



Description

Series 9000 photoelectric sensors are designed to perform in many harsh environments. They are well-sealed, with critical components epoxied in a high-impact, chemically resistant Valox® housing. Series 9000 sensors will withstand 1200psi (8270kPa) high pressure, high temperature washdowns, making them ideal for use in tough sensing environments found in food and beverage packaging and many material handling industries.

All adjustments are located under a unique clear cover. The cover is captive, and only a single captive screw is used to hold the cover in place and assure sealing. Each sensor has at least three highly visible LED indicators positioned under a raised portion of the cover. These indicators are visible from 360° around the sensor.

To provide for the best reliability and ease of installation, all Series 9000 sensors are factory assembled. There are no plug-in modules or other loose components to be assembled by the customer. Troubleshooting is simplified, because there is no need to open the sensor in the field to find hidden modules inside. A single part number provides a complete sensor for installation or field replacement.

Series 9000 sensors provide extended sensing ranges for application flexibility and extra operating margin for lower

maintenance. Most sensors are available with a choice of 2m PVC cable, DC or AC micro-style quick disconnect, or mini-style quick disconnect. Rockwell Automation/Allen-Bradley offers a variety of matching quick disconnect cables, refer to page 5-1.

Series 9000 photoelectric sensors are available in five different types.

On/Off sensors offer a fast 2ms response time and dual NPN/PNP DC outputs or single solid state AC output (15ms SPDT EM Relay). Each sensor contains highly visible Power, Output, and Margin/Short Circuit indicators, a Light/Dark Operate switch and adjustable sensitivity.

Timing sensors add adjustable On and/or Off delay output timing up to 15 seconds in two ranges. One shot or delayed one-shot output operation is also selectable, with pulse delay and pulse duration adjustable up to 15 seconds.

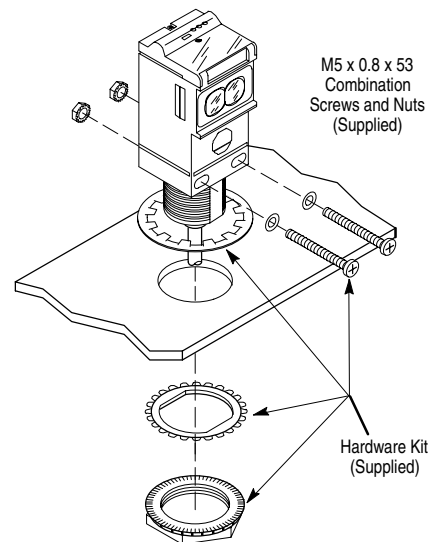
Diagnostic sensors provide separate indicators and a separate output that signals poor application quality. Static or Dynamic diagnostic modes can be selected for detection of a variety of application problems.

Darkroom sensors can be used in areas where the emission of visible light must be sharply reduced, such as in

areas where photographic films, papers, and other materials are manufactured. These On/Off sensors have been specifically designed and constructed to reduce visible light emission to less than 0.003millilux measured 25mm (1in) from the sensor.

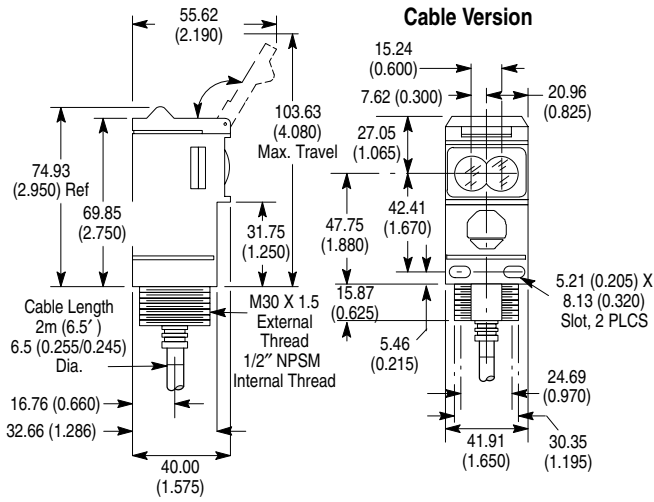
Supplied Accessories

Each sensor is packaged with installation instructions and hardware kit #129-130 containing a Valox® 30mm mounting nut, washer, and two M5 x 0.8 x 53 mounting screws and nuts.

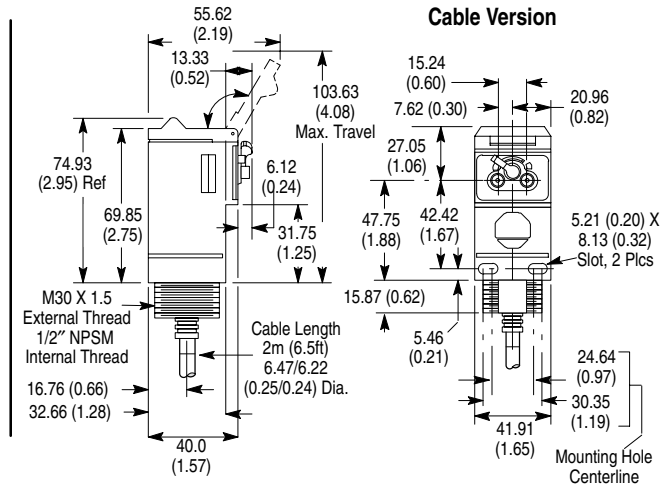


Dimensions—mm (inches)

All Versions Except Fiber Optic



Fiber Optic



Connector Version



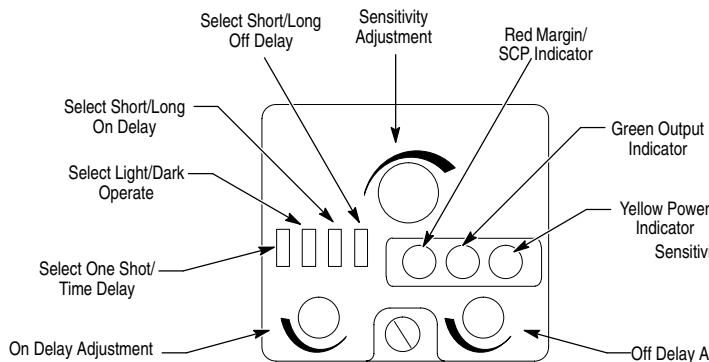
Thread Size

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

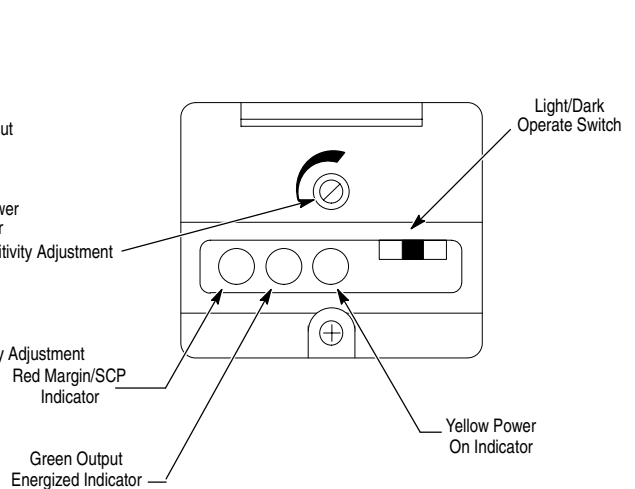
User Interface

Label	Color	State	Status
Output	Green	OFF	Sensor output de-activated
		ON	Sensor output activated
Margin/SCP	Red	OFF	Margin < 2.5
		ON	Margin > 2.5
		Flashing	Output SCP active
Power	Yellow	OFF	Sensor not powered
		ON	Sensor powered

Timing Sensors—Top View Detail



On/Off Sensors—Top View Detail



Series 9000

Standard and Timing Version

Description

The Series 9000 photoelectric sensors are designed to perform in the harshest of industrial environments. They are sealed with all critical components epoxied in a high-impact, chemically resistant Valox® housing. The sensor will withstand 1200psi (8270kPa) high temperature, high pressure washdowns, commonly found in the food and beverage industry.

For ease of maintenance, all adjustments are made on a user interface panel located under the top, clear cover. A single captive screw provides easy access to this panel while ensuring positive sealing from the outside environment. This panel also contains three LED status indicators which are highly visible from 360° around the sensor.

Series 9000 photoelectric sensors are available in both DC and AC/DC models. The DC models provide both a sink (NPN) and sourcing (PNP) output, while the AC/DC models come in either SPDT relay or MOSFET output options. A wide variety of connection types are available for increased flexibility.

In addition to the standard ON/OFF type of sensor, a **Timer** version is also available. This type of sensor allows the user to configure ON/OFF, and ONE SHOT time delays in 10ms increments up to 15 seconds. For applications where an electrical indication of a “dirty lens” condition is required, a **Diagnostic** version is also available. Along with a visual LED indication, this sensor provides a discrete output which can be tied back to a PLC, OI terminal, or tower light for further processing.

Other versions of the Series 9000 photoelectric sensor include **Intrinsically Safe** for hazardous (classified) locations, **Darkroom** for film processing applications, and **DeviceNet** for this sensor level network.

General Specifications

Light Source	Infrared LED (880nm)
Unit Protection	Overload, short circuit, reverse polarity, false pulse
Supply voltage	24V DC, 120V AC, 220V AC—see Selection Guide tables
Current Consumption	See Selection Guide tables
Output Type	NPN and PNP (DC models) SPDT Relay (AC/DC models) MOSFET (AC/DC models)
Output Mode	Light/Dark operate selectable
Output Rating	250mA @ 40V DC (NPN and PNP models) 2A @ 132V AC (SPDT relay models) 1A @ 264V AC (SPDT relay models) 300mA @ 264V AC (MOSFET models)
Response Time	2ms (NPN and PNP models) 15ms (SPDT Relay models) 5ms (MOSFET models)
Housing Material	Valox®
Lens Material	Acrylic
LED Indicators	See Indicators table below
Connection Types	2m 300V cable, 4-pin DC micro QD, 4-pin DC mini QD, 4-pin AC micro QD, 5-pin DC micro QD
Supplied Accessories	#129–130 mounting kit
Optional Accessories	Mounting brackets, reflectors, cordsets
Operating Environment	NEMA 3, 4X, 6P, 12, 13 (IP67) 1200psi washdown
Vibration	10–55Hz, 1mm amplitude, Meets or exceeds IEC 60947–5–2
Shock	30g with 1ms pulse duration, Meets or exceeds IEC 60947–5–2
Operating Temperature	–34°C to +70°C (–29°F to +158°F)
Relative Humidity	5...95%
Approvals	UL listed, CSA approved, and CE marked for all applicable directives

Features

- Harsh duty 30mm package
- Wide selection of sensing modes
- Wide selection of operating modes
- Both DC and AC/DC operation
- Standard ON/OFF and timing versions
- Fast response time
- Variety of connection types

General Information

Dimensions page 1–59
Wiring Diagrams page 1–61

Sensing Modes

Retroreflective page 1–62
Polarized Retroreflective page 1–63
Standard Diffuse page 1–64
Long Range Diffuse page 1–65
Transmitted Beam page 1–66
Visible Red Plastic
Fiber Optic page 1–67
Infrared Glass Fiber Optic page 1–68

