

Prism Series Photoelectric Sensors

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The Cutler-Hammer® Prism Series from Eaton's electrical business is a cost-effective line of miniature photoelectric sensors with twice the optical gain of other sensors in this product class. Forward and right-angle viewing models feature identical gain and optical characteristics for the best fit on your machine. A gain control allows quick adjustment for peak optical performance in a variety of applications.

Four sensing modes are available, including polarized reflex to eliminate reliability problems when sensing shiny objects. Visible red sensing beams throughout the Prism Series allow you to see exactly where the sensors are aimed for easier setup. Models are available preconfigured in either Light or Dark Operate modes.

The unique threaded body with flat sides allows quick mounting in a 3/4 inch hole or against any flat surface. Internal components are rigidly sealed in a solid encapsulated package for excellent performance in high-vibration and high-shock applications.

See **Page 2** for details on the Prism Series' flexible isolated output.

Approvals

- UL Recognized
- C-UL Recognized



Unless otherwise noted, the products contained in this document are not designed or intended for use in human safety applications.

High Performance 18 mm Tubular Sensors with a Flexible Isolated Output

Industry Standard 18 mm Threaded Body with Flat Sides for Mounting Flexibility

Forward and Right-Angle Viewing Models Have Identical Optical Performance

Visible Red Beams on All Reflex and Diffuse Models

Isolated Outputs For Wiring Flexibility

AC and DC Operation in the Same Unit

Visible Alignment Aid for Thru-Beam Models

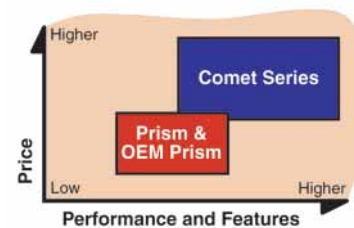
Micro-Connector Models

Product Features

- Small size for use in a wide variety of applications and locations
- High sensing power for longer ranges and resistance to dust and dirt
- Adjustable gain control to ensure peak optical performance
- High noise immunity which greatly reduces problems associated with electrical noise
- AC/DC models which allow you to order and stock one model for both voltages
- DC only models which offer lower cost options in all sensing modes
- Isolated outputs for wiring flexibility
- Short circuit protection
- Quick 3 mS response time on all models
- Highly visible output status LED
- Built-in cable models allow for lowest cost wiring
- Micro-connector models provide for quick installation or replacement
- Custom cable length options

Product Comparison

Eaton's cost-effective Prism Series, OEM Prism and premium Comet Series all share the same 18 mm flat-sided housing. This results in the largest interchangeable sensor family available, allowing you to select from well over 250 different models to solve the widest variety of sensing applications.



For Customer Service in the U.S. call 1-877-ETN CARE (386-2273),
in Canada call 1-800-268-3578.
For Application Assistance in the U.S. and Canada
call 1-800-426-9184.

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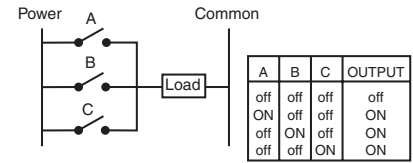
Easy and Flexible Wiring

Prism's isolated output simplifies wiring because it acts like a mechanical relay contact but with solid-state speed and reliability. Use the most convenient available voltage for the sensor while switching a different voltage with the isolated contact. NPN or PNP is easily determined by the way you wire the output.

