

August 2007

**50 Series
Photoelectric Sensors****Contents**

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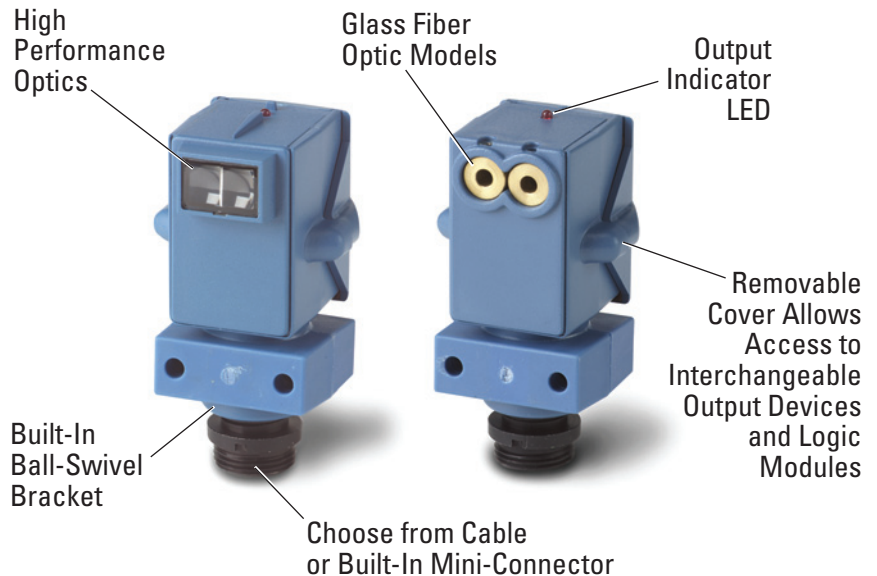
Cutler-Hammer® 50 Series Photoelectric Sensors from Eaton's electrical business offer flexibility, durability and high optical performance in a cost-effective self-contained package. Choose from four output device modules, four logic function modules, five sensing modes and two types of connection to tailor the sensor to exactly meet your needs. A removable sealed cover allows access to the interchangeable modules.

Sensors are available in thru-beam, reflex, polarized reflex, diffuse reflective and fiber optic sensing modes. Each sensor features a built-in swivel bracket for easy mounting and to allow precise adjustment of the sensor alignment.

Approvals

- UL Listed
- CSA Certified



For the most current information on this product, visit our web site: www.EatonElectrical.com

Customize These High Performance Sensors with Interchangeable Outputs and Logic Functions**Product Features**

- High optical performance includes 100-foot (30.5m) thru-beam range and 6-foot (1.8m) diffuse reflective range
- Output options include a 2 Amp SPDT relay
- All units offer light/dark selection
- Logic options include time delay, one-shot and motion detection
- Thru-beam models feature an infrared sensing beam along with a visible red LED behind the lens in the source unit to aid in sensor alignment
- Fiber optic sensors operate in thru-beam or diffuse reflective mode depending on the fiber optic cable selected
- Glass fiber optic cables plug into NEMA 4 rated sockets on the front of the sensor. Sockets are leakproof even when the fiber optic cables are not plugged in
- Fully potted construction for use in areas subject to washdown, high shock and/or vibration
- Choice of pre-wired power cable or built-in mini-connector versions. Standard pre-wired cable length is 6 feet (1.8m)
- Built-in, patented, 360° rotation 10° tilt ball-swivel base

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**.

