

August 2007

**Comet Series  
Photoelectric Sensors****Contents**

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The Cutler-Hammer® Comet Series from Eaton's electrical business is a complete line of high performance, 18 mm tubular sensors with a variety of models and modes to solve virtually any sensing problem.

The sensors are available in thru-beam, reflex, polarized reflex, diffuse reflective, focused diffuse reflective, wide angle diffuse reflective, Perfect Prox®, fine spot Perfect Prox® and fiber optic sensing. Perfect Prox® is one of the most powerful problem-solving sensors available. These sensors can reliably detect targets of different color, reflectance, contrast or surface shape at the same range, while ignoring background objects just a fraction of an inch away.

The Comet Series includes AC/DC and DC-only models with 2-, 3- and 4-wire circuitry. Choose from cable or micro-connector. Mini-connectors are available on 2-wire models for easy retrofit. Each sensor features a Light/Dark Operation switch and a gain control to provide for quick adjustment to peak optical performance.

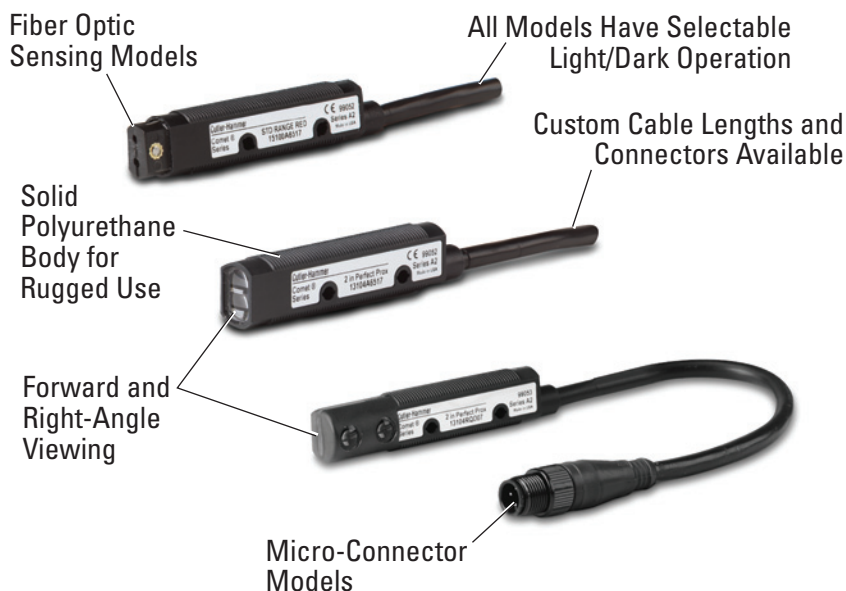
The unique threaded body with flat sides allows quick mounting in a 3/4 inch hole or against any flat surface. Internal components are rigidly sealed in a solid encapsulated package for excellent performance in high-vibration and high-shock applications.

**Approvals**

- UL Recognized
- C-UL Recognized

CE (except 2-wire DC models)

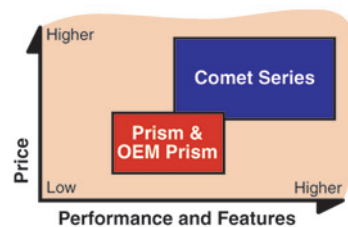
For the most current information on this product, visit our web site:  
[www.EatonElectrical.com](http://www.EatonElectrical.com)

**These High Performance Sensors Have the Versatility to Solve All of Your Sensing Problems****Product Features**

- Industry standard 18 mm diameter threaded body has flat sides allowing it to be mounted like a tubular sensor or against any flat surface
- Right-angle viewing models mount in a depth of only 6/10th of an inch
- Perfect Prox® technology provides exceptional background rejection and application problem-solving
- Visible sensing beams let you see where the beam is aimed for quick setup and alignment
- Solid polyurethane housing completely encapsulates internal circuits for high resistance to shock and vibration
- Adaptable modulation circuit provides immunity to crosstalk from other closely mounted sensors
- The industry's only background rejection sensors with a 2-wire circuit design
- Models available with both AC and DC operation in a single unit — up to 264 volts AC!
- 4-wire DC sensors offer both NPN and PNP outputs
- Output status indicator visible from a wide 270° angle

**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**.

## Sensing Modes

### Thru-Beam

This sensing mode is available with ranges of 20 and 80 feet (6 and 24m). The 20 foot (6m) range is available in forward and right-angle viewing, and can be intermixed in any combination for the best fit in your application. Long range models feature a visible sensing beam to help simplify installation and alignment.

### Reflex and Polarized Reflex

In reflex sensing, the sensing beam is reflected from a retroreflector back to the sensor. The Comet Series includes standard and polarized models with 2-wire, 3-wire and 4-wire circuits. Right-angle models are also available. Polarized models feature a polarizing filter built into the sensor to ensure that only light reflected from a corner-cube retroreflector is recognized by the sensor. This allows reliable detection of shiny targets that could reflect light and be missed by a non-polarized sensor. Most models include a visible sensing beam for easy installation and alignment.

### Diffuse Reflective, Focused Diffuse and Wide Angle Diffuse

A wide variety of diffuse reflective models are available with ranges of 8 inches (200 mm) and 24 inches (610 mm). Forward and right-angle viewing configurations offer identical optical performance in this series. Focused diffuse reflective models feature a light beam that is focused at a point 1.6 inches (40 mm) in front of the sensor lens for applications where you need to avoid sensing objects in front of or behind the target. Wide angle diffuse models provide a large spot and wide detection area.

### Perfect Prox®

This is a unique type of diffuse reflective sensor that combines extremely high sensing power (called "excess gain") with a sharp optical cutoff to ignore backgrounds. This allows the sensor to reliably detect targets regardless of variations in color, reflectance, contrast or surface shape, while ignoring objects that are just slightly outside the target range. This gives the Perfect Prox® an outstanding ability to solve sensing applications that would be difficult or impossible to manage with other types of sensors. It also makes Perfect Prox® one of the easiest photoelectric sensors to set up and use.

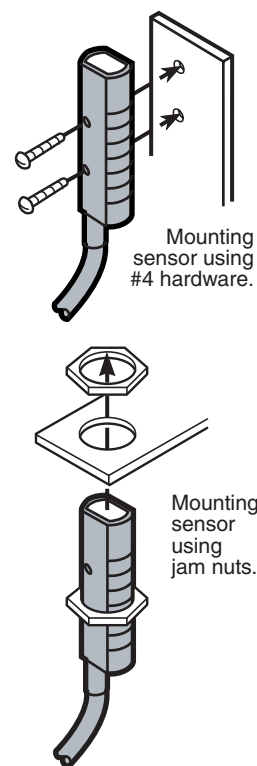
Eaton's Comet Series includes more background rejection models than any other family on the market. Choose from forward or right-angle viewing, 2-, 3- or 4-wire circuits, cable, micro or mini-connector terminations and a variety of sensing ranges. A visible sensing beam on most models lets you quickly confirm that the sensor is aligned correctly with the target. Fine spot models provide an extremely small 0.05 inch (1.3 mm) light spot for accurately detecting tiny targets such as fine strands of wire or targets that are in or behind small diameter holes.

