

August 2007

**20 Series
Photoelectric Sensors**

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For years, the Cutler-Hammer® 20 Series has set industry standards for rugged construction and long range optical performance. These heavy-duty sensors from Eaton’s electrical business are designed for use in harsh environments with constant exposure to weather and physical abuse. Large optics provide exceptional sensing ranges including 700 feet (213m) for thru-beam, 75 feet (23m) for reflex and 8 feet (2.4m) for diffuse reflective. Optional logic modules provide integral control functions like time delays, one-shot outputs and stopped motion detection. A totalizer module and LED display cover are available to count passing targets. Choose from a variety of output devices including a 10 amp DPDT relay. All modules are completely enclosed within the rugged aluminum enclosure for protection.

Approvals

- UL Listed
- CSA Certified



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

Extremely Rugged Construction, Long Sensing Ranges and High Current Switching




Product Features

- Robust optical performance for reliable sensing in dirty environments
- Rugged construction stands up to physical abuse and exposure to the elements
- Optional interchangeable modules add logic functions
- A variety of interchangeable output devices allows you to customize the sensor to your control system
- DPDT relay outputs provide high current handling; electronic outputs provide long life
- All units operate from AC power

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 ^①


	Sensing Mode	Sensing Range	Input Power		Field of View	Response Time (maximum)		Sensitivity Adjustment	Catalog Number
						Dark-to-Light	Light-to-Dark		
	Thru-Beam with Time Delay ^②	Low mode: 200 feet (61m) High mode: 700 feet (213m) (Range is switch selectable)	95 – 130 V _{RMS} 50/60 Hz	10 VA maximum	1° full conical	10 mS for 200 foot range 30 mS for 700 foot range	10 mS	10:1 ratio	Source: 1141D-6501 Detector: 1241D-6501
	Reflex (includes a 3 inch/76 mm diameter Retroreflector)	35 feet (11m) ^③	100 – 125V AC, 50/60 Hz	5 VA maximum	4 inch (101 mm) diameter at 100 inches (2.5m)	1 mS	8 mS	None	1410B-6501
		75 feet (23m) ^③	200 – 250V AC, 50/60 Hz	5 VA maximum	4 inch (101 mm) diameter at 100 inches (2.5m)	1 mS	8 mS	None	1410B-6502
	Diffuse Reflective	8 feet (2.4m) ^④	95 – 130V _{RMS} 50/60 Hz	13 VA maximum	8 inch (203 mm) diameter at 8 feet (2.4m)	6.5 mS	4.5 mS	20:1 ratio	1320B-6501
	Defined-Range Diffuse Reflective	1 – 15 inches (25 – 381 mm) ^④	95 – 130V _{RMS} 50/60 Hz	13 VA maximum	1 inch (25 mm) diameter at 10 inches (254 mm)	6.5 mS	4.5 mS	20:1 ratio	1321B-6501

^① A complete system consists of a sensor plus an output device (Page 3), and may include a logic module (Page 4).

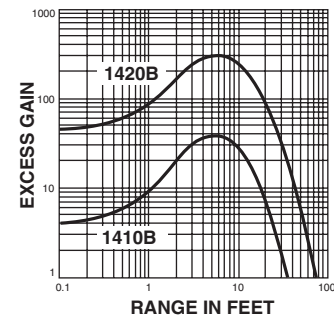
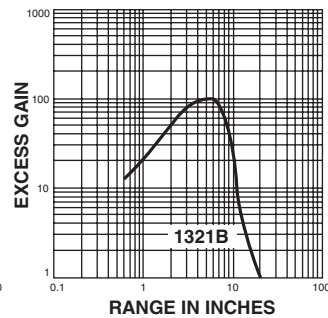
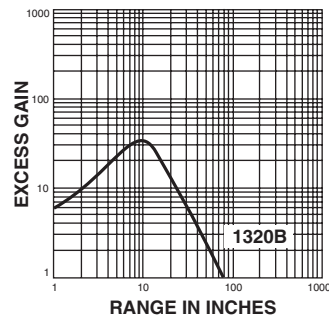
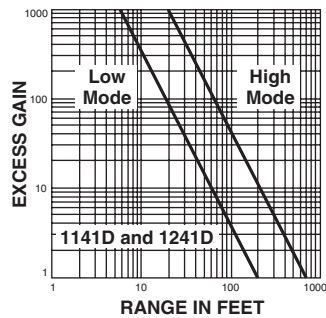
^② Detector includes a built-in time delay with selector for no delay, ON-delay, OFF-delay, or both ON- and OFF-delay. Timing range is 0.2 to 5 seconds. Effective beam diameter of sensor is 0.88 inch (23 mm).