Model Selection — Sensors

	Voltage Range	Sensing Range ①	Optimum Range ②	Field of View	Thru-Beam Component	Sensing Beam	Connection Type	Catalog Number		
 <p>Source</p> <p>Detector</p> <p>For a complete system, order One Source, One Detector, One Logic Module and One Output Device (Page 5-73)</p> <p>Minimum object size is 0.4 x 0.7 Inches (10 x 18 mm)</p>	115V AC	70 feet (21.3m)	0.1 – 35 feet (0.03 – 11m)	4 inch (102 mm) diameter at 100 inches (2540 mm)	Source	Infrared (with visible red LED to aid alignment)	6-foot Cable	1155A-6511		
					Detector		2-pin Mini-Connector	1155A-6501 ☉		
		100 feet (30.5m)	0.1 – 50 feet (0.03 – 15m)	4 inch (102 mm) diameter at 100 inches (2540 mm)	Source		6-foot Cable	1251B-6511		
					Detector		5-pin Mini-Connector	1251B-6501 ☉☼		
	230V AC	70 feet (21.3m)	0.1 – 35 feet (0.03 – 11m)	4 inch (102 mm) diameter at 100 inches (2540 mm)	Source		Infrared (with visible red LED to aid alignment)	6-foot Cable	1155A-6512	
					Detector			2-pin Mini-Connector	1155A-6502 ☉	
		100 feet (30.5m)	0.1 – 50 feet (0.03 – 15m)	4 inch (102 mm) diameter at 100 inches (2540 mm)	Source			6-foot Cable	1251B-6512	
					Detector			5-pin Mini-Connector	1251B-6502 ☉☼	
	10 – 30V DC	70 feet (21.3m)	0.1 – 35 feet (0.03 – 11m)	4 inch (102 mm) diameter at 100 inches (2540 mm)	Source	Infrared (with visible red LED to aid alignment)		6-foot Cable	1155A-6517	
					Detector			2-pin Mini-Connector	1155A-6507 ☉	
		100 feet (30.5m)	0.1 – 50 feet (0.03 – 15m)	4 inch (102 mm) diameter at 100 inches (2540 mm)	Source			6-foot Cable	1251B-6517	
					Detector			4-pin Mini-Connector	1251B-6507 ☉☼	
 <p>Sensor</p> <p>For a complete system, order Sensor, Retroreflector, One Logic Module and One Output Device (Page 5-73) (See Section 8)</p>	115V AC	30 feet (9.1m)	0 – 15 feet (0 – 4.6m)	2 inch (51 mm) diameter at 100 inches (2540 mm)	—		Infrared	6-foot Cable	1450B-6511	
								5-pin Mini-Connector	1450B-6501 ☉☼	
	230V AC	30 feet (9.1m)	0 – 15 feet (0 – 4.6m)	2 inch (51 mm) diameter at 100 inches (2540 mm)	—			—	6-foot Cable	1450B-6512
									5-pin Mini-Connector	1450B-6502 ☉☼
	10 – 30V DC	30 feet (9.1m)	0 – 15 feet (0 – 4.6m)	2 inch (51 mm) diameter at 100 inches (2540 mm)	—	—		6-foot Cable	1450B-6517	
								4-pin Mini-Connector	1450B-6507 ☉☼	




① Ranges based on 3-inch retroreflector for reflex sensors, 90% reflectance white card for diffuse reflective sensors.

② See Excess Gain graphs on Page 5-72.

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

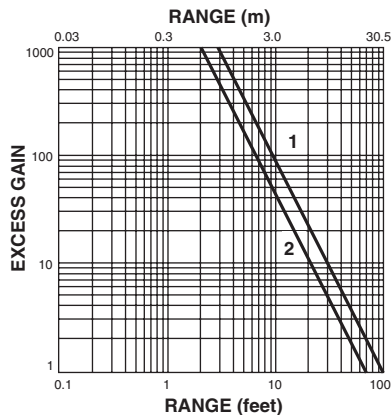
☉☼☼ See listing of compatible connector cables on Page 5-72.

