EATON
Cutler-Hammer

Enhanced 50 Series Polarized Reflex Photoelectric Sensors

1451E-6503

1451E-6513

- Fiberglass-reinforced plastic housing
- Field of view: 1.0°
- Cable wires or mini/micro connection termination
- NPN/PNP, Solid-State Relay, or SPDT EM Relay outputs
- IP67 rated

Note: Cutler-Hammer parts available for sale to North America locations only.

1451E-6534

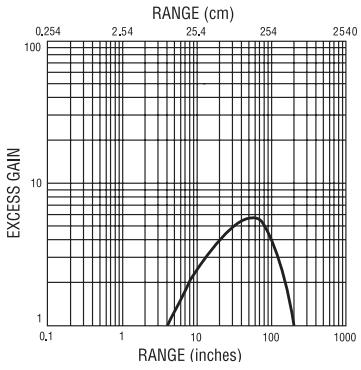
Enhanced 50 Series Polarized Reflex Photoelectric Sensors Selection Chart

Part Number	Price	Voltage Range	Sensing Range*	Optimum Range*	Sensing Beam	Output Type	Connection Type	Cable Part Number
1451E-6517	$009_0:	10 - 40 VDC	16ft. [4.9 m]	0.5 to 8 ft. [0.2 to 2.5 m]	Visible Red	NPN/PNP 250mA	6-foot cable (300V)	Pre-wired 6ft [1.8 m]
1451E-6547	$009_3:						4-pin Euro (Micro) DC connector	CSDS4A4CY2202 CSDS4A4CY2205
1451E-6507	$;;009[!:						4-pin Mini connector	CSMS4A4CY1602 CSMS4A4CY1606
1451E-6513	$;009[?:	12 - 240 VDC 24 - 240 VAC				Solid-state relay 300mA @ 240 VAC/VDC	6-foot cable (300V)	Pre-wired 6ft [1.8 m]
1451E-6543	$009_2:						4-pin Micro AC connector	CSAS4F4CY2202 CSAS4F4CY2205
1451E-6503	$;009[_:						4-pin Mini connector	CSMS4A4CY1602 CSMS4A4CY1606
1451E-6514	$;;009[,:					SPDT EM relay 3A @ 120VAC	6-foot cable (300V)	Pre-wired 6ft [1.8 m]
1451E-6534	$009_1:						5-pin Micro AC connector [7.5" pigtail]	CSAS5A5CY2202 CSAS5A5CY2205
1451E-6504	$;009[#:						5-pin Mini connector	CSMS5A5CY1602 CSMS5A5CY1606

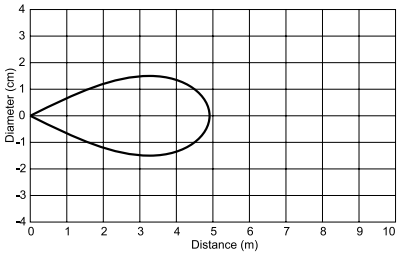
***Note: Ranges based on 3-inch retro-reflector for reflex sensors.**
Polarized sensors may not operate with reflective tape. Test tape selection before installation.

Note: Purchase reflectors separately.

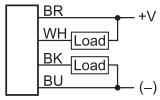
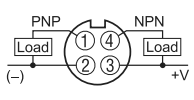
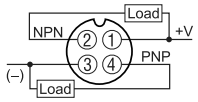
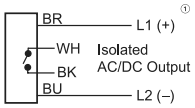
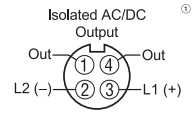
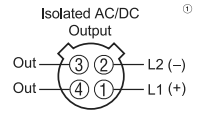
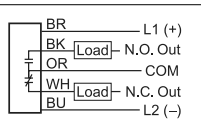
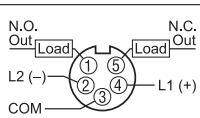
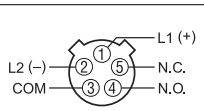
Characteristic curve chart



Spot dimension chart



Wiring Diagrams (Pin numbers are for reference only. Rely on pin location when wiring.)

Operating Voltage	Models	Cable Models	Mini-Connector Models (Face View Male Shown)	Micro and Euro (Micro) Connector Models (Face View Male Shown)
10-40 VDC	Polarized Reflex			
12 – 240 VDC or 24 – 240 VAC Solid-State Relay	Polarized Reflex			
12 – 240 VDC or 24 – 240 VAC SPDT EM Relay	Polarized Reflex			

① Connect load to appropriate output for either sinking or sourcing operation.

