Technical Data

Original Instructions

RightSight Photoelectric Sensors Specifications

Bulletin Number 42EF

Summary of Changes

This publication contains the following new or updated information. This list includes substantive updates only and is not intended to reflect all changes.

Topic	Page
Updated Product Overview and Available Models sections.	1
Updated Specifications section.	2
Updated Product Selection section.	3

Product Overview

RightSight™ Photoelectric Sensors include the following features:

- Compact right-angle housing with universal 18 mm (0.71 in.) 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 polarized retroreflective laser models
- IP67 with 1200 psi; IP69K rated enclosure for standard and laser background/foreground suppression models
- ECOLAB rated enclosure (cable models only)

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
- Large aperture fiber optic

The following laser models are available:

- Polarized retroreflective
- Standard diffuse

Specifications

Table 1 - Standard Models

Attribute	Value
Certifications	cULus 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); IP69K, 1200 psi (8270 kPa) washdown; ECOLAB (cable models only)
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	
Status indicators	See Table 8 on page 6.
Electrical	
Protection type	• Short circuit • Reverse polarity • False pulse • Overload
Operating voltage	• 10.8…30V DC • 21.6…264V AC/DC
Current consumption, max	• 35 mA DC • 15 mA AC
Outputs	
Load current	100 mA
Leakage current	• DC: 0.1 mA, max • AC: 0.4 mA, max
Output type	NPN and PNP, NPN or PNP (see Table 5 on page 3)
Output function	See Table 5 on page 3
Mechanical	
Material	• Housing: Mindel™ • Lens: Acrylic • Cover: Udel™
Supplied accessory	18 mm (0.71 in.) mounting nut
Connection type	4-pin DC micro QD, 4-pin AC micro QD, 4-pin DC pico QD 2 m (6.6 ft) 22 AWG 300V PVC cable (see Table 5 on page 3)

Table 2 - Laser Models

Attribute	Value
Environmental	
Enclosure type rating	IP67 and 1200 psi, IP69K for all models (except polarized retroreflective, which is IP54); ECOLAB (cable models only)
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 on page 3)
Output function	See Table 5 on page 3
Mechanical	
Connection type	2 m (6.6 ft) cable, 4-pin DC micro (M12) QD (see Table 5 on page 3)

Optical and Response Time Characteristics

Table 3 - Standard Models

Sensing Mode	Response Time	Field of View	Spot Size	Light Source
Retroreflective	1 ms	2.5°	140 mm (5.5 in.) @ 3 m (9.8 ft)	Visible red
Polarized retroreflective		1.5°	83.8 mm (3.3 in.) @ 3 m (9.8 ft)	
Clear object	0.5 ms		26.7 mm (1.1 in.) @ 1 m (3.3 ft)	
Diffuse	1 ms	5°	48.3 mm (1.9 in.) @ 500 mm (19.7 in.)	Infrared
Sharp cutoff		7°	16 mm (0.6 in.) @ 130 mm (5.1 in.)	
Background suppression		20°	17.8 mm (0.7 in.) @ 50 mm (1.97 in.), 14.2 mm (0.56 in.) @ 100 mm (3.94 in.)	
Transmitted beam		–	–	Infrared 880 nm
Fiber optic	Depends on fiber optic cable			Infrared

Table 4 - Laser Models

Sensing Mode	Spot Size	Light Source
Polarized retroreflective	16 x 20 mm (0.63 x 0.79 in.)	Class 1 laser
Diffuse	2 x 3.5 mm (0.08 x 0.14 in.)	

