Instruction Manual: Comet® Series Diffuse Reflective Sensors

Models covered in this manual:		AC/DC Models w/ Cable		AC/DC Models w/ Connector		DC-only Models w/ Cable		DC-only Models w/ Connector	
Viewing Style:		Forward	Right Angle	Forward	Right Angle	Forward	Right Angle	Forward	Right Angle
Standard	8 inch Range	13106A6513	13106R6513	13106AQD03	13106RQD03	13106A6517	13106R6517	13106AQD07	13106RQD07
	24 inch Range	13100A6513	13100R6513	13100AQD03	13100RQD03	13100A6517	13100R6517	13100AQD07	13100RQD07
Wide Beam	6 inch Range	13107AS6513	13107RS6513	13107ASQD03	13107RSQD03	13107AS6517	13107RS6517	13107ASQD07	13107RSQD07
Focused	1.5 inch	13102A6513	---	13102AQD03	---	13102A6517	---	13102AQD07	---

⚠ WARNING

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

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.

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.

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

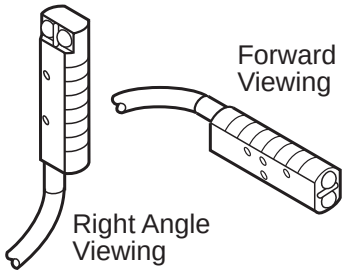
USE ONLY A SUITABLE ADJUSTMENT TOOL OR FLATBLADE SCREWDRIVER WHEN TURNING ADJUSTMENT POTS. SHARP OBJECTS CAN DAMAGE THE POT AND RESULT IN ELECTRICAL SHOCK.

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

INTRODUCTION

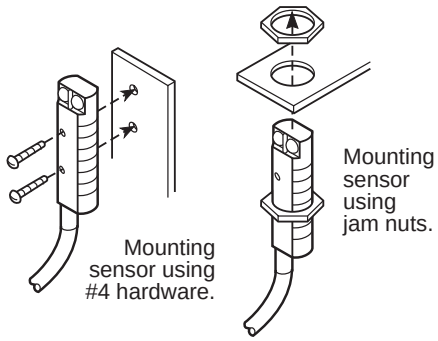
A diffuse reflective sensor operates by shining a beam of light out through the lens. When an object comes within the sensor's view, it reflects part of this beam of light back to the sensor causing the sensor to detect the object. The maximum range at which a given object can be detected depends on 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. The 13102 focused sensor is a special type of diffuse reflective sensor with optical elements focused on a point about 1.5 inches in front of the sensor lens. This allows the sensor to ignore objects in front of and behind this point.

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 Comet sensor features a threaded housing and includes jam nuts and washers. This allows mounting into any 0.75 inch hole, or a model 6161A-6501 "L" 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.



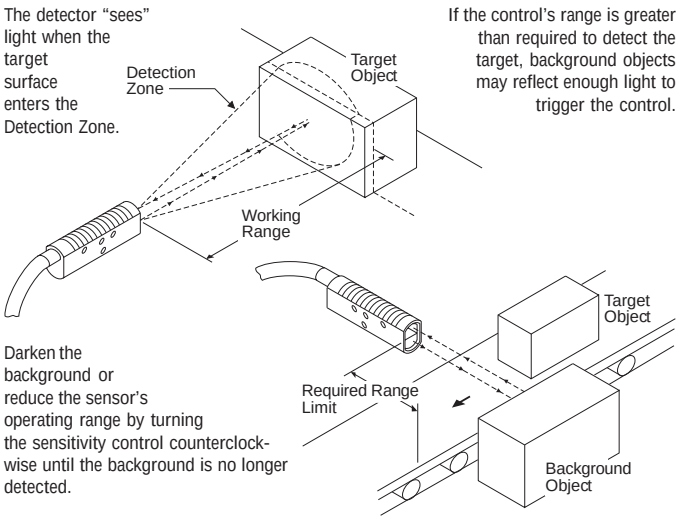
A second mounting method is to use #4 hardware in the 0.125 inch diameter mounting holes in the flat sides of the sensor. This is ideal for mounting the Comet against a wall, piece of equipment, rail, mounting bracket, etc.

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 at left concerning pot adjustment) until the LED lights (in light-operate mode). Note the position and remove the sample object. Now continue turning the sensitivity setting clockwise to find the position where the LED lights from the background reflection. Reset the sensitivity midway between the two positions. Tighten all mounting screws.

