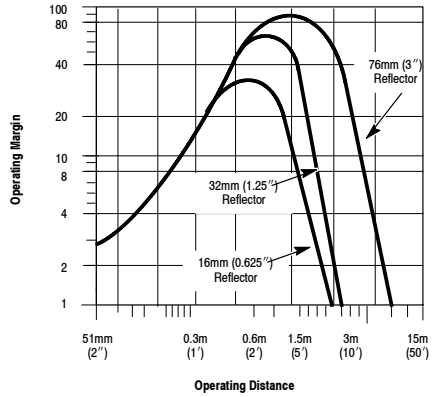
Installation Instructions
Series 9000 DeviceNet™ PHOTOSWITCH® Photoelectric Sensors

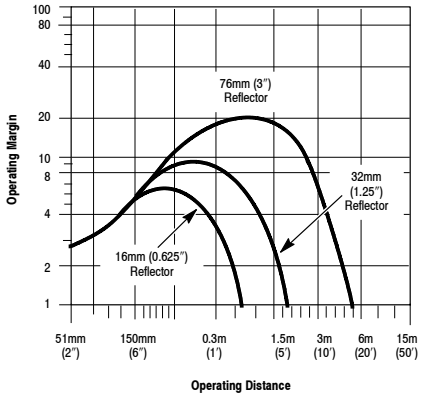
			Polarized Retroreflective	Retroreflective	Standard Diffuse	Fiber Optic		ClearSight		Transmitted Beam	
						Infrared Glass	Visible Red Plastic			Receiver	Source
Cat No.	Strobing Models	5-pin micro QD	42GNU-9200-QD	42GNU-9000-QD	42GNP-9000-QD	42GNF-9000-QD	42GNF-9100-QD	42GNC-9200-QD		42GNR-9010-QD	42GNL-9040-QD
		5-pin mini QD	42GNU-9200-QD1	42GNU-9000-QD1	42GNP-9000-QD1	42GNF-9000-QD1	42GNF-9100-QD1	42GNC-9200-QD1		42GNR-9010-QD1	42GNL-9040-QD1
		2m cable	42GNU-9200	42GNU-9000	42GNP-9000	42GNF-9000	42GNF-9100	42GNC-9200		42GNR-9000	42GNL-9040
	COS Models	5-pin micro QD	42GNU-9210-QD	42GNU-9010-QD	42GNP-9010-QD	42GNF-9010-QD	42GNF-9110-QD	42GNC-9210-QD		42GNR-9010-QD	42GNL-9040-QD
		5-pin mini QD	42GNU-9210-QD1	42GNU-9010-QD1	42GNP-9010-QD1	42GNF-9010-QD1	42GNF-9110-QD1	42GNC-9210-QD1		42GNR-9010-QD1	42GNL-9040-QD1
		2m cable	42GNU-9210	42GNU-9010	42GNP-9010	42GNF-9010	42GNF-9110	42GNC-9210		42GNR-9010	42GNL-9040
Optical	1	Max. Sensing Distance	4.8m (16ft)	9m (30ft)	1.5m (5ft)	Varies w/FO cable	Varies w/FO cable	1.2m (4ft)		152m (500ft)	152m (500ft)
	2	Field of View	1.5°	1.5°	3.5°			3.5°		1.5°	Not applicable
	3	Transmitting LED	Visible Red 660nm	Infrared 880nm			Visible Red 660nm			Not applicable	Infrared 880nm
	4	Sensitivity Adjustment	Yes							Yes	No
Electrical	5	Supply Voltage	11-25V DC								
	6	Current Consumption	70mA maximim								
	7	Power Consumption	2W maximum								
	8	Response Time	3.5ms							6.5ms	Not applicable
	9	Protection	Output: Short circuit protected, Power: Reverse polarity, False pulse (300ms power ON delay)								Power: Reverse polarity
Mechanical	10	Housing Material	Valox®								
	11	Lens Material	Acrylic			Not applicable		Acrylic			
	12	Indicators	See Table 1								Green: Power
Environmental	13	Operating Temperature	-25° to +70°C (-13° to +158°F)								
	14	Operating Environment	NEMA 4X, 6P, IP67; 8270kPa (1200psi) washdown								
	15	Vibration	10-55Hz, 1mm amplitude, meets or exceeds IEC 947-5-2								
	16	Shock	30G, meets or exceeds IEC 947-5-2								
	17	Relative Humidity	95%								
	18	Approvals	UL, CSA, CE for all applicable directives, ODVA compliant								
DeviceNet	19	Network Interface	DeviceNet								
	20	Protocol	Change-of-State (COS) or Strobing by model								
	21	Operating Mode	Selectable Light/Dark Operate								
	22	Communication Rate	Selectable 125kb, 250kb, 500kb								
	23	Supported Node Address	Selectable 0 to 63								
	24	Margin Diagnostic Type	Strobing models (static), COS models (dynamic)								

