

RightSight Photoelectric Sensors

Bulletin Number 42EF

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Features

RightSight™ Photoelectric Sensors include the following features:

- Compact right angle housing with universal 18 mm threaded nose and base mounting options
- Fixed, teachable, and adjustable sensitivity models
- Highly visible 360° indicators allow for quick verification of operation
- Dual (NPN and PNP), NPN only, and PNP only models
- IP54 rated enclosure for laser models: diffuse, polarized retroreflective, and transmitted beam models
- IP67 with 1200 psi; IP69K rated enclosure for standard and laser background/foreground suppression models

Available Models

The following standard models are available:

- Retroreflective
- Polarized retroreflective
- Clear object detection
- Standard diffuse
- Sharp cutoff diffuse
- Background suppression
- Fixed focus diffuse
- Transmitted beam
- Small aperture fiber optic

The following laser models are available:

- Polarized retroreflective
- Standard diffuse



Specifications

Table 1 - Specifications for Standard Models

Certifications	c-UL-us Listed, CSA Certified, and CE Marked for all applicable directives
Shock	30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2
Vibration	10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2
Environmental	
Enclosure type rating	NEMA 4X, 6P, IP67 (IEC 529); 1200 psi (8270 kPa) washdown
Operating temperature	-25...+70 °C (-13...+158 °F) 132V AC/DC
Relative humidity	5...95% (noncondensing)
Ambient light immunity	Incandescent light 5000 lux
User Interface	
Indicator LEDs	See Table 8 .
Electrical	
Protection type	Short circuit, reverse polarity, false pulse, overload
Outputs	
Load current	100 mA
Leakage current	DC: 0.1 mA, max AC: 0.4 mA, max
Mechanical	
Housing material	Mindel™
Lens material	Acrylic
Cover material	Udel™
Supplied accessory	18-mm mounting nut
Connection type	4-pin DC micro QD, 4-pin AC micro QD, 4-pin DC pico QD 2 m (6.5 ft) 22 AWG 300V PVC cable See Table 5 .
Electrical	
Operating voltage	10.8...30V DC, 21.6...264V AC/DC
Current consumption	35 mA DC max, 15 mA AC max
Outputs	
Output type	NPN and PNP, NPN or PNP See Table 5 .
Output function	See Table 5 on page 2
Mechanical	
Connection type	2 m cable, 4-pin DC micro (M12) QD, 4-pin pico (M8) QD See Table 5 .

Table 2 - Specifications for Laser Models

Environmental	
Enclosure type rating	IP67 and 1200 psi, IP69K for all models except Polarized Retroreflective, which is IP54
Operating temperature	-10...+50 °C (14...+122 °F)
Electrical	
Operating voltage	24V DC ± 10%
Current consumption	40 mA max
Outputs	
Output type	NPN and PNP See Table 5 .
Output function	See Table 5 on page 2
Mechanical	
Connection type	2 m cable, 4-pin DC micro (M12) QD See Table 5 .

Optical and Response Time Characteristics

Table 3 - Optical and Response Time Characteristics—Standard Models

Sensing Mode	Response Time (ms)	Field of View	Spot Size	Light Source
Retroreflective	1	2.5°	140 mm @ 3 m	Visible red
Polarized Retroreflective		1.5°	83.8 mm @ 3 m	
Clear Object	0.5		26.7 mm @ 1 m	
Diffuse	1	5°	48.3 mm @ 500 mm	Infrared
Sharp Cutoff		7°	16 mm @ 130 mm	
Background Suppression		20°	17.8 mm @ 50 mm, 14.2 mm @ 100 mm	
Transmitted Beam		—	—	
Fiber Optic	Depends on fiber optic cable	—	—	Infrared

Table 4 - Optical and Response Time Characteristics—Laser Models

Sensing Mode	Spot Size	Light Source
Polarized Retroreflective	16 x 20 mm	Class 1 laser
Diffuse	2 x 3.5 mm	