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Enhanced 50 Series Photoelectric Sensors Selection Guide

Overview

The Enhanced 50 family of high performance photoelectric sensors offers outstanding features, flexibility and durability at an incredible price. Choose from a wide selection of Through-beam, Polarized Reflex, Diffuse and even Clear Object models all designed in a rugged, industry standard, rectangular package. Each model comes with a variety of input options for maximum flexibility across many voltage ratings.

Cabling choices include built-in mini-connector, micro-connector, pigtail micro-connector or a 6 ft. integrated cable. Other convenient features included are Dark-on/Light-on selectability and Gain adjustment, available on all models. Use the Selection Guide below to find the sensor model that best suits your requirements.

Enhanced 50 Photoelectric Sensors Specifications by Model Type

Specifications	*Through-Beam*	*Diffuse*	*Polarized Reflex*	*Clear Object Detector*
Voltage Range	10 - 40 VDC 12 - 240 VDC 24 - 240 VAC	10 - 40 VDC 12 - 240 VDC 24 - 240 VAC	10 - 40 VDC 12 - 240 VDC 24 - 240 VAC	10 - 40 VDC 12 - 240 VDC 24 - 240 VAC
Sensing Range	500ft [152m]	10ft [3m]	16ft [4.9 m]	45in [1.2 m]
Optimum Power	0.1 to 250ft [0.03 to 77m]	1 to 60in [25 to 1520mm]	0.5 to 8ft [0.2 to 2.5 m]	1 to 24in [25 to 610mm]
Sensing Beam	Infrared	Infrared	Visible Red	Visible Red
Output Types	NPN/PNP 250mA, Solid-state relay 300mA @ 240 VAC/VDC, SPDT EM relay 3A @ 120VAC	NPN/PNP 250mA, Solid-state relay 300mA @ 240 VAC/VDC, SPDT EM relay 3A @ 120VAC	NPN/PNP 250mA, Solid-state relay 300mA @ 240 VAC/VDC, SPDT EM relay 3A @ 120VAC	NPN/PNP 250mA, Solid-state relay 300mA @ 240 VAC/VDC, SPDT EM relay 3A @ 120VAC

Enhanced 50 Photoelectric Sensors Specifications by Input Type

Specifications	*AC/DC EM Relay Models*	*AC/DC Solid-State Relay Models*	*DC Only Models*
Input Voltage	12 – 240 VDC 24 – 240 VAC	12 – 240 VDC 24 – 240 VAC	10 – 40 VDC
Light/Dark Operation	Switch selectable		
Operating Temperature	-13 to 131°F [-25 to 55°C]		
Humidity	95% relative humidity, non-condensing		
Case Material	Fiberglass reinforced plastic		
Lens Material	Acrylic		
Vibration	IEC 60947-5-2 part 7.4.2		
Shock	IEC 60947-5-2 part 7.4.1		
Protection	Output short circuit and overcurrent protection, reverse polarity protection		
Enclosure Ratings	IP67		
Agency Approvals	IEC IP67, cCSAus, UL508 (CSA File 224447)		
Output Load	3A @ 120VAC 3A @ 28VAC 3A @ 240VAC	300mA @ 240 VAC/VDC	250mA
Response Time	15ms	2ms	
No Load Current Draw	<30 mA		
Leakage Current (max.)	—	1mA @ 240VAC	<10µA
Indicator LEDs	Through-Beam Source.....All Others: Red: Power..... Green: Output ..... Yellow: Power ..... Red: Alignment		

