August 2007

E58 Harsh Duty Series Photoelectric Sensors

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The Cutler-Hammer® E58 Harsh Duty Series by Eaton's electrical business was designed to withstand your harshest physical, chemical and optical environments.

Extensive research dictated the choice of materials used in this sensor. Stainless steel, PVDF and tempered glass components are mechanically assembled using Viton® seals to ensure complete sealing and resistance to industry chemicals. All adhesives and potting subject to failure from chemical attack have been eliminated from the design. The result is a sensor highly resistant to chemical attack and moisture intrusion, that can withstand heavy shock and vibration in almost any application.

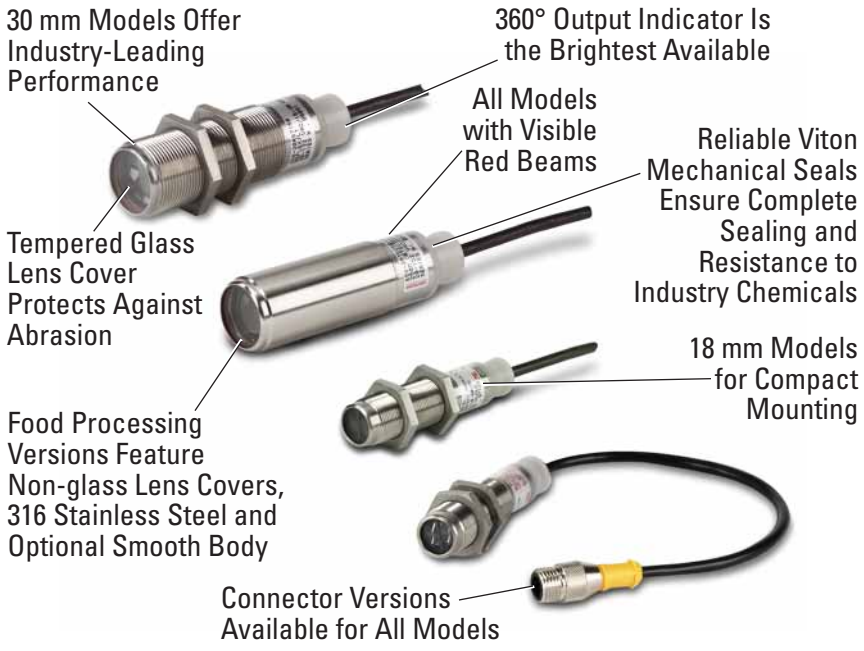
E58 Harsh Duty sensors feature unparalleled optical performance. They are ideal for automotive applications where exposure to lubricants, cutting fluids, coolants and glycols is common. For food processing applications, a smooth body version simplifies high-pressure chemical washdowns, and withstands the use of sanitizers, surfactants, and cleaning agents including diluted bases and acids.

Ratings and Approvals

- UL Listed
- C-UL Listed

CE

The World's Most Rugged and Best Sealed Photoelectric Sensors



Product Features

- Sensors are available in 18 mm and 30 mm diameters
- Highly refined optics for long sensing ranges and to see through high levels of contamination — unmatched optical performance
- Perfect Prox® technology provides exceptional background rejection and extremely high excess gain
- Resistant to the wide range of chemicals used in the automotive, food processing and forest products industries
- Suitable for high temperature, high pressure washdown (1200 psi)
- Mechanical Viton seals hold up to extreme temperature variations
- Visible sensing beam on all models lets you see where the beam is aimed for quick setup and alignment
- Output status indicator is the brightest available and is visible from any angle and in any lighting condition
- 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
- 4-wire DC sensors offer dual NPN and PNP outputs

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

E58 Harsh Duty Series Physical Attributes

Rugged physical construction

The E58 Harsh Duty Series was designed from the ground up to be the most rugged sensor family available. The strong metal housing, mechanical seals and surface mount electronics withstand heavy shock and vibration. The tempered glass lens cover provides protection in abrasive environments, and the sturdy cable is physically clamped to the sensor body.

Exceptional environmental protection and chemical resistance

The E58 Harsh Duty Series was designed to be used in the Automotive, Food Processing and Forest Products industries. It is also well suited for applications in related industries such as Pulp and Paper, Car Wash and Steel. These industries are all physically demanding on equipment and that's why we designed and tested these sensors to extreme levels of shock and vibration.