### Fiber Optic

The Comet Series also includes sensors that utilize fiber optic cables to sense objects where space is restricted, temperatures are high, or tight viewing angles are required. Choose from models that accept low cost plastic fiber optic cables, or use our patented glass fiber optic adapter that inexpensively converts our standard diffuse reflective sensors for use with durable glass fiber optic cables.

## Mounting



Comet Series sensors feature a threaded housing and include two jam nuts and washers for mounting into any 0.75 inch (19 mm) hole or a selection of accessory mounting brackets available from Eaton. The flat sides of the sensor feature two mounting holes for easily attaching the sensor to any flat surface with #4 hardware.



See **Page 5-38** at the back of this section, and **Section 8** for a full list of mounting brackets compatible with the Comet Series.

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## Model Selection — Thru-Beam Sensors

	Operating Voltage	Sensing Range	Optimum Range	Field of View	Thru-Beam Component	Connection Type	Catalog Number	
3-Wire and 4-Wire Sensors								
<div><div>Thru-Beam Forward Viewing</div><div></div><div>Source      Detector</div><div>For a complete system, order one Source and one Detector ①</div></div>	20 – 264V AC 50/60 Hz or 15 – 30V DC (NPN)	20 feet (6m)	0.1 to 10 feet (0.03 – 3m)	30 inch (760 mm) diameter at 10 feet (3m) ②	Source (Visible alignment beam)	6-foot Cable	11100A6513	
						4-pin Micro AC Connector	11100AQD03 ②	
			80 feet (24m)	0.1 to 40 feet (0.03 – 12m)	40 inch (1m) diameter at 40 feet (12m)	Detector	6-foot Cable	12100A6513
						4-pin Micro AC Connector	12100AQD03 ②	
						Source (Visible red beam)	6-foot Cable	11102A6513
						4-pin Micro AC Connector	11102AQD03 ②	
					Detector	6-foot Cable	12102A6513	
					4-pin Micro AC Connector	12102AQD03 ②		
	10 – 30V DC (NPN and PNP)	20 feet (6m)	0.1 to 10 feet (0.03 – 3m)	30 inch (760 mm) diameter at 10 feet (3m) ②	Source (Visible alignment beam)	6-foot Cable	11100A6517	
						4-pin Micro DC Connector	11100AQD07 ②	
			80 feet (24m)	0.1 to 40 feet (0.03 – 12m)	40 inch (1m) diameter at 40 feet (12m)	Detector	6-foot Cable	12100A6517
						4-pin Micro DC Connector	12100AQD07 ②	
					Source (Visible red beam)	6-foot Cable	11102A6517	
					4-pin Micro DC Connector	11102AQD07 ②		
<div><div>Thru-Beam Right-Angle Viewing</div><div></div><div>Source      Detector</div><div>For a complete system, order one Source and one Detector ①</div></div>	20 – 264V AC 50/60 Hz or 15 – 30V DC (NPN)	20 feet (6m)	0.1 to 10 feet (0.03 – 3m)	30 inch (760 mm) diameter at 10 feet (3m) ②	Source (Visible alignment beam)	6-foot Cable	11100R6513	
						4-pin Micro AC Connector	11100RQD03 ②	
						Detector	6-foot Cable	12100R6513
						4-pin Micro AC Connector	12100RQD03 ②	
						Source (Visible alignment beam)	6-foot Cable	11100R6517
						4-pin Micro DC Connector	11100RQD07 ②	
					Detector	6-foot Cable	12100R6517	
					4-pin Micro DC Connector	12100RQD07 ②		

① 11100 sources and 12100 detectors may be interchanged in any combination. 11102 models must be used with 12102 models.

② The effective beam (minimum object size that can be detected) is 0.25 inch (6.5 mm) diameter.

■ Fast turn product with typical one business day lead-time to shipment.

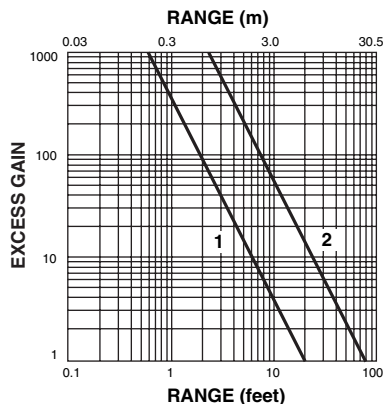
■ Stocked product, typical order quantities guaranteed in stock.

⊕ See listing of compatible connector cables on Page 5-36.







## Excess Gain — Thru-Beam

## Thru-Beam

1. 12100A and 12100R Detectors  
Using 11100A or 11100R  
Sources
2. 12102A Detectors  
Using 11102A Sources