Table 5 - Product Selection

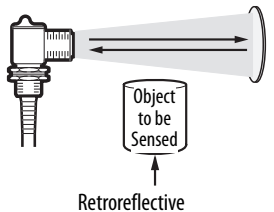
Sensing Mode	Operating Voltage	Light Source	Sensing Distance	Sensitivity Adjustment	Output Function	Output Type ⁽¹⁾	Cat. No. ⁽²⁾
	10.8...30V DC	Visible red	0.025...4.5 m (0.08...14.7 ft)	—	Light operate	NPN and PNP	42EF-U2JBB-F4
	21.6...264V AC/DC				Dark operate		42EF-U2KBB-F4
					Light operate	42EF-U2RCB-G4	
	Dark operate				N-MOSFET	42EF-U2SCB-G4	

Table 5 - Product Selection

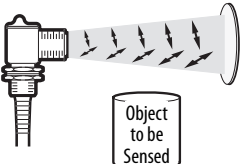
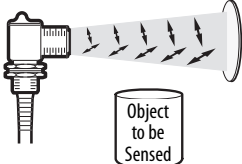
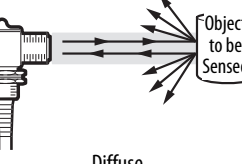
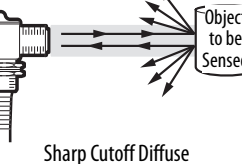
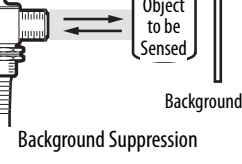
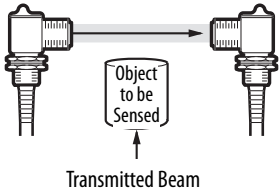
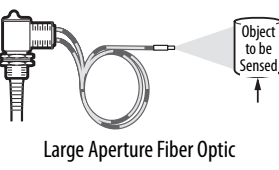
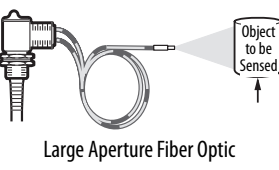
Sensing Mode	Operating Voltage	Light Source	Sensing Distance	Sensitivity Adjustment	Output Function	Output Type ⁽¹⁾	Cat. No. ⁽²⁾		
 <p>Polarized Retroreflective</p>	10.8...30V DC	Visible red	0.025...3 m (0.08...9.8 ft)	—	Light operate	NPN and PNP	42EF-P2JBB-F4		
	21.6...264V AC/DC				Dark operate		42EF-P2KBB-F4		
		24V DC ± 10%	Class 1 laser	0.05...15 m (0.16...49.2 ft)	Teach button	Light and dark operate	NPN PNP	42EF-P2MNB-F4 42EF-P2MPB-F4	
	Light operate					N-MOSFET		42EF-P2RCB-G4	
							Dark operate		42EF-P2SCB-G4
	 <p>Clear Object Detection</p>	10.8...30V DC	Visible red	0.025...1 m (0.08...3.3 ft)	Single-turn knob	Light operate	NPN and PNP	42EF-C2JBA-F4	
21.6...284V AC/DC		Dark operate				42EF-C2KBA-F4			
						Light operate	N-MOSFET	42EF-C2RCA-G4	
						Dark operate			42EF-C2SCA-G4
 <p>Diffuse</p>	10.8...30V DC	Infrared	3...700 mm (0.1...27.6 in.)	Teach button	Light operate	NPN and PNP	42EF-D1JBCK-F4		
					Dark operate		42EF-D1KBCK-F4		
					21.6...264V AC/DC		Light operate	N-MOSFET	42EF-D2JBAK-F4
							Dark operate		42EF-D2KBAK-F4
	24V DC ± 10%	Class 1 laser	3...500 mm (0.1...19.7 in.)	Single-turn knob	Light and dark operate	NPN PNP	42EF-D2MNAK-F4 42EF-D2MPAK-F4		
					Light operate		N-MOSFET	42EF-D1RCAK-G4	
					Dark operate			42EF-D1SCAK-G4	
	21.6...264V AC/DC	Infrared	3...300 mm (0.1...11.8 in.)	Single-turn knob	Light operate	NPN and PNP	42EF-D8JBA-F4		
					Dark operate		42EF-D8KBA-F4		
					Light operate		NPN and PNP	42EF-D8JBC-F4	
					Dark operate			42EF-D8KBC-F4	
	 <p>Sharp Cutoff Diffuse</p>	10.8...30V DC	Infrared	3...100 mm (0.1...3.93 in.)	Single-turn knob	Light operate	NPN and PNP	42EF-S1JBA-F4	
Dark operate						42EF-S1KBA-F4			
21.6...264V AC/DC						Light and dark operate		NPN PNP	42EF-S1MNA-F4 42EF-S1MPA-F4
						Light operate			N-MOSFET
					Dark operate	NPN and PNP	42EF-S1SCA-G4		
 <p>Background Suppression</p>		10.8...30V DC	Infrared	3...50 mm (0.1...2 in.)	—		Light operate	NPN and PNP	42EF-B1JBBC-F4
						Dark operate	42EF-B1KBBC-F4		
						21.6...264V AC/DC	Light and dark operate		NPN PNP
	Light operate						N-MOSFET		
	10.8...30V DC	Infrared	3...100 mm (0.1...3.9 in.)	—	Dark operate	NPN and PNP		42EF-B1SCBC-G4	
					Light operate		NPN and PNP	42EF-B1JBBE-F4	
	21.6...264V AC/DC	Infrared	3...100 mm (0.1...3.9 in.)	—	Dark operate	NPN and PNP		42EF-B1KBBE-F4	
					Light and dark operate		NPN PNP	42EF-B1MNBE-F4 42EF-B1MPBE-F4	
					Light operate			N-MOSFET	42EF-B1RCBE-G4
					Dark operate				42EF-B1SCBE-G4

