Instruction Manual: Prism™ Series Diffuse Reflective Sensors, OEM Version

Models covered in this manual:		8-Inch Diffuse Reflective Models			
		DC Power with Cable		DC Power with Connector	
Viewing Style:		Light Operate	Dark Operate	Light Operate	Dark Operate
NPN	Forward	*13156ALN17	*13156ADN17	*13156ALN07	*13156ADN07
Output	Right Angle	13156RLN17	13156RDN17	13156RLN07	13156RDN07
PNP	Forward	*13156ALP17	*13156ADP17	*13156ALP07	*13156ADP07
Output	Right Angle	13156RLP17	13156RDP17	13156RLP07	13156RDP07
NPN/PNP	Forward	*13156AL17	*13156AD17	*13156AL07	*13156AD07
Output	Right Angle	13156RL17	13156RD17	13156RL07	13156RD07
		24-Inch Diffuse Reflective Models			
		DC Power with Cable		DC Power with Connector	
Viewing Style:		Light Operate	Dark Operate	Light Operate	Dark Operate
NPN	Forward	*13157ALN17	*13157ADN17	*13157ALN07	*13157ADN07
Output	Right Angle	13157RLN17	13157RDN17	13157RLN07	13157RDN07
PNP	Forward	*13157ALP17	*13157ADP17	*13157ALP07	*13157ADP07
Output	Right Angle	13157RLP17	13157RDP17	13157RLP07	13157RDP07
NPN/PNP	Forward	*13157AL17	*13157AD17	*13157AL07	*13157AD07
Output	Right Angle	13157RL17	13157RD17	13157RL07	13157RD07

*Contact factory for availability on these models.

CAUTION

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

MAXIMUM INPUT VOLTAGE FOR DC OPERATION IS 30 VDC. APPLYING VOLTAGE ABOVE THIS LIMIT WILL RESULT IN DAMAGE TO THE SENSOR.

USE #4 MOUNTING HARDWARE ONLY! LARGER HARDWARE WILL DAMAGE THE SENSOR AND MAY CREATE AN ELECTRICAL SHOCK HAZARD. TIGHTEN THE HARDWARE JUST TO THE SENSOR BODY SO THAT NO DEFLECTION OF THE BODY OCCURS.

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

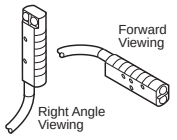
THE GAIN POT IS A 3/4 TURN POT. ANY RESISTANCE ENCOUNTERED WHILE ADJUSTING THIS POT INDICATES YOU HAVE REACHED THE ADJUSTMENT LIMIT STOP. TURNING PAST THIS STOP WILL DAMAGE THE SENSOR.

SHORT CIRCUIT PROTECTION WILL AUTOMATICALLY RESET ONCE SHORT IS REMOVED.

INTRODUCTION

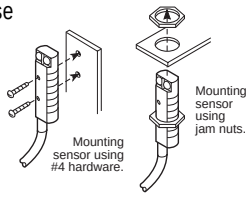
A diffuse reflective sensor operates by shining a beam of light out through the lens. When an object comes within the sensor's view, it reflects part of this beam of light back to the sensor causing the sensor to detect the object. The maximum range at which a given object can be detected depends on how well its surface reflects light—the less light it reflects back, the shorter the range. The ability of a surface to reflect light depends primarily upon its material of construction, color, and texture.

This manual covers both forward viewing and right angle viewing models. Although the units differ in the location of the lenses, the basic fundamentals of installation, set-up, and operation are nearly identical.



MOUNTING

The Prism sensor features a threaded housing and includes jam nuts and washers. This allows mounting into any 0.75 inch hole, or optional bracket. Use caution to avoid cross-threading the jam nuts on the sensor body. Tighten nuts to less than 4 N•m (36 in.-lbs. or 3 ft.-lbs.) torque to avoid stripping threads.



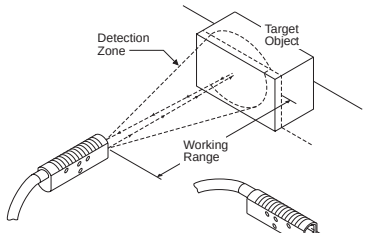
A second mounting method is to use #4 hardware in the 0.125 inch diameter mounting holes in the flat sides of the sensor. This is ideal for mounting the Prism against a wall, piece of equipment, rail, mounting bracket, etc.

MOUNTING LOCATION AND SET-UP

Select a mounting location with a clear view of the object to be detected. Avoid direct reflection from a highly reflective background (or darken the background). Mount the sensor so that it points at the most suitable part of the target object.

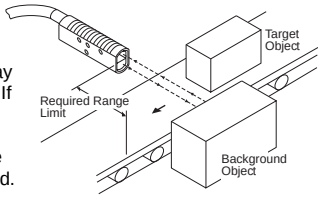
Be sure your power supply is off, then connect the sensor to the control circuit and power lines. Turn the power supply on and place a sample object in the beam. Slowly turn the gain adjustment clockwise (see Warning above concerning pot adjustment) until the LED lights (for light-operate model). Note the position and remove the sample object. Now continue turning the gain setting clockwise to find the position where the LED lights from the background reflection. Reset the gain midway between the two positions. Tighten all mounting screws.

NOTE: If background reflections are low, it will be possible to achieve a maximum gain setting without the LED lighting; in that case, set the gain midway between the first setting and maximum (this will prevent a hysteresis latch-up after sensing an object).



The detector "sees" light when the target surface enters the Detection Zone.