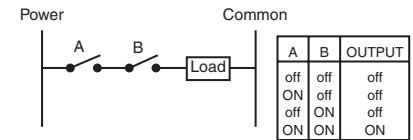
Wiring the Prism Series for Logic

With Prism, you can perform simple "and/or" logic without the need for the added cost of an external controller. Low leakage (10 µA) and resistance ratings (25 Ω) allow Prism sensor outputs to be wired in series or parallel. Two common logic examples are shown at right:



"OR" Function

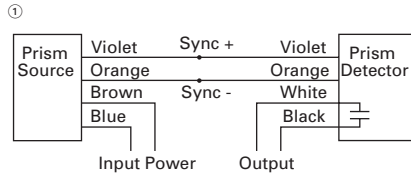


"AND" Function



Model Selection — Thru-Beam Sensors





	Operating Voltage	Sensing Range	Optimum Range	Field of View	Thru-Beam Component	Connection Type	Catalog Number	
							Light Operate	Dark Operate
3-Wire and 4-Wire Sensors								
 <p>Source</p> <p>Detector</p> <p>Synchronous design requires source and detector to be wired to one another</p>	20 – 132V AC 50/60 Hz or 15 – 30V DC	20 feet (6m)	0.1 to 10 feet (0.03 – 3m)	20 inch (0.5m) diameter at 10 feet (3m)	Source	6-foot Cable	11155AA14	
						4-Pin Micro AC Connector	11155AA04 ⊕	
					Detector	6-foot Cable	12155AL10	12155AD10
						4-Pin Micro AC Connector	12155AL04 ⊕	12155AD04 ⊕
	10 – 30V DC	20 feet (6m)	0.1 to 10 feet (0.03 – 3m)	20 inch (0.5m) diameter at 10 feet (3m)	Source	6-foot Cable	11155AA17	
						4-Pin Micro DC Connector	11155AA07 ⊕	
					Detector	6-foot Cable	12155AL10	12155AD10
						4-Pin Micro DC Connector	12155AL07 ⊕	12155AD07 ⊕
 <p>Source</p> <p>Detector</p> <p>Synchronous design requires source and detector to be wired to one another</p>	20 – 132V AC 50/60 Hz or 15 – 30V DC	20 feet (6m)	0.1 to 10 feet (0.03 – 3m)	20 inch (0.5m) diameter at 10 feet (3m)	Source	6-foot Cable	11155RA14	
						4-Pin Micro AC Connector	11155RA04 ⊕	
					Detector	6-foot Cable	12155RL10	12155RD10
						4-Pin Micro AC Connector	12155RL04 ⊕	12155RD04 ⊕
	10 – 30V DC	20 feet (6m)	0.1 to 10 feet (0.03 – 3m)	20 inch (0.5m) diameter at 10 feet (3m)	Source	6-foot Cable	11155RA17	
						4-Pin Micro DC Connector	11155RA07 ⊕	
					Detector	6-foot Cable	12155RL10	12155RD10
						4-Pin Micro DC Connector	12155RL07 ⊕	12155RD07 ⊕



See Prism Series wiring diagrams on Page 5 for details on wiring power and output.

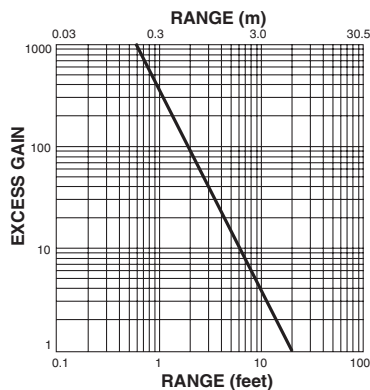
⊕ See listing of compatible connector cables on Page 5.