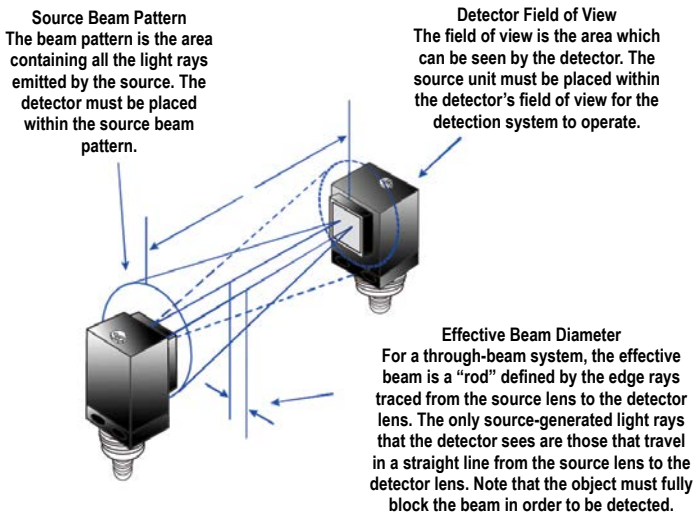
Enhanced 50 Series Photoelectric Sensors

Application Guide

The Enhanced 50 Series Photoelectric Sensors are a great fit for applications such as material handling, packaging, wrapping and sortation.
This family of sensors, with its four basic models (Through-beam, Polarized Reflex, Diffuse and Clear Object), meets the needs for almost any sensing requirement, including harsh environments with excessive dust or high temperature.
Follow the application guide below to choose the best sensor model for your application.

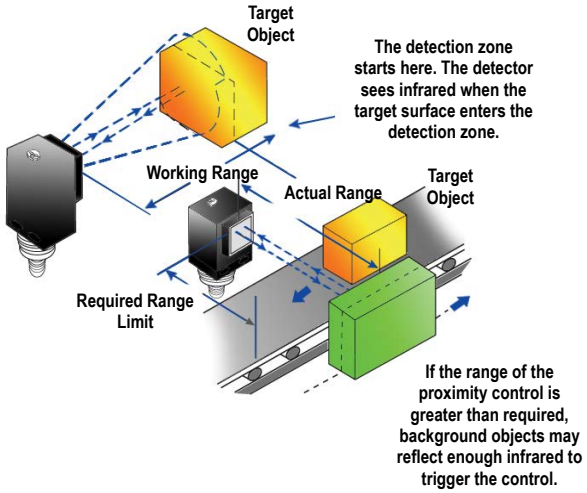
Through-Beam

- Most accurate
- Longest sensing range
- Most reliable
- Must be installed in two points on system: emitter and receiver
- More costly



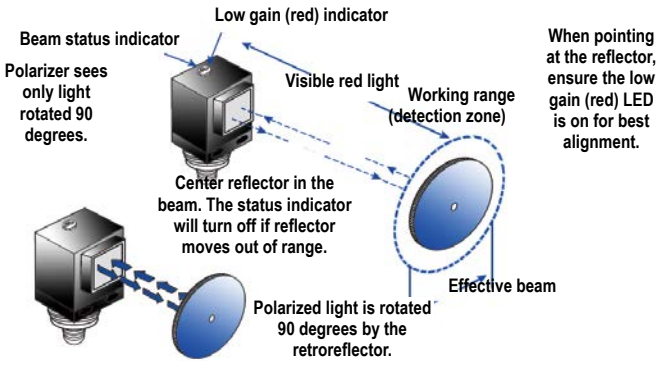
Diffuse

- Lower cost
- Install at one point
- Less accurate than Through-Beam or Polarized Reflex
- More setup time involved



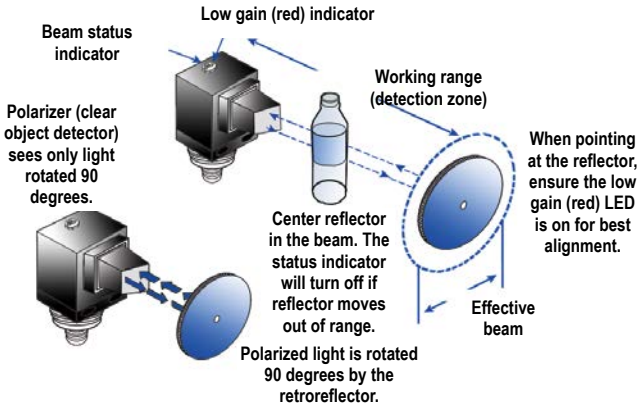
Polarized Reflex

- Lower cost than Through-Beam
- Longer sensing range than Diffuse
- Very reliable
- Must be installed in two points on system: sensor and reflector



Clear Object Detector

- Most reliable for sensing transparent objects
- Must be installed in two points on system: sensor and reflector.
- Short sensing distance: 45 inches max.