Product Selection

Table 5 - Product Selection

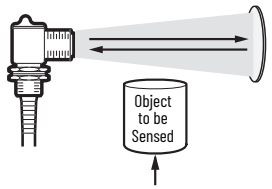
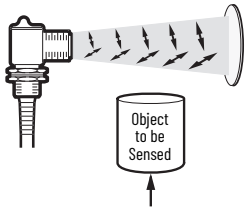
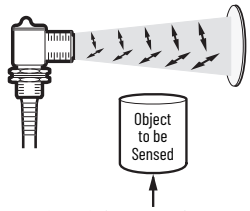
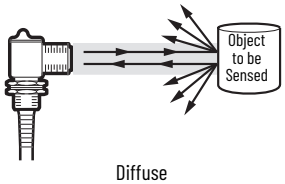
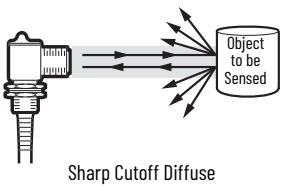
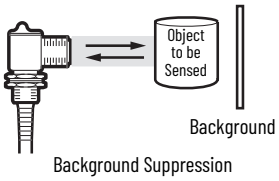
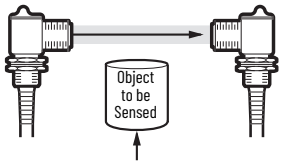
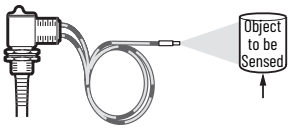
Sensing Mode	Operating Voltage	Light Source	Sensing Distance	Sensitivity Adjustment	Output Function	Output Type[1]	Cat. No.[2]
 Retroreflective	10.8...30V DC	Visible red	0.025...4.5 m (0.08...14.7 ft)	–	Light operate	NPN and PNP	42EF-U2JBB-F4
					Dark operate		42EF-U2KBB-F4
	21.6...264V AC/DC				Light operate	N-MOSFET	42EF-U2RCB-G4
					Dark operate		42EF-U2SCB-G4
 Polarized Retroreflective	10.8...30V DC	Visible red	0.025...3 m (0.08...9.8 ft)	–	Light operate	NPN and PNP	42EF-P2JBB-F4
					Dark operate		42EF-P2KBB-F4
					Light and dark operate	NPN	42EF-P2MNB-F4
						PNP	42EF-P2MPB-F4
	21.6...264V AC/DC			Single-turn knob	Light operate	N-MOSFET	42EF-P2RCB-G4
					Dark operate		42EF-P2SCB-G4
	24V DC ±10%	Class 1 laser	0.05...15 m (0.16...49.2 ft)	Teach button	Light operate	NPN and PNP	42EF-P8JBC-F4
					Dark operate		42EF-P8KBC-F4
 Clear Object Detection	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
					Dark operate		42EF-C2KBA-F4
	21.6...284V AC/DC				Light operate	N-MOSFET	42EF-C2RCA-G4
					Dark operate		42EF-C2SCA-G4
 Diffuse	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
			3...500 mm (0.1...19.7 in.)	Single-turn knob	Light operate		42EF-D2JBAK-F4
					Dark operate		42EF-D2KBAK-F4
					Light and dark operate	NPN	42EF-D2MNAK-F4
						PNP	42EF-D2MPAK-F4
	21.6...264V AC/DC		3...300 mm (0.1...11.8 in.)		Light operate	N-MOSFET	42EF-D1RCAK-G4
					Dark operate		42EF-D1SCAK-G4
	24V DC ±10%	Class 1 laser			Light operate	NPN and PNP	42EF-D8JBA-F4
					Dark operate		42EF-D8KBA-F4
				Teach button	Light operate		42EF-D8JBC-F4
					Dark operate		42EF-D8KBC-F4
 Sharp Cutoff Diffuse	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
					Light and dark operate	NPN	42EF-S1MNA-F4
						PNP	42EF-S1MPA-F4
	21.6...264V AC/DC				Light operate	N-MOSFET	42EF-S1RCA-G4
					Dark operate	NPN and PNP	42EF-S1SCA-G4

Table 5 - Product Selection (Continued)

