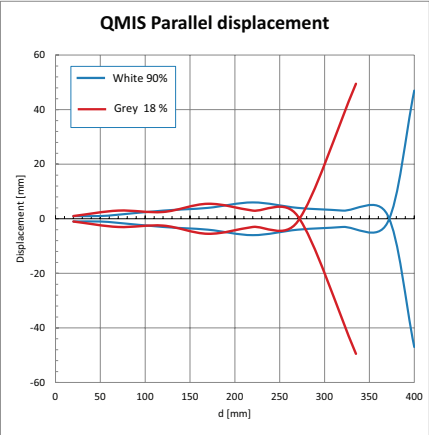
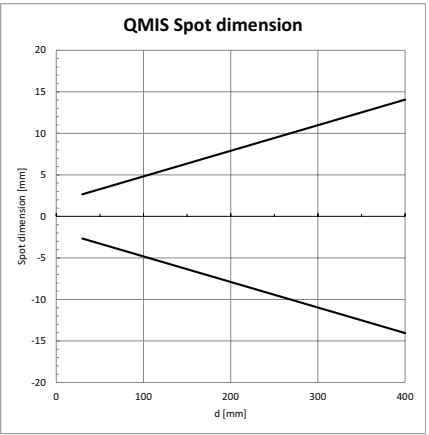
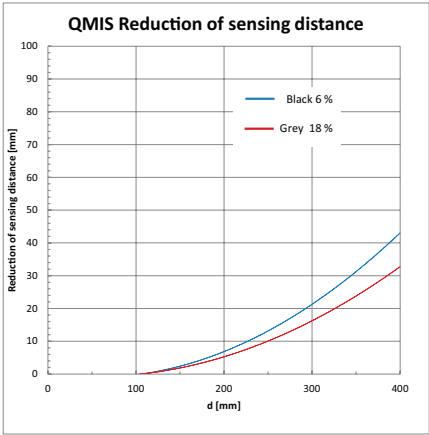
QMRSx



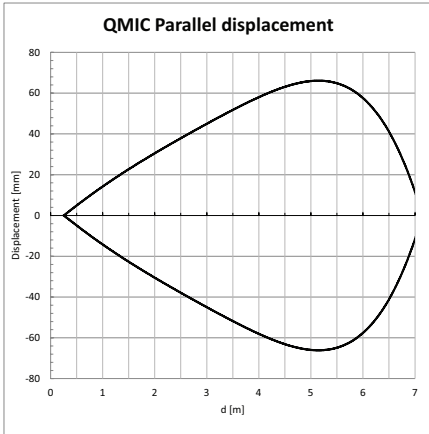
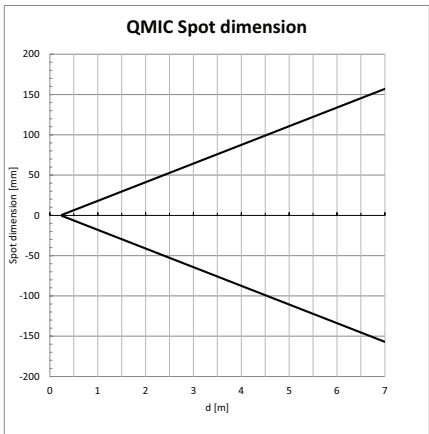
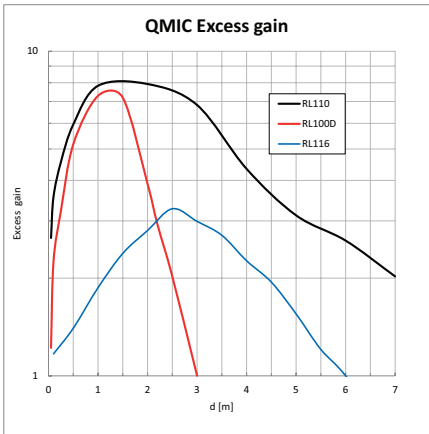
QM Series Photoelectric Sensors

Characteristic Curves

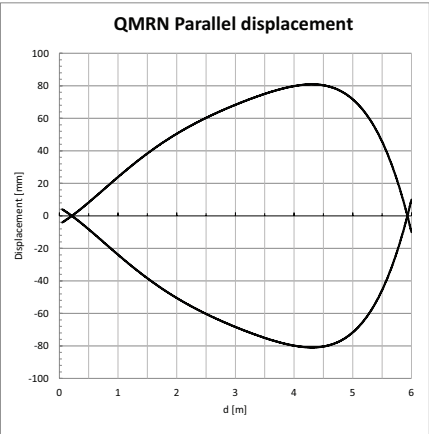
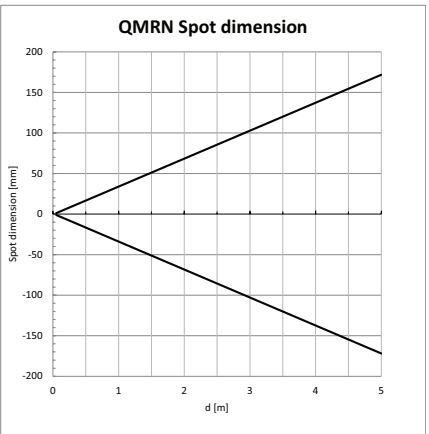
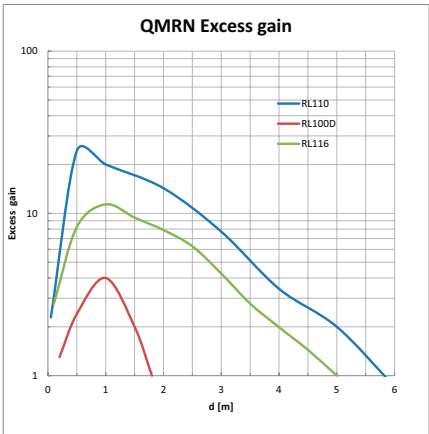
QMISx



QMICx



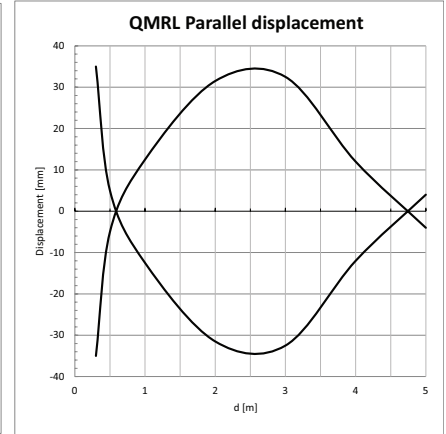
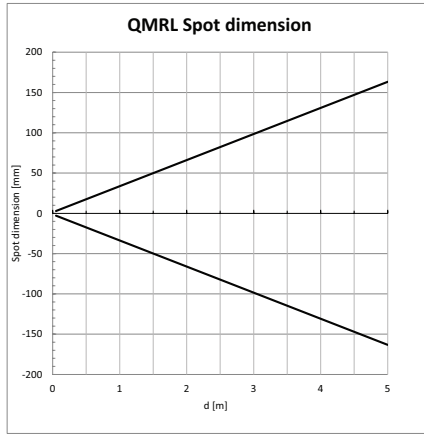
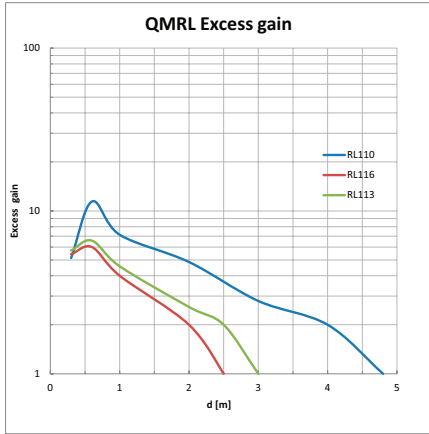
QMRNx



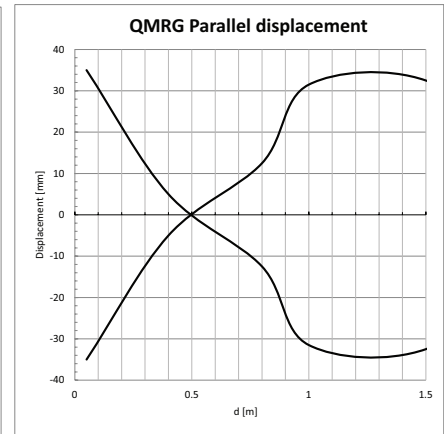
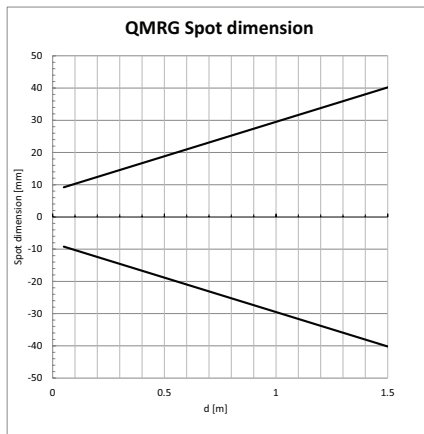
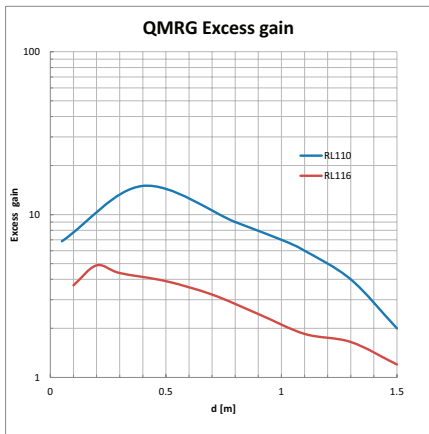
QM Series Photoelectric Sensors

Characteristic Curves

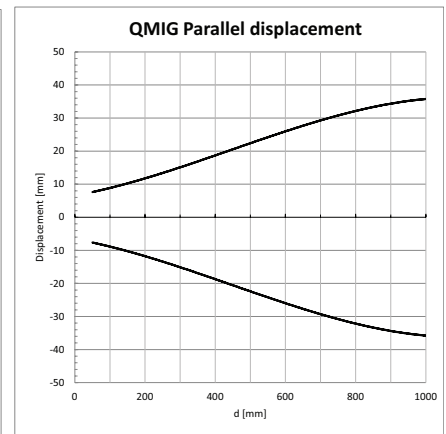
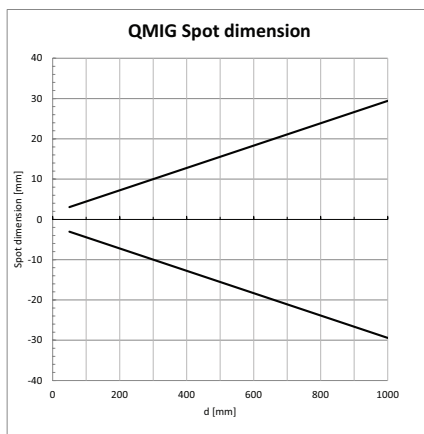
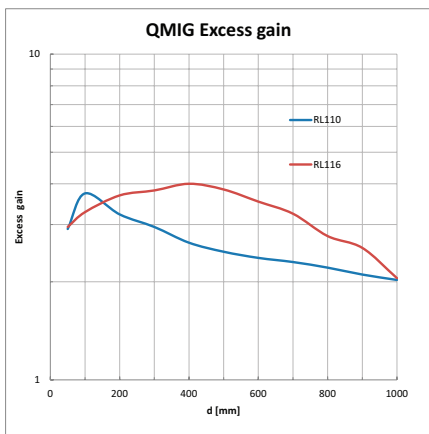
QMRLx



QMRGx



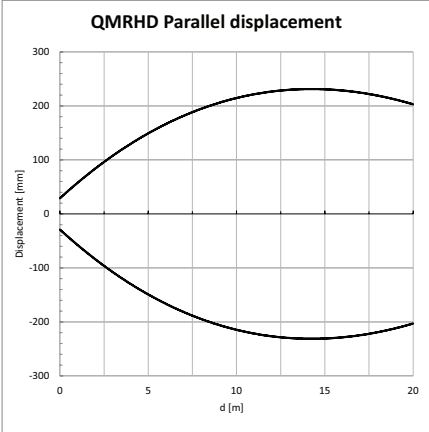
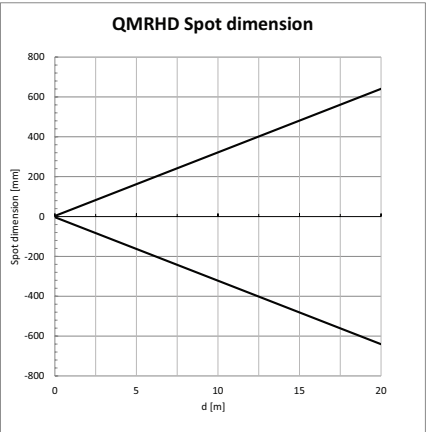
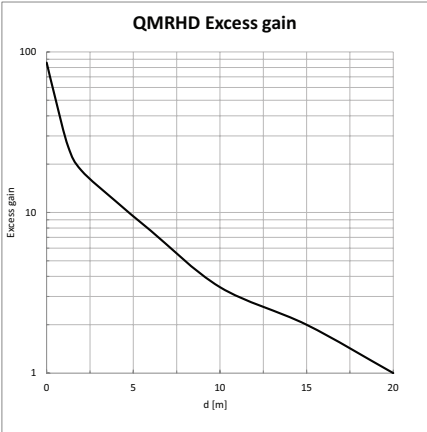
QMIGx



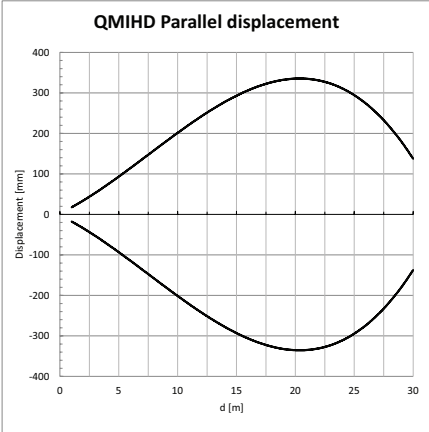
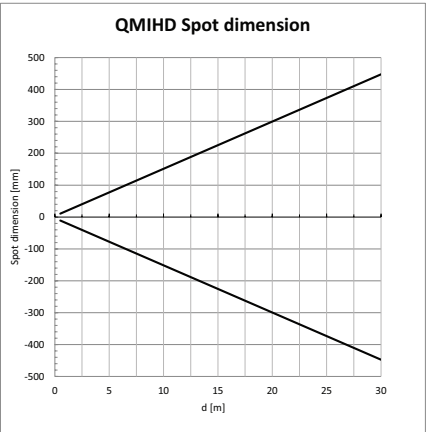
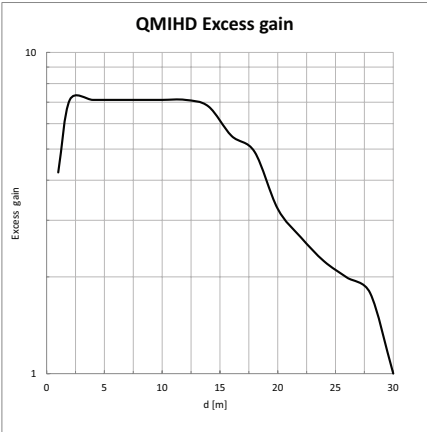
QM Series Photoelectric Sensors

Characteristic Curves

QMRHDx



QMIHDx



FM Series Photoelectric Sensors

Harsh Duty Rectangular



- 27 harsh duty, washdown models available
- Rectangular photoelectric sensor (photo eye)
- 316L stainless steel housing
- Diffuse, diffuse with background suppression, polarized retroreflective and through-beam models
- 3-wire NPN or PNP
- Through-beam models consist of emitter and receiver pair (sold separately)
- 2m output cable, M8, or M12 quick-disconnect. Purchase cable separately
- Reflectors and mounting brackets available
- IP69K for food and beverage applications



FM Series Photoelectric Sensors (Diffuse) Selection Chart								
Part Number	Price	Sensing Range	Emission Type	Logic	Connection	Wiring	Dimensions	Characteristic Curves
FMR6-OP-OA	\$42.00	5 – 500 mm (0.197 – 19.68 in)	Visible Red 633 nm	PNP	2-meter cable (pigtail)	Diagram 1	Figure 1	3
FMR6-OP-OE	\$44.00			PNP	0.3 m cable with M12 QD connector	Diagram 3	Figure 1	
FMR6-OP-OF	\$42.00			PNP	4-pin M8 quick-disconnect	Diagram 3	Figure 2	
FMR6-ON-OA	\$42.00			NPN	2-meter cable	Diagram 2	Figure 1	
FMR6-ON-OE	\$44.00			NPN	0.3 m cable with M12 QD connector	Diagram 4	Figure 1	
FMR6-ON-OF	\$42.00			NPN	4-pin M8 quick-disconnect	Diagram 4	Figure 2	

Note: Brackets sold separately.

FM Series Photoelectric Sensors (Diffuse with Background Suppression) Selection Chart								
Part Number	Price	Sensing Range	Emission Type	Logic	Connection	Wiring	Dimensions	Characteristic Curves
FMRS-OP-OA	\$57.00	2 – 200 mm (0.079 – 7.87 in)	Visible Red 633 nm	PNP	2-meter cable	Diagram 1	Figure 1	4
FMRS-OP-OE	\$59.00			PNP	0.3 m cable with M12 QD connector	Diagram 3	Figure 1	
FMRS-OP-OF	\$57.00			PNP	4-pin M8 quick-disconnect	Diagram 3	Figure 2	
FMRS-ON-OA	\$57.00			NPN	2-meter cable	Diagram 2	Figure 1	
FMRS-ON-OE	\$59.00			NPN	0.3 m cable with M12 QD connector	Diagram 4	Figure 1	
FMRS-ON-OF	\$57.00			NPN	4-pin M8 quick-disconnect	Diagram 4	Figure 2	

Note: Brackets sold separately.

FM Series Photoelectric Sensors (Polarized Retroreflective) Selection Chart								
Part Number	Price	Sensing Range	Emission Type	Logic	Connection	Wiring	Dimensions	Characteristic Curves
FMRP-OP-OA	\$50.00	0.05 – 5 m (0.16 – 16.40 ft)	Visible Red 633 -nm	PNP	2-meter cable	Diagram 1	Figure 1	2
FMRP-OP-OE	\$50.00			PNP	0.3 m cable with M12 QD connector	Diagram 3	Figure 1	
FMRP-OP-OF	\$50.00			PNP	4-pin M8 quick-disconnect	Diagram 3	Figure 2	
FMRP-ON-OA	\$50.00			NPN	2-meter cable	Diagram 2	Figure 1	
FMRP-ON-OE	\$52.00			NPN	0.3 m cable with M12 QD connector	Diagram 4	Figure 1	
FMRP-ON-OF	\$50.00			NPN	4-pin M8 quick-disconnect	Diagram 4	Figure 2	

Note: Reflectors and brackets sold separately.

FM Series Photoelectric Sensors

FM Series Photoelectric Sensors (Through-beam) Selection Chart								
Part Number	Price	Sensing Range	Emission Type	Logic	Connection	Wiring	Dimensions	Characteristic Curves
Emitters								
FMRE-00-0A	\$33.00	Up to 10 m (32.81 ft)	Visible Red 633 nm	-	2-meter cable	Diagram 5	Figure 1	-
FMRE-00-0E	\$37.00			-	0.3 m cable with M12 QD connector	Diagram 6	Figure 1	-
FMRE-00-0F	\$33.00			-	4-pin M8 quick-disconnect	Diagram 6	Figure 2	-
Receivers								
FMRR-0P-0A	\$40.00	Up to 10 m (32.81 ft)	-	PNP	2-meter cable	Diagram 1	Figure 1	1
FMRR-0P-0E	\$42.00			PNP	0.3 m cable with M12 QD connector	Diagram 3	Figure 1	
FMRR-0P-0F	\$40.00			PNP	4-pin M8 quick-disconnect	Diagram 3	Figure 2	
FMRR-0N-0A	\$40.00			NPN	2-meter cable	Diagram 2	Figure 1	
FMRR-0N-0E	\$42.00			NPN	0.3 m cable with M12 QD connector	Diagram 4	Figure 1	
FMRR-0N-0F	\$40.00			NPN	4-pin M8 quick-disconnect	Diagram 4	Figure 2	

Note: Brackets sold separately.

Wiring Diagrams

Diagram 1

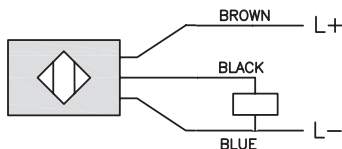


Diagram 2

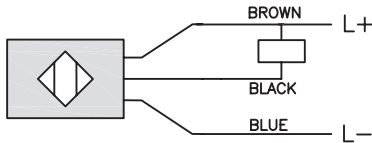


Diagram 3

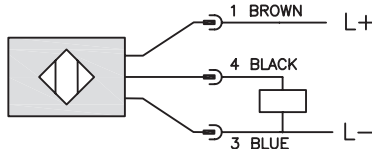


Diagram 4

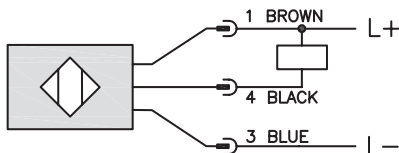


Diagram 5

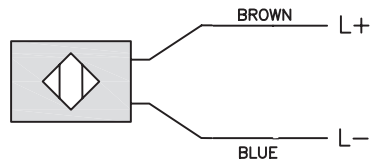
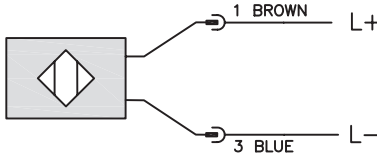
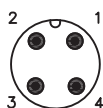


Diagram 6



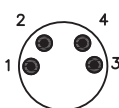
Connector

M12 Connector*



Connector

M8 Connector*



Cable Assembly Wiring Colors:

Pin 1 - Brown

Pin 2 - White

Pin 3 - Blue

Pin 4 - Black

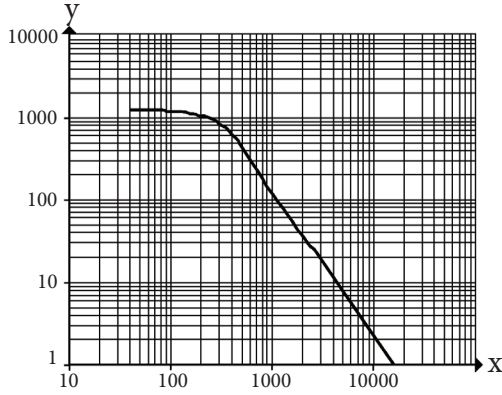
Note: wiring colors are based on AutomationDirect 4-pole cable assemblies.

* Displaying sensor end.

FM Series Photoelectric Sensors

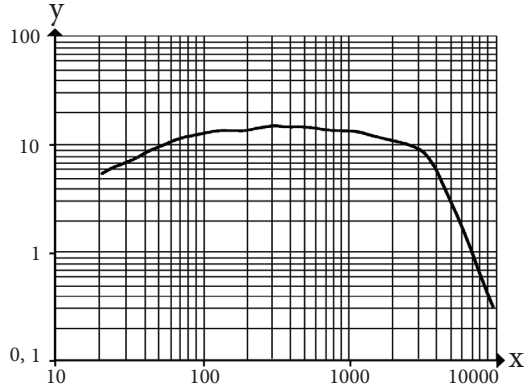
Characteristic Curves

Curve 1 (Through-beam)



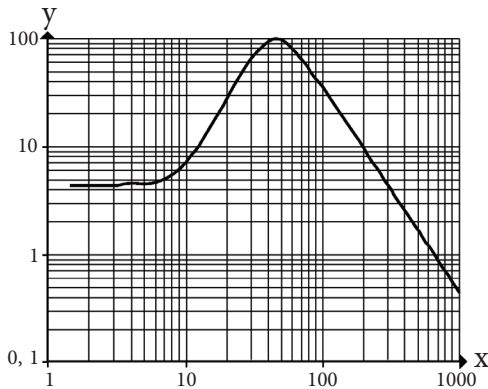
Excess gain graphs
x: distance [mm]
y: excess gain factor

Curve 2 (Polarized Retroreflective)



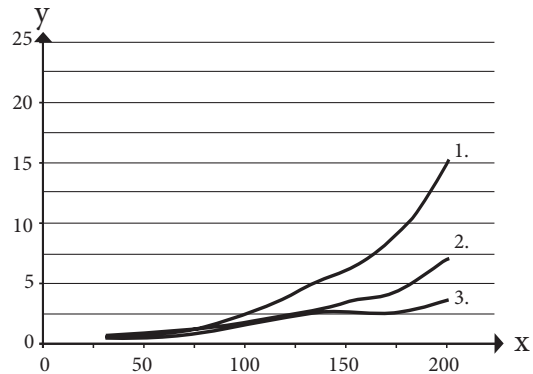
Excess gain graphs
x: distance [mm]
y: excess gain factor

Curve 3 (Diffuse)



Excess gain graphs
x: distance [mm]
y: excess gain factor

Curve 4 (Diffuse with Background Suppression)



c: background
x: distance sensor/object
y: min. distance object/background

Values in [mm]
1 = object black (6% remission), background white (90% remission)
2 = object gray (18% remission), background white (90% remission)
3 = object white (90% remission), background white (90% remission)

FM Series Photoelectric Sensors

Specifications	FM Series			
Type	Diffuse	Background suppression	Polarized Retroreflective	Through-beam
Sensing Distance	Refer to Photoelectric Sensors Selection Guide (FM Series DC)			
Light Spot Diameter	Refer to Characteristic Curves			
Emission	Refer to FM Series Photoelectric Sensors Selection Charts			
Sensitivity	Adjustable			
Output State	Light-on or Dark-on			
Operating Voltage	10 – 30 VDC			
No Load Supply Current	16mA	22mA	12mA	7mA
Operating (Load) Current	≤100mA			
Off-state (Leakage) Current	–			
Voltage Drop	<2.5 V			
Switching Frequency	1kHz			
Ripple	–			
Time Delay Before Availability (tv)	Minimal			
Short-Circuit Protection	Yes (non-latching)			
Operating Temperature	-25 to 80 °C (-13 to 176 °F)			
Thermal Drift	–			
Protection Degree (DIN 40050)	IP65 IP67 IP68 IP69K			
LED Indicators - Light On/Dark On	Green (Power); Yellow (Output Status)			
LED Indicators - Excess Gain	–			
Housing Material	316L Stainless Steel			
Lens Material	PMMA			
Shock/Vibration	See Photoelectric Sensor Terminology section			
Tightening Torque	–			
Weight	M8 quick-disconnect: 0.037 kg (1.31 oz) 0.3 m cable with M12 quick-disconnect connector: 0.053 kg (1.87 oz) 2-meter Cable: 0.084 kg (2.96 oz)	M8 quick-disconnect: 0.036 kg (1.27oz) 0.3 m cable with M12 quick-disconnect connector: 0.053 kg (1.87 oz) 2-meter Cable: 0.083 kg (2.93 oz)	M8 quick-disconnect: 0.037 kg (1.31 oz) 0.3 m cable with M12 quick-disconnect connector: 0.053 kg (1.87 oz) 2-meter Cable: 0.083 kg (2.93 oz)	M8 quick-disconnect: 0.036 kg (1.27oz) 0.3 m cable with M12 quick-disconnect connector: 0.053 kg (1.87 oz) 2-meter Cable: 0.084 kg (2.96 oz)
Connectors	Refer to FM Series Photoelectric Sensors Selection Charts			
Accessories	Reflectors and mounting brackets available			
Agency Approvals*	UL # E328811			

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

FM Series Photoelectric Sensors

Dimensions

inches [mm]

Figure 1

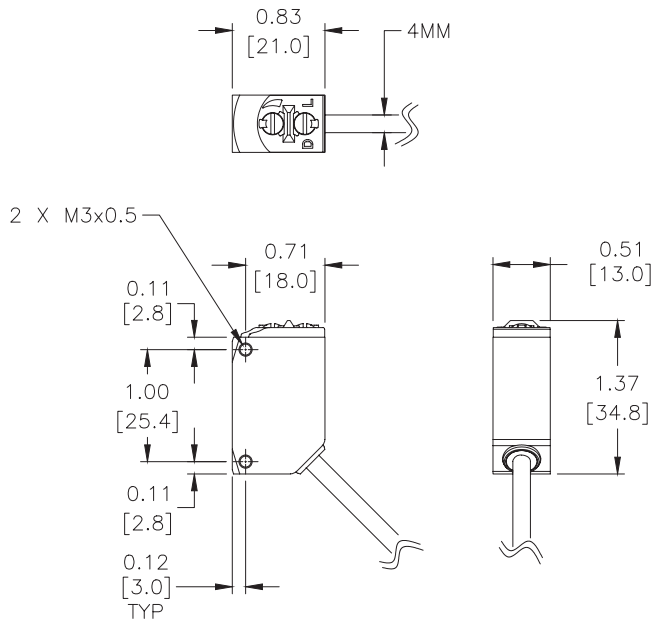
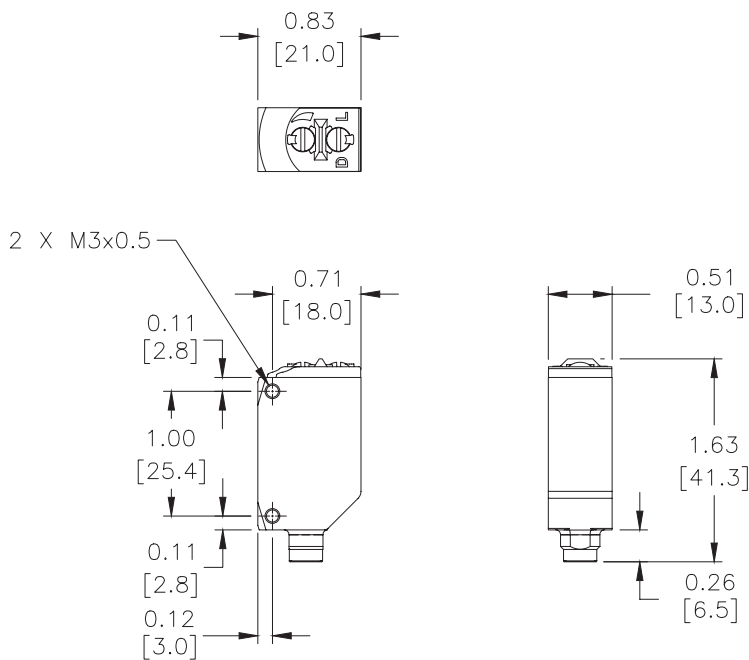


Figure 2



FE Series Photoelectric Sensors



Mini-rectangular plastic - DC

- 11 models available
- Diffuse, polarized reflective, and through-beam models
- Adjustable sensitivity
- Axial cable or M8 quick-disconnect models
- NPN or PNP, Light-on/Dark-on selectable output
- IP67 rated



FE Series Photoelectric Sensors Selection Chart									
Part Number	Price	Sensing Range	Output State	Logic	Connection	Wiring	Dimensions	Characteristic Curves	
Diffuse									
FER8-ON-0A	\$71.00	up to 800mm (31.49in)	N.O./N.C. selectable	NPN	2m (6.5) axial cable	Diagram 1	Figure 1	Chart 1	
FER8-OP-0A	\$71.00			PNP	2m (6.5) axial cable	Diagram 2	Figure 2	Chart 1	
FER8-ON-0F	\$75.00			NPN	M8 (8mm) connector	Diagram 1	Figure 1	Chart 1	
Polarized reflective*									
FERN-ON-0A	\$82.00	up to 4m (13.12ft) with RL110	N.C./N.O. selectable	NPN	2m (6.5) axial cable	Diagram 1	Figure 1	Chart 2	
FERN-OP-0A	\$82.00			PNP	2m (6.5) axial cable	Diagram 2	Figure 2	Chart 2	
FERN-ON-0F	\$82.00	up to 1m (39.37in) with RL122	N.C./N.O. selectable	NPN	M8 (8mm) connector	Diagram 1	Figure 1	Chart 2	
FERN-OP-0F	\$82.00			PNP	M8 (8mm) connector	Diagram 2	Figure 2	Chart 2	
Through-beam									
FERHD-ON-0A	\$97.00	up to 12m (39.37ft)	N.C./N.O. selectable	NPN	2m (6.5) axial cable	Diagram	Figure 1	Chart 3	
FERHD-OP-0A	\$97.00			PNP	2m (6.5) axial cable	Diagram	Figure 2	Chart 3	
FERHD-ON-0F	\$97.00			NPN	M8 (8mm) connector	Diagram	Figure 1	Chart 3	
FERHD-OP-0F	\$97.00			PNP	M8 (8mm) connector	Diagram	Figure 2	Chart 3	

*Note: Purchase reflectors separately.

Wiring Diagrams

Diagram 1

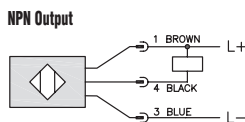
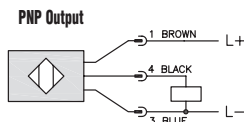
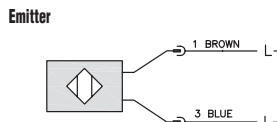


Diagram 2

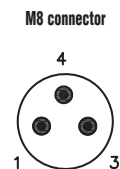


Switching Element Function		
	Thru-beam and Reflective Models	Diffuse Reflective Models
Light on	N.C.	N.O.
Dark on	N.O.	N.C.

Diagram 3



Connector



Dimensions

mm

Figure 1

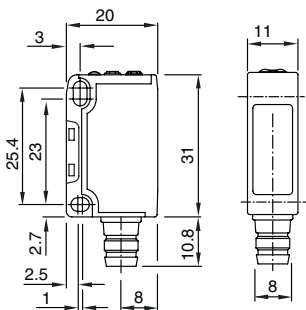
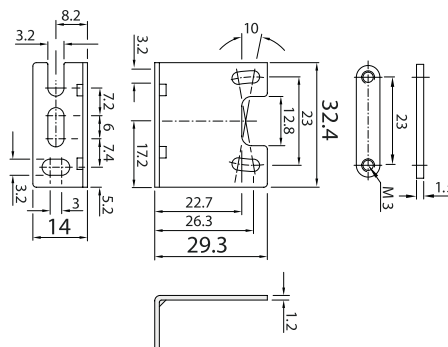
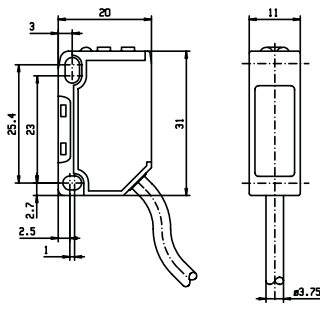


Figure 2



Horizontal mounting bracket supplied with each unit

FE Series Photoelectric Sensors

Specifications	Diffuse Models	Reflective Models	Through-Beam Models
Type	Diffuse reflection	Polarized reflection ³	Through-beam ⁴
Sensing Distance	800mm ¹	4m with RL110 1m with RL122 ²	20m
Light Spot Diameter	25 mm @ 300 mm	150 mm @2.5 mm	650 mm @ 12 m
Emission	Red LED (visible)		
Sensitivity	Adjustable		
Output Type	NPN or PNP - Light-on/Dark-on Rotary Switch		
Operating Voltage	10-30VDC		
No-load Supply Current	≤30mA		Emitter: ≤15mA; Receiver: ≤20mA
Operating (Load) Current	≤100mA		
Off-state (Leakage) Current	N/A		
Voltage Drop	1.8V max at 100mA		
Switching Frequency	1kHz		
Ripple	≤10%		
Time Delay Before Availability (tv)	100ms		
Short-Circuit Protection	Yes, switch autoresets after load is removed		
Operating Temperature	-25 to 55°C (-13° to 131° F)		
Protection Degree (DIN 40050)	IEC IP67		
LED Indicators -Switching Status	Yellow (output energized)		
Housing Material	Polybutylene Terephthalate (PBT)		
Lens Material	Polycarbonate (PC)		
Shock/Vibration	See terminology section		
Tightening Torque	40 Nm (29 lb-ft)		
Weight (cable/connector)	53 g (1.87 oz) / 9 g (0.32 oz)		
Connectors	2m (6.5') axial cable; M8 (8 mm) connector		
Agency Approvals	UL Recognized E224302, CE		
¹ With 100x100mm white matte paper ² With Ø84mm RL110 reflector or 12 x 54mm RL122 reflector. ³ Each sensor includes one 12 x 54mm rectangular reflector. Purchase additional reflectors separately. ⁴ Each through-beam part number consists of an emitter and receiver pair.			

