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 Product Selection tables
Current Consumption	See Product Selection 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 User Interface on page 1–227
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

Sensing Modes

Accessories

User Interface

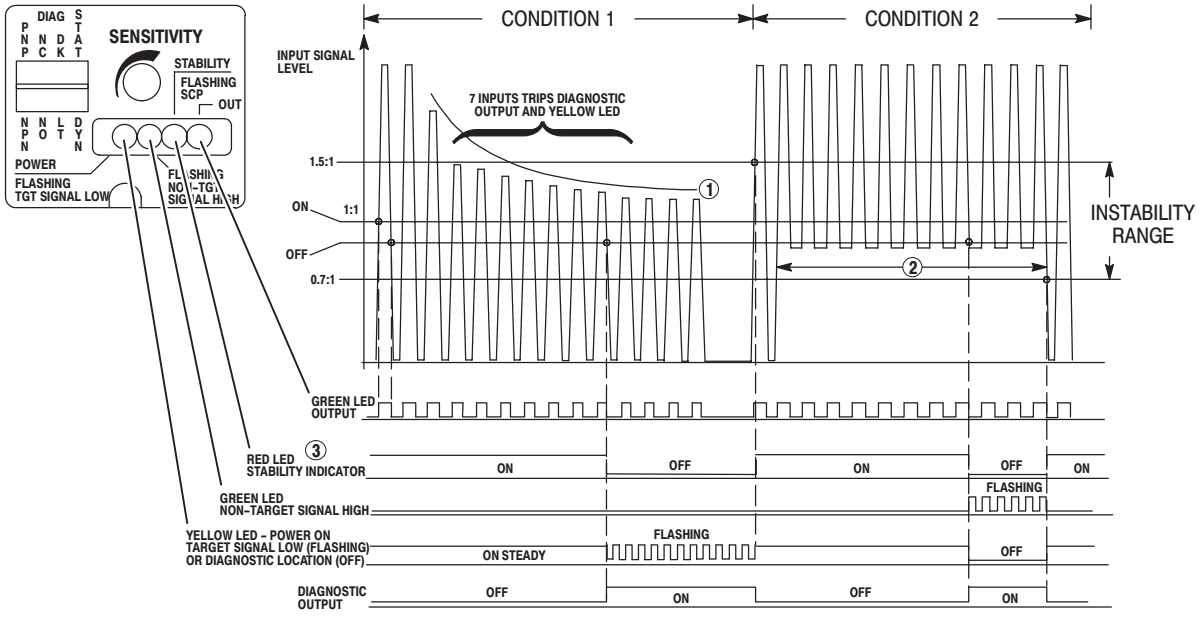
Label	Color	State	Diagnostic Operating Mode	
			Static	Dynamic
POWER FLASHING TGT SIGNAL LOW	Yellow	On Steady	Sensor Power On	
		Flashing	Unstable operation (0.7 < Margin < 1.5)	1.0 < Margin > 1.5 for seven successive operations Diffuse: Target margin too low Retro/Polarized Retro: Reflector margin too 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.

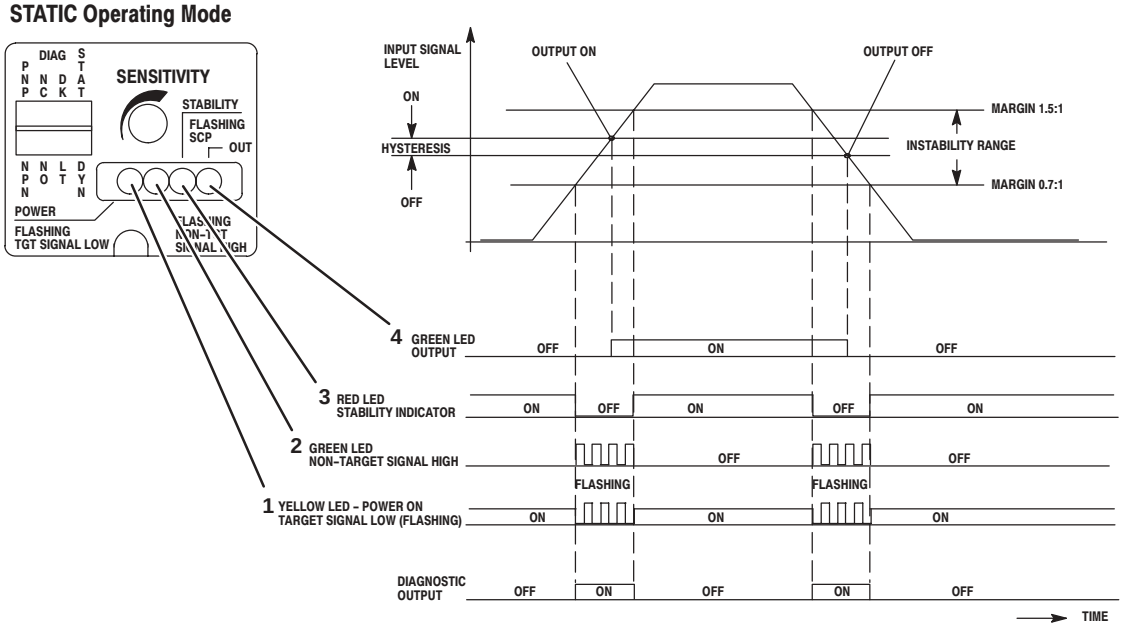
User Interface Panel—DC model shown

DYNAMIC Operating Mode



User Interface Panel—DC model shown (continued)