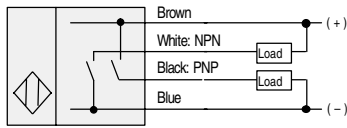
Accessories

Quick-Disconnect Cables page 5–1
Mounting Assemblies page 1–316
Reflectors, Reflective Tape page 1–327

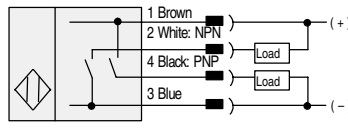
Wiring Diagrams①②

All Models Except Transmitted Beam Source

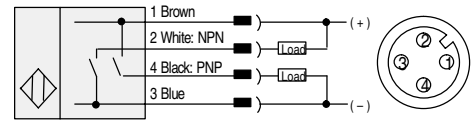
Cable Model: 9__0



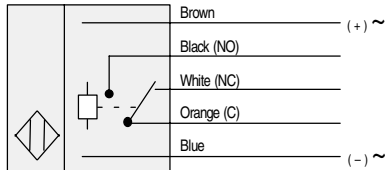
4-pin DC Micro QD Model: 9__0-QD



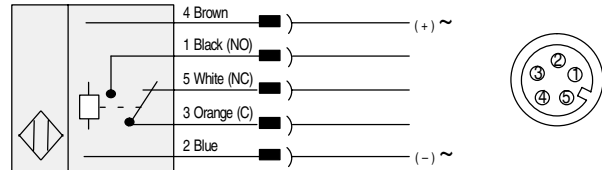
4-pin DC Mini QD Model: 9__0-QD1



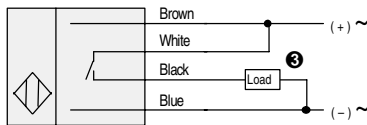
Cable Model: 9__1, 9__2



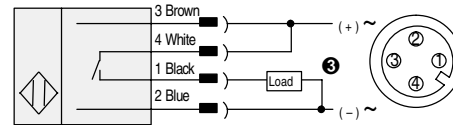
5-pin AC/DC Mini QD Model: 9__1-QD, 9__2-QD



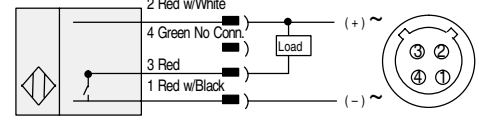
Cable Model: 9__3



AC/DC Mini QD Model: 9__3-QD



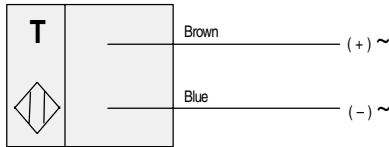
AC/DC Micro QD Model: 9__3-QD1



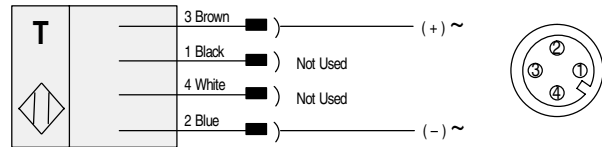
③ Load can be placed on either black or white wire to create sourcing or sinking respectively.

Transmitted Beam Source

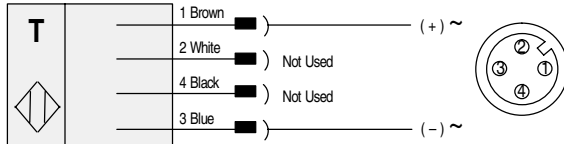
Cable Model: 42GRL-90__



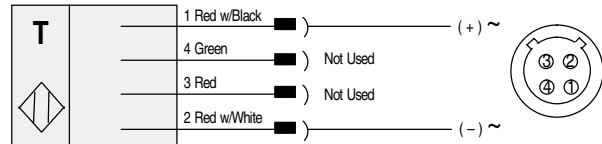
AC/DC Mini QD Model: 42GRL-90__2-QD



DC Micro QD Model: 42GRL-90__0-QD



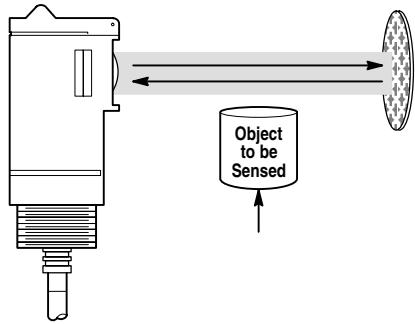
4-pin DC Micro QD Model: 42GRL-90__3-QD1



- ① For Allen-Bradley programmable controller compatible interface, refer to publication 42-2.0.
- ② Quick-disconnect wiring codes shown are valid for Allen-Bradley cables only.
- ③ Load can be placed on either black or white wire to create sourcing or sinking respectively.

Series 9000 Retroreflective

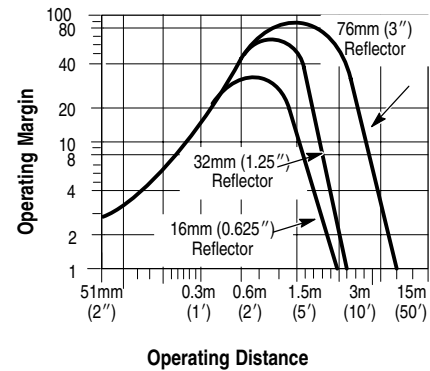
Standard and Timing



QD Cordsets and Accessories

Description	Catalog Number
1.8m (6ft) 4-pin, Mini QD Cordset	889N-F4AF-6F
1.8m (6ft) 5-pin, Mini QD Cordset	889N-F5AF-6F
2m (6.5ft) 4-pin, DC Micro QD Cordset	889D-F4AC-2
2m (6.5ft) 4-pin, AC Micro QD Cordset	889R-F4AEA-2
76mm (3in) Diameter with Center Mount Hole	92-39
32mm (1.25in) Diameter	92-47

Typical Response Curve



Specifications

Field of View	1.5°
Emitter LED	Visible red 660nm

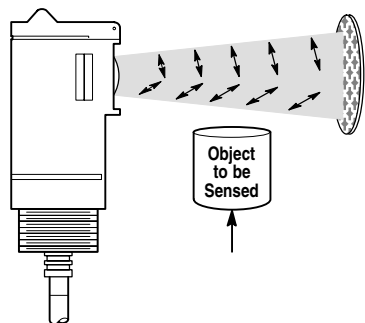
Selection Guide for On/Off Sensors

Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Max Leakage Current	Connection Type	Catalog Number
10-40V DC 30mA	50.8mm (2in) to 9.14m (30ft) with 76mm (3") Reflector	Light/Dark Selectable	NPN/PNP 250mA 2ms	10µA	2m 300V cable	42GRU-9000
					4-pin DC micro QD	42GRU-9000-QD
					4-pin mini QD	42GRU-9000-QD1
10-55V DC/20-40V AC 50-60 Hz 40mA			SPDT EM Relay 2A/132V AC 1A/264V AC 1A/150V DC 15ms	-	2m 300V cable	42GRU-9001
					5-pin mini QD	42GRU-9001-QD
70-264V AC/DC 50/60Hz 15mA			2m 300V cable	-	42GRU-9002	
	5-pin mini QD	42GRU-9002-QD				
45-264V DC/40-264V AC 50/60Hz 15mA	Solid State Isolated N.O. 300mA 2ms	1mA at 264V AC/DC	2m 300V cable	42GRU-9003		
			2m 600V cable	42GRU-9003H		
			4-pin mini QD	42GRU-9003-QD		
			4-pin AC micro QD	42GRU-9003-QD1		

Selection Guide for Sensors with Timing

Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Max Leakage Current	Connection Type	Catalog Number
10-40V DC 30mA	50.8mm (2in) to 9.14m (30ft) with 76mm (3") Reflector	Light/Dark Selectable	NPN/PNP 250mA 5ms	10µA	2m 300V cable	42GTU-9000
					4-pin DC micro QD	42GTU-9000-QD
					4-pin mini QD	42GTU-9000-QD1
10-55V DC/20-40V AC 50-60Hz 40mA			SPDT EM Relay 2A/132V AC/1A/264V AC 1A/150V DC 18ms	-	2m 300V cable	42GTU-9001
					5-pin mini QD	42GTU-9001-QD
70-264V AC/DC 50/60Hz 15mA			2m 300V cable	-	42GTU-9002	
	5-pin mini QD	42GTU-9002-QD				
45-264V DC/40-264V AC 50/60Hz 15mA	Solid State Isolated N.O. 300mA 5ms	1mA at 264V AC/DC	2m 300V cable	42GTU-9003		
			2m 600V cable	42GTU-9003H		
			4-pin mini QD	42GTU-9003-QD		
			4-pin AC micro QD	42GTU-9003-QD1		

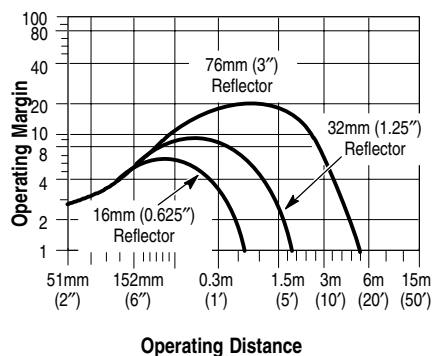
PHOTOSWITCH® Photoelectric Sensors
Series 9000 Polarized Retroreflective
Standard and Timing



QD Cordsets and Accessories

Description	Catalog Number
1.8m (6ft) 4-pin, Mini QD Cordset	889N-F4AF-6F
1.8m (6ft) 5-pin, Mini QD Cordset	889N-F5AF-6F
2m (6.5ft) 4-pin, DC Micro QD Cordset	889D-F4AC-2
2m (6.5ft) 4-pin, AC Micro QD Cordset	889R-F4AEA-2
76mm (3in) Diameter with Center Mount Hole	92-39
32mm (1.25in) Diameter	92-47

Typical Response Curve



Specifications

Field of View	1.5°
Emitter LED	Visible red 660nm

Selection Guide for On/Off Sensors

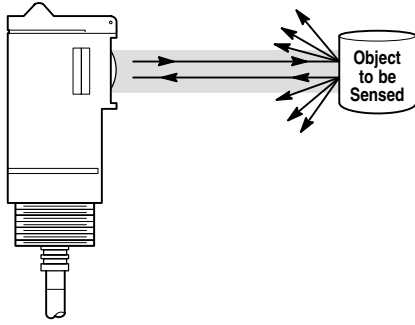
Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Max Leakage Current	Connection Type	Catalog Number		
10-40V DC 30mA	50.8mm (2in) to 4.87m (16ft) with 76mm (3") Reflector	Light/Dark Selectable	NPN/PNP 250mA 2ms	10µA	2m 300V cable	42GRU-9200		
10-55V DC/20-40V AC 50/60Hz 40mA					4-pin DC micro QD	42GRU-9200-QD		
					4-pin mini QD	42GRU-9200-QD1		
70-264V DC/60-264V AC 50/60Hz 15mA			—	2m 300V cable	42GRU-9201			
				5-pin mini QD	42GRU-9201-QD			
				2m 300V cable	42GRU-9202			
45-264V DC/40-264V AC 50/60Hz 15mA			—	Solid State Isolated N.O. 300mA 2ms	1mA at 264V AC/DC	5-pin mini QD	42GRU-9202-QD	
						2m 300V cable	42GRU-9203	
						2m 600V cable	42GRU-9203H	
						4-pin mini QD	42GRU-9203-QD	
							4-pin AC micro QD	42GRU-9203-QD1