## Model Selection — Reflex Sensors

	Operating Voltage	Sensing Range <sup>①</sup>	Optimum Range <sup>①</sup>	Field of View	Sensing Beam	Connection Type	Catalog Number
2-Wire Sensors							
Standard Reflex Forward Viewing  Sensor Retroreflector (Not Included)	90 – 132V AC 50/60 Hz or 18 – 50V DC	25 feet (7.6m)	0.1 to 15 feet (0.03 – 4.5m)	1 inch (25 mm) Diameter at 50 inches (1.3m)	Visible Red Beam	6-foot Cable	14102AS6515
						3-pin Micro AC Connector	14102ASQD05 ⚡
Polarized Reflex Forward Viewing <sup>③</sup>  Sensor Retroreflector (Not Included)	90 – 132V AC 50/60 Hz or 18 – 50V DC	15 feet (4.5m)	0.1 to 10 feet (0.03 – 3m)	1 inch (25 mm) Diameter at 50 inches (1.3m)	Visible Red Beam	6-foot Cable	14101AS6515
						3-pin Micro AC Connector	14101ASQD05 ⚡
3-Wire and 4-Wire Sensors							
Standard Reflex Forward Viewing <sup>④</sup>  Sensor Retroreflector (Not Included)	20 – 264V AC 50/60 Hz or 15 – 30V DC (NPN)	25 feet (7.6m)	0.1 to 15 feet (0.03 – 4.5m)	1 inch (25 mm) diameter at 50 inches (1.3m)	Visible Red Beam	6-foot Cable	14102A6513
						4-pin Micro AC Connector	14102AQD03 ⚡
	10 – 30V DC (NPN and PNP)	25 feet (7.6m)	0.1 to 15 feet (0.03 – 4.5m)	1 inch (25 mm) diameter at 50 inches (1.3m)	Infrared Beam	6-foot Cable	14100A6513
						4-pin Micro AC Connector	14100AQD03 ⚡
					Visible Red Beam	6-foot Cable	14102A6517
						4-pin Micro DC Connector	14102AQD07 ⚡
Infrared Beam	6-foot Cable	14100A6517					
		4-pin Micro DC Connector	14100AQD07 ⚡				
Standard Reflex Right-Angle Viewing <sup>④</sup>  Sensor Retroreflector (Not Included)	20 – 264V AC 50/60 Hz or 15 – 30V DC (NPN)	15 feet (4.5m)	0.1 to 10 feet (0.03 – 3m)	1 inch (25 mm) diameter at 50 inches (1.3m)	Visible Red Beam	6-foot Cable	14102R6513
	10 – 30V DC (NPN and PNP)	15 feet (4.5m)	0.1 to 10 feet (0.03 – 3m)	1 inch (25 mm) diameter at 50 inches (1.3m)	Visible Red Beam	4-pin Micro AC Connector	14102RQD03 ⚡
						6-foot Cable	14102R6517
						4-pin Micro DC Connector	14102RQD07 ⚡
Polarized Reflex Forward Viewing <sup>③ ④</sup>  Sensor Retroreflector (Not Included)	20 – 264V AC 50/60 Hz or 15 – 30V DC (NPN)	15 feet (4.5m)	0.1 to 10 feet (0.03 – 3m)	1 inch (25 mm) diameter at 50 inches (1.3m)	Visible Red Beam	6-foot Cable	14101A6513
	10 – 30V DC (NPN and PNP)	15 feet (4.5m)	0.1 to 10 feet (0.03 – 3m)	1 inch (25 mm) diameter at 50 inches (1.3m)	Visible Red Beam	4-pin Micro AC Connector	14101AQD03 ⚡
						6-foot Cable	14101A6517
						4-pin Micro DC Connector	14101AQD07 ⚡
Polarized Reflex Right-Angle Viewing <sup>② ③ ④</sup>  Sensor Retroreflector (Not Included)	20 – 264V AC 50/60 Hz or 15 – 30V DC (NPN)	10 feet (3m)	0.1 to 5 feet (0.03 – 1.5m)	1 inch (25 mm) diameter at 50 inches (1.3m)	Visible Red Beam	6-foot Cable	14101R6513
						4-pin Micro AC Connector	14101RQD03 ⚡
	15 – 30V DC	10 feet (3m)	0.1 to 5 feet (0.03 – 1.5m)	1 inch (25 mm) diameter at 50 inches (1.3m)	Visible Red Beam	6-foot Cable	14101R6517
						4-pin Micro DC Connector	14101RQD07 ⚡

① Ranges based on a 3-inch diameter retroreflector.

② Right-angle viewing polarized reflex models are rated NEMA 1 only. See Prism Series **Page 5-40** for a right-angle viewing polarized reflex sensor rated NEMA 4X and 6.

③ Polarized Reflex Sensors may not operate with retroreflective tape. Test selected tape prior to installation.

④ For complete system, order sensor and retroreflector, see **Section 8**.






☐ Fast turn product with typical one business day lead-time to shipment.

■ Stocked product, typical order quantities guaranteed in stock.

☹☹ See listing of compatible connector cables on **Page 5-36**.

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## Model Selection — Diffuse Reflective and Focused Diffuse Reflective Sensors

	Operating Voltage	Sensing Range ①	Optimum Range	Field of View	Sensing Beam	Connection Type	Catalog Number
<b>3-Wire and 4-Wire Sensors</b>							
Diffuse Reflective Forward Viewing 	20 – 264V AC 50/60 Hz or 15 – 30V DC (NPN)	8 inches (200 mm)	0.1 to 5 inches (3 to 127 mm)	2 inch (50 mm) diameter at 5 inches (127 mm)	Infrared Beam	6-foot Cable	<b>13106A6513</b>
						4-pin Micro AC Connector	<b>13106AQD03</b> ⊕
	10 – 30V DC (NPN and PNP)	24 inches (610 mm)	0.1 to 15 inches (3 to 380 mm)	5 inch (127 mm) diameter at 15 inches (380 mm)	Infrared Beam	6-foot Cable	<b>13100A6513</b>
						4-pin Micro AC Connector	<b>13100AQD03</b> ⊕
		8 inches (200 mm)	0.1 to 5 inches (3 to 127 mm)	2 inch (50 mm) diameter at 5 inches (127 mm)	Infrared Beam	6-foot Cable	<b>13106A6517</b>
						4-pin Micro DC Connector	<b>13106AQD07</b> ⊕
Diffuse Reflective Right-Angle Viewing 	20 – 264V AC 50/60 Hz or 15 – 30V DC (NPN)	8 inches (200 mm)	0.1 to 5 inches (3 to 127 mm)	2 inch (50 mm) diameter at 5 inches (127 mm)	Infrared Beam	6-foot Cable	<b>13106R6513</b>
						4-pin Micro AC Connector	<b>13106RQD03</b> ⊕
	10 – 30V DC (NPN and PNP)	24 inches (610 mm)	0.1 to 15 inches (3 to 380 mm)	5 inch (127 mm) diameter at 15 inches (380 mm)	Infrared Beam	6-foot Cable	<b>13100R6513</b>
						4-pin Micro AC Connector	<b>13100RQD03</b> ⊕
		8 inches (200 mm)	0.1 to 5 inches (3 to 127 mm)	2 inch (50 mm) diameter at 5 inches (127 mm)	Infrared Beam	6-foot Cable	<b>13106R6517</b>
						4-pin Micro DC Connector	<b>13106RQD07</b> ⊕
Wide Beam Diffuse Reflective Forward Viewing 	20 – 264V AC 50/60 Hz or 15 – 30V DC (NPN)	6 inches (150 mm)	0.1 to 4 inches (3 to 101 mm)	4.3 inch (109 mm) diameter at 3 inches (76 mm)	Infrared Beam	6-foot Cable	<b>13107AS6513</b>
						4-pin Micro AC Connector	<b>13107ASQD03</b> ⊕
	10 – 30V DC (NPN and PNP)	6 inches (150 mm)	0.1 to 4 inches (3 to 101 mm)	4.3 inch (109 mm) diameter at 3 inches (76 mm)	Infrared Beam	6-foot Cable	<b>13107AS6517</b>
						4-pin Micro DC Connector	<b>13107ASQD07</b> ⊕
Wide Beam Diffuse Reflective Right-Angle Viewing 	20 – 264V AC 50/60 Hz or 15 – 30V DC (NPN)	6 inches (150 mm)	0.1 to 4 inches (3 to 101 mm)	4.3 inch (109 mm) diameter at 3 inches (76 mm)	Infrared Beam	6-foot Cable	<b>13107RS6513</b>
						4-pin Micro AC Connector	<b>13107RSQD03</b> ⊕
	10 – 30V DC (NPN and PNP)	6 inches (150 mm)	0.1 to 4 inches (3 to 101 mm)	4.3 inch (109 mm) diameter at 3 inches (76 mm)	Infrared Beam	6-foot Cable	<b>13107RS6517</b>
						4-pin Micro DC Connector	<b>13107RSQD07</b> ⊕
Focused Diffuse Reflective Forward Viewing 	20 – 264V AC 50/60 Hz or 15 – 30V DC (NPN)	Focused at 1.6 inches (40 mm)	1.5 to 1.9 inches (38 to 48 mm)	0.05 inch (1.3 mm) diameter at 1.6 inches (40 mm)	Visible Red Beam	6-foot Cable	<b>13102A6513</b>
						4-pin Micro AC Connector	<b>13102AQD03</b> ⊕
	10 – 30V DC (NPN and PNP)	Focused at 1.6 inches (40 mm)	1.5 to 1.9 inches (38 to 48 mm)	0.05 inch (1.3 mm) diameter at 1.6 inches (40 mm)	Visible Red Beam	6-foot Cable	<b>13102A6517</b>
						4-pin Micro DC Connector	<b>13102AQD07</b> ⊕

① Sensor will detect a 90% reflective white card at this range.