Sensing Mode	Operating Voltage	Light Source	Sensing Distance	Sensitivity Adjustment	Output Function	Output Type[1]	Cat. No.[2]
 Background Suppression	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
					Light and dark operate	NPN	42EF-B1MNBC-F4
						PNP	42EF-B1MPBC-F4
	21.6...264V AC/DC				Light operate	N-MOSFET	42EF-B1RCBC-G4
					Dark operate		42EF-B1SCBC-G4
	10.8...30V DC		3...100 mm (0.1...3.9 in.)		Light operate	NPN and PNP	42EF-B1JBBE-F4
					Dark operate		42EF-B1KBBE-F4
					Light and dark operate	NPN	42EF-B1MNBE-F4
						PNP	42EF-B1MPBE-F4
	21.6...264V AC/DC				Light operate	N-MOSFET	42EF-B1RCBE-G4
					Dark operate		42EF-B1SCBE-G4
	10.8...30V DC	Visible red	Depends on Receiver	–	– (Emitter)	–	42EF-E2EZB-F4
	21.6...264V AC/DC	Infrared 880 nm					42EF-E1QZB-G4
 Transmitted Beam	10.8...30V DC	Visible red	8 m (26.3 ft)	–	Light operate	NPN and PNP	42EF-R2JBBT-F4
					Dark operate		42EF-R9KBBT-F4
					Light and dark operate	NPN	42EF-R9MNBT-F4
						PNP	42EF-R2MPBT-F4
	21.6...264V AC/DC	Infrared			Light operate	N-MOSFET	42EF-R9RCBT-G4
					Dark operate		42EF-R9SCBT-G4
	10.8...30V DC	Visible red	20 m (65.6 ft)	–	Light operate	NPN and PNP	42EF-R2JBB-F4
					Dark operate		42EF-R2KBB-F4
					Light and dark operate	NPN	42EF-R9MNB-F4
						PNP	42EF-R2MPB-F4
	21.6...264V AC/DC	Infrared			Light operate	N-MOSFET	42EF-R9RCB-G4
					Dark operate		42EF-R9SCB-G4
 Large Aperture Fiber Optic	10.8...30V DC	Infrared	Depends on fiber optic	Single-turn knob	Light operate	NPN and PNP	42EF-G1JBA-F4
					Dark operate		42EF-G1KBA-F4
					Light and dark operate	NPN	42EF-G1MNA-F4
						PNP	42EF-G1MPA-F4
	21.6...264V AC/DC				Light operate	N-MOSFET	42EF-G1RCA-G4
	21.6...264V DC				Dark operate		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 (6.6 ft) 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.

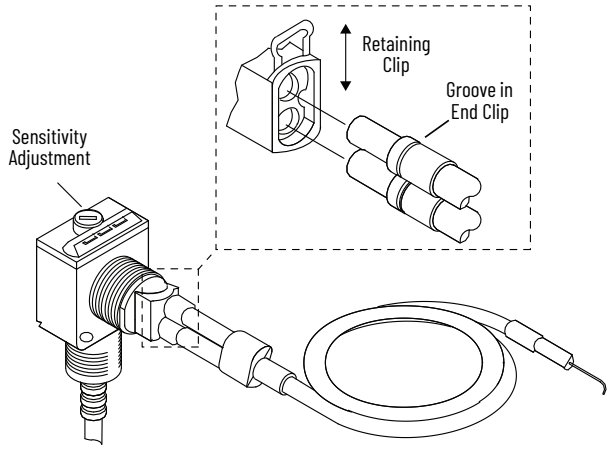
(2) P-MOSFET are available for some models. See ProposalWorks™ for additional product selection information.

ATTENTION: P-MOSFET models have a lower inrush current threshold for short-circuit protection than N-MOSFET models. Therefore, they can 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.

