



## Description

Reliable detection of clear materials such as glass and plastic bottles or films is one of the most challenging applications for a photoelectric sensor to handle. The three biggest challenges to the sensor are contrast, shape variations, and wet environments. All three of these challenges are addressed with the Rockwell Automation/Allen-Bradley ClearSight photoelectric sensor.

Using coaxial optics and circular polarization, ClearSight maximizes the contrast achievable with clear objects, increasing reliability and improving productivity. Because bottles are rarely uniform in shape, their ability to pass light is also less than unit form. For instance, variations due to molding and warping can cause certain parts of the clear material to act as a lens, increasing the amount of light going through it instead of reducing it—resulting in false signals. ClearSight technology helps reduce these false signals from occurring by requiring the emitted and returned beam to be along the same axis.

When your application is set in a wet environment, the reliability of photoelectric sensors with conventional side-by-side optical arrangements is very unpredictable. ClearSight photoelectric sensors increase this reliability allowing for water splash or mist to actually collect on the lens, bottle, or reflector.

ClearSight photoelectric sensors are available in three basic models to fit your specific application requirements. For harsh bottling applications where large amounts of water splash or mist are present, the Series ClearSight

10,000 is the superior solution. The Control Watch feature of this version will automatically adjust sensitivity levels to compensate for changing environmental conditions. When the application is not as severe, ClearSight 9000 stands ready to meet the challenge. For general purpose clear object detection, the ClearSight 7000 provides an economical solution.

## Features

- Three models for application flexibility
- Superior clear object detection system
- NEMA 4X, 6P (IP67) ratings
- Generous sensing range
- Full electrical protection
- 2m cable, micro, mini QD connections

## General Information

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**Operation**

ClearSight 10,000 and 9000 use a coaxial optic design to maximize signal contrast required for clear object detection applications. **As seen in the illustration below**, the light emitted by the LED is reflected at 90° to a beam splitter, which directs the visible red beam towards the reflector. The returned light travels in the opposite direction along the same axis through the beam splitter to the photodiode detector. One of the benefits of using this approach lies in the fact that both the emitting and receiving beams are subject to the same optical effects, thereby, reducing false signals which result in typical side-by-side optical systems.

ClearSight 10,000 complements this optical design by including an automatic sensitivity adjustment called Control Watch™. This feature will automatically adjust the sensitivity levels to accommodate for splashing liquids and mist. The accurate display of sensor margin values is made possible with the MarginView™ feature. When the margin drops to an unacceptable level, a visual indication, Red LED, and an electrical output, diagnostic, are activated.

To speed up installation time, the sensor is self-teach. An LCD display and pushbuttons makes it easy to configure any other desired parameters required for the application. These include response time, pulse rates, hysteresis, ON/OFF and ONE-SHOT time delays, and light/dark operate modes. Once these parameters are configured they may be stored and retrieved for use at a later time.

ClearSight 10,000 is also capable of optically transferring this configuration data to other ClearSight 10,000 sensors.

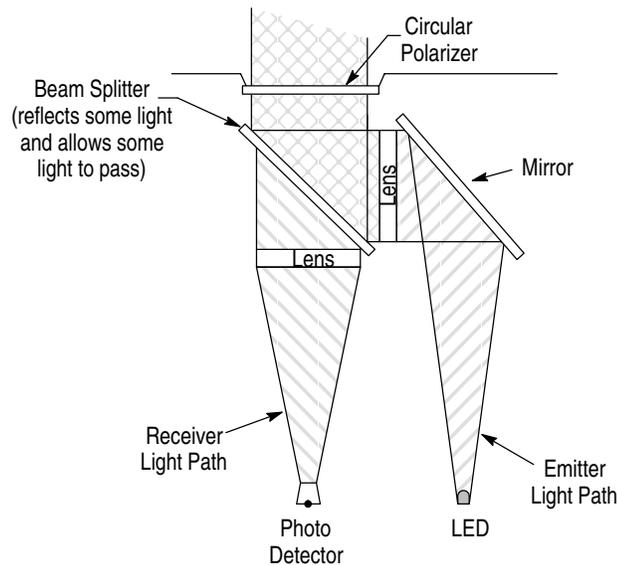
An autojitter crosstalk avoidance feature allows up to 16 sensors to be installed in close proximity without crosstalk.

For applications of lesser severity, ClearSight 9000 and 7000 provide quite capable solutions at an affordable price.