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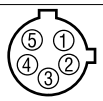
Enhanced 50 Series Photoelectric Sensors Connector Cables

Note: Cutler-Hammer parts available for sale to North America locations only.

Enhanced 50 Series Cables Selection Chart

Part Number	Price	Description	Gauge	Pin-Out Diagram
CSDS4A4CY2202	$;05td:	DC Euro (Micro) connector cable for quick-disconnect photoelectric sensors, straight female, DC 4-pin/4-wire, PVC, 6 feet (2 meter) length	22	1-Brown 2-White 3-Blue 4-Black
CSDS4A4CY2205	$;05te:	DC Euro (Micro) connector cable for quick-disconnect photoelectric sensors, straight female, DC 4-pin/4-wire, PVC, 16.4 feet (5 meter) length	22	
CSAS4F4CY2202	$05qk:	AC Micro connector cable for quick-disconnect photoelectric sensors, straight female, AC 4-pin/4-wire, PVC, 6 feet (2 meter) length, 1/2" - 20 UNF thread	22	1-Red/Black 2-Red/White 3-Red 4-Green
CSAS4F4CY2205	$-05ql:	AC Micro connector cable for quick-disconnect photoelectric sensors, straight female, AC 4-pin/4-wire, PVC, 16.4 feet (5 meter) length, 1/2" - 20 UNF thread	22	
CSAS5A5CY2202	$05qn:	AC Micro connector cable for quick-disconnect photoelectric sensors, straight female, AC 5-pin/5-wire, PVC, 6 feet (2 meter) length, 1/2" - 20 UNF thread	22	 1-Brown 2-Blue 3-Gray 4-Black 5-White
CSAS5A5CY2205	$;05tc:	AC Micro connector cable for quick-disconnect photoelectric sensors, straight female, AC 5-pin/5-wire, PVC, 16.4 feet (5 meter) length, 1/2" - 20 UNF thread	22	
CSMS4A4CY1602	$;;05tf:	Mini connector cable for quick-disconnect photoelectric sensors, straight female, 4-pin/4-wire, PVC, 6 feet (2 meter) length, 7/8" - 16 UN thread	16	1-Black 2-Blue 3-Brown 4-White
CSMS4A4CY1606	$;05tg:	Mini connector cable for quick-disconnect photoelectric sensors, straight female, 4-pin/4-wire, PVC, 19.69 feet (6 meter) length, 7/8" - 16 UN thread	16	
CSMS5A5CY1602	$;05th:	Mini connector cable for quick-disconnect photoelectric sensors, straight female, 5-pin/5-wire, PVC, 6 feet (2 meter) length, 7/8" - 16 UN thread	16	1-Black 2-Blue 3-Orange 4-Brown 5-White
CSMS5A5CY1606	$;-05ti:	Mini connector cable for quick-disconnect photoelectric sensors, straight female, 5-pin/5-wire, PVC, 19.69 feet (6 meter) length, 7/8" - 16 UN thread	16	

CSDS4A4CY2205

CSAS4F4CY2205

CSAS5A5CY2202

Connector Cables Specifications

	Micro Style	Mini Style
Jacket Material	PVC	PVC
Contact Material	Gold-plated copper alloy	Gold-plated brass
Coupling Nut Material	Zinc die-cast epoxy-coat	Zinc die cast epoxy-coat
O-ring	Nitrile rubber	None
Cable	PVC insulation and jacket, stranded copper conductors	
Cable Strain Relief	35 pounds minimum	
Voltage Rating	320 V (24 VDC for LED plugs)	600 V
Current Rating	4A	4-pin: 10A 5-pin: 8 A
Contact Resistance	5mΩ max	5mΩ max
Isolation Resistance	1000MΩ min	100 MΩ min
Protection	IP67	NEMA 6P, IP68
Temperature Range	-25 to 90°C	-20 to 105°C
Cable Diameter (3/C = 3 Conductor)	22 AWG PVC: 4/C: 0.21 inch [5.3 mm] 5/C: 0.20 inch [5.1 mm]	16AWG PVC: 4/C: 0.42 inch [10.7 mm] 5/C: 0.50 inch [12.7 mm]
Bend Radius	Minimum recommended bend radius is 12X cable diameter	

