EAT-N
Cutler-Hammer

# Enhanced 50 Series Clear Object Photoelectric Sensors

- Fiberglass-reinforced plastic housing
- Field of view: 0.68°
- Cable wires or mini/micro connector termination
- NPN/PNP, Solid-State Relay, or SPDT EM Relay outputs
- IP67 rated

1452E-6547   **1452E-6517**

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

Enhanced 50 Series Clear Object Photoelectric Sensors Selection Chart								
Part Number	Price	Voltage Range	Sensing Range	Optimum Range	Sensing Beam	Output Type	Connection Type	Cable Part Number
1452E-6517	$233.00	10 - 40 VDC	45in [1.2 m]	1 to 24 in [25 to 610mm]	Visible Red	NPN/PNP 250mA	6-foot cable (300V)	Pre-wired 6ft [1.8 m]
1452E-6547	$233.00						4-pin Euro (Micro) DC connector	CSDS4A4CY2202 CSDS4A4CY2205
1452E-6513	$241.00	12 - 240 VDC 24 - 240 VAC				Solid-state relay 300mA @ 240 VAC/VDC	6-foot cable (300V)	Pre-wired 6ft [1.8 m]
1452E-6543	$233.00						4-pin Micro AC connector	CSAS4F4CY2202 CSAS4F4CY2205
1452E-6504	$232.00					SPDT EM relay 3 A @ 120 VAC	5-pin Mini connector	CSMS5A5CY1602 CSMS5A5CY1606

Characteristic curve chart

RANGE (cm)
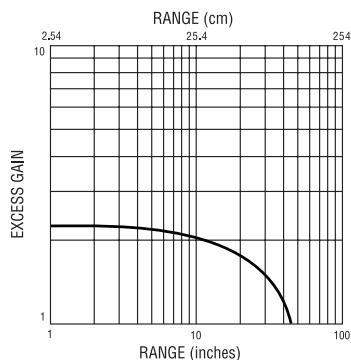
Spot dimension chart
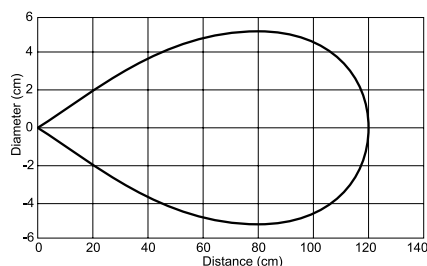
Note: Purchase reflectors separately.

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

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	

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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.
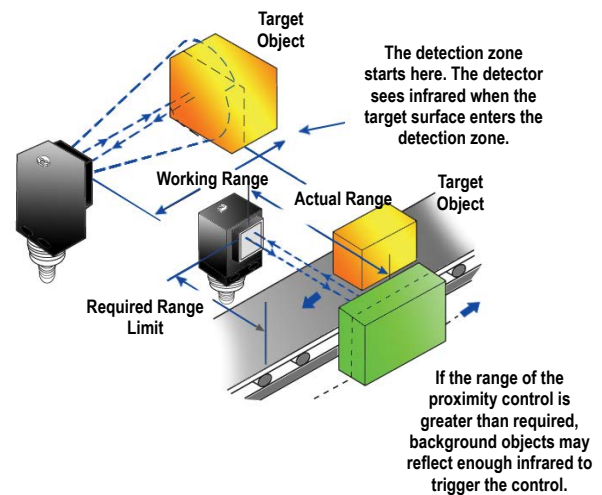Follow the application guide below to choose the best sensor model for your application.

Through-Beam
- Most accurate
- Longest sensing range
- Most reliable
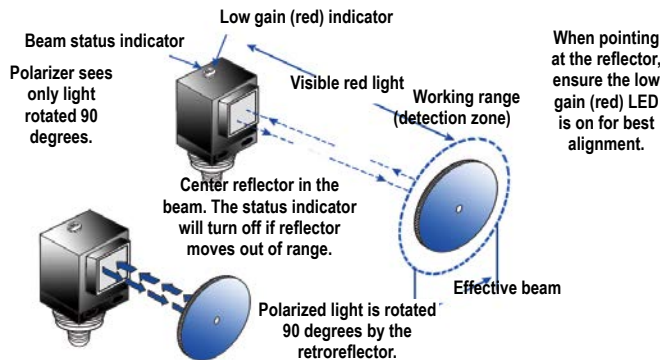- Must be installed in two points on system: emitter and receiver
- More costly
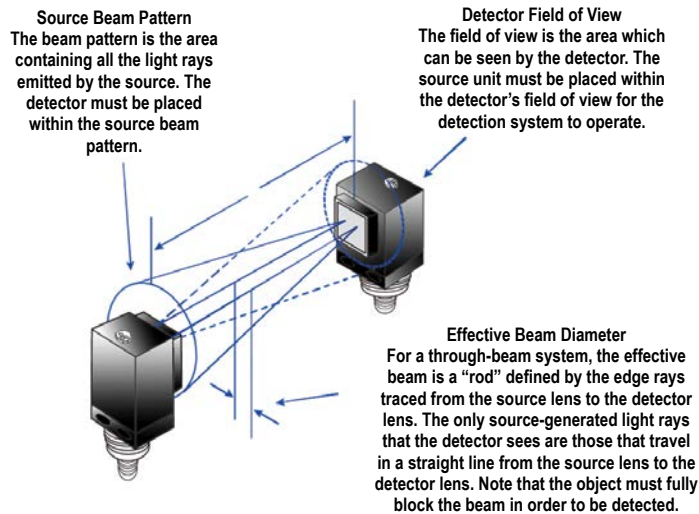
Diffuse
- Lower cost
- Install at one point
- Less accurate than Through-Beam or Polarized Reflex
- More setup time involved