Model Selection — Sensors (Continued)

	Operating Voltage	Sensing Range ^①	Optimum Range ^②	Field of View	Sensing Beam	Connection Type	Catalog Number	
 <p>Retroreflector (Not Included)</p> <p>Sensor</p> <p>For a complete system, order Sensor, Retroreflector, One Logic Module and One Output Device (Page 5-73) (See Section 8)</p>	115V AC	15 feet (4.6m)	0.5 – 6 feet (0.2 – 1.8m)	2 inch (51 mm) diameter at 100 inches (2540 mm)	Visible Red	6-foot Cable	1451B-6511	
						5-pin Mini-Connector	1451B-6501 ☼	
	230V AC	15 feet (4.6m)	0.5 – 6 feet (0.2 – 1.8m)	2 inch (51 mm) diameter at 100 inches (2540 mm)		6-foot Cable	1451B-6512	
						5-pin Mini-Connector	1451B-6502 ☼	
	10 – 30V DC	15 feet (4.6m)	0.5 – 6 feet (0.2 – 1.8m)	2 inch (51 mm) diameter at 100 inches (2540 mm)		6-foot Cable	1451B-6517	
						4-pin Mini-Connector	1451B-6507 ☼	
 <p>For a complete system, order One Logic Module and One Output Device (See Page 5-73)</p>	115V AC	10 inches (254 mm)	0.25 – 5 inches (6 – 127 mm)	1 inch (25 mm) diameter at 10 inches (254 mm)	Infrared	6-foot Cable	1350B-6511	
							5-pin Mini-Connector	1350B-6501 ☼
		24 inches (610 mm)	1 – 8 inches (25 – 203 mm)	1 inch (25 mm) diameter at 10 inches (254 mm)		6-foot Cable	1351B-6511	
						5-pin Mini-Connector	1351B-6501 ☼	
	72 inches (1828 mm)	1 – 36 inches (25 – 914 mm)	5.5 inch (140 mm) diameter at 24 inches (610 mm)	6-foot Cable		1352B-6511		
						5-pin Mini-Connector	1352B-6501 ☼	
	230V AC	10 inches (254 mm)	0.25 – 5 inches (6 – 127 mm)	1 inch (25 mm) diameter at 10 inches (254 mm)		6-foot Cable	1350B-6512	
						5-pin Mini-Connector	1350B-6502 ☼	
		24 inches (610 mm)	1 – 8 inches (25 – 203 mm)	1 inch (25 mm) diameter at 10 inches (254 mm)		6-foot Cable	1351B-6512	
						5-pin Mini-Connector	1351B-6502 ☼	
	10 – 30V DC	10 inches (254 mm)	0.25 – 5 inches (6 – 127 mm)	1 inch (25 mm) diameter at 10 inches (254 mm)		6-foot Cable	1350B-6517	
						4-pin Mini-Connector	1350B-6507 ☼	
24 inches (610 mm)		1 – 8 inches (25 – 203 mm)	1 inch (25 mm) diameter at 10 inches (254 mm)	6-foot Cable	1351B-6517			
				4-pin Mini-Connector	1351B-6507 ☼			
72 inches (1828 mm)	1 – 36 inches (25 – 914 mm)	5.5 inch (140 mm) diameter at 24 inches (610 mm)	6-foot Cable	1352B-6517				
				4-pin Mini-Connector	1352B-6507 ☼			
 <p>Glass Fiber Optic Cables Not Included (See Section 9)</p> <p>For a complete system, order One Logic Module and One Output Device (See Page 5-73)</p>	115V AC	④	—	Depends on Fiber Selected	Infrared	6-foot Cable	1550B-6511	
						5-pin Mini-Connector	1550B-6501 ☼	
	230V AC	④	—	Depends on Fiber Selected		6-foot Cable	1550B-6512	
						5-pin Mini-Connector	1550B-6502 ☼	
	10 – 30V DC	④	—	Depends on Fiber Selected		6-foot Cable	1550B-6517	
						4-pin Mini-Connector	1550B-6507 ☼	