CSMS4A4CY1602

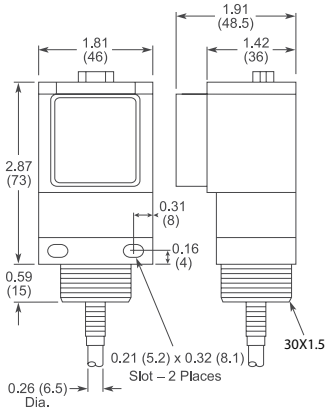
CSMS5A5CY1602

Enhanced 50 Series Photoelectric Sensors Dimensions

Sensor Dimensions

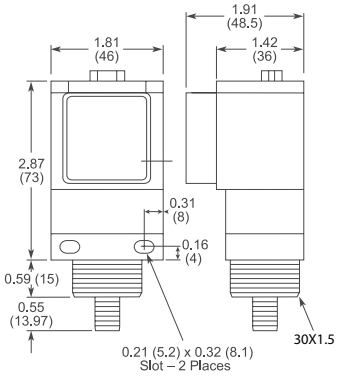
inches (mm)

Cable and Pigtail Connector* Version

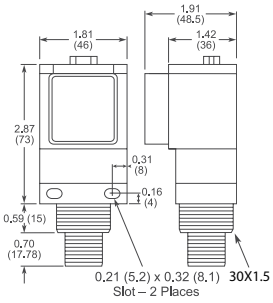


* Pigtail length: 7.5" nominal

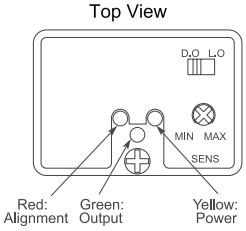
AC/DC Micro or Euro (Micro) Connector Versions



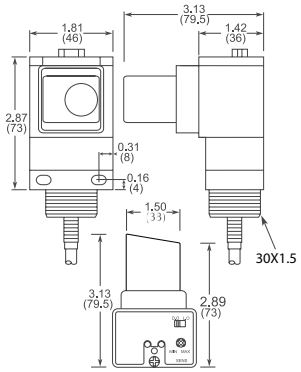
Mini Connector Versions



Top View



Clear Object Versions (Cable Version Shown)

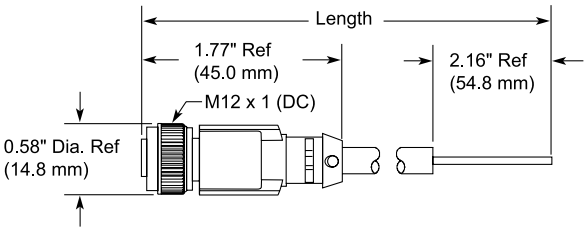


Connector Cables Dimensions

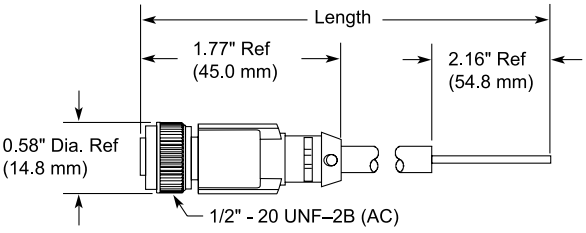
(in/mm)

Micro Style Connector Cables

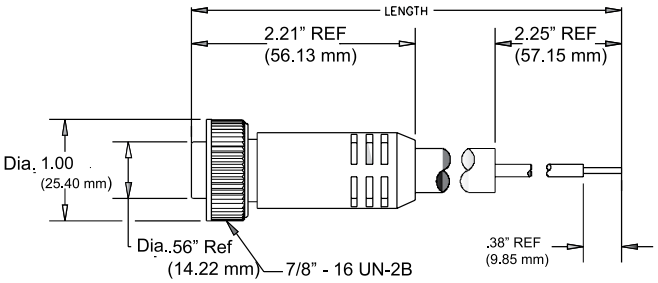
M12 x 1 (DC) connector cable



1/2" - 20 UNF-2B (AC) connector cable



Mini Style Connector Cables



DFT Series Fiber Photoelectric Amplifiers

Compact Rectangular Plastic DIN rail Mount with Teach Function - DC

- DIN rail mounting
- Bargraph signal-strength indicator
- NPN or PNP, Light-on/Dark-on selectable outputs
- Red LED with visible spot
- IP64 rated