Table 5 - Product Selection

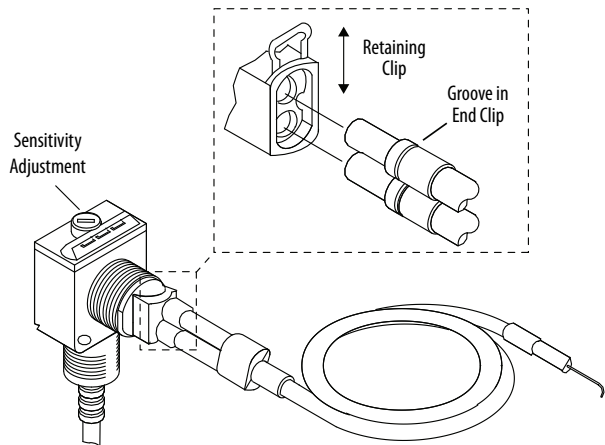
Sensing Mode	Operating Voltage	Light Source	Sensing Distance	Sensitivity Adjustment	Output Function	Output Type ⁽¹⁾	Cat. No. ⁽²⁾				
	10.8...30V DC	Visible Red	Depends on Receiver	—	— (Emitter)	—	42EF-E2EZB-F4				
	21.6...264V AC/DC	Infrared 880 nm					42EF-E1QZB-G4				
		10.8...30V DC	Visible Red	8 m (26.3 ft)	—	Light operate Dark operate	NPN and PNP	42EF-R2JBBT-F4			
		21.6...264V AC/DC	Infrared					42EF-R9KBBT-F4			
		10.8...30V DC	Visible Red				20 m (65.6 ft)	—	Light and dark operate	NPN and PNP	42EF-R9MNB-T-F4
											PNP
21.6...264V AC/DC	Infrared	Light operate Dark operate	N-MOSFET	42EF-R9RCBT-G4							
				42EF-R9SCBT-G4							
	10.8...30V DC	Infrared	Depends on fiber optic	Single-turn knob	Light operate Dark operate	NPN and PNP	42EF-R2JBB-F4				
	21.6...264V AC/DC						Infrared	42EF-R2KBB-F4			
						10.8...30V DC		Visible Red	Light and dark operate	NPN and PNP	42EF-R9MNB-F4
	PNP						42EF-R2MPB-F4				
	21.6...264V AC/DC				Infrared	Light operate Dark operate	N-MOSFET	42EF-R9RCB-G4			
								42EF-R9SCB-G4			
	10.8...30V DC				Infrared	Light operate Dark operate	NPN and PNP	42EF-G1JBA-F4			
								42EF-G1KBA-F4			
21.6...264V AC/DC	Infrared	Light and dark operate	NPN and PNP	42EF-G1MNA-F4							
				42EF-G1MPA-F4							
21.6...264V DC	Infrared	Light operate Dark operate	N-MOSFET	42EF-G1RCA-G4							
				42EF-G1SCB-G4							
Recommended standard 4-pin DC micro (M12) quick-disconnect cordset							889D-F4AC-2				
Recommended standard 4-pin DC pico (M8) quick-disconnect cordset							889P-F4AB-2				
Recommended standard 4-pin AC micro (M12) quick-disconnect cordset							889D-F4AEA-2				

