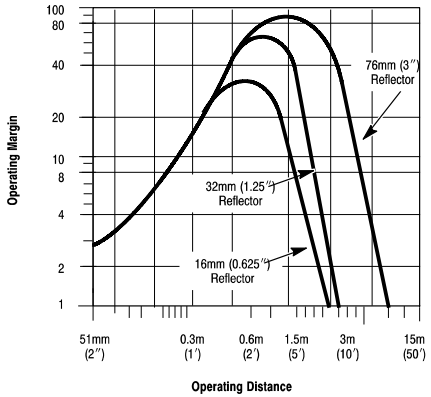
Installation Instructions
SmartSight™ DeviceNet™ PHOTOSWITCH® Photoelectric Sensors

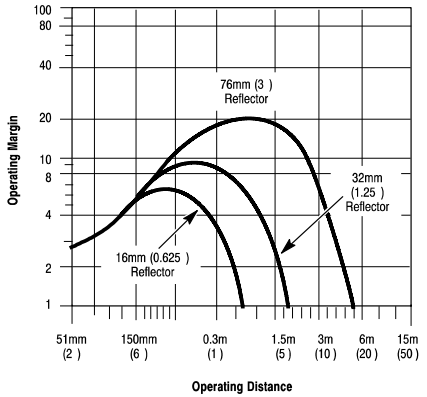
All Sensors			Polarized Retroreflective	Retroreflective	Standard Diffuse	ClearSight™	Transmitted Beam	
							Receiver	Source
Cat. No.		5-pin micro QD	**42GNU-9220-QD**	**42GNU-9020-QD**	**42GNP-9020-QD**	**42GNC-9220-QD**	**42GNR-9020-QD**	**42GNL-9040-QD**
		5-pin mini QD	**42GNU-9220-QD1**	**42GNU-9020-QD1**	**42GNP-9020-QD1**	**42GNC-9220-QD1**	**42GNR-9020-QD1**	**42GNL-9040-QD1**
		2 m cable	**42GNU-9220**	**42GNU-9020**	**42GNP-9020**	**42GNC-9220**	**42GNR-9020**	
Optical	1	Max. Sensing Distance	4.8 m (16 ft)	9 m (30 ft)	1.5 m (5 ft)	1.2 m (4 ft)	129.5 m (425 ft)	
	2	Field of View	1.5°	1.5°	3.5°	1.5°	1.5°	Not applicable
	3	Transmitting LED	Visible red 660 nm	Visible red 660 nm	Infrared 880 nm	Visible red 660 nm	Not applicable	Infrared 880 nm
	4	Sensitivity Adjustment	Yes, Learn Button				Yes	
Electrical	5	Supply Voltage	11…25V DC					
	6	Current Consumption	75 mA maximum					
	7	Power Consumption	1.8 W maximum					
	8	Response Time	3.5 ms				6.5 ms	Not applicable
	9	Protection	Miswire, hot insertion					
Mechanical	10	Housing Material	Valox®					
	11	Lens Material	Acrylic					
	12	Indicators	See Table 1					Green: Power
Environmental	13	Operating Temperature	-25…+70°C (-13…+158°F)					
	14	Operating Environment	NEMA 4X, 6P, IP67, 8270 kPa (1200 psi) washdown, IP69K					
	15	Vibration	10…55 Hz, 1 mm amplitude, Meets or exceeds IEC 60947-5-2					
	16	Shock	30 g, meets or exceeds IEC 60947-5-2					
	17	Relative Humidity	95%					
	18	Approvals	UL, CSA, and CE marked for all applicable directives, ODVA compliant					
DeviceNet	19	Network Interface	DeviceNet					
	20	Protocol	Selectable Change-of-State (COS) and Strobing					
	21	Operating Mode	Selectable Light/Dark Operate					
	22	Autobaud Detect	Selectable ON/OFF					
	23	Communication Rate	Selectable 125 kb, 250 kb, 500 kb					
	24	Supported Node Address	Selectable 0…63					
	25	Timer	ON delay and OFF delay/one-shot (0…65,535 ms, 1 or 10 ms time base)					
	26	Counter	Adjustable with output bit (0…65,535 counts)					
	27	Motion Detect	Adjustable with output bit (0…65,535 ms, 1 ms time base)					
	28	Margin Diagnostic	Selectable with dual thresholds (0.7…1.5 and 0.7…2.0)					
	29	Margin Diagnostic Type	Selectable static or dynamic					