Typical Response Curves

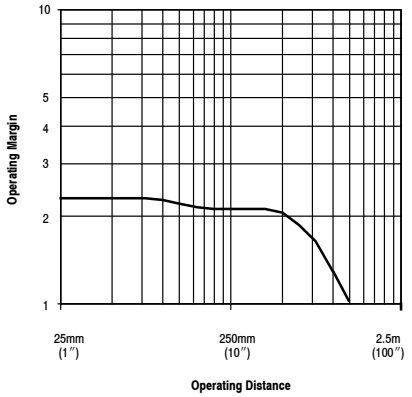
Retroreflective



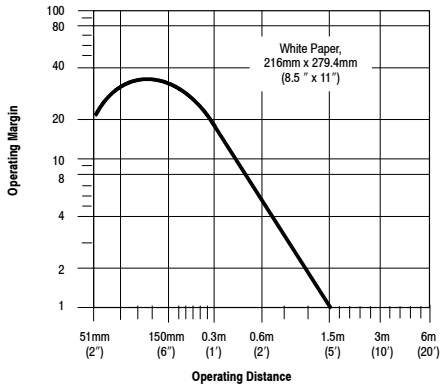
Polarized Retroreflective



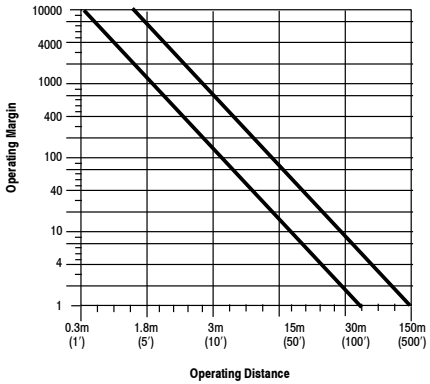
ClearSight Clear Object Detector



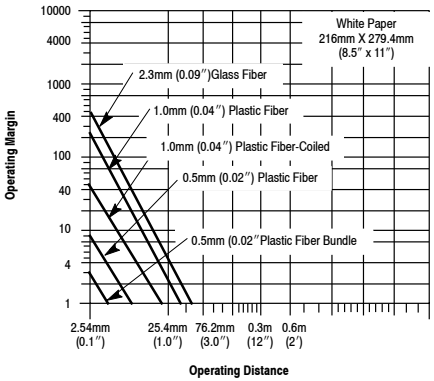
Standard Diffuse



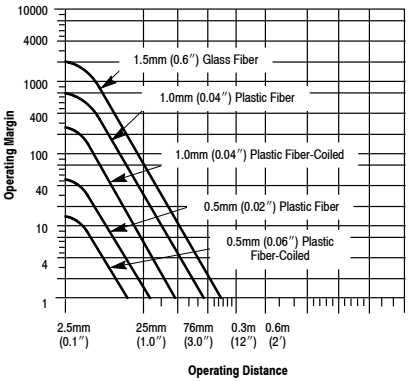
Transmitted Beam, 61m (200ft), 152m (500ft) Light Source



