Comet Series
Photoelectric Sensors

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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.

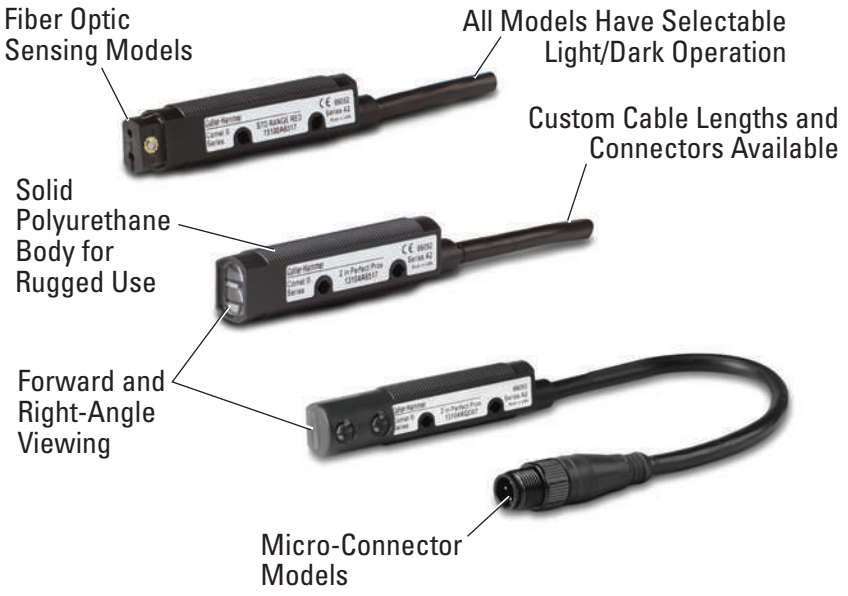
The unique threaded body with flat sides allows quick mounting in a 3/4 inch hole or against any flat surface. Internal components are rigidly sealed in a solid encapsulated package for excellent performance in high-vibration and high-shock applications.

Approvals

- UL Recognized
- C-UL Recognized

CE (except 2-wire DC models)

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

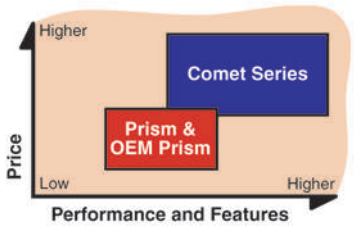


Product Features

- 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.



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.

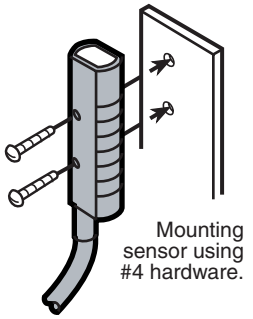
Eaton's Comet Series includes more background rejection models than any other family on the market. Choose from forward or right-angle viewing, 2-, 3- or 4-wire circuits, cable, micro or mini-connector terminations and a variety of sensing ranges. A visible sensing beam on most models lets you quickly 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.

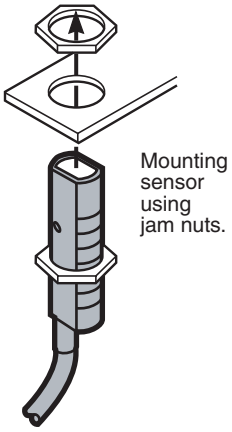
Fiber Optic

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.

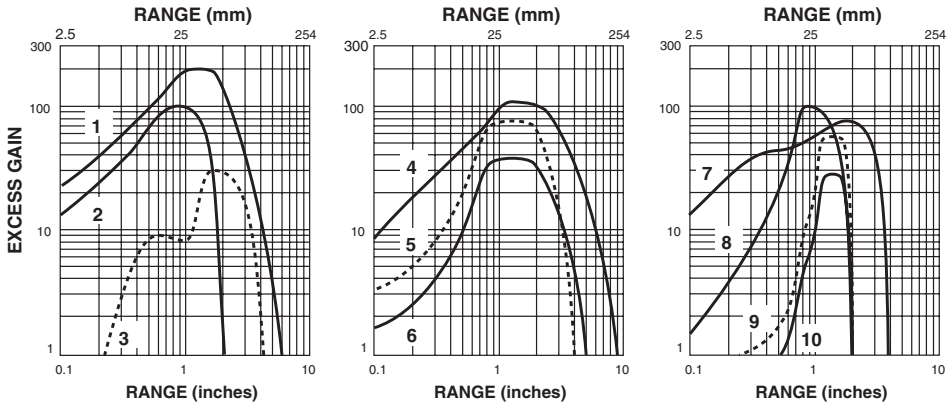
Model Selection — Perfect Prox® Background Rejection Sensors (Continued)

