

# Installation Instructions

## RightSight™ PHOTOSWITCH® Photoelectric Sensors

Description	Polarized Retro-reflective	Standard Retro-reflective	Diffuse	Sharp Cutoff Diffuse	Background Suppression		Glass Fiber Optic	Transmitted Beam			
					50 mm (2 in.)	100 mm (4 in.)		20 m Receiver	4 m Receiver		
Optical	Sensing Distance	3 m (9.8 ft)	4.5 m (14.7 ft)	500 mm (20 in.)	<127 mm (5 in.)	50 mm (2 in.)	100 mm (4 in.)	Varies w/FO cable	20 m (60 ft)	4 m (13 ft)	
	Field of View	7°	2.5°	5°	7°	20°	8°	Varies w/FO cable	7°	7°	
	Transmitted LED	Visible Red 660 nm	Visible Red 660 nm	Infrared 880 nm							
	Sensitivity Adjustment	no	no	yes		no		yes	no		
Mechanical	Housing/Lens Material	Specially formulated polymer/Acrylic									
	Connection Type	Connection Type									
	LED Indicators	See table below									
	Supplied Accessories	One 18 mm mounting nut, two on fiber optic models									
	Optional Accessories	See accessories for mounting brackets, reflectors, apertures, fiber optic cables, cordsets, and patchcords									
Environmental	Operating Temperature	-25° to +55°C (-13° to +131°F) . 132V AC/DC -25° to +70°C (-13° to +158°F) . 132V AC/DC									
	Operating Environment	NEMA 3R, 4X, 6P, IP67; 8270 kPa (1200 psi) washdown									
	Vibration/Shock	5g, 10-55 Hz, 1 mm amplitude, meets or exceeds IEC 947-5-2/30g, 1 ms pulse duration, meets or exceeds IEC 947-5-2									
	Relative Humidity	95%									
	Certifications	UL, CSA, CE for all applicable directives									
DC Sensors	<b>Catalog Number</b> Complementary LO & DO NPN	42EF-P2MNB-a	—	42EF-D1MNAK-a	42EF-S1MNA-a	42EF-B1MNBC-a	42EF-B1MNBE-a	42EF-G1MNA-a	42EF-R9MNB-a	42EF-R9MNBV-a	
	Complementary LO & DO PNP	42EF-P2MPB-a	—	42EF-D1MPAK-a	42EF-S1MPA-a	42EF-B1MPBC-a	42EF-B1MPBE-a	42EF-G1MPA-a	42EF-R9MPB-a	42EF-R9MPBV-a	
	DO NPN & PNP	42EF-P2KBB-a	42EF-U2KBB-a	42EF-D1KBAK-a	42EF-S1KBA-a	42EF-B1KBBC-a	42EF-B1KBBE-a	42EF-G1KBA-a	42EF-R9KBB-a	42EF-R9KBBV-a	
	LO NPN & PNP	42EF-P2JBB-a	42EF-U2JBB-a	42EF-D1JBAK-a	42EF-S1JBA-a	42EF-B1JBBC-a	42EF-B1JBBE-a	42EF-G1JBA-a	42EF-R9JBB-a	42EF-R9JBV-a	
	Voltage/Current/Power Consumption	10.8 to 30V DC @ 35 mA maximum (1 W maximum)									
DC Sensors	Sensor Protection	Input reverse polarity, over voltage, false pulse protected, output short-circuit (SCP) to 100 mA, overload									
	Output Type	NPN, PNP, Dual NPN and PNP									
	Output Rating	30V DC @ 100 mA maximum (SCP protected)									
	Output Leakage Current	0.1 mA maximum									
	Response Time	1 ms typical, 4 ms for transmitted beam models									
AC/DC Sensors	<b>Catalog Number</b> MOSFET, Dark operate output ❶	42EF-P2SCB-b	42EF-U2SCB-b	42EF-D1SCAK-b	42EF-S1SCA-b	42EF-B1SCBC-b	42EF-B1SCBE-b	42EF-G1SCA-b	42EF-R9SCB-b	42EF-R9SCBV-b	
	MOSFET, Light operate output ❶	42EF-P2RCB-b	42EF-U2RCB-b	42EF-D1RCAK-b	42EF-S1RCA-b	42EF-B1RCBC-b	42EF-B1RCBE-b	42EF-G1RCA-b	42EF-R9RCB-b	42EF-R9RCBV-b	
	MOSFET, Dark operate output ❷	42EF-P2SFB-b	42EF-U2SFB-b	42EF-D1SFAK-b	42EF-S1SFA-b	42EF-B1SFBC-b	42EF-B1SFBE-b	42EF-G1SFA-b	42EF-R9SFB-b	42EF-R9SFBV-b	
	MOSFET, Light operate output ❷	42EF-P2RFB-b	42EF-U2RFB-b	42EF-D1RFAK-b	42EF-S1RFA-b	42EF-B1RFCB-b	42EF-B1RFBE-b	42EF-G1RFA-b	42EF-R9RFB-b	42EF-R9RFBV-b	
	Voltage/Current/Power Consumption	21.6 to 264V AC/DC @ 25 mA maximum (1 VA maximum) 21.6 to 132V AC/DC for 42EF-xxxFx-a models									
	Sensor Protection	Input reverse polarity, over voltage, false pulse protected, output short-circuit (SCP) to 100 mA, overload									
	Output Type	Light/dark operate (N.O./N.C.) MOSFET output									
	Output Rating	264V AC/DC (132V AC/DC for 42EF-xxxFx-a models) @ 100 mA maximum (SCP protected)									
	Output Leakage Current	0.4 mA maximum									
	Response Time	8.3 ms typical, 16 ms for transmitted beam models									