Selection Guide for Sensors with Timing

Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Max Leakage Current	Connection Type	Catalog Number		
10-40V DC 30mA	50.8mm (2in) to 4.87m (16ft) with 76mm (3") Reflector	Light/Dark Selectable	NPN/PNP 250mA 5ms	10µA	2m 300V cable	42GTU-9200		
10-55V DC/20-40V AC 50/60Hz 40mA					4-pin DC micro QD	42GTU-9200-QD		
					4-pin mini QD	42GTU-9200-QD1		
70-264V DC/60-264V AC 50/60Hz 15mA			—	SPDT EM Relay 2A/132V AC 1A/264V AC 1A/150V DC 18ms	—	2m 300V cable	42GTU-9201	
						5-pin mini QD	42GTU-9201-QD	
						2m 300V cable	42GTU-9202	
45-264V DC/40-264V AC 50/60Hz 15mA			—	Solid State Isolated N.O. 300mA 5ms	1mA at 264V AC/DC	5-pin mini QD	42GTU-9202-QD	
						2m 300V cable	42GTU-9203	
						2m 600V cable	42GTU-9203H	
						4-pin mini QD	42GTU-9203-QD	
							4-pin AC micro QD	42GTU-9203-QD1

Series 9000 Standard Diffuse

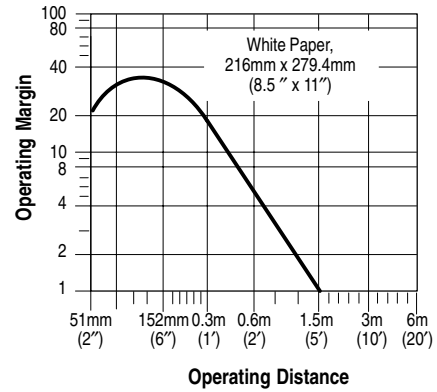
Standard and Timing



QD Cordsets and Accessories

Description	Catalog Number
1.8m (6ft) 4-pin, Mini QD Cordset	889N-F4AF-6F
1.8m (6ft) 5-pin, Mini QD Cordset	889N-F5AF-6F
2m (6.5ft) 4-pin, DC Micro QD Cordset	889D-F4AC-2
2m (6.5ft) 4-pin, AC Micro QD Cordset	889R-F4AEA-2

Typical Response Curve



Specifications

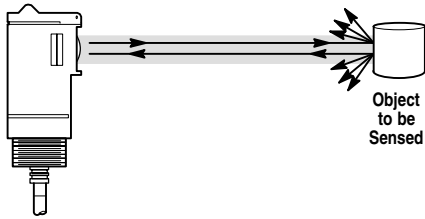
Field of View	3.5°
Emitter LED	Infrared 880nm

Selection Guide for On/Off Sensors

Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Max Leakage Current	Connection Type	Catalog Number	
10–40V DC 30mA	50.8mm (2in) to 1.52m (5ft) to White Paper	Light/Dark Selectable	NPN/PNP 250mA 2ms	10µA	2m 300V cable	42GRP-9000	
					4-pin DC micro QD	42GRP-9000-QD	
					4-pin mini QD	42GRP-9000-QD1	
10–55V DC/20–40V AC 50/60Hz 40mA			SPDT EM Relay 2A/132V AC 1A/264V AC 1A/150V DC 15ms	—	—	2m 300V cable	42GRP-9001
						5-pin mini QD	42GRP-9001-QD
70–264V DC/60–264V AC 50/60Hz 15mA			Solid State Isolated N.O. 300mA 2ms	1mA at 264V AC/DC	—	2m 300V cable	42GRP-9002
	5-pin mini QD	42GRP-9002-QD					
45–264V DC/40–264V AC 50/60Hz 15mA	—	—	—	2m 300V cable	42GRP-9003		
				2m 600V cable	42GRP-9003H		
				4-pin mini QD	42GRP-9003-QD		
					4-pin AC micro QD	42GRP-9003-QD1	

Selection Guide for Sensors with Timing

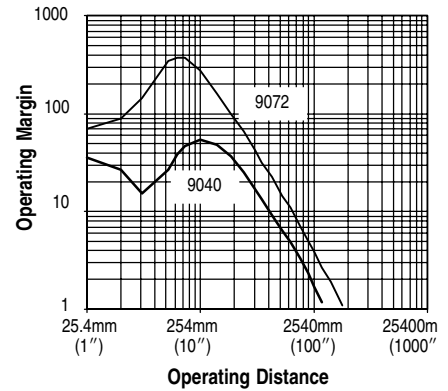
Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Max Leakage Current	Connection Type	Catalog Number	
10–40V DC 30mA	50.8mm (2in) to 1.52m (5ft) to White Paper	Light/Dark Selectable	NPN/PNP 250mA 5ms	10µA	2m 300V cable	42GTP-9000	
					4-pin DC micro QD	42GTP-9000-QD	
					4-pin mini QD	42GTP-9000-QD1	
10–55V DC/20–40V AC 50/60Hz 40mA			SPDT EM Relay 2A/132V AC 1A/264V AC 1A/150V DC 18ms	—	—	2m 300V cable	42GTP-9001
						5-pin mini QD	42GTP-9001-QD
70–264V DC/60–264V AC 50/60Hz 15mA			Solid State Isolated N.O. 300mA 5ms	1mA at 264V AC/DC	—	2m 300V cable	42GTP-9002
	5-pin mini QD	42GTP-9002-QD					
45–264V DC/40–264V AC 50/60Hz 15mA	—	—	—	2m 300V cable	42GTP-9003		
				2m 600V cable	42GTP-9003H		
				4-pin mini QD	42GTP-9003-QD		
					4-pin AC micro QD	42GTP-9003-QD1	



QD Cordsets and Accessories

Description	Catalog Number
1.8m (6ft) 4-pin, Mini QD Cordset	889N-F4AF-6F
1.8m (6ft) 5-pin, Mini QD Cordset	889N-F5AF-6F
2m (6.5ft) 4-pin, DC Micro QD Cordset	889D-F4AC-2
2m (6.5ft) 4-pin, AC Micro QD Cordset	889R-F4AEA-2

Typical Response Curve



Specifications

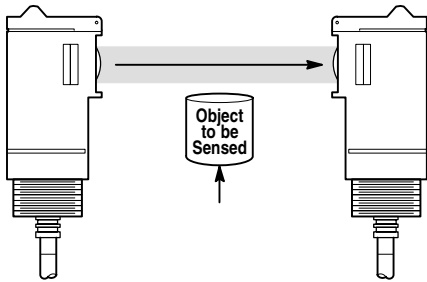
Field of View	6.5°
Emitter LED	Infrared 880nm

Selection Guide for On/Off Sensors

Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Max Leakage Current	Connection Type	Catalog Number		
10–40V DC 30mA	50.8mm (2in) to 3.04m (10ft)	Light/Dark Selectable	NPN/PNP 250mA 2ms	10µA	2m 300V cable	42GRP-9040		
					4-pin DC micro QD	42GRP-9040-QD		
					4-pin mini QD	42GRP-9040-QD1		
10–55V DC/20–40V AC 50/60Hz 40mA			2m 300V cable	42GRP-9041				
				5-pin mini QD	42GRP-9041-QD			
				70–264V AC/DC 50/60Hz 15mA	2m 300V cable	42GRP-9042		
5-pin mini QD	42GRP-9042-QD							
45–264V DC/40–264V AC 50/60Hz 15mA	2m 300V cable	42GRP-9043						
		2m 600V cable	42GRP-9043H					
		4-pin mini QD	42GRP-9043-QD					
70–264V AC/DC 50/60Hz 15mA	50.8mm (2in) to 4.6m (15ft)	Light/Dark Selectable	Solid State Isolated N.O. 300mA 2ms	1mA at 264V AC/DC	4-pin AC micro QD	42GRP-9043-QD1		
					SPDT EM Relay 2A/132V AC 1A/264V AC 1A/150V DC 15ms	—	2m 300V cable	42GRP-9072
							3m 300V cable	42GRP-9072-3
5-pin mini QD	42GRP-9072-QD							

Series 9000 Transmitted Beam

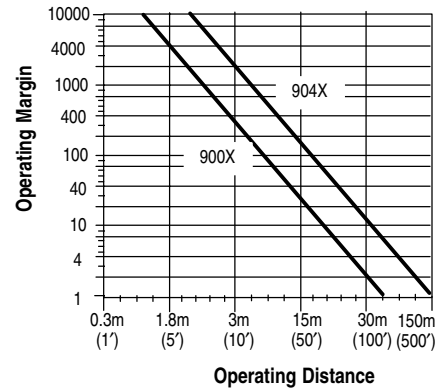
Standard and Timing



QD Cordsets and Accessories

Description	Catalog Number
1.8m (6ft) 4-pin, Mini QD Cordset	889N-F4AF-6F
1.8m (6ft) 5-pin, Mini QD Cordset	889N-F5AF-6F
2m (6.5ft) 4-pin, DC Micro QD Cordset	889D-F4AC-2
2m (6.5ft) 4-pin, AC Micro QD Cordset	889R-F4AEA-2

Typical Response Curve with 61m (200ft) Light Source



Specifications

Field of View	1.5°
Emitter LED	Infrared 880nm

Selection Guide for Light Sources

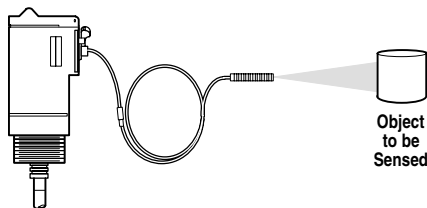
Operating Voltage Supply Current	Max Sensing Distance	Connection Type	Catalog Number
10-264V AC/DC 50/60Hz 15mA	25.4mm (1in) to 61m (200ft)	2m 300V cable	42GRL-9000
		2m 600V cable	42GRL-9000H
		4-pin DC micro QD	42GRL-9000-QD
		4-pin mini QD	42GRL-9002-QD
	25.4mm (1in) to 152m (500ft)	2m 300V cable	42GRL-9040
		4-pin DC micro QD	42GRL-9040-QD
		4-pin mini QD	42GRL-9042-QD
		4-pin AC micro QD	42GRL-9043-QD1

Selection Guide for On/Off Receivers

Operating Voltage Supply Current	Output Energized	Output Type Capacity Response Time	Max Leakage Current	Connection Type	Catalog Number
10-40V DC 25mA	Receiver Light or Dark Output Selectable	NPN and PNP 250mA 5ms	10µA	2m -300V cable	42GRR-9000
				4-pin DC micro QD	42GRR-9000-QD
				4-pin mini QD	42GRR-9000-QD1
10-55V DC, 20-40V AC 50/60Hz 35mA		SPDT EM Relay 2A/132V AC, 1A/264V AC 1A/150V DC 23ms	-	2m 300V cable	42GRR-9001
				5-pin mini QD	42GRR-9001-QD
70-264V AC/DC, 50/60Hz 10mA		Solid State Isolated N.O. 300mA 15ms	1mA	2m 300V cable	42GRR-9002
				5-pin mini QD	42GRR-9002-QD
45-264V DC, 40-264V AC 50/60Hz 10mA		-	-	2m 300V cable	42GRR-9003
				2m 600V cable	42GRR-9003H
	4-pin mini QD			42GRR-9003-QD	
	4-pin AC micro QD			42GRR-9003-QD1	

