

Prism Series Sensors



Prism Series Sensors

Product Description

The Prism Series from Eaton's Electrical Sector 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 in 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 V8-T5-73** for details on the Prism Series' flexible isolated output.

Contents

<i>Description</i>	<i>Page</i>
Prism Series Sensors	
Product Overview . . . . .	<b>V8-T5-70</b>
Product Selection	
Thru-Beam Sensors . . . . .	<b>V8-T5-70</b>
Reflex and Diffuse Reflective Sensors . . . . .	<b>V8-T5-71</b>
Glass Fiber Optic Adapter . . . . .	<b>V8-T5-71</b>
Compatible Connector Cables . . . . .	<b>V8-T5-72</b>
Accessories . . . . .	<b>V8-T5-72</b>
Technical Data and Specifications . . . . .	<b>V8-T5-73</b>
Excess Gain . . . . .	<b>V8-T5-74</b>
Wiring Diagrams . . . . .	<b>V8-T5-75</b>
Dimensions . . . . .	<b>V8-T5-76</b>

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

Standards and Certifications

- UL Recognized
- cUL Recognized
- CE



**⚠ DANGER**

**THIS SENSOR IS NOT A SAFETY DEVICE AND IS NOT INTENDED TO BE USED AS A SAFETY DEVICE. This sensor is designed only to detect and read certain data in an electronic manner and perform no use apart from that, specifically no safety-related use. This sensor product does not include self-checking redundant circuitry, and the failure of this sensor product could cause either an energized or de-energized output condition, which could result in death, serious bodily injury, or property damage.**

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.

For the most current information on this product, visit our Web site: [www.eaton.com](http://www.eaton.com)

# 5.6

## Photoelectric Sensors

### Prism Series Sensors

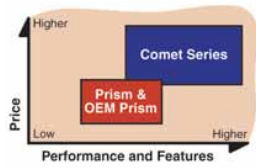
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#### Product Overview

##### 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 fit the widest variety of sensing applications.

##### Comparison



Compared to the similar-looking Comet, the Prism Series is optimized for just value, with a basic feature set best suited for OEMs:

- DC and AC/DC versions
- Isolated AC/DC solid-state outputs

##### Prism Series

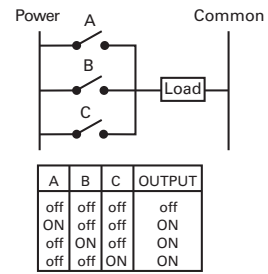
##### Easy and Flexible Wiring

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 to a different voltage with the isolated contact. NPN or PNP is easily determined by the way you wire the output.

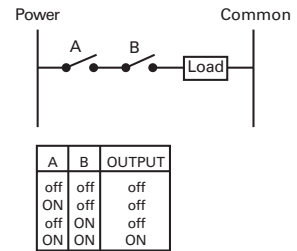
##### Wiring the Prism Series for Logic

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

##### "OR" Function



##### "AND" Function



#### Product Selection

##### Thru-Beam Sensors

##### Three-Wire and Four-Wire Sensors

	Operating Voltage	Sensing Range	Optimum Range	Field of View	Thru-Beam Component	Connection Type	Light Operate Catalog Number	Dark Operate Catalog Number
<b>Thru-Beam Forward Viewing</b> 	<b>Thru-Beam Forward Viewing</b>							
	20–132 Vac 50/60 Hz or 15–30 Vdc	20 ft (6m)	0.1 to 10 ft (0.03 to 3m)	20 in (0.5m) diameter at 10 ft (3m)	Source	6 ft cable	<b>11155AA14</b>	<b>11155AA14</b>
						4-pin micro AC connector	<b>11155AA04</b> ⊕	<b>11155AA04</b> ⊕
					Detector	6 ft cable	<b>12155AL10</b>	<b>12155AD10</b>
						4-pin micro AC connector	<b>12155AL04</b> ⊕	<b>12155AD04</b> ⊕
	10–30 Vdc	20 ft (6m)	0.1 to 10 ft (0.03 to 3m)	20 in (0.5m) diameter at 10 ft (3m)	Source	6 ft cable	<b>11155AA17</b>	<b>11155AA17</b>
<b>Thru-Beam Right Angle Viewing</b> 	<b>Thru-Beam Right Angle Viewing</b>							
	20–132 Vac 50/60 Hz or 15–30 Vdc	20 ft (6m)	0.1 to 10 ft (0.03 to 3m)	20 in (0.5m) diameter at 10 ft (3m)	Source	6 ft cable	<b>11155RA14</b>	<b>11155RA14</b>
						4-pin micro AC connector	<b>11155RA04</b> ⊕	<b>11155RA04</b> ⊕
					Detector	6 ft cable	<b>12155RL10</b>	<b>12155RD10</b>
						4-pin micro AC connector	<b>12155RL04</b> ⊕	<b>12155RD04</b> ⊕
	10–30 Vdc	20 ft (6m)	0.1 to 10 ft (0.03 to 3m)	20 in (0.5m) diameter at 10 ft (3m)	Source	6 ft cable	<b>11155RA17</b>	<b>11155RA17</b>
					4-pin micro DC connector	<b>11155RA07</b> ⊕	<b>11155RA07</b> ⊕	
				Detector	6 ft cable	<b>12155RL10</b>	<b>12155RD10</b>	
					4-pin micro DC connector	<b>12155RL07</b> ⊕	<b>12155RD07</b> ⊕	