Cordsets and Accessories

Description		Cat. No.
Cordset	DC Micro QD, straight, 4-pin, 2 m (6.6 ft)	889D-F4AC-2
	AC Micro QD, straight, 4-pin, 2 m (6.6 ft)	889R-F4AEA-2
	Pico QD, straight, 4-pin, 2 m (6.6 ft)	889P-F4AB-2
Fiber optic cable	Bifurcated, 38 mm (1.5 in.) typical range	43GR-TBB25SL
	Bifurcated, 21 mm (0.8 in.) typical range	43GR-TFS10ML
	Individual, 457 mm (18 in.) typical range	43GT-FAS25SL
	Individual, 152 mm (6 in.) typical range	43GT-TFS10ML
Mounting bracket	Swivel/tilt	60-2649
Reflector	76 mm (3 in.) diameter	92-39
	32 mm (1.25 in.) diameter	92-47
Aperture	1 mm (0.04 in.) slot	60-2660
	2 mm (0.08 in.) slot	60-2661
	4 mm (0.16 in.) slot	60-2662
	Aperture set	60-2659

Figure 1 - Glass Fiber-optic Cables



Sensor User Interface

The green status indicator can be 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, such as, dust build-up on the sensor lens.

When you align the sensor, the optimum performance can be obtained if this margin indicator is illuminated with the target in place. When you align a diffuse mode sensor, 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 help 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

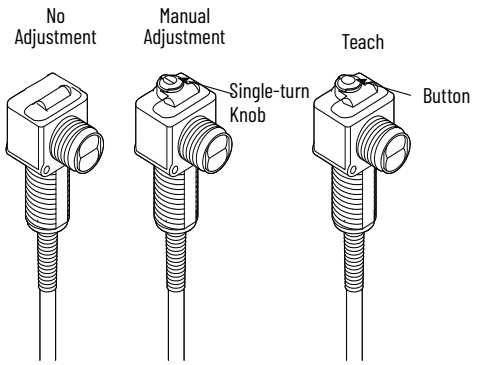
Indicator Color	Status	Description
Green	OFF	Power is OFF
	ON	Power is ON
	Flashing (6 Hz)	Unstable light: 0.8 x < margin < 1.5 x
	Flashing (1.4 Hz)	Output short-circuit protection active
Orange	OFF	Output de-energized
	ON	Output energized

Table 7 - IO-Link Operation Mode Indication

Indicator Color	Status	Description
Green	OFF	Power is OFF
	Flashing (1 Hz)	Power is ON
Orange	OFF	Output de-energized
	ON	Output energized

See rockwellautomation.com/en-us/products/hardware/allen-bradley/network-security-and-infrastructure/io-link-technology.html for additional details about the operation of the RightSight in IO-Link mode.

Table 8 - User Interface Panel

Description	Indicator 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

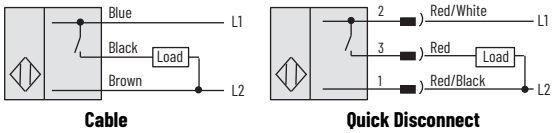
(1) For DC models, output and margin status indicators alternate flashing when SCP is active.

Wiring Diagrams

IMPORTANT For Allen-Bradley® programmable controller compatible interface, see publication 42-2.0. All wire colors on quick-disconnect models refer to Allen-Bradley 889D cordsets.

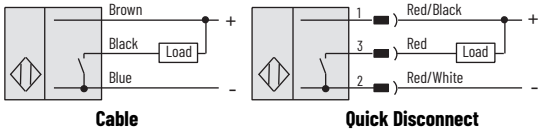
21.6...264V AC/DC Sensors

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



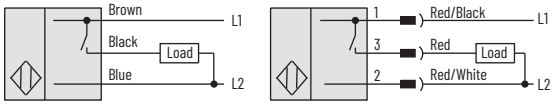
Cable Quick Disconnect

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

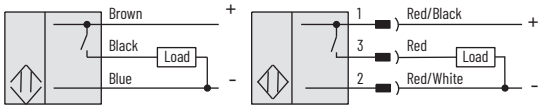


Cable Quick Disconnect

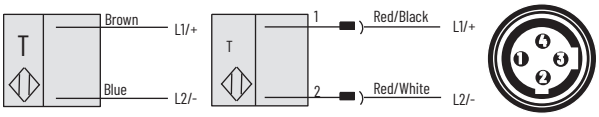
AC Wiring for 42EF-_ _ _ F _ _ - _ _ Models (P-MOSFET)