Characteristic curves

Warning: These products are not safety sensors and are not suitable for use in personal safety applications.

Chart 1 (Diffuse)

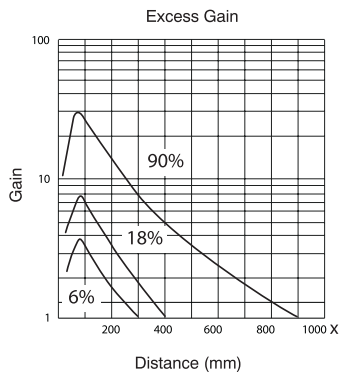


Chart 2 (Polarized Reflective)

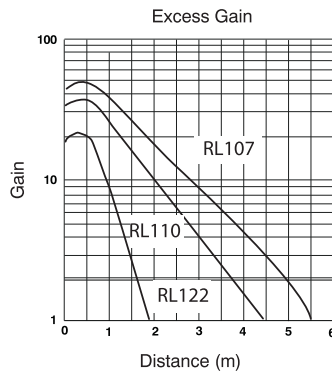
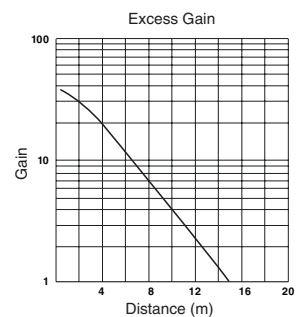
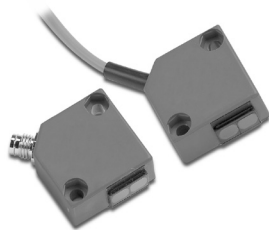


Chart 3 (Through-Beam)



CX Series Photoelectric Sensors

Mini-rectangular plastic - DC



- 18 models available
- Long operating distances
- Adjustable sensitivity
- Scratch-resistant and easy to clean glass lens
- Axial cable or M8 quick-disconnect models
- Complete overload protection
- Mounting brackets are not needed
- IP65 rated



CX Series Mini-Rectangular Photoelectric Sensors Selection Chart									
Part Number	Price	Sensing Range	Output State	Logic	Connection	Wiring	Dimensions	Characteristic Curves	
Diffuse									
CX3-AN-1A	\$48.50	Up to 600 mm (23.62 in)	N.O.	NPN	2 m (6.5') axial cable	Diagram 1	Figure 1	Chart 1	
CX3-AP-1A	\$48.50			PNP	2 m (6.5') axial cable	Diagram 2	Figure 1	Chart 1	
CX3-AN-1F	\$48.50			NPN	M8 (8 mm) connector	Diagram 1	Figure 2	Chart 1	
CX3-AP-1F	\$48.50			PNP	M8 (8 mm) connector	Diagram 2	Figure 2	Chart 1	
Diffuse with background suppression									
CX5-AN-1A	\$65.00	15-150 mm (0.59 to 5.91 in)	N.O.	NPN	2 m (6.5') axial cable	Diagram 1	Figure 1	Chart 2	
CX5-AP-1A	\$65.00			PNP	2 m (6.5') axial cable	Diagram 2	Figure 1	Chart 2	
CX5-AN-1F	\$65.00			NPN	M8 (8 mm) connector	Diagram 1	Figure 2	Chart 2	
CX5-AP-1F	\$65.00			PNP	M8 (8 mm) connector	Diagram 2	Figure 2	Chart 2	
Polarized reflective*									
CXP-AN-1A	\$51.00	Up to 2 m (6.6 ft)	N.O.	NPN	2 m (6.5') axial cable	Diagram 1	Figure 1	Chart 3	
CXP-AP-1A	\$51.00			PNP	2 m (6.5') axial cable	Diagram 2	Figure 1	Chart 3	
CXP-AN-1F	\$51.00			NPN	M8 (8 mm) connector	Diagram 1	Figure 2	Chart 3	
CXP-AP-1F	\$51.00			PNP	M8 (8 mm) connector	Diagram 2	Figure 2	Chart 3	
Through-beam**									
CXR-AN-1A	Receiver	\$48.50	Up to 6 m (19.7 ft)	N.O.	NPN	2 m (6.5') axial cable	Diagram 1	Figure 1	
CXR-AP-1A	Receiver	\$48.50			PNP	2 m (6.5') axial cable	Diagram 2	Figure 1	Chart 4
CXR-AN-1F	Receiver	\$48.50			NPN	M8 (8 mm) connector	Diagram 1	Figure 2	Chart 4
CXR-AP-1F	Receiver	\$48.50			PNP	M8 (8 mm) connector	Diagram 2	Figure 2	Chart 4
CXE-ON-1A	Emitter	\$30.50	Receiver dependent	Receiver dependent	2 m (6.5') axial cable	Diagram 3	Figure 1	Chart 4	
CXE-ON-1F	Emitter	\$30.50			M8 (8 mm) connector	Diagram 3	Figure 2	Chart 4	

*Purchase reflectors separately.

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

Switching Element Function		
	Thru-beam and Reflective Models	Diffuse Reflective Models
Light on	N.C.	N.O.
Dark on	N.O.	N.C.

Wiring Diagrams

Diagram 1

NPN Output

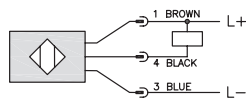


Diagram 2

PNP Output

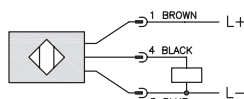
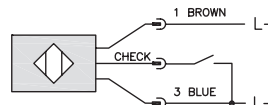


Diagram 3

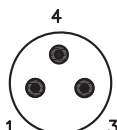
Emitter



Emitter test input (<4V: OFF / >8V or open: ON) 0.5mA

Connector

M8 connector



Warning: These products are not safety sensors and are not suitable for use in personal safety applications.

CX Series Photoelectric Sensors

Specifications	Diffuse Models	Diffuse Models with Background Suppression	Reflective Models	Through-beam Models ¹
Type	Diffuse reflection	Diffuse reflection with background suppression	Polarized reflection	Through-beam
Sensing Distance	600mm ²	15 to 150mm ³	2m	6m
Light Spot Diameter	See charts			
Emission	IR-LED (880nm)	LED red (660nm)	LED red polarized(660nm)	IR-LED (880nm)
Sensitivity	Adjustable 12-turn pot.			
Output Type	NPN or PNP; N.O. only			
Operating Voltage	10-36VDC			
No Load Supply Current	15mA	25mA	15mA	15mA (R) / 10mA (E)
Operating (Load) Current	≤200mA			
Off-state (Leakage) Current	≤10μA			
Voltage Drop	≤2.0V			
Switching Frequency	1kHz	500Hz	1kHz	1kHz
Ripple	≤20%			
Time Delay Before Availability (tv)	100ms			
Short-Circuit Protection	Yes (switch autoresets after overload is removed)			
Operating Temperature	-25° to +55°C (-13° to 131°F)			
Protection Degree (DIN 40050)	IEC IP65			
LED Indicators - Switching Status	Yellow (output state, output energized), green (excess light indication)			
Housing Material	PBTP (Crastin)			
Lens Material	Glass			
Shock/Vibration	See terminology section			
Tightening Torque	N/A			
Weight (cable/connector)	84g (2.96 oz)/49g (1.73 oz)			232g (8.40oz)/98g (3.46oz)
Connectors	2m (6.5') axial cable; M8 (8 mm) connector			
Agency Approvals	cULus E32881			

¹ Through-beam sensors must be used in pairs consisting of one receiver and one emitter ²With 200x200mm white matte paper, ³With 100x100mm white matte paper

Dimensions

(mm)

Figure 1

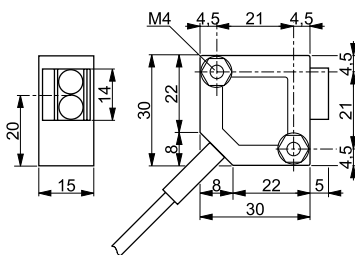
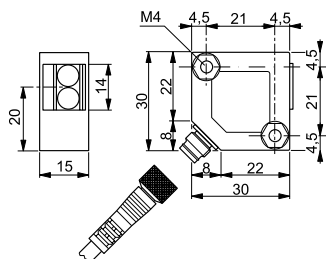


Figure 2



Characteristic curves

Chart 1 (Diffuse)

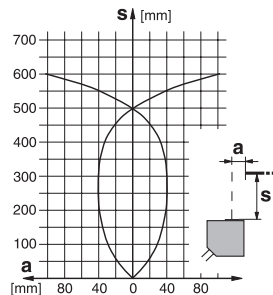


Chart 2 (Diffuse with background suppression)

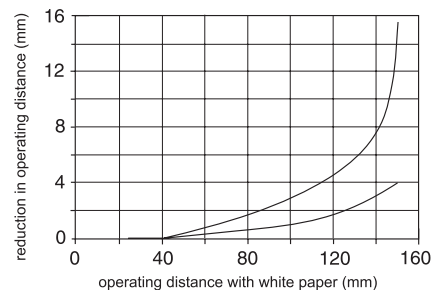


Chart 3 (Polarized reflective)

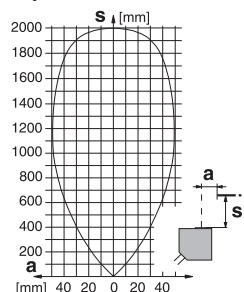
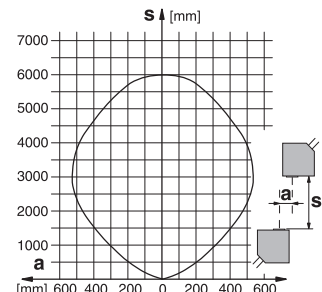
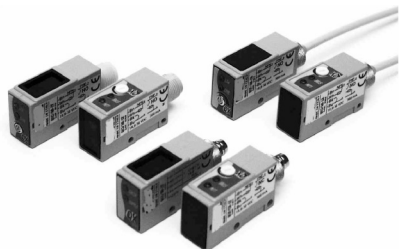


Chart 4 (Through-beam)



QX Series Photoelectric Sensors



Rectangular plastic - DC

- One through-beam detection model available
- Right-angle optics
- Fast response time
- NPN/PNP selectable output
- 2 LED indicators (threshold and signal margin)
- IP65 rated



Note: Some sensors shown above are discontinued and are no longer available.

QX Series Photoelectric Sensor Selection Chart

Part Number	Price	Sensing Range	Output State*	Optics	Logic	Connection	Wiring	Dimensions	Characteristic Curves	
Through-beam										
QXX-00-2A*	Emitter	Retired	8m (26.25 ft)	Receiver dependent	Right-angle	Receiver dependent	2m (6.5') axial cable	Diagram 2	Figure 2	Chart 1

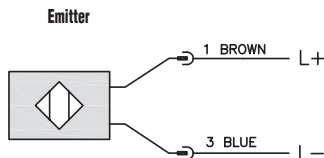
*Product no longer available from supplier. Once this part is out of stock, it will be discontinued.

Switching Element Function

	Thru-beam Models
Light on	N.C.
Dark on	N.O.

Wiring diagrams

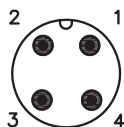
Diagram 1



Check input test circuit (QXX models only): To test that the sensor is operating correctly, apply 10.8-30VDC across the WH/2 (+) and BK/4 (-) leads, which are decoupled from the power supply. In light state, light pulses are interrupted, which simulates the presence of a target and causes the output to switch. If switching does not occur, check for a fault in the system.

Connector

M12 connector



Warning: These products are not safety sensors and are not suitable for use in personal safety applications.

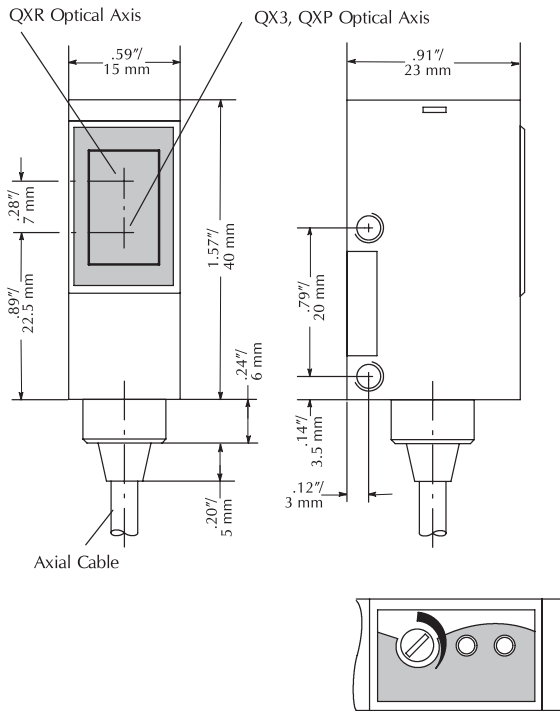
QX Series Photoelectric Sensors

Dimensions

(inches/mm)

(M3 x 0.5 screws included with sensor)

Figure 1



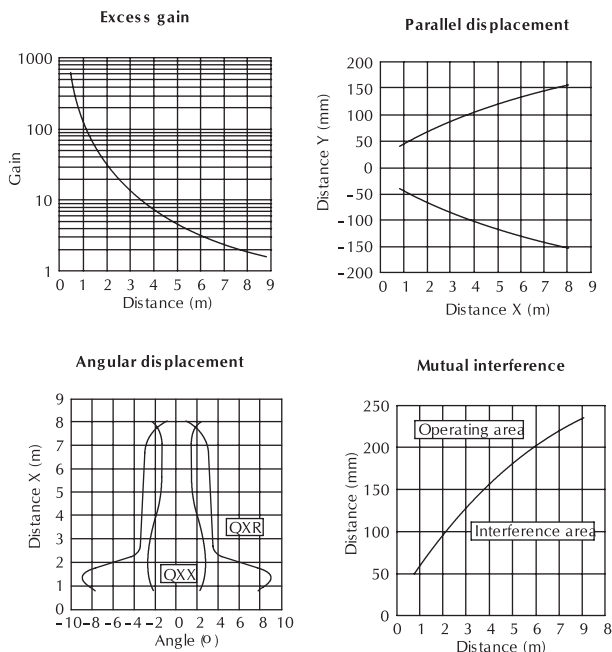
QX Series Photoelectric Sensors

Specifications	Through-Beam Models
Type	Through-beam ¹
Sensing Distance	8m
Light Spot Diameter	300mm @ 8 m
Emission	red (660nm)
Sensitivity	Adjustable one-turn pot.
Output Type	NPN/PNP selectable/N.O. only
Operating Voltage	10.8-30VDC
No-load Supply Current	20mA (emitter), 5mA (receiver)
Operating (Load) Current	300mA
Off-state (Leakage) Current	10µA max at 30VDC
Voltage Drop	1.2 volt maximum at 100mA
Switching Frequency	500Hz (Tr=0.75ms)
Ripple	10% max.
Time Delay Before Availability (tv)	200 ms
Short-Circuit Protection	Yes, (switch autoresets after overload is removed)
Operating Temperature	-25° to +70°C (-13° to 158°F)
Protection Degree (DIN 40050)	IEC IP65
LED Indicators - Switching Status	See Dimensions on previous page
Housing Material	ABS (glass reinforced)
Lens Material	Acrylic
Shock/Vibration	See terminology section
Tightening Torque	N/A
Weight	70g (2.47oz)
Connectors	2m (6.5') axial cable; M12 (12 mm) connector
Agency Approvals	UL recognized, E130644, CE
¹ An emitter (QXX) and receiver (QXR) pair is needed for a complete sensor set.	

Characteristic curves

Chart 1

Through Beam Models (QXX)



OPT Short Range (CMOS) Series Photoelectric Sensors



OPT2001

50 x 50 mm rectangular plastic - DC

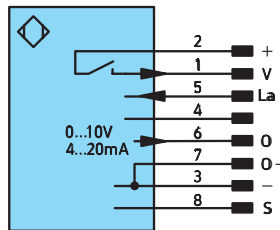
- Diffuse (Reflex) laser distance measurement sensors with CMOS technology
- Analog and switching outputs available
- Measured value independent of material, color, and brightness
- Class 1 and 2 lasers available (safety label included with Class 2 lasers)
- High resolution down to 8 μm - (analog scalable down to 5 mm range)
- High speed response times down to 660 μs
- M12 quick-disconnect; order cable separately
- Mounting hardware included



OPT Series Photoelectric Sensors Selection Chart										
Part Number	Price	Sensing Range	Laser Class	Measurement Rate	Resolution	Output State	Logic	Connection	Wiring	Characteristic Curves
Diffuse (Reflex)										
OPT2001	\$629.00	30-80 mm [1.18 - 3.15 in]	2	1500/s (660 μs)	<8 μm	Analog 4-20 mA or 0-10 V	—	8-pin M12 quick-disconnect	Diagram 1	See Characteristic Curve
OPT2002	\$629.00		1	1000/s (1000 μs)			—			
OPT2003	\$629.00	40-160 mm [1.57 - 6.30 in]	2	1500/s (660 μs)	<20 μm		—			
OPT2004	\$629.00		1	1000/s (1000 μs)			—			
OPT2005	\$629.00	50-350 mm [1.97 - 13.80 in]	2	800/s (1250 μs)	<50 μm		—			
OPT2006	\$629.00		1	500/s (2000 μs)			—			
OPT2007	\$319.00	0 - 660 mm [0 - 25.98 in] working range 60-660 mm [2.36 - 25.98 in] adjustable range	1	100 Hz switching	Hysteresis <1 % of range	Selectable (N.O., N.C.)	5-wire, con- figurable as PNP, NPN, or Push-Pull	5-pin M12 quick-disconnect	Diagram 2	—

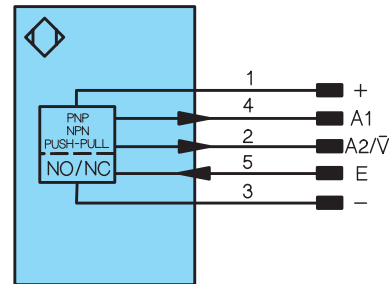
Wiring Diagrams

Diagram 1



- + Supply Voltage "+"
- V Contamination/Error output (NO)
- O Analog output
- O- Ground for the analog output
- Supply Voltage "0 V"
- S Shielding
- La Emitted Light disengageable

Diagram 2



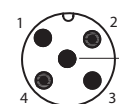
- + Supply Voltage "+"
- Supply Voltage "0 V"
- A1/A2 Switching output (NO)
- ∇ Contamination Warning/
Error Output (NC)
- E Input (Teach Input, Emitted light can
be switched off)



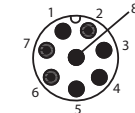
PRODUCT MANUAL AVAILABLE VIA DOWNLOAD AT
WWW.AUTOMATIONDIRECT.COM

Connectors

5-Pin M12 connector



8-Pin M12 connector

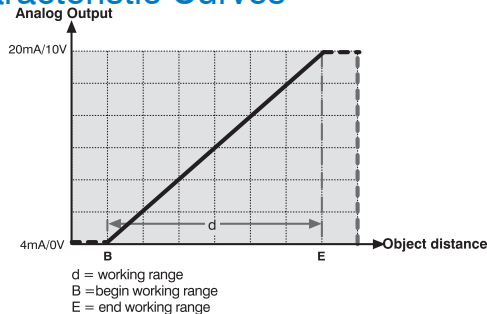


NOTE: CLASS 2 POWER SOURCE REQUIRED

OPT Short Range (CMOS) Series Photoelectric Sensors

Specifications	OPT 2001	OPT 2002	OPT 2003	OPT 2004	OPT 2005	OPT 2006	OPT 2007
Type	Diffuse Reflex						
Sensing Distance	30-80 mm [1.18-3.15 in]	30-80 mm [1.18-3.15 in]	40-160 mm [1.57-6.30 in]	40-160 mm [1.57-6.30 in]	50-350 mm [1.97-13.78 in]	50-350 mm [1.97-13.78 in]	60-660 mm [2.36-25.98 in]
Light Spot Diameter (at maximum range)	1 x 2 mm [0.04 x 0.08 in]	0.7 x 1.4 mm [0.03 x 0.06 in]	1 x 2.5 mm [0.04 x 0.10 in]	0.9 x 1.8 mm [0.04 x 0.07 in]	1.5 x 4 mm [0.06 x 0.16 in]	1.4 x 3.1 mm [0.06 x 0.12 in]	2.0 x 5.5 mm [0.08 x 0.22 in]
Emission	Class 2 Red laser 660 Nm	Class 1 Red laser 660 Nm	Class 2 Red laser 660 Nm	Class 1 Red laser 660 Nm	Class 2 Red laser 660 Nm	Class 1 Red laser 660 Nm	Class 1 Red laser 655 Nm
Sensitivity	Adjustable via Teach						
Output Type	0-10 VDC or 4-20 mA; PNP error output						Complementary N.O./N.C. (Light-on, Dark-on) PNP or NPN
Current Output Max Load	500Ω						NA
Voltage Output Min Load	10 KΩ						NA
Operating Voltage	18-30 VDC						10-30 VDC
No Load Supply Current	<80 mA @ 24 VDC						<50 mA @ 24 VDC
Operating (Load) Current	max 200 mA						
Off-state (Leakage) Current	negligible						
Voltage Drop	<2.5V						<1.5V
Measurement Rate/Resolution	1500/s (660 μs) @ 12 μm 600/s (1660 μs) @ 8 μm	1000/s (1000 μs) @ 12 μm 500/s (2000 μs) @ 8 μm	1500/s (660 μs) @ 30 μm 600/s (1660 μs) @ 20 μm	1000/s (1000 μs) @ 30 μm 500/s (2000 μs) @ 20 μm	800/s (1250 μs) @ 80 μm 400/s (2500 μs) @ 50 μm	500/s (2000 μs) @ 80 μm 250/s (4000 μs) @ 50 μm	NA
Switching Frequency	1.5 kHz	1.0 kHz	1.5 kHz	1.0 kHz	800 Hz	500 Hz	100 Hz
Linearity	0.1%				0.15%		NA
Time Delay Before Availability (tv)	NA						
Short-Circuit Protection	Yes						
Operating Temperature	-25°C to 50°C [13°F to 122°F]						-25°C to 60°C [13°F to 140°F]
Protection Degree (DIN 40050)	IEC IP67						IEC IP68
LED Indicators - Switching Status	Yellow						
LED Indicators - Power	Green						
Housing Material	Polycarbonate						
Lens Material	Poly(methyl methacrylate) (PMMA)						
Shock/Vibration	See Terminology section.						
Tightening Torque	0.5 Nm (mounting screws)						
Weight (lbs) (cable/connector)	0.2						
Connectors	M12 Quick Disconnect						
Agency Approvals	CE, cJULUS, E189727, RoHs						

Characteristic Curves



The Laser Classification Systems for the standards IEC (EN) 60825-1 defines the following safety classes:

Class 1

This class is eye-safe under all operating conditions.

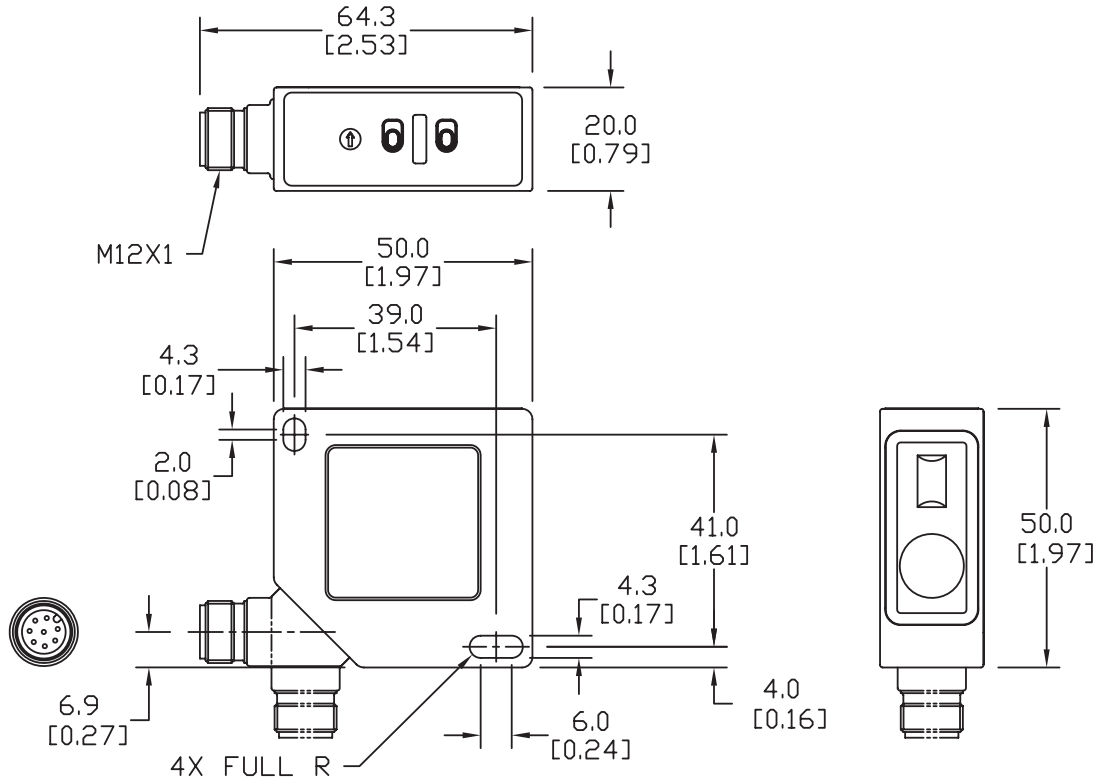
Class 2

These are visible lasers. This class is safe for accidental viewing under all operating conditions. However, it may not be safe for a person who deliberately stares into the laser beam for longer than 0.25 s, by overcoming their natural aversion response to the very bright light.

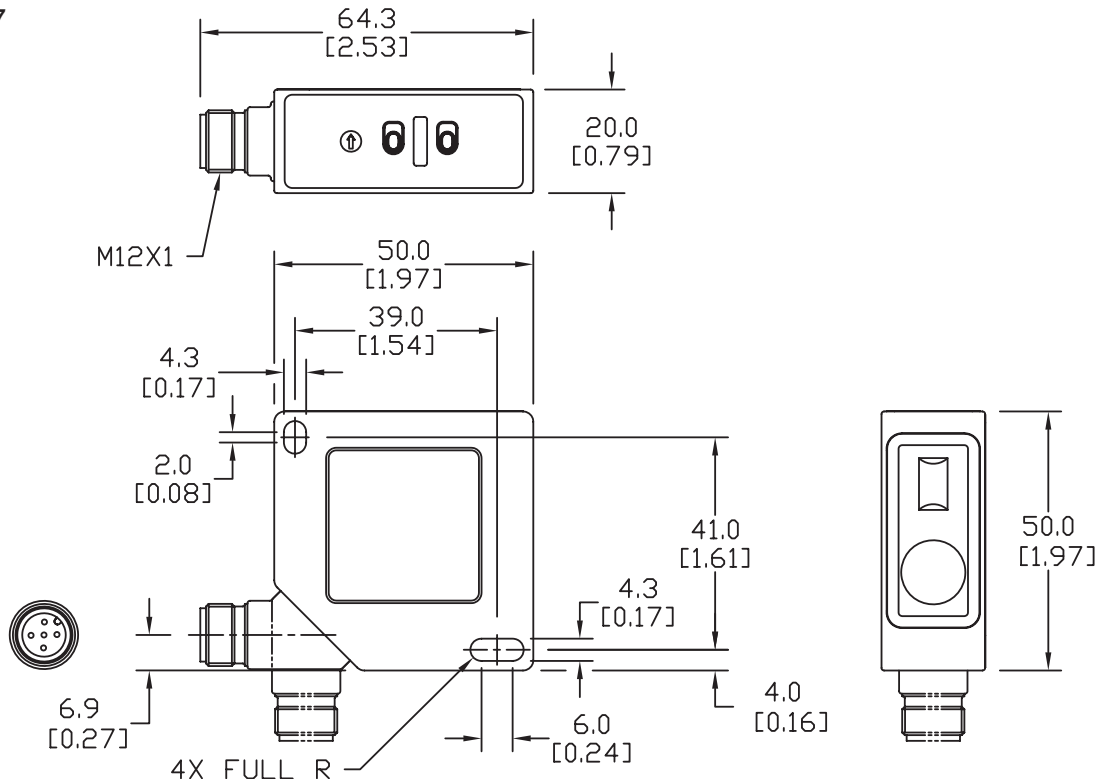
OPT Short Range (CMOS) Series Photoelectric Sensors

Dimensions mm [inches]

OPT2001
OPT2002
OPT2003
OPT2004
OPT2005
OPT2006



OPT2007



OPT Long Range (Transit Time) Series Photoelectric Sensors

50 x 50 and 81 x 55 mm rectangular plastic DC



OPT2010
OPT2015

- Diffuse and Retro-reflective (Transit time) laser distance measurement sensors
- Analog and switching outputs available
- Measured value independent of material, color, and brightness
- Class 1 and 2 lasers available (safety label included with Class 2 lasers)
- M12 quick-disconnect; order cable separately
- Mounting hardware included

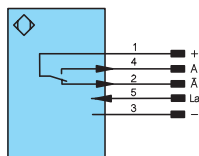


OPT Series Photoelectric Sensors Selection Chart									
Part Number	Price	Sensing Range	Laser Class	Measurement Rate	Resolution	Output State	Connection	Wiring	Dimensions
Diffuse (Transit Time)									
OPT2010	\$249.00	0 - 3000 mm [0 - 118.11 in] working range 200 - 3000 mm [7.87 - 118.11 in] adjustable range	1	1 kHz switching	Hysteresis <15 mm	Complementary (N.O. and N.C.). PNP	5-pin M12 quick-disconnect	Diagram 1	50 x 50 mm
OPT2011	\$295.00	50 - 3050 mm [1.97 - 120.08 in] working range		500/s [2 ms]	1 mm [0.04 in]		4-pin M12 quick-disconnect	Diagram 2	50 x 50 mm
OPT2012	\$319.00	0.2 - 6.2 m [7.87 - 244.09 in] working range					Diagram 3	81 x 55 mm	
OPT2013	\$559.00	0.1 - 10.1 m [3.94 - 397.64 in] working range	2	1-100/s [10 ms]	1-12 mm [0.04 - 0.47 in]	Analog 4-20 mA or 0-10 VDC Switching PNP/NPN, N.O. or N.C.	8-pin M12 quick-disconnect	Diagram 4	81 x 55 mm
OPT2014	\$335.00	0.1 - 10.1 m [3.94 - 397.64 in] working range					4-pin M12 quick-disconnect	Diagram 3	81 x 55 mm
Retro-Reflective (Transit Time)									
OPT2015*	\$659.00	0.2 - 100.2 m [0.66 ft - 328.74 ft] working range	1	1-100/s [10 ms]	4-20 mm [0.16 - 0.79 in]	Analog 4-20 mA or 0-10 VDC Switching PNP/NPN, N.O. or N.C.	8-pin M12 quick-disconnect	Diagram 4	81 x 55 mm

*Requires purchase of OPT2030 reflector (see Accessories). <50m sensing distance requires 1 reflector. 50-100m sensing distance requires 4 reflectors.

