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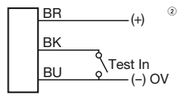
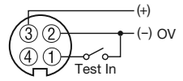
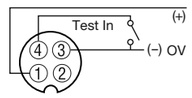
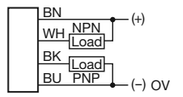
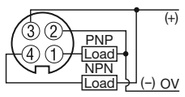
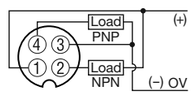
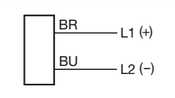
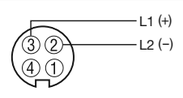
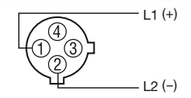
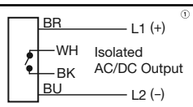
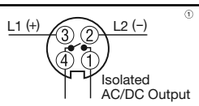
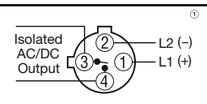
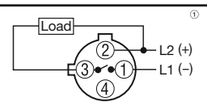
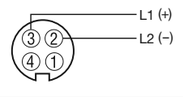
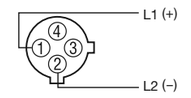
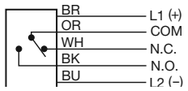
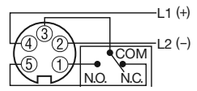
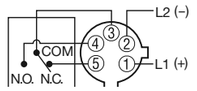
WIRING DIAGRAMS (Pin numbers are for reference only; rely on pin location when wiring)

Operating Voltage	Models	Cable Models	Mini-Connector Models (Face View Male Shown)	Micro-Connector Models (Face View Male Shown)
10-40V DC	Thru-Beam Emitters			
	Thru-Beam Receivers			
12-240V DC or 24-240V AC with Solid-State Relay	Thru-Beam Emitters			
	Thru-Beam Receivers with Isolated AC/DC Output			
	Thru-Beam Receivers with Non-Isolated AC/DC Output			
12-240V DC or 24-240V AC with SPDT EM Relay	Thru-Beam Emitters			
	Thru-Beam Receivers			

[1] Connect load to the appropriate outlet for either sinking or sourcing operation.
[2] Connecting the test input to 0V DC allows you to switch the light source off for troubleshooting while leaving the sensor under power.
[3] Over current protection is to be provided in the field. Conductor size for 20 AWG: 5 amp; 22 AWG: 3 amp; 24 AWG: 2 amp.

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INSTRUCTION MANUAL: ENHANCED 50 SERIES PHOTOELECTRIC SENSORS THRU-BEAM

MODELS COVERED IN THIS MANUAL

AC/DC Models									
		6-Foot Cable		Integral Micro Quick Disconnect		Integral Mini Quick Disconnect		Pigtail Micro Quick Disconnect	
Style	Output Type	No Time Delay	With Time Delay	No Time Delay	With Time Delay	No Time Delay	With Time Delay	No Time Delay	With Time Delay
200-Foot Thru-Beam Source (Emitter)	N/A	1150E-6513	N/A	1150E-6543	N/A	1150E-6504	N/A	1150E-6534	N/A
200-Foot Thru-Beam Detector (Receiver)	Solid-State Relay	1250E-6513	1250E-8513	1250E-6543*	1250E-8543*	1250E-6503	1250E-8503	1250E-6533	1250E-8533
	Electromechanical Relay	1250E-6514	1250E-8514	N/A	N/A	1250E-6504	1250E-8504	1250E-6534	1250E-8534
500-Foot Thru-Beam Source (Emitter)	N/A	1151E-6513	N/A	1151E-6543	N/A	1151E-6504	N/A	1151E-6534	N/A
500-Foot Thru-Beam Detector (Receiver)	Solid-State Relay	1251E-6513	1251E-8513	1251E-6543*	1251E-8543*	1251E-6503	1251E-8503	1251E-6533	1251E-8533
	Electromechanical Relay	1251E-6514	1251E-8514	N/A	N/A	1251E-6504	1251E-8504	1251E-6534	1251E-8534
DC Models									
		6-Foot Cable		Integral Euro (Micro) Quick Disconnect		Integral Mini Quick Disconnect		Pigtail Euro (Micro) Quick Disconnect	
Style Emitter LED	Output Type	No Time Delay	With Time Delay	No Time Delay	With Time Delay	No Time Delay	With Time Delay	No Time Delay	With Time Delay
200-Foot Thru-Beam Source (Emitter)	N/A	1150E-6517	N/A	1150E-6547	N/A	1150E-6507	N/A	1150E-6537	N/A
200-Foot Thru-Beam Detector (Receiver)	NPN/PNP	1250E-6517	1250E-8517	1250E-6547	1250E-8547	1250E-6507	1250E-8507	1250E-6537	1250E-8537
500-Foot Thru-Beam Source (Emitter)	N/A	1151E-6517	N/A	1151E-6547	N/A	1151E-6507	N/A	1151E-6537	N/A
500-Foot Thru-Beam Detector (Receiver)	NPN/PNP	1251E-6517	1251E-8517	1251E-6547	1251E-8547	1251E-6507	1251E-8507	1251E-6537	1251E-8537