(1) Connection Options: The -F4 suffix describes a 4-pin DC micro (M12) quick-disconnect connector on a 150 mm (6 in.) length cable for DC models and the -G4 describes a 4-pin AC micro (M12) quick-disconnect connector on a 150 mm (6 in.) length cable for AC models. For additional connection options, replace the -F4 or -G4 suffix with:
 -A2 for a 2 m cable without quick-disconnect connection (for example, 42EF-P2MPB-A2).
 -Y4 for a 4-pin DC pico (M8) quick-disconnect connection (for example, 42EF-P2MPB-Y4). This option is only available for DC non-laser models.
 (2) P-MOSFET are available for some models. Visit www.ab.com/e-tools for additional product selection information.



ATTENTION: P-MOSFET models have a lower in-rush current threshold for short-circuit protection than N-MOSFET models. Therefore, they may be susceptible to false trigger or short-circuit protection due to induced noise. For high noise AC applications, we recommend the use of N-MOSFET models.

Figure 1 - Glass Fiber Optic Cables



Sensor User Interface

The green status indicator can also serve as a set-up alignment aid that indicates that a margin of 1.5 has been reached. The sensor is receiving at least 1.5 times the signal strength back from the target that is required to trigger an output signal. In general, it is desirable to have a higher margin to help overcome any deteriorating environmental conditions, that is, dust build-up on the sensor lens. When aligning the sensor, the optimum performance can be obtained if this margin indicator is illuminated with the target in place. When aligning diffuse mode sensors, be sure that the sensitivity is set at its maximum setting; use the single-turn adjustment knob on the front panel. Pan the sensor left, right, up, and down to center the beam on the target. Decrease this setting to prevent the sensor from detecting a background object. If this problem persists, the application requires the use of a background suppression, sharp cutoff diffuse, or retroreflective sensing mode.

Table 6 - Standard I/O (Auto PNP/NPN) Operating Mode Indication

Color	Status	Description
Green	OFF	Power is off
	ON	Power is on
	Flashing (6 Hz)	Unstable light: $0.8x < \text{margin} < 1.5x$
	Flashing (1.4 Hz)	Output short-circuit protection active
Orange	OFF	Output de-energized
	On	Output energized

Table 7 - IO-Link Operation Mode Indication

Color	Status	Description
Green	OFF	Power is off
	Flashing (1 Hz)	Power is on
Orange	OFF	Output de-energized
	On	Output energized

See www.ab.com for additional details about the operation of the RightSight in IO-Link mode.