Selection Guide for Receivers with Timing

Operating Voltage Supply Current	Output Energized	Output Type Capacity Response Time	Max Leakage Current	Connection Type	Catalog Number
10-40V DC 25mA	Receiver Light or Dark Output Selectable	NPN and PNP 250mA 5ms	10µA	2m 300V cable	42GTR-9000
				4-pin DC micro QD	42GTR-9000-QD
				4-pin mini QD	42GTR-9000-QD1
70-264V AC/DC 50/60Hz 10mA		SPDT EM Relay 2A/132V AC, 1A/264V AC 1A/150V DC 23ms	-	2m 300V cable	42GTR-9002
				5-pin mini QD	42GTR-9002-QD



QD Cordsets and Accessories

Description	Catalog Number
1.8m (6ft) 4-pin, Mini QD Cordset	889N-F4AF-6F
1.8m (6ft) 5-pin, Mini QD Cordset	889N-F5AF-6F
2m (6.5ft) 4-pin, DC Micro QD Cordset	889D-F4AC-2

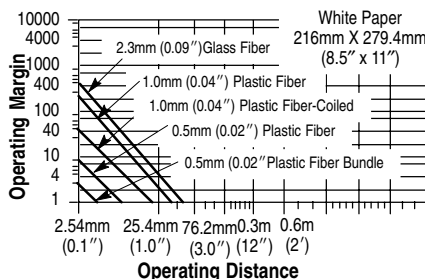
Description	Catalog Number
2m (6.5ft) 4-pin, AC Micro QD Cordset	889R-F4AEA-2

Specifications

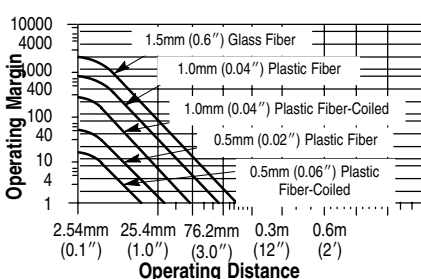
Emitter LED	Visible red 660nm
-------------	-------------------

Typical Response Curves

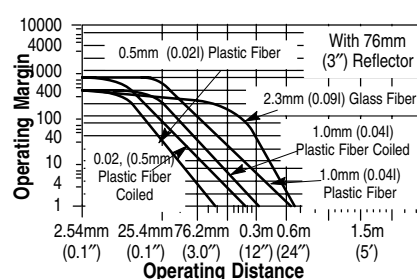
Standard Diffuse



Transmitted Beam



Retroreflective



Selection Guide for On/Off Sensors

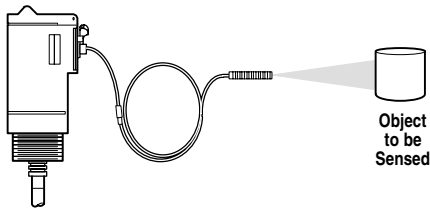
Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type/Capacity Response Time	Max Leakage Current	Connection Type	Catalog Number
10-40V DC 30mA	Depends on Fiber Optic cable	Light/Dark Selectable	NPN/PNP 250mA 2ms	10µA	2m 300V cable	42GRF-9100
					4-pin DC micro QD	42GRF-9100-QD
10-55V DC/20-40V AC 50-60Hz 40mA			2m 300V cable	42GRF-9101		
				5-pin mini QD	42GRF-9101-QD	
70-264V AC/DC 50/60Hz 15mA			2m 300V cable	42GRF-9102		
				5-pin mini QD	42GRF-9102-QD	
45-264V DC/40-264V AC 50/60Hz 15mA			2m 300V cable	42GRF-9103		
				2m 600V cable	42GRF-9103H	
	4-pin mini QD	42GRF-9103-QD				
	4-pin AC micro QD	42GRF-9103-QD1				

Selection Guide for Sensors with Timing

Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type/Capacity Response Time	Max Leakage Current	Connection Type	Catalog Number
10-40V DC 30mA	Depends on Fiber Optic cable	Light/Dark Selectable	NPN/PNP 250mA 2ms	10µA	2m 300V cable	42GTF-9100
					4-pin DC micro QD	42GTF-9100-QD
10-55V DC/20-40V AC 50-60-Hz 40mA			2m 300V cable	42GTF-9101		
				5-pin mini QD	42GTF-9101-QD	
70-264V AC/DC 50/60Hz 15mA			2m 300V cable	42GTF-9102		
				5-pin mini QD	42GTF-9102-QD	
45-264V DC/40-264V AC 50/60Hz 15mA			2m 300V cable	42GTF-9103		
				4-pin mini QD	42GTF-9103-QD	
	4-pin AC micro QD	42GTF-9103-QD1				

Series 9000 Infrared Fiber Optic

Standard and Timing



Specifications

Emitter LED	Infrared 880nm
-------------	----------------

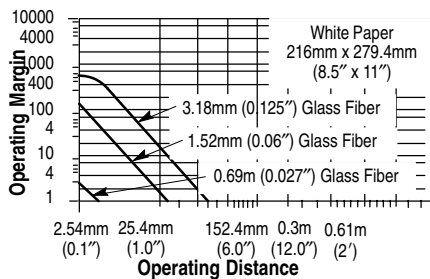
QD Cordsets and Accessories

Description	Catalog Number
1.8m (6ft) 4-pin, Mini QD Cordset	889N-F4AF-6F
1.8m (6ft) 5-pin, Mini QD Cordset	889N-F5AF-6F
2m (6.5ft) 4-pin, DC Micro QD Cordset	889D-F4AC-2

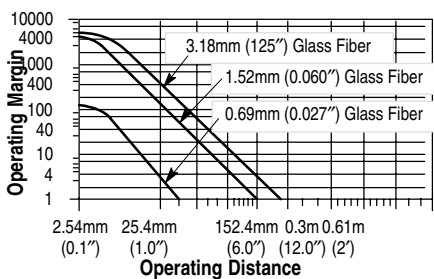
Description	Catalog Number
2m (6.5ft) 4-pin, AC Micro QD Cordset	889R-F4AEA-2

Typical Response Curves

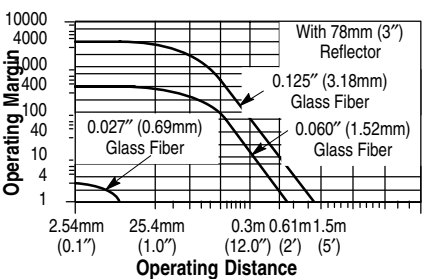
Standard Diffuse



Transmitted Beam



Retroreflective



Selection Guide for On/Off Sensors

Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type/Capacity Response Time	Max Leakage Current	Connection Type	Catalog Number
10-40V DC 30mA	Depends on Fiber Optic cable	Light/Dark Selectable	NPN/PNP 250mA 2ms	10µA	2m 300V cable	42GRF-9000
					4-pin DC micro QD	42GRF-9000-QD
10-55V DC /20-40V AC 50-50Hz 40mA			SPDT EM Relay 2A/132V AC, 1A/264V AC 1A/150V DC 15ms	-	2m 300V cable	42GRF-9001
					5-pin mini QD	42GRF-9001-QD
70-264V AC/DC, 50/60Hz 15mA			2m 300V cable	42GRF-9002	5-pin mini QD	42GRF-9002-QD
					2m 300V cable	42GRF-9003
45-264V DC/40-264V AC 50/60Hz 15mA			2m 600V cable	42GRF-9003H	4-pin mini QD	42GRF-9003-QD
			4-pin AC micro QD	42GRF-9003-QD1	1mA at 264V AC/DC	

Selection Guide for Sensors with Timing

Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type/Capacity Response Time	Max Leakage Current	Connection Type	Catalog Number
10-40V DC 30mA	Depends on Fiber Optic cable	Light/Dark Selectable	NPN/PNP 250mA 2ms	10µA	2m 300V cable	42GTF-9000
					4-pin DC micro QD	42GTF-9000-QD
10-55V DC /20-40V AC 50-60Hz 40mA			SPDT EM Relay 2A/132V AC, 1A/264V AC 1A/150V DC 15ms	-	2m 300V cable	42GTF-9001
					5-pin mini QD	42GTF-9001-QD
70-264V AC/DC, 50/60Hz 15mA			2m 300V cable	42GTF-9002	5-pin mini QD	42GTF-9002-QD
					2m 300V cable	42GTF-9003
45-264V DC/40-264V AC 50/60Hz 15mA			2m 600V cable	42GTF-9003H	4-pin mini QD	42GTF-9003-QD
			4-pin AC micro QD	42GTF-9003-QD1	1mA at 264V AC/DC	

AB Drives

Description

The use of electrical sensors in hazardous locations presents many challenges. The traditional method has been to place these devices and the connected wiring in explosion-proof enclosures and conduit systems, which would be capable of containing a potential explosion. Although a proven method, these systems tend to be very difficult to install and maintain, have a high material and labor cost, and offer limited flexibility and corrosion protection. Therefore, many users have migrated to the use of intrinsic safety as the preferred choice for explosion protection.

The Series 9000 Transmitted Beam Photoelectric Sensor is designed and approved as an intrinsically safe apparatus under the entity concept to worldwide standards. It may be installed into a Class I, II, III; Division 1 (Zones 0, 1, 2) hazardous location when connected to an appropriate safety barrier. The sensor is also approved as nonincendive for installation into Class I; Division 2 hazardous locations without the need for a safety barrier. Further, the user may follow the same wiring practices as for nonhazardous location installations with few exceptions. The result is a safer, more flexible, easily maintained, and lower cost system.

The sensor offers a long sensing range 106m (350ft) and high operating margin. This makes it an ideal solution for use in the harsh industrial environments commonly found in the automotive, petrochemical, and grain processing industries. It also retains many of the same features, which have made the Series 9000 an industry standard.

For other sensing modes refer to the Intrinsically Safe Series 5000 photoelectric sensor. Information on the Series 897H intrinsic safety barriers may be found on page 5–1.

General Specifications

Light Source	Infrared LED (880nm)
Unit Protection	Overload, short circuit, reverse polarity, false pulse
Supply Voltage	13 to 30V DC
Current Consumption	25mA maximum
Output Type	Both NPN and PNP
Output Mode	Light/dark operate selectable
Output Rating	8.5mA (PNP) 15mA (NPN)
Response Time	10ms maximum
Housing Material	Valox®
Lens Material	Acrylic
LED Indicators	See Indicators table below
Connection Types	2m 300V cable, 4-pin DC micro QD, 4-pin DC mini QD
Supplied Accessories	#129–130 mounting kit
Optional Accessories	Series 897H intrinsic safety barriers, mounting brackets, cordsets
Operating Environment	NEMA 3, 4X, 6P, 12, 13 (IP67) 1200psi washdown
Vibration	10–55Hz, 1mm amplitude, Meets or exceeds IEC 60947–5–2
Shock	30g with 1ms pulse duration, Meets or exceeds IEC 60947–5–2
Operating Temperature	–20°C to +70°C (–4°F to +158°F)
Relative Humidity	5...95%
Approvals	FM approved, CSA approved, CE marked for all applicable directives

Indicators

Label	Color	State	Status
Output	Green	OFF	Sensor output de-activated
		ON	Sensor output activated
Margin/SCP	Red	OFF	Margin <2.5
		ON	Margin >2.5
		Flashing	Output SCP active
Power	Yellow	OFF	Sensor not powered
		ON	Sensor powered

Selection Guide for Intrinsic Safety Barriers

The 42GRx–95x0 is approved as an intrinsically safe apparatus under the entity concept by FM and CSA. Therefore, any safety barrier which meets both the stated operational and safety requirements (see Table 1) of the sensor may be used. Note that the sensor is also approved as nonincendive (FM) for installation into Class I; Division 2 hazardous locations without the need for a safety barrier.