	Operating Voltage	Nominal Range ①	Optimum Range	Cutoff Range ②	Field of View	Sensing Beam Type	Connection Type	Catalog Number
3-Wire and 4-Wire Sensors (Continued)								
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	**13104R6513**
							4-pin Micro AC Connector	**13104RQD03** ⊛
		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	**13104RS5013**
							4-pin Micro AC Connector	**13104RS5003** ⊛
		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	**13108R6513**
							4-pin Micro AC Connector	**13108RQD03** ⊛
		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	**13103R6513**
							4-pin Micro AC Connector	**13103RQD03** ⊛
	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	**13104R6517**
							4-pin Micro DC Connector	**13104RQD07** ⊛
		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	**13104RS5020**
							4-pin Micro DC Connector	**13104RS5007** ⊛
		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	**13108R6517**
							4-pin Micro DC Connector	**13108RQD07** ⊛
		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	**13103R6517**
							4-pin Micro DC Connector	**13103RQD07** ⊛
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	**13105A6513**
							4-pin Micro AC Connector	**13105AQD03** ⊛
	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)		6-foot Cable	**13105A6517**
							4-pin Micro DC Connector	**13105AQD07** ⊛

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



PHOTOELECTRIC SENSORS
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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	3-pin 3-wire	22 AWG	6.0 feet (2m)	**CSAS3F3CY2202**	**CSAS3F3RY2202**	—	 1-Green 2-Red/Black 3-Red/White
		4-pin 4-wire	22 AWG	6.0 feet (2m)	**CSAS4F4CY2202**	**CSAS4F4RY2202**	**CSAS4F4IO2202**	 1-Red/Black 2-Red/White 3-Red 4-Green
	DC	4-pin 4-wire	22 AWG	6.0 feet (2m)	**CSDS4A4CY2202**	**CSDS4A4RY2202**	**CSDS4A4IO2202**	 1-Brown 2-White 3-Blue 4-Black

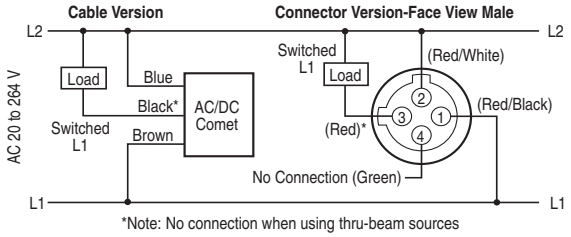
	Voltage Style	Number of Pins	Gauge	Length	Catalog Number	Pin Configuration/Wire Colors (Face View Female Shown)
Standard Cables — Mini Style						
Mini Style Straight Female  Current Rating @ 600V 3-pin: 13A	—	3-pin	16 AWG	6 feet (2m)	**CSMS3F3CY1602**	 1-Green 2-Black 3-White

① For a full selection of connector cables, see **Section 10**.

Stocked product, typical order quantities guaranteed in stock.

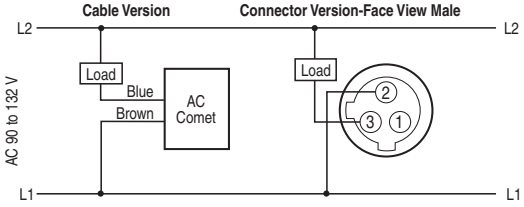
Wiring Diagrams

AC/DC Models (AC Connection)

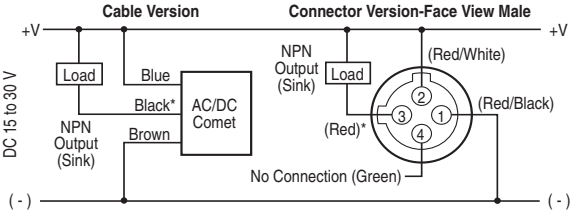


*Note: No connection when using thru-beam sources

AC Models (AC Connection)

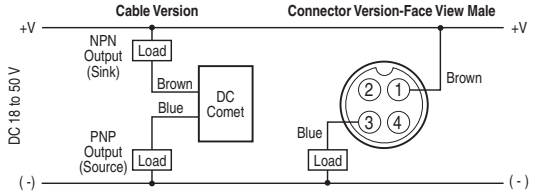


AC/DC Models (DC Connection)

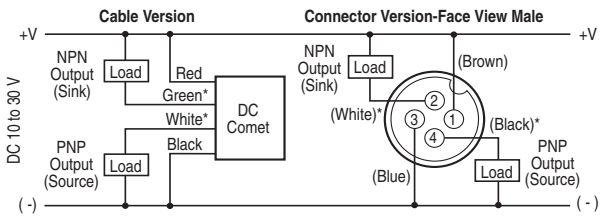


*Note: No connection when using thru-beam sources

DC Models (DC Connection)



DC Models (DC Connection)



*Note: No connection when using thru-beam sources

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.