Table 8 - User Interface Panel

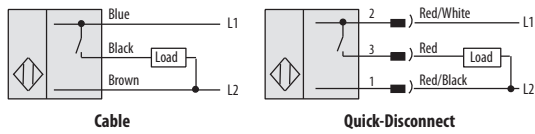
Description	Color	State ⁽¹⁾	Status	Label
	Yellow	Off	Output de-energized	Output de-energized
		On	Output energized	Output energized
		Flashing	SCP active	NA
	Orange	Off	Margin < 2.5	Normal operation
		On	Margin > 2.5	Teach mode active
		Flashing	Output SCP active (AC models only)	Teach mode active or output SCP active
	Green	Off	Sensor not powered, SCP active, output active	Sensor not powered
		On	Sensor powered	Sensor powered
		Flashing	—	Unstable margin condition or output SCP active

(1) For DC models, output and margin LEDs alternate flashing when SCP is active.

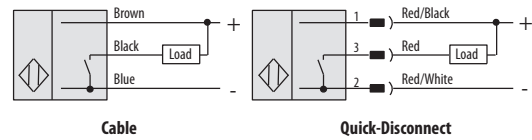
Figure 2 - Wiring Diagrams⁽¹⁾

21.6-264V AC/DC Sensors

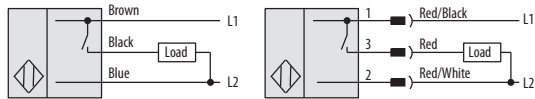
AC Wiring for 42EF- C - - Models (N-MOSFET)



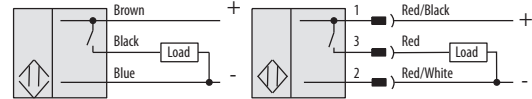
DC Wiring for 42EF- C - - Models (N-MOSFET)



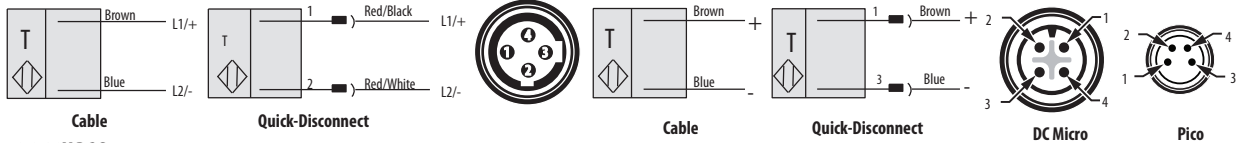
AC Wiring for 42EF- F - - Models (P-MOSFET)



DC Wiring for 42EF- F - - Models (P-MOSFET)