Features

- Intrinsically safe to North American standards
- Transmitted beam sensing mode
- Compatible with Series 897H intrinsic safety barriers
- 30mm harsh duty package
- Fast response time
- Variety of connection types

Table 1
Entity Parameters

	Sensor		Barrier
V_{max}	31.5V	\geq	V_t
I_{max}	150mA	\geq	I_t
P_{max}	0.95W	\geq	P_t
$C_i + C_{leads}$	0uF	\leq	C_a
$L_i + L_{leads}$	0mH	\leq	L_a

General Information

Dimensions page 1–59
Wiring Diagrams page 1–70

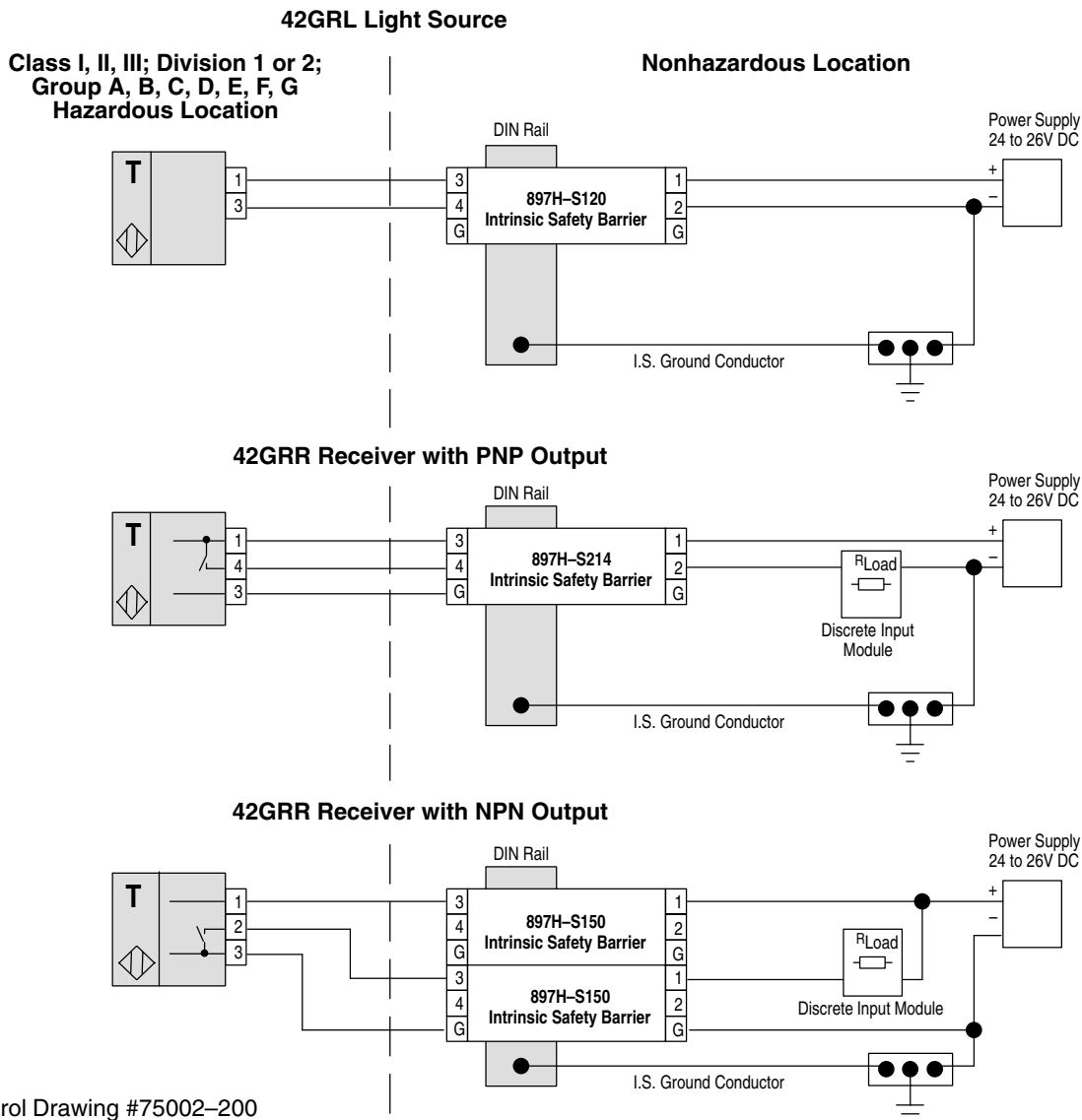
Sensing Modes

Transmitted Beam page 1–71

Accessories

Quick-Disconnect Cables page 5–1
Mounting Assemblies page 1–316

Wiring Diagrams



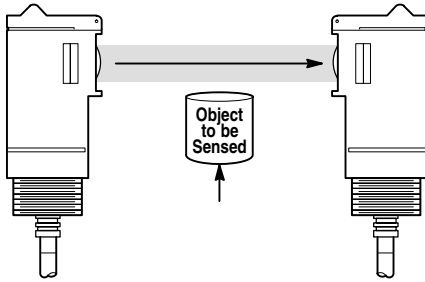
When installing intrinsically safe systems the user should refer to all relevant national standards and/or those standards set forth by the "authority having jurisdiction" at the installation site. Reference should also be made to Rockwell Automation/Allen-Bradley documents #75002-200 (Control Drawing) and PA-9802 (Installation Instructions). Other

installation guidelines may be found in the ANSI/ISA RP 12.6 (Wiring Practices for Hazardous (Classified) Location Instrumentation) document. Contact the Allen-Bradley Product Support Center for a complete list of compatible A-B I/O modules.

It is recommended that wiring for intrinsically safe systems be identified

as such through the use of light blue jacketing and/or through appropriate labels. Such labels are required by NEC Article 504 and ANSI/ISA RP-12.6 to be placed at no more than 25 foot intervals.

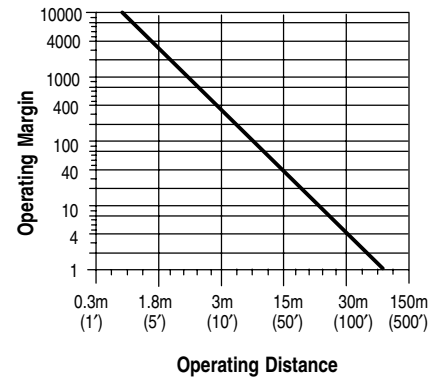
For more information on Intrinsically Safe Barriers, see page 5-56.



QD Cordsets and Accessories

Description	Catalog Number
1.8m (6ft) 4-pin, Mini QD Cordset	889N-F4AF-6F
2m (6.5ft) 4-pin, DC Micro QD Cordset	889D-F4AC-2
Mounting Bracket	60-2439

Typical Response Curve



Specifications

Field of View	1.5° Receiver
Transmitting LED	Infrared 880nm

Selection Guide for Light Sources

Operating Voltage Supply Current	Sensing Distance	Connection Type	Catalog Number
14 to 30V DC 16mA	25.4mm (2in) to 106m (350ft)	2m 300V cable	42GRL-9540
		4-pin micro QD	42GRL-9540-QD
		4-pin mini QD	42GRL-9540-QD1

Selection Guide for Receivers

Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type/ Capacity Response Time	Max Leakage Current	Connection Type	Catalog Number
13 to 30V DC 25mA	25.4mm (2in) to 106m (350ft)	Light/Dark Operate	PNP/8.5mA NPN/15mA 10ms max.	10uA	2m 300V cable	42GRR-9500
					4-pin micro QD	42GRR-9500-QD
					4-pin mini QD	42GRR-9500-QD1

Series 9000

Diagnostic

Description

The Series 9000 photoelectric sensors with diagnostic output are designed to provide both a visual and electrical indication of a “dirty lens” condition. This is useful in applications where dirt and dust build-up on the optics lens are expected. This action will reduce the return light signal to the sensor thereby, reducing it’s capability to reliably detect passing targets.

The sensor may be operated in one of two operating modes—**static** or **dynamic**. The static mode of operation is intended for web applications where an immediate indication is required of an unstable sensing condition. This condition occurs when the margin level is greater than 0.7X and less than 1.5X.

The dynamic mode of operation is intended for repetitive applications where targets are constantly moving into and out of the sensor’s field of view. These applications include packages moving on a conveyor, material on a moving product line, etc. To minimize “nuisance” diagnostic outputs which would result in these types of applications, the dynamic mode of operation will only provide a diagnostic output after detection of seven “unstable” signals.

General Specifications

Light Source	Infrared LED (880nm)
Unit Protection	Overload, short circuit, reverse polarity, false pulse
Supply voltage	24V DC, 120V AC, 220V AC—see Selection Guide tables
Current Consumption	See Selection Guide tables
Output Type	NPN and PNP both sensor and diagnostic output (DC models) SPST relay with SPDT relay for diagnostic output (AC/DC models)
Output Mode	Light/dark operate selectable N.O. and N.C. for diagnostic output
Output Rating	100mA @ 30V DC (DC models) 2A @ 132V AC (AC/DC sensor and diagnostic) 1A @ 264V AC (AC/DC sensor and diagnostic)
Response Time	2ms (DC models) 15ms (AC/DC models)
Housing Material	Valox®
Lens Material	Acrylic
LED Indicators	See Indicators table below
Connection Types	2m 300V cable, 4-pin DC micro QD, 4-pin DC mini QD, 5-pin DC micro QD
Supplied Accessories	#129–130 mounting kit
Optional Accessories	Mounting brackets, reflectors, cordsets
Operating Environment	NEMA 3, 4X, 6P, 12, 13 (IP67) 1200psi washdown
Vibration	10–55Hz, 1mm amplitude, Meets or exceeds IEC 60947–5–2
Shock	30g with 1ms pulse duration, Meets or exceeds IEC 60947–5–2
Operating Temperature	0°C to +70°C (32°F to +158°F)
Relative Humidity	5...95%
Approvals	UL listed, CSA approved, CE marked for all applicable directives

Features

- Both visual and electrical indication of “dirty lens” condition
- Supports both static and diagnostic modes of operation
- Harsh duty 30mm package
- Wide selection of sensing modes
- Both DC and AC/DC operation
- Fast response time
- Variety of connection types

General Information

Dimensions page 1–59
Wiring Diagrams page 1–74

Sensing Modes

Retroreflective page 1–75
Polarized Retroreflective page 1–76
Standard Diffuse page 1–77
Transmitted Beam page 1–78