Many sensor failures, however, are actually due to chemical attack so we had to make them stand up to constant chemical exposure — day in and day out. To ensure resistance to the widest possible range of chemicals, we conducted extensive studies of the chemical agents commonly used in these industries. We then selected only those materials that could withstand exposure to these chemicals without failure in the design of the E58 Harsh Duty Series. In addition, we eliminated adhesives in favor of more reliable Viton compression seals. Some of the more common chemicals against which this sensor has been tested are listed in the resistance chart.

This resistance chart reflects testing of the 303 stainless steel body used on the standard E58 Harsh Duty Series sensors. Additional chemical resistance for food industry applications is available using sensors with the optional 316 stainless steel body and hard-coated polycarbonate (or acrylic on reflex models) lens cover.

The E58 Harsh Duty Series was designed to resist the chemicals shown in this table under normal use and conditions. Extremes of environmental factors such as temperature, pressure, concentration, duration of exposure, ultraviolet sunlight and chemical interactions combined with the presence of these chemicals could result in premature material failure. For these cases, testing the sensor in the specific application is recommended.

E58 Harsh Duty Series Chemical Resistance Chart

Chemical Category	Commonly Found In:
Oils, Cutting Fluids, Aqueous Coolants	Automotive, Forest Industry
Vegetable and Mineral Oil	Automotive, Forest Industry
Surfactants	Automotive, Food Processing
Dilute Acids	Food Processing
Dilute Bases	Food Processing
Sanitizers	Food Processing

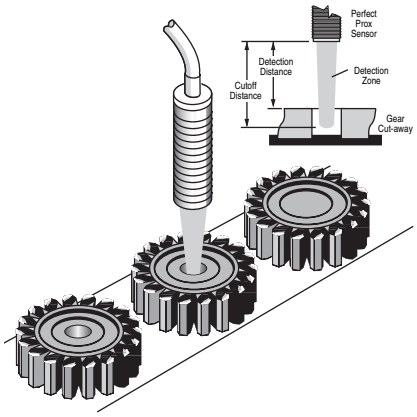
Sensing Modes

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 just slightly outside the target range. With Perfect Prox®, the E58 Harsh Duty Series can act just like an inductive prox sensor — but with up to 20 times the range for mounting away from a moving target so you can avoid damage and downtime. 18 mm and 30 mm sizes, 2-, 3- and 4-wire circuits, and cable, micro and mini connector terminations mean quick and easy replacement of damaged proximity sensors. A visible sensing beam lets you quickly confirm the sensor is aligned correctly in the application.

The 18 mm Perfect Prox® has a sensing range of 2 or 4 inches (50 or 100 mm), and the 30 mm version has a range of 6 or 11 inches (150 or 280 mm).

This simplified application example shows the power of the Perfect Prox®.



If the hole is If the hole is present in the gear, the sensor will shine through the hole and ignore the belt — no detection event will occur.

If the hole in the gear is missing, the sensor will detect the surface of the gear and reject the part.

Thru-Beam

This sensing mode is available in the 30 mm models. Rated sensing range is 800 feet, among the longest ranges available on the market. This provides extremely high excess gain when the source and detector are positioned at closer, optimum ranges to see through high levels of contamination. A visible red sensing beam and wide field-of-view mean quick and easy installation and alignment.

Polarized Reflex

Another sensing mode available in the 30 mm models is polarized reflex. In this mode, the sensing beam is reflected from a retroreflector back to the sensor. The maximum range of 34 feet is also among the longest available on the sensor market. The polarizing filter built into the sensor ensures only light reflected off a corner cube retroreflector is recognized by the sensor. This allows reliable detection of shiny targets that could reflect light back to the sensor and be missed by a non-polarized version. As in all models, a visible sensing beam is featured for easy installation and alignment.