Typical Response Curves

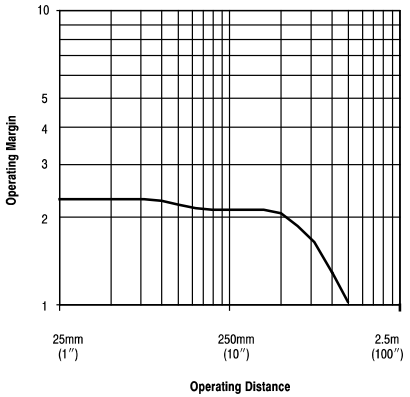
Retroreflective



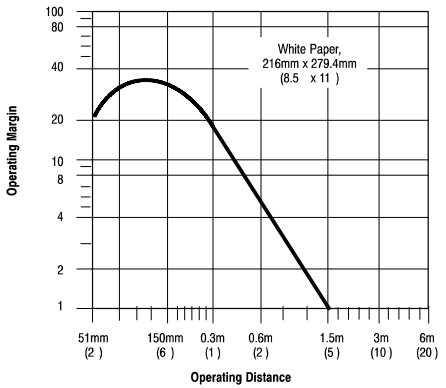
Polarized Retroreflective



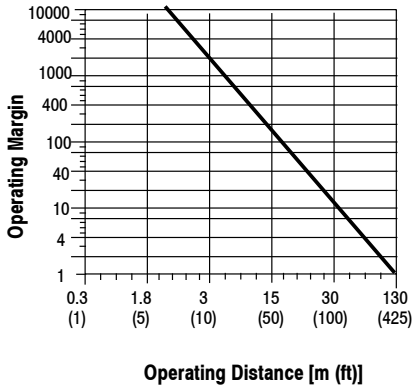
ClearSight Clear Object Detector



Standard Diffuse

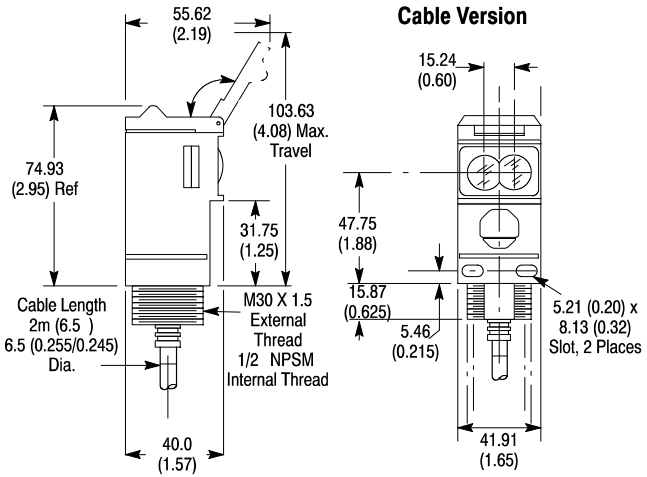


Transmitted Beam 130m (425ft) Light Source



Dimensions [mm (inches)]

All Versions Except ClearSight™ ❶



Connector Version

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	

❶ Refer to SmartSight DeviceNet catalog pages for ClearSight dimensions.

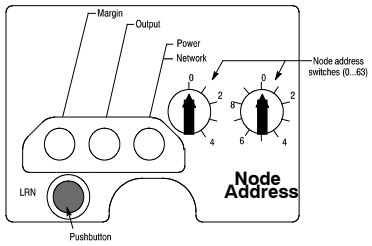
Accessories [mm (inches)]

Description	Cat. No.	Description	Cat. No.	Description	Cat. No.
2 m (6.5 ft) mini QD cordset	**1485R-P2N5-C**	RS-232 PC Interface Module	**1770-KFD**	Reflector, 3 in. Diameter	**92-39**
2 m (6.5 ft) mini QD patchcord	**1485R-P2N5-M5**	RS Networx Software	**9357DNETL3**	Reflector, 1.5 in. Diameter	**92-47**
2 m (6.5 ft) micro QD cordset	**1485R-P2R5-C**	PCMCIA DeviceNet Interface Card	**1784-PCD1**		
2 m (6.5 ft) micro QD patchcord, 90°	**1485R-P2R5-F5**	DeviceNet Handheld Configurator	**193-DNCT**		

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, node-address switches, and LED indicators for configuring and viewing the sensor's operation and status. A more complete description of each item is described below.

SmartSight™ Sensor—Top View Detail



Pushbutton

A single momentary pushbutton, labeled LRN, is used to "teach" the sensor the application presented to it. Refer to the Self-Teach in this document for complete instructions on using this feature.

Selector Switches

Two selector switches are provided for setting the sensor node address on the network. Possible addresses range from 0…63. The node address may also be set over the network using the RS Networx configuration tool.

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 self-teach mode.