Accessories

Quick-Disconnect Cables page 5–1
Mounting Assemblies page 1–316
Reflectors, Reflective Tape page 1–327

Indicators

Label	Color	State	Diagnostic Operating Mode	
			Static	Dynamic
POWER FLASHING TGT SIGNAL LOW	Yellow	On Steady	Sensor Power On	
		Flashing	Unstable operation (0.7 < Margin < 1.5)	1.0 < Margin > 1.5 for seven successive operations Diffuse: Target margin too low Retro/Polarized Retro: Reflector margin too low Transmitted Beam unbroken beam margin too low
FLASHING NON-TGT SIGNAL HIGH	Green	Flashing	Unstable operation (0.7 < Margin < 1.5)	0.7 < Margin < 1.0 for seven successive operations Diffuse: Background margin too high Retro / Polarized Retro: Target margin too high Transmitted Beam broken beam margin to high
STABILITY ❶ FLASHING SCP	Red	On Steady	Stable operation (Margin < 0.7 or Margin > 1.5)	
		Off	Unstable operation (0.7 < Margin < 1.5)	
		Flashing ❷	Overload or short circuit at sensor output	
OUTPUT	Green	On	Output energized	

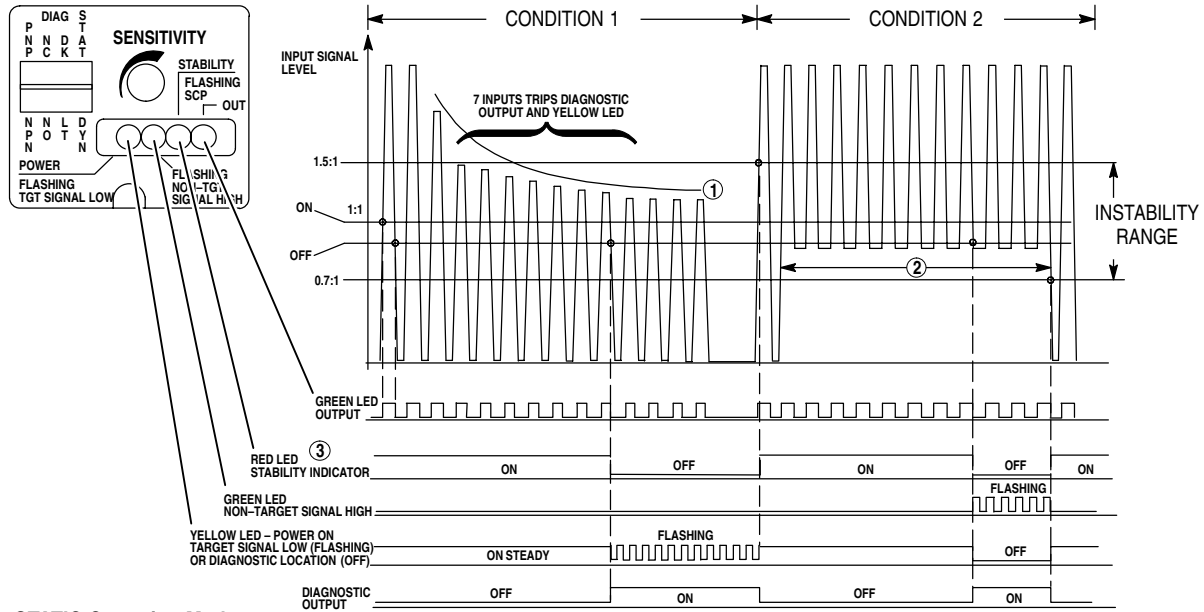
❶ To prevent potentially confusing indications during rapid signal transitions, the red STABILITY indicator has a typical delay of 100ms before it turns off. As a result, the indicator will not turn off for quick, brief events. (The Diagnostic Output has no delay.)

❷ 10–30V DC sensors only.

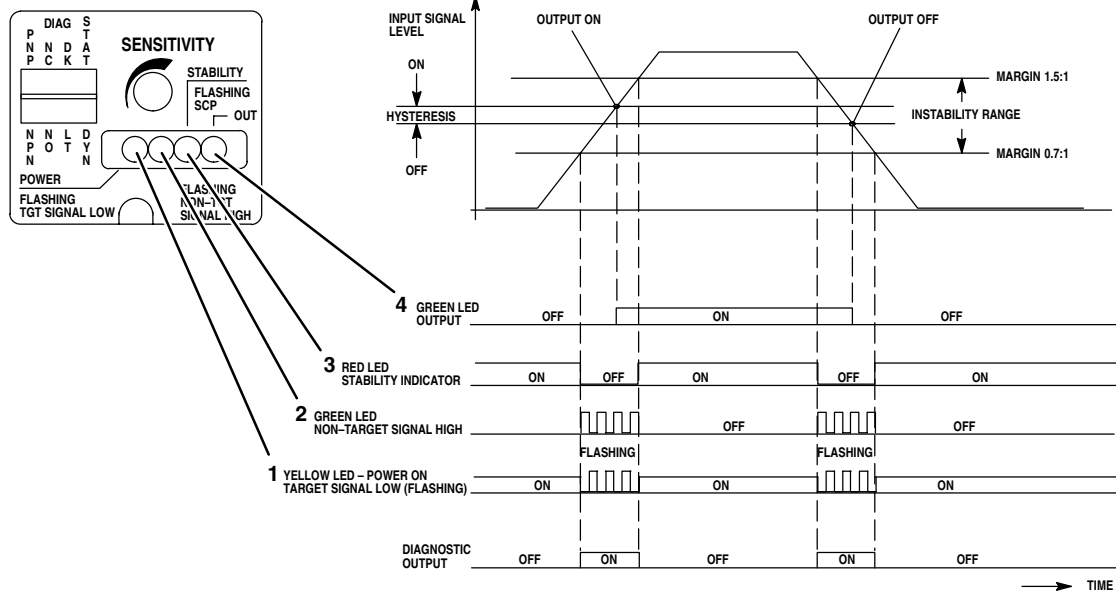


User Interface Panel—DC model shown

DYNAMIC Operating Mode

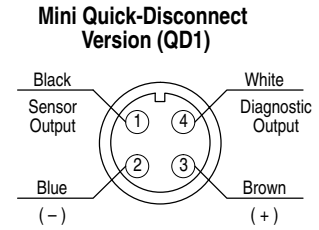
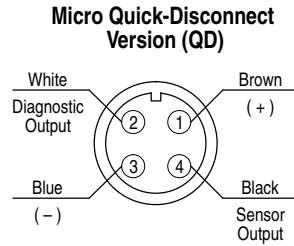
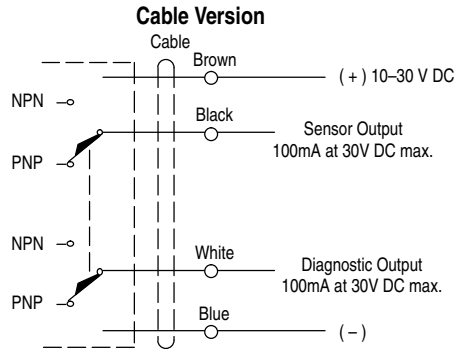


STATIC Operating Mode



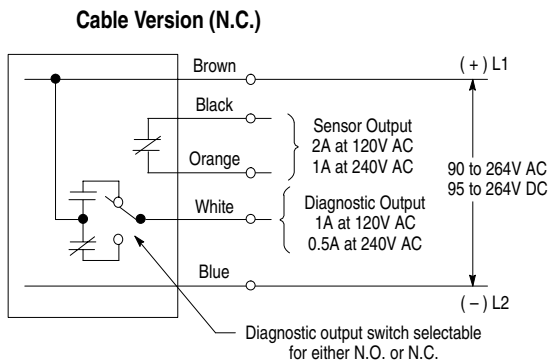
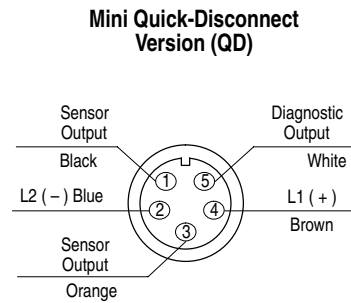
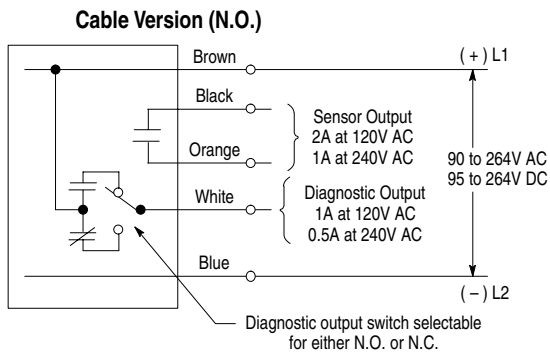
Wiring Diagrams

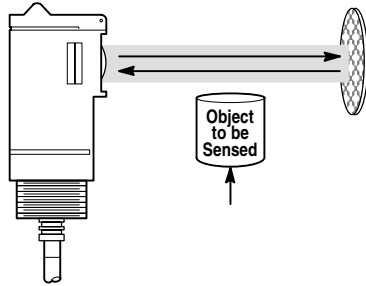
DC Sensors



Note: DO NOT connect both an NPN and PNP load at the same time!

AC Sensors

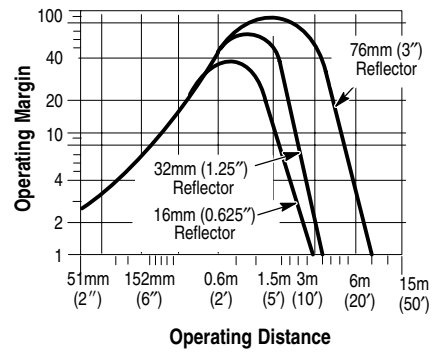




QD Cordsets and Accessories

Description	Catalog Number
1.8m (6ft) 4-pin, Mini QD Cordset	889N-F4AF-6F
1.8m (6ft) 5-pin, Mini QD Cordset	889N-F5AF-6F
2m (6.5ft) 4-pin, DC Micro QD Cordset	889D-F4AC-2
Mounting Bracket	60-2439
76mm (3in) Diameter with Center Mount Hole	92-39
32mm (1.25in) Diameter	92-47

Typical Response Curve



Specifications

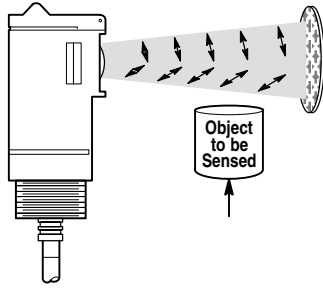
Field of View	1.5°
Emitter LED	Visible red 660nm

