

FAT·N Enhanced 50 Series Thru-beam Photoelectric Sensors

Cutler-Hammer

- Long sensing distances
- 13 models available
- Fiberglass-reinforced plastic housing
- Field of view: 2.4°
- Cable wires or mini/micro connector termination
- NPN/PNP, Solid-State Relay, or SPDT EM Relay outputs
- IP67 rated



1151E-6504 1251E-6504



1151E-6517 1251E-6517

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

Enhanced 50 Series Thru-beam Photoelectric Sensors Selection Chart

Part Number	Price	Voltage Range	Sensing Range	Optimum Range	Sensing Beam	Thru-Beam Component	Output Type	Connection Type	Cable Part Number
1151E-6517	<--->	10 - 40 VDC	500 ft. (152 m)	0.1 to 250 ft. (0.03 to 77 m)	Infrared	Source/Emitter	N/A	6-foot cable (300V)	pre-wired 6 ft. (1.8 m)
1251E-6517	<--->					Detector/Receiver	NPN/PNP 250 mA		
1151E-6547	<--->					Source/Emitter	N/A	4-pin Euro (Micro) DC connector	CSDS4A4CY2202 CSDS4A4CY2205
1251E-6547	<--->					Detector/Receiver	NPN/PNP 250 mA		
1151E-6507	<--->					Source/Emitter	N/A	4-pin Mini connector	CSMS4A4CY1602 CSMS4A4CY1606
1251E-6507	<--->					Detector/Receiver	NPN/PNP 250 mA		
1151E-6513	<--->	12 - 240 VDC 24 - 240 VAC	500 ft. (152 m)	0.1 to 250 ft. (0.03 to 77 m)	Infrared	Source/Emitter	N/A	6-foot cable (300V)	pre-wired 6 ft. (1.8 m)
1251E-6513	<--->					Detector/Receiver	Solid-state relay 300 mA @ 240 VAC/VDC		
1151E-6543	<--->					Source/Emitter	N/A	4-pin Micro AC connector	CSAS4F4CY2202 CSAS4F4CY2205
1251E-6543	<--->					Detector/Receiver	Solid-state relay 300 mA @ 240 VAC/VDC		
1151E-6504	<--->					Source/Emitter	N/A	4-pin Mini connector	CSMS4A4CY1602 CSMS4A4CY1606
1251E-6503	<--->					Detector/Receiver	Solid-state relay 300 mA @ 240 VAC/VDC		
1251E-6504	<--->	Detector/Receiver	SPDT EM relay 3A @ 120 VAC	5-pin Mini connector	CSMS5A5CY1602 CSMS5A5CY1606				

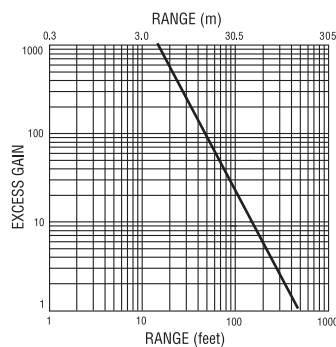
Note: Purchase one source and one detector for a complete set.

WIRING DIAGRAM (Pin numbers are for reference only. Rely on pin location when wiring.)

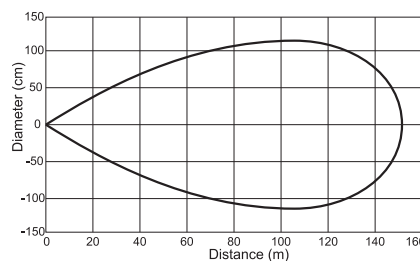
Operating Voltage	Models	Cable Models	Mini-Connector Models (Face View Male Shown)	Micro and Euro (Micro) Connector Models (Face View Male Shown)
10 - 40V DC	Thru-Beam Source / Emitter	BR (+) Test BK (-) BU (-)	Test (1) (4) (2) (3)	(1) (4) (3) (2) (+) (-) Test
	Thru-Beam Detector/Receiver	BR (+) WH Load BK Load BU (-)	PNP (1) (4) (2) (3) NPN Load Load	NPN (2) (1) (+) Load PNP (3) (4) (-) Load
12 - 240V DC or 24 - 240V AC Solid-State Relay	Thru-Beam Source / Emitter	BR L1 (+) BU L2 (-)	L2 (-) (1) (4) (2) (3) L1 (+)	(3) (2) L2 (-) (4) (1) L1 (+)
	Thru-Beam Detector/Receiver	BR L1 (+) WH Isolated AC/DC Output BK Isolated AC/DC Output BU L2 (-)	Isolated AC/DC Output (1) (4) (2) (3) L2 (-) L1 (+)	Isolated AC/DC Output (3) (2) L2 (-) (4) (1) L1 (+)
12 - 240V DC or 24 - 240V AC SPDT EM Relay	Thru-Beam Source / Emitter	BR L1 (+) BU L2 (-)	L2 (-) (1) (4) (2) (3) L1 (+)	(3) (2) L2 (-) (4) (1) L1 (+)
	Thru-Beam Detector/Receiver	BR L1 (+) BK Load N.O. Out CR C.O.M. WH Load N.C. Out BU L2 (-)	N.Q. Out (1) (5) Load Load L2 (-) (2) (3) (4) L1 (+) C.O.M.	L1 (+) (2) (1) (5) N.C. (3) (4) N.O.