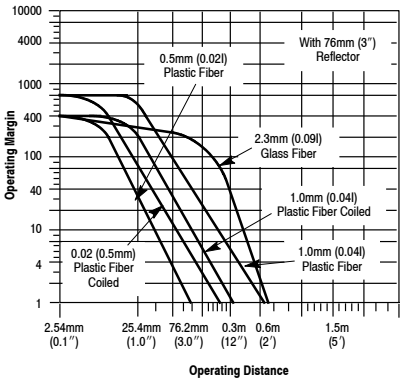
Visible Red Fiber Optic Standard Diffuse



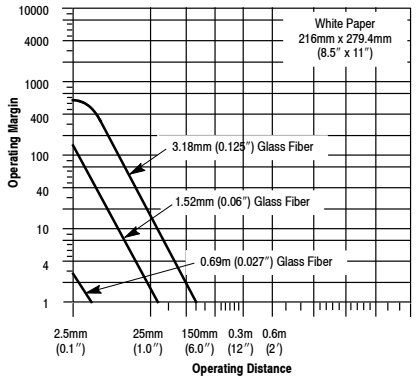
Visible Red Fiber Optic Transmitted Beam



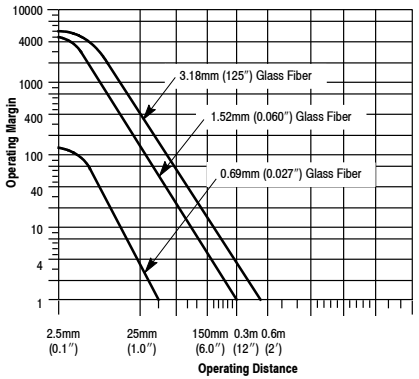
Visible Red Fiber Optic Retroreflective



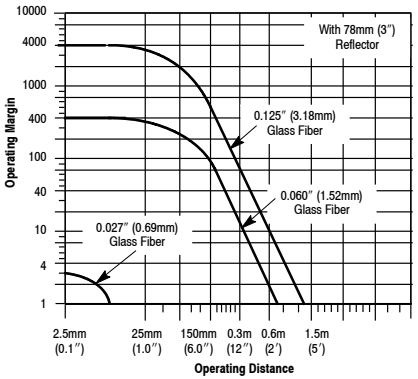
Infrared Fiber Optic Standard Diffuse



Infrared Fiber Optic Transmitted Beam

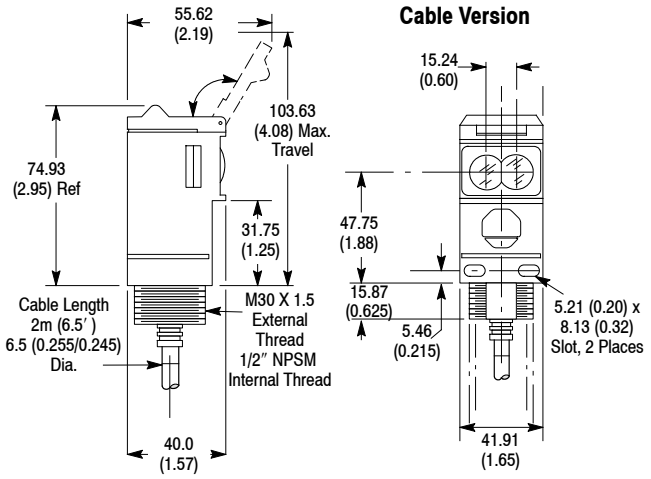


Infrared Fiber Optic Retroreflective

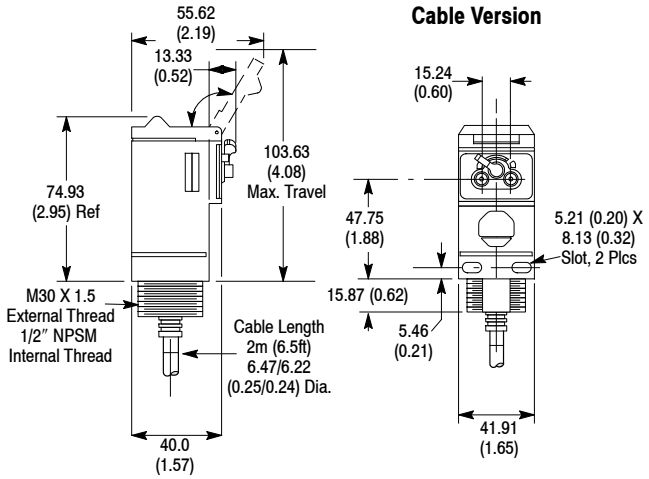


Dimensions—mm (inches)