Model Selection — Reflex and Diffuse Reflective Sensors

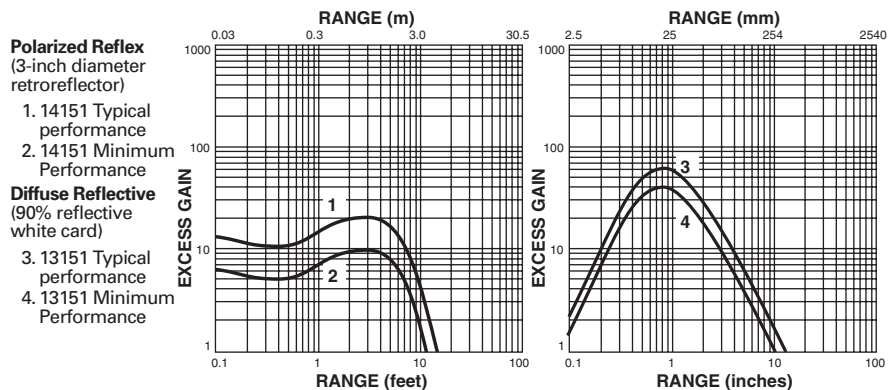
	Operating Voltage	Type	Sensing Range	Optimum Range	Field of View	Connection Type	Catalog Number	
							Light Operate	Dark Operate
3-Wire and 4-Wire Sensors								
Reflex — Forward Viewing Retroreflector (Not Included)  Sensor For complete system, order Sensor and Retroreflector (See PG.05E.17.T.E)	20 – 132V AC 50/60 Hz or 15 – 30V DC	Standard Reflex	15 feet (4.5m) ①	0.1 to 12 feet (0.03 – 3.6m)	3 inch (76 mm) diameter at 12 feet (3.6m)	6-foot Cable	14150AL14	14150AD14
		Polarized Reflex	10 feet (3m) ①	0.1 to 8 feet (0.03 – 2.4m)		4-Pin Micro AC Connector	14150AL04 ⊕	14150AD04 ⊕
	10 – 30V DC	Standard Reflex	15 feet (4.5m) ①	0.1 to 12 feet (0.03 – 3.6m)	3 inch (76 mm) diameter at 12 feet (3.6m)	6-foot Cable	14150AL17	14150AD17
		Polarized Reflex	10 feet (3m) ①	0.1 to 8 feet (0.03 – 2.4m)		4-Pin Micro DC Connector	14150AL07 ⊕	14150AD07 ⊕
Reflex — Right-Angle Viewing Retroreflector (Not Included)  Sensor For complete system, order Sensor and Retroreflector (See PG.05E.17.T.E)	20 – 132V AC 50/60 Hz or 15 – 30V DC	Standard Reflex	15 feet (4.5m) ①	0.1 to 12 feet (0.03 – 3.6m)	3 inch (76 mm) diameter at 12 feet (3.6m)	6-foot Cable	14150RL14	14150RD14
		Polarized Reflex	10 feet (3m) ①	0.1 to 8 feet (0.03 – 2.4m)		4-Pin Micro AC Connector	14150RL04 ⊕	14150RD04 ⊕
	10 – 30V DC	Standard Reflex	15 feet (4.5m) ①	0.1 to 12 feet (0.03 – 3.6m)	3 inch (76 mm) diameter at 12 feet (3.6m)	6-foot Cable	14150RL17	14150RD17
		Polarized Reflex	10 feet (3m) ①	0.1 to 8 feet (0.03 – 2.4m)		4-Pin Micro DC Connector	14150RL07 ⊕	14150RD07 ⊕
Diffuse Reflective Forward Viewing 	20 – 132V AC 50/60 Hz or 15 – 30V DC	—	8 inches (200 mm) ②	0.15 to 5 inches (4 – 127 mm)	0.6 inch (15 mm) diameter at 5 inches (127 mm)	6-foot Cable	13150AL14	13150AD14
	10 – 30V DC	—	8 inches (200 mm) ②	0.15 to 5 inches (4 – 127 mm)	0.6 inch (15 mm) diameter at 5 inches (127 mm)	4-Pin Micro AC Connector	13150AL04 ⊕	13150AD04 ⊕
Diffuse Reflective Right-Angle Viewing 	20 – 132V AC 50/60 Hz or 15 – 30V DC	—	8 inches (200 mm) ②	0.15 to 5 inches (4 – 127 mm)	0.6 inch (15 mm) diameter at 5 inches (127 mm)	6-foot Cable	13150RL14	13150RD14
	10 – 30V DC	—	8 inches (200 mm) ②	0.15 to 5 inches (4 – 127 mm)	6 inch (15 mm) diameter at 5 inches (127 mm)	4-Pin Micro DC Connector	13150RL07 ⊕	13150RD07 ⊕

- ① Ranges based on a 3" diameter retroreflector.
- ② Sensor will detect a 90% reflectance white card at this range.
- ⊕ Stocked product, typical order quantities guaranteed in stock.
- ⊕ See listing of compatible connector cables on Page 5.