Model Selection — Thru-Beam and Reflex 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								
30 mm Diameter Thru-Beam  Detector Source For a complete system, order One Source and One Detector	20 – 132V AC 50/60 Hz or 15 – 30V DC	800 feet (250m)	0.1 to 300 feet (0.03 – 90m)	33 inches (830 mm) diameter at 25 feet (7.6m)	Source	2-meter Cable	**E58-30TS250-GA**	
						4-pin Micro AC Connector	**E58-30TS250-GAP** ⊛	
					Detector	2-meter Cable	**E58-30TD250-GL**	**E58-30TD250-GD**
						4-pin Micro AC Connector	**E58-30TD250-GLP** ⊛	**E58-30TD250-GDP** ⊛
	10 – 30V DC	800 feet (250m)	0.1 to 300 feet (0.03 – 90m)	33 inches (830 mm) diameter at 25 feet (7.6m)	Source	2-meter Cable	**E58-30TS250-HA**	
						4-pin Micro DC Connector	**E58-30TS250-HAP** ⊛	
					Detector	2-meter Cable	**E58-30TD250-HL**	**E58-30TD250-HD**
						4-pin Micro DC Connector	**E58-30TD250-HLP** ⊛	**E58-30TD250-HDP** ⊛
30 mm Diameter Reflex  Sensor Retroreflector (Not Included) For a complete system, order Sensor and Retroreflector (See **PG.05E.17.T.E**)	20 – 132V AC 50/60 Hz or 15 – 30V DC	59 feet (18m)	1 to 40 feet (0.03 – 12m)	6 inches (150 mm) diameter at 20 feet (6m)	—	2-meter Cable	**E58-30RS18-GL**	**E58-30RS18-GD**
						4-pin Micro AC Connector	**E58-30RS18-GLP** ⊛	**E58-30RS18-GDP** ⊛
	10 – 30V DC	59 feet (18m)	1 to 40 feet (0.03 – 12m)	6 inches (150 mm) diameter at 20 feet (6m)	—	2-meter Cable	**E58-30RS18-HL**	**E58-30RS18-HD**
						4-pin Micro DC Connector	**E58-30RS18-HLP** ⊛	**E58-30RS18-HDP** ⊛
30 mm Diameter Polarized Reflex  Sensor Retroreflector (Not Included) For a complete system, order Sensor and Retroreflector (See **PG.05E.17.T.E**)	20 – 132V AC 50/60 Hz or 15 – 30V DC	34 feet (10m)	1 to 20 feet (0.03 – 6m)	6 inches (150 mm) diameter at 20 feet (6m)	—	2-meter Cable	**E58-30RP10-GL**	**E58-30RP10-GD**
						4-pin Micro AC Connector	**E58-30RP10-GLP** ⊛	**E58-30RP10-GDP** ⊛
	10 – 30V DC	34 feet (10m)	1 to 20 feet (0.03 – 6m)	6 inches (150 mm) diameter at 20 feet (6m)	—	2-meter Cable	**E58-30RP10-HL**	**E58-30RP10-HD**
						4-pin Micro DC Connector	**E58-30RP10-HLP** ⊛	**E58-30RP10-HDP** ⊛

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

⊛ See listing of compatible connector cables on **Page 5**.

Sensor Options for Thru-Beam and Reflex

(Built-to-order, contact Eaton's Cutler Hammer Sensor Applications Department at 1-800-426-9184 for delivery lead times)

Thru-Beam Apertured Versions

Reduces effective sensing beam to 0.2 x 0.9 inches (5 x 23 mm) for accurate edge detection or sensing smaller objects. Factory installed behind lens cover for protection and sealing. Sensing range is reduced to 230 feet (70m). To order, substitute "**070**" in place of "**250**" in source or detector Catalog Number (Example: E58-30TS**070**-GA).

Food Processing Versions with Threaded Housings

Upgrade to a 316 Stainless Steel threaded body from 303, and change the lens cover to hard-coated polycarbonate (cast acrylic for reflex models) from glass. To order, add the Suffix "**-FC**" to the end of the Catalog Number (Example: E58-30RP10-GL-**FC**).

Food Processing Versions with Smooth (Non-threaded) Housings

Upgrade to a 316 Stainless Steel smooth (non-threaded body from 303, and change the lens cover to hard-coated polycarbonate (cast acrylic for reflex models) from glass. To order, add the Suffix "**-FSC**" to the end of the Catalog Number (Example: E58-30RP10-GL-**FSC**).