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

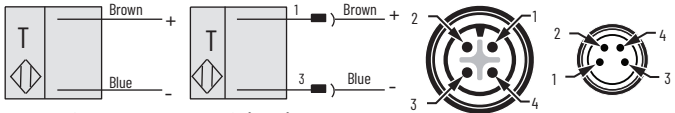


Transmitted Beam Source 21.6...264V AC/DC



Cable Quick Disconnect

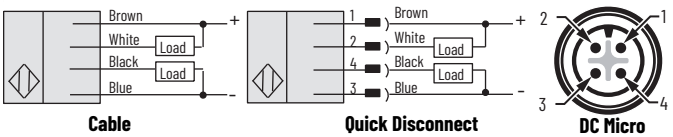
All Models



Cable Quick Disconnect DC Micro Pico

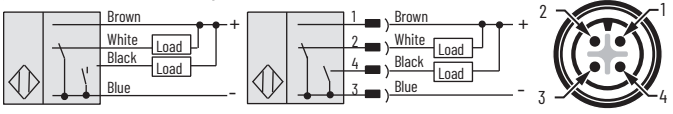
10.8...30V DC Sensors

Models with Dual NPN and PNP Outputs

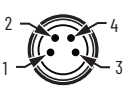


Cable Quick Disconnect DC Micro

Models with Complementary NPN Outputs

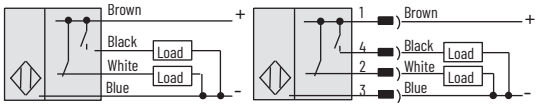


Cable Quick Disconnect DC Micro



Pico

Models with Complementary PNP Outputs



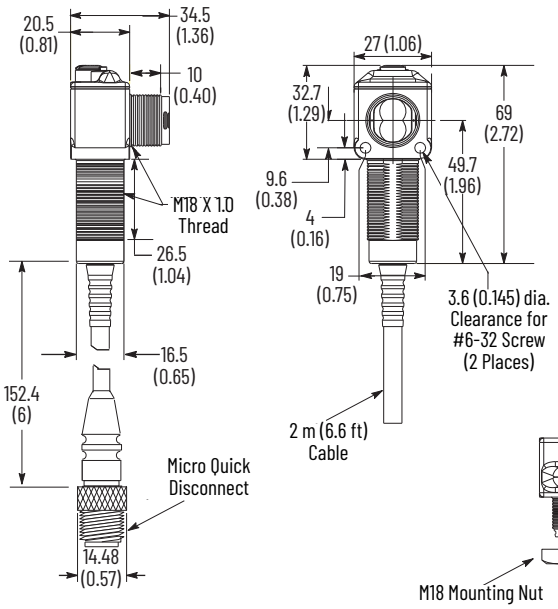
Cable Quick Disconnect

Approximate Dimensions

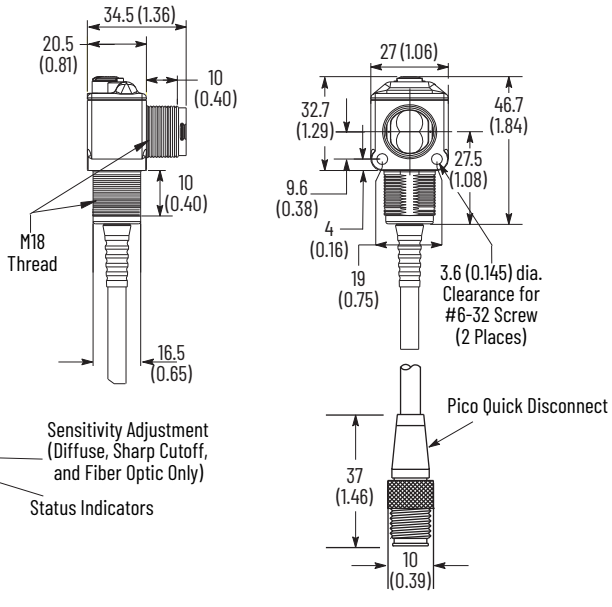
Dimensions are shown in mm (in.). Dimensions are not intended to be used for installation purposes.