Wiring Diagrams, see Page V8-T5-75.

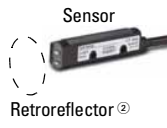


##### Notes

⊕ See listing of compatible connector cables on Page V8-T5-72.

① Synchronous design requires source and detector to be wired to one another.

Reflex and Diffuse Reflective Sensors

Three-Wire and Four-Wire Sensors

	Operating Voltage	Type	Sensing Range	Optimum Range	Field of View	Connection Type	Light Operate Catalog Number	Dark Operate Catalog Number	
<b>Reflex—Forward Viewing</b> 	<b>Reflex—Forward Viewing</b>								
	20–132 Vac 50/60 Hz or 15–30 Vdc	Standard reflex	15 ft (4.5m) ③	0.1 to 12 ft (0.03 to 3.6m)	3 in (76 mm) diameter at 12 ft (3.6m)	6 ft cable	<b>14150AL14</b>	<b>14150AD14</b>	
		Polarized reflex	10 ft (3m) ③	0.1 to 8 ft (0.03 to 2.4m)		4-pin micro AC connector	<b>14150AL04</b> Ⓢ	<b>14150AD04</b> Ⓢ	
	10–30 Vdc	Standard reflex	15 ft (4.5m) ③	0.1 to 12 ft (0.03 to 3.6m)	3 in (76 mm) diameter at 12 ft (3.6m)	6 ft cable	<b>14150AL17</b>	<b>14150AD17</b>	
		Polarized reflex	10 ft (3m) ③	0.1 to 8 ft (0.03 to 2.4m)		4-pin micro DC connector	<b>14150AL07</b> Ⓢ	<b>14150AD07</b> Ⓢ	
	<b>Reflex—Right Angle Viewing</b>								
20–132 Vac 50/60 Hz or 15–30 Vdc	Standard reflex	15 ft (4.5m) ③	0.1 to 12 ft (0.03 to 3.6m)	3 in (76 mm) diameter at 12 ft (3.6m)	6 ft cable	<b>14150RL14</b>	<b>14150RD14</b>		
	Polarized reflex	10 ft (3m) ③	0.1 to 8 ft (0.03 to 2.4m)		4-pin micro AC connector	<b>14150RL04</b> Ⓢ	<b>14150RD04</b> Ⓢ		
10–30 Vdc	Standard reflex	15 ft (4.5m) ③	0.1 to 12 ft (0.03 to 3.6m)	3 in (76 mm) diameter at 12 ft (3.6m)	6 ft cable	<b>14150RL17</b>	<b>14150RD17</b>		
	Polarized reflex	10 ft (3m) ③	0.1 to 8 ft (0.03 to 2.4m)		4-pin micro DC connector	<b>14150RL07</b> Ⓢ	<b>14150RD07</b> Ⓢ		
<b>Diffuse Reflective Forward Viewing</b> 	<b>Diffuse Reflective Forward Viewing</b>								
	20–132 Vac 50/60 Hz or 15–30 Vdc	—	8 in (200 mm) ④	0.15 to 5 in (4 to 127 mm)	0.6 in (15 mm) diameter at 5 in (127 mm)	6 ft cable	<b>13150AL14</b>	<b>13150AD14</b>	
		4-pin micro AC connector	<b>13150AL04</b> Ⓢ	<b>13150AD04</b> Ⓢ					
10–30 Vdc	—	8 in (200 mm) ④	0.15 to 5 in (4 to 127 mm)	0.6 in (15 mm) diameter at 5 in (127 mm)	6 ft cable	<b>13150AL17</b>	<b>13150AD17</b>		
4-pin micro DC connector	<b>13150AL07</b> Ⓢ	<b>13150AD07</b> Ⓢ							
<b>Diffuse Reflective Right Angle Viewing</b> 	<b>Diffuse Reflective Right Angle Viewing</b>								
	20–132 Vac 50/60 Hz or 15–30 Vdc	—	8 in (200 mm) ④	0.15 to 5 in (4 to 127 mm)	0.6 in (15 mm) diameter at 5 in (127 mm)	6 ft cable	<b>13150RL14</b>	<b>13150RD14</b>	
		4-pin micro AC connector	<b>13150RL04</b> Ⓢ	<b>13150RD04</b> Ⓢ					
10–30 Vdc	—	8 in (200 mm) ④	0.15 to 5 in (4 to 127 mm)	6 in (15 mm) diameter at 5 in (127 mm)	6 ft cable	<b>13150RL17</b>	<b>13150RD17</b>		
4-pin micro DC connector	<b>13150RL07</b> Ⓢ	<b>13150RD07</b> Ⓢ							