* Versions of these sensors are available with a non-isolated output. Non-isolated output models end in -45, ex. 1350E-6545. For more information, consult wiring diagrams on Page 4.

⚠ WARNING

THESE PRODUCTS ARE NOT DESIGNED, TESTED, OR RECOMMENDED FOR USE IN HUMAN SAFETY APPLICATIONS.

DURING INSTALLATION, CORRECT POWER CONNECTIONS MUST BE MADE FIRST TO ENSURE FAIL-SAFE SHORT CIRCUIT PROTECTION OF THE OUTPUTS. REFER TO THE WIRING DIAGRAMS IN THIS MANUAL.

DO NOT USE TOOLS TO APPLY TORQUE DIRECTLY TO SENSOR BODY. ALIGN SENSOR BY HAND BEFORE TIGHTENING MOUNTING HARDWARE.

ADJUSTMENT POTS ARE 3/4 TURN DEVICES. ANY RESISTANCE ENCOUNTERED WHILE ADJUSTING THESE POTS INDICATES YOU HAVE REACHED THE ADJUSTMENT LIMIT STOP. TURNING PAST THIS STOP WILL DAMAGE THE SENSOR.

USE ONLY THE ADJUSTMENT TOOL PROVIDED OR SUITABLE SCREWDRIVER WHEN TURNING ADJUSTMENT POTS OR SETTING SWITCH POSITIONS. SHARP OBJECTS CAN DAMAGE THE SENSOR AND RESULT IN ELECTRICAL SHOCK.

ENSURE THE PRODUCT IS CONNECTED TO THE CORRECT POWER SUPPLY FOR THE APPLICATION. REFER TO THE WIRING DIAGRAMS IN THIS MANUAL.

AC/DC CONNECTOR VERSION SENSORS ARE EQUIPPED WITH AN AC-TYPE CONNECTOR. THE USE OF DC POWER WITH AC-TYPE CONNECTORS MAY NOT CONFORM WITH ESTABLISHED STANDARDS.

INTRODUCTION

Enhanced 50 Series photoelectric sensors offer flexibility, durability, and high optical performance in a low-cost self-contained package. Each sensor features several mounting options and a low-gain indicator for quick installation and easy alignment. Models are available for operation with DC power, or AC and DC power in a single unit. Sensors are wired using a 6-foot power cable, body-mounted quick disconnect mini connector, body mounted quick disconnect micro (AC/DC Micro or Euro (Micro)) connector, or quick disconnect micro (AC/DC Micro or Euro (Micro)) connector on a short cable pigtail. All sensors have built-in light/dark selection, and modes are available with timing features that include on-delay, off-delay, and one-shot delay.

An Enhanced 50 thru-beam photoelectric sensor installation consists of an emitter and a receiver positioned on opposite sides of a detection zone. The emitter emits infrared light, which is detected by the receiver. The receiver output switches on when this beam of light is either blocked (when set in dark operate mode) or completed (in light operate mode).

A complete system consists of an emitter and receiver mounted such that the emitter directs its light beam at the receiver and the receiver is aimed to detect the beam. The emitter and receiver can be separated by up to 61 meters (200 feet) using standard range models and 152 meters (500 feet) using extended range models.

MOUNTING

The Enhanced 50 Series sensor features a 30 mm threaded base housing and includes jam nut and washer. This allows mounting into any 1.25 inch hole. Use caution to avoid cross-threading the jam nut on the sensor body.

A second mounting method is to use #10 hardware in the mounting holes of the sensor. This is ideal for mounting the Enhanced 50 Series Sensor against a wall, piece of equipment, rail, or mounting bracket.