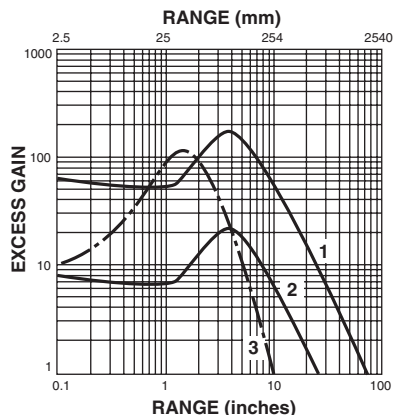
① Ranges based on 3-inch retroreflector for reflex sensors, 90% reflectance white card for diffuse reflective sensors.
 ② See Excess Gain graphs on Page 5-72.
 ③ Polarized sensors may not operate with retroreflective tape. Test selected tape before installation.
 ④ Ranges using standard 0.125-inch diameter fiber optic cable: Thru-beam mode — 12 inches (305 mm); Diffuse reflective mode — 2.25 inches (57 mm).
 ☼ Fast turn product with typical one business day lead-time to shipment.
 ☼☼ See listing of compatible connector cables on Page 5-72.

Excess Gain



Thru-Beam

- 1. 1250B detectors using 1155A sources
- 2. 1251B detectors using 1155A sources



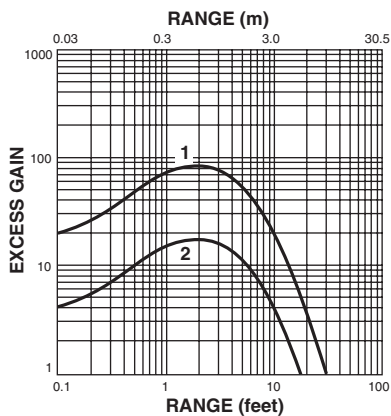
Diffuse Reflective

(90% reflective white card)

- 1. 1352B
- 2. 1351B
- 3. 1350B

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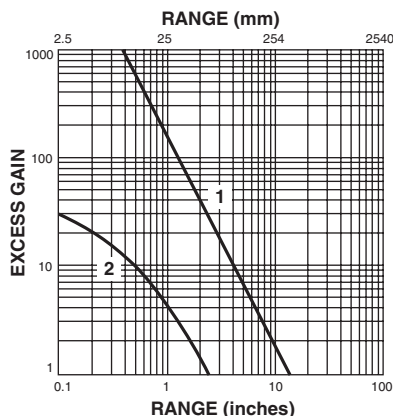
PHOTOELECTRIC SENSORS



Reflex

(3-inch diameter retroreflector)





- 1. 1450B
- 2. 1451B



Fiber Optic (standard 0.125-inch diameter fiber optic cable shown)

- 1. Thru-beam mode
- 2. Diffuse reflective mode (90% reflective white card)

Model Selection — Compatible Connector Cables ①




	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	—	2-pin	16 AWG	6 feet (2m)	CSMS2D2CY1602	 1-White 2-Black
	—	4-pin	16 AWG	6 feet (2m)	CSMS4F4CY1602	 1-Black 2-White 3-Red 4-Green
	—	5-pin	16 AWG	6 feet (2m)	CSMS5D5CY1602	 1-White 2-Red 3-Green 4-Orange 5-Black

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

■ Stocked product, typical order quantities guaranteed in stock.


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Model Selection — Output Devices (One required for each sensor except thru-beam source) ①





Description	Sensors Used With	Load Switching	Output Type	Output Rating	OFF-State Leakage	ON-State Voltage Drop	Catalog Number
 Plug-In Relay (May be wired in series or parallel with other switches)	115 or 230V AC sensors	AC or DC loads. For loads under 40 mA use solid-state switch below	SPDT	2A at 115V AC resistive load	—	—	8532B-6501
 Solid-State Switch (May be wired in series or parallel with other switches)	115V AC sensors	AC or DC loads	SPST VMOS solid-state relay	68 mA max. resistive load, AC or DC	50 µA max.	4V max.	8562B-6501
	115 or 230V AC sensors	AC loads only	SPST isolated output, triac solid-state relay	50 mA max. resistive load, AC only	200 µA max.	3V max.	8563A-6501
 Sink/Source/TTL	DC sensors	DC loads only	Open collector transistor ②	0.25A max. resistive or inductive	10 µA max. at 30V DC	Less than 1V at rated load	8587A-6501


① Plug-in relay has a life expectancy of 200,000 operations at rated load — all other output devices have unlimited life expectancy when used within rated load limits.