5

Glass Fiber Optic Adapter

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

Glass Fiber Optic Adapter with Hex Wrench



Glass Fiber Optic Adapter

Sensors	Fibers	Catalog Number
<b>Glass Fiber Optic Adapter with Hex Wrench</b>		
Forward viewing, diffuse reflective sensors (ordered separately, see table above)	Glass fiber optic cables (ordered separately, see <b>Tab 9, section 9.2</b> )	<b>6235A-6501</b>

Notes

- Ⓢ See listing of compatible connector cables on **Page V8-T5-72**.
- ① For complete system, order sensor and retroreflector (see **Tab 8, section 8.1**).
- ② Retroreflector not included.
- ③ Ranges based on a 3 in diameter retroreflector.
- ④ Sensor will detect a 90% reflectance white card at this range.

# 5.6

## Photoelectric Sensors



### Prism Series Sensors

#### Compatible Connector Cables

Micro-Style,  
Straight Female







#### Standard Cables—Micro <sup>①</sup>

Voltage Style	Number of Pins	Gauge	Length	Pin Configuration/ Wire Colors (Face View Female Shown)	PVC Jacket Catalog Number	PUR Jacket Catalog Number	IRR PUR Jacket Catalog Number
<b>Micro-Style, Straight Female</b>							
AC	4-pin, 4-wire	22 AWG	6 ft (2m)	 1-Red/Black 2-Red/White 3-Red 4-Green	CSAS4F4CY2202	CSAS4F4RY2202	CSAS4F4IO2202
DC	4-pin, 4-wire	22 AWG	6 ft (2m)	 1-Brown 2-White 3-Blue 4-Black	CSDS4A4CY2202	CSDS4A4RY2202	CSDS4A4IO2202

5

#### Accessories

#### Prism Series Sensors

Description	Catalog Number
<b>Retroreflectors</b>	
Retroreflectors and retroreflective tape	See <b>Tab 8, section 8.1</b>
<b>Mounting Brackets</b>	
A wide variety of mounting brackets for tubular sensors	See <b>Tab 8, section 8.2</b>
<b>Flush Mount Bracket</b>	
 Contoured design is ideal for flush mounting of Right Angle Prism Series reflex to mounting surface using 1/4 in hardware. No alignment adjustment. Sensor mounts on #4 studs. 304 stainless steel	<b>6161AS5296</b>
 Same as above except without contour. Ideal for right angle diffuse and thru-beam sensors. 304 Stainless Steel	<b>6161AS5297</b>
 Heavy-duty bracket protects the sensor from damage. Works with all Prism Series sensors. Ideal for material handling applications with Prism right angle reflex sensors. Provides locking vertical and horizontal adjustments for independent adjustment in each axis. Sensor mounts on #4 studs. 10 ga. painted steel	<b>E58KS5200</b>
 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.	<b>6181AS5200</b>
<b>Accessories</b>	
Replacement mounting nuts and other accessories	See <b>Tab 8, sections 8.2 and 8.3</b>
<b>Connector Cables</b>	
A variety of cables, connector blocks and accessories	See <b>Tab 10, section 10.1</b>
<b>Dimensions, see Page V8-T5-76.</b>	

**Note**

① For a full selection of connector cables, see **Tab 10, section 10.1**.