IMPORTANT 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).

AC/DC and Laser Models

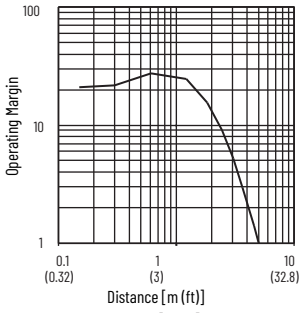
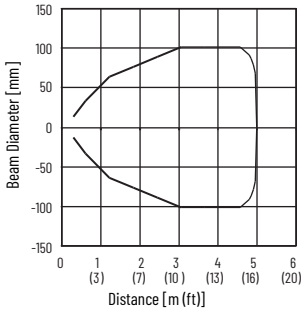
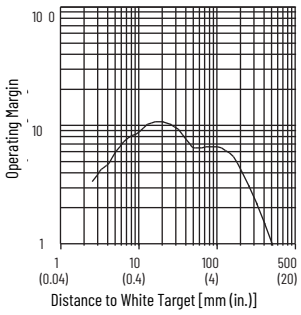
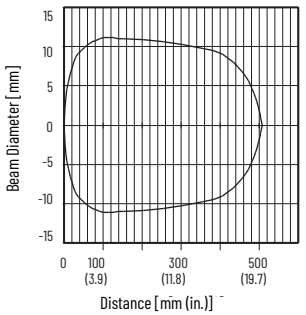
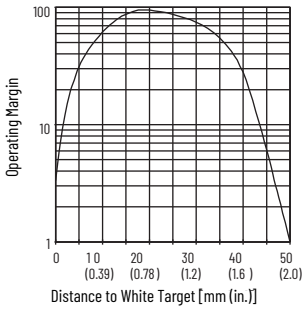
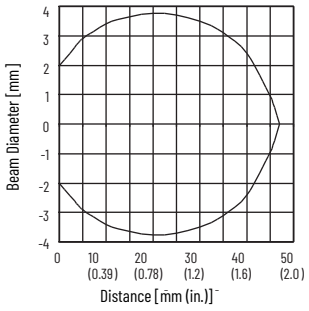
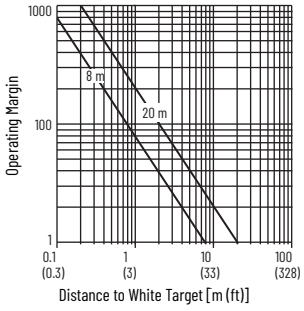
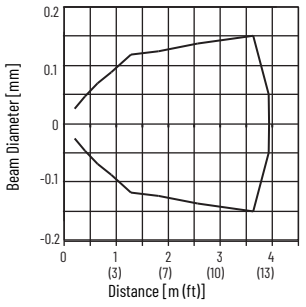
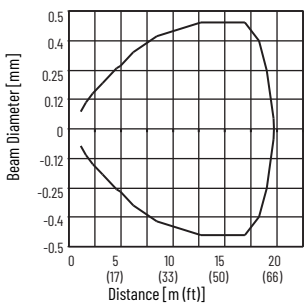


AC/DC and Laser Models



Typical Response Curves and Beam Patterns

Table 9 - Standard Models

Typical Response Curve	Beam Pattern
Retroreflective	
	
Standard Diffuse	
	
50 mm (1.97 in.) Background Suppression	
	
Transmitted Beam	
	**4 m (13.1 ft) Receiver Models** 
	20 m (65.6 ft) Receiver Models 