DFT Series Fiber Photoelectric Amplifier Selection Chart							
Part Number	*Price*	*Sensing Range*	*Output State*	*Logic*	*Connection*	*Wiring*	*Dimensions*
DFT-AN-1A	$;008[_:	Optical fiber Dependent	N.O./N.C. selectable	NPN	2m [6.5 ft] axial cable	Diagram 1	Figure 1
DFT-AN-1F	$;008[#:				M8 [8mm] connector	Diagram 1	Figure 2
DFT-AP-1A	$;;008[!:			PNP	2m [6.5 ft] axial cable	Diagram 2	Figure 1
DFT-AP-1F	$;008[?:				M8 [8mm] connector	Diagram 2	Figure 2

Specifications		
Type	*DFT-AN-1**	*DFT-AP-1**
Sensing Distance	See Optical Fibers Table	
Light Spot Diameter	N/A	
Emission	red (680nm)	
Sensitivity	Dual Teach function	
Output Type	NPN Light-on or Dark-on Selectable Output delay or stretch programmable	PNP Light-on or Dark-on Selectable Output delay or stretch programmable
Operating Voltage	10-30VDC	
No-Load Supply Current	≤ 25mA	
Operating (Load) Current	≤ 200mA	
Off-state (Leakage) Current	≤ 0.1mA	
Voltage Drop	2V maximum at 200mA	
Switching Frequency	1.5 kHz	
Ripple	m20%	
Time Delay Before Availability (tv)	80ms	
Short-Circuit Protection	Yes (switch auto-resets after overload is removed)	
Operating Temperature	-25 to 55°C [-13 to 131°F]	
Protection Degree	IEC IP64	
LED Indicators -Switching Status	Yellow (output energized)	
Housing Material	PBT	
Lens Material	Acrylic	
Shock/Vibration	See terminology section	
Tightening Torque	N/A	
Weight (cable/connector)	68g [2.39oz] / 17g [0.60oz]	
Connectors	2m [6.5 ft] axial cable; M8 [8mm] connector	
Agency Approvals	UL file E328811	

To obtain the most current agency approval information, see the Agency Approval Checklist section on the specific part number's web page.

Dimensions

(mm)

Figure 1

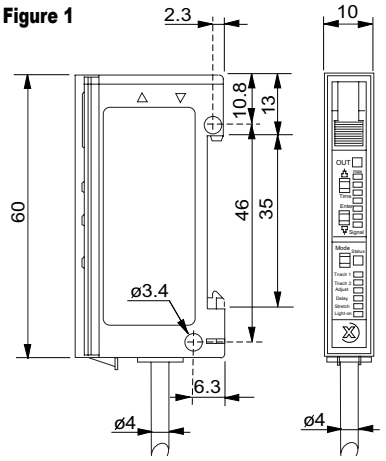
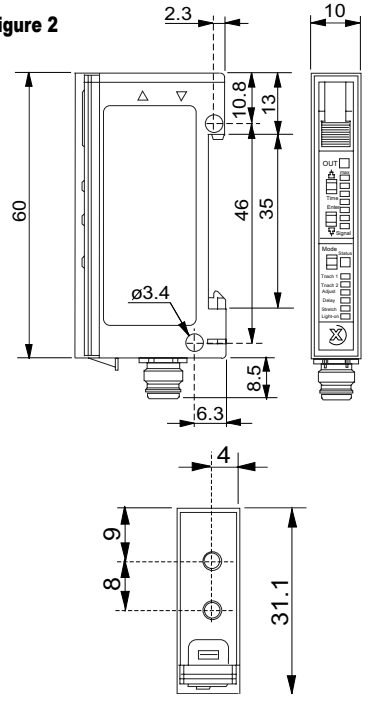


Figure 2



Wiring Diagrams

Diagram 1

NPN Output

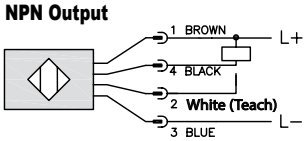
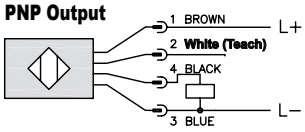


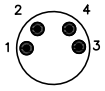
Diagram 2

PNP Output



Connector

M8 Connector



Switching Element Function		
	Through-beam and Reflective Models	*Diffuse Reflective Models*
Light-on	N.C.	N.O.
Dark-on	N.O.	N.C.