If the control's range is greater than required to detect the target, background objects may reflect enough light to trigger the control. If this happens, darken the background or reduce the sensor's operating range by turning the gain control counterclockwise until the background is no longer detected.



SPECIFICATIONS

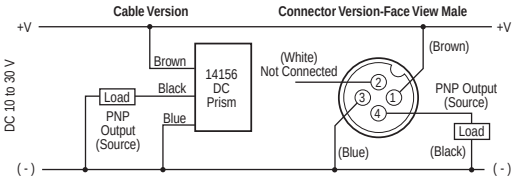
	DC MODELS
Input Voltage	10 to 30 V DC, reverse polarity protected
Power Dissipation	1 W maximum
Output Type	NPN only, PNP only, or NPN and PNP by model
Output Operation	Dark operate models: ON when beam is blocked; OFF when beam is not blocked Light operate models: ON when beam is not blocked; OFF when beam is blocked
Current Switching Capacity	100 mA maximum
Off-State Leakage	10 mA maximum
On-State Voltage Drop	NPN: 2.0 V at 100 mA; PNP: 2.5 V at 100 mA
Short Circuit Protection	Protected against dead shorts only. Operation: Output is continuously retried at 3 mS intervals and will automatically reset when short is removed (no visual indication of a short circuit condition). CAUTION: will not protect against overloads between 100 mA and 1 A.
Response Time	1.2 mS
Light/Dark Operation	Specified by model number
Temperature Range	Operating: -25° to 55° C (-13° to 131° F), Storage: -25° to 70° C (-13° to 158° F)
Sunlight Immunity	1,000 foot-candles
Material of Construction	Lens: Polycarbonate; Cable jacket: PVC; Body: Structural polyurethane foam (do not expose to concentrated acids, alcohols, or ketones)
Cable models	6-foot long; 3-wire NPN or PNP models; 4-wire NPN/PNP models
Connector Models	Micro Connector, 4-pin male
Vibration and Shock	Vibration: 30 g over 10 Hz to 2 kHz; Shock: 50 g for 10 mS 1/2 sinewave pulse
Indicator LED	Lights steady when output is ON; OFF when output is OFF; OFF when output is in short circuit mode
Alarm Indicator LED	ON in condition of low gain or noise interferance; OFF in normal condition
Enclosure Ratings	NEMA 1, 2, 3, 4, 4X, 6, 12, and 13 (See note below)
Approvals	Contact factory for latest list of agency approvals

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 our Applications Department.

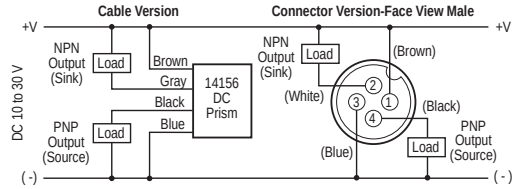
WIRING DIAGRAMS

NPN Models

PNP Models



NPN/PNP Models

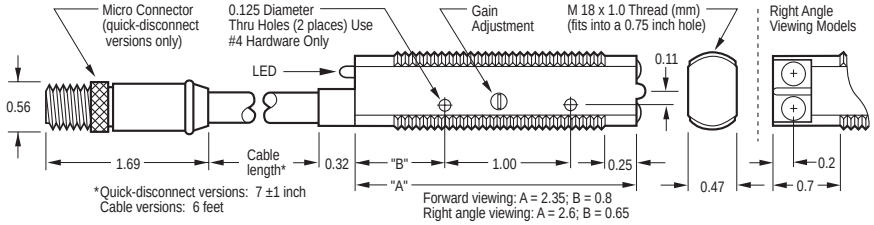


OPTICAL PERFORMANCE

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

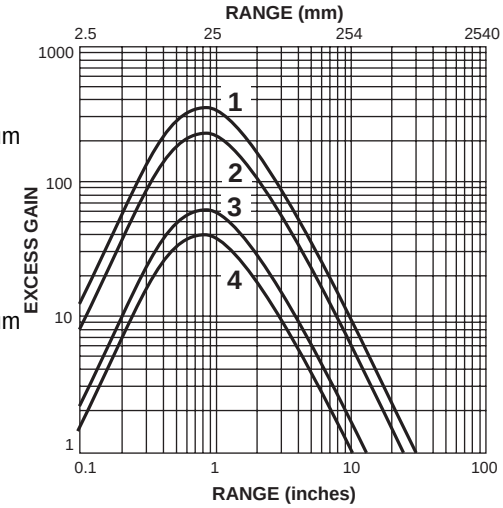
Dirt in the environment will affect optical performance by reducing the amount of light the control receives. For best results, sensors should be used at distances where excess gain is higher than 1.5 (1.5 times the amount of sensing power required to detect an object under ideal conditions). Higher excess gain will allow the sensor to overcome higher levels of contamination on the lens. All ranges and excess gain graphs are based on a 90% reflectance white card.

APPROXIMATE DIMENSIONS
(Shown in inches except where noted)



13156		13157
Source	Infrared, 880 nm	Infrared, 880 nm
Maximum Range	8 inches (203 mm)	24 inches(609mm)
Optimum Range	0.1-5 inches (3-127 mm)	0.1-15 inches (3-381mm)
Field of View	2 inch (51 mm) diameter at 5 inches (127 mm)	6 inches (152 mm) at 15 inches (381 mm)

1. 13157 Typical Performance
2. 13157 Minimum Performance
3. 13156 Typical Performance
4. 13156 Minimum Performance



Still Need Help?

Contact the Cutler-Hammer Sensor Application Engineers

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