## Technical Data and Specifications

### Glass Fiber Optic Adapter

Description	Specification
Sensor specifications	See Prism Series specifications below
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 <sup>①</sup>

### Prism Series Sensors

Description	AC/DC Models	DC Only Models
Input voltage	20 to 132 Vac, 50/60 Hz or 15 to 30 Vdc	10 to 30 Vdc
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	Solid-state relay
Output isolation	400V maximum	400V maximum
Voltage switching capacity	200 Vac peak; 180 Vdc	200 Vac peak; 180 Vdc
Current switching capacity	80 mA AC load, 110 mA at 132 Vdc (derate to 100 mA at 180 Vdc)	80 mA AC load, 110 mA at 132 Vdc (derate to 100 mA at 180 Vdc)
Off-state leakage	10 $\mu$ A maximum	10 $\mu$ A maximum
On-state resistance	25 ohms maximum	25 ohms maximum
Short circuit protection	Protected (current limited) for loads less than 32 Vac or Vdc <sup>②</sup>	Protected (current limited) for loads less than 32 Vac or Vdc <sup>②</sup>
Response time	3 ms	3 ms
Light/dark operation	Specified by catalog number	Specified by catalog number
Temperature range		
Operating	-13° to 131°F (-25° to 55°C)	-13° to 131°F (-25° to 55°C)
Storage	-13° to 158°F (-25° to 70°C)	-13° to 158°F (-25° to 70°C)
Material of construction	Lens: polycarbonate; cable jacket: PVC; body: structural polyurethane foam <sup>③</sup>	Lens: polycarbonate; cable jacket: PVC; body: structural polyurethane foam <sup>③</sup>
Cable versions	2m length, 4-conductor cable; micro 4-pin male connector	2m length, 4-conductor cable; micro 4-pin male connector
Connector versions	Micro-connector 4-pin male AC or DC key (by model)	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	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: Light steady when output is ON	Thru-beam source: Lights steady when power is ON; all others: Light steady when output is ON
Thru-beam alignment aid	Detector includes a visible LED behind lens that lights steady when beam is complete	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 <sup>④</sup>	NEMA 1, 2, 3, 4, 4X, 6, 12 and 13 <sup>④</sup>

#### Notes

- <sup>①</sup> 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.
- <sup>②</sup> **IMPORTANT:** Output will reset automatically when short is removed (there is no visual indication of a short circuit condition)
- <sup>③</sup> Do not expose to concentrated acids, alcohols or ketones.
- <sup>④</sup> Photoelectric sensors conform to NEMA tests as indicated above, however, some severe washdown applications can exceed these NEMA test specifications.

# 5.6

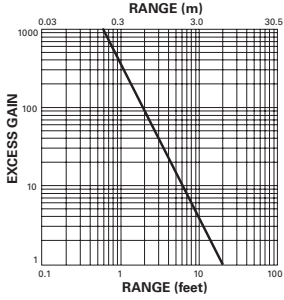
## Photoelectric Sensors

### Prism Series Sensors

#### Excess Gain

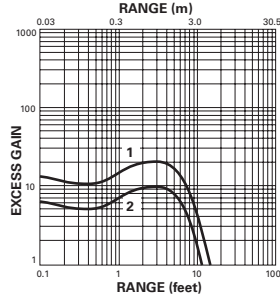
#### Thru-Beam Sensors

#### Thru-Beam



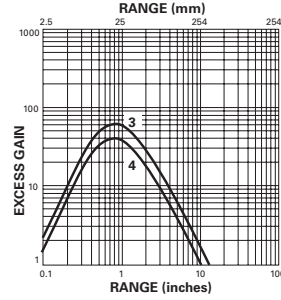
#### Reflex and Diffuse Reflective Sensors

#### Polarized Reflex (3 in diameter retroreflector)



1. 14151 Typical performance
2. 14151 Minimum performance

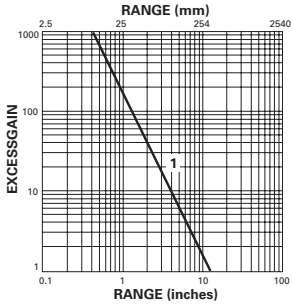
#### Diffuse Reflective (90% reflective white card)