Source Beam Pattern
The beam pattern is the area containing all the light rays emitted by the source. The detector must be placed within the source beam pattern.

Detector Field of View
The field of view is the area which can be seen by the detector. The source unit must be placed within the detector's field of view for the detection system to operate.

Effective Beam Diameter
For a through-beam system, the effective beam is a "rod" defined by the edge rays traced from the source lens to the detector lens. The only source-generated light rays that the detector sees are those that travel in a straight line from the source lens to the detector lens. Note that the object must fully block the beam in order to be detected.

Target Object

The detection zone starts here. The detector sees infrared when the target surface enters the detection zone.

Working Range

Actual Range

Target Object

Required Range Limit

If the range of the proximity control is greater than required, background objects may reflect enough infrared to trigger the control.
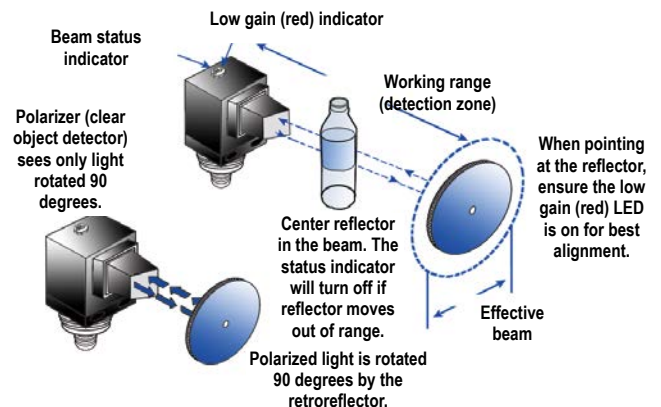
Polarized Reflex
- Lower cost than Through-Beam
- Longer sensing range than Diffuse
- Very reliable
- Must be installed in two points on system: sensor and reflector

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.

Low gain (red) indicator

Beam status indicator

Polarizer sees only light rotated 90 degrees.

Visible red light

Working range (detection zone)

When pointing at the reflector, ensure the low gain (red) LED is on for best alignment.

Center reflector in the beam. The status indicator will turn off if reflector moves out of range.

Effective beam

Polarized light is rotated 90 degrees by the retroreflector.

Low gain (red) indicator

Beam status indicator

Polarizer (clear object detector) sees only light rotated 90 degrees.

Working range (detection zone)

When pointing at the reflector, ensure the low gain (red) LED is on for best alignment.

Center reflector in the beam. The status indicator will turn off if reflector moves out of range.

Effective beam

Polarized light is rotated 90 degrees by the retroreflector.

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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	$34.50	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	$35.50	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	$39.00	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	$40.00	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	$49.00	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	$52.00	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	$53.00	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	$85.00	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	$62.00	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	$98.00	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
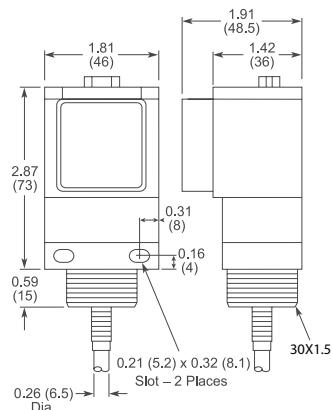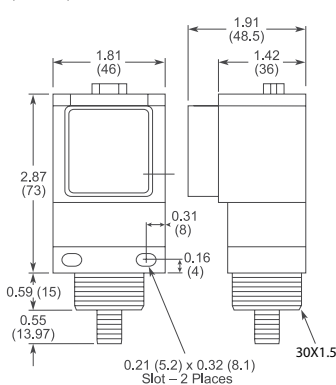