All Versions Except Fiber Optic

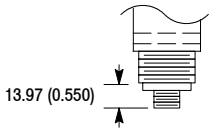


Fiber Optic

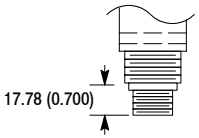


Connector Version

Micro Style



Mini Style



Thread Size

	AC	DC
Micro Style	1/2-20 UNF 2 Keyways	M12 x 1 1 Keyway
Mini Style	7/8-16 UN 1 Keyway	

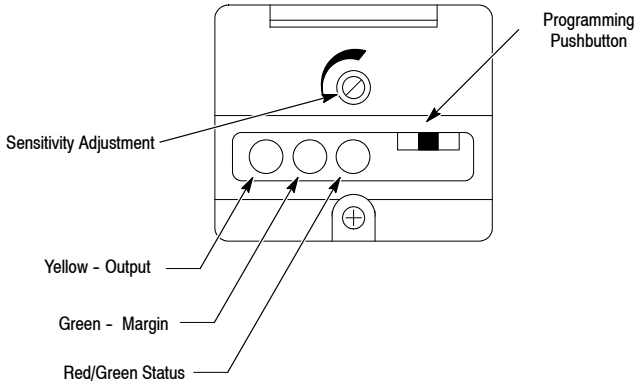
Accessories

Description	Catalog Number	Description	Catalog Number	Description	Catalog Number
2m (6.5ft) mini QD Cordset	**1485R-P2N5-C**	RS-232 PC Interface Module	**1770-KFD**	Reflector, 3″ Diameter	**92-39**
2m (6.5ft) mini QD Patchcord	**1485R-P2N5-M5**	RS Networx Software	**9357DNETL3**	Reflector, 1.5″ Diameter	**92-47**
2m (6.5ft) micro QD Cordset	**1485R-P2R5-C**	PCMCIA DeviceNet Interface Card	**1784-PCD1**	Other DeviceNet Products	**See Publication DN2.5**
2m (6.5ft) micro QD Patchcord, 90°	**1485R-P2R5-F5**	DeviceNet Hand-Held Configurator	**2707-DNC**		

User Interface

Using an instrument screwdriver, open the top cover of the sensor to gain access to the user interface panel. This panel contains a pushbutton and LED indicators for configuring and viewing the sensor's operation and status. A more complete description of each item is described below.

Timing Sensors—Top View Detail



Pushbutton

A single momentary pushbutton is used to configure the sensor (strobing models only). Refer to the configuration section in this document for complete instructions on using this feature.

LED Indicators

Three LED indicators are provided to indicate a variety of conditions making it easy for installation and troubleshooting. The function of each is described in the table below. The LEDs also work together as indicated on page 5 when used in the configuration mode.

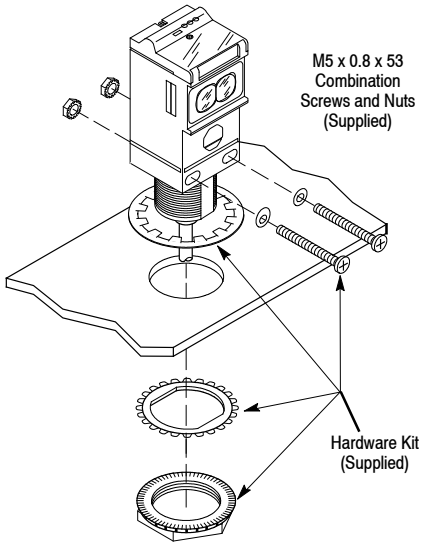
Table 1. LED Function

Label	Color	State	Status
Output	Yellow	ON	Target detected
Margin	Green	OFF	Margin < 2.5
		ON	Margin >2.5
Status	Red/Green	OFF	Sensor not powered
		Green ON Steady	Sensor active and allocated by master
		Green Flashing	Sensor active but not allocated by master
		Red Flashing	Minor correctable fault (baud rate)
		Red ON Steady	Major fault (possible duplicate address)