Fast turn product with typical one business day lead-time to shipment.

Stocked product, typical order quantities guaranteed in stock.

⊕ See listing of compatible connector cables on **Page 5-36**.

## Excess Gain — Reflex Sensors, Diffuse Reflective Sensors and Focused Diffuse Reflective Sensors

Reflex  
(3-Inch Diameter Retroreflector)

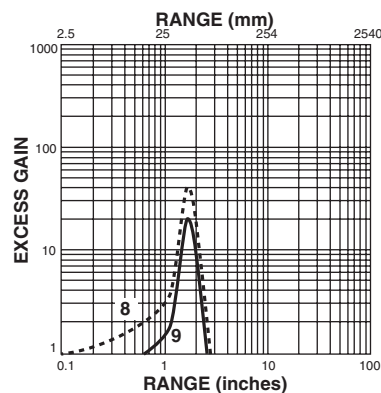
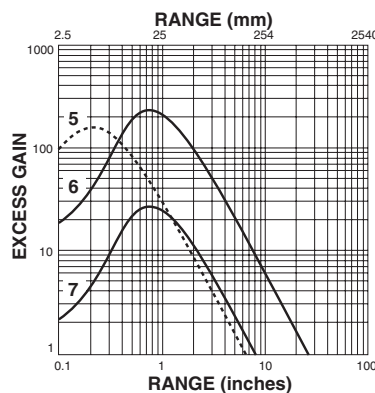
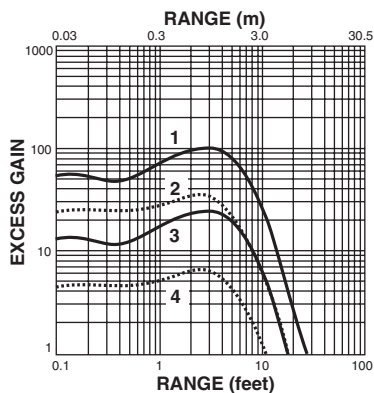
1. 14100A/14102A
2. 14102R
3. 14101A
4. 14101R

Diffuse Reflective  
(90% Reflective White Card)

5. 13107
6. 13100
7. 13106




Focused Diffuse Reflective  
(90% Reflective White Card)

8. 13102A Typical
9. 13102A Minimum






## Model Selection — Perfect Prox® Background Rejection Sensors

	Operating Voltage	Nominal Range ①	Optimum Range	Cutoff Range ②	Field of View	Sensing Beam Type	Connection Type	Catalog Number
2-Wire Sensors								
<div>Perfect Prox® Forward Viewing</div> 	90 – 132V AC 50/60 Hz or 18 – 50V DC	2 inches (50 mm) Sharp Cutoff	0.4 to 1.8 inches (10 to 45 mm)	2.25 inches (57 mm) and beyond	0.25 inch (6 mm) diameter at 2.25 inches (64 mm)	Visible Red	6-foot Cable	13104A6515
							3-pin Micro AC Connector	13104AQD05 Ⓢ
		3-pin Mini-Connector	13104AQD25 Ⓢ					
		6-foot Cable	13101AS6515 ③					
		3-pin Micro AC Connector	13101ASQD05 ③ Ⓢ					
		3-pin Mini-Connector	13101ASQD25 ③ Ⓢ					
<div>Perfect Prox® Right-Angle Viewing</div> 	90 – 132V AC 50/60 Hz or 18 – 50V DC	2 inches (50 mm) Sharp Cutoff	0.4 to 1.8 inches (10 to 45 mm)	2.25 inches (57 mm) and beyond	0.25 inch (6 mm) diameter at 2.25 inches (64 mm)	Visible Red	6-foot Cable	13104R6515
							3-pin Micro AC Connector	13104RQD05 Ⓢ
		3-pin Mini-Connector	13104RQD25 Ⓢ					
		6-foot Cable	13101RS6515 ③					
		3-pin Micro AC Connector	13101RSQD05 ③ Ⓢ					
		3-Wire and 4-Wire Sensors						
<div>Perfect Prox® Forward Viewing</div> 	20 – 264V AC 50/60 Hz or 15 – 30V DC (NPN)	2 inches (50 mm) Sharp Cutoff	0.4 to 1.8 inches (10 to 45 mm)	2.25 inches (57 mm) and beyond	0.25 inch (6 mm) diameter at 2.25 inches (64 mm)	Visible Red	6-foot Cable	13104A6513
							4-pin Micro AC Connector	13104AQD03 Ⓢ
		4 inches (100 mm) Sharp Cutoff	0.5 to 3 inches (13 to 76 mm)	5 inches (127 mm) and beyond	0.35 inch (9 mm) diameter at 5 inches (127 mm)		6-foot Cable	13101A6513
							4-pin Micro AC Connector	13101AQD03 Ⓢ
		6 inches (150 mm) Standard Cutoff	0.1 to 4 inches (3 to 100 mm)	9 inches (228 mm) and beyond	0.6 inch (15 mm) diameter at 6 inches (150 mm)	Infrared	6-foot Cable	13108A6513
							4-pin Micro AC Connector	13108AQD03 Ⓢ
		9 inches (225 mm) Standard Cutoff	0.1 to 6 inches (3 to 150 mm)	12 inches (304 mm) and beyond	0.9 inch (23 mm) diameter at 9 inches (225 mm)		6-foot Cable	13103A6513
							4-pin Micro AC Connector	13103AQD03 Ⓢ
	10 – 30V DC (NPN and PNP)	2 inches (50 mm) Sharp Cutoff	0.4 to 1.8 inches (10 to 45 mm)	2.25 inches (57 mm) and beyond	0.25 inch (6 mm) diameter at 2.25 inches (64 mm)	Visible Red	6-foot Cable	13104A6517
							4-pin Micro DC Connector	13104AQD07 Ⓢ
		4 inches (100 mm) Sharp Cutoff	0.5 to 3 inches (13 to 76 mm)	5 inches (127 mm) and beyond	0.35 inch (9 mm) diameter at 5 inches (127 mm)		6-foot Cable	13101A6517
							4-pin Micro DC Connector	13101AQD07 Ⓢ
		6 inches (150 mm) Standard Cutoff	0.1 to 4 inches (3 to 100 mm)	9 inches (228 mm) and beyond	0.6 inch (15 mm) diameter at 6 inches (150 mm)	Infrared	6-foot Cable	13108A6517
							4-pin Micro DC Connector	13108AQD07 Ⓢ
		9 inches (225 mm) Standard Cutoff	0.1 to 6 inches (3 to 150 mm)	12 inches (304 mm) and beyond	0.9 inch (23 mm) diameter at 9 inches (225 mm)		6-foot Cable	13103A6517
							4-pin Micro DC Connector	13103AQD07 Ⓢ

① Sensor will detect a 90% reflectance card at this range.