Accessories for 50 Series Photoelectric Sensors

Mounting Brackets

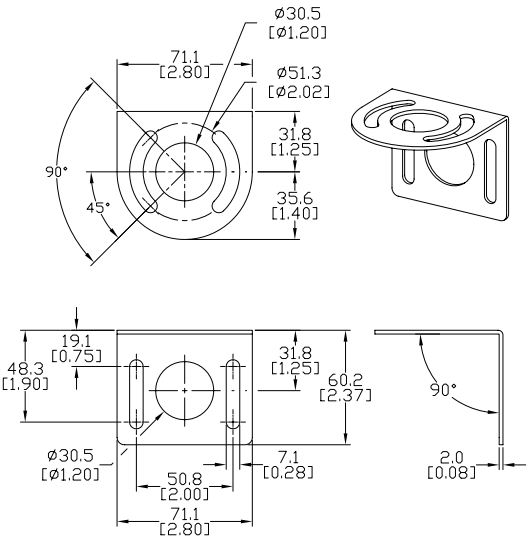
Short, tall or ball-swivel style of mounting brackets are available. All styles allow 360° rotation of the sensor.

Note: Cutler-Hammer parts available for sale to North America locations only.

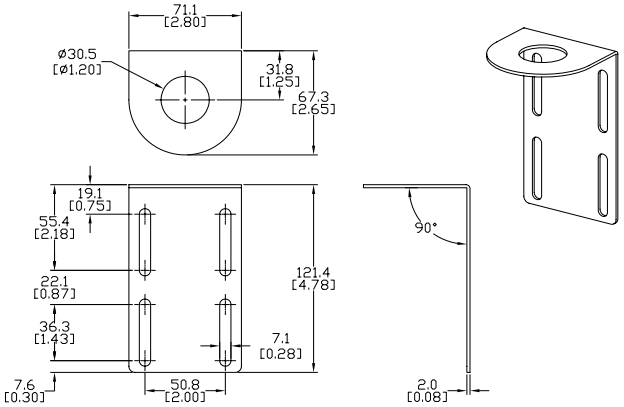
Accessories for Enhanced 50 Series Sensors			
Part Number	***Price***	***Description***	***Weight [lb]***
6150E-6501	$05hu:	Mounting bracket, right-angle, 1.5in vertical adjustment, nickel plated steel. For use with CH Enhanced 50 Series sensor.	0.20
6150E-6502	$05hv:	Mounting bracket, right-angle, 3.5in vertical adjustment, nickel plated steel. For use with CH Enhanced 50 Series sensor.	0.39
6150E-6503	$05hx:	Mounting bracket, right-angle ball swivel, 60 degree vertical and horizontal adjustment, plastic. For use with CH Enhanced 50 Series sensor. Ball swivel allows for ±30° angle.	0.11

Dimensions

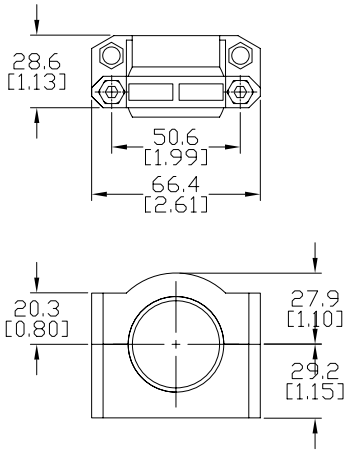
mm [inches]

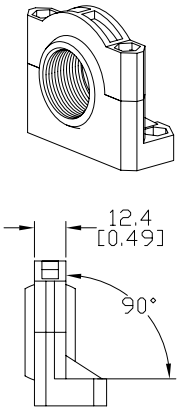


6150E-6501



6150E-6502



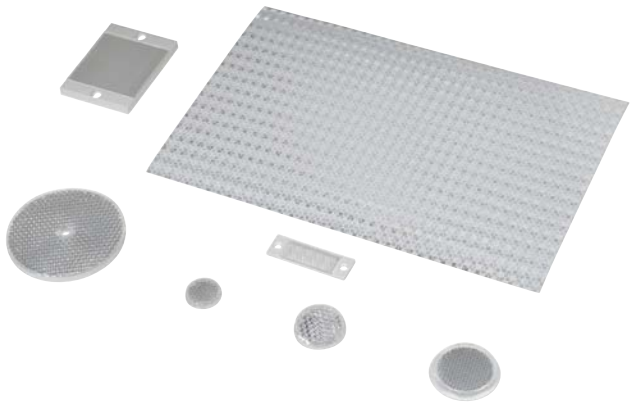


6150E-6503

Reflectors

RL Series Reflectors for Polarized Reflective Photoelectric Sensors (All Models)