NOTE: LED indicators are used during the configuration operation of the sensor. Refer to the configuration section for complete instructions on using this feature.

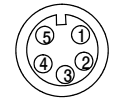
Mounting the Sensor

Securely mount the sensor on a firm, stable, surface or support using one of the many mounting brackets available from Rockwell Automation/Allen-Bradley. The sensor is supplied with hardware kit #129–130 which contains a plastic mounting nut, lock washer, 2 M5 x 0.8 x 53 screws and nuts. Excessive vibration or shifting may cause intermittent operation of the sensor.



Wiring the Sensor

Models of the Series 9000 DeviceNet are available in one of three different connection types as identified in the following table. Rockwell Automation/Allen-Bradley recommends the use of the 1485R Series of cordsets and patchcords on the quick-disconnect models. All external wiring should conform to the National Electric Code and all applicable local codes.

Designation	Lead Color	Pin Assignment	
	2m Cable	5-Pin Micro QD	5-Pin Mini QD
			
V+	Red	2	2
V-	Black	3	3
CAN +	White	4	4
CAN -	Blue	5	5
Drain	Bare	1	1

Sensor Configuration

Once installed and aligned the sensor must be configured (programmed) to operate properly. Using the pushbutton under the sensor's cover or a Configuration Tool such as RS Networx the user must set the sensor's address, baud rate and select Light or Dark operating mode. Note that COS models can only be configured over the network. The following instructions refer to "local programming." For programming with a Configuration Tool, refer to the instructions provided with the tool.

Programming is a two step process.

1. **First a Category is selected using the pushbutton.**
   The RED STATUS Indicator:
   a. Confirms Category selection by flashing the same number of times the pushbutton was pressed to select a category. (*1/4 second flashes*)

or

   b. Flashes once for *one full second* to indicate an invalid input.

2. **Then a setting is input using the pushbutton.**
   The GREEN STATUS Indicator:
   a. Confirms the setting by flashing the same number of times the pushbutton was pressed to input the setting.

or

   b. The RED STATUS Indicator flashes once for one full second to indicate an invalid input.

Enter Programming Mode

Press the pushbutton for 3 seconds and release it. The RED and GREEN Network STATUS Indicators each flash twice, alternately, to confirm entry to PROGRAMMING MODE.

Return to Run Mode

The sensor may be returned to RUN MODE in either of two ways. The user can return the sensor to RUN MODE from PROGRAMMING MODE at any time by pressing the pushbutton for 3 seconds and releasing it. The RED and GREEN Network STATUS Indicators each flash twice, alternately, to confirm return to RUN MODE mode. Or *the sensor will automatically return to RUN MODE from PROGRAMMING MODE whenever the pushbutton remains unpressed for 15 seconds!*

Setting Sensor Address: Valid addresses: 00 thru 63 (factory default: 63)

Category 1. MSD
Press the pushbutton one time, quickly.
The RED STATUS Indicator confirms the selection.
Press the pushbutton once quickly to set the MSD to "1," twice to set it to "2," etc. Press the pushbutton ten times to set the MSD to "0." The GREEN STATUS Indicator flashes to confirm the setting; once for a setting of "1," twice for a setting of "2," etc.

Category 2. LSD
Press the pushbutton two times, quickly.
The RED STATUS Indicator confirms the selection.
Press the pushbutton once quickly to set the LSD to "1," twice to set it to "2," etc. Press the pushbutton ten times to set the LSD to "0." The GREEN STATUS Indicator flashes to confirm the setting; once for a setting of "1," twice for a setting of "2," etc.