After mounting, ensure gain adjustment is turned fully clockwise (receiver only). See Warning on Page 1 concerning pot adjustment.

MOUNTING AND SETUP FOR THRU-BEAM MODELS

Mount the emitter and receiver units so they are aimed directly at each other from opposite sides of the target. (The receiver should be on the dirtier side because the light scattering effect of dirt collecting on the lens is less significant if it takes place at the receiver.) Ensure the area of the target to be detected will block the entire effective beam (see illustration to the right). Apply power to both units.

Accurate sensing depends on proper alignment of the emitter and receiver. To begin, the emitter and receiver must be positioned in rough alignment so that emitter light is received by the receiver (check by placing a solid object in front of the emitter beam—the output indicator on the receiver will change state when the object blocks the beam and will change back when the object is removed). If the output indicator does not change state, follow this alignment method:

Move the receiver back and forth in the horizontal axis to find the extreme positions where the output indicator on the receiver goes "OFF" (in dark operate mode) or "ON" (light operate mode). Position the receiver midway between the two extremes. Repeat this procedure for the vertical axis, then tighten the receiver in place. Now repeat the final alignment procedure for the emitter.

The alignment (red) indicator LED on the top of the sensor can aid in setup. Even if the sensor is working properly, it may not be optimally aligned. If this is the case, this red LED will be off, indicating a low gain condition. Repeating the alignment procedure to clear this indication will maximize the long-term reliability of the unit.

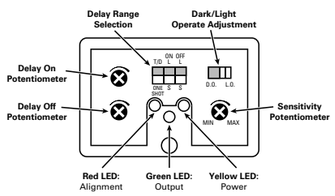
In short range applications, you may need to reduce the sensor sensitivity by turning the gain adjustment counter-clockwise to account for object transparency in the detection zone.

LIGHT OR DARK OPERATE MODES (FOR ALL MODELS)

All sensors are equipped with a light/dark operate selector switch. In Light Operate mode, the sensor output is energized when the sensor "sees" light. For a thru-beam sensor in light operate mode, the output will be energized when an object is not present in the detection zone (as the receiver is "seeing" the light from the emitter). For a thru-beam sensor in dark operate mode, the output will be energized when an object is present in the detection zone. In dark operate mode, the sensor output is energized when the receiver does not "see" light.

SENSORS WITH TIMING FUNCTIONS

Sensors are available with time delay functions as shown in the model table on page one of this installation guide. Sensors with built-in timing capability can be configured in four different modes using the Delay Range switch on top of the sensor. These modes are:



NO DELAY

In this mode, the time delay functionality is disabled and the sensor operates in the same way as would a standard unit. For "No Delay," the Delay Range switch must be selected to "T/D" and both delay potentiometers turned fully CCW.

ON DELAY

In this mode, after an object enters the detection zone the delay timer starts and the sensor output does not switch until the timer has timed out. For "On Delay," the Delay Range switch must be selected to "T/B" and the Delay On potentiometer turned CW to the desired delay time. *See **Note A** for toggling between short and long delays.*

OFF DELAY

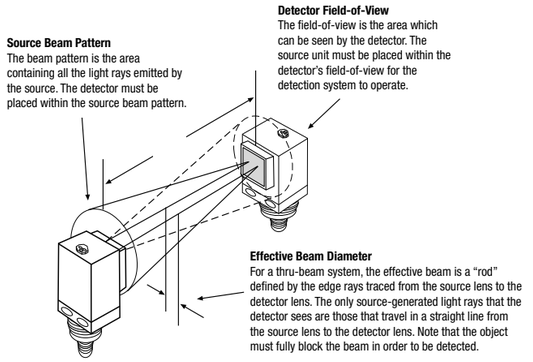
In this mode, when an object exits the detection zone, the delay timer starts and the sensor output does not switch until the timer has timed out. For "Off Delay," the Delay Range switch must be selected to "T/D" and the Delay Off potentiometer turned CW to the desired delay time. *See **Note A** for toggling between short and long delays.*

ONE-SHOT DELAY

In this mode, a change in the state of the light beam will result in a delayed output pulse. The switch labeled "D.O./L.O." determines whether the pulse is initiated by the "light to dark" transition of the light beam of the "dark to light" transition. In the D.O. switch position, the pulse is initiated by the "light to dark" transition, while in the L.O. position the pulse is initiated by the "dark to light" transition.