**General Specifications**

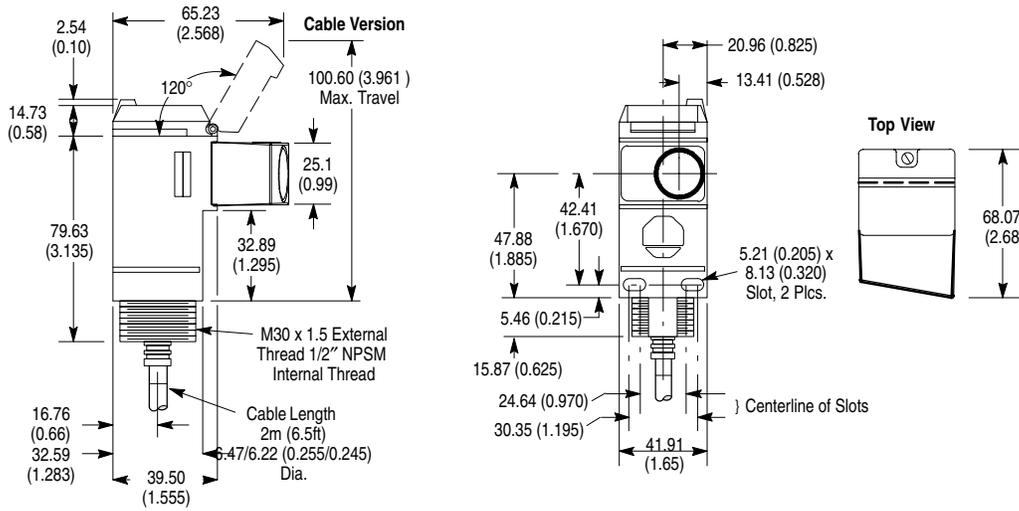
	ClearSight 10,000	ClearSight 9000	ClearSight 7000
<b>ClearSight Method</b>	Coaxial optics and circular polarization		Circular polarization
<b>Unit Protection</b>	False Pulse, reverse polarity, overload, short circuit		
<b>Supply Voltage</b>	10–30V DC	10–40V DC 70–264V AC/DC 45–264V DC 40–264V AC	11–28V DC
<b>Current Consumption</b>	70mA maximum	30mA maximum	46mA maximum
<b>Output Type</b>	NPN and PNP	NPN and PNP, SPDT Relay, SS Isolated	NPN or PNP
<b>Output Mode</b>	Light/dark operate by switch		Light & dark operate
<b>Output Rating</b>	250mA @ 30V DC	250mA @ 40V DC, 1A @ 264V AC, 300mA @ 264V AC	100mA @ 28V DC
<b>Response Time</b>	250µs–4ms selectable	2–15ms	1ms
<b>Housing Material</b>	Valox®		
<b>Lens Material</b>	Acrylic		
<b>Cover Material</b>	Radel		N/a
<b>LED Indicators</b>	See page		
<b>Connection Type</b>	5-pin micro QD, 5-pin mini QD, 2m cable	4-pin micro QD, 4-pin mini QD, 5-pin mini QD, 2m cable	4-pin micro QD, 2m cable
<b>Supplied Accessories</b>	#129–130 mounting kit; 92–90 reflector		92–90 reflector
<b>Optional Accessories</b>	Cordsets, mounting brackets		
<b>Operating Environment</b>	NEMA 3, 4X, 6P, 12, 13, IP67 (IEC529); 1200psi (8270kPa) Washdown		
<b>Vibration</b>	10–55Hz, 1mm amplitude, Meets or exceeds IEC 947–5–2		
<b>Shock</b>	30g with 1ms pulse duration, Meets or exceeds IEC 947–5–2		
<b>Operating Temperature</b>	–25°C to +60°C (–13°F to +140°F)	–34°C to +70°C (–29°F to +158°F)	–40°C to +65°C (–13°F to +150°F)
<b>Relative Humidity</b>	5...95%		
<b>Approvals</b>	UL listed, CSA certified, and CE marked for all applicable directives		