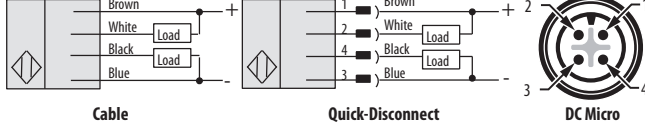


Transmitted Beam Source
21.6-264V AC/DC

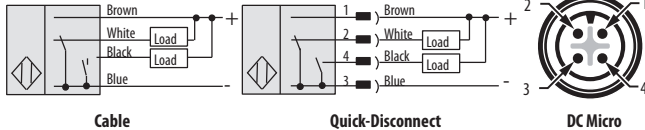


10.8-30V DC Sensors

Models with Dual NPN and PNP Outputs



Models with Complementary NPN Outputs



Models with Complementary PNP Outputs

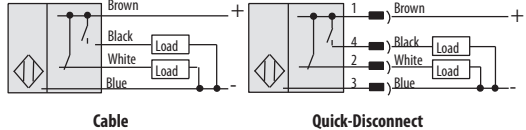
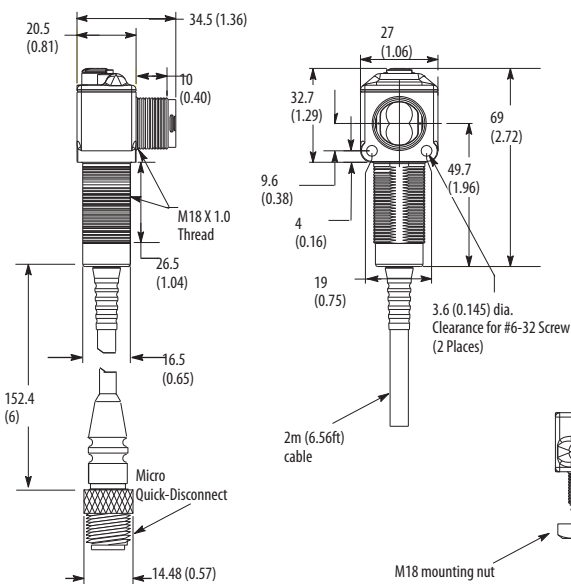
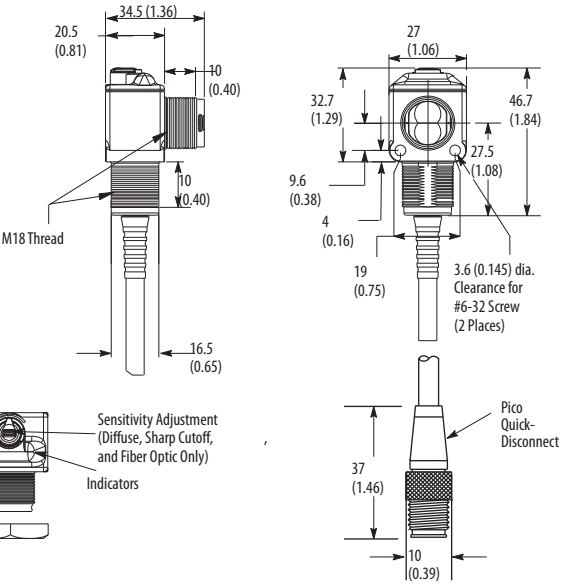


Figure 3 - Approximate Dimensions [mm (in.)]⁽²⁾

AC/DC and Laser Models



DC Models

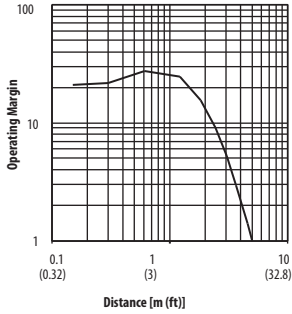


(1) For Allen-Bradley programmable controller compatible interface, refer to publication 42-2.0. All wire colors on quick-disconnect models refer to Allen-Bradley 889D cordsets.
 (2) All sensors supplied with one M18 mounting nut (cat. no. 75012-097-01) except fiber optic models, which come with two M18 mounting nuts (cat. no. 75012-025-01). Refer to www.ab.com/e-tools for 2D and 3D CAD drawings.

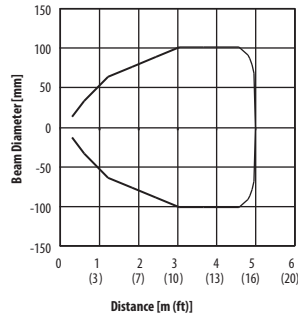
Typical Response Curves

Figure 4 - Response Curves and Beam Patterns—Standard Models

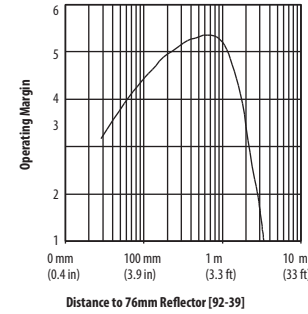
Typical Response Curve
Retroreflective



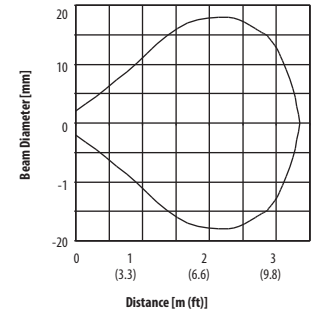
Beam Pattern



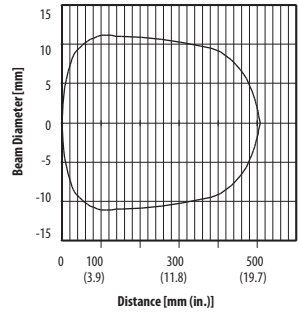
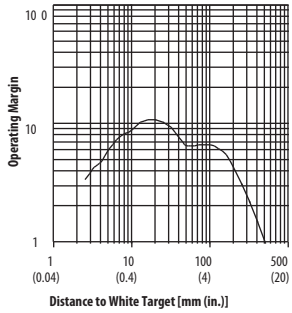
Typical Response Curve
Polarized Retroreflective