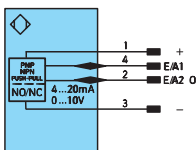
Wiring Diagrams

Diagram 1



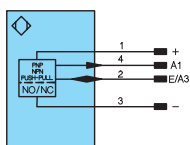
- + Supply Voltage "+"
- Supply Voltage "0 V"
- A Switching output (NO)
- Ā Switching output (NC)
- La Emitted light can be switched off

Diagram 2



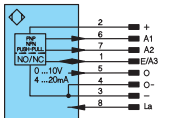
- + Supply Voltage "+"
- Supply Voltage "0 V"
- O Analog output
- EA1/EA2 Output/Input programmable

Diagram 3



- + Supply Voltage "+"
- Supply Voltage "0 V"
- E/A3 Input/Output programmable
- A1 Switching Output (NO)

Diagram 4



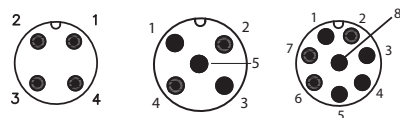
- + Supply Voltage "+"
- Supply Voltage "0 V"
- La Emitted light can be switched off
- O Analog output
- O Ground for the Analog output
- E/A3 Input/Output programmable
- A1/A2 Switching Output (NO)

Switching Element Function

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

Connectors

4-Pin M12 connector 5-Pin M12 connector 8-Pin M12 connector



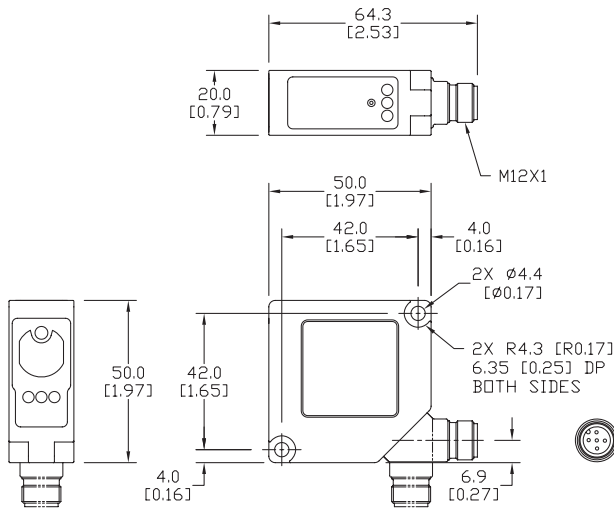
NOTE: CLASS 2 POWER SOURCE REQUIRED

OPT Long Range (Transit Time) Series Photoelectric Sensors

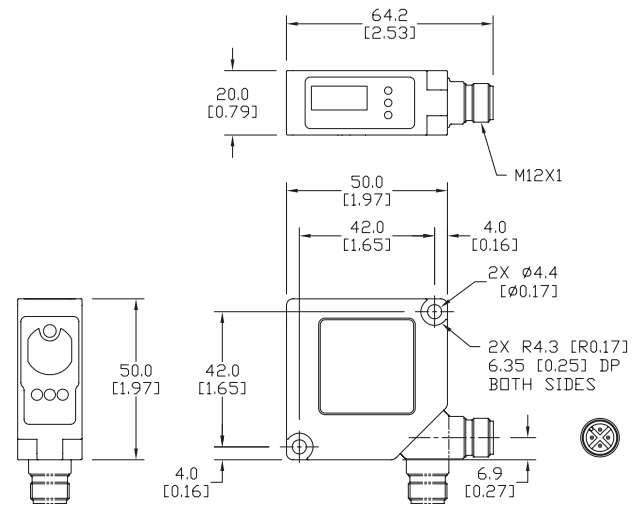
Dimensions

mm [inches]

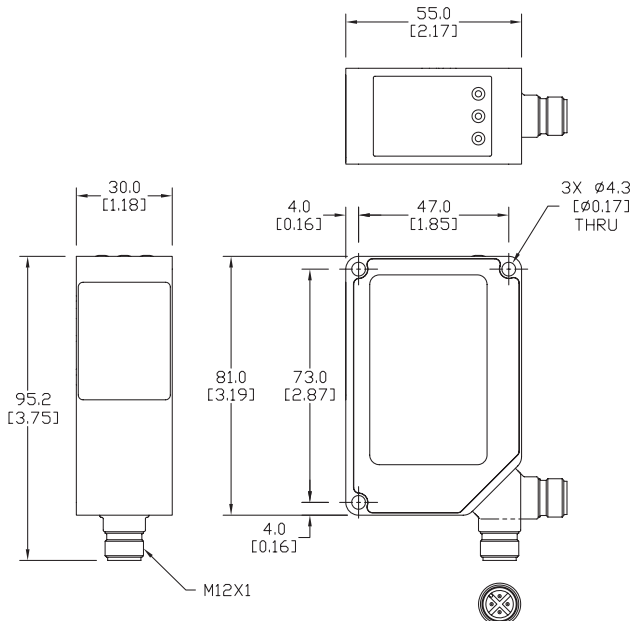
OPT2010



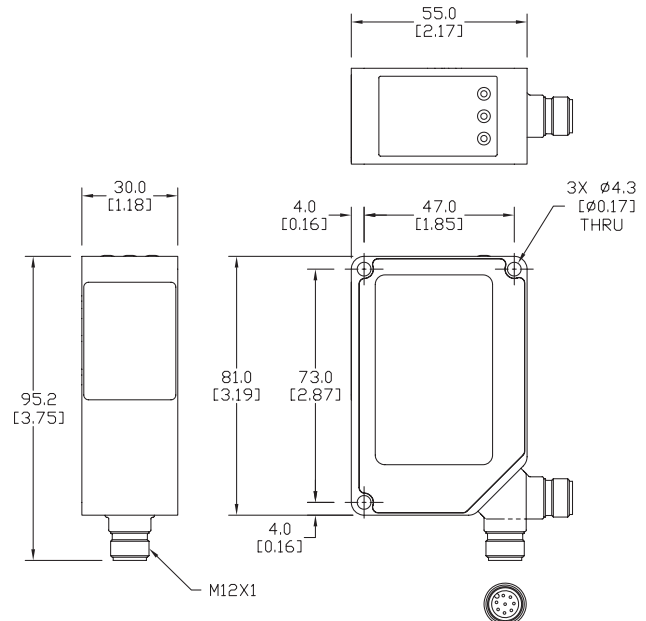
OPT2011



OPT2012 OPT2014



OPT2013 OPT2015



OPT Long Range (Transit Time) Series Photoelectric Sensors

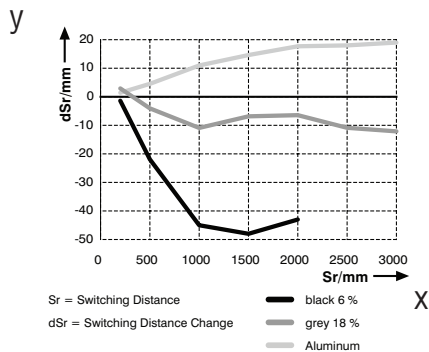
Specifications	OPT2010	OPT2011	OPT2012	OPT2013	OPT2014	OPT2015
Type	Diffuse (Transit time)					*Retro-Reflective
Sensing Distance	3m [118.11 in]	3.05m [120.08 in]	6.2m [244.09 in]	10.1m [397.64 in]	10.1m [397.64 in]	100.2m [3944.90 in]
Light Spot Diameter (at maximum range)	9 mm		<12 mm	<20 mm		80 mm @ 40m <200 mm @ 100m
Emission	Class 1 Red laser 660 Nm	Class 1 Red laser 660 Nm	Class 1 Red laser 660 Nm	Class 2 Red laser 660 Nm	Class 2 Red laser 660 Nm	Class 1 Red laser 660 Nm
Sensitivity	Adjustable via Teach					
Output Type	N.O./N.C. PNP	Programmable: Analog 4-20 mA/0-10 VDC, N.O./N.C. PNP/NPN				
Current Output Max Load	NA	500 Ω				
Operating Voltage	10-30 VDC	18-30 VDC				
No Load Supply Current	<50 mA	<70 mA	<100 mA			
Operating (Load) Current	200 mA	100 mA	200 mA			
Off-state (Leakage) Current	negligible					
Voltage Drop	<2.5V (switching outputs)					
Measurement Rate	NA	500/s	1-100/s			
Switching Frequency	1000 Hz	250 HZ	50 Hz			
Linearity	NA		0.2%			.05%
Time Delay Before Availability (tv)	NA					
Short-Circuit Protection	Yes					
Operating Temperature	-40 °C to 60 °C [-40 °F t to 140°F]	-40°C to 50°C [-40°F to 122°F]	-25 °C to 60 °C [13°F t to 140°F]			
Protection Degree (DIN 40050)	IEC IP 68					
LED Indicators - Switching Status	Yellow	Screen Display				
LED Indicators - Power	Green	Screen Display				
Housing Material	Polycarbonate					
Lens Material	Poly(methyl methacrylate) (PMMA)					
Shock/Vibration	See Terminology section					
Tightening Torque	0.5 Nm (mounting screws)					
Weight (cable/connector)	0.2			0.3		
Connectors	M12 Connector					
Agency Approvals	CE, cULUS, E189727, RoHs					

*Requires purchase of OPT2030 reflector (see Accessories). <50m sensing distance requires 1 reflector. 50-100m sensing distance requires 4 reflectors.

Characteristic Curves (OPT2010)

Switching Distance Deviation

Typical characteristic curve based on Kodak white, 90 %



Sr = Switching Distance
dSr = Switching Distance Change

— black 6 %
— grey 18 %
— Aluminum

The Laser Classification Systems for the standards IEC (EN) 60825-1 defines the following safety classes:

Class 1

This class is eye-safe under all operating conditions.

Class 2

These are visible lasers. This class is safe for accidental viewing under all operating conditions. However, it may not be safe for a person who deliberately stares into the laser beam for longer than 0.25 s, by overcoming their natural aversion response to the very bright light.

X	Distance to target [mm]
Y	Minimum distance between object and background [mm]

OPT Series Photoelectric Sensors Accessories

OPT Series Photoelectric Sensors Accessories			
Part Number	Price	Description	Weight (Lbs)
OPT2030*	\$11.00	Reflector, for photoelectric laser sensors, square, 100 x 100 mm.	0.2
OPT2031	\$5.50	Mounting bracket, nickel-plated brass, for 50 x 50 mm sensors, right angle	0.2
OPT2032	\$5.50	Mounting bracket, nickel-plated brass, for 81 x 55 mm sensors, right angle	0.3

* OPT2015 requires purchase of OPT2030 reflector. <50m sensing distance requires 1 reflector. 50-100m sensing distance requires 4 reflectors.



OPT2030



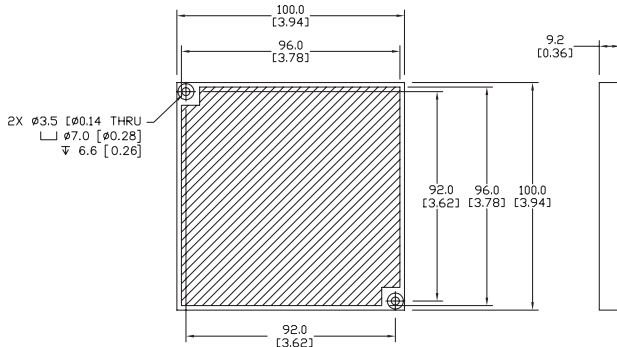
OPT2031



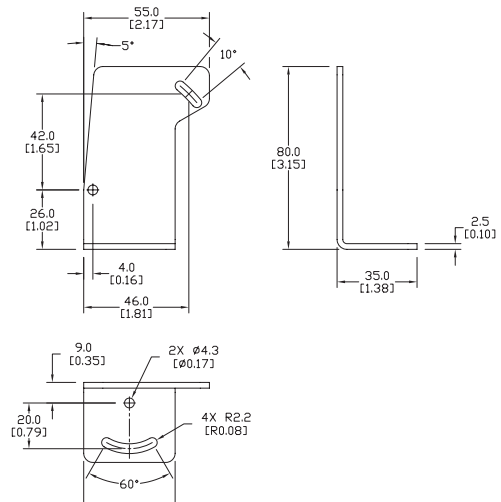
OPT2032

Dimensions mm [inches]

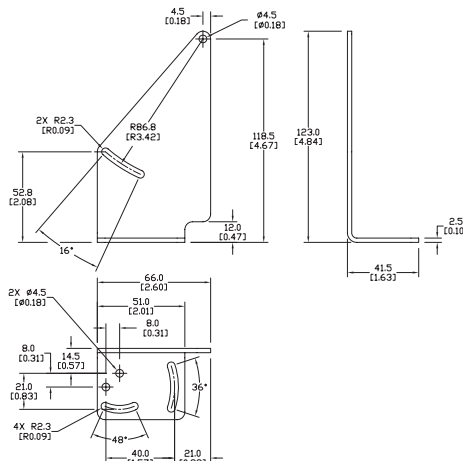
OPT2030



OPT2031



OPT2032



FW Series Photoelectric Sensors

M30 (30 mm) Compact Metal - DC



- 8 models available
- Zinc alloy nickel-plated housing
- Diffuse with background suppression and polarized retro-reflective models
- 30 mm mounted with 1 mounting hex nut included
- NPN or PNP, Light-on, Dark-on output models
- Easy-to-use multi-turn potentiometer for setting switchpoint distance on select models
- M12 quick-disconnect; order cable separately
- IP67 rated



FW Series Photoelectric Sensors Selection Chart							
Part Number	Price	Sensing Distance	Output State	Logic	Connection	Wiring	Characteristic Curves
Diffuse with background suppression							
FW3-LP-1E	\$65.00	Adjustable 50 to 800 mm (1.97 to 31.5 in)	Light-On	PNP	M12 (12 mm) connector	Diagram 1	Chart 1
FW3-LN-1E	\$65.00		Light-On	NPN		Diagram 2	Chart 1
FW3-LP-2E	\$59.00	Fixed 0.0 to 600 mm (0 to 23.62 in)	Light-On	PNP		Diagram 1	NA
FW3-LN-2E	\$59.00		Light-On	NPN		Diagram 2	NA
Polarized retro-reflective*							
FWP-DP-1E	\$55.00	0.1 to 15m (0.33 to 49.21 ft)	Dark-On	PNP	M12 (12 mm) connector	Diagram 1	Chart 2
FWP-LP-1E	\$55.00		Light-On	PNP		Diagram 1	
FWP-DN-1E	\$55.00		Dark-On	NPN		Diagram 2	
FWP-LN-1E	\$55.00		Light-On	NPN		Diagram 2	

*Note: Purchase reflectors separately.

Switching Element Function		
	Reflective Models	Diffuse Models
Light-on	N.C.	N.O.
Dark-on	N.O.	N.C.

Mounting Bracket



FW Series Accessories Selection Chart			
Part Number	Price	Description	Weight
ST30C6W	\$2.50	Mounting bracket, for 30mm FW series photoelectric sensors, 304S15 stainless steel, right angle	0.1 lbs

Wiring Diagrams

Connector

M12 connector

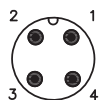


Diagram 1

PNP Output

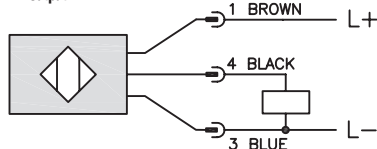
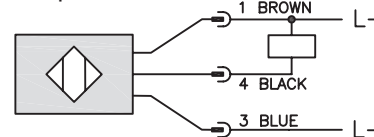


Diagram 2

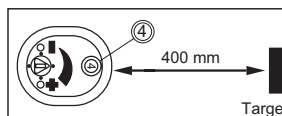
NPN Output



NOTE: CLASS 2 POWER SOURCE REQUIRED

Adjustable Background Suppression Settings

- Measure the desired range. Example: target distance 400 mm
- Set the range:
 - Turn the setting screw of the potentiometer clockwise until the required range to the target has been reached. Each rotation corresponds to 100 mm.
 - If the setting fails, increase the potentiometer value until the target is detected.



FW Series Photoelectric Sensors

Specifications	Diffuse with Background Suppression Models	Retro-Reflective Models
Type	Diffuse reflection	Polarized Retro-reflective
Sensing Distance	FW3-L*-1E: 50 to 800 mm (1.97 to 31.5 in) FW3-L*-2E: 0.0 to 600 mm (23.62 in)	0.1 to 15m (0.33 to 49.21 ft)
Light Spot Diameter	FW3-LP-1E, FW3-LN-1E: 55 mm (2.17 in) at maximum range FW3-LP-2E, FW3-LN-2E: 30 mm (1.18 in) at maximum range	100 mm x 130 mm (3.94 in x 5.12 in) Sensing range 5m (16.4 ft)
Emission	Red LED (visible) 624-625 nm	
Sensitivity	Adjustable (FW3-LP-1E, FW3-LN-1E)	
Output Type	NPN or PNP, Light-on or Dark-on	
Operating Voltage	10 to 30 VDC	
No Load Supply Current	35 mA	20 mA
Operating (Load) Current	200 mA	
Off-state (Leakage) Current	N/A	
Voltage Drop	<2.5V	
Switching Frequency	300 Hz	1000 Hz
Ripple	N/A	
Time Delay Before Availability (tv)	Minimal	
Short-Circuit Protection	Yes (non-latching)	
Operating Temperature	-25 to 60 °C (-37.7 to 140 °F)	
Protection Degree (DIN 40050)	IP67	
LED Indicators - Switching Status	Yellow	
LED Indicators - Power	Green	
Housing Material	Zinc Alloy Nickel-plated (ZnAl4Cu1)	
Lens Material	Polymethyl methacrylate (PMMA)	
Shock/Vibration	See terminology section	
Tightening Torque	80Nm (59 lb-ft)	
Weight	0.5 lbs	
Connectors	M12 Connector	
Accessories	1 mounting hex nut included	
Agency Approvals	CULus listed UL file E328811, CE	

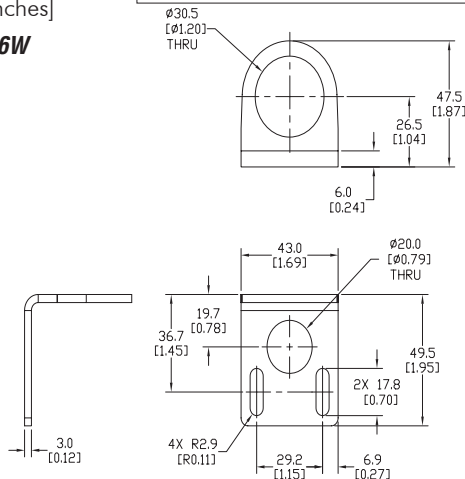
¹With 200x200mm white matte paper, 90% remission. ²With standard diameter 84mm reflector.

Dimensions

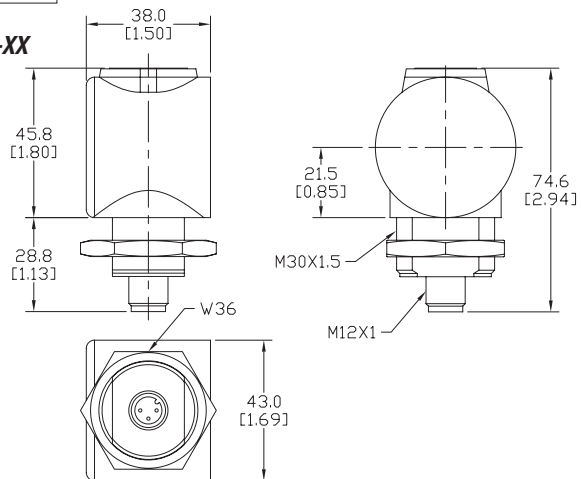
Warning: These products are not safety sensors and are not suitable for use in personal safety applications.

mm [inches]

ST30C6W



FW3-XX-XX

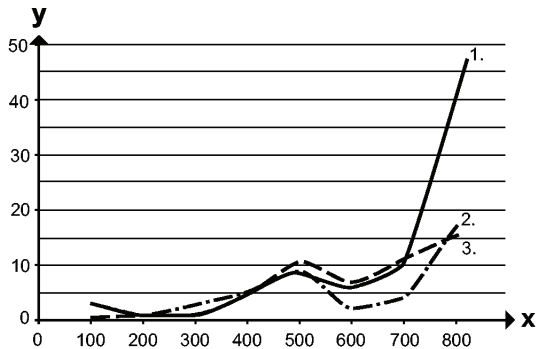


FW Series Photoelectric Sensors

Characteristic Curves

Background Suppression Curves

Chart 1 (Diffuse with Background Suppression)

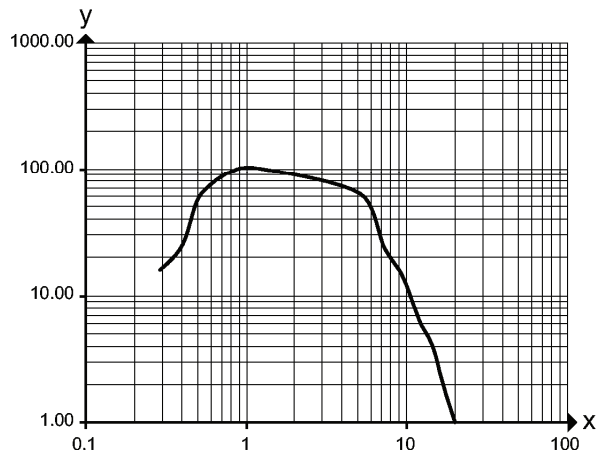


X	Distance to target [mm]
Y	Minimum distance object [mm]

Values in [mm]
 1 = object black (6 % remission), background white (90 % remission)
 2 = object gray (18 % remission), background white (90 % remission)
 3 = object white (90 % remission), background white (90 % remission)

Excess Gain Chart

Chart 2 (Polarized retro-reflective)



X	Distance to target [m]
Y	Excess gain factor



Enhanced 50 Series Photoelectric Sensors Selection Guide

Overview

The Enhanced 50 family of high performance photoelectric sensors offers outstanding features, flexibility and durability at an incredible price. Choose from a wide selection of Thru-beam, Polarized Reflex, Diffuse and even Clear

Object models all designed in a rugged, industry standard, rectangular package. Each model comes with a variety of input options for maximum flexibility across many voltage ratings. Cabling choices include built-in mini-connector, micro-connector, pigtail micro-connector or a 6 ft. integrated cable.

Other convenient features included are Dark-On/Light-On selectability and Gain adjustment, available on all models. Use the Selection Guide below to find the sensor model that best suits your requirements.



Enhanced 50 Photoelectric Sensors Specifications by Model Type

Specifications	Thru-Beam	Diffuse	Polarized Reflex	Clear Object Detector
Voltage Range	10 - 40 VDC 12 - 240 VDC 24 - 240 VAC	10 - 40 VDC 12 - 240 VDC 24 - 240 VAC	10 - 40 VDC 12 - 240 VDC 24 - 240 VAC	10 - 40 VDC 12 - 240 VDC 24 - 240 VAC
Sensing Range	500 ft. (152 m)	10 ft. (3 m)	16 ft. (4.9 m)	45 in. (1.2 m)
Optimum Power	0.1 to 250 ft. (0.03 to 77 m)	1 to 60 in. (25 to 1520 mm)	0.5 to 8 ft. (0.2 to 2.5 m)	1 to 24 in. (25 to 610 mm)
Sensing Beam	Infrared	Infrared	Visible Red	Visible Red
Output Types	NPN/PNP 250 mA, Solid-state relay 300 mA @ 240 VAC/VDC, SPDT EM relay 3 A @ 120 VAC	NPN/PNP 250 mA, Solid-state relay 300 mA @ 240 VAC/VDC, SPDT EM relay 3 A @ 120 VAC	NPN/PNP 250 mA, Solid-state relay 300 mA @ 240 VAC/VDC, SPDT EM relay 3 A @ 120 VAC	NPN/PNP 250 mA, Solid-state relay 300 mA @ 240 VAC/VDC, SPDT EM relay 3 A @ 120 VAC

Enhanced 50 Photoelectric Sensors Specifications by Input Type

Specifications	AC/DC EM Relay Models	AC/DC Solid-State Relay Models	DC Only Models
Input Voltage	12 - 240 VDC 24 - 240 VAC	12 - 240 VDC 24 - 240 VAC	10 - 40 VDC
Light/Dark Operation	Switch selectable		
Operating Temperature	-13° to 131°F (-25° to 55°C)		
Humidity	95% relative humidity, non-condensing		
Case Material	Fiberglass reinforced plastic		
Lens Material	Acrylic		
Vibration	IEC 60947-5-2 part 7.4.2		
Shock	IEC 60947-5-2 part 7.4.1		
Protection	Output short circuit and overcurrent protection, reverse polarity protection		
Enclosure Ratings	IP67		
Agency Approvals	IEC IP67, cCSAus, UL508 (CSA File 224447)	IEC IP67, cCSAus, UL508 (CSA File 224447)	IEC IP67, cCSAus, UL508 (CSA File 224447)
Output Load	3A @ 120 VAC 3A @ 28 VAC 3A @ 240 VAC	300 mA @ 240 VAC/VDC	250 mA
Response Time	15 ms	2 ms	
No Load Current Draw	<30 mA		
Leakage Current (max.)	—	1 mA @ 240 VAC	<10 µA
Indicator LEDs	Thru-Beam Source All Others: Red: Power Green: Output Yellow: Power Red: Alignment		

EATON Enhanced 50 Series Cutler-Hammer Photoelectric Sensors

Application Guide

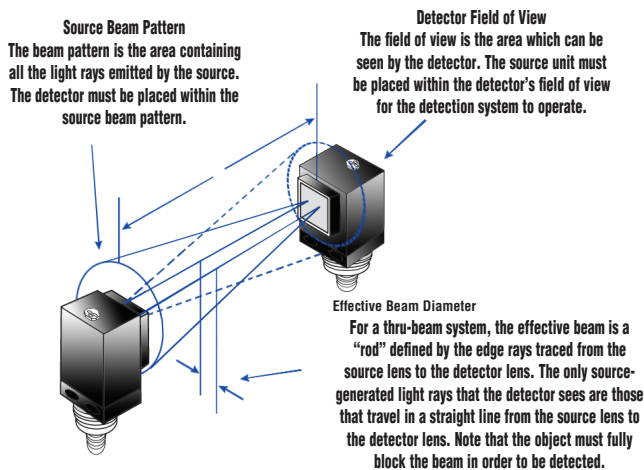
The Enhanced 50 Series Photoelectric Sensors are a great fit for applications such as material handling, packaging, wrapping and sortation.

This family of sensors, with its four basic models (Thru-beam, Polarized Reflex, Diffuse and Clear Object), meets the needs for almost any sensing requirement, including harsh environments with excessive dust or high temperature.

Follow the application guide below to choose the best sensor model for your application.

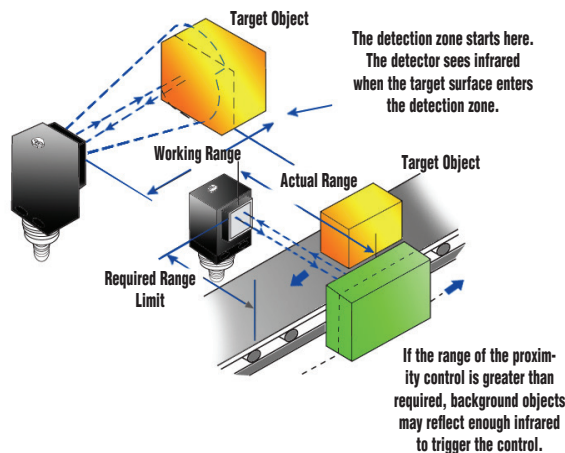
Thru-Beam

- Most accurate
- Longest sensing range
- Most reliable
- Must be installed in two points on system: emitter and receiver
- More costly



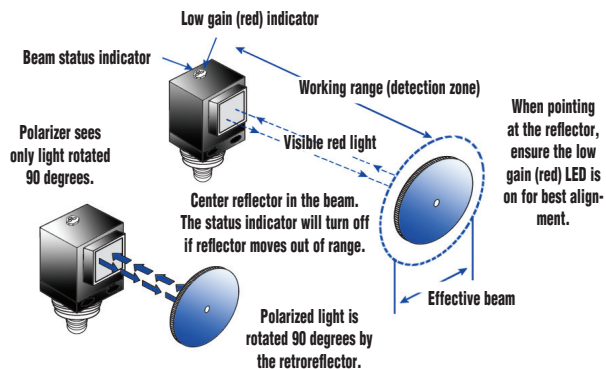
Diffuse

- Lower cost
- Install at one point
- Less accurate than Thru-Beam or Polarized Reflex
- More setup time involved



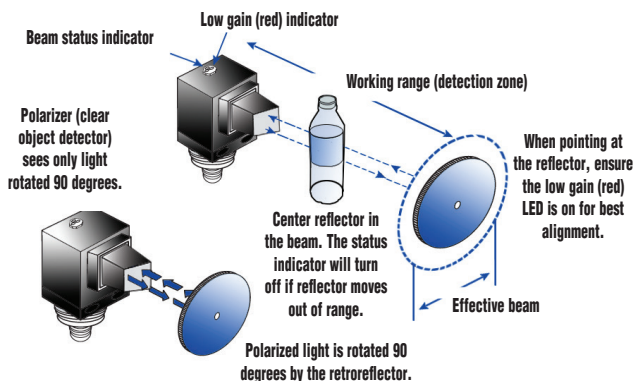
Polarized Reflex

- Lower cost than Thru-Beam
- Longer sensing range than Diffuse
- Very reliable
- Must be installed in two points on system: sensor and reflector



Clear Object Detector

- Most reliable for sensing transparent objects
- Must be installed in two points on system: sensor and reflector.
- Short sensing distance: 45 inches max.





Enhanced 50 Series Thru-beam Photoelectric Sensors

- Long sensing distances
- 13 models available
- Fiberglass-reinforced plastic housing
- Field of view: 2.4°
- Cable wires or mini/micro connector termination
- NPN/PNP, Solid-State Relay, or SPDT EM Relay outputs
- IP67 rated



1151E-6504 1251E-6504



1151E-6517 1251E-6517

Note: Cutler-Hammer parts available for sale to North America locations only.

Enhanced 50 Series Thru-beam Photoelectric Sensors Selection Chart

Part Number	Price	Voltage Range	Sensing Range	Optimum Range	Sensing Beam	Thru-Beam Component	Output Type	Connection Type	Cable Part Number				
1151E-6517	\$73.00	10 - 40 VDC	500 ft. (152 m)	0.1 to 250 ft. (0.03 to 77 m)	Infrared	Source/Emitter	N/A	6-foot cable (300V)	pre-wired 6 ft. (1.8 m)				
1251E-6517	\$66.00					Detector/Receiver	NPN/PNP 250 mA						
1151E-6547	\$73.00					Source/Emitter	N/A	4-pin Euro (Micro) DC connector	CSDS4A4CY2202				
1251E-6547	\$66.00					Detector/Receiver	NPN/PNP 250 mA						
1151E-6507	\$73.00					Source/Emitter	N/A	4-pin Mini connector	CSMS4A4CY1602				
1251E-6507	\$61.00					Detector/Receiver	NPN/PNP 250 mA						
1151E-6513	\$73.00					12 - 240 VDC 24 - 240 VAC	500 ft. (152 m)	0.1 to 250 ft. (0.03 to 77 m)	Infrared	Source/Emitter	N/A	6-foot cable (300V)	pre-wired 6 ft. (1.8 m)
1251E-6513	\$72.00									Detector/Receiver	Solid-state relay 300 mA @ 240 VAC/VDC		
1151E-6543	\$73.00									Source/Emitter	N/A	4-pin Micro AC connector	CSAS4F4CY2202
1251E-6543	\$72.00									Detector/Receiver	Solid-state relay 300 mA @ 240 VAC/VDC		
1151E-6504	\$73.00									Source/Emitter	N/A	4-pin Mini connector	CSMS4A4CY1602
1251E-6503	\$73.00									Detector/Receiver	Solid-state relay 300 mA @ 240 VAC/VDC		
1251E-6504	\$71.00									Detector/Receiver	SPDT EM relay 3A @ 120 VAC	5-pin Mini connector	CSMS5A5CY1602

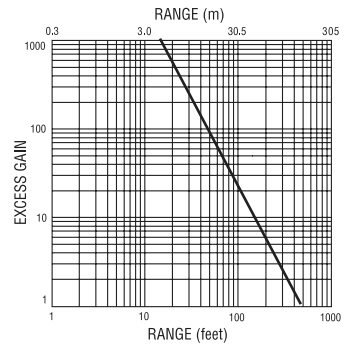
Note: Purchase one source and one detector for a complete set.

WIRING DIAGRAM (Pin numbers are for reference only. Rely on pin location when wiring.)

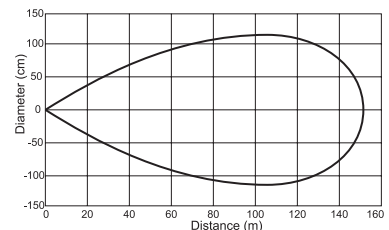
Operating Voltage	Models	Cable Models	Mini-Connector Models (Face View Male Shown)	Micro and Euro (Micro) Connector Models (Face View Male Shown)
10 - 40 VDC	Thru-Beam Source / Emitter	BR (+) BK Test BU (-)	Test (+) (-)	Test (+) (-)
	Thru-Beam Detector/Receiver	BR (+) WH Load BK Load BU (-)	PNP Load (-) NPN Load (+)	NPN Load (+) PNP Load (-)
12 - 240V DC or 24 - 240V AC Solid-State Relay	Thru-Beam Source / Emitter	BR L1 (+) BU L2 (-)	L2 (-) L1 (+)	L2 (-) L1 (+)
	Thru-Beam Detector/Receiver	BR L1 (+) WH Isolated AC/DC Output BK Isolated AC/DC Output BU L2 (-)	Out L2 (-) L1 (+)	Out L2 (-) L1 (+)
12 - 240V DC or 24 - 240V AC SPDT EM Relay	Thru-Beam Source / Emitter	BR L1 (+) BU L2 (-)	L2 (-) L1 (+)	L2 (-) L1 (+)
	Thru-Beam Detector/Receiver	BR L1 (+) BK Load N.C. Out OR CCM WH Load N.C. Out BU L2 (-)	N.C. Out L2 (-) L1 (+) CCM	L1 (+) L2 (-) CCM N.C.

① Connect load to appropriate output for either sinking or sourcing operation.
② Connecting the test input to 0 VDC allows you to switch the light source off for troubleshooting while leaving the sensor under power.

Characteristic curve chart



Spot dimension chart





Enhanced 50 Series Diffuse Photoelectric Sensors



1351E-6547



1351E-6517

- 9 models available
- Fiberglass-reinforced plastic housing
- Field of view: 2.8°
- Cable wires or mini/micro connector termination
- NPN/PNP, Solid-State Relay, or SPDT EM Relay outputs
- IP67 rated



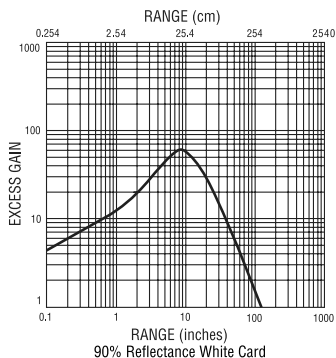
1351E-6534

Note: Cutler-Hammer parts available for sale to North America locations only.

Enhanced 50 Series Diffuse Photoelectric Sensors Selection Chart								
Part Number	Price	Voltage Range	Sensing Range*	Optimum Range*	Sensing Beam	Output Type	Connection Type	Cable Part Number
1351E-6517	\$83.00	10 - 40 VDC				NPN/PNP 250 mA	6-foot cable (300V)	Pre-wired 6 ft. (1.8 m)
1351E-6547	\$83.00						4-pin Euro (Micro) DC connector	CSDS4A4CY2202 CSDS4A4CY2205
1351E-6507	\$84.00						4-pin Mini connector	CSMS4A4CY1602 CSMS4A4CY1606
1351E-6513	\$91.00	12 - 240 VDC 24 - 240 VAC	10 ft. (3 m)	1 to 60 in. (25 to 1520 mm)	Infrared	Solid-state relay 300 mA @ 240 VAC/VDC	6-foot cable (300V)	Pre-wired 6 ft. (1.8 m)
1351E-6543	\$91.00						4-pin Micro AC connector	CSAS4F4CY2202 CSAS4F4CY2205
1351E-6503	\$92.00						4-pin Mini connector	CSMS4A4CY1602 CSMS4A4CY1606
1351E-6514	\$87.00						6-foot cable (300V)	Pre-wired 6 ft. (1.8 m)
1351E-6534	\$87.00						5-pin Micro AC connector (7.5" pigtail)	CSAS5A5CY2202 CSAS5A5CY2205
1351E-6504	\$87.00						5-pin Mini connector	CSMS5A5CY1602 CSMS5A5CY1606

*Note: Ranges based on 90% reflectance white card for diffuse reflective sensors.

Characteristic curve chart



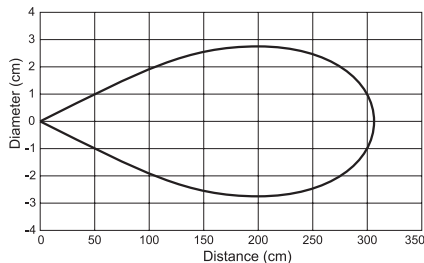
Wiring Diagrams

(Pin numbers are for reference only. Rely on pin location when wiring.)

Operating Voltage	Models	Cable Models	Mini-Connector Models (Face View Male Shown)	Micro and Euro (Micro) Connector Models (Face View Male Shown)
10-40 VDC	Diffuse			
12 - 240 VDC or 24 - 240 VAC	Diffuse			
12 - 240 VDC or 24 - 240 VAC	Diffuse			

① Connect load to appropriate output for either sinking or sourcing operation.

Spot dimension chart





Enhanced 50 Series Polarized Reflex Photoelectric Sensors



1451E-6503



1451E-6513

- 9 models available
- Fiberglass-reinforced plastic housing
- Field of view: 1.0°
- Cable wires or mini/micro connection termination
- NPN/PNP, Solid-State Relay, or SPDT EM Relay outputs
- IP67 rated

Note: Cutler-Hammer parts available for sale to North America locations only.



1451E-6543

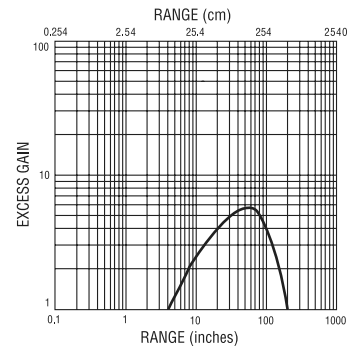
Enhanced 50 Series Polarized Reflex Photoelectric Sensors Selection Chart								
Part Number	Price	Voltage Range	Sensing Range*	Optimum Range*	Sensing Beam	Output Type	Connection Type	Cable Part Number
1451E-6517	\$77.00	10 - 40 VDC				NPN/PNP 250 mA	6-foot cable (300V)	Pre-wired 6 ft. (1.8 m)
1451E-6547	\$77.00						4-pin Euro (Micro) DC connector	CSDS4A4CY2202 CSDS4A4CY2205
1451E-6507	\$81.00						4-pin Mini connector	CSMS4A4CY1602 CSMS4A4CY1606
1451E-6513	\$84.00	12 - 240 VDC 24 - 240 VAC	16 ft. (4.9 m)	0.5 to 8 ft. (0.2 to 2.5 m)	Visible Red	Solid-state relay 300 mA @ 240 VAC/VDC	6-foot cable (300V)	Pre-wired 6 ft. (1.8 m)
1451E-6543	\$84.00						4-pin Micro AC connector	CSAS4F4CY2202 CSAS4F4CY2205
1451E-6503	\$89.00						4-pin Mini connector	CSMS4A4CY1602 CSMS4A4CY1606
1451E-6514	\$84.00						6-foot cable (300V)	Pre-wired 6 ft. (1.8 m)
1451E-6534	\$84.00						5-pin Micro AC connector (7.5" pigtail)	CSAS5A5CY2202 CSAS5A5CY2205
1451E-6504	\$84.00						5-pin Mini connector	CSMS5A5CY1602 CSMS5A5CY1606

*Note: Ranges based on 3-inch retro-reflector for reflex sensors.
Polarized sensors may not operate with reflective tape. Test tape selection before installation.



Note: Purchase reflectors separately.