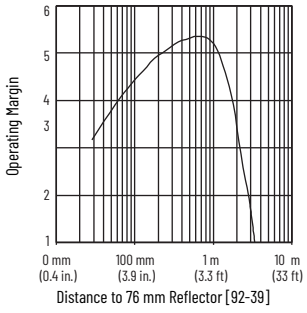
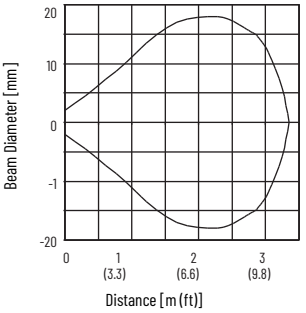
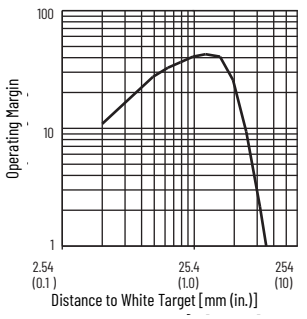
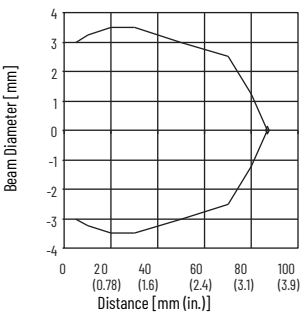
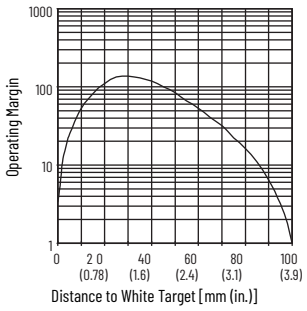
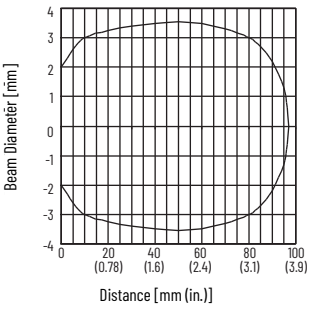
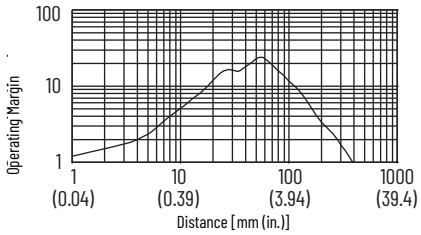
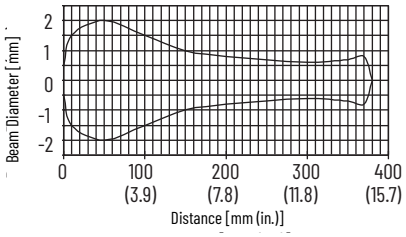
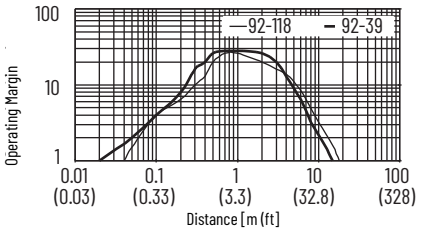
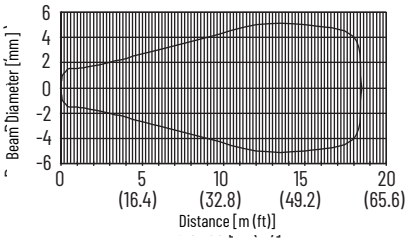
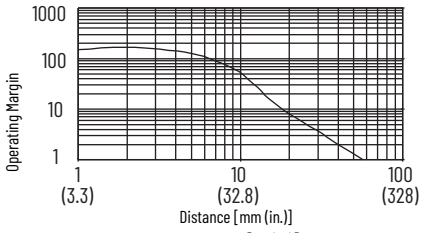
Typical Response Curve	Beam Pattern
Polarized Retroreflective	
	
Sharp Cutoff Diffuse	
	
100 mm (3.94 in.) Background Suppression	
	

Table 10 - Standard Models

Typical Response Curve	Beam Pattern
Standard Diffuse	
	
Polarized Retroreflective	
	
Transmitted Beam	
	

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