The Delay On potentiometer adjusts the delay of the time between the initiating transition and when the output pulse actually begins. The Delay Off potentiometer adjusts the duration of the output pulse. *See **Note A** for toggling between short and long delays.*

***Note A:** The positions of the Delay Range switches determine the length of time delay. When put into the "S" position, the respective delay potentiometer works over a short time delay range of 0-1.5 seconds (approximate). When put into the "L" position, the respective delay potentiometer works over a time delay range of 0-15 seconds (approximate).*



OPTICAL PERFORMANCE

All optical specifications are guaranteed to be the minimum performance under clean conditions of any product delivered from stock. Typical performance may be higher.

Dirt in the environment will affect optical performance by reducing the amount of light the control receives. For best results, sensors should be used at distances where excess gain is higher than 1.5 (1.5 times the amount of sensing power required to detect an object under ideal conditions). Higher excess gain will allow the sensor to overcome higher levels of contamination on the lens.

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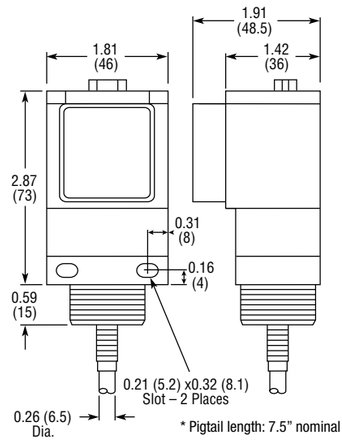
SPECIFICATIONS

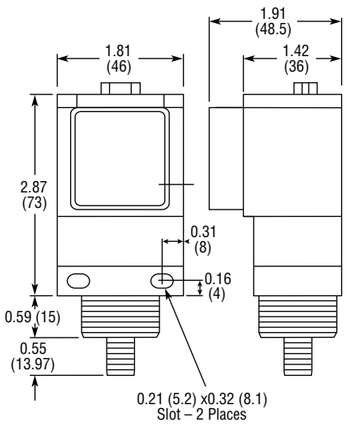
	AC/DC Electromechanical Relay Models	AC/DC Solid-State Relay Models	DC Only Models
Input Voltage	12 - 240V DC 24 - 240V AC	12 - 240V DC 24 - 240V AC	10 - 40V DC
Light/Dark Operation	Switch selectable		
Operating Temperature	-13 to 122ºF (-25 to 50ºC)		
Humidity	95% Relative Humidity; Non-Condensing		
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, Overcurrent Protection and Reverse Polarity Protection		
Enclosure Rating	IP67		
Output Load	3A @ 120V AC 3A @ 240V AC 3A @ 28V AC	300 mA @ 240V AC/DC	250 mA @ 40V DC
Response Time	15 mS	2 mS	
Timer Timing Response	0 - 15 sec.		
No Load Current	<30 mA		
Leakage Current (Maximum)	—	1 mA @ 240V AC	<10 µA
Emitter LED	Infrared 880 nm		
Indicator LEDs	Yellow for Power; Green for Output; Red for Alignment		

DIMENSIONS IN INCHES (MM)

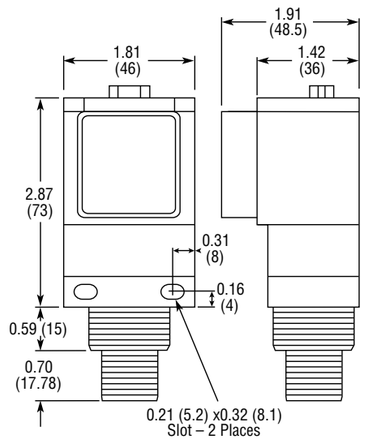
Cable and Pigtail Connector* Versions



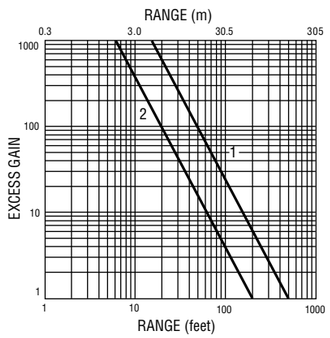
AC/DC Micro or Euro (Micro) Connector Versions



Mini Connector Versions



EXCESS GAIN CURVE



Thru-Beam
1. 1151E/1251E
2. 1150E/1250E