① Connect load to appropriate output for either sinking or sourcing operation.
② Connecting the test input to 0 VDC allows you to switch the light source off for troubleshooting while leaving the sensor under power.

Characteristic curve chart



Spot dimension chart



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 Thru-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	Thru-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	500 ft. (152 m)	10 ft. (3 m)	16 ft. (4.9 m)	45 in. (1.2 m)
Optimum Power	0.1 to 250 ft. (0.03 to 77 m)	1 to 60 in. (25 to 1520 mm)	0.5 to 8 ft. (0.2 to 2.5 m)	1 to 24 in. (25 to 610 mm)
Sensing Beam	Infrared	Infrared	Visible Red	Visible Red
Output Types	NPN/PNP 250 mA, Solid-state relay 300 mA @ 240 VAC/VDC, SPDT EM relay 3 A @ 120 VAC	NPN/PNP 250 mA, Solid-state relay 300 mA @ 240 VAC/VDC, SPDT EM relay 3 A @ 120 VAC	NPN/PNP 250 mA, Solid-state relay 300 mA @ 240 VAC/VDC, SPDT EM relay 3 A @ 120 VAC	NPN/PNP 250 mA, Solid-state relay 300 mA @ 240 VAC/VDC, SPDT EM relay 3 A @ 120 VAC

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)	IEC IP67, cCSAus, UL508 (CSA File 224447)	IEC IP67, cCSAus, UL508 (CSA File 224447)
Output Load	3A @ 120 VAC 3A @ 28 VAC 3A @ 240 VAC	300 mA @ 240 VAC/VDC	250 mA
Response Time	15 ms	2 ms	
No Load Current Draw	<30 mA		
Leakage Current (max.)	—	1 mA @ 240 VAC	<10 µA
Indicator LEDs	<p>Thru-Beam Source All Others:</p> <p>Red: Power Green: Output</p> <p>Yellow: Power Red: Alignment</p>		

- Company Information
- Systems Overview
- Programmable Controllers
- Field I/O
- Software
- C-more & other HMI
- Drives
- Soft Starters
- Motors & Gearbox
- Steppers/ Servos
- Motor Controls
- Proximity Sensors
- Photo Sensors
- Limit Switches
- Encoders
- Current Sensors
- Pressure Sensors
- Temperature Sensors
- Pushbuttons/ Lights
- Process
- Relays/ Timers
- Comm.
- Terminal Blocks & Wiring
- Power
- Circuit Protection
- Enclosures
- Tools
- Pneumatics
- Safety
- Appendix
- Product Index
- Part # Index

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Application Guide

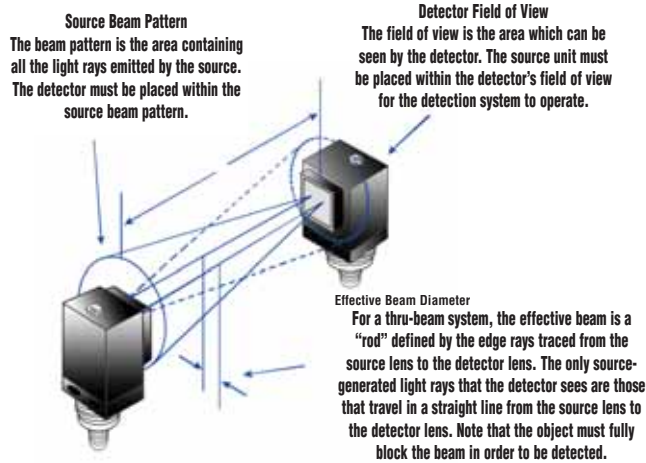
The Enhanced 50 Series Photoelectric Sensors are a great fit for applications such as material handling, packaging, wrapping and sortation.

This family of sensors, with its four basic models (Thru-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.