② Sensor will ignore a 90% reflectance card at this range.

③ Contact factory for approval status.

 Stocked product, typical order quantities guaranteed in stock.
ⓈⓈ See listing of compatible connector cables on **Page 5-36**.

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## Model Selection — Perfect Prox® Background Rejection Sensors (Continued)

	Operating Voltage	Nominal Range ①	Optimum Range	Cutoff Range ②	Field of View	Sensing Beam Type	Connection Type	Catalog Number
<b>3-Wire and 4-Wire Sensors (Continued)</b>								
 Perfect Prox® Right-Angle Viewing	20 – 264V AC 50/60 Hz or 15 – 30V DC (NPN)	2 inches (50 mm) Sharp Cutoff	0.4 to 1.8 inches (10 to 45 mm)	2.25 inches (57 mm) and beyond	0.25 inch (6 mm) diameter at 2.25 inches (64 mm)	Visible Red	6-foot Cable	<b>13104R6513</b>
							4-pin Micro AC Connector	<b>13104RQD03</b> Ⓢ
		4 inches (100 mm) Sharp Cutoff	0.5 to 3 inches (13 to 76 mm)	5 inches (127 mm) and beyond	0.35 inch (9 mm) diameter at 5 inches (127 mm)	Infrared	6-foot Cable	<b>13104RS5013</b>
							4-pin Micro AC Connector	<b>13104RS5003</b> Ⓢ
	10 – 30V DC (NPN and PNP)	6 inches (150 mm) Standard Cutoff	0.1 to 4 inches (3 to 100 mm)	9 inches (228 mm) and beyond	0.6 inch (15 mm) diameter at 6 inches (150 mm)	Infrared	6-foot Cable	<b>13108R6513</b>
							4-pin Micro AC Connector	<b>13108RQD03</b> Ⓢ
		9 inches (225 mm) Standard Cutoff	0.1 to 6 inches (3 to 150 mm)	12 inches (304 mm) and beyond	0.9 inch (23 mm) diameter at 9 inches (225 mm)	Infrared	6-foot Cable	<b>13103R6513</b>
							4-pin Micro AC Connector	<b>13103RQD03</b> Ⓢ
 Fine Spot Perfect Prox® Forward Viewing	20 – 264V AC 50/60 Hz or 15 – 30V DC (NPN)	2 inches (50 mm) Sharp Cutoff	0.4 to 1.8 inches (10 to 45 mm)	2.25 inches (57 mm) and beyond	0.25 inch (6 mm) diameter at 2.25 inches (64 mm)	Visible Red	6-foot Cable	<b>13104R6517</b>
							4-pin Micro DC Connector	<b>13104RQD07</b> Ⓢ
		4 inches (100 mm) Sharp Cutoff	0.5 to 3 inches (13 to 76 mm)	5 inches (127 mm) and beyond	0.35 inch (9 mm) diameter at 5 inches (127 mm)	Infrared	6-foot Cable	<b>13104RS5020</b>
							4-pin Micro DC Connector	<b>13104RS5007</b> Ⓢ
	10 – 30V DC (NPN and PNP)	6 inches (150 mm) Standard Cutoff	0.1 to 4 inches (3 to 100 mm)	9 inches (228 mm) and beyond	0.6 inch (15 mm) diameter at 6 inches (150 mm)	Infrared	6-foot Cable	<b>13108R6517</b>
							4-pin Micro DC Connector	<b>13108RQD07</b> Ⓢ
		9 inches (225 mm) Standard Cutoff	0.1 to 6 inches (3 to 150 mm)	12 inches (304 mm) and beyond	0.9 inch (23 mm) diameter at 9 inches (225 mm)	Infrared	6-foot Cable	<b>13103R6517</b>
							4-pin Micro DC Connector	<b>13103RQD07</b> Ⓢ
 Fine Spot Perfect Prox® Forward Viewing	20 – 264V AC 50/60 Hz or 15 – 30V DC (NPN)	2 inches (50 mm) Sharp Cutoff	0.9 to 1.8 inches (23 to 45 mm)	2.25 inches (57 mm) and beyond	0.05 inch (1.3 mm) diameter at 1.7 inches (43 mm)	Visible Red	6-foot Cable	<b>13105A6513</b>
							4-pin Micro AC Connector	<b>13105AQD03</b> Ⓢ
	10 – 30V DC (NPN and PNP)	2 inches (50 mm) Sharp Cutoff	0.9 to 1.8 inches (23 to 45 mm)	2.25 inches (57 mm) and beyond	0.05 inch (1.3 mm) diameter at 1.7 inches (43 mm)	Visible Red	6-foot Cable	<b>13105A6517</b>
							4-pin Micro DC Connector	<b>13105AQD07</b> Ⓢ

① Sensor will detect a 90% white reflectance card at this range.

② Sensor will ignore a 90% white reflectance card at this range.

■ Fast turn product with typical one business day lead-time to shipment.

■ Stocked product, typical order quantities guaranteed in stock.

Ⓢ See listing of compatible connector cables on **Page 5-36**.

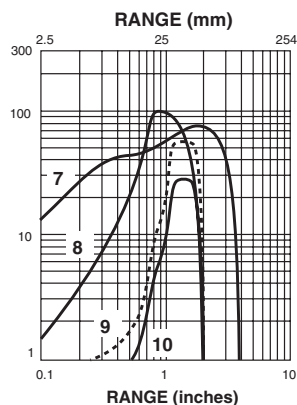
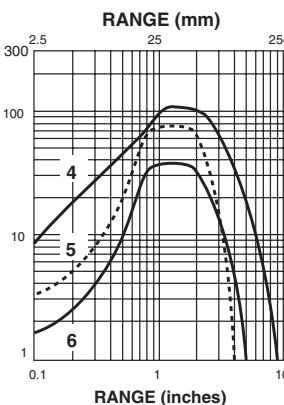
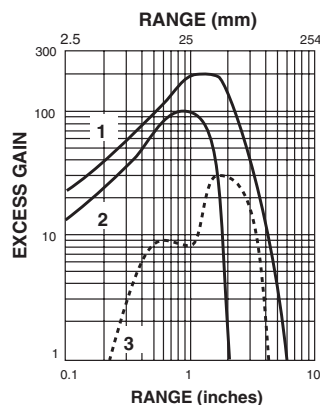
## Excess Gain — Perfect Prox® Sensors