Characteristic curve chart

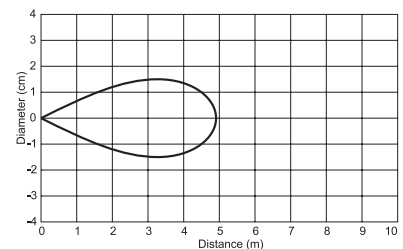


Wiring Diagrams (Pin numbers are for reference only. Rely on pin location when wiring)

Operating Voltage	Models	Cable Models	Mini-Connector Models (Face View Male Shown)	Micro and Euro (Micro) Connector Models (Face View Male Shown)
10-40 VDC	Polarized Reflex			
12 - 240 VDC or 24 - 240 VAC	Polarized Reflex			
12 - 240 VDC or 24 - 240 VAC	Polarized Reflex			

① Connect load to appropriate output for either sinking or sourcing operation.

Spot dimension chart





Enhanced 50 Series Clear Object Photoelectric Sensors



1452E-6547



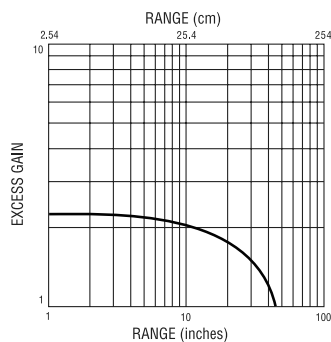
1452E-6517

- 7 models available
- Fiberglass-reinforced plastic housing
- Field of view: 0.68°
- Cable wires or mini/micro connector termination
- NPN/PNP, Solid-State Relay, or SPDT EM Relay outputs
- IP67 rated

Note: Cutler-Hammer parts available for sale to North America locations only.

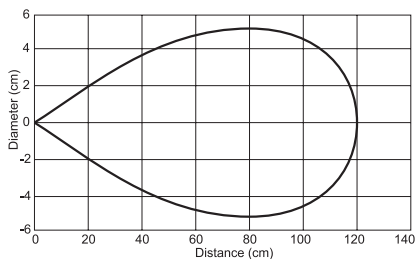
Enhanced 50 Series Clear Object Photoelectric Sensors Selection Chart								
Part Number	Price	Voltage Range	Sensing Range	Optimum Range	Sensing Beam	Output Type	Connection Type	Cable Part Number
1452E-6517	\$129.00	10 - 40 VDC	45 in. (1.2 m)	1 to 24 in. (25 to 610 m m)	Visible Red	NPN/PNP 250 mA	6-foot cable (300V)	Pre-wired 6 ft. (1.8 m)
1452E-6547	\$129.00						4-pin Euro (Micro) DC connector	CSDS4A4CY2202 CSDS4A4CY2205
1452E-6507	\$125.00						4-pin Mini connector	CSMS4A4CY1602 CSMS4A4CY1606
1452E-6513	\$133.00	12 - 240 VDC 24 - 240 VAC	45 in. (1.2 m)	1 to 24 in. (25 to 610 m m)	Visible Red	Solid-state relay 300 mA @ 240 VAC/VDC	6-foot cable (300V)	Pre-wired 6 ft. (1.8 m)
1452E-6543	\$129.00						4-pin Micro AC connector	CSAS4F4CY2202 CSAS4F4CY2205
1452E-6503	\$133.00						4-pin Mini connector	CSMS4A4CY1602 CSMS4A4CY1606
1452E-6504	\$128.00						5-pin Mini connector	CSMS5A5CY1602 CSMS5A5CY1606

Characteristic curve chart



Note: Purchase reflectors separately.

Spot dimension chart



Wiring Diagrams

(Pin numbers are for reference only. Rely on pin location when wiring.)

Operating Voltage	Models	Cable Models	Mini-Connector Models (Face View Male Shown)	Micro and Euro (Micro) Connector Models (Face View Male Shown)
10-40 VDC	Clear Object			
12 - 240 VDC or 24 - 240 VAC	Clear Object Solid-State Relay			
12 - 240 VDC or 24 - 240 VAC	Clear Object SPDT EM Relay			

① Connect load to appropriate output for either sinking or sourcing operation.



Enhanced 50 Series Photoelectric Sensors Accessories

Mounting brackets

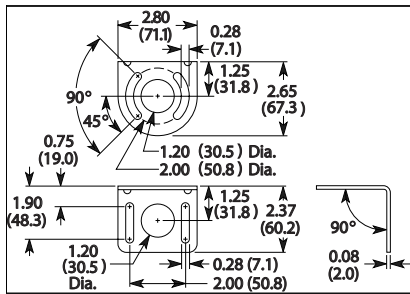
Short, tall or ball-swivel style of mounting brackets are available. All styles allow 360° rotation of the sensor.

Note: Cutler-Hammer parts available for sale to North America locations only.

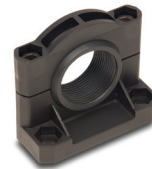
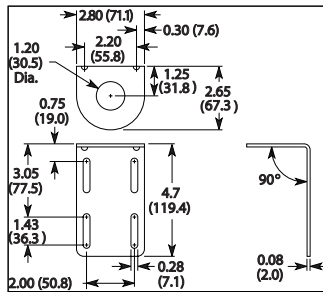
Enhanced 50 Series Accessories Selection Chart		
Part Number	Price	Description
6150E-6501	\$5.75	Short right angle metal mounting bracket. Allows full 360° rotation of sensor and up to 1.5" of vertical adjustment. Nickel plated.
6150E-6502	\$7.25	Tall right angle metal mounting bracket. Allows full 360° rotation of sensor, up to 1.5" of vertical adjustment in each slot, and 3.5" overall positioning adjustment
6150E-6503	\$7.25	Right angle plastic mounting bracket with ball swivel. Allows full 360° rotation of sensor. Ball swivel allows for ±30° sensor angle



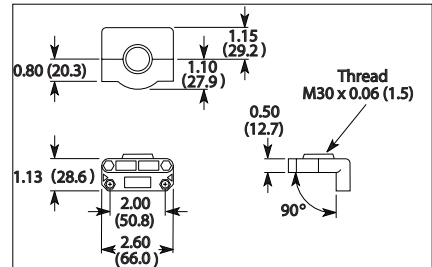
6150E-6501



6150E-6502



6150E-6503



Approximate dimensions in inches (millimeters)

RL series reflectors

- Suitable for use with polarized light photoelectric sensors
- 10 reflectors per package

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 of the environment. 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°.

Specifications	
Model	RL110 ³
Price	\$18.00
% Sensing Range Using Enhanced 50 Series ¹	100%
Dimensions	Diameter: 84 mm
Degree of Protection ²	IEC IP67
Mounting	one 5 mm dia. 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.





Enhanced 50 Series Photoelectric Sensors Connector Cables

Enhanced 50 Series Cables Selection Chart				
Part Number	Price	Description	Gauge	Pin-Out Diagram
CSDS4A4CY2202	\$19.00	DC Euro (Micro) connector cable for quick-disconnect photoelectric sensors, straight female, DC 4-pin/4-wire, PVC, 6 feet (2 meter) length	22	1-Brown 2-White 3-Blue 4-Black
CSDS4A4CY2205	\$20.00	DC Euro (Micro) connector cable for quick-disconnect photoelectric sensors, straight female, DC 4-pin/4-wire, PVC, 16.4 feet (5 meter) length	22	1-Brown 2-White 3-Blue 4-Black
CSAS4F4CY2202	\$21.50	AC Micro connector cable for quick-disconnect photoelectric sensors, straight female, AC 4-pin/4-wire, PVC, 6 feet (2 meter) length, 1/2" - 20 UNF thread	22	1-Red/Black 2-Red/White 3-Red 4-Green
CSAS4F4CY2205	\$22.50	AC Micro connector cable for quick-disconnect photoelectric sensors, straight female, AC 4-pin/4-wire, PVC, 16.4 feet (5 meter) length, 1/2" - 20 UNF thread	22	1-Red/Black 2-Red/White 3-Red 4-Green
CSAS5A5CY2202	\$27.00	AC Micro connector cable for quick-disconnect photoelectric sensors, straight female, AC 5-pin/5-wire, PVC, 6 feet (2 meter) length, 1/2" - 20 UNF thread	22	1-Brown 2-Blue 3-Gray 4-Black 5-White
CSAS5A5CY2205	\$29.00	AC Micro connector cable for quick-disconnect photoelectric sensors, straight female, AC 5-pin/5-wire, PVC, 16.4 feet (5 meter) length, 1/2" - 20 UNF thread	22	1-Brown 2-Blue 3-Gray 4-Black 5-White
CSMS4A4CY1602	\$29.50	Mini connector cable for quick-disconnect photoelectric sensors, straight female, 4-pin/4-wire, PVC, 6 feet (2 meter) length, 7/8" - 16 UN thread	16	1-Black 2-Blue 3-Brown 4-White
CSMS4A4CY1606	\$48.00	Mini connector cable for quick-disconnect photoelectric sensors, straight female, 4-pin/4-wire, PVC, 19.69 feet (6 meter) length, 7/8" - 16 UN thread	16	1-Black 2-Blue 3-Brown 4-White
CSMS5A5CY1602	\$34.00	Mini connector cable for quick-disconnect photoelectric sensors, straight female, 5-pin/5-wire, PVC, 6 feet (2 meter) length, 7/8" - 16 UN thread	16	1-Black 2-Blue 3-Orange 4-Brown 5-White
CSMS5A5CY1606	\$54.00	Mini connector cable for quick-disconnect photoelectric sensors, straight female, 5-pin/5-wire, PVC, 19.69 feet (6 meter) length, 7/8" - 16 UN thread	16	1-Black 2-Blue 3-Orange 4-Brown 5-White



CSDS4A4CY2205



CSAS4F4CY2205

Note: Cutler-Hammer parts available for sale to North America locations only.

Connector Cables Specifications		
	Micro Style	Mini Style
Jacket Material	PVC	PVC
Contact Material	Gold-plated copper alloy	Gold-plated brass
Coupling Nut Material	Zinc die-cast epoxy-coat	Zinc die cast epoxy-coat
O-ring	Nitrile rubber	None
Cable	PVC insulation and jacket, stranded copper conductors	
Cable Strain Relief	35 pounds minimum	
Voltage Rating	320 V (24 VDC for LED plugs)	600 V
Current Rating	4A	4-pin: 10A 5-pin: 8 A
Contact Resistance	5 mΩ maximum	5 mΩ maximum
Isolation Resistance	1000 MΩ minimum	1000 MΩ minimum
Protection	IP67	NEMA 6P, IP68
Temperature Range	-25° to 90°C	-20° to 105°C
Cable Diameter (3/C = 3 Conductor)	22 AWG PVC: 4/C: 0.21 inch (5.3 mm) 5/C: 0.20 inch (5.1 mm)	16AWG PVC: 4/C: 0.42 inch (10.7 mm) 5/C: 0.50 inch (12.7 mm)
Bend Radius	Minimum recommended bend radius is 12X cable diameter	



CSAS5A5CY2202



CSMS4A4CY1602



CSMS5A5CY1602

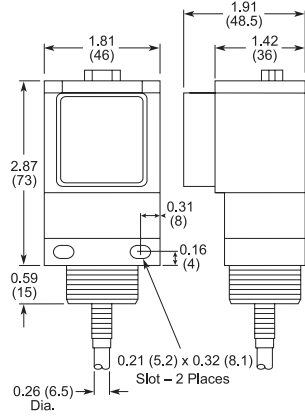


Enhanced 50 Series Photoelectric Sensors Dimensions

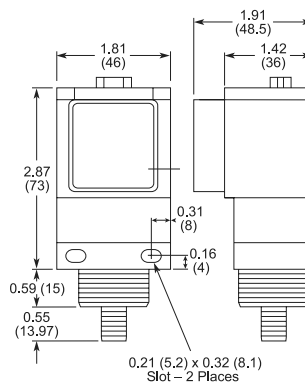
Sensor Dimensions

(inches (mm))

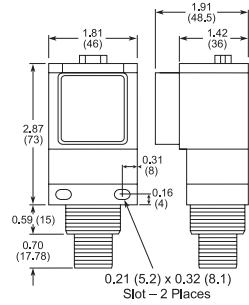
Cable and Pigtail Connector* Version



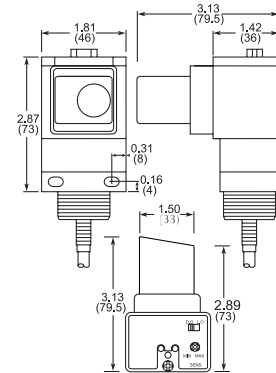
AC/DC Micro or Euro (Micro) Connector Versions



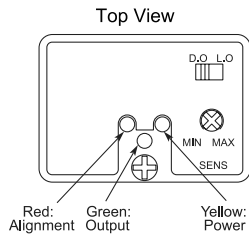
Mini Connector Versions



Clear Object Versions (Cable Version Shown)



* Pigtail length: 7.5" nominal

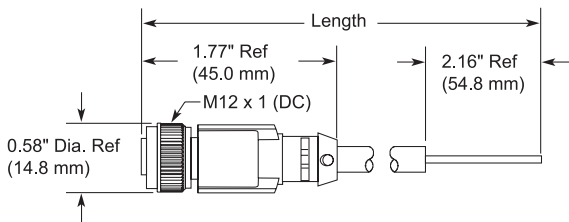


Connector Cables Dimensions

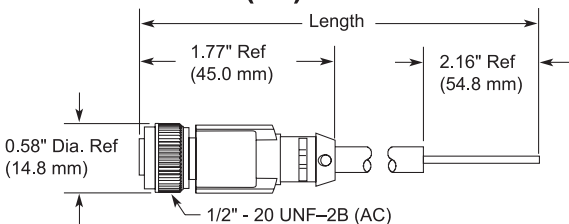
(in/mm)

Micro Style Connector Cables

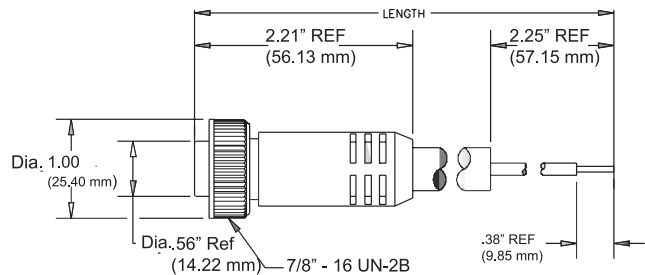
M12 x 1 (DC) connector cable



1/2" - 20 UNF-2B (AC) connector cable



Mini Style Connector Cables



DFT Series Fiber Photoelectric Amplifiers

Compact rectangular plastic DIN-rail mount with Teach function - DC



- 4 models available
- DIN-rail mounting
- Bargraph signal-strength indicator
- NPN or PNP, Light-on/Dark-on selectable outputs
- Red LED with visible spot
- IP64 rated



DFT Series Fiber Photoelectric Amplifier Selection Chart							
Part Number	Price	Sensing Range	Output State	Logic	Connection	Wiring	Dimensions
DFT-AN-1A	\$132.00	Optical fiber dependent	N.O./N.C. selectable	NPN	2m (6.5') axial cable	Diagram 1	Figure 1
DFT-AN-1F	\$132.00				M8 (8mm) connector	Diagram 1	Figure 2
DFT-AP-1A	\$132.00			PNP	2m (6.5') axial cable	Diagram 2	Figure 1
DFT-AP-1F	\$132.00				M8 (8mm) connector	Diagram 2	Figure 2

Dimensions

(mm)

Figure 1

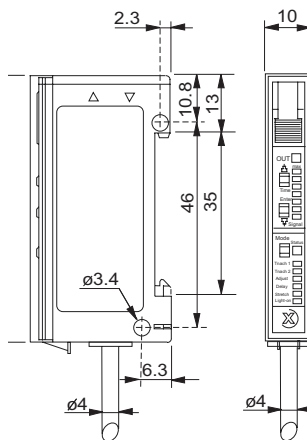
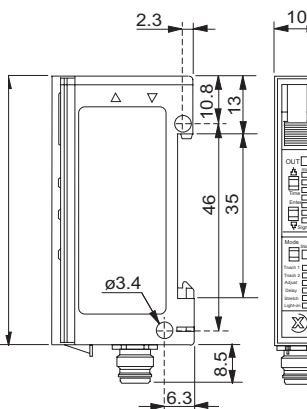


Figure 2



Specifications		
Type	DFT-AN-1*	DFT-AP-1*
Sensing Distance	See Optical Fibers Table	
Light Spot Diameter	N/A	
Emission	red (680nm)	
Sensitivity	Dual Teach function	
Output Type	NPN Light On or Dark On Selectable	PNP Light On or Dark On Selectable
Operating Voltage	10-30VDC	
No-Load Supply Current	≤25mA	
Operating (Load) Current	≤200mA	
Off-state (Leakage) Current	≤0.1mA	
Voltage Drop	2V maximum at 200mA	
Switching Frequency	1.5kHz	
Ripple	≤20%	
Time Delay Before Availability (tv)	80ms	
Short-Circuit Protection	Yes (switch autoresets after overload is removed)	
Operating Temperature	-25° to +55° C (-13° to 131° F)	
Protection Degree	IEC IP64	
LED Indicators -Switching Status	Yellow (output energized)	
Housing Material	PBT	
Lens Material	Acrylic	
Shock/Vibration	See terminology section	
Tightening Torque	N/A	
Weight (cable/connector)	68g (2.39oz) / 17g (0.60oz)	
Connectors	2m (6.5') axial cable; M8 (8mm) connector	
Agency Approvals	UL file E328811	

Switching Element Function		
	Thru-beam and Reflective Models	Diffuse Reflective Models
Light on	N.C.	N.O.
Dark on	N.O.	N.C.

Wiring diagrams

Diagram 1

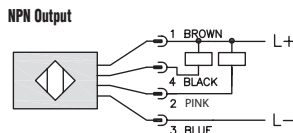
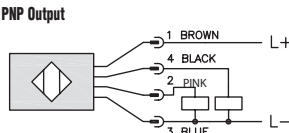
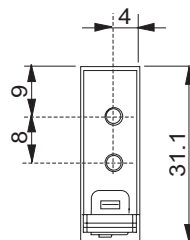
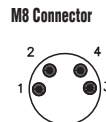


Diagram 2



Connector



DFP Series Fiber Photoelectric Amplifiers



Compact rectangular plastic
DIN-rail mount- DC

- 4 models available
- DIN-rail mounting
- 12-turn potentiometer sensitivity setting with illuminated scale
- NPN or PNP, Light-on/Dark-on selectable outputs
- Red LED with visible spot
- IP64 rated



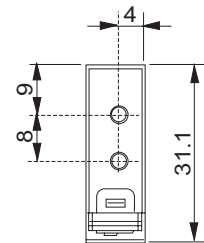
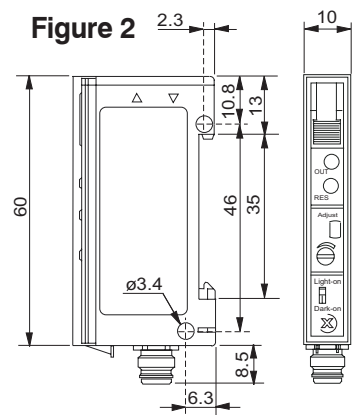
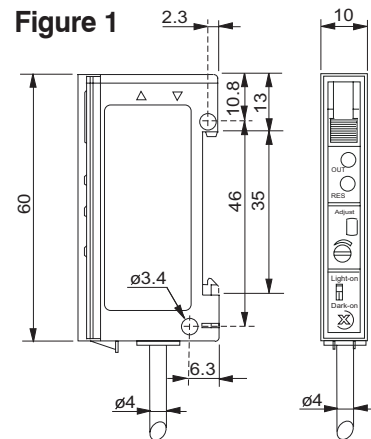
DFP Series Fiber Photoelectric Amplifier Selection Chart							
Part Number	Price	Sensing Range	Output State	Logic	Connection	Wiring	Dimensions
DFP-AN-1A	\$83.00	Optical fiber dependent	N.O./N.C. selectable	NPN	2m (6.5') axial cable	Diagram 1	Figure 1
DFP-AN-1F	\$83.00				M8 (8mm) connector	Diagram 1	Figure 2
DFP-AP-1A	\$83.00			PNP	2m (6.5') axial cable	Diagram 2	Figure 1
DFP-AP-1F	\$83.00				M8 (8mm) connector	Diagram 2	Figure 2

Specifications		
Type	DFP-AN-1*	DFP-AP-1*
Sensing Distance	See Optical Fibers Table	
Light Spot Diameter	N/A	
Emission	red (680nm)	
Sensitivity	12-turn Potentiometer with illuminated scale	
Output Type	NPN Light On or Dark On Selectable	PNP Light On or Dark On Selectable
Operating Voltage	10-30VDC	
No-load Supply Current	≤15mA	
Operating (Load) Current	≤200mA	
Off-state (Leakage) Current	≤0.1mA	
Voltage Drop	2V maximum at 200mA	
Switching Frequency	1.5kHz	
Ripple	≤20%	
Time Delay Before Availability (tv)	300ms	
Short-Circuit Protection	Yes (switch autoresets after overload is removed)	
Operating Temperature	-25° to 55°C (-13° to 131°F)	
Protection Degree	IEC IP64	
LED Indicator - Switching Status	Pin 4 (black): switching status - yellow Pin 2 (pink): excess gain status - green	
Housing Material	PBT	
Lens Materials	Acrylic	
Shock/Vibration	See terminology section	
Tightening Torque	N/A	
Weight (cable/connector)	69g (2.44oz) / 18g (0.63oz)	
Connectors	2m (6.5') axial cable; M8 (8mm) connector	
Agency Approvals	UL file E32881	

Switching Element Function		
	Thru-beam and Reflective Models	Diffuse Reflective Models
Light on	N.C.	N.O.
Dark on	N.O.	N.C.

Dimensions

(mm)



Wiring diagrams

Diagram 1

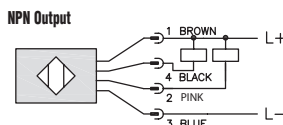
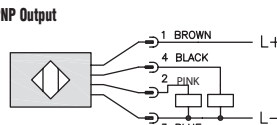


Diagram 2



Connector



OPT Series Fiber Photoelectric Amplifiers

Description



- 4 models available
- DIN-rail mounting
- Bargraph signal-strength indicator
- NPN or PNP, Push Pull, Light-on/Dark-on selectable outputs
- Red LED with visible spot
- IO-Link available on select units
- IP50/IP65 rated
- Key potentiometer, teach-in
- Large detection and working range
- Recognition of transparent objects
- Diffuse and Thru Beam operation mode are possible.

OPT Series Fiber Photoelectric Amplifier Selection Chart

Part Number	Price	Sensing Range	Output State	Logic	Connection	Fiber Channel	Wiring	Dimensions
OPT2040	\$79.00	Optical fiber dependent	N.O. / N.C. selectable	NPN / PNP / Push Pull	4-pin M8 (8 mm) quick-disconnect	1	Diagram 1	Figure 1
OPT2041	\$145.00			PNP / Push Pull			Diagram 2	Figure 2
OPT2042	\$300.00			4-pin M12 and (2) 8-pin M12 quick-disconnect	3 (Expandable to 13)	Diagram 3	Figure 3	
OPT2043*	\$120.00			N/A		1	—	Figure 4



* OPT2043 is an add-on module to OPT2042 (not standalone)

Specifications

Type	OPT2040	OPT2041	OPT2042	OPT2043 (add-on module)
Sensing Distance	See optical fibers table			
Light Spot Diameter	N/A			
Emission	Red (660nm)			
Sensitivity	Teach Functions			
Output Type	Configurable NC/NO PNP/NPN/ Push Pull	Configurable PNP/ PushPull	Configurable NC/NO PNP/NPN PushPull	Output handled thru OPT2042 Master
Operating Voltage	10 to 30VDC	18 to 30VDC		N/A
No-Load Supply Current	< 40mA		<70mA	Add +10 mA to 2042 per add on module to OPT2043
Operating (Load) Current	200mA	100mA	100mA	Refer to OPT2042
Off-state (Leakage) Current	> 0.1 ma			
Voltage Drop	< 2.5 VDC			
Switching Frequency	2kHz	4kHz	2kHz	
Ripple	< 15%			
Time Delay Before Availability (tv)	250µs	125µs	250µs	+70µs to 2042 per add on module to OPT2043
Short-Circuit Protection	Yes			
Operating Temperature	-25 to 60°C (-13 to +140°F)			
Protection Degree	IP65		IP50	
Led Indicators - Switching Status	Yellow LED	Via display window		
Housing Material	Plastic			
Lens Material	N/A			
IO-Link Version	N/A	1.0		
IO-Link Parameter	N/A	> 12		
Shock/Vibration	See Terminology Section			
Tightening Torque	N/A			
Weight	0.1 lbs	0.3 lbs	0.4 lbs	0.1 lbs
Connectors	M8 4 Pole		(1) M12 4 pole (2) M12 8 pole	This is an add-on unit that connects to master unit OPT2042
Agency Approvals	CE, cULus E189727			

OPT Series Fiber Photoelectric Amplifiers

Dimensions

mm [inch]

Figure 1

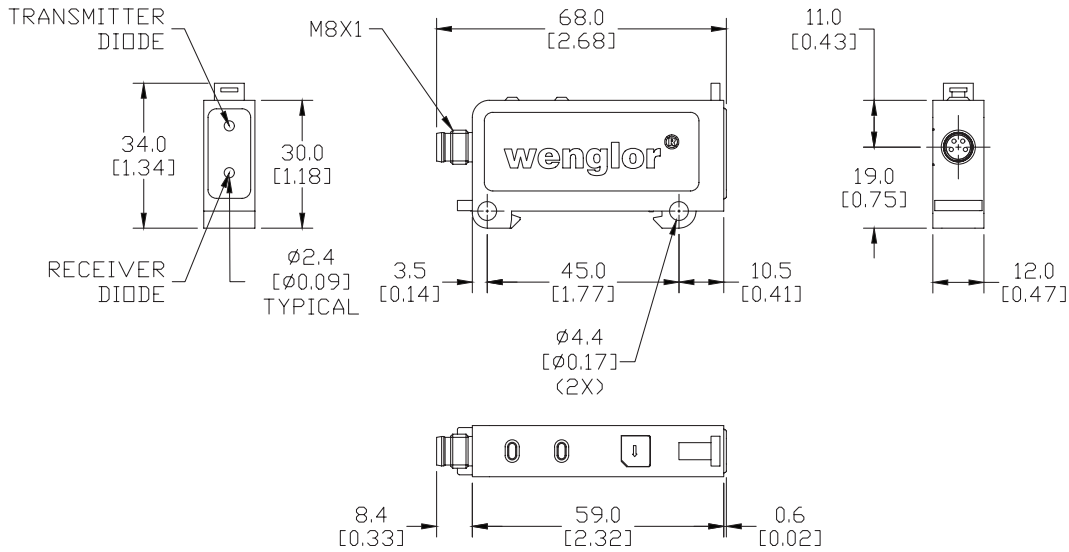
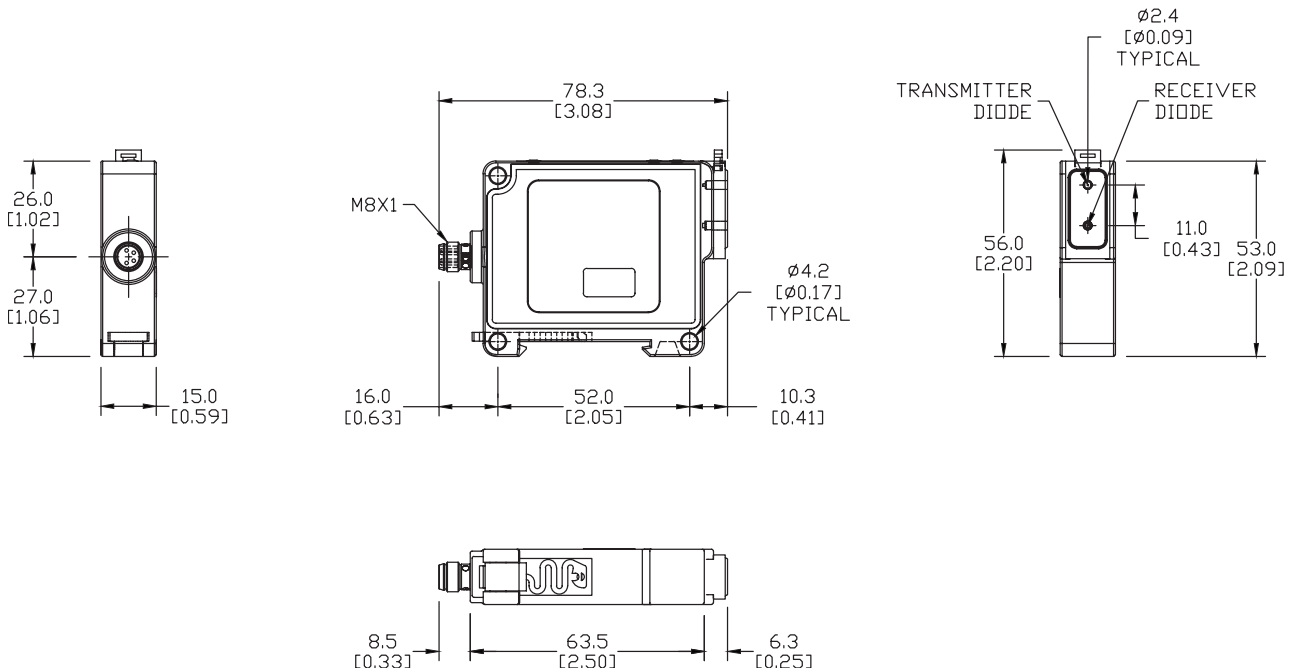


Figure 2



SEE OUR WEBSITE: WWW.AUTOMATIONDIRECT.COM FOR COMPLETE ENGINEERING DRAWINGS.

OPT Series Fiber Photoelectric Amplifiers

Dimensions

mm [inch]

Figure 3

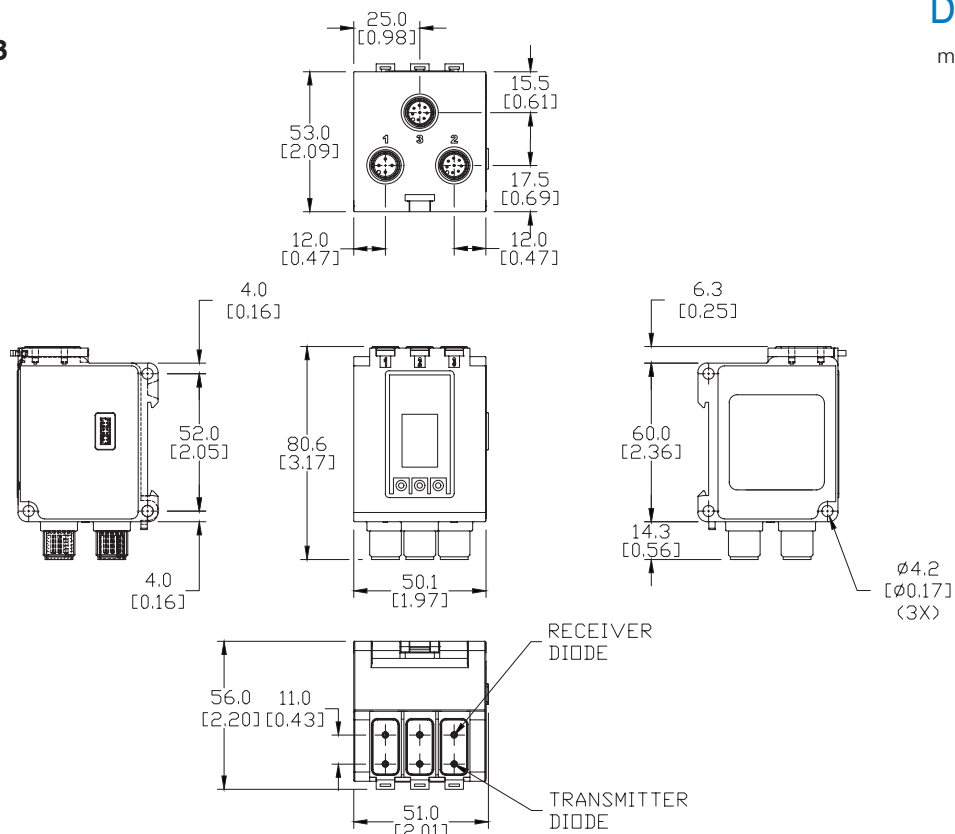
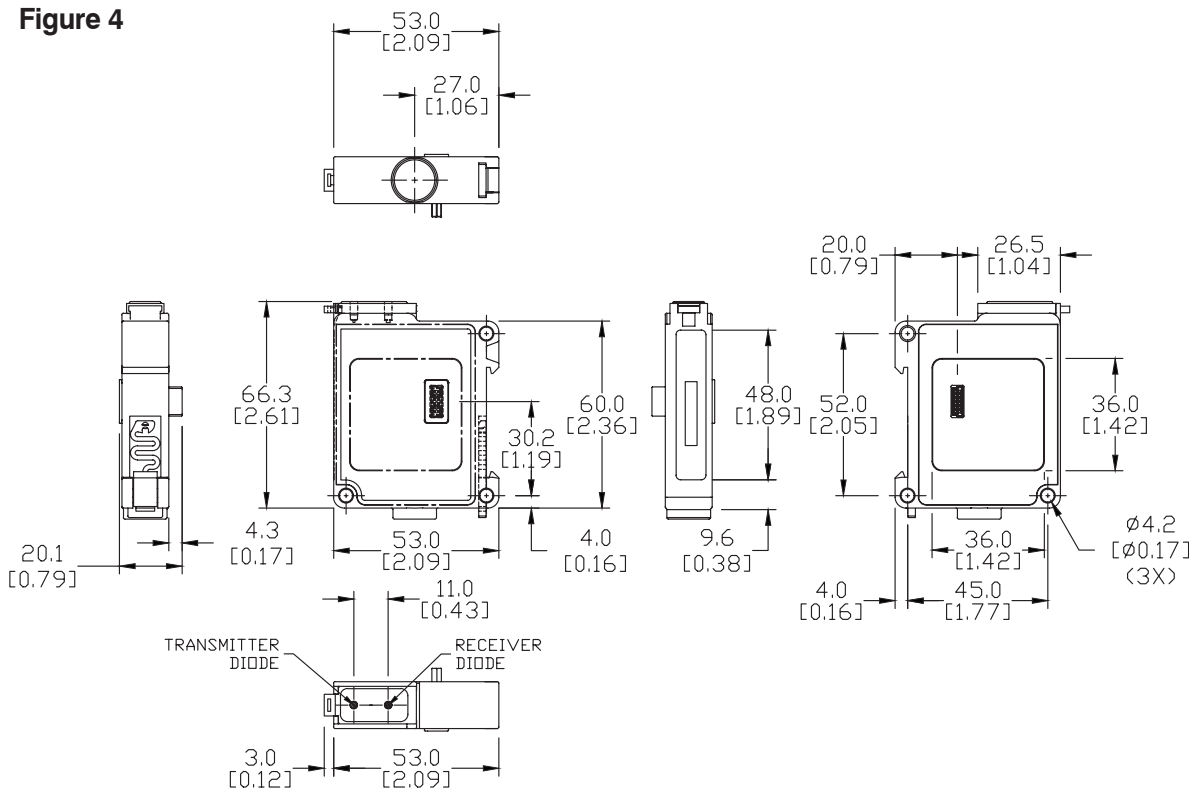


Figure 4

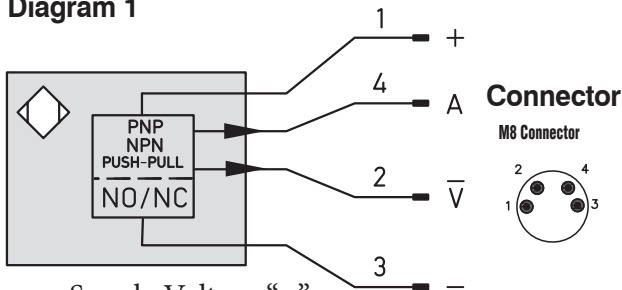


SEE OUR WEBSITE: WWW.AUTOMATIONDIRECT.COM FOR COMPLETE ENGINEERING DRAWINGS.