**Coaxial Optics System**

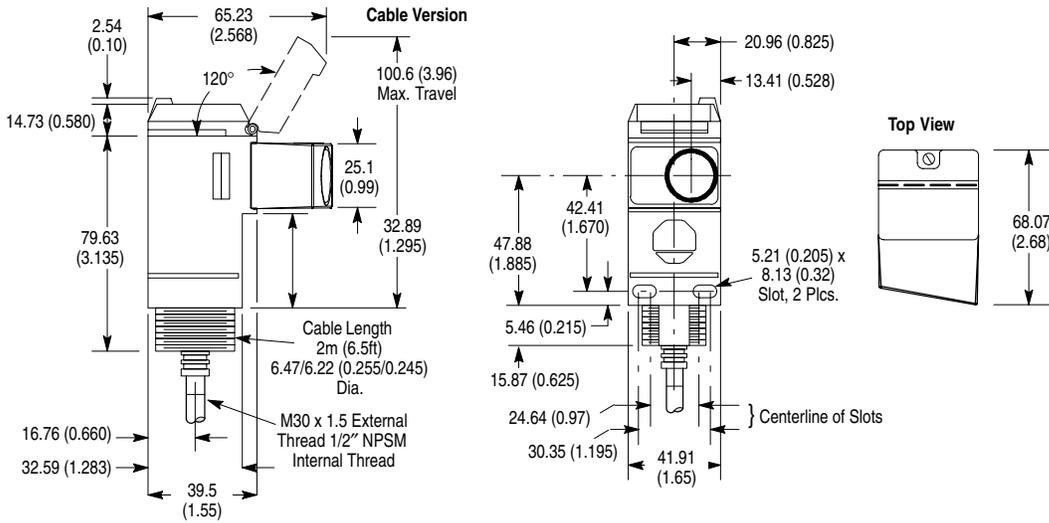


Dimensions—mm (inches)

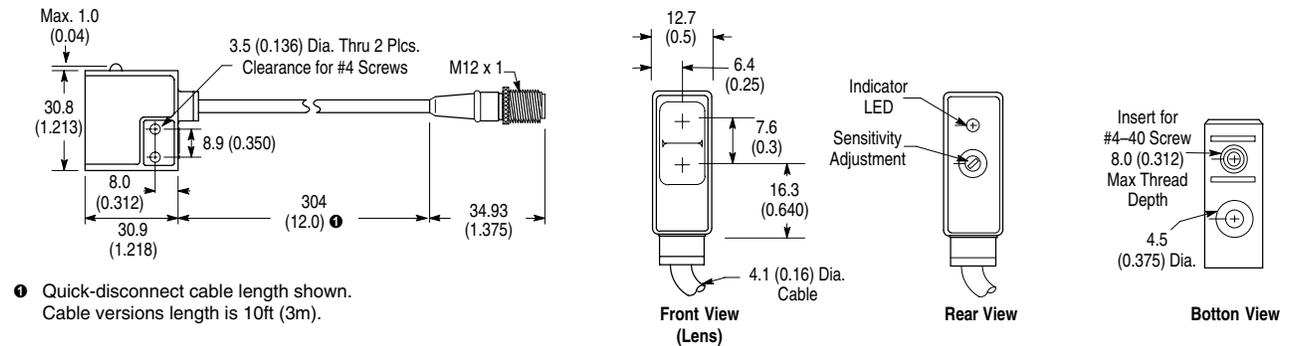
ClearSight 10,000



ClearSight 9000



ClearSight 7000

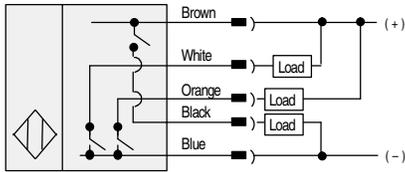


① Quick-disconnect cable length shown. Cable versions length is 10ft (3m).

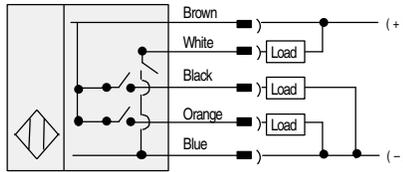
Wiring Diagrams

ClearSight 10,000

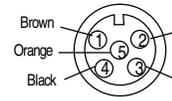
Sensors with NPN Diagnostic Output



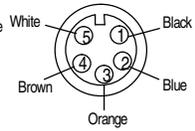
Sensors with PNP Diagnostic Output



Micro QD



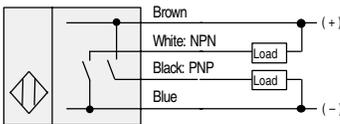
Mini QD



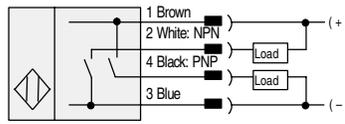
Note: Orange lead is diagnostic output.