^③ Range based on supplied 3 inch retroreflector.

^④ Range based on a 90% reflectance white card.



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

Excess Gain



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Model Selection — Output Devices (One required for sensor operation)

	Description	Input		Output				Catalog Number	
		Operating Voltage	Current	Type	ON-State Current	OFF-State Leakage	ON-State V Drop		One Cycle Surge A
Output Devices for 1410B and 1241D Sensors 	DPDT Relay For low frequency general purpose switching of control power loads	Power supplied by control unit	—	DPDT	Contact Ratings: AC Load: 5A at 115V AC or 230V AC DC Load: 5A at 30V DC Contact Life: 100,000 operations at rated load				8526A-6501
	Isolated Triac For high rate switching of resistive or inductive AC loads	Power supplied by control unit	—	SPST Normally open triac	2 A _{RMS} continuous	5 mA at 100V AC	1.7 V _{RMS} or less	20A peak	8570A-6501
	Triac, PC Compatible Optically isolated solid-state relay for switching non-capacitive AC loads. Response is 100,000 operations/hour	Power supplied by control unit	—	SPST Normally open triac	5 – 500 mA _{RMS} at 70°C	1.5 mA at 120V AC	1.7V maximum	6A peak	8574A-6501
	Optical Isolator Driver Drives a user supplied remote optical isolator for a solid-state interface. Isolator can then be used to switch DTL, TTL, CMOS, etc.	Power supplied by control unit	—	PNP output drive to a remote optical isolator	20 mA	—	—	—	8580A-6501
	Isolated NPN Transistor Optically isolated NPN SPST transistor switch	Power supplied by control unit	—	Optically isolated NPN transistor switch	20 mA at V _{SAT} less than 0.2V	0.01 mA maximum at 30V DC	—	—	8582A-6501
Output Devices for 1420B, 1320B and 1321B Sensors 	DPDT Relay Plug-in industrial control relay	12V DC nominal. Power supplied by control unit	75 mA at 75°F 12V DC	DPDT	Contact Ratings: Resistive Load: 10A, 1/4 hp maximum at 110/220V AC, 10A maximum at 28V DC Inductive Load: 7A maximum at 110/220V AC, 7A maximum at 28V DC Contact Life: 500,000 operations at rated load				8530A-6501
	Isolated Triac Optically isolated, solid-state relay for switching non-capacitive AC loads. Response is 100,000 operations/hour	3 – 20V DC Power supplied by control unit	—	SPST Normally open triac	2 A _{RMS} at 25°C, 1 A _{RMS} at 65°C	5 mA at 100V AC, 9 mA at 200V	1.7 V _{RMS} or less	60A peak	8572A-6501
	Triac, PC Compatible Optically isolated, solid-state relay for switching non-capacitive AC loads. Response is 100,000 operations/hour	8 – 20V DC Power supplied by control unit	9.5 – 20 mA	SPST Normally open triac	5 – 500 mA _{RMS} at 70°C	1.5 mA at 120V AC	1.7V maximum	6A peak	8573A-6501
	Isolated NPN Transistor Optically isolated, NPN SPST transistor switch	12V DC nominal	20 mA typical	Optically isolated NPN transistor switch	20 mA at V _{SAT} less than 0.2V, 500 mA at V _{SAT} less than 1V ^①	10 μA maximum at 30V DC ^②	—	—	8586A-6501

① For 3-wire connection. For 2-wire connection, 100 mA at V_{SAT} less than 1.2V.