OPT Series Fiber Photoelectric Amplifiers

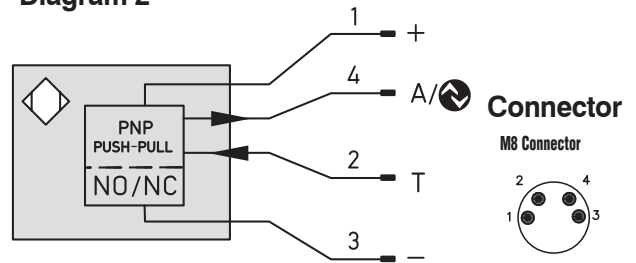
Wiring diagrams

Diagram 1



- + Supply Voltage “+”
- A Switching Output
- \bar{V} Contamination Output/Error Output (NC)
- Supply Voltage “0 V”

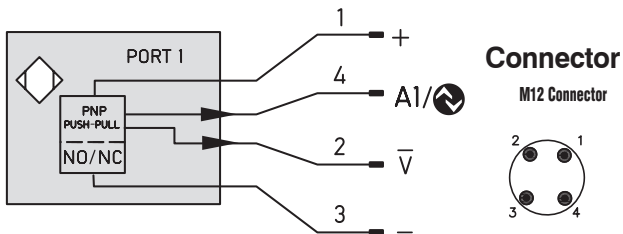
Diagram 2



- + Supply Voltage “+”
- A/IO-Link Switching Output/IO-Link
- T Teach Input
- Supply Voltage “0 V”

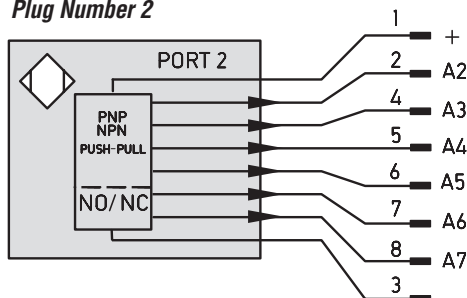
Diagram 3

Plug Number 1

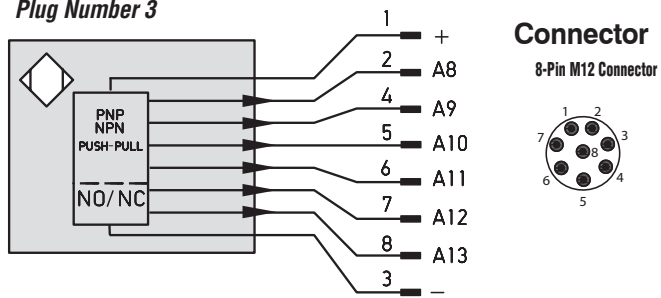


- + Supply Voltage “+”
- A1/IO-Link Switching Output /IO-Link
- A Switching Output (1, 2, 3...)
- \bar{V} Contamination Output/Error Output (NC)
- Supply Voltage “0 V”

Plug Number 2



Plug Number 3



Cuttable Fiber Optic Cable

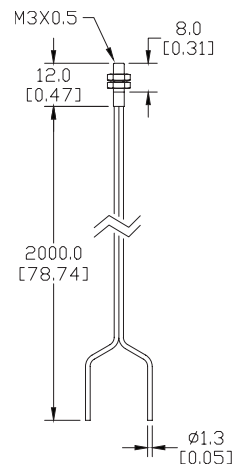
Dimensions

mm [inch]

OPT2050 Diffuse (Reflex) Mode

\$37.00

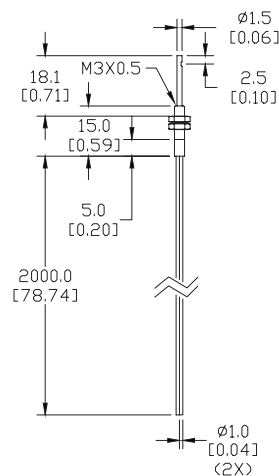
Specifications	
Optical Fiber Core Ø	0.5 mm
Sensing Distance with OPT series	60mm
Fiber Length (L)	2m
Fiber Bending Radius	15mm
Free Cut	Yes
Head Size	M3
Thread Pitch	0.5
Temperature Range	-40 to 85°C [-40 to 185°F]
Fiber Materials	PMMA
Sleeve Materials	PE (black)
Head Materials	Stainless steel
Fiber Distribution	Parallel arrangement
Opening Angle	55 degrees
Diameter Jacket	1mm
Light Emission	Straight



OPT2051 Diffuse (Reflex) Mode

\$103.00

Specifications	
Optical Fiber Core Ø	0.5 mm
Sensing Distance with OPT series	12mm
Fiber Length (L)	2m
Fiber Bending Radius	15mm
Free Cut	Yes
Head Size	M3
Thread Pitch	0.5
Temperature Range	-40 to 85°C [-40 to 185°F]
Fiber Materials	PMMA
Sleeve Materials	PE (black)
Head Materials	Stainless steel
Fiber Distribution	Parallel arrangement
Opening Angle	55 degrees
Diameter Jacket	1mm
Light Emission	Sidewise



Cuttable Fiber Optic Cable

OPT2052 Diffuse (Reflex) Mode

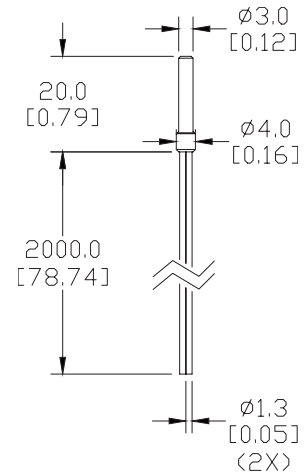
\$48.00

Specifications	
Optical Fiber Core Ø	0.5 mm
Sensing Distance with OPT series	60mm
Fiber Length (L)	2m
Fiber Bending Radius	15mm
Free Cut	Yes
Head Size	3mm
Thread Pitch	NA
Temperature Range	-40 to 85°C [-40 to 185°F]
Fiber Materials	PMMA
Sleeve Materials	PE (black)
Head Materials	Stainless steel
Fiber Distribution	Coaxial arrangement
Opening Angle	55 degrees
Diameter Jacket	1.3 mm
Light Emission	Straight



Dimensions

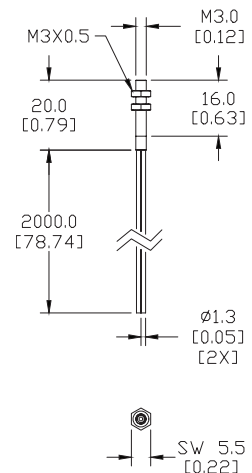
mm [inch]



OPT2053 Diffuse (Reflex) Mode

\$48.00

Specifications	
Optical Fiber Core Ø	0.5 mm
Sensing Distance with OPT series	60mm
Fiber Length (L)	2m
Fiber Bending Radius	15mm
Free Cut	Yes
Head Size	M3
Thread Pitch	0.5
Temperature Range	-40 to 85°C [-40 to 185°F]
Fiber Materials	PMMA
Sleeve Materials	PE (black)
Head Materials	Stainless steel
Fiber Distribution	Coaxial Arrangement
Opening Angle	55 degrees
Diameter Jacket	1.3 mm
Light Emission	Straight



Cuttable Fiber Optic Cable

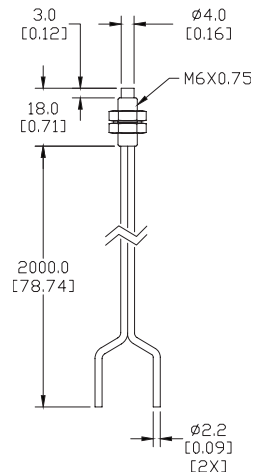
Dimensions

mm [inch]

OPT2054 Diffuse (Reflex) Mode

\$37.00

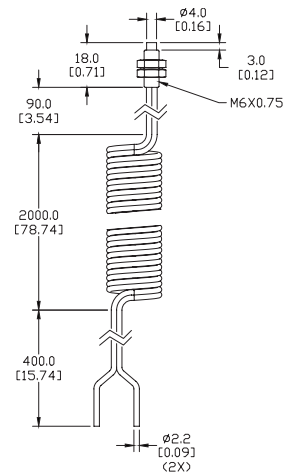
Specifications	
Optical Fiber Core Ø	1mm
Sensing Distance with OPT series	160mm
Fiber Length (L)	2m
Fiber Bending Radius	30mm
Free Cut	Yes
Head Size	M6
Thread Pitch	0.75
Temperature Range	-40 to 85°C [-40 to 185°F]
Fiber Materials	PMMA
Sleeve Materials	PE (black)
Head Materials	Nickel-plated brass
Fiber Distribution	Parallel arrangement
Opening Angle	55 degrees
Diameter Jacket	2.2 mm
Light Emission	Straight



OPT2055 Diffuse (Reflex) Mode

\$76.00

Specifications	
Optical Fiber Core Ø	1mm
Sensing Distance with OPT series	60mm
Fiber Length (L)	2m
Fiber Bending Radius	30mm
Free Cut	Yes
Head Size	M6
Thread Pitch	0.75
Temperature Range	-40 to 85°C [-40 to 185°F]
Fiber Materials	PMMA
Sleeve Materials	PE (black)
Head Materials	Nickel-plated brass
Fiber Distribution	Parallel arrangement
Opening Angle	55 degrees
Diameter Jacket	2.2 mm
Light Emission	Straight



* 2000.0 mm maximum extended coil length.

Cuttable Fiber Optic Cable

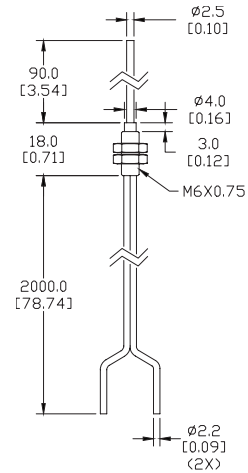
Dimensions

mm [inch]

OPT2056 Diffuse (Reflex) Mode

\$43.00

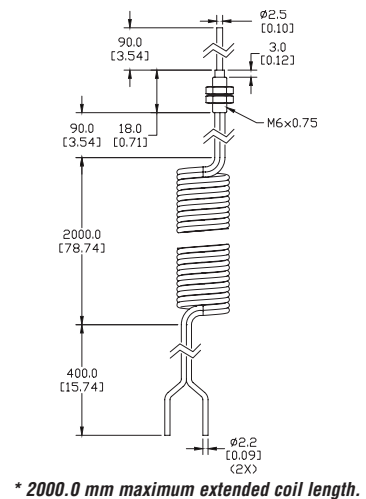
Specifications	
Optical Fiber Core Ø	1mm
Sensing Distance with OPT series	160mm
Fiber Length (L)	2m
Fiber Bending Radius	30mm
Free Cut	Yes
Head Size	M6
Thread Pitch	0.75
Temperature Range	-40 to 85 °C [-40 to 185 °F]
Fiber Materials	PMMA
Sleeve Materials	PE (black)
Head Materials	Stainless steel
Fiber Distribution	Parallel arrangement
Opening Angle	55 degrees
Diameter Jacket	2.2 mm
Light Emission	Straight
Flexible Endpot	Yes



OPT2057 Diffuse (Reflex) Mode

\$76.00

Specifications	
Optical Fiber Core Ø	1mm
Sensing Distance with OPT series	60mm
Fiber Length (L)	2m
Fiber Bending Radius	30mm
Free Cut	Yes
Head Size	M6
Thread Pitch	0.75
Temperature Range	-40 to 85 °C [-40 to 185 °F]
Fiber Materials	PMMA
Sleeve Materials	PE (black)
Head Materials	Stainless steel
Fiber Distribution	Parallel arrangement
Opening Angle	55 degrees
Diameter Jacket	2.2 mm
Light Emission	Straight
Flexible Endpot	Yes



Cuttable Fiber Optic Cable

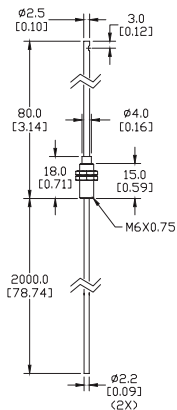
Dimensions

mm [inch]

OPT2058 Diffuse (Reflex) Mode

\$128.00

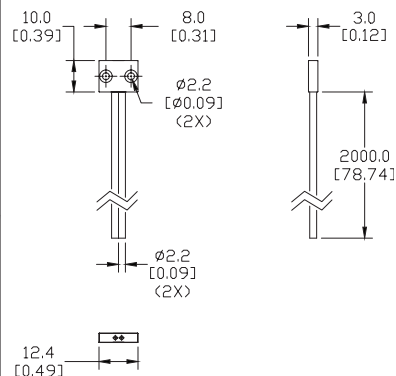
Specifications	
Optical Fiber Core Ø	1mm
Sensing Distance with OPT series	60mm
Fiber Length (L)	2m
Fiber Bending Radius	30mm
Free Cut	Yes
Head Size	M6
Thread Pitch	0.75
Temperature Range	-40 to 85°C [-40 to 185°F]
Fiber Materials	PMMA
Sleeve Materials	PE (black)
Head Materials	Stainless steel
Fiber Distribution	Parallel arrangement
Opening Angle	55 degrees
Diameter Jacket	2.2 mm
Light Emission	Sidewise



OPT2059 Diffuse (Reflex) Mode

\$96.00

Specifications	
Optical Fiber Core Ø	1mm
Sensing Distance with OPT series	160mm
Fiber Length (L)	2m
Fiber Bending Radius	20mm
Free Cut	Yes
Head Size	12mm flat
Thread Pitch	NA
Temperature Range	-40 to 85°C [-40 to 185°F]
Fiber Materials	PMMA
Sleeve Materials	PE (black)
Head Materials	Aluminum
Fiber Distribution	Parallel arrangement
Opening Angle	55 degrees
Diameter Jacket	2.2 mm
Light Emission	Straight



Cuttable Fiber Optic Cable

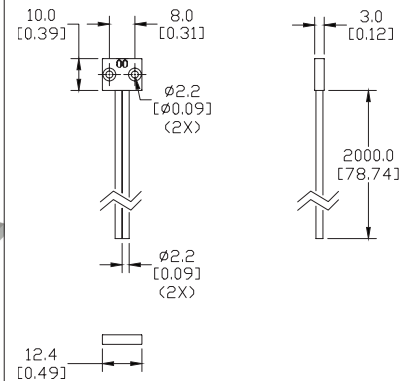
Dimensions

mm [inch]

OPT2060 Diffuse (Reflex) Mode

\$96.00

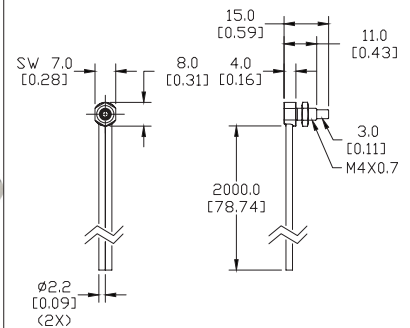
Specifications	
Optical Fiber Core Ø	1mm
Sensing Distance with OPT series	50mm
Fiber Length (L)	2m
Fiber Bending Radius	20mm
Free Cut	Yes
Head Size	12mm flat
Thread Pitch	NA
Temperature Range	-40 to 85°C [-40 to 185°F]
Fiber Materials	PMMA
Sleeve Materials	PE (black)
Head Materials	Aluminum
Fiber Distribution	Parallel arrangement
Opening Angle	55 degrees
Diameter Jacket	2.2 mm
Light Emission	Sidewise



OPT2061 Diffuse (Reflex) Mode

\$96.00

Specifications	
Optical Fiber Core Ø	1mm
Sensing Distance with OPT series	70mm
Fiber Length (L)	2m
Fiber Bending Radius	50mm
Free Cut	Yes
Head Size	M4
Thread Pitch	0.7
Temperature Range	-40 to 85°C [-40 to 185°F]
Fiber Materials	PMMA
Sleeve Materials	PE (black)
Head Materials	Stainless steel
Fiber Distribution	Parallel arrangement
Opening Angle	55 degrees
Diameter Jacket	2.2 mm
Light Emission	Sidewise



Cuttable Fiber Optic Cable

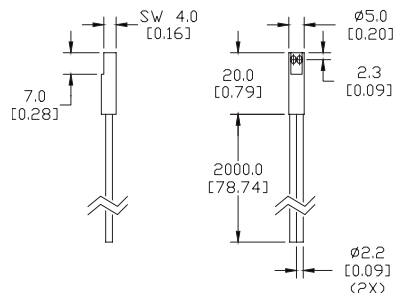
Dimensions

mm [inch]

OPT2062 Diffuse (Reflex) Mode

\$96.00

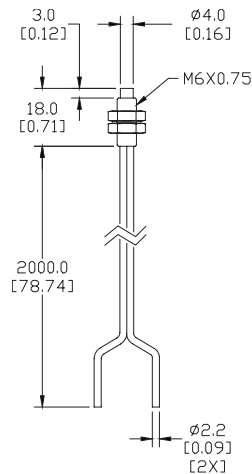
Specifications	
Optical Fiber Core Ø	1mm
Sensing Distance with OPT series	50mm
Fiber Length (L)	2m
Fiber Bending Radius	20mm
Free Cut	Yes
Head Size	5mm
Thread Pitch	NA
Temperature Range	-40 to 85°C [-40 to 185°F]
Fiber Materials	PMMA
Sleeve Materials	PE (black)
Head Materials	Stainless steel
Fiber Distribution	Parallel arrangement
Opening Angle	55 degrees
Diameter Jacket	2.2 mm
Light Emission	Sidewise



OPT2063 Diffuse (Reflex) Mode

\$96.00

Specifications	
Optical Fiber Core Ø	1mm
Sensing Distance with OPT series	90mm
Fiber Length (L)	2m
Fiber Bending Radius	20mm
Free Cut	Yes
Head Size	M6
Thread Pitch	0.75
Temperature Range	-40 to 85°C [-40 to 185°F]
Fiber Materials	PMMA
Sleeve Materials	PE (black)
Head Materials	Nickel-plated brass
Fiber Distribution	Parallel arrangement
Opening Angle	55 degrees
Diameter Jacket	2.2 mm
Light Emission	Straight



Cuttable Fiber Optic Cable

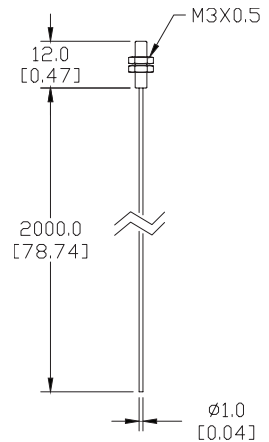
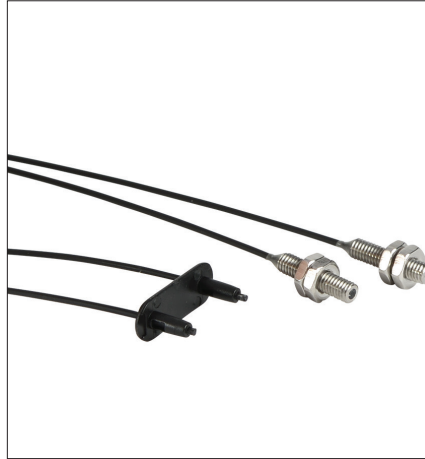
Dimensions

mm [inch]

OPT2064 Through-Beam Mode

\$40.00

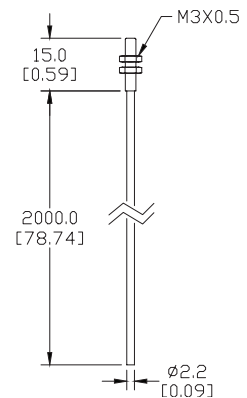
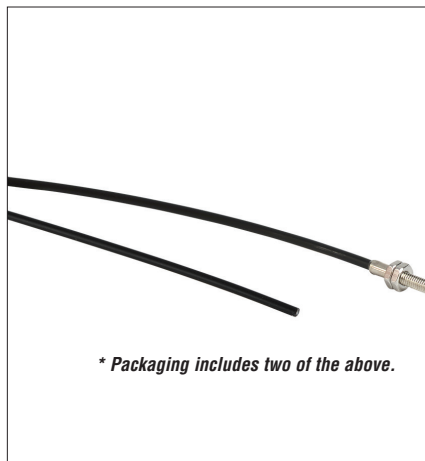
Specifications	
Optical Fiber Core Ø	0.5 mm
Sensing Distance with OPT series	160mm
Fiber Length (L)	2m
Fiber Bending Radius	15mm
Free Cut	Yes
Head Size	M3
Thread Pitch	0.5
Temperature Range	-40 to 85°C [-40 to 185°F]
Fiber Materials	PMMA
Sleeve Materials	PE (black)
Head Materials	Stainless steel
Fiber Distribution	Parallel arrangement
Opening Angle	55 degrees
Diameter Jacket	1mm
Light Emission	Straight



OPT2065 Through-Beam Mode

\$37.00

Specifications	
Optical Fiber Core Ø	1mm
Sensing Distance with OPT series	400mm
Fiber Length (L)	2m
Fiber Bending Radius	30mm
Free Cut	Yes
Head Size	M3
Thread Pitch	0.5
Temperature Range	-40 to 85°C [-40 to 185°F]
Fiber Materials	PMMA
Sleeve Materials	PE (black)
Head Materials	Nickel-plated brass
Fiber Distribution	Parallel arrangement
Opening Angle	55 degrees
Diameter Jacket	2.2 mm
Light Emission	Straight



Cuttable Fiber Optic Cable

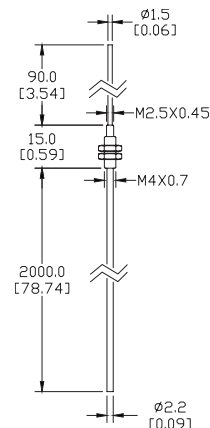
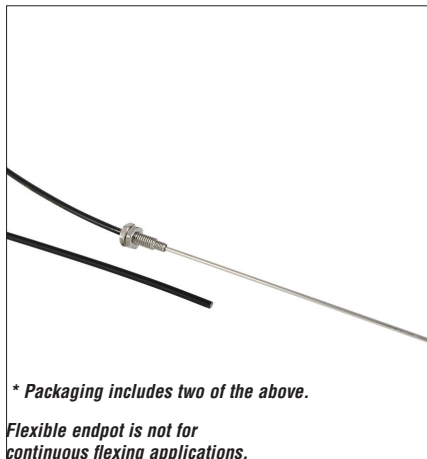
OPT2066 Through-Beam Mode

\$43.00

Dimensions

mm [inch]

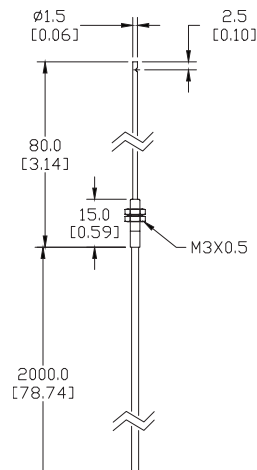
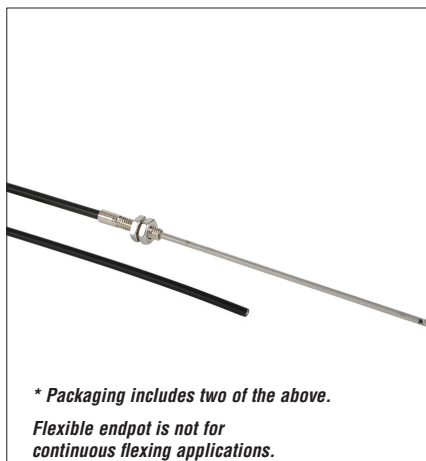
Specifications	
Optical Fiber Core Ø	1mm
Sensing Distance with OPT series	400mm
Fiber Length (L)	2m
Fiber Bending Radius	30mm
Free Cut	Yes
Head Size	M4
Thread Pitch	0.7
Temperature Range	-40 to 85 °C [-40 to 185 °F]
Fiber Materials	PMMA
Sleeve Materials	PE (black)
Head Materials	Stainless steel
Fiber Distribution	Parallel arrangement
Opening Angle	55 degrees
Diameter Jacket	2.2 mm
Light Emission	Straight
Flexible endpoint	Yes



OPT2067 Through-Beam Mode

\$106.00

Specifications	
Optical Fiber Core Ø	1mm
Sensing Distance with OPT series	200mm
Fiber Length (L)	2m
Fiber Bending Radius	30mm
Free Cut	Yes
Head Size	M3
Thread Pitch	0.5
Temperature Range	-40 to 85 °C [-40 to 185 °F]
Fiber Materials	PMMA
Sleeve Materials	PE (black)
Head Materials	Stainless steel
Fiber Distribution	Parallel arrangement
Opening Angle	55 degrees
Diameter Jacket	2.2 mm
Light Emission	Sidewise
Flexible endpoint	Yes

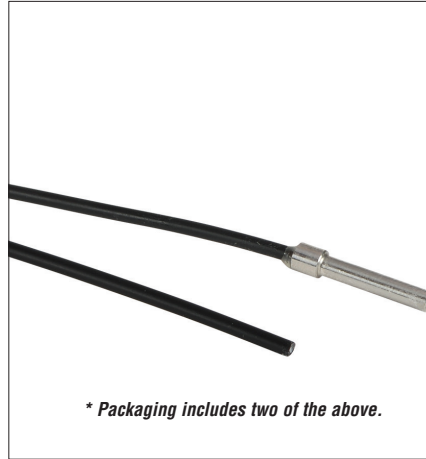


Cuttable Fiber Optic Cable

OPT2068 Through-Beam Mode

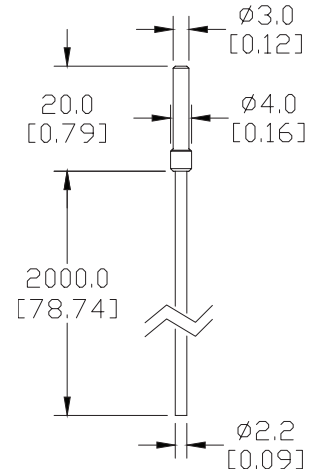
\$48.00

Specifications	
Optical Fiber Core Ø	1mm
Sensing Distance with OPT series	350mm
Fiber Length (L)	2m
Fiber Bending Radius	20mm
Free Cut	Yes
Head Size	3mm
Thread Pitch	NA
Temperature Range	-40 to 85°C [-40 to 185°F]
Fiber Materials	PMMA
Sleeve Materials	PE (black)
Head Materials	Stainless steel
Fiber Distribution	Parallel arrangement
Opening Angle	55 degrees
Diameter Jacket	2.2 mm
Light Emission	Straight



Dimensions

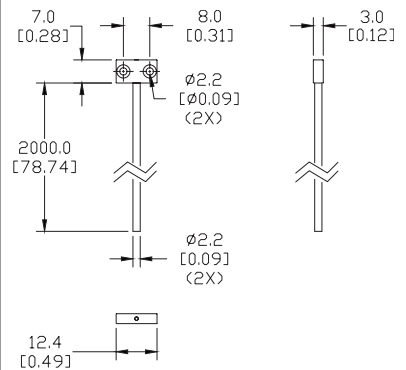
mm [inch]



OPT2069 Through-Beam Mode

\$96.00

Specifications	
Optical Fiber Core Ø	1mm
Sensing Distance with OPT series	350mm
Fiber Length (L)	2m
Fiber Bending Radius	20mm
Free Cut	Yes
Head Size	12mm flat
Thread Pitch	NA
Temperature Range	-40 to 85°C [-40 to 185°F]
Fiber Materials	PMMA
Sleeve Materials	PE (black)
Head Materials	Aluminum
Fiber Distribution	Parallel arrangement
Opening Angle	55 degrees
Diameter Jacket	2.2 mm
Light Emission	Straight



Cuttable Fiber Optic Cable

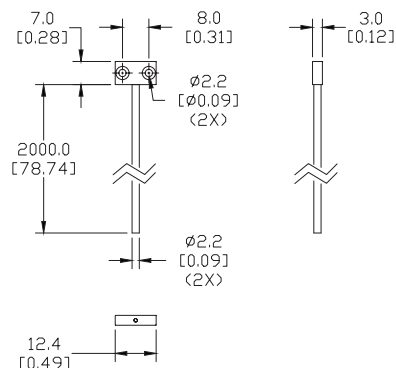
OPT2070 Through-Beam Mode

\$96.00

Dimensions

mm [inch]

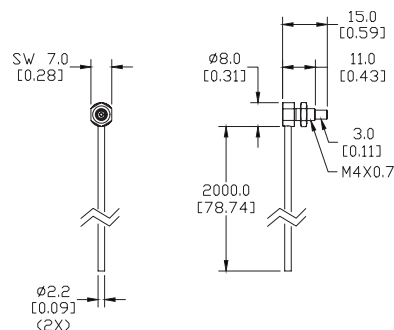
Specifications	
Optical Fiber Core Ø	1mm
Sensing Distance with OPT series	200mm
Fiber Length (L)	2m
Fiber Bending Radius	20mm
Free Cut	Yes
Head Size	NA
Thread Pitch	NA
Temperature Range	-40 to 85°C [-40 to 185°F]
Fiber Materials	PMMA
Sleeve Materials	PE (black)
Head Materials	Aluminum
Fiber Distribution	Parallel arrangement
Opening Angle	55 degrees
Diameter Jacket	2.2 mm
Light Emission	Sidewise



OPT2071 Through-Beam Mode

\$96.00

Specifications	
Optical Fiber Core Ø	1mm
Sensing Distance with OPT series	250mm
Fiber Length (L)	2m
Fiber Bending Radius	2mm
Free Cut	Yes
Head Size	M4
Thread Pitch	0.7
Temperature Range	-40 to 85°C [-40 to 185°F]
Fiber Materials	PMMA
Sleeve Materials	PE (black)
Head Materials	Stainless steel
Fiber Distribution	Parallel arrangement
Opening Angle	55 degrees
Diameter Jacket	2.2 mm
Light Emission	Sidewise



Cuttable Fiber Optic Cable

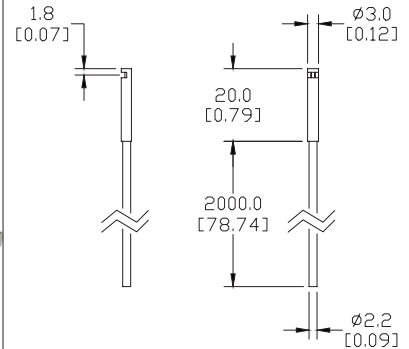
OPT2072 Through-Beam Mode

\$96.00

Dimensions

mm [inch]

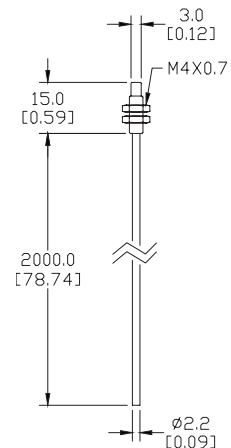
Specifications	
Optical Fiber Core Ø	1mm
Sensing Distance with OPT series	200mm
Fiber Length (L)	2m
Fiber Bending Radius	20mm
Free Cut	Yes
Head Size	3mm
Thread Pitch	NA
Temperature Range	-40 to 85°C [-40 to 185°F]
Fiber Materials	PMMA
Sleeve Materials	PE (black)
Head Materials	Stainless steel
Fiber Distribution	Parallel arrangement
Opening Angle	55 degrees
Diameter Jacket	2.2 mm
Light Emission	Sidewise



OPT2073 Through-Beam Mode

\$96.00

Specifications	
Optical Fiber Core Ø	1mm
Sensing Distance with OPT series	220mm
Fiber Length (L)	2m
Fiber Bending Radius	2mm
Free Cut	Yes
Head Size	M4
Thread Pitch	0.7
Temperature Range	-40 to 85°C [-40 to 185°F]
Fiber Materials	PMMA
Sleeve Materials	PE (black)
Head Materials	Stainless steel
Fiber Distribution	Parallel arrangement
Opening Angle	55 degrees
Diameter Jacket	2.2 mm
Light Emission	Straight



Cuttable Fiber Optic Cable

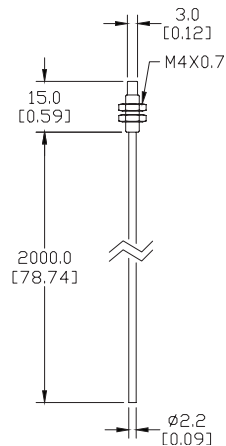
OPT2074 Through-Beam Mode

\$32.00

Dimensions

mm [inch]

Specifications	
Optical Fiber Core Ø	1mm
Sensing Distance with OPT series	350mm
Fiber Length (L)	2m
Fiber Bending Radius	20mm
Free Cut	Yes
Head Size	M4
Thread Pitch	0.7
Temperature Range	-40 to 85°C [-40 to 185°F]
Fiber Materials	PMMA
Sleeve Materials	PE (black)
Head Materials	Stainless steel
Fiber Distribution	Parallel arrangement
Opening Angle	55 degrees
Diameter Jacket	2.2 mm
Light Emission	Straight



Glass Fiber Optic Cable

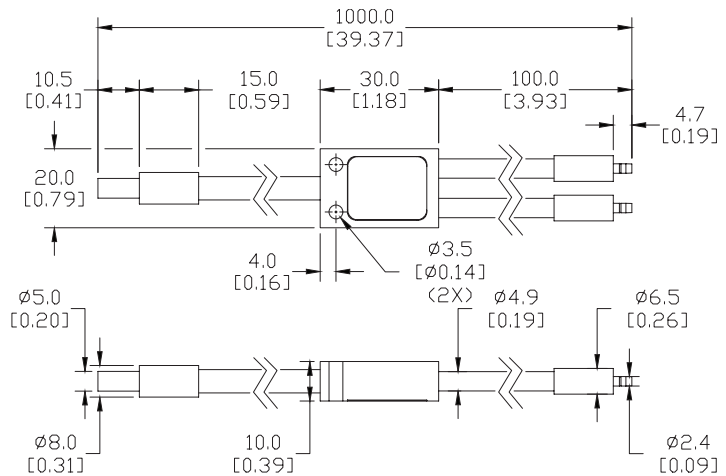
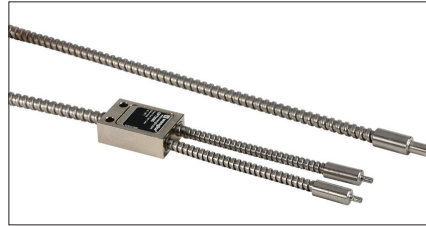
OPT2080 Diffuse (Reflex) Mode

\$127.00

Dimensions

mm [inch]

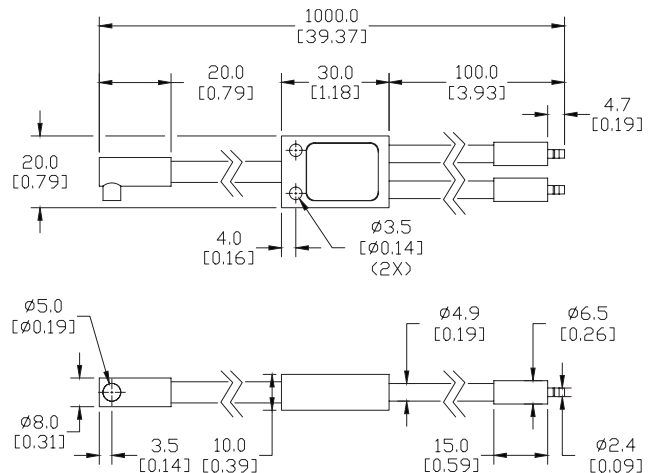
Specifications	
Optical Fiber Core Ø	1.6 mm
Sensing Distance with OPT series	160mm
Fiber Length (L)	1m
Fiber Bending Radius	60mm
Free Cut	No
Head Size	5mm
Thread Pitch	NA
Temperature Range	-25 to 180 °C [-13 to 365°F]
Fiber Materials	Glass
Sleeve Materials	Stainless steel
Head Materials	Stainless steel
Fiber Diameter	50µm
Fiber Distribution	Statistic mixture
Opening Angle	68 degrees
Light Emission	Straight