Excess Gain — Thru-Beam Sensors



Excess Gain — Reflex and Diffuse Reflective Sensors




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Glass Fiber Optic Adapter

This simple adapter allows glass fiber optic cables to be used with standard Prism Series diffuse reflective sensors.



Model Selection — Glass Fiber Optic Adapter

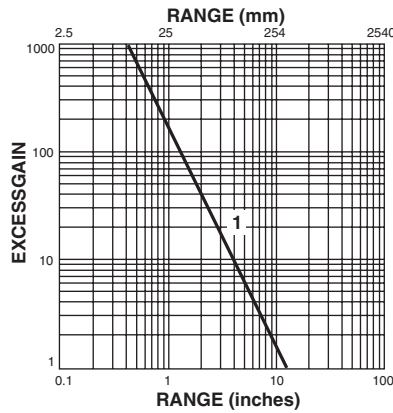
	Sensors	Fibers	Catalog Number
Glass Fiber Optic Adapter with Hex Wrench Patent #5,559,919 	Forward Viewing, Diffuse Reflective Sensors (ordered separately, see Page 3)	Glass Fiber Optic Cables (ordered separately, see PG.05E.15.T.E)	6235A-6501

Stocked product, typical order quantities guaranteed in stock.

Excess Gain

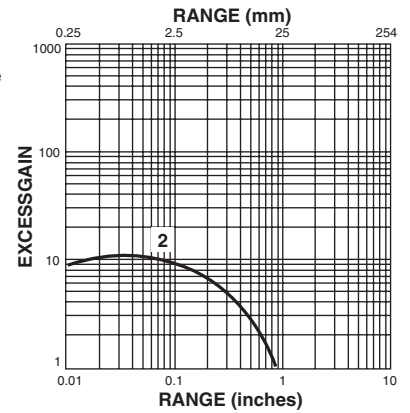
When Using Single Fibers for Thru-Beam Sensing
(Gain using E51KF823 fibers)

- 1. 13150A Prism



When Using Duplex Fibers for Diffuse Reflective sensing
(Gain using E51KF723 fibers, based on 90% reflective white card)

- 2. 13150A Prism

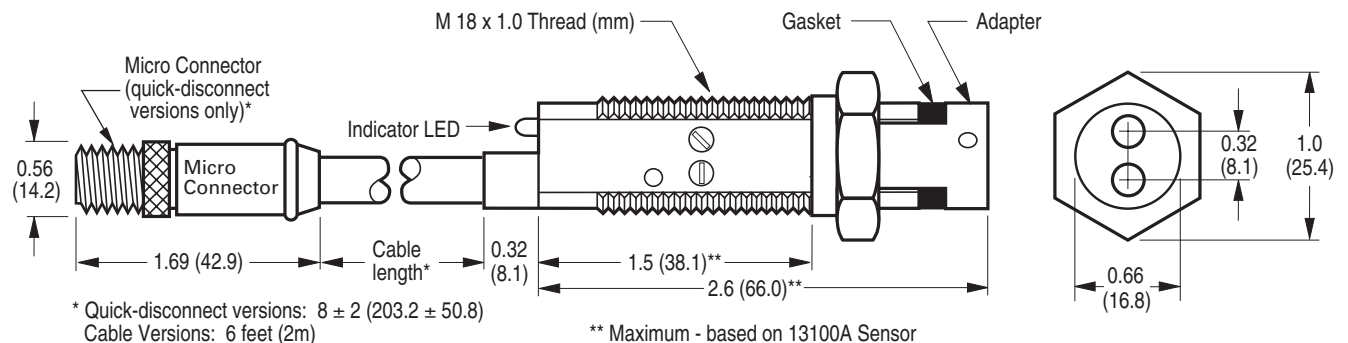


Specifications — Glass Fiber Optic Adapter




Sensor Specifications	See Prism Series Specifications on Page 7
Material of Construction	Adapter: 360 Brass; Gasket: Silicone
Vibration (Sensor/Adapter)	30g over 10 Hz to 2 kHz
Shock (Sensor/Adapter)	50g for 10 mS 1/2 sinewave pulse
Enclosure Ratings	NEMA 1 ①