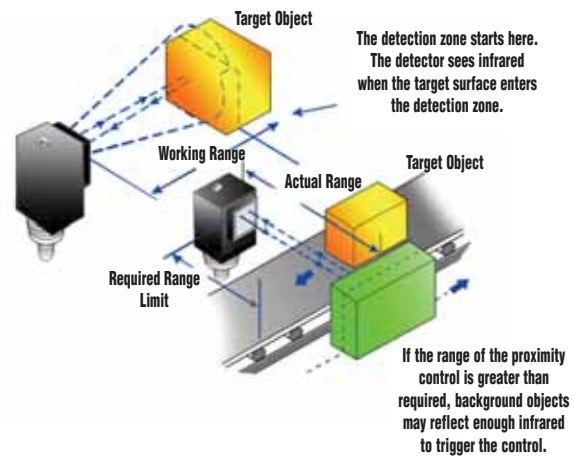
Thru-Beam

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



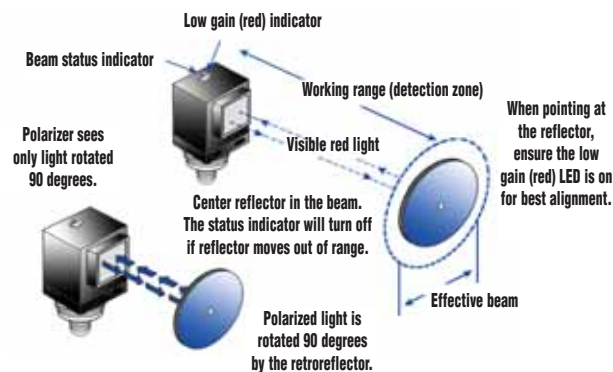
Diffuse

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



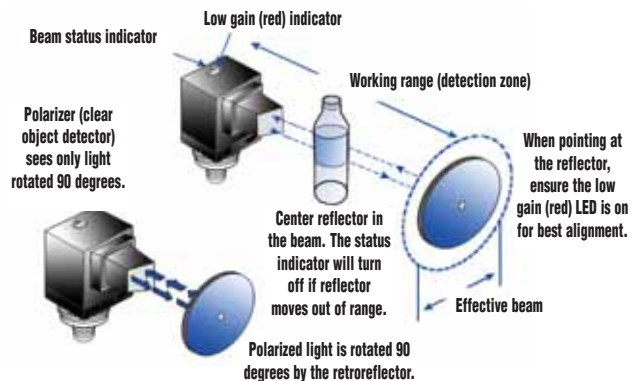
Polarized Reflex

- Lower cost than Thru-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.



Mounting brackets

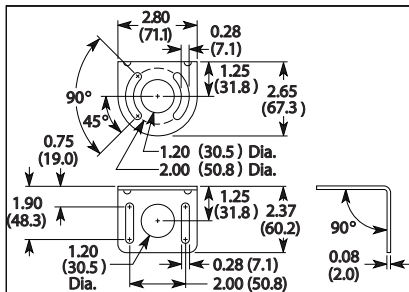
Short, tall or ball-swivel style of mounting brackets are available. All styles allow 360° rotation of the sensor.

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

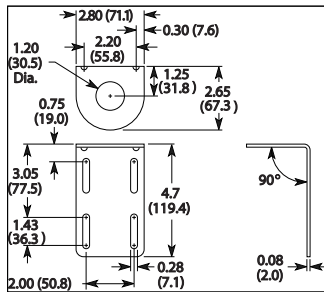
Enhanced 50 Series Accessories Selection Chart		
Part Number	Price	Description
6150E-6501	<--->	Short right angle metal mounting bracket. Allows full 360° rotation of sensor and up to 1.5" of vertical adjustment. Nickel plated.
6150E-6502	<--->	Tall right angle metal mounting bracket. Allows full 360° rotation of sensor, up to 1.5" of vertical adjustment in each slot, and 3.5" overall positioning adjustment
6150E-6503	<--->	Right angle plastic mounting bracket with ball swivel. Allows full 360° rotation of sensor. Ball swivel allows for ±30° sensor angle



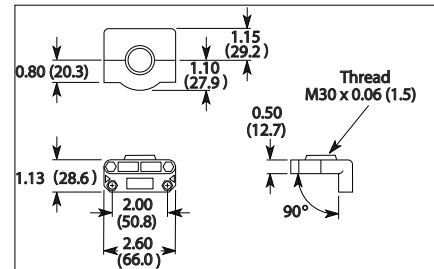
6150E-6501



6150E-6502



6150E-6503



Approximate dimensions in inches (millimeters)

RL series reflectors

- Suitable for use with polarized light photoelectric sensors
- 10 reflectors per package

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 of the environment. 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°.