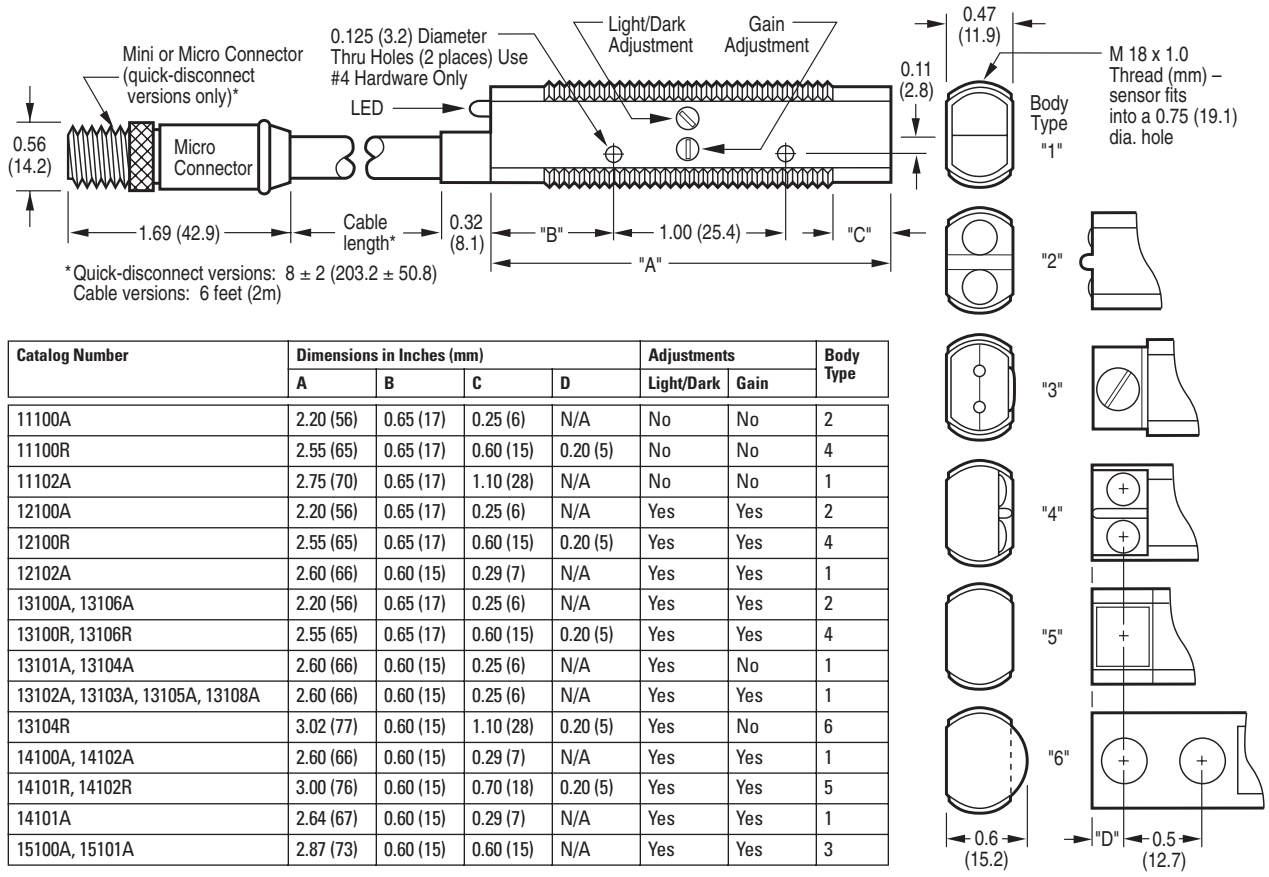
NOTE: For connector versions, the pin numbering and color codes shown are typical of several manufacturers. However, variations are possible. In case of discrepancies, rely on function indicated and pin location rather than pin number or color code.

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. **IMPORTANT:** 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.

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