① The adapter will resist the entrance of moisture in the area between the lenses and the fiber ends when properly assembled. However, moisture entry is possible during direct high pressure sprays. Since the Prism Series sensors are rated NEMA 1, 2, 3, 4, 4X, 6, 12 and 13, this will not result in damage to the sensors themselves.

Approximate Dimensions — Sensor with Adapter Installed — in Inches (mm) Except Where Noted



Model Selection — Compatible Connector Cables ①

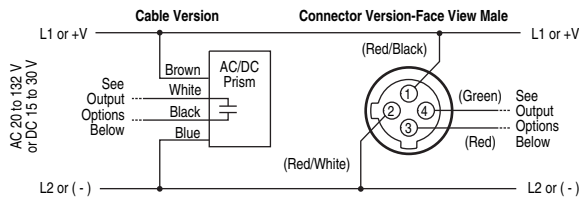
	Voltage Style	Number of Pins	Gauge	Length	Catalog Number			Pin Configuration/Wire Colors (Face View Female Shown)
					PVC Jacket	PUR Jacket	IRR PUR Jacket	
Standard Cables — Micro Style								
 Micro Style Straight Female	AC	4-pin 4-wire	22 AWG	6.0 feet (2m)	CSAS4F4CY2202	CSAS4F4RY2202	CSAS4F4IO2202	
	DC	4-pin 4-wire	22 AWG	6.0 feet (2m)	CSDS4A4CY2202	CSDS4A4RY2202	CSDS4A4IO2202	

① For a full selection of connector cables, see **PG.05.05.T.E.**
 ■ Stocked product, typical order quantities guaranteed in stock.

Wiring Diagrams

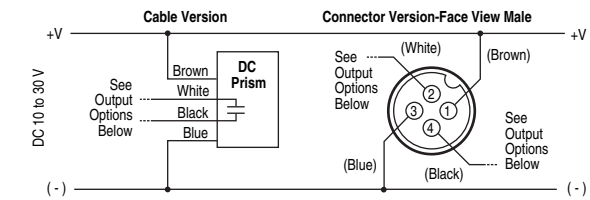
AC/DC Models ② ③

All AC/DC Models (except Thru-Beam)

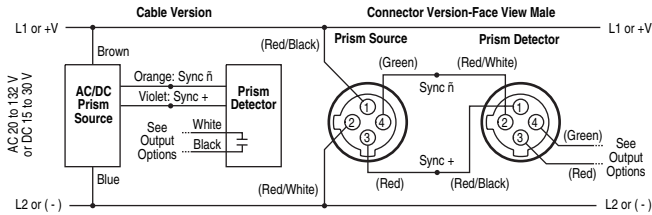


DC Models ② ③ ④

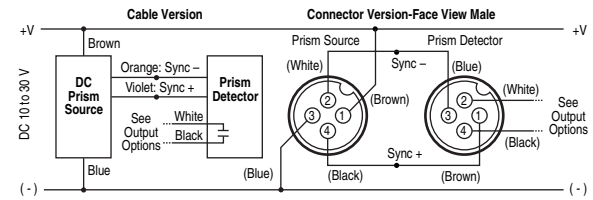
All DC Models (except Thru-Beam)