Selection Guide

Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Max Leakage Current	Connection Type	Catalog Number	
10-30V DC 30mA	50.8mm (2in) to 9.14m (30ft) with 76mm (3'') Reflector	Light/Dark Selectable	NPN and PNP (Sensor and Diagnostic) 100mA @ 30V DC 2ms	10µA	2m 300V cable	42GDU-9000	
					4-pin DC micro QD	42GDU-9000-QD	
					4-pin mini QD	42GDU-9000-QD1	
90 to 264V AC 95 to 264V DC 15mA			SPST Relay N.O. (Sensor) 2A @ 120V AC 1A @ 264V AC 15ms SPDT Relay, N.O. and N.C. (Diagnostic) 1A @ 120V AC 0.5A @ 240V AC 15ms		—	2m 300V cable	42GDU-9004
						5-pin mini QD	42GDU-9004-QD
						2m 300V cable	42GDU-9005
90 to 264V AC 95 to 264V DC 15mA	SPST Relay N.C. (Sensor) 2A @ 120V AC 1A @ 264V AC 15ms SPDT Relay, N.O. and N.C. (Diagnostic) 1A @ 120V AC 0.5A @ 240V AC 15ms	—	5-pin mini QD	42GDU-9005-QD			

Series 9000 Polarized Retroreflective

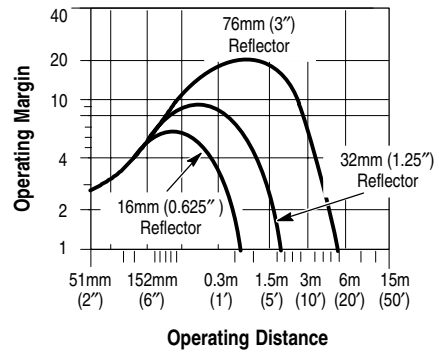
Diagnostic



QD Cordsets and Accessories

Description	Catalog Number
1.8m (6ft) 4-pin, Mini QD Cordset	889N-F4AF-6F
1.8m (6ft) 5-pin, Mini QD Cordset	889N-F5AF-6F
2m (6.5ft) 4-pin, DC Micro QD Cordset	889D-F4AC-2
Mounting Bracket	60-2439
76mm (3in) Diameter with Center Mount Hole	92-39
32mm (1.25in) Diameter	92-47

Typical Response Curve

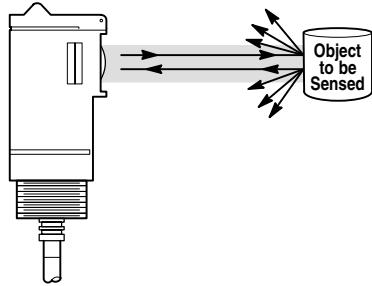


Specifications

Field of View	1.5°
Emitter LED	Visible red 660nm

Selection Guide

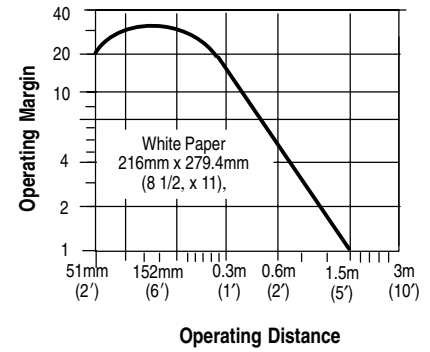
Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Max Leakage Current	Connection Type	Catalog Number
10-30V DC 30mA			NPN and PNP (Sensor and Diagnostic) 100mA @ 30V DC 2ms	10µA	2m 300V cable	42GDU-9200
					4-pin DC micro QD	42GDU-9200-QD
					4-pin mini QD	42GDU-9200-QD1
90 to 264V AC 95 to 264V DC 15mA	50.8mm (2in) to 4.87m (16ft) with 76mm (3") Reflector	Light/Dark Selectable	SPST Relay N.O. (Sensor) 2A @ 120V AC 1A @ 264V AC 15ms SPDT Relay, N.O. and N.C. (Diagnostic) 1A @ 120V AC 0.5A @ 240V AC 15ms	-	2m 300V cable	42GDU-9204
					5-pin mini QD	42GDU-9204-QD
					2m 300V cable	42GDU-9205
					5-pin mini QD	42GDU-9205-QD
					2m 300V cable	42GDU-9205
					5-pin mini QD	42GDU-9205-QD



QD Cordsets and Accessories

Description	Catalog Number
1.8m (6ft) 4-pin, Mini QD Cordset	889N-F4AF-6F
1.8m (6ft) 5-pin, Mini QD Cordset	889N-F5AF-6F
2m (6.5ft) 4-pin, DC Micro QD Cordset	889D-F4AC-2
Mounting Bracket	60-2439

Typical Response Curve



Specifications

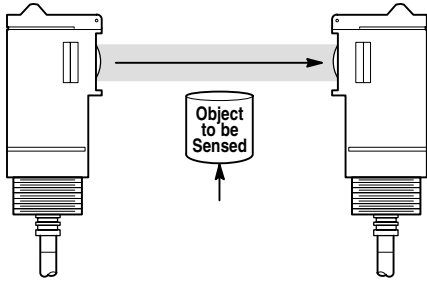
Field of View	3.5°
Emitter LED	Infrared 880nm

Selection Guide

Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Max Leakage Current	Connection Type	Catalog Number		
10–30V DC 30mA	50.8mm (2in) to 1.52m (5ft) to White Paper	Light/Dark Selectable	NPN and PNP (Sensor and Diagnostic) 100mA @ 30V DC 2ms	10µA	2m 300V cable	42GDP-9000		
					4-pin DC micro QD	42GDP-9000-QD		
					4-pin mini QD	42GDP-9000-QD1		
90 to 264V AC 95 to 264V DC 15mA			50.8mm (2in) to 1.52m (5ft) to White Paper	Light/Dark Selectable	SPST Relay N.O. (Sensor) 2A @ 120V AC 1A @ 264V AC 15ms SPDT Relay, N.O. and N.C. (Diagnostic) 1A @ 120V AC 0.5A @ 240V AC 15ms	—	2m 300V cable	42GDP-9004
							5-pin mini QD	42GDP-9004-QD
							2m 300V cable	42GDP-9005
90 to 264V AC 95 to 264V DC 15mA	50.8mm (2in) to 1.52m (5ft) to White Paper	Light/Dark Selectable	SPST Relay N.C. (Sensor) 2A @ 120V AC 1A @ 264V AC 15ms SPDT Relay, N.O. and N.C. (Diagnostic) 1A @ 120V AC 0.5A @ 240V AC 15ms	—	5-pin mini QD	42GDP-9005-QD		

Series 9000 Transmitted Beam

Diagnostic



Light Sources and Receivers must be ordered separately. Any Light Source is compatible with any Receiver.

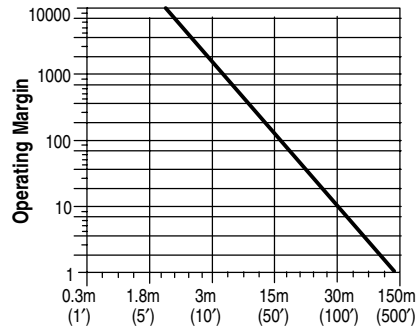
Specifications

Field of View	1.5°
Emitter LED	Infrared 880nm

QD Cordsets and Accessories

Description	Catalog Number
1.8m (6ft) 4-pin, Mini QD Cordset	889N-F4AF-6F
1.8m (6ft) 5-pin, Mini QD Cordset	889N-F5AF-6F
2m (6.5ft) 4-pin, DC Micro QD Cordset	889D-F4AC-2
Mounting Bracket	60-2439

Typical Response Curve



Operating Distance

Selection Guide for Light Sources

Operating Voltage Supply Current	Sensing Distance	Max Leakage Current	Connection Type	Catalog Number
10-264V AC/DC 15mA	25.4mm (1in) to 61m (200ft)	—	2m 300V cable	42GRL-9000
			4-pin DC micro QD	42GRL-9000-QD
			4-pin mini QD	42GRL-9002-QD
10-264V AC/DC 15mA	25.4mm (1in) to 152m (500ft)	—	2m 300V cable	42GRL-9040
			4-pin DC micro QD	42GRL-9040-QD
			4-pin mini QD	42GRL-9042-QD

Selection Guide for Receivers

Operating Voltage Supply Current	Output Energized	Output Type Capacity Response Time	Max Leakage Current	Connection Type	Catalog Number
10-30V DC 30mA	Receiver Light/Dark Selectable	NPN and PNP (Sensor and Diagnostic) 100mA @ 30V DC 2ms	10µA	2m 300V cable	42GDR-9000
				4-pin DC micro QD	42GDR-9000-QD
				4-pin mini QD	42GDR-9000-QD1
90 to 264V AC 95 to 264V DC 15mA	Light/Dark Selectable	SPST Relay N.O. (Sensor) 2A @ 120V AC 1A @ 264V AC 15ms SPDT Relay, N.O. and N.C. (Diagnostic) 1A @ 120V AC 0.5A @ 240V AC 15ms	—	2m 300V cable	42GDR-9004
				5-pin mini QD	42GDR-9004-QD
				2m 300V cable	42GDR-9005
				5-pin mini QD	42GDR-9005-QD
90 to 264V AC 95 to 264V DC 15mA	Light/Dark Selectable	SPST Relay N.C. (Sensor) 2A @ 120V AC 1A @ 264V AC 15ms SPDT Relay, N.O. and N.C. (Diagnostic) 1A @ 120V AC 0.5A @ 240V AC 15ms	—	2m 300V cable	42GDR-9005
				5-pin mini QD	42GDR-9005-QD
				2m 300V cable	42GDR-9005
				5-pin mini QD	42GDR-9005-QD

Description

Series 9000 darkroom sensors are designed for use in areas where the emission of visible light must be sharply reduced, such as in the manufacture of photographic films and papers. These On/Off sensors have been specifically designed and constructed to reduce visible light emission to less than 0.003 millilux measured 25mm (1in) from the sensor.

Series 9000 darkroom sensors use an LED light source with very little visible light emission. Visible light radiation from the sensor is further controlled through the use of special construction techniques and lens and housing materials.

Like standard Series 9000 On/Off sensors, these sensors contain Power, Output, and Margin/Short Circuit indicators. Using these indicators can speed setup and maintenance. During normal "lights out" operation, the opaque sensor cover must be closed and the cover screw tightened with a torque equal to 0.226 to 0.452 Newton-meter (2 to 4 inch-pounds) to prevent visible light emission from these indicators.

Series 9000 darkroom version sensors are available in several versions that operate from supply voltages of 10–40V DC or 70–264V AC/DC. DC models are available with NPN and PNP outputs. The AC/DC models are available with SPDT electro-mechanical relay outputs, allowing the sensor and output to be supplied with different AC and/or DC voltage levels.