CSMS5A5CY1602

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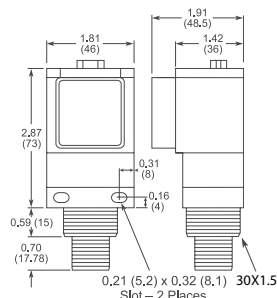**Cutler-Hammer**

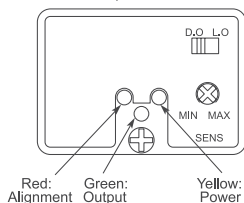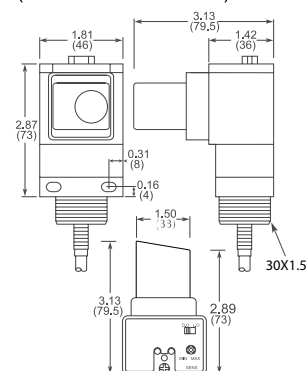# Enhanced 50 Series Photoelectric Sensors Dimensions

Sensor Dimensions
inches (mm)

Cable and Pigtail Connector*
Version

AC/DC Micro or Euro
(Micro) Connector Versions

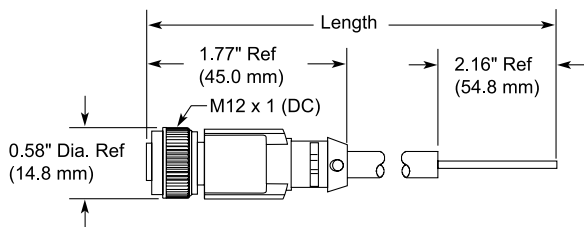Mini Connector Versions

* Pigtail length: 7.5" nominal
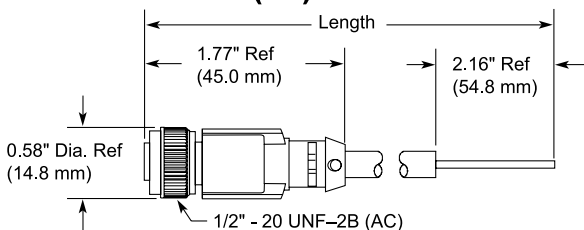
Clear Object Versions
(Cable Version Shown)

Top View

Red: Green: Yellow:
Alignment   Output   Power

Connector Cables Dimensions
(in/mm)

Micro Style Connector Cables

M12 x 1 (DC) connector cable

Length

1.77" Ref
(45.0 mm)

2.16" Ref
(54.8 mm)

M12 x 1 (DC)

0.58" Dia. Ref
(14.8 mm)

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

Length

1.77" Ref
(45.0 mm)

2.16" Ref
(54.8 mm)

0.58" Dia. Ref
(14.8 mm)

1/2" - 20 UNF–2B (AC)

Mini Style Connector Cables

LENGTH

2.21" REF
(56.13 mm)

2.25" REF
(57.15 mm)

Dia. 1.00
(25.40 mm)

Dia..56" Ref
(14.22 mm)

7/8" - 16 UN-2B

.38" REF
(9.85 mm)
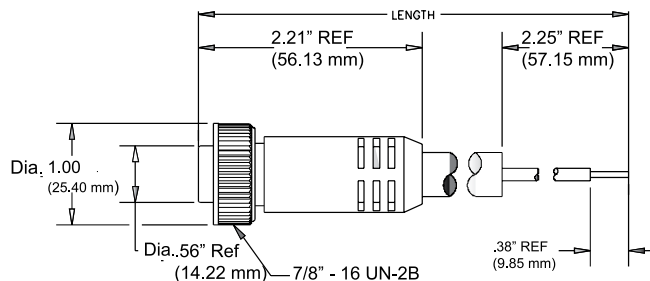
# Accessories for 50 Series Photoelectric Sensors