ClearSight 9000

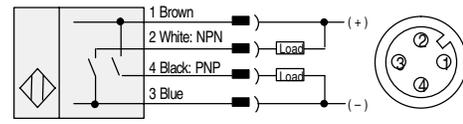
Cable Model: 9\_\_0



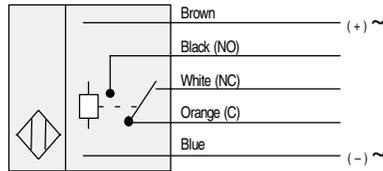
4-pin DC Micro QD Model: 9\_\_0-QD



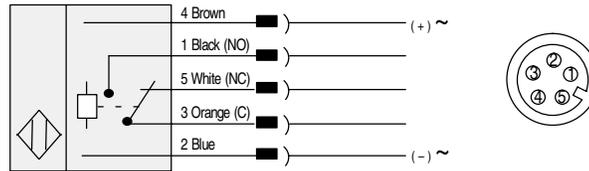
4-pin DC Mini QD Model: 9\_\_0-QD1



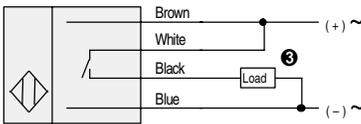
Cable Model: 9\_\_1, 9\_\_2



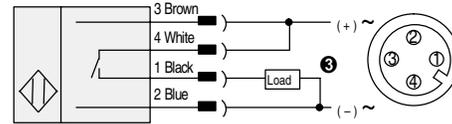
5-pin AC/DC Mini QD Model: 9\_\_1-QD, 9\_\_2-QD



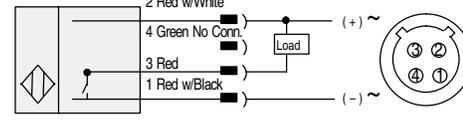
Cable Model: 9\_\_3



AC/DC Mini QD Model: 9\_\_3-QD



AC/DC Micro QD Model: 9\_\_3-QD1

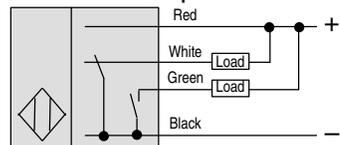


⊕ Load can be placed on either black or white wire to create sourcing or sinking respectively.

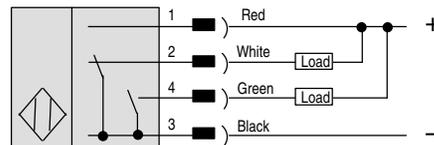
ClearSight 7000

10.8–30V DC Sensors

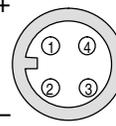
Models with NPN Outputs



Cable



Quick-Disconnect

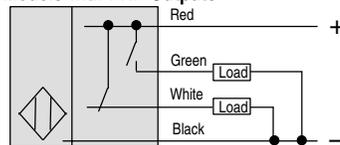


DC Micro

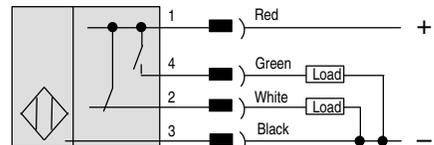


Pico

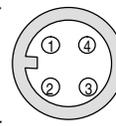
Models with PNP Outputs



Cable



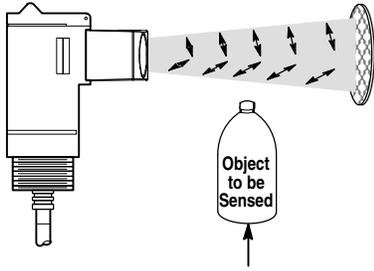
Quick-Disconnect



DC Micro



Pico



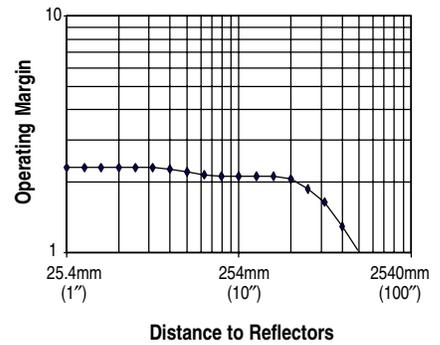
**Specifications**

Field of View	1.5°
Emitter LED	Visible red 660nm

**QD Cordsets and Accessories**

Description	Catalog Number
2m (6.5ft) 5-pin DC Micro QD Cordset	889D-F5AC-2
1.8m (6ft) 5-pin Mini QD Cordset	889N-F5AF-6F
Mounting Bracket Swivel/Tilt	60-2681
Reflectors	92-90 (included)