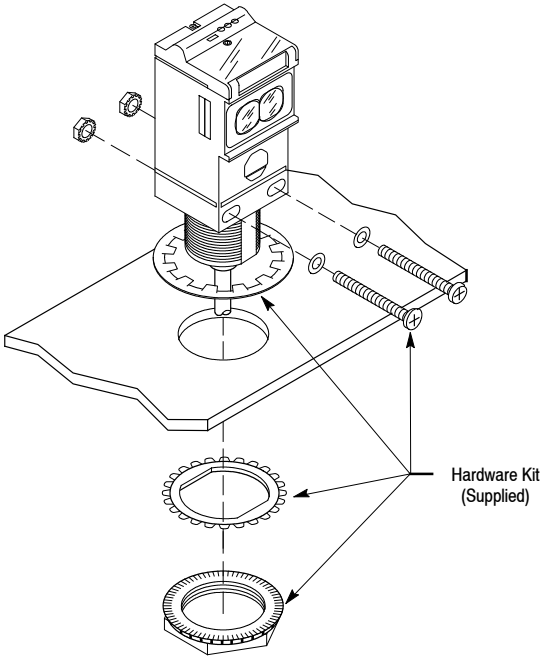
Table 1. LED Function

Label	Color	State	Status
Output	Yellow	ON	Target detected
Margin	Orange	OFF	Margin < 2.5
		ON	Margin ≥ 2.5
Network	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 *Self-Teach* operation of the sensor. Refer to the *Self-Teach* section for complete instructions on using this feature.

Mounting the Sensor

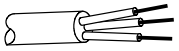
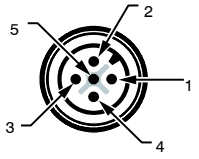
Securely mount the sensor on a firm, stable, surface or support using one of the many mounting brackets available from Rockwell Automation/Allen-Bradley. The sensor is supplied with hardware kit #129-130 which contains a plastic mounting nut, lock washer, 2 M5 x 0.8 x 53 screws and nuts. Excessive vibration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



Wiring the Sensor

Models of SmartSight 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.

ATTENTION: All external wiring should conform to the National Electric Code and all applicable local codes.

Designation	Lead Color	Cordset Pin Assignment	
	2 m 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

Configuration

After securing the sensor to a stable surface or support and connecting to the network, it will be necessary to configure some of the parameters using a suitable network configuration tool such as the Rockwell RS Networx. For remote configuration the DeviceView Handheld Configurator (193-DNCT) is available. Note that the node address setting can be set locally using the two switches located on the user interface panel. The address can also be configured over the network.

Self-Teach Operation

SmartSight DeviceNet photoelectric sensors provide self-teach operation for learning the application presented to it. In essence, it automatically adjusts its sensitivity level to help distinguish between the target and the background. This feature eliminates the need to manually adjust a sensitivity potentiometer as found on the earlier DeviceNet 9000 photoelectric sensor. The self-teach can be accomplished either locally or over the network.

Local Self-Teach

1. Open the top cover of the user interface panel and locate the LRN pushbutton.
2. Press the LRN pushbutton for five seconds to enter the Learn mode. The bi-colored LED will alternate red/green/red to indicate that this mode is active.
3. To learn condition #1 (background or target), press and release the LRN pushbutton quickly. The Yellow LED will turn ON.
4. To learn condition #2 (opposite of condition #1), press and release the LRN pushbutton quickly. If the learn was successful, the yellow LED will turn off then on again. If the sensor was unable to learn the application, then go to number 6.
5. The sensor will automatically exit the Learn mode and is now ready for operation.
6. If the sensor was unable to establish sufficient contrast difference between the condition #1 and #2 (background and target), the Red LED will turn ON indicating a Learn failure. Try the Learn process again.
7. If, after a second attempt, the sensor is still unable to learn the application, it indicates that there is insufficient contrast in the application. Retry the Learn operation using RS Networx as it may be possible to learn the application by manually setting the sensitivity level over the network.

Remote Self-Teach

Using RS Networx, it is possible to enter the Learn mode to teach the sensor. This process is similar to that described for the local self-teach and is supplemented with extensive help functions.

ATTENTION: In most retroreflective, polarized retroreflective, and transmitted beam applications, it is not necessary to make any sensitivity level adjustments.

Due to the detection method, adjustments may be required for diffuse sense modes.

Features

Sensor Output Operation	Light/dark operate
Timers	On, off, motion
Counters	One (1) counter
Diagnostics	Diagnostic mode Diagnostic margin Motion detection
Margin	Analog value
Teach Function	Low contrast/sensitivity

Diagnostic Operation

The SmartSight DeviceNet photoelectric sensor provides two independent diagnostic outputs to indicate an unstable sensing condition. These two diagnostic outputs may be configured to operate in one of two possible modes. The first, static, is designed for web sensing or other applications in which an immediate diagnostic output is required. The *dynamic* operating mode is useful in repetitive applications where targets are constantly moving into and out of the sensors field of view. In this mode, the output bit will only be triggered after detection of seven successive “unstable” signals. This prevents “false triggering” caused by the leading and trailing edges of the target.

A third diagnostic output bit is also provided. This output will be activated when either the Margin 1 or Margin 2 diagnostic, or the Motion Detect preset values is reached.

Data Byte 1

	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
	Sensor Output	**Diagnostic**	**Diagnostic Margin 2x**	**Diagnostic Margin 3x**	**Motion Output**	**Counter Output**	**Not Used**	**Not Used**
0	OFF	OK	OK	OK	Motion	Less than Preset		
1	ON	ALARM	Margin Unstable	Margin Unstable	No Motion	Preset Reached		

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