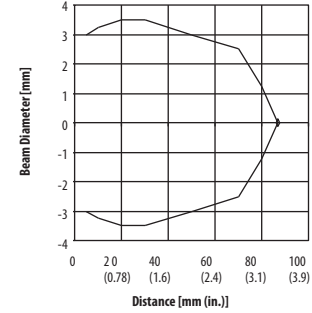
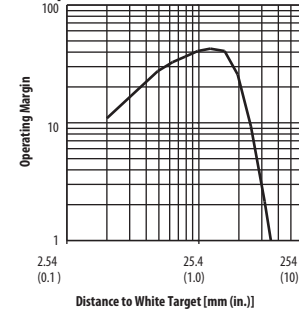
Beam Pattern



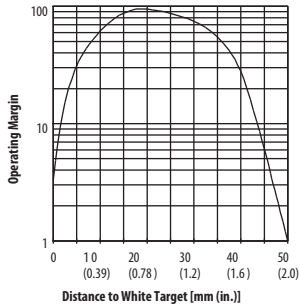
Standard Diffuse



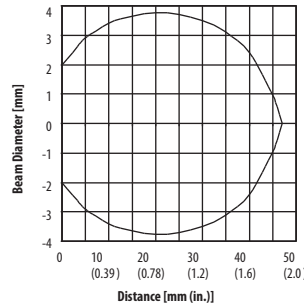
Sharp Cutoff Diffuse



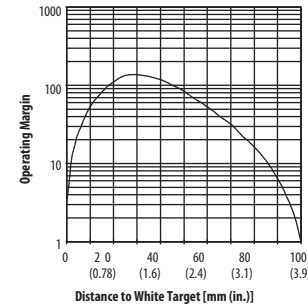
Background Suppression
50 mm



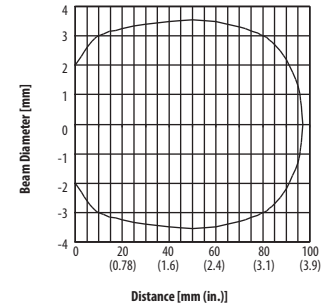
50 mm



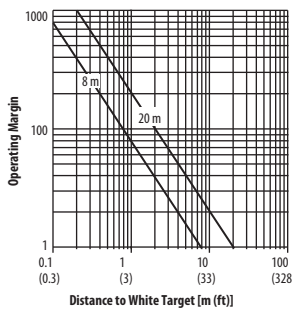
Background Suppression
100 mm



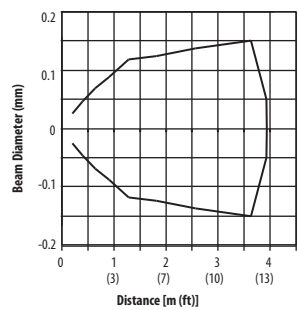
100 mm



Transmitted Beam



4 m Receiver Models



Transmitted Beam

20 m Receiver Models

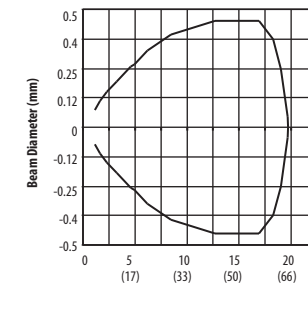
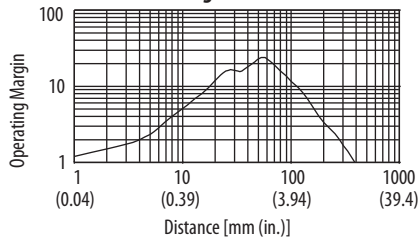
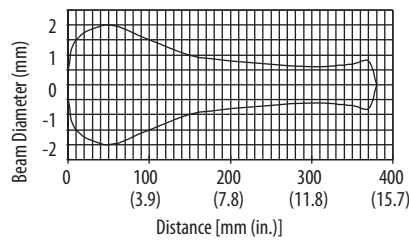