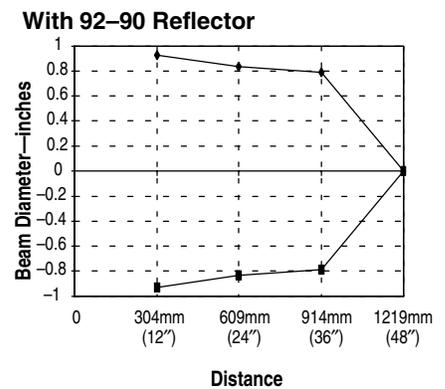
**Typical Response Curve**



ClearSight 10,000 provides many features which enhance its capability as the superior clear object photoelectric sensor.

ControlWatch Adaptive Sensitivity Adjustment System allows the Series 10,000 to *automatically* adjust its sensitivity in response to changing background and target margins. This can substantially reduce the need for cleaning of sensor and reflector.

**Beam Pattern**

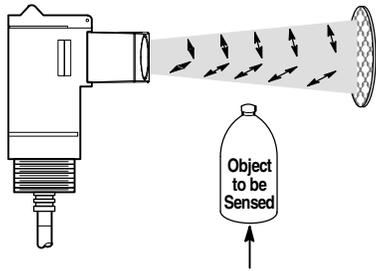


**Selection Guide**

Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Max Leakage Current	Diagnostic Output/Rating	Connection Type	Catalog Number
10-30V DC 70mA	0m (0in) to 1.2m (48in)	Light/Dark Selectable	NPN & PNP 250mA at 30V DC 250µs to 4ms Selectable	10µA	NPN 20mA at 30V DC	2m 300V cable	42GTGC-10200-02
						5-pin DC micro QD	42GTGC-10200-QD
						5-pin mini QD	42GTGC-10200-Q1
					PNP 20mA at 30V DC	2m 300V cable	42GTGC-10210-02
						5-pin DC micro QD	42GTGC-10210-QD
						5-pin mini QD	42GTGC-10210-Q1

# ClearSight™ 9000 Clear Object Detector

## On/Off and Timing



Reliable detection of clear objects and films is one of the most challenging applications for a photoelectric sensor. ClearSight™ 9000 photoelectric sensors are polarized retroreflective sensors with a unique optical system to provide the best possible optical contrast when detecting clear materials. For optimal performance, these sensors should be used with the included 92–90 reflector.

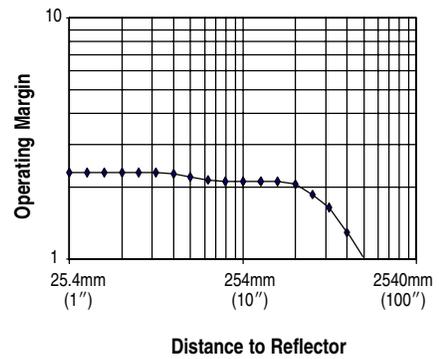
### Specifications

Field of View	1.5°
Emitter LED	Visible red 660nm

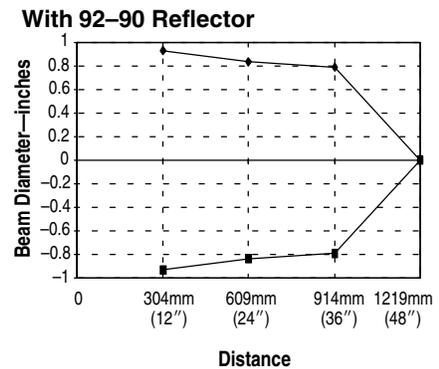
### QD Cordsets and Accessories

Description	Catalog/Page 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
Mounting Bracket Swivel/Tilt	60-2681
Reflectors	92-90 (included)