3. 13151 Typical performance
4. 13151 Minimum performance

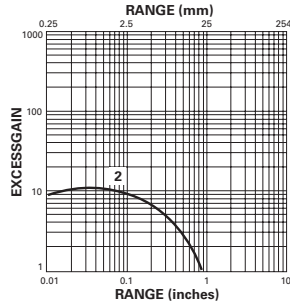
#### Glass Fiber Optic Adapter

#### When Using Single Fibers for Thru-Beam Sensing



- Gain using E51KF823 fibers
1. 13150A Prism

#### When Using Duplex Fibers for Diffuse Reflective Sensing

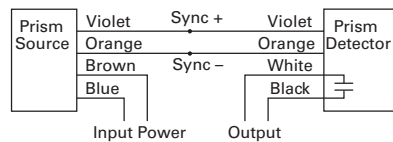


- Gain using E51KF723 fibers, based on 90% reflective white card
2. 13150A Prism

### Wiring Diagrams

Pin numbers are for reference, rely on pin location when wiring.

#### Thru-Beam Sensors

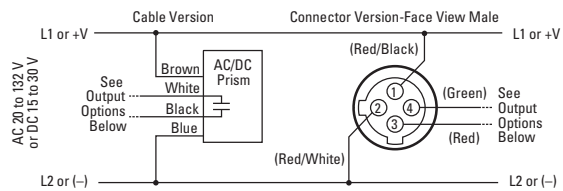


See Prism Series wiring diagrams below for details on wiring power and output.

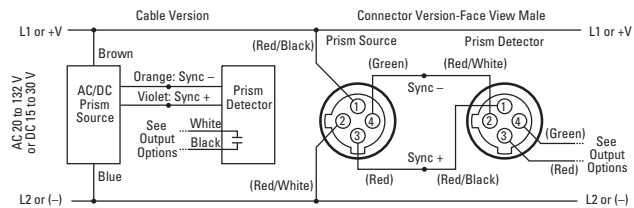
### Prism Series Sensors

#### AC/DC Models ①②

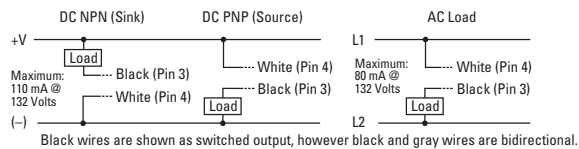
##### All AC/DC Models (except Thru-Beam)



#### AC/DC Thru-Beam Wiring

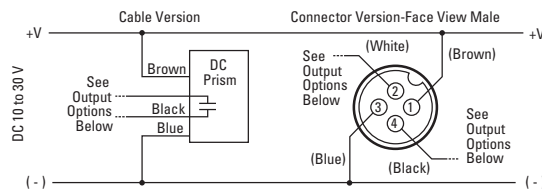


#### AC/DC Isolated Output Options

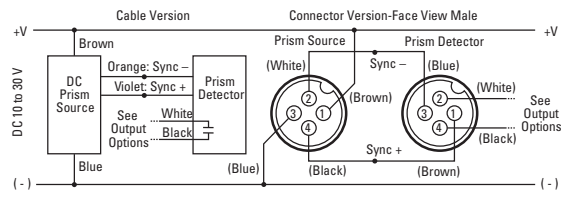


#### DC Models ①②③

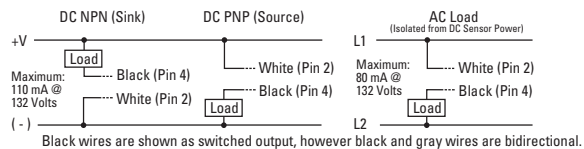
##### All DC Models (except Thru-Beam)



#### DC Thru-Beam Wiring



#### DC Isolated Output Options



#### Notes

- ① Cable versions: The color codes are the actual wire colors emanating from the sensor.
- ② Connector versions: The pin numbering and wire colors, shown in ( ), are typical of several manufacturers, however, variations are possible. In case of discrepancies, rely on function indicated and pin location rather than pin number or wire color.
- ③ Sensor operates on DC voltage, but isolated output can switch AC or DC loads.