OPT2081 Diffuse (Reflex) Mode

\$125.00

Specifications	
Optical Fiber Core Ø	1.6 mm
Sensing Distance with OPT series	160mm
Fiber Length (L)	1m
Fiber Bending Radius	50mm
Free Cut	No
Head Size	5mm
Thread Pitch	NA
Temperature Range	-25 to 180 °C [-13 to 365°F]
Fiber Materials	Glass
Sleeve Materials	Nickel-plated brass
Head Materials	Aluminum
Fiber Diameter	50µm
Fiber Distribution	Statistic mixture
Opening Angle	68 degrees
Light Emission	Sidewise



Glass Fiber Optic Cable

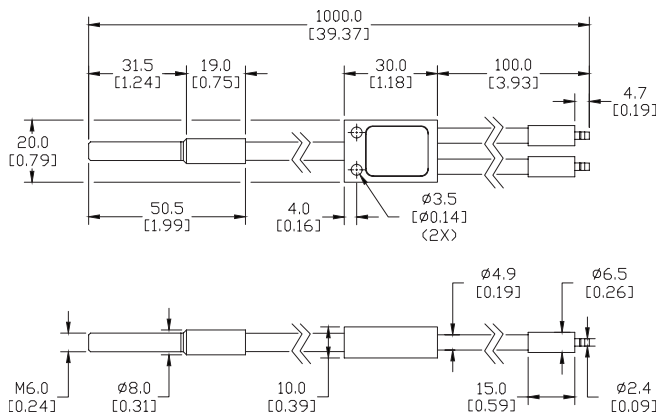
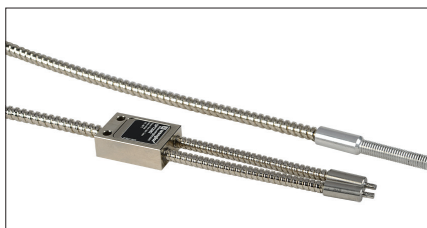
OPT2082 Diffuse (Reflex) Mode

\$117.00

Dimensions

mm [inch]

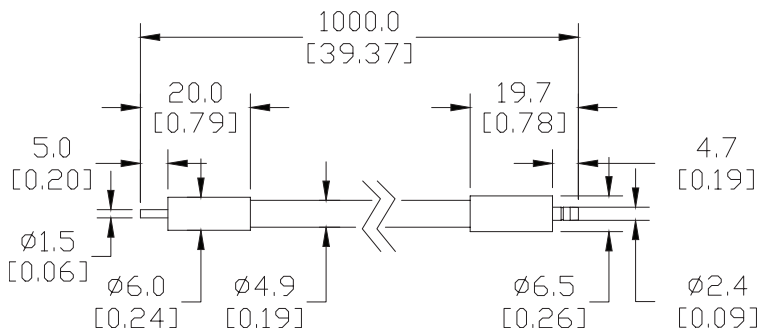
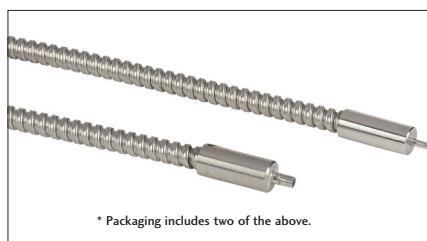
Specifications	
Optical Fiber Core Ø	1.6 mm
Sensing Distance with OPT series	160mm
Fiber Length (L)	1m
Fiber Bending Radius	50mm
Free Cut	No
Head Size	M6
Thread Pitch	1.0
Temperature Range	-25 to 180 °C (-13 to 356 °F)
Fiber Materials	Glass
Sleeve Materials	Nickel-plated brass
Head Materials	Aluminum
Fiber Diameter	50µm
Fiber Distribution	separated bundles
Opening Angle	68 degrees
Light Emission	Straight



OPT2083 Through-Beam Mode

\$104.00

Specifications	
Optical Fiber Core Ø	0.8 mm
Sensing Distance with OPT series	126mm
Fiber Length (L)	1m
Fiber Bending Radius	50mm
Free Cut	No
Head Size	1.2 mm
Thread Pitch	NA
Temperature Range	-25 to 180 °C (-13 to 356 °F)
Fiber Materials	Glass
Sleeve Materials	Stainless steel
Head Materials	Stainless steel
Fiber Diameter	50µm
Fiber Distribution	Parallel arrangement
Opening Angle	68 degrees
Light Emission	Straight



Glass Fiber Optic Cable

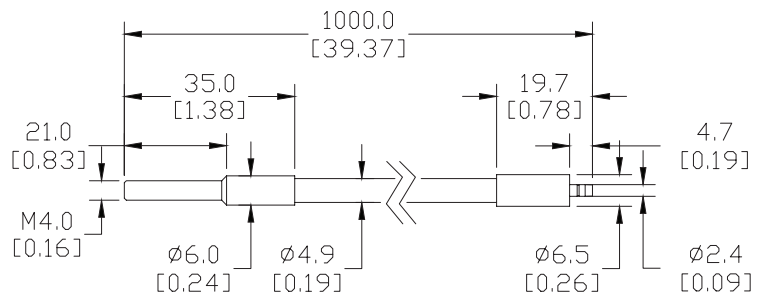
OPT2084 Through-Beam Mode

\$98.00

Dimensions

mm [inch]

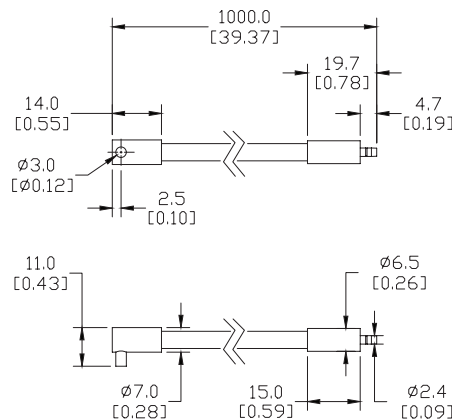
Specifications	
Optical Fiber Core Ø	1.1 mm
Sensing Distance with OPT series	380mm
Fiber Length (L)	1m
Fiber Bending Radius	45mm
Free Cut	No
Head Size	M4
Thread Pitch	0.7
Temperature Range	-25 to 180 °C [-13 to 365°F]
Fiber Materials	Glass
Sleeve Materials	Nickel-plated brass
Head Materials	Aluminum
Fiber Diameter	50µm
Fiber Distribution	Parallel arrangement
Opening Angle	68 degrees
Light Emission	Straight



OPT2085 Through-Beam Mode

\$102.00

Specifications	
Optical Fiber Core Ø	1.1 mm
Sensing Distance with OPT series	380mm
Fiber Length (L)	1m
Fiber Bending Radius	45mm
Free Cut	No
Head Size	Ø3 mm
Thread Pitch	0.7
Temperature Range	-25 to 180 °C [-13 to 365°F]
Fiber Materials	Glass
Sleeve Materials	Nickel-plated brass
Head Materials	Aluminum
Fiber Diameter	50µm
Fiber Distribution	Parallel arrangement
Opening Angle	68 degrees
Light Emission	Sidewise

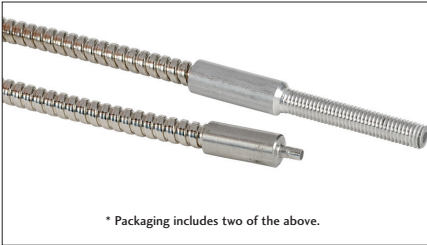


Glass Fiber Optic Cable

OPT2086 Through-Beam Mode

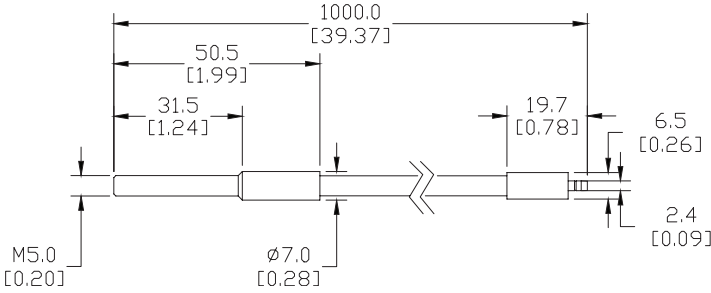
\$112.00

Specifications	
Optical Fiber Core Ø	1.6 mm
Sensing Distance with OPT series	480mm
Fiber Length (L)	1m
Fiber Bending Radius	45mm
Free Cut	No
Head Size	M5
Thread Pitch	0.8
Temperature Range	-25 to 180 °C [-13 to 365 °F]
Fiber Materials	Glass
Sleeve Materials	Nickel-plated brass
Head Materials	Aluminum
Fiber Diameter	50µm
Fiber Distribution	Parallel arrangement
Opening Angle	68 degrees
Light Emission	Straight



Dimensions

mm [inch]



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



SSF Series Fiber Photoelectric Amplifier Selection Chart							
Part Number	Price	Sensing Range	Output State	Logic	Connection	Wiring	Dimensions
SSF-ON-0A	\$45.50	Optical fiber dependent	N.O./N.C. selectable	NPN	2m (6.5') axial cable	Diagram 1	Figure 1
SSF-ON-0E	\$45.50				M12 (12mm) connector		Figure 2
SSF-OP-0A	\$45.50			PNP	2m (6.5') axial cable	Diagram 2	Figure 1
SSF-OP-0E	\$45.50				M12 (12mm) connector		Figure 2

Specifications		
Type	SSF-ON-0*	SSF-OP-0*
Sensing Distance	See Optical Fibers Table	
Light Spot Diameter	N/A	
Emission	Red LED	
Sensitivity	Teach button	
Output Type	NPN Light On or Dark On Selectable	PNP Light On or Dark On Selectable
Operating Voltage	10-30VDC	
No-load Supply Current	≤20mA	
Load Current	≤100mA	
Leakage Current	≤10µA	
Voltage Drop	2V maximum	
Switching Frequency	800Hz	
Ripple	≤10%	
Time Delay Before Availability (tv)	150ms	
Short-Circuit Protection	Yes (switch autoresets after overload is removed)	
Temperature	-25° to +70°C (-13° to 158°F)	
Protection Degree	IP67	
LED Output Indicator	Yellow (output energized)	
Housing Material	PBT	
Lens Materials	Acrylic	
Shock/Vibration	See terminology section	
Tightening Torque	40 Nm (29l lb-ft)	
Weight (cable/connector)	100g (3.53oz)	
Connectors	2m (6.5') axial cable; M12 (12mm) connector	
Agency Approvals	CE	

Switching Element Function		
	Thru-beam and Reflective Models	Diffuse Reflective Models
Light on	N.C.	N.O.
Dark on	N.O.	N.C.

Dimensions

(mm)

Figure 1

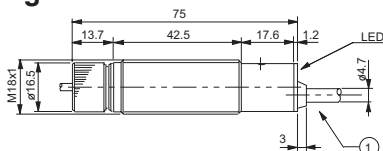
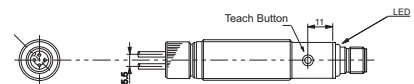
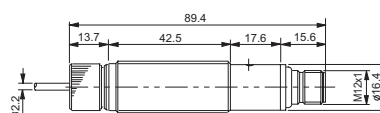


Figure 2



Wiring diagrams

Diagram 1

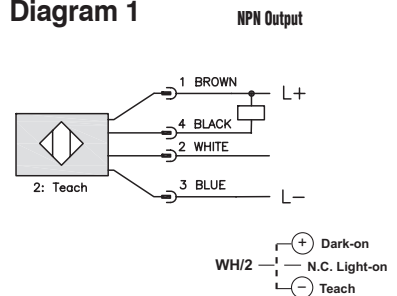
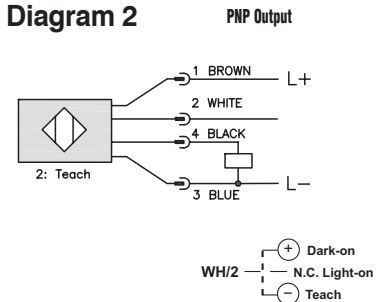


Diagram 2



Connector

M12 Connector

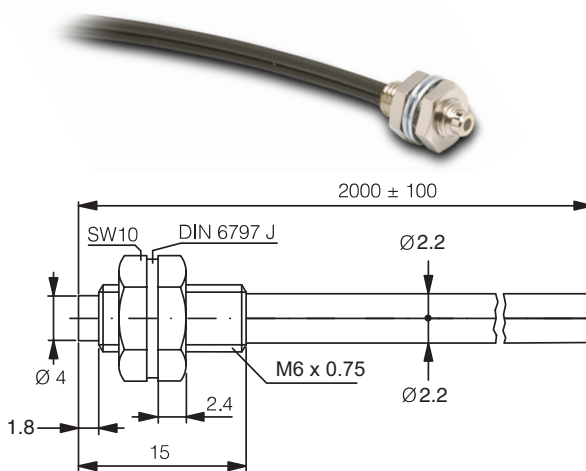


Cuttable Optical Fibers (2.2 mm Diameter)

CF-DB1-20 diffuse reflection

\$30.00

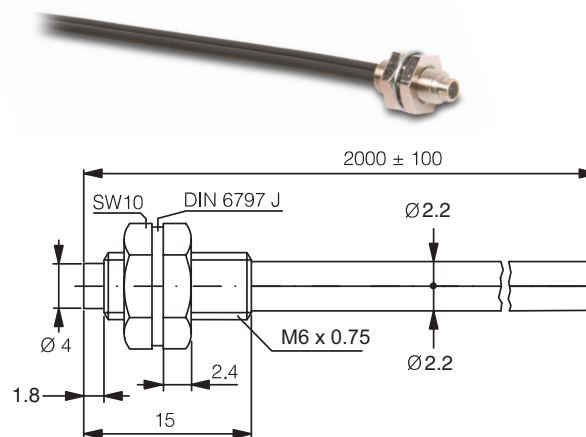
Specifications	
Optical Fiber Core Ø	1 mm (0.039in)
Sensing Distance with DFT and DFP series	200 mm (7.87in)
Fiber Length (L)	2.0 m (78.74in)
Fiber Bending Radius	25 mm (0.98in)
Free Cut	Yes
Head Size	M6
Thread Pitch	0.75 mm
Protection Degree	IEC IP67
Agency Approvals	UL file 328811
Temperature Range	-25° to +70°C (-13° to 158°F)
Fiber Materials	PMMA
Sleeve Materials	Polyethylene
Head Materials	Nickel-plated brass



CF-DB2-20 diffuse reflection

\$45.00

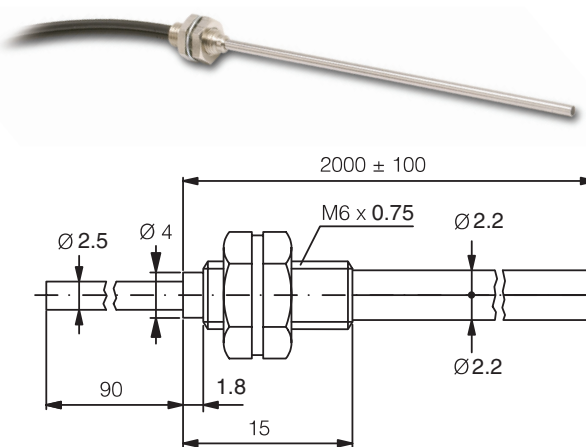
Specifications	
Optical Fiber Core Ø	1.5 mm (0.06in)
Sensing Distance with DFT and DFP Series	260 mm (10.27in)
Fiber Length (L)	2.0 m (78.74in)
Fiber Bending Radius	40 mm (1.57in)
Free Cut	Yes
Head Size	M6
Thread Pitch	0.75 mm
Protection Degree	IEC IP67
Agency Approvals	UL file 328811
Temperature Range	-25° to +70°C (-13° to 158°F)
Fiber Materials	PMMA
Sleeve Materials	Polyethylene
Head Materials	Nickel-plated brass



CF-DB3-20 diffuse reflection

\$48.50

Specifications	
Optical Fiber Core Ø	1 mm (0.039in)
Sensing Distance with DFT and DFP Series	200 mm (7.87in)
Fiber Length (L)	2.0 m (78.74in)
Fiber Bending Radius	25 mm (0.98in)
Bendable light-outlet tube	Yes, 25 mm (0.98in) radius
Free Cut	Yes
Head Size	M6
Thread Pitch	0.75 mm
Protection Degree	IEC IP67
Agency Approvals	UL file 328811
Temperature Range	-25° to +70°C (-13° to 158°F)
Fiber Materials	PMMA
Sleeve Materials	Polyethylene
Head Materials	Nickel-plated brass

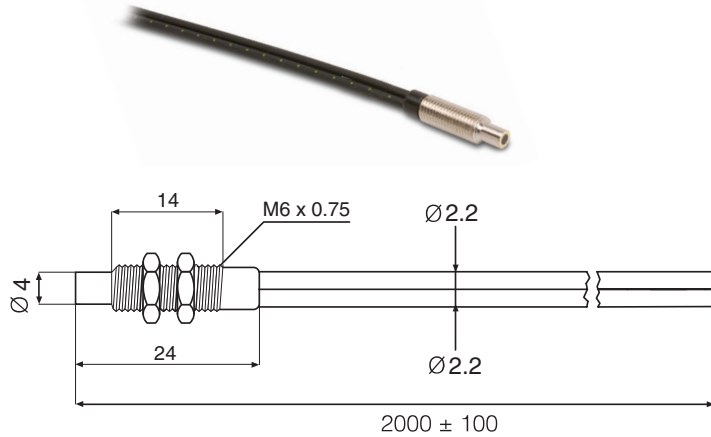


Cuttable Optical Fibers (2.2 mm Diameter)

CF-CB1-20 diffuse reflection

Specifications	
Optical Fiber Core Ø	1 mm (0.039in)
Sensing Distance with SSF Series	50 mm (1.97in)
Fiber Length (L)	2.0 m (78.74in)
Fiber Bending Radius	25 mm (0.98in)
Free Cut	Yes
Head Size	M6
Thread Pitch	0.75 mm
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

\$25.00

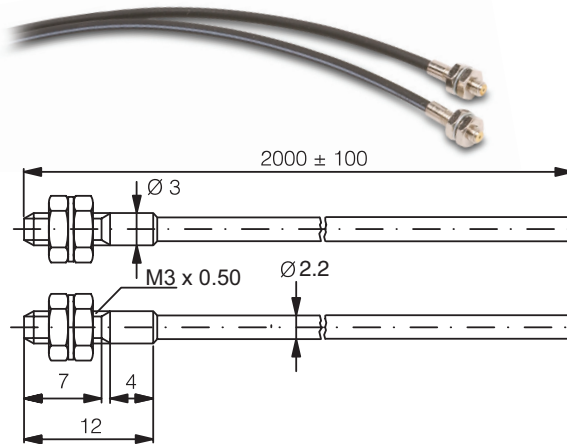


CF-TB1-20 through-beam

Specifications	
Optical Fiber Core Ø	0.5 mm (0.02in)
Sensing Distance with DFT and DFP Series	200 mm (7.87in)
Fiber Length (L)	2.0 m (78.74in) ea. piece
Fiber Bending Radius	25 mm (0.98in)
Free Cut	Yes
Head Size	M3
Thread Pitch	0.5 mm
Protection Degree	IEC IP67
Agency Approvals	UL file 328811
Temperature Range	-25° to +70°C (-13° to 158°F)
Fiber Materials	PMMA
Sleeve Materials	Polyethylene
Head Materials	Nickel-plated brass

\$30.00

Includes 2 optical fiber cables

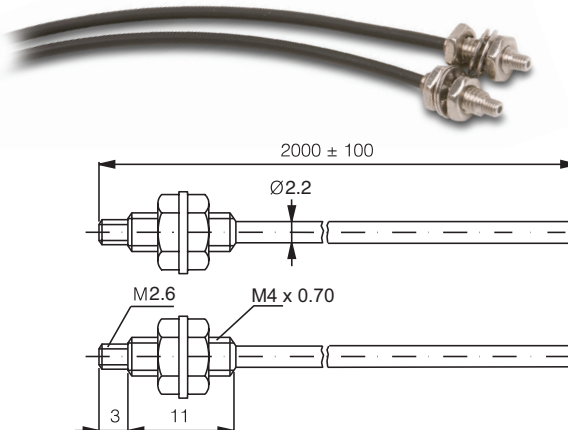


\$30.00

Includes 2 optical fiber cables

CF-TB2-20 through-beam

Specifications	
Optical Fiber Core Ø	1 mm (0.039in)
Sensing Distance with DFT and DFP Series	700 mm (27.56in)
Fiber Length (L)	2.0 m (78.74in) ea. piece
Fiber Bending Radius	25 mm (0.98in)
Free Cut	Yes
Head Size	M4
Thread Pitch	0.7 mm
Protection Degree	IEC IP67
Agency Approvals	UL file E328811
Temperature Range	-25° to +70°C (-13° to 158°F)
Fiber Materials	PMMA
Sleeve Materials	Polyethylene
Head Materials	Nickel-plated brass

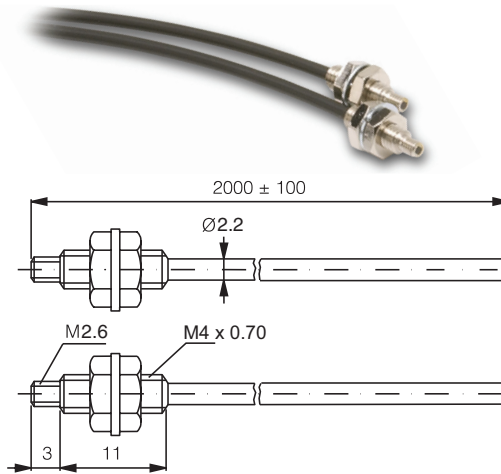


Cuttable Optical Fibers (2.2 mm Diameter)

CF-TB3-20 through-beam

\$48.50 Includes 2 optical fiber cables

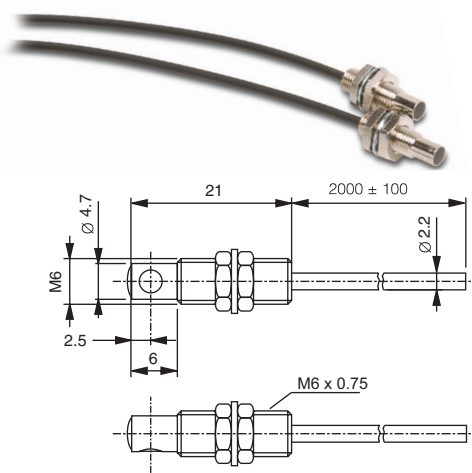
Specifications	
Optical Fiber Core Ø	1.5 mm (0.06in)
Sensing Distance with DFT and DFP Series	900 mm (35.43in)
Fiber Length (L)	2.0 m (78.74in) ea. piece
Fiber Bending Radius	40 mm (1.57in)
Free Cut	Yes
Head Size	M4
Thread Pitch	0.7 mm
Protection Degree	IEC IP67
Agency Approvals	UL file E328811
Temperature Range	-25° to +70°C (-13° to 158°F)
Fiber Materials	PMMA
Sleeve Materials	Polyethylene
Head Materials	Nickel-plated brass



CF-TB4-20 90° through-beam

\$60.00 Includes 2 optical fiber cables

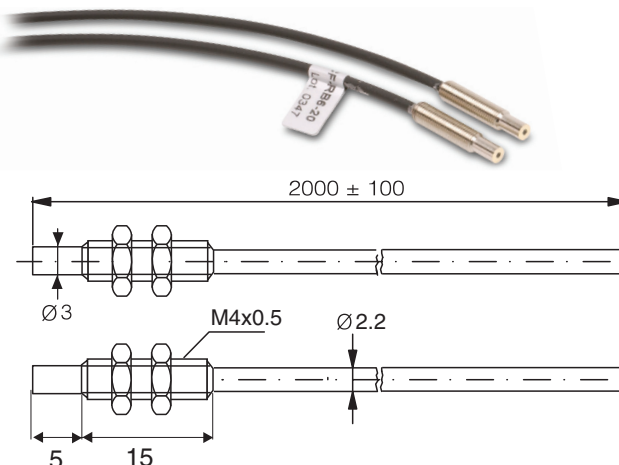
Specifications	
Optical Fiber Core Ø	1.0 mm (0.039in)
Sensing Distance with DFT and DFP Series	1800 mm (70.87in)
Fiber Length (L)	2.0 m (78.74in) ea. piece
Fiber Bending Radius	25 mm (0.98in)
Free Cut	Yes
Head Size	M6
Thread Pitch	0.75 mm
Protection Degree	IEC IP67
Agency Approvals	UL file E328811
Temperature Range	-25° to +70°C (-13° to 158°F)
Fiber Materials	PMMA
Sleeve Materials	Polyethylene
Head Materials	Nickel-plated brass



CF-RB6-20 through beam

\$25.00 Includes 2 optical fiber cables

Specifications	
Optical Fiber Core Ø	1.0 mm (0.039in)
Sensing Distance with SSF Series	120 mm (4.72in)
Fiber Length (L)	2.0 m (78.74in) ea. piece
Fiber Bending Radius	25 mm (0.98in)
Free Cut	Yes
Head Size	M4
Thread Pitch	0.50 mm
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



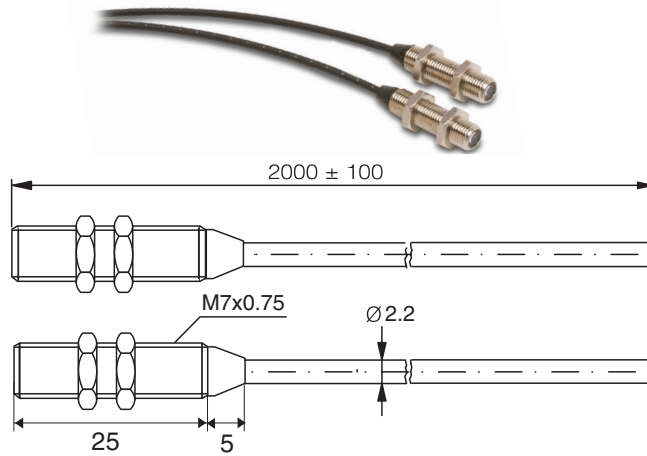
Cutttable Optical Fibers (2.2 mm Diameter)

CF-RBA-20 through-beam with lenses

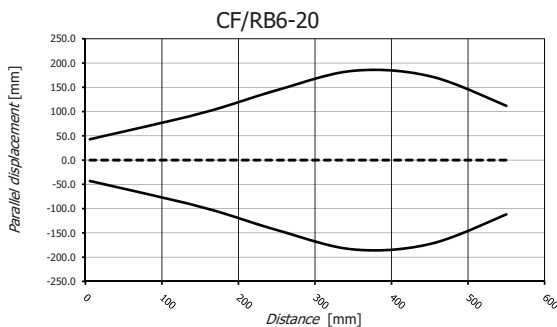
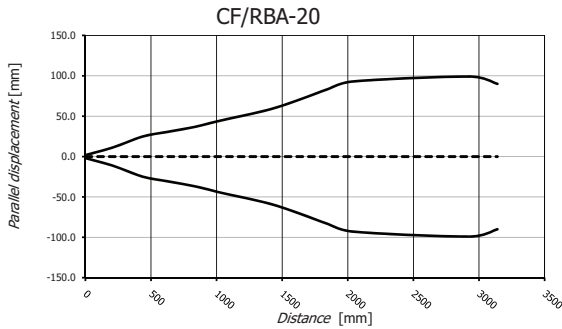
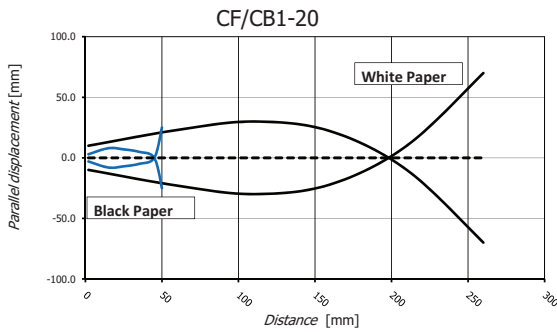
\$42.50

Includes 2 optical fiber cables

Specifications	
Optical Fiber Core Ø	1.0 mm (0.039in)
Sensing Distance with SSF series	1200 mm (47.24in)
Fiber Length (L)	2.0 m (78.74in) ea. piece
Fiber Bending Radius	25 mm (0.98in)
Free Cut	Yes
Head Size	M7
Thread Pitch	0.75 mm
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



Characteristic Curves



PS Series Fork Sensors

Fork Sensor- Visible Red Light



- Rugged metal one-piece housing - always in alignment
- Easy installation
- Visible red light - easy setup
- Glass optics
- High resolution
- Light / Dark operation selectable
- Adjustable sensitivity
- High switching frequency
- M8 connector with 360° LED



PS Series Fork Sensor Selection Chart - Red Light

Part Number	Price	Sensing Range	Output State	Logic	Connection	Wiring	Dimensions
PSUR-0P-1F	\$86.00	5mm (0.2 in)	Light On/Dark On Selectable	PNP	M8 connector	Diagram 2	Figure 1
PSUR-0N-1F	\$86.00	5mm (0.2 in)	Light On/Dark On Selectable	NPN	M8 connector	Diagram 1	Figure 1
PSUR-0P-2F	\$86.00	10mm (0.39 in)	Light On/Dark On Selectable	PNP	M8 connector	Diagram 2	Figure 2
PSUR-0N-2F	\$86.00	10mm (0.39 in)	Light On/Dark On Selectable	NPN	M8 connector	Diagram 1	Figure 2
PSUR-0P-3F	\$86.00	20mm (0.79 in)	Light On/Dark On Selectable	PNP	M8 connector	Diagram 2	Figure 3
PSUR-0N-3F	\$86.00	20mm (0.79 in)	Light On/Dark On Selectable	NPN	M8 connector	Diagram 1	Figure 3
PSUR-0P-4F	\$98.00	30mm (1.18 in)	Light On/Dark On Selectable	PNP	M8 connector	Diagram 2	Figure 4
PSUR-0N-4F	\$98.00	30mm (1.18 in)	Light On/Dark On Selectable	NPN	M8 connector	Diagram 1	Figure 4
PSUR-0P-5F	\$104.00	50mm (1.97 in)	Light On/Dark On Selectable	PNP	M8 connector	Diagram 2	Figure 5
PSUR-0N-5F	\$104.00	50mm (1.97 in)	Light On/Dark On Selectable	NPN	M8 connector	Diagram 1	Figure 5
PSUR-0P-6F	\$109.00	80mm (3.15 in)	Light On/Dark On Selectable	PNP	M8 connector	Diagram 2	Figure 6
PSUR-0N-6F	\$109.00	80mm (3.15 in)	Light On/Dark On Selectable	NPN	M8 connector	Diagram 1	Figure 6
PSUR-0P-7F	\$114.00	120mm (4.72 in)	Light On/Dark On Selectable	PNP	M8 connector	Diagram 2	Figure 7
PSUR-0N-7F	\$114.00	120mm (4.72 in)	Light On/Dark On Selectable	NPN	M8 connector	Diagram 1	Figure 7
PSUR-0P-8F	\$132.00	180mm (7.09 in)	Light On/Dark On Selectable	PNP	M8 connector	Diagram 2	Figure 8
PSUR-0N-8F	\$132.00	180mm (7.09 in)	Light On/Dark On Selectable	NPN	M8 connector	Diagram 1	Figure 8
PSUR-0P-9F	\$137.00	220mm (8.66 in)	Light On/Dark On Selectable	PNP	M8 connector	Diagram 2	Figure 9
PSUR-0N-9F	\$137.00	220mm (8.66 in)	Light On/Dark On Selectable	NPN	M8 connector	Diagram 1	Figure 9

PS Series Fork Sensors

Fork Sensor - Laser

- Rugged metal one-piece housing - always in alignment
- Easy installation
- Class 1 laser to detect small objects
- Glass optics
- High resolution
- Light / Dark operation selectable
- Adjustable sensitivity
- High switching frequency
- M8 connector with 360° LED
- Some units designed specifically for transparent objects



PS Series Fork Sensor Selection Chart - Laser Class 1							
Part Number	Price	Sensing Range	Output State	Logic	Connection	Wiring	Dimensions
PSUL-0P-4F	\$137.00	30mm (1.18 in)	Light On/Dark On Selectable	PNP	M8 connector	Diagram 2	Figure 4
PSUL-0N-4F	\$137.00	30mm (1.18 in)	Light On/Dark On Selectable	NPN	M8 connector	Diagram 1	Figure 4
PSUL-0P-5F	\$137.00	50mm (1.97 in)	Light On/Dark On Selectable	PNP	M8 connector	Diagram 2	Figure 5
PSUL-0N-5F	\$137.00	50mm (1.97 in)	Light On/Dark On Selectable	NPN	M8 connector	Diagram 1	Figure 5
PSUL-0P-6F	\$158.00	80mm (3.15 in)	Light On/Dark On Selectable	PNP	M8 connector	Diagram 2	Figure 6
PSUL-0N-6F	\$158.00	80mm (3.15 in)	Light On/Dark On Selectable	NPN	M8 connector	Diagram 1	Figure 6
PSUL-0P-7F	\$158.00	120mm (4.72 in)	Light On/Dark On Selectable	PNP	M8 connector	Diagram 2	Figure 7
PSUL-0N-7F	\$158.00	120mm (4.72 in)	Light On/Dark On Selectable	NPN	M8 connector	Diagram 1	Figure 7

Fork Sensor - Laser for Transparent Objects

PS Series Fork Sensor Selection Chart - Laser Class 1 for Transparent Objects							
Part Number	Price	Sensing Range	Output State	Logic	Connection	Wiring	Dimensions
PSTL-0P-6F	\$163.00	80mm (3.15 in)	Light On/Dark On Selectable	PNP	M8 connector	Diagram 2	Figure 6
PSTL-0N-6F	\$163.00	80mm (3.15 in)	Light On/Dark On Selectable	NPN	M8 connector	Diagram 1	Figure 6

Wiring diagrams

Diagram 1

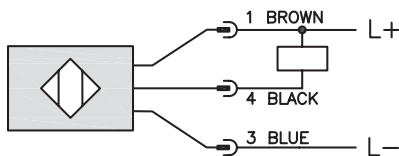
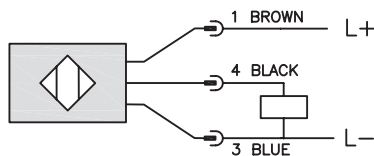
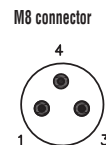


Diagram 2



Connectors



NOTE: CLASS 2 POWER SUPPLY REQUIRED

PS Series Fork Sensors

Specifications			
	Visible Red Light	Laser	Laser for Transparent Objects
Mounting Type	Slot	Slot	Slot
Sensing Distance	5.0 mm (0.20 in) to 220mm (8.66 in)	30mm (1.18 in) to 120mm (4.72 in)	80mm (3.15 in)
Smallest Detectable Object	PSUR 1F–2F–3F–4F 0.3 mm (0.12 in) PSUR 5F–6F 0.4 mm (0.16 in) PSUR 7F 0.5 mm (0.02 in) PSUR 8F–9F 0.6 mm (0.24 in)	PSUL 4F 0.05 mm (0.002 in) PSUL 5F 0.08 mm (0.003 in) PSUL 6F 0.10 mm (0.004 in) PSUL 7F 0.15 mm (0.006 in)	2 mm (0.8 in) thickness and at an angle of 30 degrees
Emission	Visible Red Light	Class 1 Laser (650nm)*	Class 1 Laser (650nm)*
Sensitivity	Adjustable Potentiometer (0 to 270°)		
Output Type	NPN or PNP/ Light on/Dark on/ 3-wire		
Operating Voltage	10 to 30 VDC		
No-load Supply Current	≤ 35 mA	≤ 20 mA	
Operating (Load) Current	200 mA		
Off-state (Leakage) Current	≤ 10 µA		
Voltage Drop	≤ 3.0V (PNP); ≤2 (NPN)		
Switching Frequency	PSUR 1F–2F 3 kHz PSUR 3F–9F 1.5 kHz	5 kHz	
Differential Travel	PSUR 1F2F–3F–4F ≤ 0.1 mm (0.004 in) PSUR 5F ≤ 0.15 mm (0.006 in) PSUR 6F–9F ≤ 0.20 mm (0.008 in)	PSUL 4F ≤20 µm (0.00078 in) PSUL 5F ≤25 µm (0.00098 in) PSUL 6F ≤30 µm (0.0011 in) PSUL 7F ≤ 50 µm (0.0019 in)	PSUL 6F ≤30 µm (0.0011 in)
Repeat Accuracy	PSUR 1F–2F–3F–4F 0.02 mm (0.0008 in) PSUR 5F 0.04 mm (0.0016 in) PSUR 6F 0.06 mm (0.002 in) PSUR 7F–8F–9F 0.08 mm (0.003 in)	PSUL 4F–5F–6F 10 µm (0.0004 in) PSUL 7F 15 µm (0.0005 in)	10 µm (0.0004 in)
Ripple	N/A		
Time Delay Before Availability (tv)	N/A		
Reverse Polarity Protection	Yes		
Short-Circuit Protection	Yes		
Operating Temperature	-10°C to +60°C (-14°F to +140°F)		-10°C to +45°C (-14°F to +113°F)
Protection Degree (DIN 40050)	IP67		
Indication/Switch Status	On Yellow LED		
Housing Material	GD Zn (Gadolinium-Zinc)		
Sensing Face Material	Glass		
Shock	Meets IEC 68-2-27 (See Photoelectric Sensor Terminology at the end of this section for more details)		
Vibration	Meets IEC 68-2-6 (See Photoelectric Sensor Terminology at the end of this section for more details)		
Tightening Torque	N/A		
Weight	PSUR 1F 20g (0.71 oz) PSUR 2F 23g (0.81 oz) PSUR 3F 28g (0.99 oz) PSUR 4F 36g (1.27 oz) PSUR 5F 54g (1.90 oz) PSUR 6F 77g (2.72 oz) PSUR 7F 118g (4.16 oz) PSUR 8F 190g (6.70 oz) PSUR 9F 220g (7.76 oz)	PSUR 4F 66g (2.33 oz) PSUR 5F 110g (3.88 oz) PSUR 6F 135g (4.76 oz) PSUR 7F 210g (7.41 oz)	135g (4.76 oz)
Connection	M8 connector		
Agency Approvals	UL E328811– CE		

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

*IMPORTANT NOTE

The Laser Classification Systems for the standards IEC (EN) 60825-1 defines the following safety classes:

Class 1

This class is eye-safe under all operating conditions.