### Typical Response Curve



### Beam Pattern

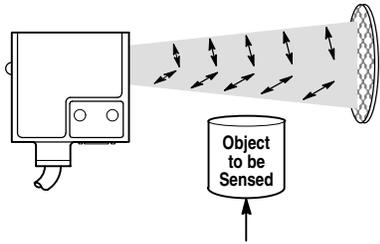


### Selection Guide for On/Off Sensors

Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Max Leakage Current	Connection Type	Catalog Number
10-40V DC 30mA	2.54cm (2in) to 1.2m (4ft)	Light/Dark Selectable	NPN/PNP 250mA 2ms	10µA	2m 300V cable	42GRC-9200
					4-pin DC micro QD	42GRC-9200-QD
					4-pin mini QD	42GRC-9200-QD1
70-264V AC/DC 50/60Hz 15mA			SPDT EM Relay 2A/132V AC/1A/264V AC 1A/150V DC 15ms	—	2m 300V cable	42GRC-9202
					5-pin mini QD	42GRC-9202-QD
45-264V DC/40-264V AC 50/60Hz 15mA			Solid State Isolated N.O. 300mA 2ms	1mA @ 264V AC/DC	2m 300V cable	42GRC-9203
					4-pin mini QD	42GRC-9203-QD
					4-pin AC micro QD	42GRC-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	2.54cm (2in) to 1.2m (4ft)	Light/Dark Selectable	NPN/PNP 250mA 5ms	10µA	2m 300V cable	42GTC-9200
					4-pin DC micro QD	42GTC-9200-QD
					4-pin mini QD	42GTC-9200-QD1
70-264V AC/DC 50/60Hz 15mA			SPDT EM Relay 2A/132V AC/1A/264V AC 1A/150V DC 15ms	—	2m 300V cable	42GTC-9202
					5-pin mini QD	42GTC-9202-QD
45-264V DC/40-264V AC 50/60Hz 15mA			Solid State Isolated N.O. 300mA 5ms	1mA @ 264V AC/DC	2m 300V cable	42GTC-9203
					4-pin mini QD	42GTC-9203-QD
					4-pin AC micro QD	42GTC-9203-QD1



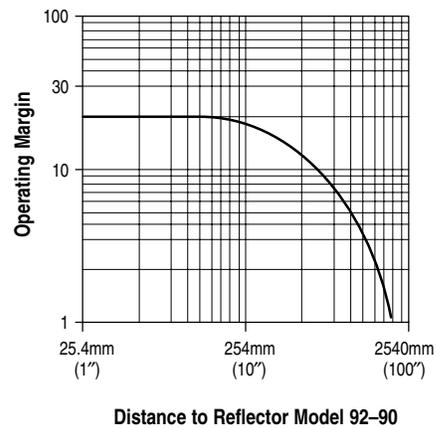
**Specifications**

Field of View	3°
Emitter LED	Visible red 660nm

**QD Cordsets and Accessories**

Description	Catalog Number
DC Micro QD Cordset, 4-pin, 2m	889D-F4AC-2
Mounting Bracket Swivel/Tilt	60-2619
Reflector	92-90 (included)

**Typical Response Curve**



ClearSight™ 7000 photoelectric sensors are special purpose Polarized Retroreflective sensors designed for detection of clear objects and films. Linear Polarized versions are optimized for clear film detection, Circular Polarized versions are intended for clear bottles and containers.

For optimal performance, the ClearSight 7000 should be used with the included 92-90 reflector.

**Selection Guide for Linear Polarized Sensors  
For Detection of Clear Films**

Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Max Leakage Current	Connection Type	Catalog Number
11-28V DC 46mA	50mm (2in) to 1.5m (4.9ft)	Complementary N.O./N.C.	NPN 100mA 1ms	10µA	3m cable	42SMU-7250
					4-pin DC micro QD	42SMU-7250-QD
			PNP 100mA 1ms		3m cable	42SMU-7251
					4-pin DC micro QD	42SMU-7251-QD

**Selection Guide for Circular Polarized Sensors  
For Detection of Clear Objects (Bottles, Clear Packages)**

Operating Voltage Supply Current	Sensing Distance	Output Energized	Output Type Capacity Response Time	Max Leakage Current	Connection Type	Catalog Number
11-28V DC 46mA	50mm (2in) to 1.5m (4.9ft)	Complementary N.O./N.C.	NPN 100mA 1ms	10µA	3m cable	42SMU-7260
					4-pin DC micro QD	42SMU-7260-QD
			PNP 100mA 1ms		3m cable	42SMU-7261
					4-pin DC micro QD	42SMU-7261-QD