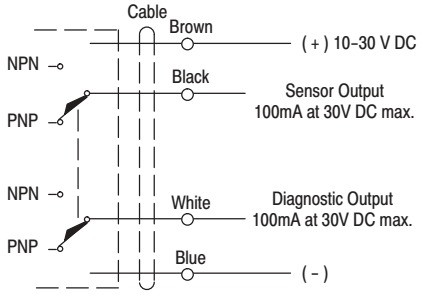
STATIC Operating Mode



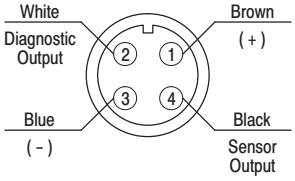
Wiring Diagrams

DC Sensors

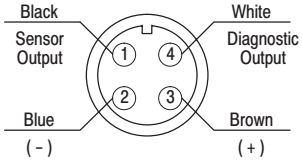
Cable Version



Micro Quick-Disconnect Version (QD)



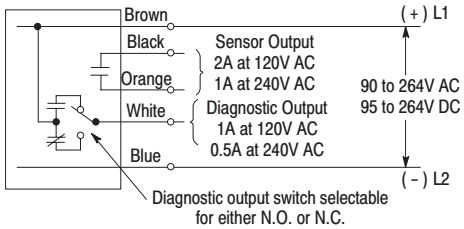
Mini Quick-Disconnect Version (QD1)



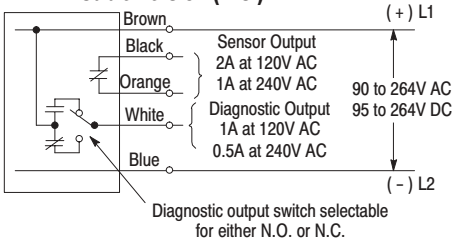
Note: DO NOT connect both an NPN and PNP load at the same time!

AC Sensors

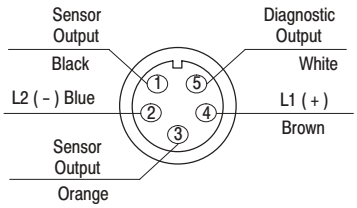
Cable Version (N.O.)



Cable Version (N.C.)

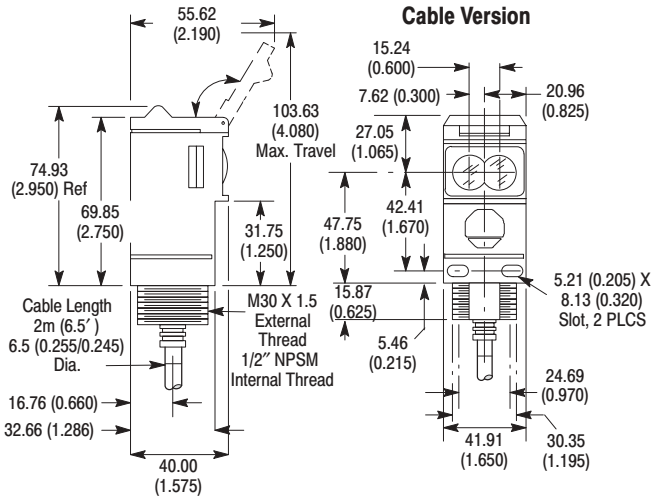


Mini Quick-Disconnect Version (QD)

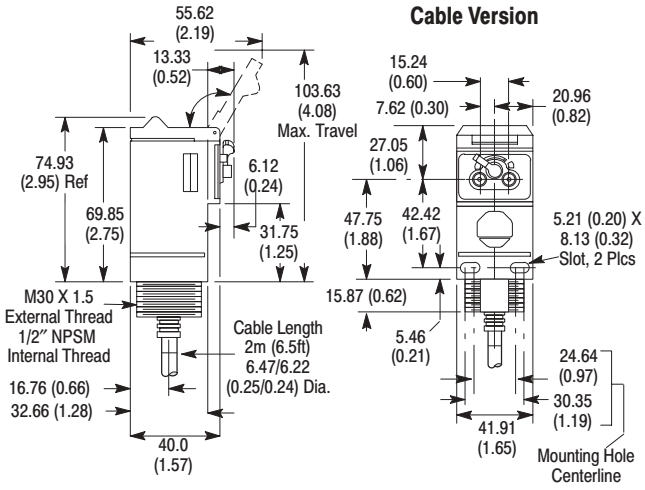


Dimensions—mm (inches)