General Specifications

Light Source	Infrared LED (940nm)
Unit Protection	Overload, short circuit, reverse polarity, false pulse
Supply Voltage	24V DC, 120V AC, 220V AC (see Selection Guide page)
Current Consumption	See Selection Guide page
Output Type	NPN and PNP (DC models); SPDT relay (AC/DC models)
Output Mode	Light/Dark operate selectable
Output Rating	100mA @ 30V DC (DC models); 2A @ 132V AC (AC/DC sensor); 1A @ 264V AC (AC/DC sensor)
Response Time	2ms (DC models); 15ms (AC/DC models)
Housing Material	Valox®
Lens Material	Acrylic
LED Indicators	See Indicators table
Connection Types	2m 300V cable, 4-pin DC micro QD, 5-pin AC mini QD
Supplied Accessories	#129–130 mounting kit
Optional Accessories	Mounting brackets, reflectors, cordsets
Operating Environment	NEMA 3, 4X, 6P, 12, 13 (IP67) 1200psi washdown
Vibration	10–55Hz, 1mm amplitude, Meets or exceeds IEC 60947–5–2
Shock	30g with 1ms pulse duration, Meets or exceeds IEC 60947–5–2
Operating Temperature	–34° C to +70° C (–29° F to +158° F)
Relative Humidity	5...95%
Approvals	UL listed, CSA approved, CE marked for all applicable directives

Features

- Reduced light emission for darkroom applications
- Harsh duty 30mm package
- Wide selection of sensing modes
- Both DC and AC/DC operation
- Fast response time
- Variety of connection types

General Information

Dimensions page 1–59
Wiring Diagrams page 1–61

Sensing Modes

Darkroom

Operation page 1–79
Retroreflective page 1–81
Standard Diffuse page 1–82
Transmitted Beam page 1–83
Infrared Glass Fiber Optic page 1–84

Accessories

Quick-Disconnect Cables page 5–1
Mounting Assemblies page 1–316
Reflectors, Reflective Tape page 1–327

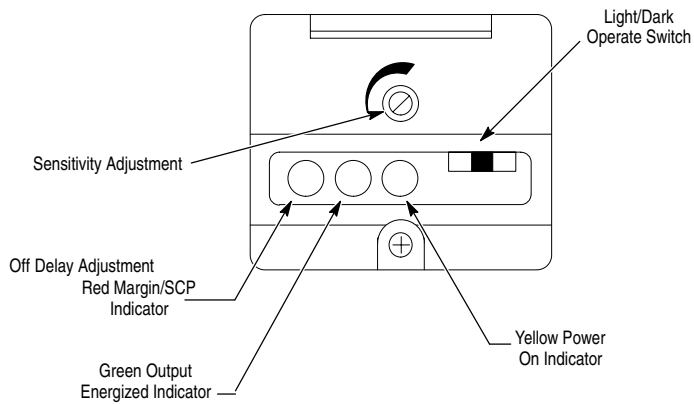
Series 9000

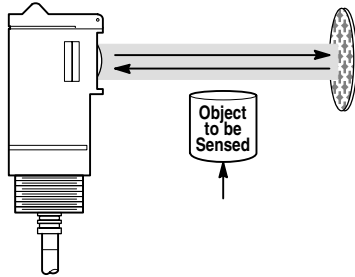
Darkroom

User Interface

Label	Color	State	Status
Output	Green	OFF	Sensor output de-activated
		ON	Sensor output activated
Margin/SCP	Red	OFF	Margin < 2.5
		ON	Margin >2.5
		Flashing	Output SCP active
Power	Yellow	OFF	Sensor not powered
		ON	Sensor powered

On/Off Sensors—Top View Detail





QD Cordsets and Accessories

Description	Catalog Number
1.8m (6ft) 5-pin, Mini QD Cordset	889N-F5AF-6F
2m (6.5ft) 4-pin, DC Micro QD Cordset	889D-F4AC-2
76mm (3in) Diameter with Center Mount Hole	92-39
32mm (1.25in) Diameter	92-47

Specifications

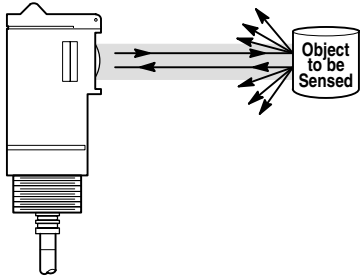
Field of View	1.5°
Emitter LED	Infrared 940nm

Selection Guide for Sensors

Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Max Leakage Current	Connection Type	Catalog Number	
10-40V DC 30mA	50.8mm (2in) to 4.5m (15ft) with 78mm (3") Reflector	Light/Dark Selectable	NPN/PNP 250mA 2ms	10µA	2m 300V cable	42KRU-9000	
					4-pin DC micro QD	42KRU-9000-QD	
70-264V AC/DC 50/60Hz 15mA			—	SPDT EM Relay 2A/132V AC 1A/264V AC 1A/150V DC 15ms	—	2m 300V cable	42KRU-9002
						5-pin mini QD	42KRU-9002-QD

Series 9000 Standard Diffuse

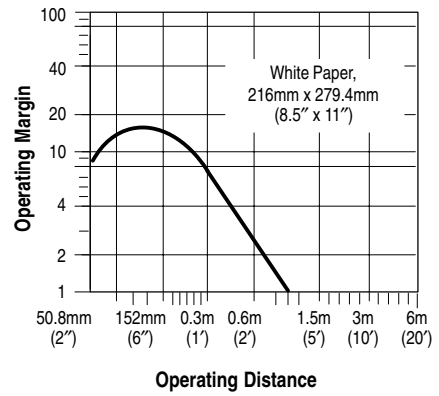
Darkroom



QD Cordsets and Accessories

Description	Catalog Number
1.8m (6ft) 5-pin, Mini QD Cordset	889N-F5AF-6F
2m (6.5ft) 4-pin, DC Micro QD Cordset	889D-F4AC-2

Typical Response Curve



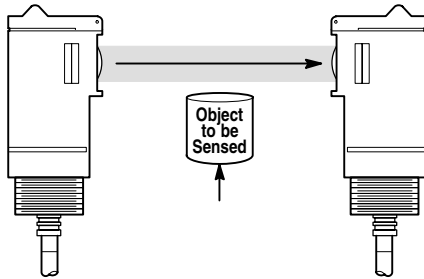
Specifications

Field of View	3.5°
Emitter LED	Infrared 940nm

Selection Guide for Sensors

Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Max Leakage Current	Connection Type	Catalog Number
10-40V DC 30mA	50.8mm (2in) to 0.91m (3ft) to White Paper	Light/Dark Selectable	NPN/PNP 250mA 2ms	10µA	2m 300V cable	42KRP-9000
					4-pin DC micro QD	42KRP-9000-QD
70-264V AC/DC 50/60Hz 15mA			2m 300V cable	42KRP-9002		
				5-pin mini QD	42KRP-9002-QD	

AB Drives

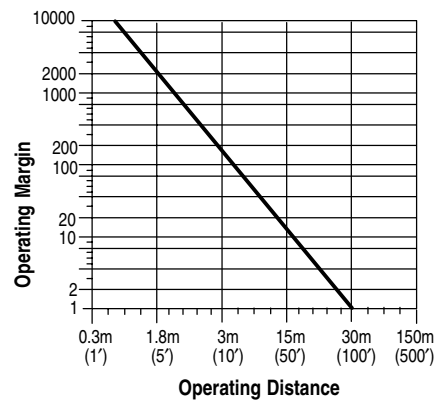


Light Sources and Receivers must be ordered separately. Any Light Source is compatible with any Receiver.

QD Cordsets and Accessories

Description	Catalog Number
1.8m (6ft) 4-pin, DC Mini QD Cordset	889N-F4AF-6F
1.8m (6ft) 5-pin, AC/DC Mini QD Cordset	889N-F5AF-6F
2m (6.5ft) 4-pin, DC Micro QD Cordset	889D-F4AC-2

Typical Response Curve



Specifications

Field of View	1.5°
Emitter LED	Infrared 940nm

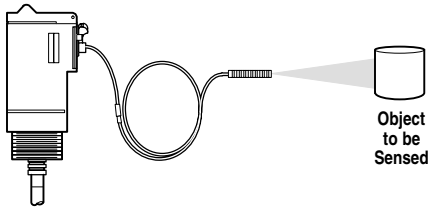
Selection Guide for Light Source

Operating Voltage Supply Current	Sensing Distance	Connection Type	Catalog Number
10–264V AC/DC 50/60Hz 15mA	25.4mm (1in) to 30m (100ft)	2m 300V cable	42KRL-9000
		4-pin DC micro QD	42KRL-9000-QD
		4-pin mini QD	42KRL-9002-QD

Selection Guide for Receivers

Operating Voltage Supply Current	Output Energized	Output Type Capacity Response Time	Max Leakage Current	Connection Type	Catalog Number
10–40V DC 25mA	Receiver: Light/Dark Selectable	NPN/PNP 250mA 5ms	10µA	2m 300V cable	42KRR-9000
				4-pin DC micro QD	42KRR-9000-QD
70–264V AC/DC 50/60Hz 10mA	Receiver: Light/Dark Selectable	SPDT EM Relay 2A/132V AC 1A/264V AC 1A/150V DC 23ms	—	2m 300V cable	42KRR-9002
				5-pin mini QD	42KRR-9002-QD

QD Cordsets and Accessories



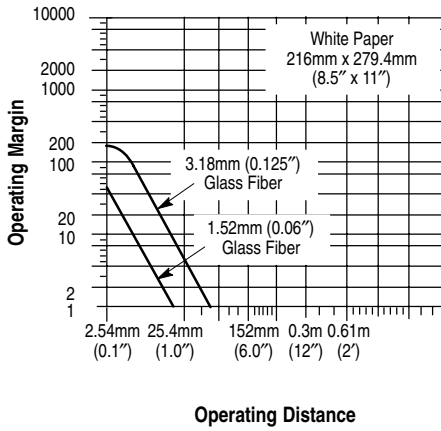
Description	Catalog Number
1.8m (6ft) 5-pin, Mini QD Cordset	889N-F5AF-6F
2m (6.5ft) 4-pin, DC Micro QD Cordset	889D-F4AC-2
Bifurcated Glass Fiber Optic Cable	99-32-1
Individual Glass Fiber Optic Cable	99-52-1

Specifications

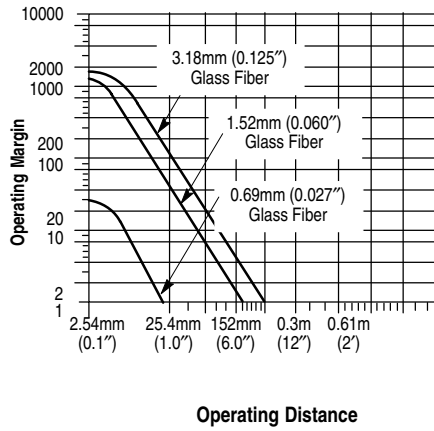
Emitter LED	Infrared 940nm
-------------	----------------

Typical Response Curve

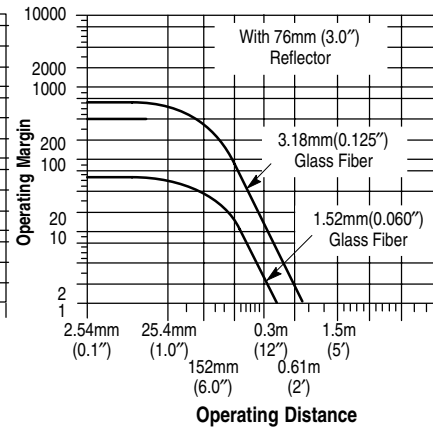
Standard Diffuse



Transmitted Beam



Retroreflective



Selection Guide for Sensors

Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Max Leakage Current	Connection Type	Catalog Number
10-40V DC 30mA	Depends on Fiber Optic cable	Light/Dark Selectable	NPN/PNP 250mA 2ms	10µA	2m 300V cable	42KRF-9000
					4-pin DC micro QD	42KRF-9000-QD
70-264V AC/DC 50/60Hz 15mA			2m 300V cable	42KRF-9002		
				5-pin mini QD	42KRF-9002-QD	