Excess Gain

Thru Beam

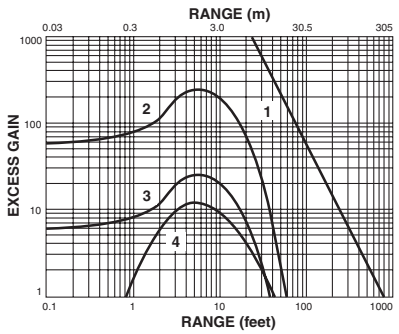
1. Thru-Beam

Reflex

2. Performance to 3-inch Retroreflector

Polarized Reflex

3. Performance to 3-inch Retroreflector
4. Performance to Corner-Cube Retroreflective tape



Model Selection — Perfect Prox® Background Rejection Sensors

	Operating Voltage	Nominal Range ①	Optimum Range	Cutoff Range ②	Field of View	Connection Type	Catalog Number	
							Light Operate	Dark Operate
2-Wire Sensors								
18 mm Diameter Perfect Prox® 	90 – 132V AC 50/60 Hz or 18 – 50V DC	2 inches (50 mm)	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 inches (50 mm)	2-meter Cable	**E58-18DP50-EL**	**E58-18DP50-ED**
						3-pin Micro AC Connector	**E58-18DP50-ELP** ㊂	**E58-18DP50-EDP** ㊂
						3-pin Mini Connector	**E58-18DP50-ELPB** ㊂	**E58-18DP50-EDPB** ㊂
		4 inches (100 mm)	0.5 to 3 inches (13 to 76 mm)	5 inches (127 mm) and beyond	0.38 inch (10 mm) diameter at 4 inches (100 mm)	2-meter Cable	**E58-18DP100-EL**	**E58-18DP100-ED**
						3-pin Micro AC Connector	**E58-18DP100-ELP** ㊂	**E58-18DP100-EDP** ㊂
						3-pin Mini Connector	**E58-18DP100-ELPB** ㊂	**E58-18DP100-EDPB** ㊂
	18 – 50V DC	2 inches (50 mm)	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 inches (50 mm)	4-pin Micro DC Connector	**E58-18DP50-DLP** ㊆	**E58-18DP50-DDP** ㊆
		4 inches (100 mm)	0.5 to 3 inches (13 to 76 mm)	5 inches (127 mm) and beyond	0.38 inch (10 mm) diameter at 4 inches (100 mm)	4-pin Micro DC Connector	**E58-18DP100-DLP** ㊆	**E58-18DP100-DDP** ㊆
30 mm Diameter Perfect Prox® 	90 – 132V AC 50/60 Hz or 18 – 50V DC	6 inches (150 mm)	1 to 6 inches (26 to 150 mm)	6.5 inches (165 mm) and beyond	0.75 inch (19 mm) diameter at 6 inches (150 mm)	2-meter Cable	**E58-30DP150-EL**	**E58-30DP150-ED**
						3-pin Micro AC Connector	**E58-30DP150-ELP** ㊂	**E58-30DP150-EDP** ㊂
						3-pin Mini Connector	**E58-30DP150-ELPB** ㊂	**E58-30DP150-EDPB** ㊂
		11 inches (280 mm)	1 to 9 inches (26 to 228 mm)	12.5 inches (318 mm)	1.0 inch (26 mm) diameter at 11 inches (280 mm)	2-meter Cable	**E58-30DPS280-EL**	**E58-30DPS280-ED**
						3-pin Micro AC Connector	**E58-30DPS280-ELP** ㊂	**E58-30DPS280-EDP** ㊂
						3-pin Mini Connector	**E58-30DPS280-ELPB** ㊂	**E58-30DPS280-EDPB** ㊂
	18 – 50V DC	6 inches (150 mm)	1 to 6 inches (26 to 150 mm)	6.5 inches (165 mm) and beyond	0.75 inch (19 mm) diameter at 6 inches (150 mm)	4-pin Micro DC Connector	**E58-30DP150-DLP** ㊆	**E58-30DP150-DDP** ㊆
3-Wire and 4-Wire Sensors								
18 mm Diameter Perfect Prox® 	10 – 30V DC	2 inches (50 mm)	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 inches (50 mm)	2-meter Cable	**E58-18DP50-HL**	**E58-18DP50-HD**
						4-pin Micro DC Connector	**E58-18DP50-HLP** ㊆	**E58-18DP50-HDP** ㊆
		4 inches (100 mm)	0.5 to 3 inches (13 to 76 mm)	5 inches (127 mm) and beyond	0.38 inch (10 mm) diameter at 4 inches (100 mm)	2-meter Cable	**E58-18DP100-HL**	**E58-18DP100-HD**
						4-pin Micro DC Connector	**E58-18DP100-HLP** ㊆	**E58-18DP100-HDP** ㊆
30 mm Diameter Perfect Prox® 	20 – 132V AC 50/60 Hz or 15 – 30V DC	6 inches (150 mm)	1 to 6 inches (26 to 150 mm)	6.5 inches (165 mm) and beyond	0.75 inch (19 mm) diameter at 6 inches (150 mm)	2-meter Cable	**E58-30DP150-GL**	**E58-30DP150-GD**
						4-pin Micro AC Connector	**E58-30DP150-GLP** ㊆	**E58-30DP150-GDP** ㊆
		11 inches (280 mm)	1 to 9 inches (26 to 228 mm)	12.5 inches (318 mm)	1.0 inch (26 mm) diameter at 11 inches (280 mm)	2-meter Cable	**E58-30DPS280-GL** ㊆	**E58-30DPS280-GD** ㊆
						4-pin Micro AC Connector	**E58-30DPS280-GLP** ㊆	**E58-30DPS280-GDP** ㊆
	10 – 30V DC	6 inches (150 mm)	1 to 6 inches (26 to 150 mm)	6.5 inches (165 mm) and beyond	0.75 inch (19 mm) diameter at 6 inches (150 mm)	2-meter Cable	**E58-30DP150-HL**	**E58-30DP150-HD**
						4-pin Micro DC Connector	**E58-30DP150-HLP** ㊆	**E58-30DP150-HDP** ㊆
		11 inches (280 mm)	1 to 9 inches (26 to 228 mm)	12.5 inches (318 mm)	1.0 inch (26 mm) diameter at 11 inches (280 mm)	2-meter Cable	**E58-30DPS280-HL**	**E58-30DPS280-HD**
						4-pin Micro DC Connector	**E58-30DPS280-HLP** ㊆	**E58-30DPS280-HDP** ㊆