## Perfect Prox®

1. 13108A/13108R
2. 13104A
3. 13104RS

4. 13103A/13103R
5. 13101A Typical
6. 13101A Minimum


7. 13101AS
8. 13104R
9. 13105A Typical
10. 13105A Minimum



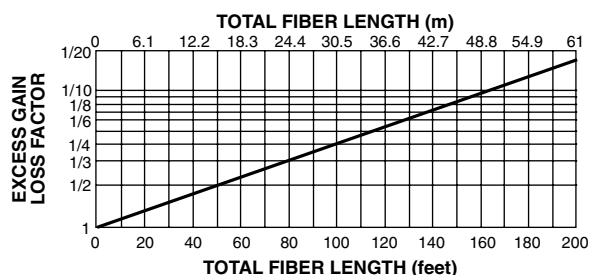
## Model Selection — Fiber Optic Sensors

	Operating Voltage	Sensing Range (Optimum Range is 50% of Sensing Range) ①						Connection Type	Catalog Number
		Bulk Length Fibers ②		Pre-assembled Fiber Optic Cables					
		Thru-Beam Mode	Diffuse Reflective Mode	Thru-Beam Mode		Diffuse Reflective Mode			
				0.5 mm Diameter Fibers	1 mm Diameter Fibers	0.5 mm Diameter Fibers	1 mm Diameter Fibers		

## 3-Wire and 4-Wire Sensors

	20 – 264V AC 50/60 Hz or 15 – 30V DC (NPN)	5 inches (123 mm)	1.5 inches (38 mm)	2.1 inches (53 mm)	5 inches (127 mm)	0.6 inch (15 mm)	1.5 inches (38 mm)	6-foot Cable	15100A6513
								4-pin Micro AC Connector	15100AQD03 ☹
	10 – 30V DC (NPN and PNP)	5 inches (123 mm)	1.5 inches (38 mm)	2.1 inches (53 mm)	5 inches (127 mm)	0.6 inch (15 mm)	1.5 inches (38 mm)	6-foot Cable	15100A6517
								4-pin Micro DC Connector	15100AQD07 ☹
Glass Fiber Optic	Use our patented glass fiber optic adapter with any diffuse reflective sensor model — see <b>Page 5-35</b> for details.								

① Ranges are with bare fibers — no lenses. Sensing range is affected by power of sensor, length of fiber optic cable and use of lenses. Lenses will increase ranges. As bulk fiber length increases, sensing range decreases — see table below. For example, for 100 ft. of fiber (the total of source and detector fiber lengths), the excess gain shown in gain graphs below would be reduced to about 1/4 its nominal value.



② Sensing range is based on 6.6 feet (2m) of plastic 1 mm diameter source and detector fiber optic cable for a total length of 13.1 feet (4m). To determine performance with longer lengths, see ①.

Compatible fiber optic cables are shown in **Section 9**.

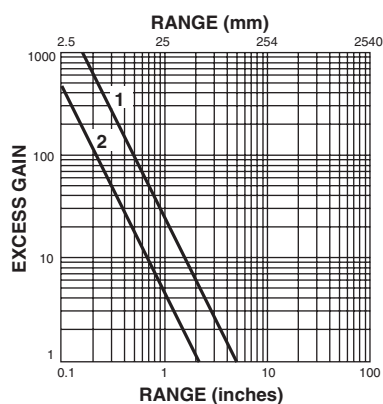
■ Fast turn product with typical one business day lead-time to shipment.

⊕ See listing of compatible connector cables on **Page 5-36**.

## Excess Gain — Fiber Optic Sensors (Performance using 13.1 feet (4m) of fiber)

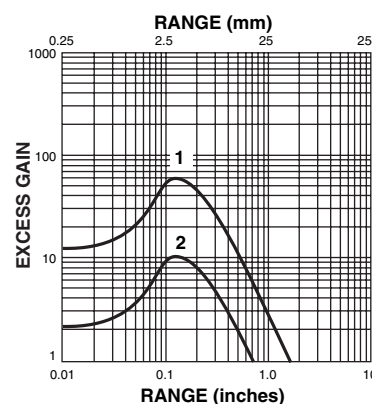
## Thru-Beam Mode

- 15100 with 1 mm Diameter Fibers
- 15100 with 0.5 mm Diameter Fibers



## Diffuse Reflective Mode

- 15100 with 1 mm Diameter Fibers
- 15100 with 0.5 mm Diameter Fibers






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## Glass Fiber Optic Adapter

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



### Model Selection — Glass Fiber Optic Adapter

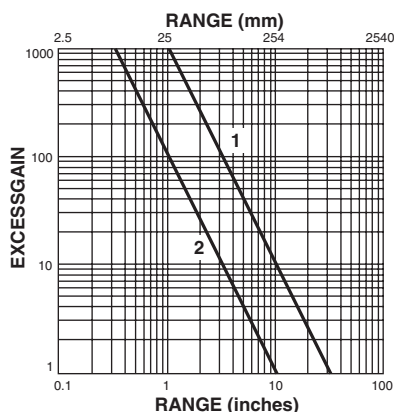
	Sensors	Fibers	Catalog Number
Glass Fiber Optic Adapter with Hex Wrench  Patent #5,559,919 	Forward Viewing, Diffuse Reflective Sensors (ordered separately, see Page 5-31)	Glass Fiber Optic Cables (ordered separately, see Section 9) Note: Use only with the E51KF Series Fibers.	6235A-6501

 Stocked product, typical order quantities guaranteed in stock.

### Excess Gain

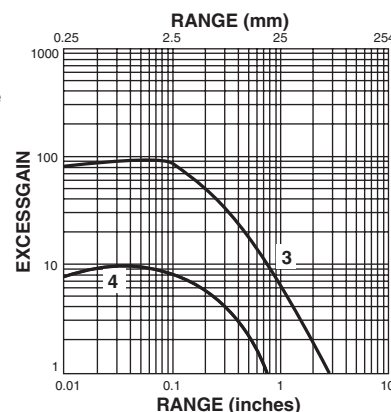
**When Using Single Fibers for Thru-Beam Sensing**  
(Gain using E51KF823 fibers)

1. 13100A Comet
2. 13106A Comet



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

3. 13100A Comet
4. 13106A Comet

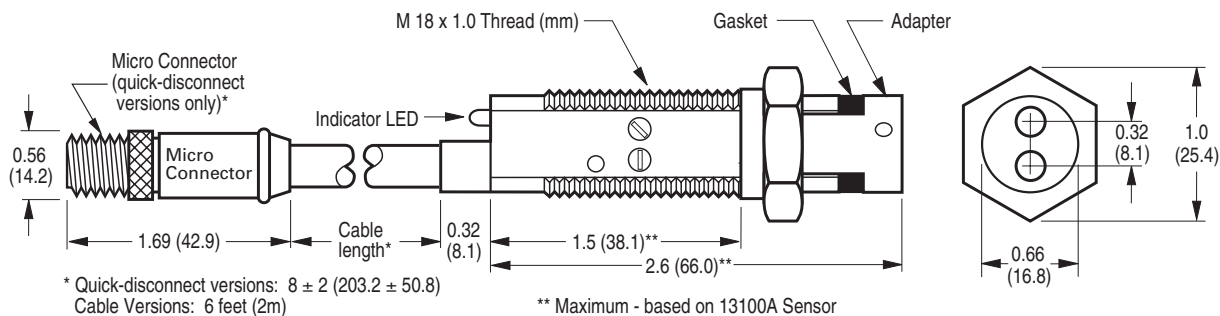


### Specifications — Glass Fiber Optic Adapter

Sensor Specifications	See Comet Series Specifications on Page 5-37
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 Note: 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 Comet 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 <sup>①</sup>