② Sink (NPN) SPST switch to DC common — provides dry contact and NPN open collector output. Source (PNP) SPST to positive DC power supply.

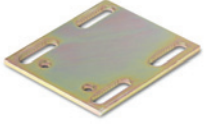
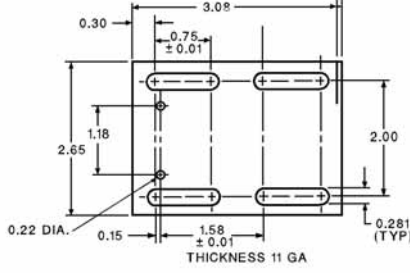

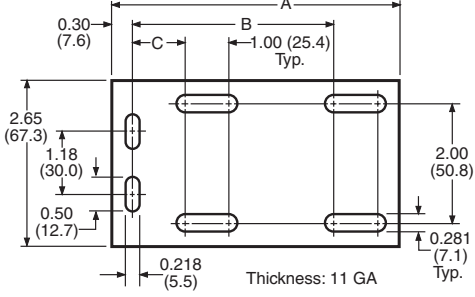

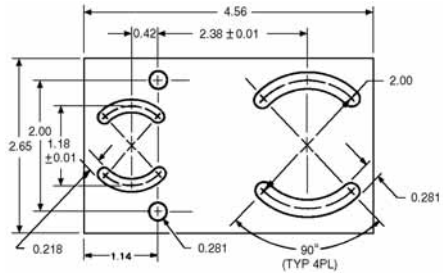
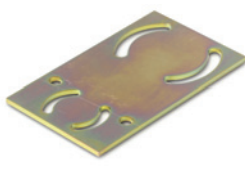
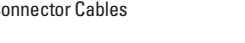

 Fast turn product with typical one business day lead-time to shipment.

Model Selection — Logic Modules (One required for each sensor except thru-beam source)

Description	Operation	Operating Mode(s) (Switch Selectable)	Ranges	Catalog Number
 Light/Dark	Provides selection of light or dark operation. Use this module only when no other logic function is required, as all four models shown here have a light/dark select switch.	Light Operate Dark Operate	—	8250B-6501
 Time Delay	Delays state changes of the sensor output signal by a user-adjustable time period.	On and Off Delay Light Operate Dark Operate	0.001 to 0.25 seconds 0.005 to 2.5 seconds 0.05 to 25 seconds	8251B-6501
 One-Shot	Produces a pulse when triggered length of pulse is user-adjustable. Triggering on leading or trailing edge of target is switch selectable.	Standard One-Shot Retriggerable One-Shot Delayed One-Shot On-Delay One-Shot Light Operate Dark Operate	0.005 to 0.050 seconds 0.040 to 0.40 seconds 0.32 to 3.2 seconds 2.5 to 25 seconds	8252A-6501
 Motion Detection	Performs same function as a speed switch. Triggering on leading or trailing edge of target is switch selectable.	Underspeed Overspeed Under/Overspeed Light Operate Dark Operate	1200 to 12,000 CPM 150 to 1500 CPM 19 to 180 CPM 2.4 to 23 CPM	8253A-6501

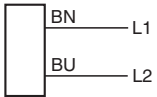
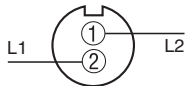
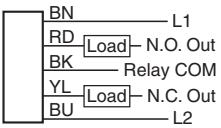
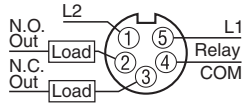
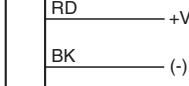
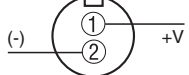
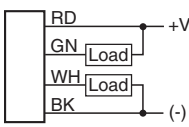
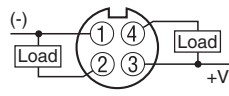
 Fast turn product with typical one business day lead-time to shipment.