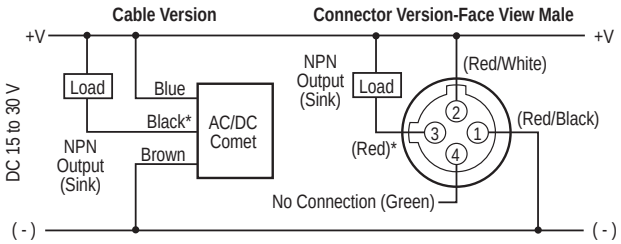
NOTE: If background reflections are low, it will be possible to achieve a maximum gain setting without the LED lighting; in that case, set the gain midway between the first setting and maximum (this will prevent a hysteresis latch-up after sensing an object).



WIRING DIAGRAMS

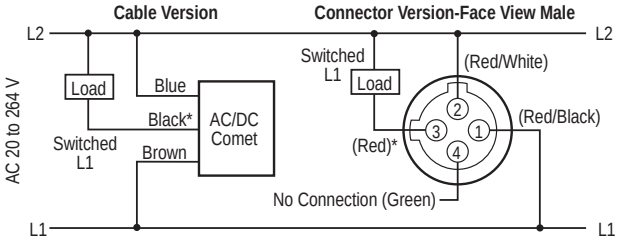
For wiring cable versions, the color codes shown are the actual wire colors emanating from the sensor. For connector versions, the pin numbering and color codes shown are typical of several manufacturers, however, variations are possible. **In case of discrepancies, rely on function indicated and pin location rather than pin number or color code.**

AC/DC Models (DC Connection, see Warning above)



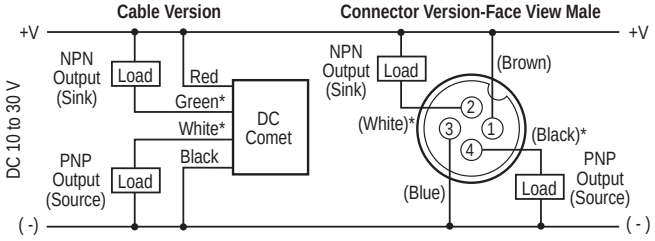
*Note: No connection when using thru-beam sources

AC/DC Models (AC Connection)



*Note: No connection when using thru-beam sources

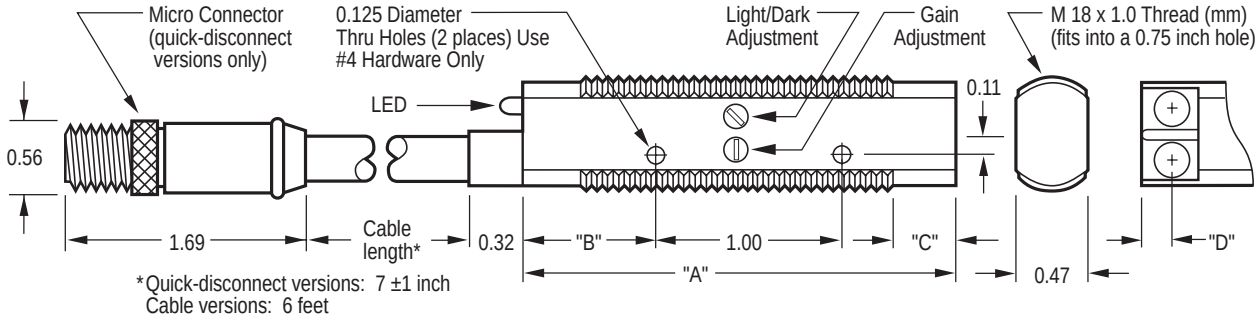
DC Models



*Note: No connection when using thru-beam sources

APPROXIMATE DIMENSIONS (Shown in inches except where noted)

Sensor Type	A	B	C	D	Lt/Dk Adjust	Gain Adjust
13100A, 13102A 13106A, 13107A	2.20	0.65	0.25	n/a	Yes	Yes
13100R, 13106R 13107R	2.55	0.65	0.60	0.20	Yes	Yes



OPTICAL PERFORMANCE

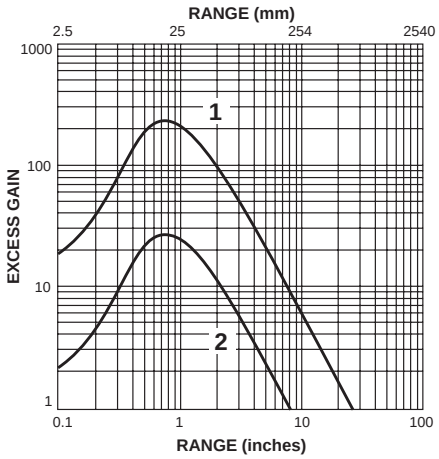
All optical specifications are guaranteed to be the minimum performance under clean conditions of any product delivered from stock. Typical performance may be higher.