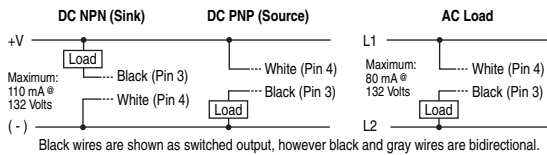
AC/DC Thru-Beam Wiring



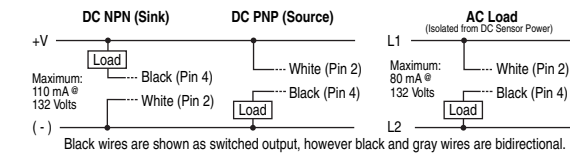
DC Thru-Beam Wiring



Isolated Output Options




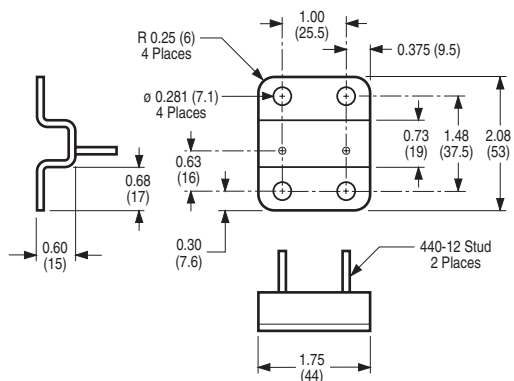

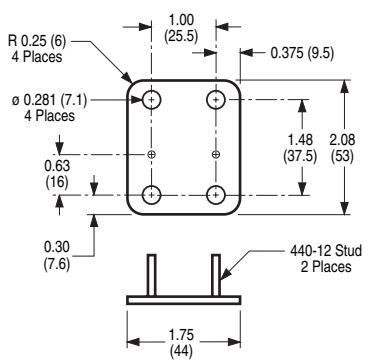

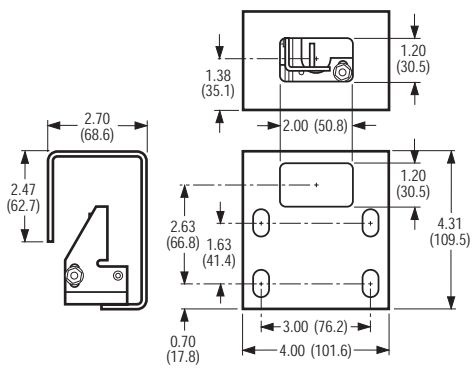

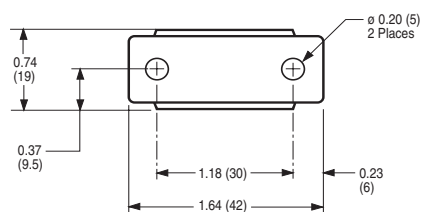
Isolated Output Options



- ② Cable Versions: The color codes are the actual wire colors emanating from the sensor.
- ③ Connector Versions: The pin numbering and wire colors, shown in (), are typical of several manufacturers, however, variations are possible.
NOTE: In case of discrepancies, rely on function indicated and pin location rather than pin number or wire color.
- ④ **NOTE:** Sensor operates on DC voltage, but isolated output can switch AC or DC loads.

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Model Selection — Accessories

	Description	Catalog Number	Approximate Dimensions in Inches (mm)
Retroreflectors	Retroreflectors and retroreflective tape	See PG.05E.17.TE	
Mounting Brackets	A wide variety of mounting brackets for tubular sensors	See PG.05.03.TE	
	<p>Flush Mount Bracket</p> <p>Contoured design is ideal for flush mounting of right-angle Prism Series reflex to mounting surface using 1/4-inch hardware. No alignment adjustment. Sensor mounts on #4 studs. 304 Stainless Steel</p>	6161AS5296	
	<p>Flush Mount Bracket</p> <p>Same as above except without contour. Ideal for right-angle diffuse and thru-beam sensors. 304 Stainless Steel</p>	6161AS5297	
	<p>Adjustable Protective Bracket</p> <p>Heavy-duty bracket protects the sensor from damage. Works with all Prism Series sensors. Ideal for material handling applications with the Prism right-angle reflex sensor. Provides locking vertical and horizontal adjustments for independent adjustment in each axis. Sensor mounts on #4 studs. 10 ga. painted steel</p>	E58KS5200	
	<p>Comet/Prism Ball Swivel Bracket</p> <p>Allows 360° rotation and 10° vertical tilt. Hole spacing is identical to our 50 and 55 Series sensors. Ideal for mounting right-angle sensors. Made of Noryl®.</p>	6181AS5200	
Accessories	Replacement mounting nuts and other accessories	See PG.05.04.TE	
Connector Cables	A variety of cables, connector blocks and accessories	See PG.05.05.TE	