	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

	AC	3-pin 3-wire	22 AWG	6.0 feet (2m)	CSAS3F3CY2202	CSAS3F3RY2202	—	
		4-pin 4-wire	22 AWG	6.0 feet (2m)	CSAS4F4CY2202	CSAS4F4RY2202	CSAS4F4I02202	
	DC	4-pin 4-wire	22 AWG	6.0 feet (2m)	CSDS4A4CY2202	CSDS4A4RY2202	CSDS4A4I02202	

	Voltage Style	Number of Pins	Gauge	Length	Catalog Number	Pin Configuration/Wire Colors (Face View Female Shown)
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## Standard Cables — Mini Style

	—	3-pin	16 AWG	6 feet (2m)	CSMS3F3CY1602	
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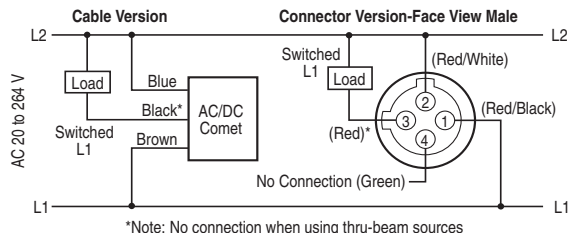
Current Rating @ 600V  
3-pin: 13A

<sup>①</sup> For a full selection of connector cables, see **Section 10**.

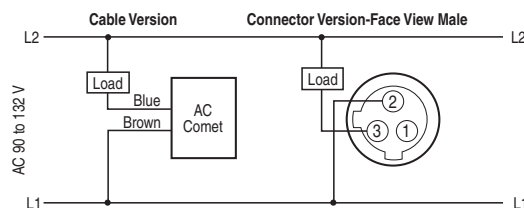
■ Stocked product, typical order quantities guaranteed in stock.

## Wiring Diagrams

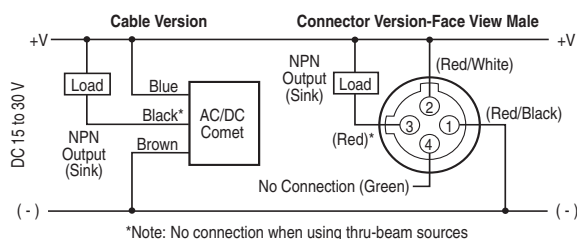
## AC/DC Models (AC Connection)



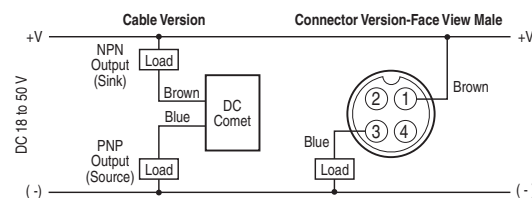
## AC Models (AC Connection)



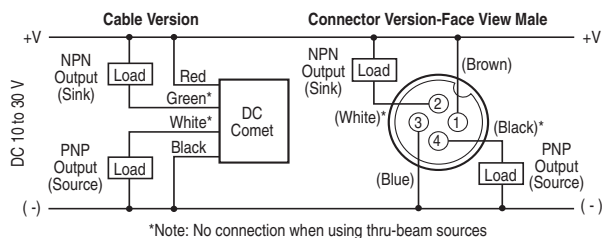
## AC/DC Models (DC Connection)



## DC Models (DC Connection)



## DC Models (DC Connection)



**CAUTION:** AC/DC connector version sensors use an AC-type connector. Use of DC power with AC-type connectors may not conform with established standards.

**NOTE:** For connector versions, the pin numbering and color codes shown 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 color code.

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## Specifications

	3-Wire and 4-Wire Sensors			2-Wire Sensors	
	AC/DC Models (AC Operation)	AC/DC Models (DC Operation)	DC-Only Models	AC Models	DC Models
Input Voltage	20 to 264V AC, 50/60 Hz	15 to 30V DC (15 to 24V DC above 131°F/55°C)	10 to 30V DC, (10 to 24V DC above 131°F/55°C)	90 to 132V AC, 50/60 Hz	18 to 50V DC
Power Dissipation	1.5W maximum	1.5W maximum	1W maximum	2W maximum	2W maximum
Output Type	VMOS (bi-directional)	NPN (sink)	NPN and PNP (dual outputs)	DMOS	DMOS
Current Switching	300 mA maximum	300 mA maximum	PNP: 100 mA maximum; NPN: 250 mA maximum (NPN: 120 mA maximum above 131°F/55°C)	300 mA	300 mA
Voltage Switching	375V peak maximum	375V peak maximum	30V DC maximum	132V AC maximum	50V DC maximum
Off-State Leakage	250 µA typical; 500µA maximum	250 µA typical; 500 µA maximum	10 µA maximum	1.7 mA maximum	1.5 mA maximum
Surge Current	2A maximum	2A maximum	1A maximum	1A maximum	1A maximum
On-State Voltage Drop	—	1.8V at 10 mA; 3.5V at 300 mA	NPN: 400 mV at 10 mA, 1.5V at 250 mA; PNP: 2.4V at 100 mA	10V AC	8V DC
Response Time	10 mS		1 mS; 3.5 mS (thru-beam)	32 mS	32 mS
Time Delay	Models with Fixed Time Delay Available — Contact Factory				
Short Circuit Protection	Sensor will turn off immediately when short or overload is detected (Indicator LED flashes). Turn power OFF and back ON to reset. <b>IMPORTANT:</b> During installation, correct power connections must be made first to ensure fail-safe short circuit protection of outputs.		Sensor will turn off immediately when short or overload is detected (indicator LED flashes). Sensor will reset when short is removed.	Auto reset	Auto reset
Temperature Range	Thru-Beam Source: -4° to +158°F (-20° to +70°C); All others: -40° to +158°F (-40° to +70°C)			-13° to +131°F (-25° to +55°C)	
Light/Dark Operation	Switch selectable				
Enclosure Material	Lens: polycarbonate; Cable jacket: PVC; Body: structural polyurethane foam (do not expose to concentrated acids, alcohols or ketones)				
Cable/Connector	Cable versions: 6-foot cable; Connector versions: male mini and micro connectors (refer to wiring diagrams for number of pins per model) on nominal 8” pigtails				
Vibration and Shock	Vibration: 30g over 10 Hz to 2 kHz; Shock: 100g for 3 mS 1/2 sine wave pulse				
Indicator LED	Lights steady when output is ON; flashes when short circuit protection is in latch condition (except 2-wire models)				
Sunlight Immunity	Perfect Prox: 5,000 foot-candles; All others: 10,000 foot-candles				
Enclosure Ratings	NEMA 1, 2, 3, 4, 4X, 6, 12 and 13 ① NEMA 6P Models Available — Contact Factory				
Approvals	UL and C-UL Recognized (all models), CE Compliant (except 2-wire DC models)				

① **NOTE:** These products conform to NEMA tests as indicated, however, some severe washdown applications can exceed these NEMA test specifications. For questions about a specific application, contact Eaton's Cutler-Hammer Sensor Applications Department at 1-800-426-9184.