Specifications	
Model	RL110 ³
Price	<--->
% Sensing Range Using Enhanced 50 Series ¹	100%
Dimensions	Diameter: 84 mm
Degree of Protection ²	IEC IP67
Mounting	one 5 mm dia. hole
Materials	Acrylic/polycarbonate
¹ Refer to individual catalog pages for detailed explanations of these photoelectric sensors. ² Not recommended for applications involving moist air environments or water immersion. ³ All reflective sensors are shipped with an RL110 reflector.	

Enhanced 50 Series Photoelectric Sensors Connector Cables

Enhanced 50 Series Cables Selection Chart				
Part Number	Price	Description	Gauge	Pin-Out Diagram
CSDS4A4CY2202	<--->	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	<--->	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	1-Brown 2-White 3-Blue 4-Black
CSAS4F4CY2202	<--->	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	<--->	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	1-Red/Black 2-Red/White 3-Red 4-Green
CSAS5A5CY2202	<--->	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	<--->	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	1-Brown 2-Blue 3-Gray 4-Black 5-White
CSMS4A4CY1602	<--->	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	<--->	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	1-Black 2-Blue 3-Brown 4-White
CSMS5A5CY1602	<--->	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	<--->	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	1-Black 2-Blue 3-Orange 4-Brown 5-White

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



CSDS4A4CY2205



CSAS4F4CY2205



CSAS5A5CY2202



CSMS4A4CY1602



CSMS5A5CY1602

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	5 mΩ maximum	5 mΩ maximum
Isolation Resistance	1000 MΩ minimum	1000 MΩ minimum
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	

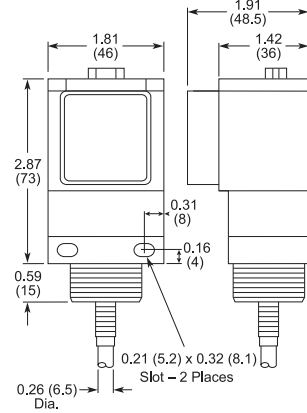
Enhanced 50 Series Photoelectric Sensors Dimensions

Cutler-Hammer

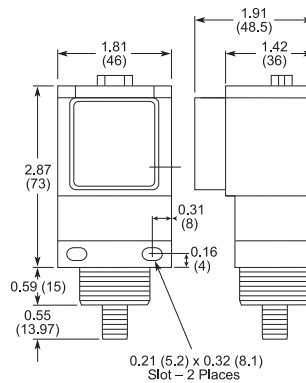
Sensor Dimensions

(inches (mm))

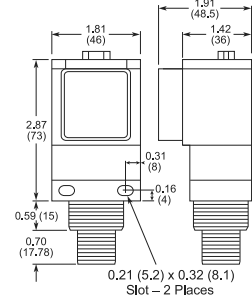
Cable and Pigtail Connector* Version



AC/DC Micro or Euro (Micro) Connector Versions

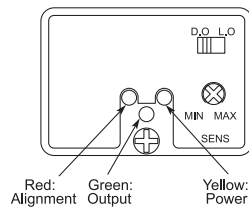


Mini Connector Versions

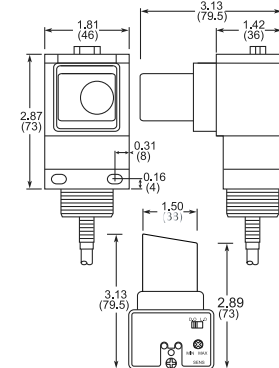


* Pigtail length: 7.5" nominal

Top View



Clear Object Versions (Cable Version Shown)

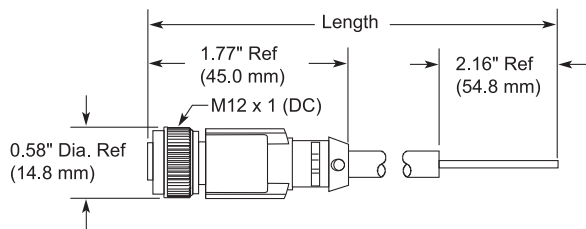


Connector Cables Dimensions

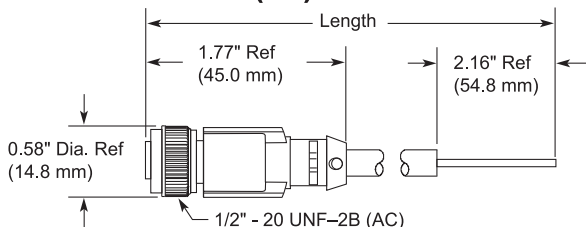
(in/mm)

Micro Style Connector Cables

M12 x 1 (DC) connector cable



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



Mini Style Connector Cables