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	$10.50	Mounting bracket, right-angle, 1.5in vertical adjustment, nickel plated steel. For use with CH Enhanced 50 Series sensor.	0.20
6150E-6502	$13.50	Mounting bracket, right-angle, 3.5in vertical adjustment, nickel plated steel. For use with CH Enhanced 50 Series sensor.	0.39
6150E-6503	$13.50	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]
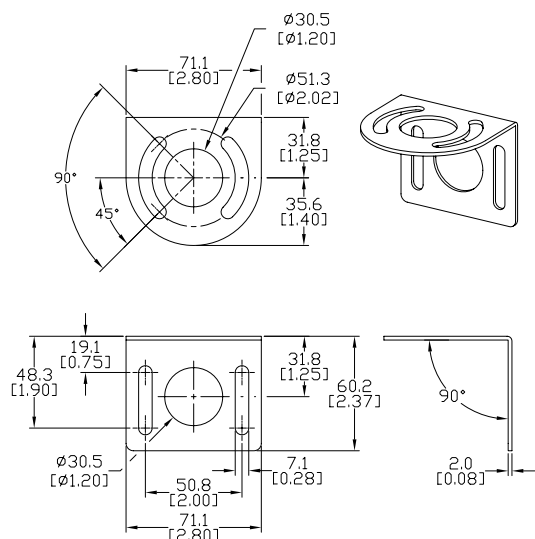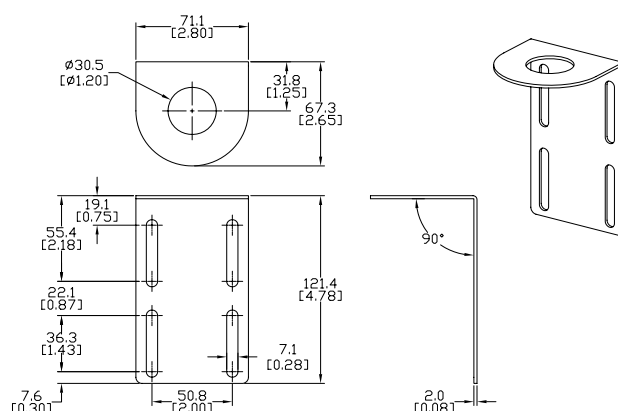
6150E-6501
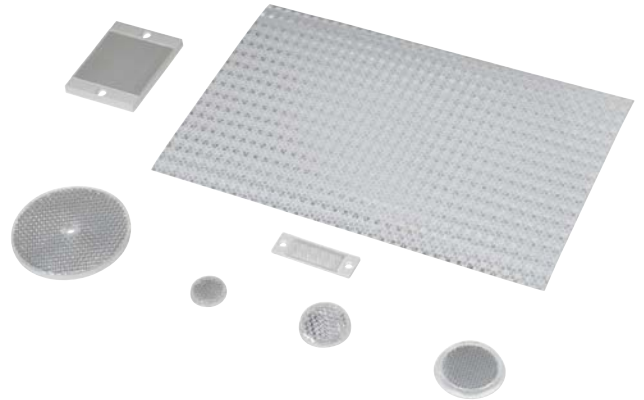
6150E-6502
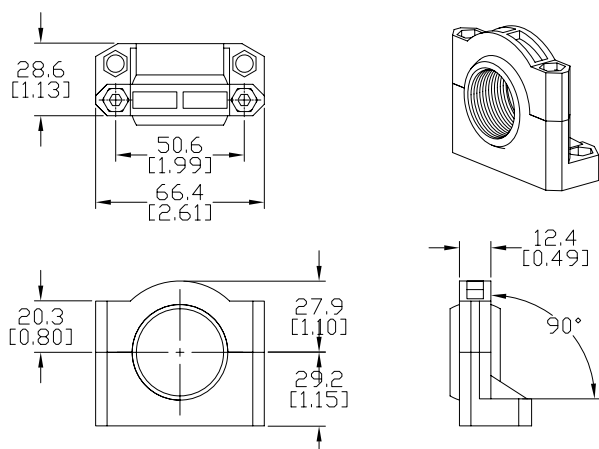
6150E-6503

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	$42.00	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	$4.75		1				
RL103	$47.00	PDF	10	34.5 [1.36]			
RL103-1	$5.25		1				
RL104	$47.00	PDF	10	46 [1.81]			
RL104-1	$5.25		1				
RL105G	$42.00	PDF	10	95 x 38 [3.74 x 1.50]		Two 4.3 mm holes	
RL105G-1	$4.75		1				
RL106G	$47.00	PDF	10	182 x 42 [7.17 x 1.65]		Two 6mm holes	
RL106G-1	$5.25		1				
RL110	$21.00	PDF	10	84 [3.31]		One 5mm hole	
RL110-1	$2.25		1				
RL116	$21.00	PDF	10	41 x 60 [3.54 x 2.36]		Two 3mm holes	
RL116-1	$2.25		1				
RL100DA4	$42.50	NA	1	200 x 300 [7.87 x 11.81]		Self-adhesive	Paper (Acrylic tape with micro prism)
RL100DC4	$13.00	NA	1	50 x 300 [1.97 x 11.81]			
RL100DQ1	$9.75	NA	1	100 x 100 [3.94 x 3.94]			
RL111G	$66.00	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	$8.00		1				
RL112G	$48.50	PDF	10	19 x 73 [0.75 x 2.87]			
RL112G-1	$5.25		1				
RL113G	$58.00	PDF	10	51.4 x 60.3 [2.02 x 2.37]		Two 4mm slots	
RL113G-1	$6.50		1				

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

Sensor Accessories

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	$42.00	$9.00	$39.00	$8.50	$33.00	$7.50
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.**