① Sensor will detect a 90% reflectance card at this range.
② Sensor will ignore a 90% reflectance card at this range.

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

㊂㊆ See listing of compatible connector cables on **Page 5**.

Sensor Options for Perfect Prox® — 30 mm Diameter Models Only
(Built-to-order, contact Eaton's Cutler-Hammer Sensor Applications Department at 1-800-426-9184 for delivery lead times)

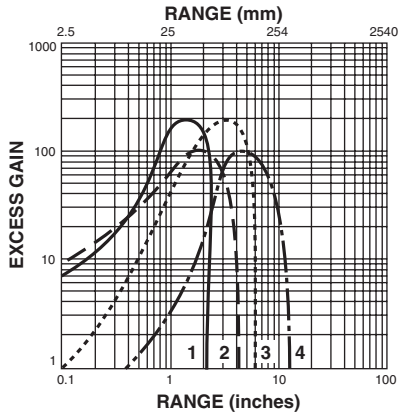
Food Processing Versions with Threaded Housings
Upgrade to a 316 Stainless Steel threaded body from 303, and change the lens cover to hard-coated polycarbonate from glass. To order, add the Suffix "**-FC**" to the end of the Catalog Number (Example: E58-30DP150-EL-**FC**).

Food Processing Versions with Smooth (Non-threaded) Housings
Upgrade to a 316 Stainless Steel smooth (non-threaded) body from 303, and change the lens cover to hard-coated polycarbonate from glass. To order, add the Suffix "**-FSC**" to the end of the Catalog Number (Example: E58-30DP150-EL-**FSC**).