All Versions Except Fiber Optic

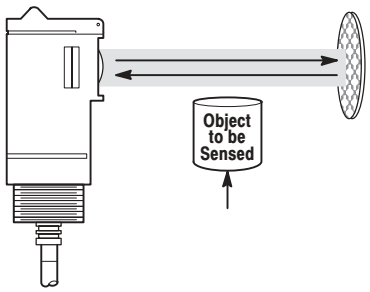


Fiber Optic



Series 9000 Retroreflective

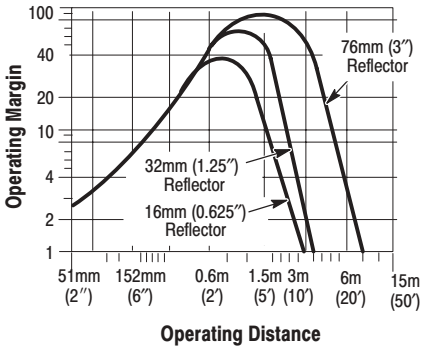
Diagnostic



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

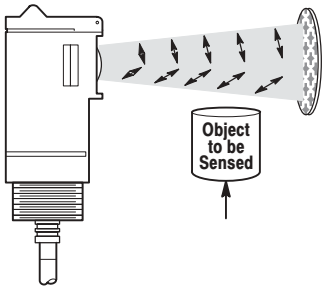


Specifications

Field of View	1.5°
Emitter LED	Visible red 660nm

Product Selection

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**
			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	**42GDU–9005**
					5-pin mini QD	**42GDU–9005–QD**



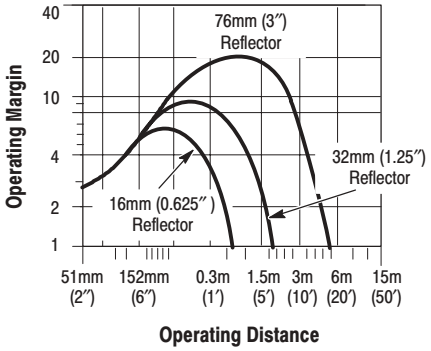
Specifications

Field of View	1.5°
Emitter LED	Visible red 660nm

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

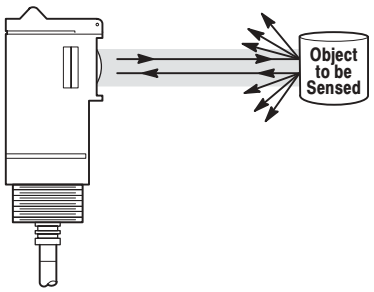


Product Selection

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 4.87m (16ft) with 76mm (3″) Reflector	Light/Dark Selectable	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			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**
			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	**42GDU–9205**
					5-pin mini QD	**42GDU–9205–QD**

Series 9000 Standard Diffuse

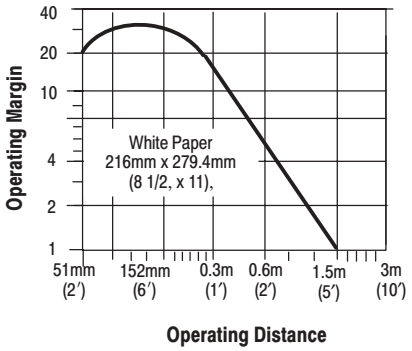
Diagnostic



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**

Typical Response Curve

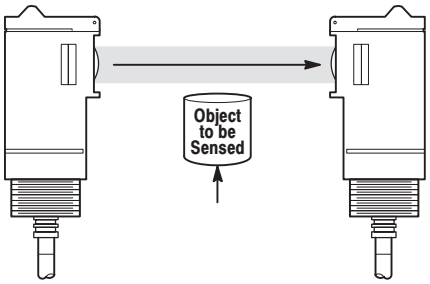


Specifications

Field of View	3.5°
Emitter LED	Infrared 880nm

Product Selection

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			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**
			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	**42GDP–9005**
					5-pin mini QD	**42GDP–9005–QD**



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

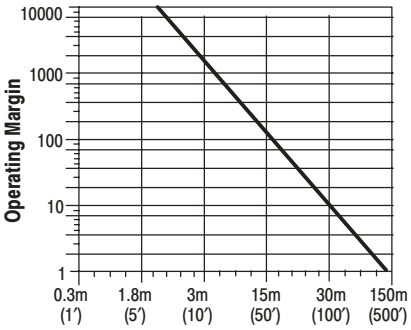
Specifications

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



Product Selection 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**

Product Selection 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**
		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**