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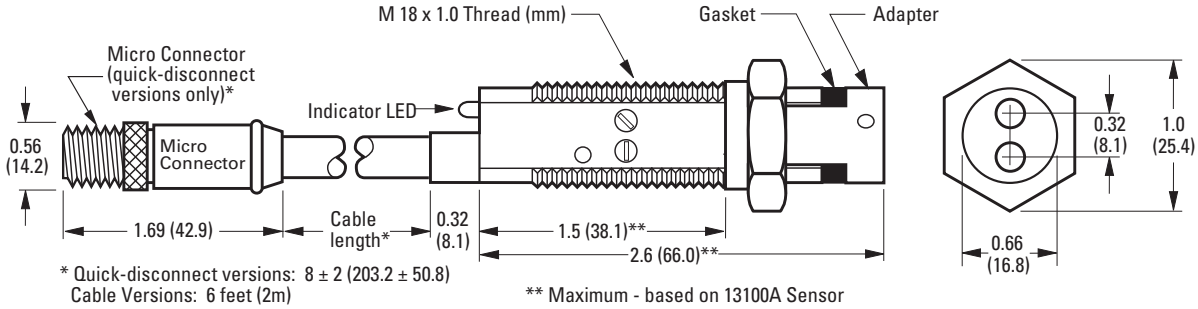
## Photoelectric Sensors

### Prism Series Sensors

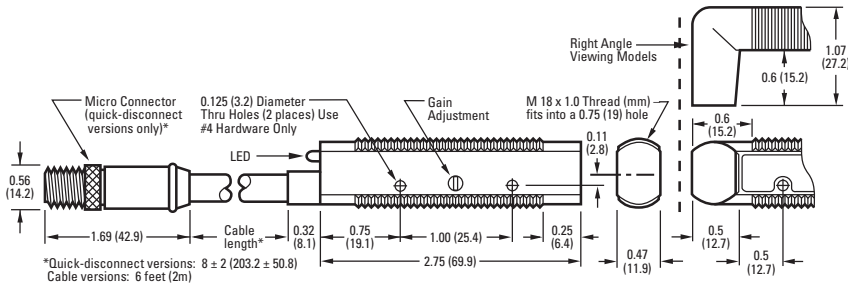
#### Dimensions

Approximate Dimensions in Inches (mm) except where noted.

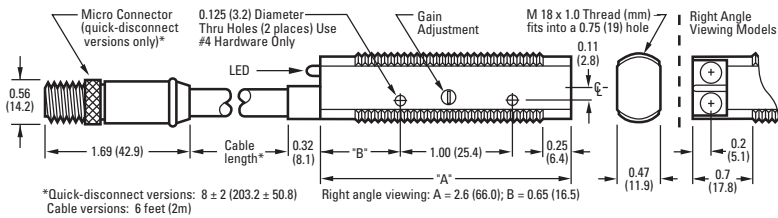
#### Sensor with Adapter Installed



#### Reflex and Polarized Reflex Models



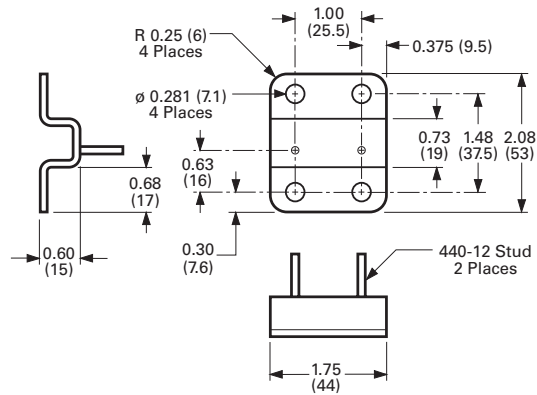
#### Diffuse Reflective and Thru-Beam Models



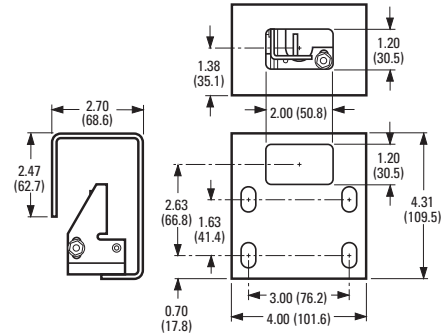
Approximate Dimensions in Inches (mm)

**Accessories**

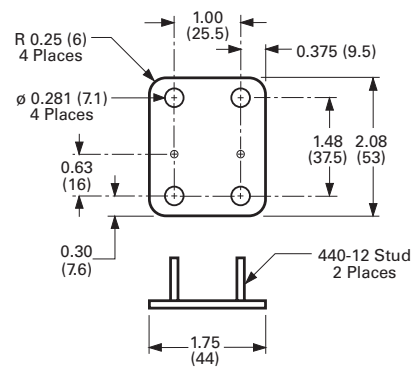
**Flush Mount Bracket—6161AS5296**



**Adjustable Protective Bracket**



**Flush Mount Bracket—6161AS5297**



**Comet/Prism Ball Swivel Bracket**