Excess Gain

Perfect Prox

1. 18 mm Diameter, 2 Inch (50 mm) range models
2. 18 mm Diameter, 4 Inch (100 mm) range models
3. 30 mm Diameter, 6 Inch (150 mm) range models
4. 30 mm Diameter, 11 Inch (280 mm) range models



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

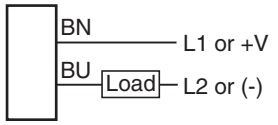
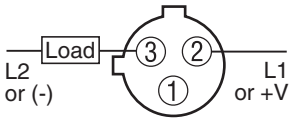
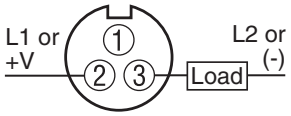
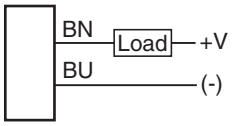
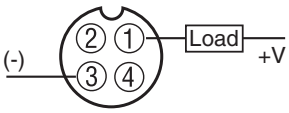
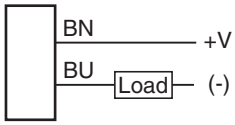
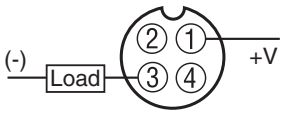
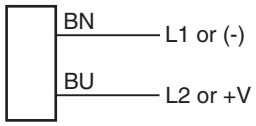
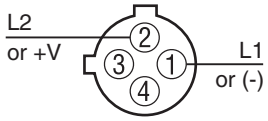
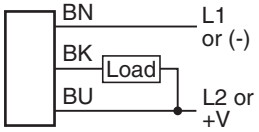
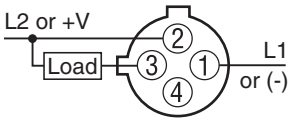
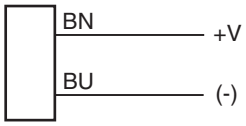
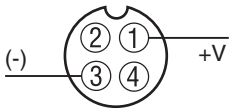
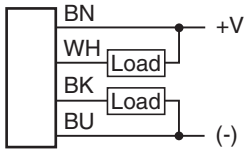
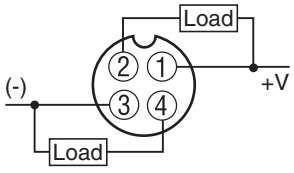
	Voltage Style	Number of Pins	Gauge	Length	Catalog Number	Pin Configuration/Wire Colors (Face View Female Shown)
Standard Cables — Mini Style						
Mini Style Straight Female  Current Rating @ 600V 3-pin: 13A	—	3-pin	16 AWG	6 feet (2m)	**CSMS3F3CY1602**	 1-Green 2-Black 3-White

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

Model Selection — Accessories

Description	Reference
Retroreflectors and retroreflective tape	See **PG.05E.17.T.E**
Mounting brackets	See **PG.05.03.T.E**
Mounting nuts and other accessories	See **PG.05.04.T.E**
Connector cables	See **PG.05.05.T.E**

Wiring Diagrams (Pin numbers are for reference only, rely on pin location when wiring)

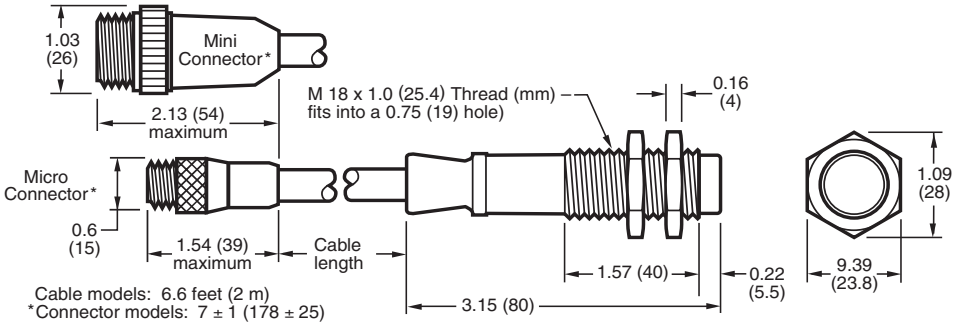
Operating Voltage	Mode/Output	Cable Models	Connector Models	
			Micro	Mini
2-Wire Sensors				
90 – 132V AC 50/60 Hz or 18 – 50V DC	All			
18 – 50V DC	All (NPN)			—
	All (PNP)			—
3-Wire and 4-Wire Sensors				
20 – 132V AC 50/60 Hz or 15 – 30V DC	Thru-Beam Source			—
	All Others			—
10 – 30V DC	Thru-Beam Source			—
	All Others (NPN & PNP)			—