Class 2

These are visible lasers. This class is safe for accidental viewing under all operating conditions. However, it may not be safe for a person who deliberately stares into the laser beam for longer than 0.25 seconds, by overcoming their natural aversion response to the very bright light.

PS Series Fork Sensors

Dimensions

mm
[inch]

Figure 1

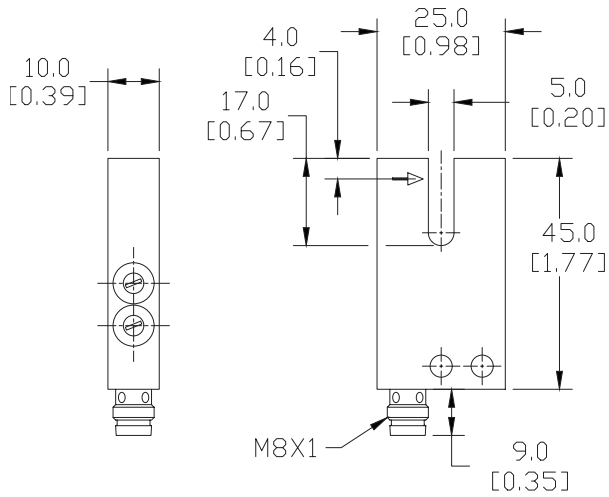


Figure 2

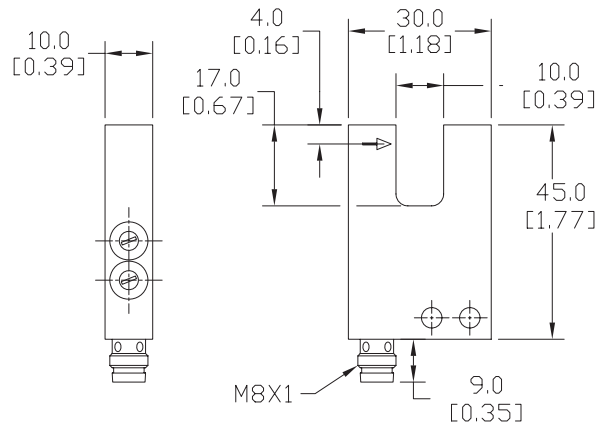


Figure 3

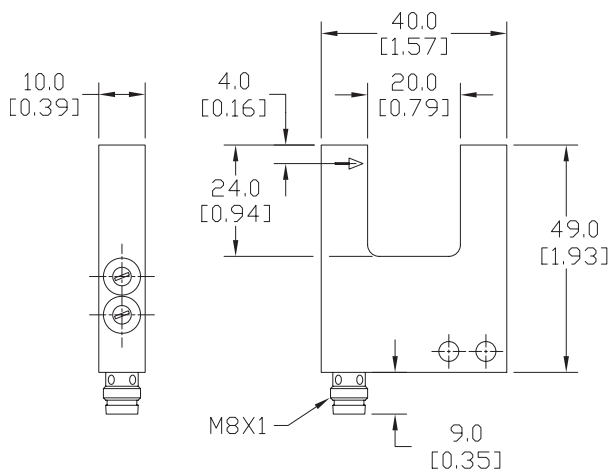
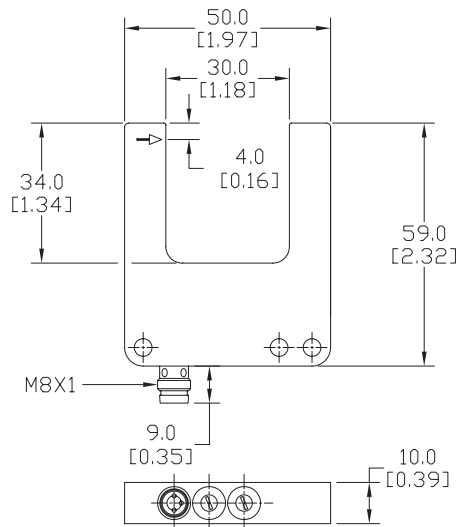


Figure 4



SEE OUR WEBSITE: WWW.AUTOMATIONDIRECT.COM FOR COMPLETE ENGINEERING DRAWINGS.

PS Series Fork Sensors

Dimensions

mm
[inch]

Figure 5

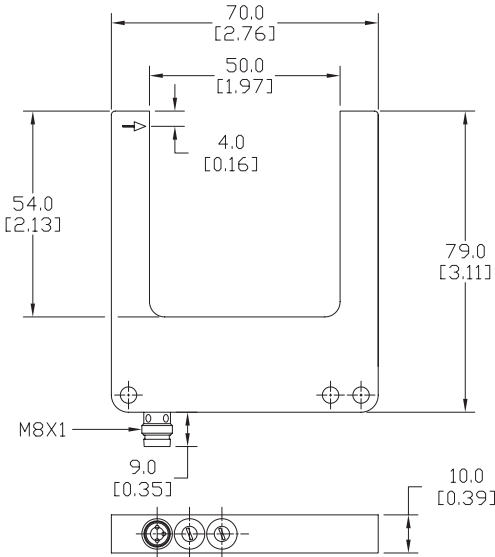


Figure 6

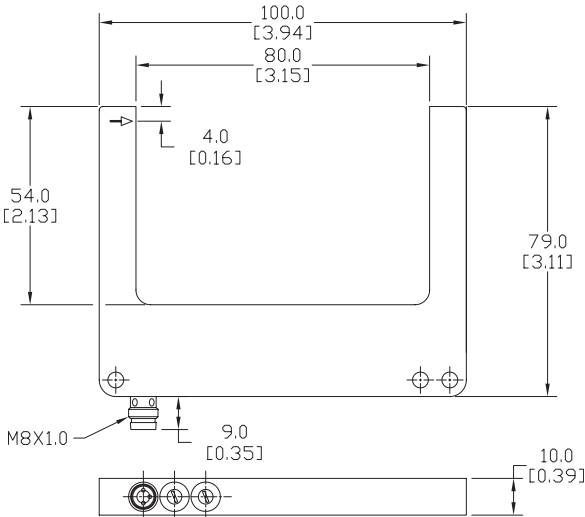
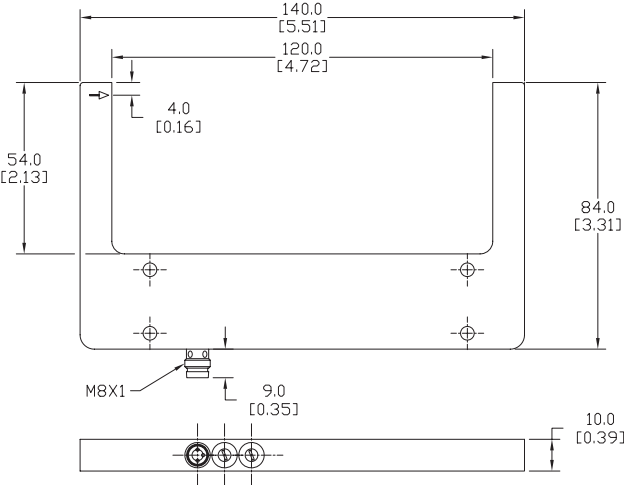


Figure 7



SEE OUR WEBSITE: WWW.AUTOMATIONDIRECT.COM FOR COMPLETE ENGINEERING DRAWINGS.

PS Series Fork Sensors

Dimensions

mm
[inch]

Figure 8

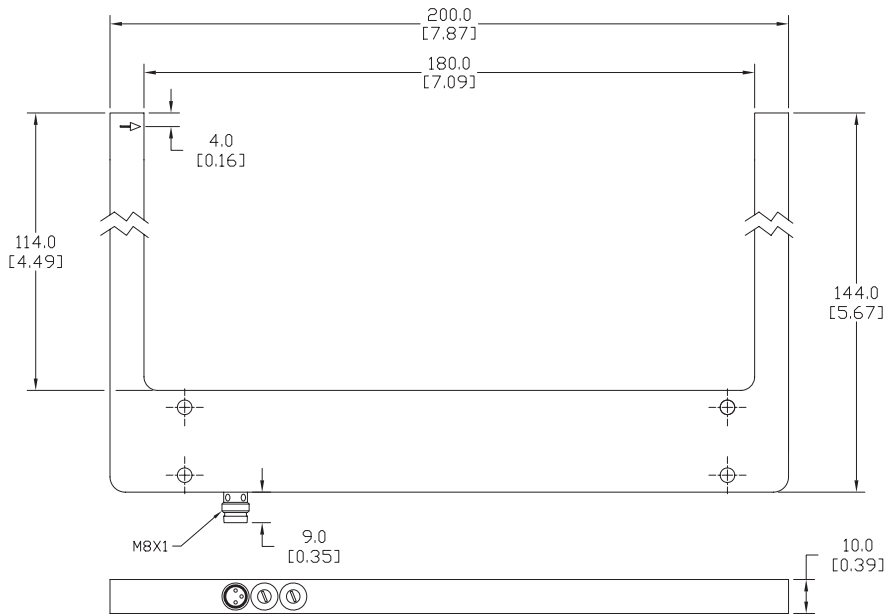
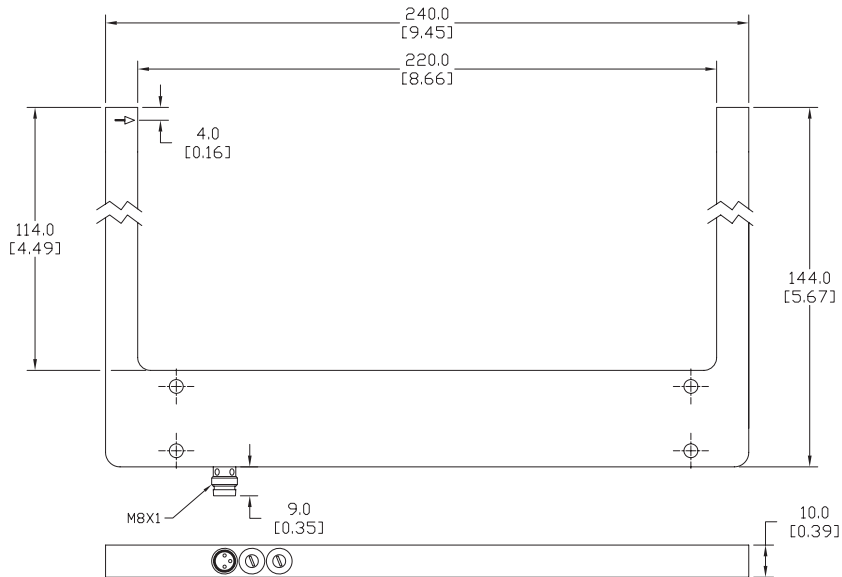


Figure 9



SEE OUR WEBSITE: WWW.AUTOMATIONDIRECT.COM FOR COMPLETE ENGINEERING DRAWINGS.

S8 Series Contrast Sensors



Contrast Sensor

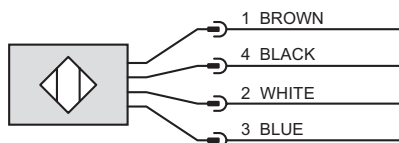
- Datalogic® print mark contrast sensor
- RGB light emission
- Horizontal spot orientation
- 6 – 12mm sensing distance
- 12 to 30VDC operating voltage
- Selectable Light On/Dark On
- NPN or PNP
- 25 kHz switching frequency
- 316L stainless steel or plastic housing
- Teach-in sensitivity adjustment
- 4-pin M8 quick-disconnect or 150mm cable with M12 quick-disconnect
- IP67/IP69K
- Purchase cable separately
- Mounting brackets also available



S8 Series Contrast Sensors Selection Chart									
Part Number	Price	Sensing Range	Spot Orientation	Switching Frequency	Output State	Logic	Connection	Wiring	Dimensions
Stainless Steel									
S8-MR-5-W13-NN	<-->	6–12 mm [0.2–0.5 in]	Horizontal	25kHz	Light On/Dark On Selectable	NPN	4-pin M8 quick-disconnect	Diagram 1	Figure 1
S8-MR-5-W13-PP	<-->					PNP			
Plastic									
S8-PR-3-W13-NN	<-->	6–12 mm [0.2–0.5 in]	Horizontal	25kHz	Light On/Dark On Selectable	NPN	150mm cable with M12 quick-disconnect	Diagram 1	Figure 2
S8-PR-3-W13-PP	<-->					PNP			
S8-PR-5-W13-NN	<-->					NPN	4-pin M8 quick-disconnect		Figure 3
S8-PR-5-W13-PP	<-->					PNP			

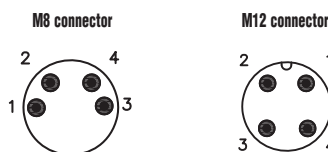
Wiring diagrams

Diagram 1



- Pin 1 – Supply Voltage
- Pin 4 – NPN/PNP Output
- Pin 2 – Remote Input
- Pin 3 – 0 VDC

Connectors



NOTE: WIRING COLORS ARE BASED ON AUTOMATIONDIRECT 4-POLE CABLE ASSEMBLIES. CLASS 2 POWER SUPPLY REQUIRED.

S8 Series Contrast Sensors

Dimensions

mm [inch]

Figure 1

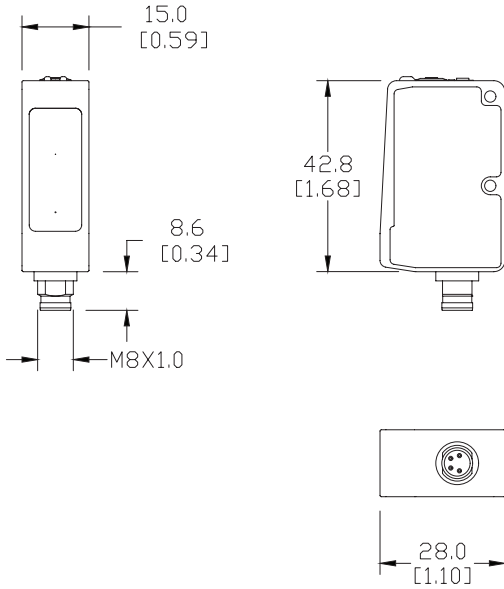


Figure 2

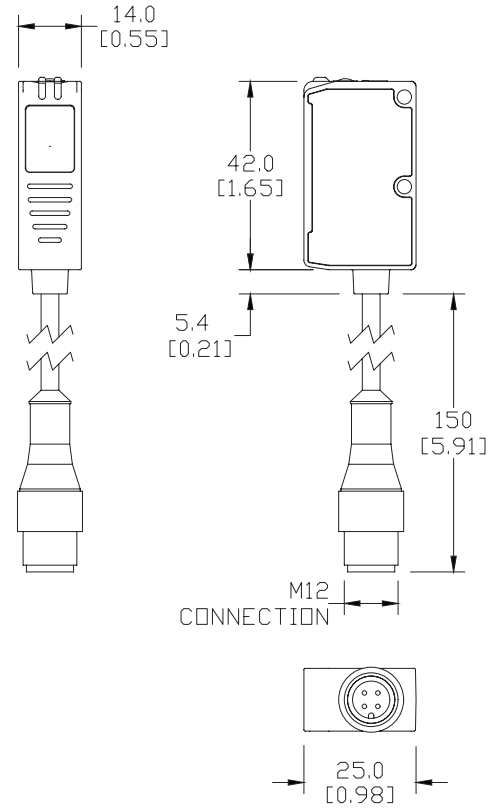
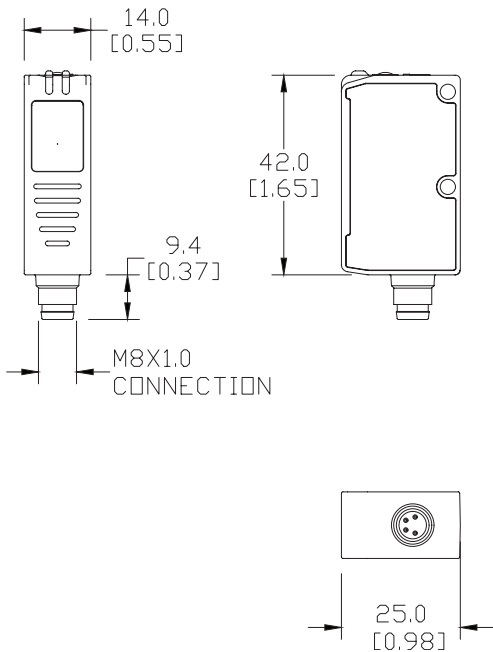


Figure 3



SEE OUR WEBSITE: WWW.AUTOMATIONDIRECT.COM FOR COMPLETE ENGINEERING DRAWINGS.

S8 Series Contrast Sensors

Specifications	
Sensing Distance	6–12 mm [0.2–0.5 in]
Spot Dimension	3x1 mm ²
Spot Orientation	Horizontal
Emission	RGB LEDs: Blue [465nm]/ Green [520nm]/Red [630nm] with automatic selection
Sensitivity	Yes via teach-in button/remote signal
Output Type	NPN or PNP; Light On/Dark On selectable
Operating Voltage	12 to 30 VDC
No-load Supply Current	≤ 30 mA
Operating (Load) Current	≤ 100 mA
Off-state (Leakage) Current	Max source current: 40 µA Max sink current: 200 µA
Voltage Drop	≤ 2 V
Switching Frequency	25 kHz
Response Time	20 µs
Differential Travel	<20 mV
Jitter	10µS
Ripple	≤2 Vpp
Time Delay Before Availability (tv)	N/A
Reverse Polarity Protection	Yes
Short-Circuit Protection	Yes
Operating Temperature	-10–55 °C (14–131 °F)
Protection Degree (DIN 40050)	IP67 (S8-PR) / IP69K (S8-MR)
Indication/Switch Status	Output LED (Yellow) / Ready LED (Green)
Housing Material	ABS (S8-PR) / INOX AISI 316L (S8-MR)
Sensing Face Material	Glass window; PC (S8-PR) lens / PMMA (S8-MR) window
Shock	EN60068-2-27
Vibration	EN60068-2-6
Weight	12g (0.42 oz) max. (S8-PR connector) 50 g (1.76 oz) max pig-tail (S8-PR pig-tail) 70 g (2.5 oz) max (S8-MR connector)
Connectors	M8 4-pole connector / 150mm cable with M12 4-pole connector (S8-PR pigtail)
Agency Approvals	CE cULus E227487

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

TL Series Contrast Sensors



Contrast Sensor

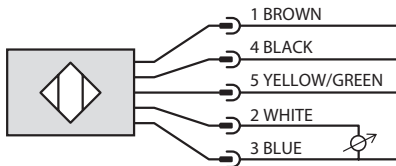
- Datalogic contrast print mark sensor
- RGB light emission
- Vertical or horizontal spot orientation
- 6-12mm sensing distance
- 10 to 30 VDC operating voltage
- Selectable light-on / dark-on
- NPN / PNP
- 0 – 5 VDC analog output models
- 15, 20, or 50kHz switching frequency
- Aluminum housing
- Teach-in sensitivity adjustment
- 5-pin M12 quick-disconnect with adjustable exit angle
- Purchase cable separately
- IP67



TL Series Contrast Sensors Selection Chart									
Part Number	Price	Sensing Range	Spot Orientation	Switching Frequency	Output State	Logic	Connection	Wiring	Dimensions
TL46-W-815	<-->	6-12 mm [0.2-0.5 in]	Vertical	15kHz	Selectable Light-on/Dark-on plus analog output 0-5 VDC	NPN / PNP	M12 connector	Diagram 1	Figure 1
TL46-W-815L	<-->		Horizontal						
TL46-WL-815	<-->		Vertical	20kHz				Diagram 2	
TL46-WL-815L	<-->		Horizontal						
TL46-WJ-815	<-->		Vertical	50kHz	Diagram 3				
TL46-WJ-815L	<-->		Horizontal						

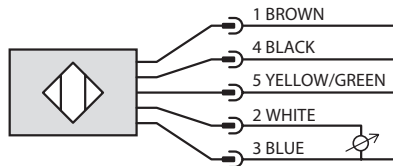
Wiring diagrams

Diagram 1



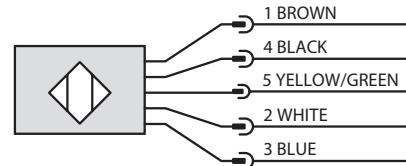
- Pin 1 – Supply Voltage
- Pin 4 – NPN/PNP Output
- Pin 5 – Delay Setting Input
- Pin 2 – Analog Output
- Pin 3 – 0 VDC

Diagram 2



- Pin 1 – Supply Voltage
- Pin 4 – NPN/PNP Output
- Pin 5 – Remote Acquisition
- Pin 2 – Analog Output
- Pin 3 – 0 VDC

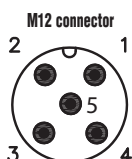
Diagram 3



- Pin 1 – Supply Voltage
- Pin 4 – PNP Output
- Pin 5 – Remote Acquisition
- Pin 2 – Light/Dark Input
- Pin 3 – 0 VDC

NOTE: WIRING OBJECTS ARE BASED ON AUTOMATTONDIRECT 5-POLE CABLE ASSEMBLIES.

Connectors



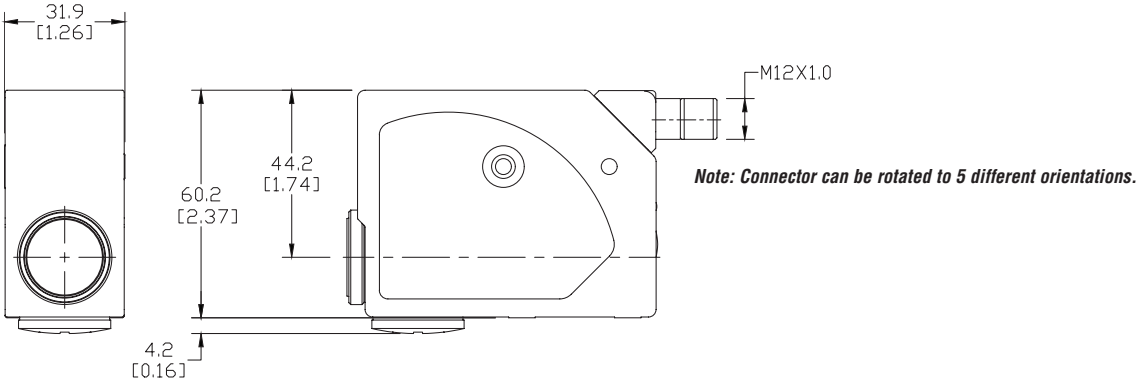
NOTE: CLASS 2 POWER SUPPLY REQUIRED

TL Series Contrast Sensors

Dimensions

mm [inch]

Figure 1



SEE OUR WEBSITE: WWW.AUTOMATIONDIRECT.COM FOR COMPLETE ENGINEERING DRAWINGS.

TL Series Contrast Sensors

Specifications			
TL Series	TL46-W	TL46-WL	TL46-WJ
Sensing Distance	6–12 mm [0.2–0.5 in]		
Spot Dimension	1.5 x 5 mm		0.8 x 4 mm
Spot Orientation	Vertical	Horizontal	Vertical
Emission	RGB LEDs: Blue (465nm)/ Green (520nm)/Red (630nm) with automatic selection		
Sensitivity	Yes via teach-in button/remote signal		No
Output Type	NPN or PNP; Light On/Dark On selectable		PNP Light On/Dark On Selectable
Delay	0 – 20ms selectable via delay input		NA
Operating Voltage	10 – 30 VDC		
No-load Supply Current	≤ 50 mA	≤ 85 mA (bargraph on) ≤ 55 mA (bargraph off)	≤ 50 mA
Operating (Load) Current	≤ 100 mA		
Off-state (Leakage) Current	< 5 μ A		
Voltage Drop	≤ 2 V		
Switching Frequency	15 kHz	20 kHz	50 kHz
Response Time	33 μ s	25 μ s	10 μ s
Differential Travel	< 20 mV		
Jitter	< = 33 μ s	< = 25 μ s	< 7 μ s
Ripple	≤ 2 Vpp		
Time Delay Before Availability (tv)	N/A		
Reverse Polarity Protection	Yes		
Short-Circuit Protection	Yes		
Operating Temperature	-10–55 °C [14–131 °F]		
Protection Degree (DIN 40050)	IP67		
Indication/Switch Status	Output LED (yellow) / Ready LED (green)	Out LED (yellow) Ready LED (green) Delay and Keylock LED (orange) 5-segment Bar graph	Output LED (yellow) / Ready LED (green)
Housing Material	Aluminum		
Sensing Face Material	PMMA	Glass	PMMA
Shock	EN60068-2-27		
Vibration	EN60068-2-6		
Weight	170g (5.99 oz)		
Connectors	M12 5-pole connector		
Agency Approvals	CE cULus E227487		

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

BX Series High Resolution Area Sensor



High resolution area sensor (light screen) - DC

- 70 mm controlled area height
- Operating distance up to 2m
- Adjustable sensitivity
- NPN or PNP with NO/NC selectable output
- Emitter and receiver LED status indicators
- IP67 rated

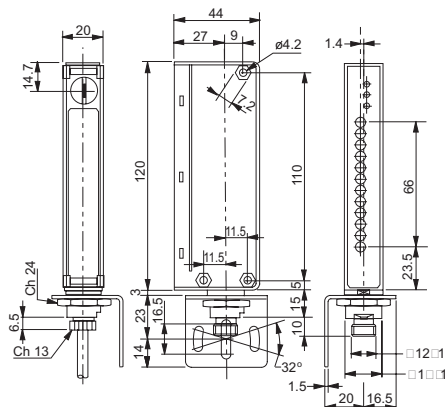


BX80 Series Area Sensor Selection Chart							
Part Number	Price	Function	Sensing Range	Output State	Logic	Connection	Wiring
BX80B-1N-0H	\$197.00	Receiver	2m (78.74in)	N.O./N.C. selectable	NPN	M12 (12mm) connector	Figure 1
BX80B-1P-0H	\$197.00	Receiver			PNP		Figure 2
BX80S-10-0H	\$166.00	Emitter			Receiver dependent		Receiver dependent

Specifications	
Type	Thru-beam
Sensing Distance	2m (2.56 ft)
Light Spot Diameter	N/A
Emission	Infrared (880nm)
Sensitivity	Fixed
Output Type	NPN or PNP; N.O./N.C.selectable
Operating Voltage	12-24VDC
No-load Supply Current	Emitter: 100mA; Receiver: 50mA
Operating (Load) Current	≤100mA
Off-state (Leakage) Current	≤10µA
Voltage Drop	1.2volt maximum at 100mA
Switching Frequency	50Hz
Ripple	≤10%
Time Delay Before Availability (tv)	500ms
Short-Circuit Protection	Yes (switch autoresets after overload is removed)
Operating Temperature	-25° to 50°C (-13° to 122°F)
Protection Degree (DIN 40050)	IEC IP67
Emitter's LED Indicators - Switching Status	Green (power), Red (sync. alarm), Yellow (area occupied)
Receiver's LED Indicators - Switching Status	Green (power), Red (alignment alarm), Yellow (output energized)
Housing Material	Polybutylene Terephthalate (PBT)
Lens Material	Polycarbonate (PC)
Shock/Vibration	See terminology section
Tightening Torque	25 Nm (18.44 lb-ft) max.
Weight	300g (10.58oz)
Agency Approvals	cULus E187310, CE

Dimensions

(mm)



Wiring diagrams

Figure 1

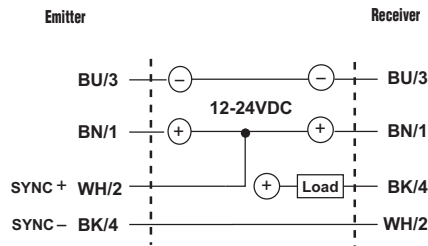
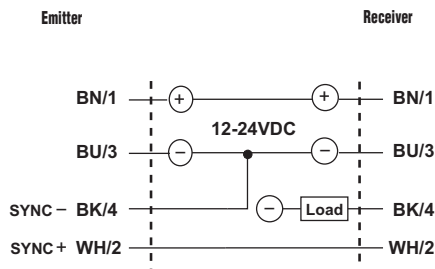
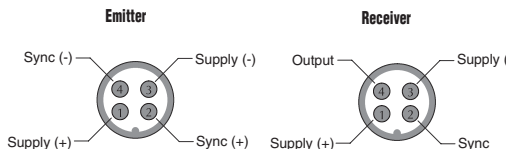


Figure 2



Switching Element Function		
	Thru-beam and Reflective Models	Diffuse Reflective Models
Light on	N.C.	N.O.
Dark on	N.O.	N.C.

Connectors



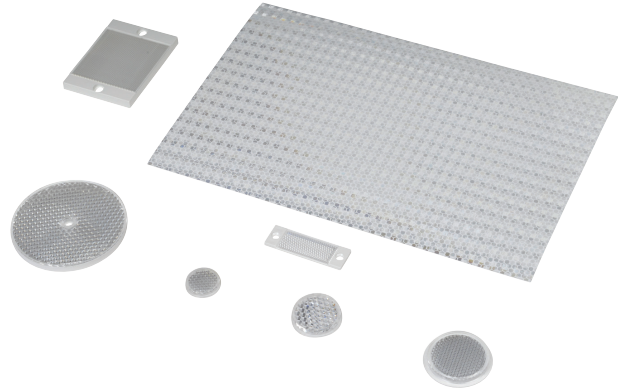
Reflectors

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°.



Specifications

Model	Price	Quantity	Dimensions	Degree of Protection	Mounting	Materials	
RL102	\$35.00	10 per pack	Ø25mm [0.98 in]	IEC IP67	Customer-supplied adhesive or other mounting method required	Reflective face: PMMA Polymethylmethacrylate (acrylic); base material: ABS (Acrylonitrile-butadiene-styren)	
RL102-1	\$3.75	1 per pack					
RL103	\$40.00	10 per pack	Ø34.5mm [1.36 in]				
RL103-1	\$4.25	1 per pack					
RL104	\$40.00	10 per pack	Ø46mm [Ø1.81 in]				two Ø4.3 mm holes
RL104-1	\$4.25	1 per pack					
RL105	\$35.00	10 per pack	90 x 40mm [3.54 x 1.58 in]				
RL105-1	\$3.75	1 per pack					
RL106G	\$40.00	10 per pack	182 x 42mm [7.17 x 1.65 in]		two Ø6 mm holes		
RL106G-1	\$4.25	1 per pack					
RL110	\$18.00	10 per pack	Ø84mm [3.31 in]		one Ø5 mm hole		
RL110-1	\$2.00	1 per pack					
RL116	\$18.00	10 per pack	41 x 60mm [3.54 x 2.36 in]		two M3 holes		
RL116-1	\$2.00	1 per pack					
RL100DA4	\$32.50	1 per pack	200 x 300mm [7.87 x 11.81 in]		Self-adhesive	Paper (Acrylic tape with micro prism)	
RL100DC4	\$10.00	1 per pack	50 x 300mm [1.97 x 11.81 in]				
RL100DQ1	\$7.50	1 per pack	100 x 100mm [3.94 x 3.94 in]				
RL111G	\$52.00	10 per pack	22.5 x 47mm [0.89 x 21.85 in]	two M3 slots	Reflective face: PMMA Polymethylmethacrylate (acrylic); base material: ABS (Acrylonitrile-butadiene-styren)		
RL111G-1	\$6.00	1 per pack					
RL112G	\$40.00	10 per pack	19 x 73mm [0.75 x 2.87 in]	two M4 slots			
RL112G-1	\$4.25	1 per pack					
RL113G	\$46.00	10 per pack	51.4 x 60.3mm [2.02 x 2.37 in]				
RL113G-1	\$5.00	1 per pack					

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

Reflectors

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

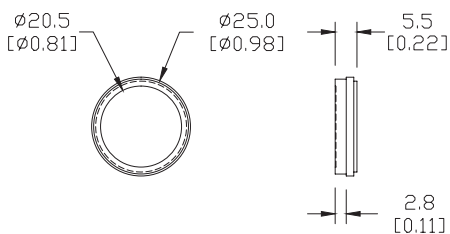
- Suitable for use with polarized light laser photoelectric sensors
- Sizes for most applications
- Miniature types for close mounting in multiple sensor installations
- Single and 5-packs available

Specifications						
Model	RL201	RL201-1	RL203	RL203-1	RL204	RL204-1
Price	\$32.00	\$7.00	\$30.00	\$6.50	\$26.00	\$5.75
Quantity (per package)	5	1	5	1	5	1
Dimensions	60mm x 82mm 2.36 in x 3.23 in		19mm x 60mm 0.75 in x 2.36 in		20mm x 32mm 0.80 in x 1.26 in	
Degree of Protection ¹	IEC IP67					
Mounting	two Ø 0.4 mm holes		two Ø 0.4 mm holes		two Ø 0.3 mm holes	
Materials	Acrylic/polycarbonate					
1 Not recommended for applications involving moist air environments or water immersion.						