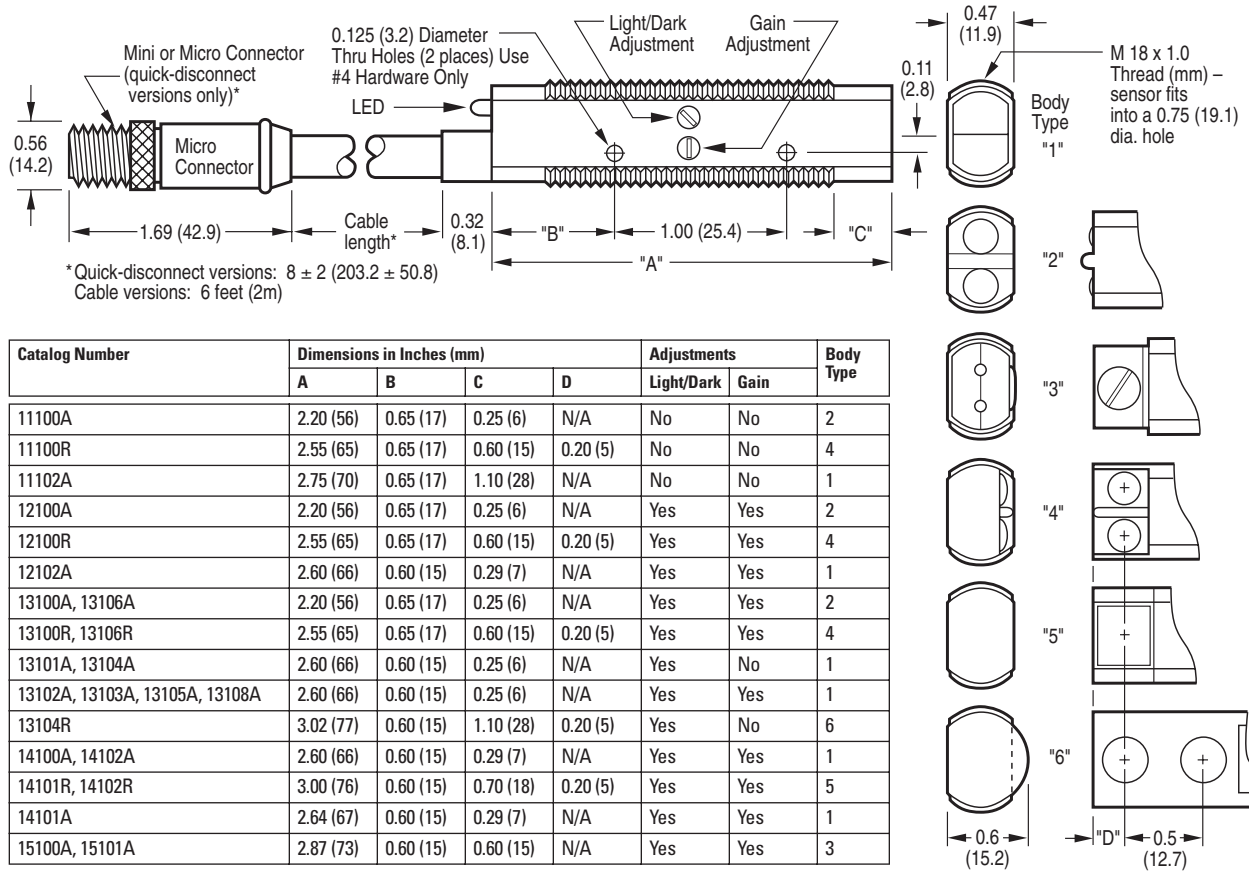
## Model Selection — Accessories

	Description	Catalog Number	Approximate Dimensions in Inches (mm)
Retroreflectors	Retroreflectors and Retroreflective Tape	See Section 8	
Mounting Brackets	A wide variety of Mounting Brackets for tubular sensors	See Section 8	
Flush Mount Bracket	Contoured design is ideal for flush mounting of right-angle Comet Series reflex to mounting surface using 1/4-inch hardware. No alignment adjustment. Sensor mounts on #4 studs. 304 Stainless Steel	6161AS5296	
Flush Mount Bracket	Same as above except without contour. Ideal for right-angle diffuse and thru-beam sensors. 304 Stainless Steel	6161AS5297	
Adjustable Protective Bracket	Heavy-duty bracket protects the sensor from damage. Works with all Comet Series sensors except 2-inch Perfect Prox® models. Ideal for material handling applications with 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	E58KS5200	
Comet Ball Swivel Bracket	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®.	6181AS5200	
Accessories	Replacement mounting nuts and other accessories	See Section 8	
Connector Cables	A variety of cables, connector blocks and accessories	See Section 10	

Stocked product, typical order quantities guaranteed in stock.

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## Approximate Dimensions in Inches (mm) Except Where Noted



Catalog Number	Dimensions in Inches (mm)				Adjustments		Body Type
	A	B	C	D	Light/Dark	Gain	
11100A	2.20 (56)	0.65 (17)	0.25 (6)	N/A	No	No	2
11100R	2.55 (65)	0.65 (17)	0.60 (15)	0.20 (5)	No	No	4
11102A	2.75 (70)	0.65 (17)	1.10 (28)	N/A	No	No	1
12100A	2.20 (56)	0.65 (17)	0.25 (6)	N/A	Yes	Yes	2
12100R	2.55 (65)	0.65 (17)	0.60 (15)	0.20 (5)	Yes	Yes	4
12102A	2.60 (66)	0.60 (15)	0.29 (7)	N/A	Yes	Yes	1
13100A, 13106A	2.20 (56)	0.65 (17)	0.25 (6)	N/A	Yes	Yes	2
13100R, 13106R	2.55 (65)	0.65 (17)	0.60 (15)	0.20 (5)	Yes	Yes	4
13101A, 13104A	2.60 (66)	0.60 (15)	0.25 (6)	N/A	Yes	No	1
13102A, 13103A, 13105A, 13108A	2.60 (66)	0.60 (15)	0.25 (6)	N/A	Yes	Yes	1
13104R	3.02 (77)	0.60 (15)	1.10 (28)	0.20 (5)	Yes	No	6
14100A, 14102A	2.60 (66)	0.60 (15)	0.29 (7)	N/A	Yes	Yes	1
14101R, 14102R	3.00 (76)	0.60 (15)	0.70 (18)	0.20 (5)	Yes	Yes	5
14101A	2.64 (67)	0.60 (15)	0.29 (7)	N/A	Yes	Yes	1
15100A, 15101A	2.87 (73)	0.60 (15)	0.60 (15)	N/A	Yes	Yes	3