② For 3-wire connection. For 2-wire connection, 0.1 μA maximum at 30V DC.

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

 Stocked product, typical order quantities guaranteed in stock.
Specifications — Output Devices

	DPDT Relays		Triacs		Others
	8526A-6501	8530A-6501	Isolated	PC Compatible	
Operating Temperature	-40° to 140°F (-40 to 60°C)	-4° to 131°F (-20° to 55°C)	-4° to 149°F (-20° to 65°C)	-4° to 149°F (-20° to 65°C)	-4° to 149°F (-20° to 65°C)
Response Time Off-to-On (pull-in) On-to-Off (drop-out)	15 mS	25 mS maximum	1 mS maximum		Instantaneous
	5 mS	25 mS maximum	1/2 cycle of line voltage		Instantaneous
Pull-In Voltage	8 – 9.6V	8 – 9.6V	3V minimum	8 – 20V	—
Drop-Out Voltage	1.2 – 2V	1.2 – 2V	0.8V maximum	—	—


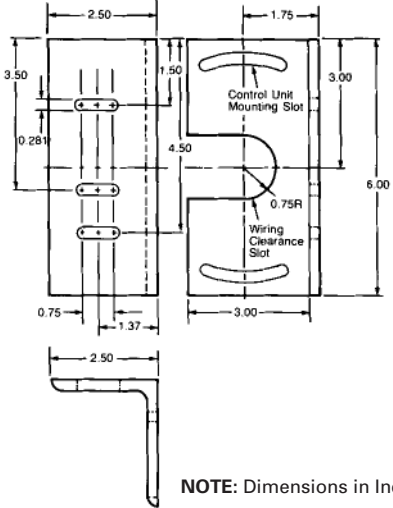

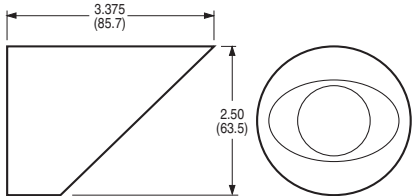
Model Selection — Logic Modules (Optional, not required for sensor operation)

	Description	Selectable Ranges	For Use with These Sensors	Catalog Number
Logic Modules (Modules mount to circuit board within sensor enclosure) 	Time Delay ON and OFF time delays from 0.01 to 35 seconds. Independent adjustment of ON-delay and OFF-delay.	Timing Ranges: ① 0.01 to 0.2 seconds 0.1 to 2.0 seconds 1.0 to 15.0 seconds 2.0 to 35.0 seconds	1320B, 1321B, 1410B and 1420B	8212B-6501
	One-Shot Produces a pulse of preset time when triggered. Switch-select to trigger on leading or trailing edge of object.	Pulse Width: ① 0.02 to 0.5 seconds 0.3 to 2.0 seconds 1.0 to 18.0 seconds 10.0 to 30.0 seconds	1320B, 1321B, 1410B and 1420B	8213B-6501
	Stopped Motion Retriggerable one-shot. Start-up delay adjusts from 0.1 to 11 seconds to allow machine to come up to speed. Control can be reset from remote location.	Retrigger Interval: ① 30 to 430 RPM 430 to 5,000 RPM	1320B, 1321B, 1410B and 1420B	8216A-6501

① Once range is selected, exact value is adjusted via potentiometer.