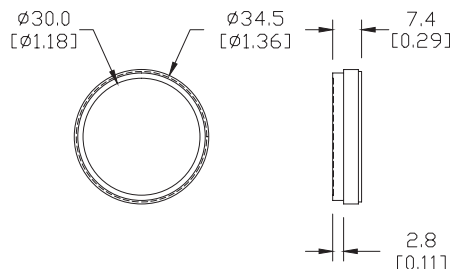
Dimensions

mm [inches]

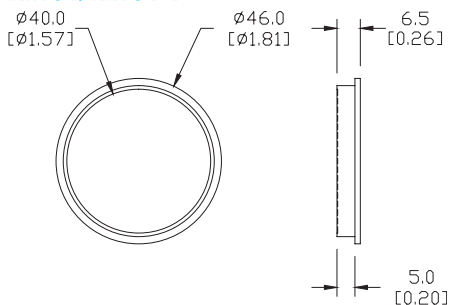
RL102/RL102-1



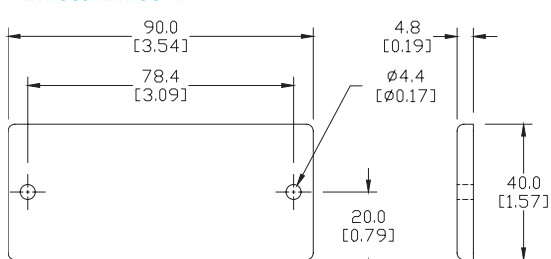
RL103/RL103-1



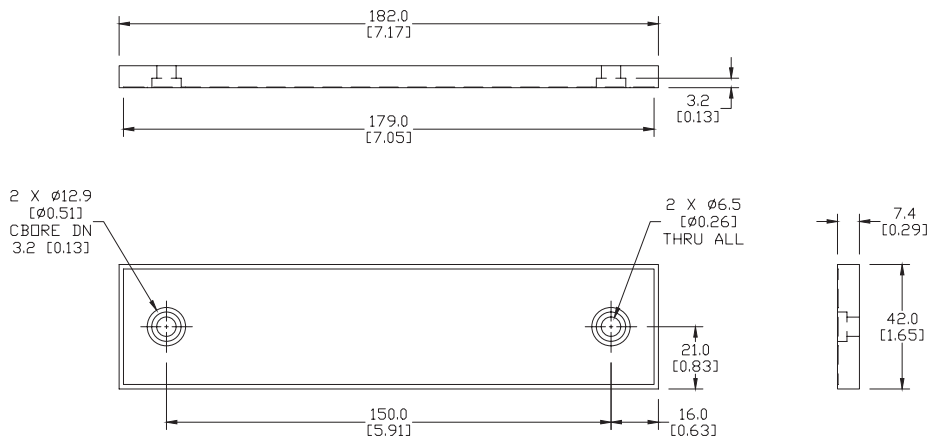
RL104/RL104-1



RL105/RL105-1



RL106G/RL106G-1

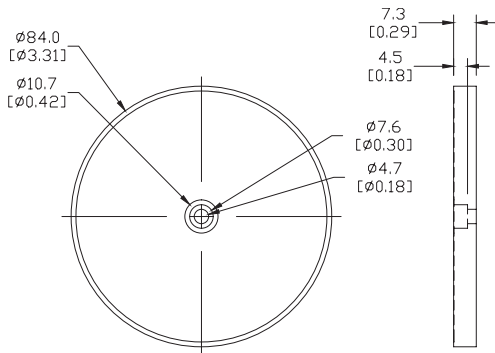


Reflectors

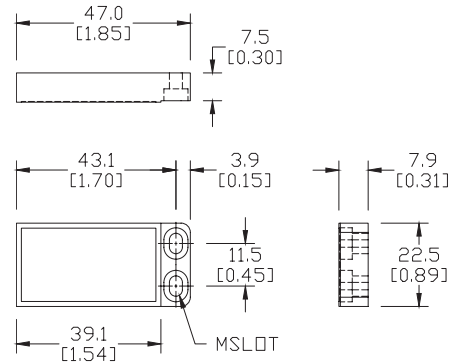
Dimensions

mm [inches]

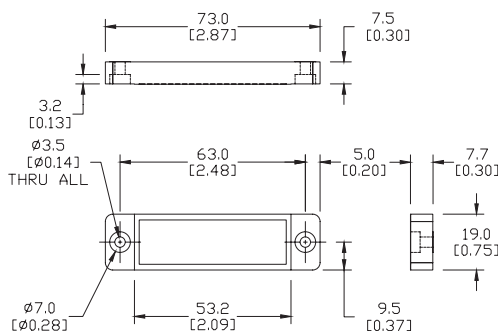
RL110/RL110-1



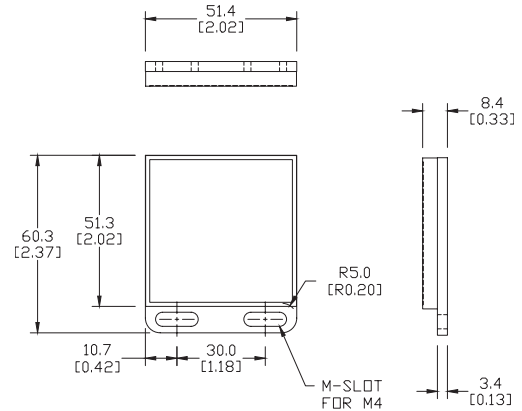
RL111G/RL111G-1



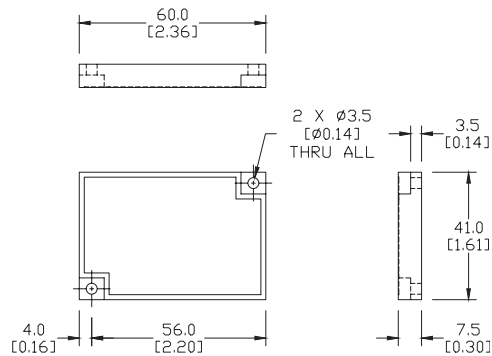
RL112G/RL112G-1



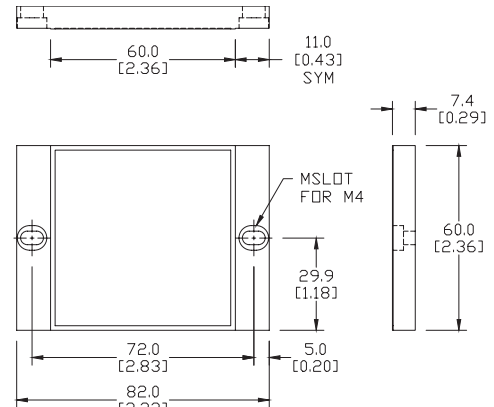
RL113G/RL113G-1



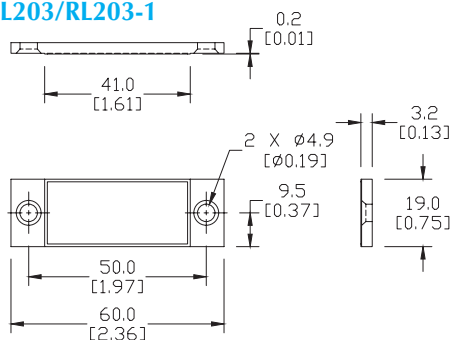
RL116/RL116-1



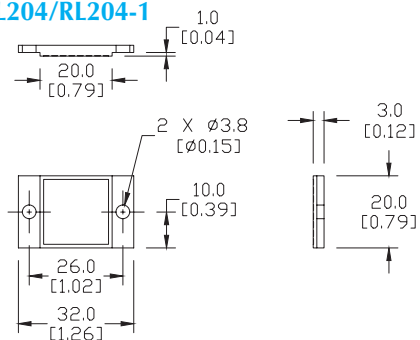
RL201/RL201-1



RL203/RL203-1



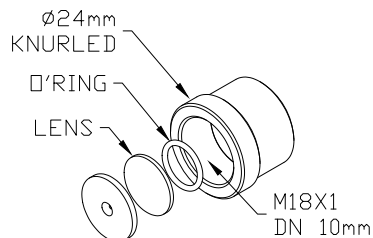
RL204/RL204-1



Shutters and Adapters

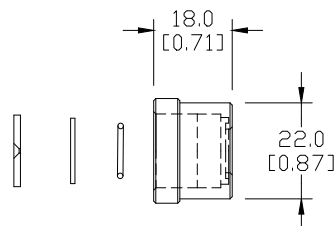
ST0S1 through ST0S8 shutters for M18 (18 mm) through-beam sensors (SSE / SSR)

- Reduces the emitted beam, allowing the detection of small targets
- Shutter consists of 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



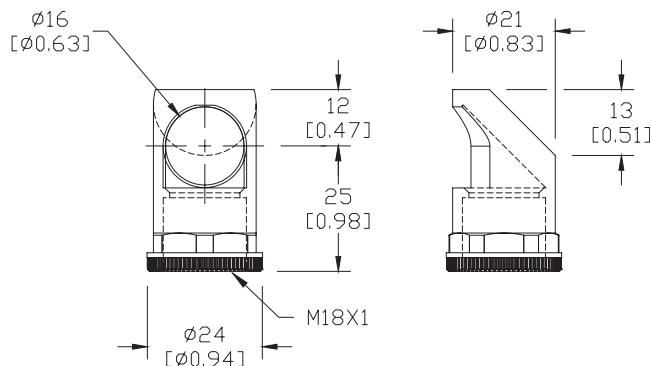
Sensing Distance (when used with SSE / SSR Model photoelectric switches)					
Model	ST0S1	ST0S2	ST0S4	ST0S6	ST0S8
Price	\$13.50	\$13.50	\$13.50	\$13.50	\$13.50
Ø x shutter (mm)	1	2	4	6	8
Distance (m)	N/A	N/A	1.5	3.5	6.5
object (mm)	N/A	N/A	2	3	4

Table shows sensing distance and minimal detectable object.



ST03 right-angle M18 (18 mm) beam adapter

Beam Adapters		
Part Number	Price	Description
ST03	\$13.50	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%.



Accessories: Mounting Brackets

ST12A axial bracket

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



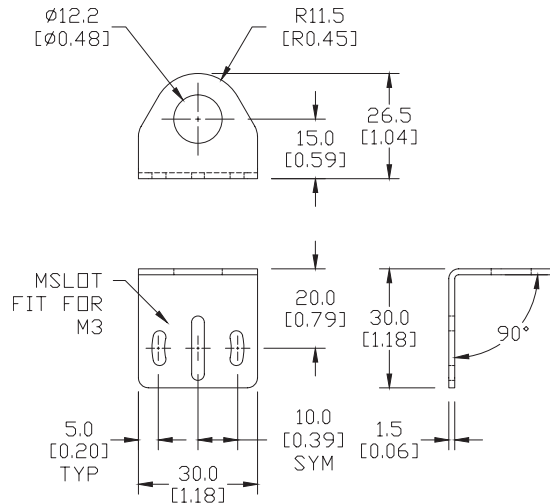
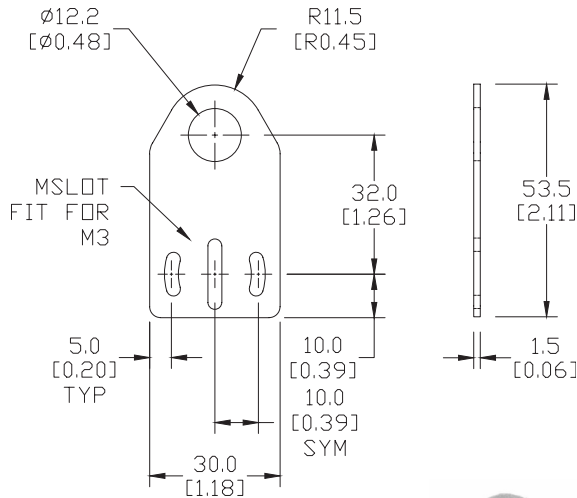
ST12C right-angle bracket

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



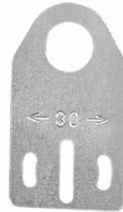
Brackets		
Part Number	Price	Description
ST12A	\$2.00	Metal axial bracket for 12mm sensors, 1/pk
ST12A7W	\$6.00	316L stainless steel axial bracket for 12mm sensors, 1/pk

Brackets		
Part Number	Price	Description
ST12C	\$6.00	Metal right angle bracket for 12mm sensors, 1/pk
ST12C7W	\$6.00	316L stainless steel right angle bracket for 12mm sensors, 1/pk



ST18A axial bracket

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



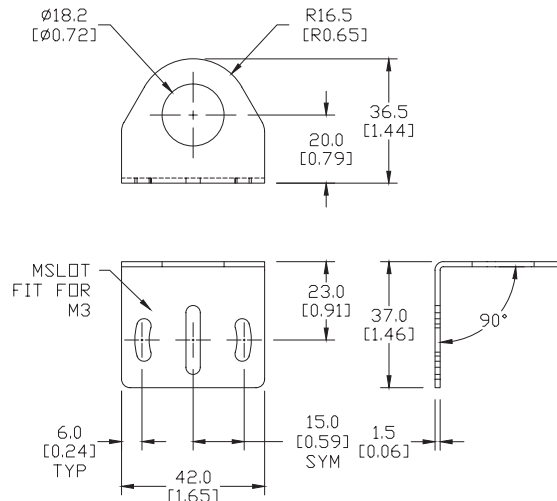
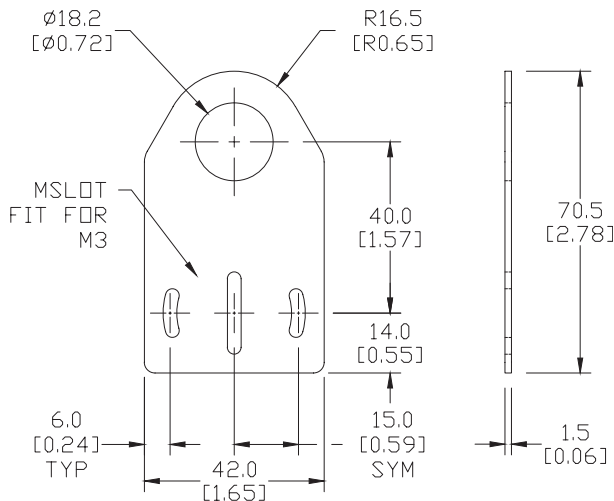
ST18C right-angle bracket

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



Brackets		
Part Number	Price	Description
ST18A	\$1.25	Metal axial bracket for 18mm sensors, 1/pk
ST18A7W	\$6.00	316L stainless steel axial bracket for 18mm sensors, 1/pk

Brackets		
Part Number	Price	Description
ST18C	\$1.25	Metal right angle bracket for 18mm sensors, 1/pk
ST18C7W	\$6.00	316L stainless steel right angle bracket for 18mm sensors, 1/pk



Accessories: Mounting Brackets

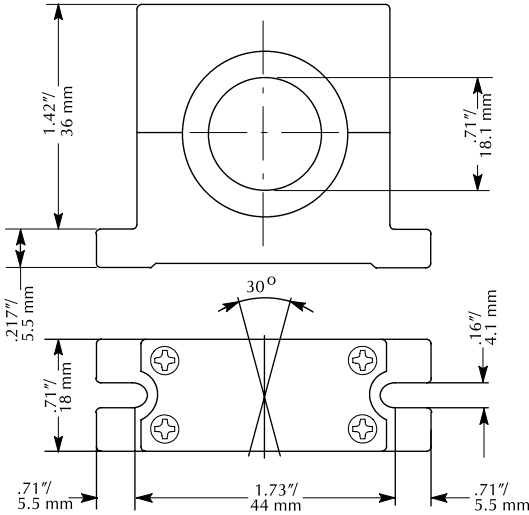
ST02 plastic swivel bracket M18 (18 mm)



Brackets		
Part Number	Price	Description
ST02	\$8.25	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).

Dimensions

inches [mm]



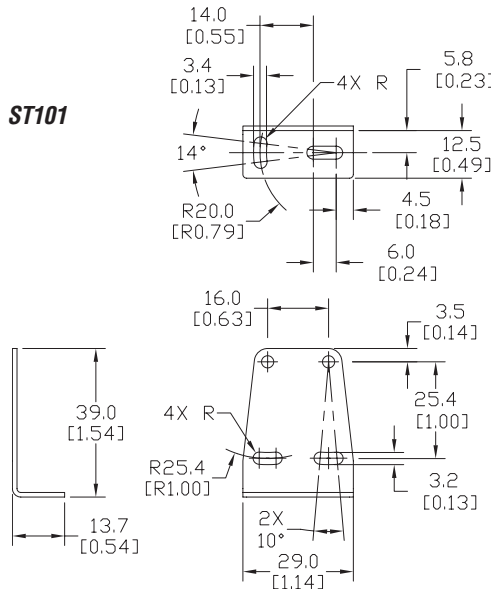
Accessories: Mounting Brackets

ST101 through ST104 mounting brackets

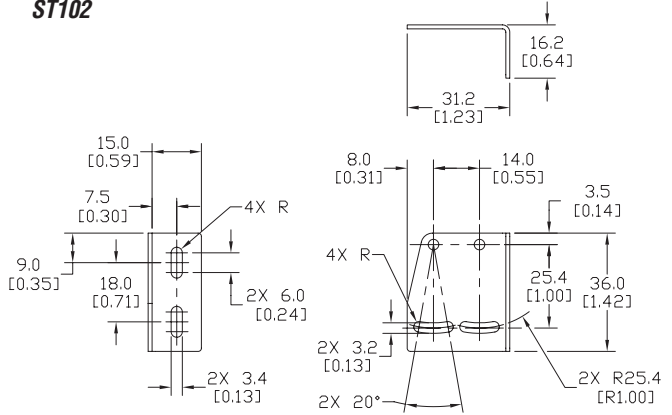
Photoelectric Sensor Brackets			
Part Number	Price	Description	Weight [lb]
ST101	\$3.00	Mounting bracket, 304 stainless steel, right-angle vertical mount. Mounting hardware included.	0.04
ST102	\$3.00	Mounting bracket, 304 stainless steel, right-angle horizontal mount. Mounting hardware included.	0.05
ST103	\$4.00	Mounting bracket, for prewired photoelectric sensors only, 304 stainless steel, protective vertical mount. Mounting hardware included.	0.06
ST104	\$4.00	Mounting bracket, for prewired photoelectric sensors only, 304 stainless steel, protective horizontal mount. Mounting hardware included.	0.05

Dimensions

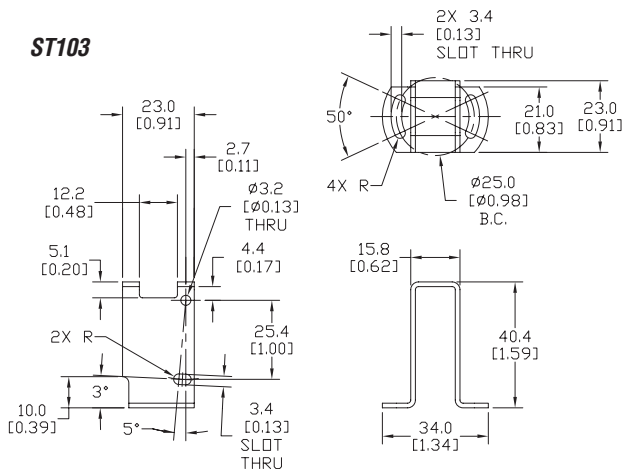
mm [inches]



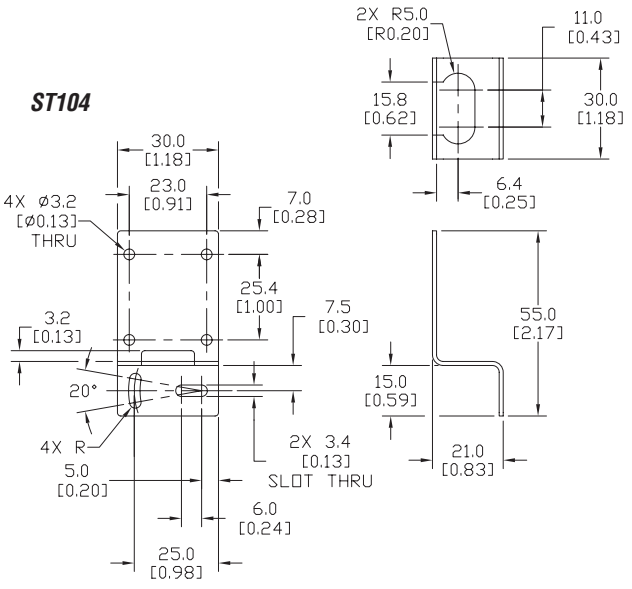
ST102



ST103

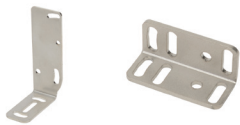


ST104



Accessories: Mounting Brackets

ST-S8 and ST-5072 mounting brackets

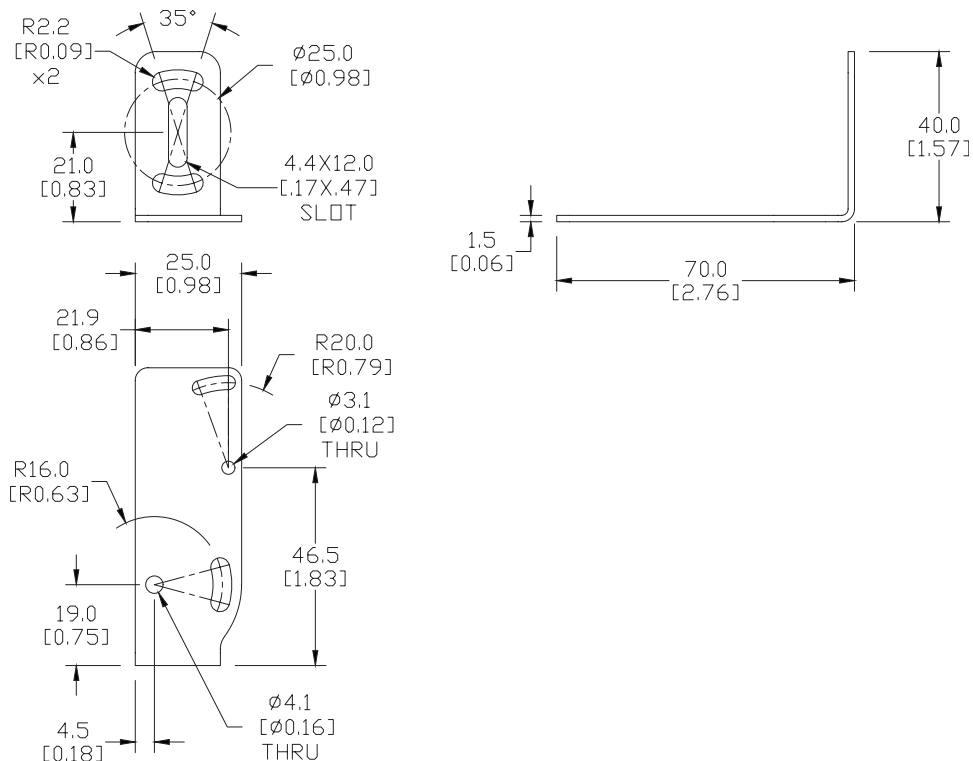


Contrast Sensor Brackets			
Part Number	Price	Description	Weight [lb]
ST-S8-FRM	<-->	Datalogic mounting bracket, 304 stainless steel, vertical. For use with S8 series contrast sensors.	0.48
ST-5072	<-->	Datalogic mounting bracket, 304 stainless steel, right-angle. For use with S8 series contrast sensors.	0.10

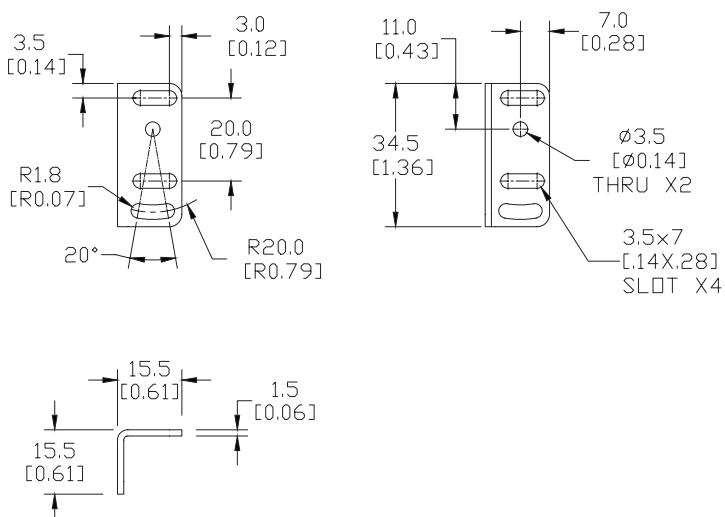
Dimensions

mm [inches]

ST-S8-FRM



ST-5072



SEE OUR WEBSITE: WWW.AUTOMATIONDIRECT.COM FOR COMPLETE ENGINEERING DRAWINGS.

Photoelectric Sensor Terminology

Background suppression

These sensors function in an identical manner to energetic diffuse sensors, but using the angle of incidence, rather than the amount of reflected light. For this reason, the operating distance depends only to a slight extent on the target's size, color, or surface nature. The target can therefore be accurately recognized even on a light background.

Break N.C. (normally closed)

This feature causes load current to flow when a target is not detected and not to flow when a target is detected.

Clearance

The photo sensors must not be mutually influenced. For this reason, a minimum distance between sensors has to be provided. This distance depends strongly upon the model used and the actual sensitivity setting.

Correction factors

The specified operating distance s refers to exactly defined measuring conditions (see sensing distance in specifications tables). Other arrangements generally result in a reduction of the operating distance. When this occurs, a correction factor must be applied.

DC out:

A sensor with two power supply wires and two optically decoupled output terminals. Because of its decoupled static relay, it is capable of offering NPN, PNP, parallel and series configurations as well as interfacing with any input desired. The changeover (make-break) function allows switching from N.O. to N.C. and vice versa by simply reversing the polarity of the power supply leads, allowing complex logical functions.

Diffuse-reflection photo-sensor

With this type of device, the emitter and receiver form part of the same unit. The optical beams are either parallel or slightly converging. The presence of an object in the optical field causes diffused reflection of the luminous beam. The

receiver detects the reflection from the object itself. The reflective properties of the object are important. It is generally possible to reliably detect the presence of any object unless it is perfectly reflective or black. Clear objects with a reflective power of 90% are detected close to the rated operating distance. Dark objects with 18% reflectivity are detected at about half the normal operating distance.

Dual Teach function

Teach 1: With no target present, the operating distance is automatically adjusted to the available background in such a way that the background will not be detected. Thus, with respect to the target, maximum excess light is achieved.

Teach 2: The teach process takes place in two stages; the first on the target, the second on the background. The device subsequently sets the operating distance to an intermediate value. This provides the best results where there is little difference in signal strength between the target and the background. The **Adjust** mode can be used to manually tune the detection zone or to fine tune after using the either Teach function.

Excess light indication Gain)

The excess light indication circuit senses the excess radiation power that falls upon the light incidence surface and is processed by the light receiver. The excess light can decrease in time due to dirt, change in the reflection factor of the object, and aging of the emitter diode, so that reliable operation may no longer be guaranteed. Some of the units are therefore equipped with a second LED (green) which lights up when more than approximately 80% of the available operating distance is used. Given this situation in units without the second green LED, the yellow LED will flash. Models with an excessive light output make the excess light signal available to the user for further processing. Unreliable operating conditions may be checked by the control system.

Inductive-load Protection

Unless otherwise stated, DC sensors are fitted with an inductive-load (surge) protection which consists of a diode or Zener diode.

IR light

IR is the abbreviation for InfraRed. This refers to any electromagnetic radiation with a wavelength longer than that of normal visible light (wavelength range approx. 380 to 780 nm). Wavelengths of approx. 780 to 1500 nm are used. IR light cannot be used with plastic fibers due to their high attenuation in this range. Red light is used instead. Usual polarization filters do not work properly in the IR range, therefore red light is also used for reflex sensors.

Leakage current

The leakage current is the current that passes through the output transistor when it is blocked. This must be taken into account, especially in the case of parallel connection of several sensors.

Load resistance

From the selected supply voltage U_B and the specified maximum output current of the photoelectric sensor, the lowest permissible load resistance for trouble-free operation can be calculated. With a voltage of 24V and a specified maximum output current of 200 mA, the minimum load resistance is 120 Ohms; for 15V, the value is 75 Ohms ($R=V/I$. In this example, $120 \text{ Ohms} = 24V/.2A$).

Make-break or complementary function:

A switching element combination that contains one make function and one break function.

In order to establish a relationship between the two different modes, you must distinguish between type D sensors (light diffusion) and types R and T (light reflection or transmission):

Type	Dark operate	Light operate
Diffuse Reflective	N.C.	N.O.
Retroreflective	N.O.	N.C.
Through-beam	N.O.	N.C.

Photoelectric Sensor Terminology

Make N.O. (normally open)

Causes load current to flow when a target is detected and not to flow when a target is not detected.

Open collector

An output transistor is not internally connected to a pull-up or pull-down load in an open collector model. Therefore, it is possible to connect an external load supplied by an external voltage. If the output is not the open-collector type, it is possible for the load to be supplied by an external voltage using a blocking diode in series with the output. This solution increments the output voltage drop.

Optical fibers

An optical fiber consists of:

- A core through which the light is transmitted
- A lining that ensures reflection of the light and keeps it within the core
- A sheath that protects the actual fiber from the outside environment

The light travelling inside the fiber is reflected by the surface separating the core from the lining. This is because the refractive index of the core is greater than that of the lining. In order for a light ray to enter the fiber, it must reach the surface of the fiber with an angle of incidence lower than the critical angle limit, which is the angle beyond which the rays enter the lining and are scattered onto the protective covering.

Standard: OF Series, "uncuttable" fiber, with special connection for MSF amplifier.

Acceptance angle

The acceptance angle is the angle inside which a light ray is accepted by the fiber. It is also the angle with which the light is discharged from the fiber. This angle produces the size of the spot generated by a fiber photocell.

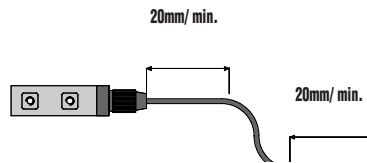
For plastic fibers, the opening angle is 60°; for glass fibers, it is 70°.

Attenuation

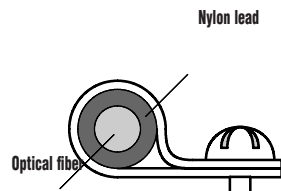
Attenuation is the reduction in signal power caused by the length of the fiber. This parameter must be considered if using fibers with length greater than the standard size.

Installation

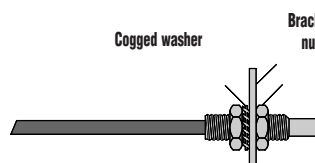
- Do not subject the fibers to a tractive force exceeding 3 kg.
- Keep the radius of curvature as wide as possible.
- Do not bend near the amplifier or termination.
- Secure the fibers using nylon fairleads or cable clamps to avoid causing pressure that could deform the fiber.
- Adjust the ring nut using the following maximum torque wrench settings:
 - M7: 4.5 Nm (39.83 lb-in)
 - M6: 1.2 Nm (10.62 lb-in)
 - M4: 0.8 Nm (7.08 lb-in)
 - M3: 0.8 Nm (7.08 lb-in)
- Set the smooth terminations of the optical fiber using a dowel following the maximum torque wrench settings:
- \varnothing (diameter) = 3 mm: 0.25 Nm (2.2 lb-in)



- \varnothing (diameter) > 3 mm: 0.5 Nm (4.43 lb-in)



- Insert the fiber in the amplifier:
- CF series: loosen the ring nuts on the fiber carriers, insert the two optical fibers in their special seats, push down in order to overcome the resistance of the internal O-ring, then tighten the ring nuts securely.
- OF Series: insert the special termination in the fiber-carrier seat of the MSF amplifier and tighten the ring nut securely.



Please note:

It is important that the minimum radius of curvature be followed to avoid performance loss or breakage of bendable fiber terminations:

- Plastic fiber with core diameter 0.5 mm: Rmin = 5 mm
- Plastic fiber with core diameter 1 mm: Rmin = 10 mm

Overvoltage protection

When an inductive load is switched off, the output voltage (when there is no protection circuit present) rises to such a high value that the output transistor may be destroyed. For this reason, our photo sensors feature a built-in Zener diode at the output, which limits the output voltage to a safe value (3-wire types). When connecting an inductive load with a current greater than 100 mA, and a switching frequency exceeding 10 Hz, the addition of a protective diode placed directly at the load terminal is recommended to limit the power loss of the built-in Zener diode.

Polarity reversal protection

All our photo sensors are protected against polarity reversal at all terminals. However, operation, is only possible if the sensor is connected the right way.

Protection degree

For information on how to define your IP Rating, see the APPENDIX section of this desk reference.

Polarized reflective photoelectric sensor

This is a variant of the reflective photo sensor. A polarizing filter is placed in the emitter's optical path. A polarizing filter in the receiver is oriented at a right angle to the filter in the emitter. This results in the elimination of reflections from surfaces other than the reflector. The light from the reflector possesses a component that is strongly polarized in a perpendicular direction to the incident light. It becomes the only recognizable reflected-light source.

Photoelectric Sensor Terminology

Reflective photoelectric sensor

The emitter and receiver form part of the same unit. The optical beams are parallel. The emitter's luminous beam hits a reflector and is redirected toward the receiver. Detection occurs when the path of the beam is interrupted by the presence of an opaque object. Operating distance mainly depends on the quality of the reflector used and on the optical-beam angle.

Shock

In accordance with IEC 68-2-27:

- Pulse shape: half-sine
- Peak acceleration: 30g
- Pulse duration: 11ms

Short circuit protection

All DC devices feature a built-in protection circuit against short-circuits and overloads. Short-circuits between the output and both power supply terminals do not damage the switch and may be applied permanently. The same applies for overloads. During a short-circuit condition, the LEDs do not operate.

Status indicators

The LED indicators can be classified according to color:

Continuous green: Power on

Continuous yellow: Output on

Continuous red: Fault — When there is only one LED, it is usually red and indicates the output state.

Switching element functions

Dark operate

Allows current to flow when the path of the light beam does not reach receiver and will prevent flow when the path of the light beam does reach receiver.

Light operate

Allows current to flow when the path of the light beam reaches receiver and will prevent flow when the path of the light beam does not reach receiver.

Tightening torque

Over-tightening of the nuts can mechanically damage the photoelectric sensor. The following tightening torques should therefore not be exceeded:

M5 x 1 1.5 Nm

M18 x 1 20 Nm

M30 x 1.5 40 Nm

Through-beam photoelectric sensor

Emitter and receiver are housed in separate units and are installed adjacent to one another and carefully aligned. Detection occurs when the path of the beam is interrupted by the presence of an object.

Fork (or 'Slot') style photoelectric sensor

Fork sensors (sometimes referred to as "Slot" sensors) are a unique variety of through-beam sensors that incorporate both the emitter and receiver components in a u-shaped housing which simplifies mounting and cabling, and eliminates the need for alignment. Detection occurs when the path of the beam is interrupted by the presence of an object.

Types of output and load connections

3-wire NPN

There are two power wires and one output wire. The switching element is connected between the output wire and the negative terminal, and the load is connected between the output wire and the positive terminal. In the ON state, the current sinks from the load into the switching element.

3-wire PNP

There are two power wires and one output wire. The switching element is connected between the output wire and the positive terminal, and the load is connected between the output wire and the negative terminal. In the ON state, the current flows from the switching element into the load.

4-wire NPN or PNP

(Programmable output state)

There are two power wires, one N.O./N.C. selection input and one output wire. The output state is programmable, connecting the input wire to one of the power supply lines.

4-wire NPN or PNP

(Complementary outputs)

There are two power wires, one N.O. output and one N.C. output.

4-wire NPN and PNP

There are two power wires and the output type is wiring programmable. The NPN output is available by connecting the PNP terminal to the negative power supply line. The PNP output is available by connecting the NPN terminal to the positive power supply line.

2-wire AC

The two leads make up the switching element itself. In the ON state, with one terminal connected to the phase and the other to the load, current is drawn from the phase line and supplied to the load through the output terminal. The other load terminal is connected to the neutral line.

3-wire AC

These models have two power supply wires and one output. The switching element is connected between output terminal and phase line. In the ON state, current is drawn from the phase line and supplied to the load through the output terminal. The other load terminal is connected to the neutral line.

Vibration

In accordance with IEC 68-2-6:

- Frequency Range: 10-55 Hz
- Amplitude: 1 mm
- Sweep cycle duration: 5 min.
- Duration of endurance at 55 Hz: 30 min. in each of the three axis directions

Photoelectric Sensor Terminology

Field Device Examples - 3 Wire Connections