■ Stocked product, typical order quantities guaranteed in stock.

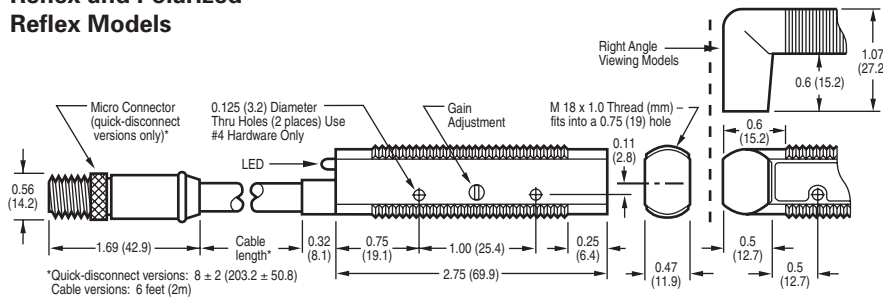
Specifications

	AC/DC Models	DC Only Models
Input Voltage	20 to 132V AC, 50/60 Hz or 15 to 30V DC	10 to 30V DC
Power Dissipation	Thru-beam: 2W maximum; All others: 1.5W maximum	Thru-beam: 1.5W maximum; All others: 1W maximum
Output Type	Solid-state relay	
Output Isolation	400V maximum	
Voltage Switching Capacity	200V AC peak; 180V DC	
Current Switching Capacity	80 mA AC load, 110 mA @ 132V DC (derate to 100 mA @ 180V DC)	
Off-State Leakage	10 μ A maximum	
On-State Resistance	25 Ω maximum	
Short Circuit Protection	Protected (current limited) for loads less than 32V AC or DC. IMPORTANT: Output will reset automatically when short is removed (there is no visual indication of a short circuit condition)	
Response Time	3 mS	
Light/Dark Operation	Specified by catalog number	
Temperature Range	Operating: -13° to +131°F (-25° to +55°C); Storage: -13° to +158°F (-25° to +70°C)	
Material of Construction	Lens: polycarbonate; Cable jacket: PVC; Body: structural polyurethane foam (do not expose to concentrated acids, alcohols or ketones)	
Cable Versions	2m length, 4-conductor cable; micro 4-pin male connector	
Connector Versions	Micro Connector 4-pin male AC or DC key (by model)	
Vibration and Shock	Vibration: 30g over 10 Hz to 2 kHz; Shock: 50g for 10 mS 1/2 sine wave pulse	
LED Indicator	Thru-beam source: Lights steady when power is ON; All others: Lights steady when output is ON	
Thru-Beam Alignment Aid	Detector includes a visible LED behind lens that lights steady when beam is complete	
Enclosure Ratings	NEMA 1, 2, 3, 4, 4X, 6, 12 and 13 ^①	

^① **NOTE:** Photoelectric sensors conform to NEMA tests as indicated above, however, some severe washdown applications can exceed these NEMA test specifications. If questions about a particular application arise, contact Eaton's Cutler-Hammer Sensor Applications Department at 1-800-426-9184.

Approximate Dimensions in Inches (mm) Except Where Noted

Reflex and Polarized Reflex Models



Diffuse Reflective and Thru-Beam Models