Category 3. Operating Mode (default: Light Operate)
Press the pushbutton 3 times, quickly.
The RED STATUS Indicator confirms the selection.
Light Operate: Press the pushbutton once, quickly.
The GREEN STATUS Indicator flashes to confirm the setting.
Dark Operate: Press the pushbutton twice, quickly. The GREEN STATUS Indicator flashes to confirm the setting.

Category 4. Baud Rate (default: 125 kb)
Press the pushbutton 4 times, quickly.
The RED STATUS Indicator confirms the selection.
125kb: Press the pushbutton once, quickly.
The GREEN STATUS Indicator flashes to confirm the setting.
250kb: Press the pushbutton twice, quickly.
The GREEN STATUS Indicator flashes to confirm the setting.
500kb: Press the pushbutton 3 times, quickly.
The GREEN STATUS Indicator flashes to confirm the setting.

Category 5. Reset to Factory Default
Press the pushbutton 5 times, quickly.
The RED STATUS Indicator confirms the selection.
Press the pushbutton once.
The GREEN STATUS Indicator flashes to confirm that all settings have been reset to factory values.

Table 2. Configuration Parameters

Parameter	Type	Options	Default
Operate Mode	R,W	Light or dark operate	Light operate
Sensor Output	R	Bit 0: 0=output OFF, 1=output ON	
Diagnostic	R	Bit 1: 0=OK, 1=alarm	
Communication Rate	R,W	125, 150, 300kB	125kb
Node Address	R,W	0 to 63	63

Diagnostic Operation

The Series 9000 DeviceNet sensors provide a diagnostic output bit to indicate an unstable sensing condition. This condition can be caused by a “dirty or contaminated” lens or by sensor misalignment. Strobing models of the sensor will output immediately upon detection of a margin value between 1 and 2.5. This method, called static diagnostic, is ideal for web sensing applications where an immediate indication is required. The diagnostic bit of COS models will not output until a complete “low margin” transition occurs. Called dynamic diagnostics, this method is best suited for applications where targets are constantly moving into and out of the sensor field of view, i.e., conveyor application.

Data Byte 1

	Bit 0	Bit 1
	Output	Diagnostic
0	OFF	OK
1	ON	ALARM

Transmitted Beam Mode

Visually align the emitter and receiver units (emitter and receiver fibers) until the Output LED on the top of the control lights up (with Light Operate mode) or goes out (with Dark Operate mode).

To be certain that the beam is centered, it is required to sweep the emitter or receiver in the horizontal and vertical plane and determine at what position the output indicator goes on and then goes off. Set the sensor (or fiber optics) halfway between both positions. The Margin LED should also be on when the beam is unbroken.

Retroreflective/Polarized Retroreflective Mode

Visually align the sensor (or fiber optic cable) on the reflector until the Output LED on the top of the control lights up (with Light Operate mode) or goes out (with Dark Operate mode). Also verify that the Margin LED is on.

To be certain that the beam is centered, it is required to sweep the sensor in the horizontal and vertical plane and determine at what position the output indicator goes on and then goes off. Set the sensor (or fiber optics) halfway between both positions.

Break the beam with the object to be detected and check if the output indicator turns on. When this does not happen turn down the sensitivity adjustment until it does. Restore the light beam by removing the object and check if the output indicator turns off again and that the Margin LED comes on. If this does not happen, increase the size of the reflector or decrease the distance between the reflector and the sensor.

Diffuse Mode

Visually align the sensor (or fiber optic cable) on the object until the Output LED on the top of the control lights up (with Light Operate mode) or goes out (Dark Operate mode).

To be certain that the beam is centered, it is required to sweep the sensor in the horizontal and vertical plane and determine at what position the output indicator goes on and then goes off. Set the sensor (or fiber optics) halfway between both positions.

Remove the object in front of the sensor and eliminate any background signals by turning down the sensitivity adjustment, if such background signals exist. Replace the object and verify that the output LED goes on and that the Margin LED is on.

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