Model Selection — Accessories

	Description	Catalog Number	Approximate Dimensions in Inches (mm) Except Where Noted															
	Allows 50 Series sensor to replace Photoswitch® 5000 Series terminal base and 60-1785 normal duty bracket	6150A-6502																
	Allows 50 Series sensor to replace Photoswitch® 5000 Series cable base and 60-1785 normal duty bracket	6150A-6503	 <table border="1" data-bbox="998 976 1323 1155"> <thead> <tr> <th rowspan="2">Catalog Number</th> <th colspan="3">Dimensions in Inches (mm)</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>6150A-6503</td> <td>4.45 (113.0)</td> <td>2.83 (71.9)</td> <td>1.09 (27.7)</td> </tr> <tr> <td>6150A-6504</td> <td>5.64 (143.3)</td> <td>4.04 (102.6)</td> <td>2.15 (54.6)</td> </tr> </tbody> </table>	Catalog Number	Dimensions in Inches (mm)			A	B	C	6150A-6503	4.45 (113.0)	2.83 (71.9)	1.09 (27.7)	6150A-6504	5.64 (143.3)	4.04 (102.6)	2.15 (54.6)
Catalog Number	Dimensions in Inches (mm)																	
	A	B	C															
6150A-6503	4.45 (113.0)	2.83 (71.9)	1.09 (27.7)															
6150A-6504	5.64 (143.3)	4.04 (102.6)	2.15 (54.6)															
	Allows 50 Series sensor to replace Photoswitch® 4000 Series self-contained models and 60-1749 bracket	6150A-6504	<p>NOTE: Dimensions in Inches</p> 															
	Retroreflectors and retroreflective tape	See Section 8																
	For use with connector version sensors	See Section 10																
	Lens protector kit. Clear glass cover fits snugly over the sensor lens to protect it from damage. Ideal for environments in which damage to the lens is likely. Not recommended for use with diffuse reflective sensors.	1450B-7501																

■ Stocked product, typical order quantities guaranteed in stock.

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)
115V AC or 230V AC	Thru-Beam Source		
	All others		
10 – 30V DC	Thru-Beam Source		
	All others		

Specifications

	115V AC Models	230V AC Models	10 – 30V DC Models
Input Voltage	90 – 132V AC, 60 Hz 100 – 132V AC, 50 Hz	180 – 264V AC, 60 Hz 200 – 264V AC, 50 Hz	10 – 30V DC, 35 mA
Power Dissipation	2W		1W
Light/Dark Operation	Switch selection on logic module		
Operating Temperature	Thru-Beam: -22° to +158°F (-30° to +70°C) All Others: -40° to +158°F (-40° to +70°C)		
Humidity	95% relative humidity, non-condensing		
Case Material	Noryl® (avoid exposing to chlorinated, halogenated or aromatic hydrocarbons)		
Lens Material	Nylon		
Vibration	15g or 0.06-inch displacement, whichever is less, over 10 Hz to 2 kHz (when using 8532B relay — 0.04-inch displacement between 10 – 55 Hz)		
Shock	40g for 10 mS and 500g for 2 mS, 1/2 sine wave pulse		
Sensitivity Adjustment	20:1 Ratio		
Enclosure Ratings	NEMA 1, 3, 4, 12 and 13 ①		
Sunlight Immunity	100 foot Thru-Beam models: 6,000 foot-candles All other models: 10,000 foot-candles		
Output	See output device specifications		

Sensor Type	Output Device Installed	Response Time	
		Dark-to-Light	Light-to-Dark
AC Thru-Beam Models	8532B	12 mS	18 mS
	8562B	5 mS	11 mS
	8563A	10 mS	16 mS
All Other AC Models	8532B	12 mS	12 mS
	8562B	5 mS	5 mS
	8563A	10 mS	10 mS
DC Thru-Beam Models	8587A	2 mS	8 mS
All Other DC Models	8587A	2 mS	2 mS

① NOTE: Our products conform to NEMA tests as indicated, however, some severe washdown applications can exceed these NEMA test specifications. If you have questions about a specific application, contact Eaton's Cutler-Hammer Sensor Applications Department at 1-800-426-9184.

Approximate Dimensions in Inches (mm)

Sensors