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Model Selection — Accessories

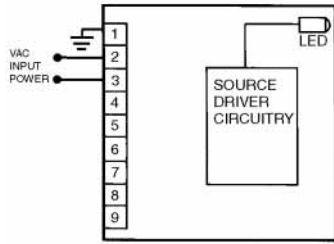
	Description	Catalog Number	Approximate Dimensions in Inches (mm) Except Where Noted
Mount 	Swivel Mounting Bracket, zinc plated steel	6140A-6501	 <p>NOTE: Dimensions in Inches</p>
Retroreflectors	Retroreflectors and retroreflective tape	See PG.05E.17.T.E	
Replacement Lens 	Replacement Lens Kit for Catalog Numbers 1320B, 1321B, 1410B and 1420B	1320B-7501	
Protective Lens Cover 	Lens Attachment for Catalog Numbers 1141D and 1241D thru-beam source and detector — attaches to lens barrel and provides a 45° thick flush window that prevents dirt build-up on the lens	6110A-6501	

■ Stocked product, typical order quantities guaranteed in stock.

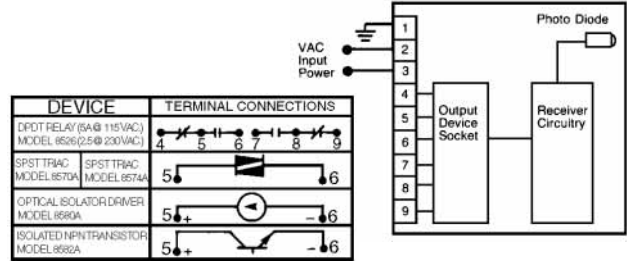
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Wiring Diagrams

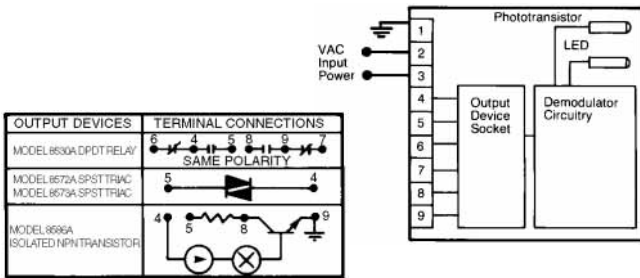
1141D-6501



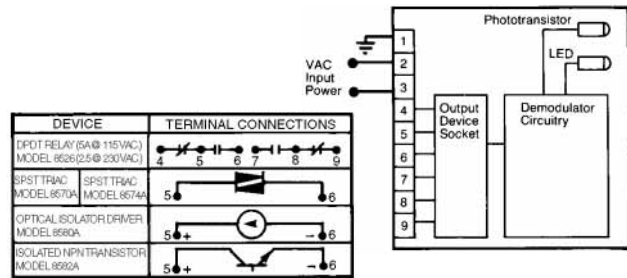
1241D-6501



1320B-6501, 1321B-6501 and 1420B-6501



1410B-6501 and 1410B-6502



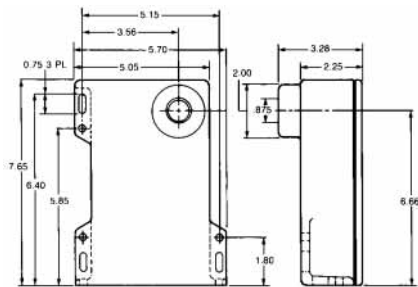
Specifications

Description	Specification
Power-On Condition	No false pulse
Temperature Range	Operating: -4° to 131°F (-20° to 55°C); Storage: -40° to 185°F (-40° to 85°C)
Material of Construction	Case: Cast aluminum; Lens: Thru-Beam — Glass, All Others — Polycarbonate
Enclosure Ratings	NEMA 3, 4, 6, 12 and 13 ①
Sunlight Immunity	10,000 foot-candles
Humidity	95% RH, non-condensing
Vibration	10g or 0.06 inch displacement, whichever is less, over 10 Hz to 1 kHz
Shock	15g minimum for 1 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

1141D-6501 and 1241D-6501



1320B-6501, 1321B-6501, 1410B-6501,
1410B-6502 and 1420B-6501