Figure 5 - Response Curves and Beam Patterns—Laser Models

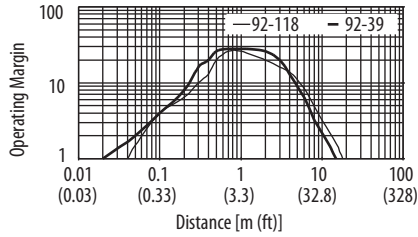
Standard Diffuse—Margin



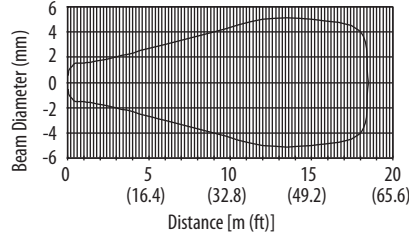
Standard Diffuse—Beam Pattern



Polarized Retroreflective—Margin



Polarized Retroreflective—Beam Pattern



Transmitted Beam—Margin

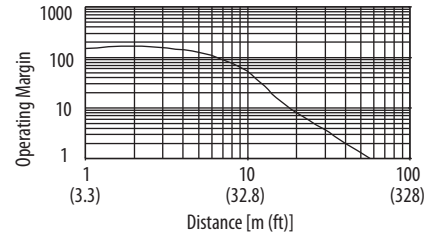


Table 9 - Cordsets and Accessories

Description	Cat. No.
DC Micro QD Cordset, Straight, 4-pin, 2 m	889D-F4AC-2
AC Micro QD Cordset, Straight, 4-pin, 2 m	889R-F4AEA-2
Pico QD Cordset, Straight, 4-pin, 2 m	889P-F4AB-2
Bifurcated Fiber Optic Cable, 38 mm (1.5 in.) typical range	43GR-TBB25SL
Bifurcated Fiber Optic Cable, 21 mm (0.8 in.) typical range	43GR-TFS10ML
Individual Fiber Optic Cable, 457 mm (18 in.) typical range	43GT-FAS25SL
Individual Fiber Optic cable, 152 mm (6 in.) typical range	43GT-TFS10ML
Mounting Bracket Swivel/Tilt	60-2649
76 mm (3 in.) Diameter Reflector	92-39
32 mm (1.25 in.) Diameter Reflector	92-47
Apertures, 1 mm Slot	60-2660
Apertures, 2 mm Slot	60-2661
Apertures, 4 mm Slot	60-2662
Aperture Set	60-2659

Notes:

Rockwell Automation Support

Use the following resources to access support information.

Technical Support Center	Knowledgebase Articles, How-to Videos, FAQs, Chat, User Forums, and Product Notification Updates.	www.rockwellautomation.com/knowledgebase
Local Technical Support Phone Numbers	Locate the phone number for your country.	www.rockwellautomation.com/global/support/get-support-now.page
Direct Dial Codes	Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer.	www.rockwellautomation.com/global/support/direct-dial.page
Literature Library	Installation Instructions, Manuals, Brochures, and Technical Data.	www.rockwellautomation.com/literature
Product Compatibility and Download Center (PCDC)	Get help determining how products interact, check features and capabilities, and find associated firmware.	www.rockwellautomation.com/global/support/pcdc.page

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Rockwell Automation maintains current product environmental information on its website at <http://www.rockwellautomation.com/rockwellautomation/about-us/sustainability-ethics/product-environmental-compliance.page>.

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