- Suitable for use with polarized light photoelectric sensors
- Shapes and sizes for most applications
- Miniature types for close mounting in multiple sensor installations
- Single hole, dual hole and self-adhesive mounting types available
- Single and 10-packs available



Installation Notes

- Keep the reflector surface clean to ensure peak detection performance. This is especially true when the maximum sensing range is being used. Clean using a damp cloth.
- When selecting a reflector, it is important to consider the ambient conditions it will be exposed to. Dusty or high humidity conditions may reduce the sensing range as much as 90%.
- Reflectors should be positioned at a 90° angle to the optical axis with a tolerance of ±15°.

Reflector Specifications

Part number	Price	Drawing Link	Quantity	Dimensions mm [in]	Degree of Protection	Mounting	Materials
RL102	$;09[h:	PDF	10	25 [0.98]	IEC IP67	Customer-supplied adhesive or other mounting method required	Reflective face: PMMA Polymethylmethacrylate (acrylic) Base material: ABS (Acrylonitrile-butadiene-styren)
RL102-1	$?6y:		1				
RL103	$;-09[i:	PDF	10	34.5 [1.36]			
RL103-1	$?6z:		1				
RL104	$;-09[j:	PDF	10	46 [1.81]			
RL104-1	$;?6]:		1				
RL105G	$-2e_j:	PDF	10	95 x 38 [3.74 x 1.50]		Two 4.3 mm holes	
RL105G-1	$2e_k:		1				
RL106G	$;-09[l:	PDF	10	182 x 42 [7.17 x 1.65]		Two 6mm holes	
RL106G-1	$?6_:		1				
RL110	$;09[n:	PDF	10	84 [3.31]		One 5mm hole	
RL110-1	$?6#:		1				
RL116	$05yv:	PDF	10	41 x 60 [3.54 x 2.36]		Two 3mm holes	
RL116-1	$;?6!:		1				
RL100DA4	$0?77:	NA	1	200 x 300 [7.87 x 11.81]		Self-adhesive	Paper (Acrylic tape with micro prism)
RL100DC4	$0?78:	NA	1	50 x 300 [1.97 x 11.81]			
RL100DQ1	$?79:	NA	1	100 x 100 [3.94 x 3.94]			
RL111G	$;0?6,:	PDF	10	22.5 x 47 [0.89 x 1.85]		Two 3mm slots	Reflective face: PMMA Polymethylmethacrylate (acrylic) Base material: ABS (Acrylonitrile-butadiene-styren)
RL111G-1	$?6?:		1				
RL112G	$0?71:	PDF	10	19 x 73 [0.75 x 2.87]			
RL112G-1	$?70:		1				
RL113G	$0?73:	PDF	10	51.4 x 60.3 [2.02 x 2.37]		Two 4mm slots	
RL113G-1	$?72:		1				

Not recommended for applications involving moist air environments or water immersion.

Reflectors

RL Series Reflectors for Polarized Reflective Laser Photoelectric Sensors (FALN series)

- Suitable for use with polarized light laser photoelectric sensors
- Sizes for most applications
- Miniature types for close mounting in multiple sensor installations
- Single and 5-packs available

Specifications						
Part Number	***RL201***	***RL201-1***	***RL203***	***RL203-1***	***RL204***	***RL204-1***
Price	$;09[o:	$?74:	$;09[p:	$?75:	$;09[q:	$?76:
Quantity	5	1	5	1	5	1
Drawing Link	PDF		PDF		PDF	
Dimensions	60 x 82 mm 2.36 x 3.23 in		19 x 6mm 0.75 x 2.36 in		20mm x 32mm 0.80 in x 1.26 in	
Degree of Protection [1]	IEC IP67					
Mounting	Two 0.4 mm holes		Two 0.4 mm holes		Two 0.3 mm holes	
Materials	Acrylic/polycarbonate					

[1] **Not recommended for applications involving moist air environments or water immersion.**