Specifications

	4-Wire Sensors			2-Wire Sensors	
	AC/DC MODELS (AC Operation)	**AC/DC MODELS (DC Operation)**	**DC-ONLY MODELS**	**AC/DC MODELS (AC Operation)**	**DC-ONLY and AC/DC MODELS (DC Operation)**
Input Voltage	20 – 132V AC, 50/60 Hz	15 – 30V DC	10 – 30V DC	90 – 132V AC, 50/60 Hz	18 – 50V DC
Power Dissipation	3W maximum	3W maximum	2W maximum	3W maximum	3W maximum
Output Type	VMOS (bi-directional)	NPN (sink)	4-Wire: NPN and PNP (dual outputs)	18 mm models: DMOS/Bipolar; 30 mm models: DMOS	
Current Switching	300 mA maximum	300 mA maximum	PNP: 100 mA maximum NPN: 18 mm models: 250 mA maximum; 30 mm models: 100 mA maximum	18 mm models: 100 mA; 30 mm models: 300 mA	
Voltage Switching	186V peak maximum	186V peak maximum	30V DC maximum	186V peak maximum	50V DC maximum
Off-State Leakage	250 µA typical: 500 µA Max.	250 µA typical: 500 µA Max.	10 µA maximum	1.7 mA maximum	18 mm: 1.7 mA maximum 30 mm: 1.5 mA maximum
Surge Current	2A maximum	2A maximum	1A maximum	1A AC	1A DC
On-State Voltage Drop	—	1.8V at 10 mA 4.0V at 300 mA	NPN: 1.2V at 10 mA; 18 mm models: 2.0V at 100 mA; 30 mm models: 2.0V at 250 mA; PNP: 2.8V at 100 mA	10V AC rms	18 mm models: 10V DC 30 mm models: 8V DC
Response Time	10 mS	2 mS	18 mm models: 1 mS; 30 mm models: 1.6 mS	35 mS	35 mS
Short Circuit Protection	Sensor will turn off immediately when a short or overload is detected (indicator LED will flash).			Auto reset	Auto reset
	Turn power OFF and back ON to reset. Sensor will reset when short is removed.				
Operating and Storage Temperature Range	-40° to 131°F (-40° to 55°C)			18 mm models: -40° to 158°F (-40° to 70°C) 30 mm models: -10° to 131°F (-25° to 55°C)	
Enclosure Material	Cable Jacket: PVC (poly vinyl chloride) Indicator Ring: PVDF (high-density fluorinated polymer) Seals: Viton (registered trademark of Dupont) Lens Cover: Thru-Beam and Perfect Prox® models: Tempered Glass (or hard-coated polycarbonate for models ending in **FC** or **FSC)** Polarized Reflex models: Glass (or cast acrylic for models ending in **FC** or **FSC)** Body: 303 Stainless Steel (or 316 Stainless Steel for models ending in **FC** or **FSC)**				
Cable Versions	2 meter cable length				
Connector Versions	Male mini and micro connectors on 7" pigtail (refer to model selection for number of pins per model)				
Vibration and Shock	Vibration: 30g over 20 Hz to 2 kHz; Shock: 100g for 3 mS 1/2 sinewave pulse				
Indicator LED	Thru-Beam Source: Lights when power is ON; All other models: 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 Others: 10,000 foot-candles				
Enclosure Ratings	NEMA 1, 2, 3, 3R, 3S, 4, 4X, 6, 6P, 12, 12K and 13; This product is suitable for high temperature, high pressure washdown (1200 psi).				
Chemical Resistance	This product was designed to withstand chemicals commonly used in the automotive, machine tool, food processing and forest industries. Consult Eaton's Cutler-Hammer Sensor Applications Department at 1-800-426-9184 for information on resistance to specific chemicals				

Approximate Dimensions in Inches (mm) Except Where Noted

18 mm Diameter
(Threaded Model Shown)



30 mm Diameter
(Threaded Model Shown)