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.

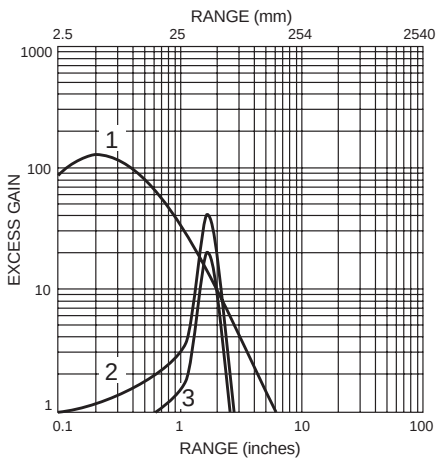
All ranges and excess gain graphs are based on a 90% reflectance white card.

	13100	13102	13106	13107
Source	Infrared, 880 nm	Visible red, 680 nm	Infrared, 880 nm	Infrared, 880 nm
Maximum Range	24 inches	- - -	8 inches	6 inches
Focused Point	- - -	1.6 inches	- - -	- - -
Optimum Range	0 to 15 inches	1.5 to 1.9 inches	0 to 5 inches	0 to 5 inches
Field of View	5 inch diameter at 15 inches	0.05 inch diameter at 1.6 inches	2 inch diameter at 5 inches	3 inch diameter at 2.5 inches

1. 13100
2. 13106



1. 13107 Typical
2. 13102 Typical
3. 13102 Minimum



SPECIFICATIONS

	AC/DC MODELS (AC Operation)	AC/DC MODELS (DC Operation)	DC-ONLY MODELS
Input Voltage	20 to 264 V ac, 50/60 Hz	15 to 30 V dc (15 to 24 V dc above 55° C/131° F)	10 to 30 V dc (10 to 24 V dc above 55°C/131° F)
Power Dissipation	1.5 W maximum	1.5 W maximum	1 W maximum
Output Type	VMOS (bi-directional)	NPN (sink)	NPN and PNP (dual outputs)
Current Switching Capacity	300 mA maximum	300 mA maximum	PNP (source): 100 mA maximum; NPN (sink): 250 mA max. (120 mA max. above 55° C/131° F)
Voltage Switching Capacity	375 V peak maximum	375 V peak maximum	30 VDC maximum
Off-State Leakage	250 µA typical; 500 µA maximum	250 µA typical; 500 µA maximum	10 µA maximum
Surge Current	2 A maximum	2 A maximum	1 A maximum
On-State Voltage Drop	- - -	1.8 V at 10 mA; 3.5 V at 300 mA	NPN: 400 mV at 10 mA, 1.5 V at 250 mA; PNP: 2.4 V at 100 mA
Response Time	10 mS		1 mS
Short Circuit Protection	Sensor will turn off immediately when a short or overload is detected (Indicator LED will flash). Turn power OFF and back ON to reset. IMPORTANT: During installation, correct power connections must be made first to ensure fail-safe short circuit protection of the outputs.		
Light/Dark Operation	Switch selectable		
Temperature Range	Operating and Storage: -40° to +70° C (-40° to +158° F)		
Material of Construction	Lens: Polycarbonate; Cable jacket: PVC; Body: Structural polyurethane foam (do not expose to concentrated acids, alcohols, or ketones)		
Cable/Connector	6-foot cable, 3-wire (ac/dc models), 4-wire (dc-only models); Micro Connector, 4-pin male		
Vibration and Shock	Vibration: 30 g over 10 Hz to 2 kHz; Shock: 100 g for 3 mS 1/2 sinewave pulse		
Indicator LED	Lights steady when output is ON; Flashes when short circuit protection is in latch condition		
Sunlight Immunity	10,000 foot-candles		
Enclosure Ratings	NEMA 1, 2, 3, 4, 4X, 6, 12, and 13 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.		
Approvals	UL recognized, CSA approved		

Still Need Help?

Contact the Cutler-Hammer Sensor Application Engineers

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Effective 6/99
Printed in U.S.A.

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