❶ Provide NPN output when wired as DC circuit.

❷ Provide PNP output when wired as DC circuit.

❸ Contact factory for availability of 8 m range receivers.

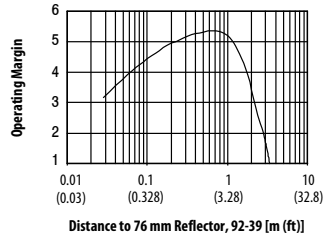
Transmitted beam source models: 42EF-E1EZB-a (DC) and 42EF-E1QZB-b (AC/DC)

a = (-A2) 2 m PVC, 300V cable, (-F4) 4-pin DC micro QD on six-inch pigtail

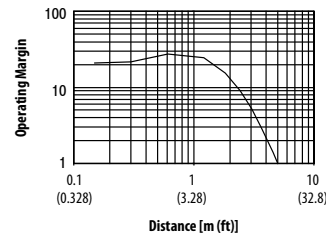
b = (-A2) 2 m PVC, 300V cable, (-G4) 4-pin AC micro QD on six-inch pigtail

## Typical Response Curves

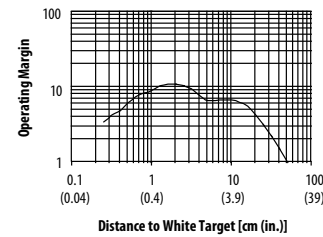
**Polarized Retroreflective**



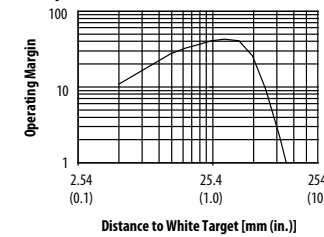
**Standard Retroreflective**



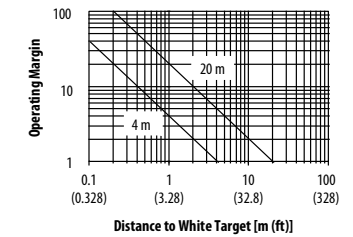
**Diffuse**



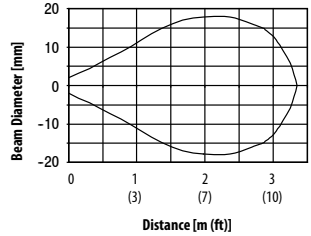
**Sharp Cutoff Diffuse**



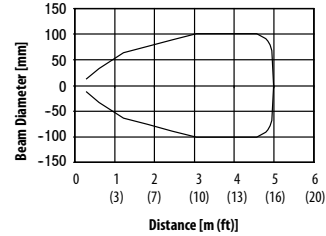
**Transmitted Beam**



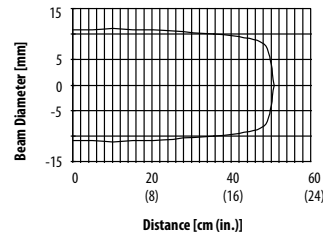
**Polarized Retroreflective Beam Pattern**



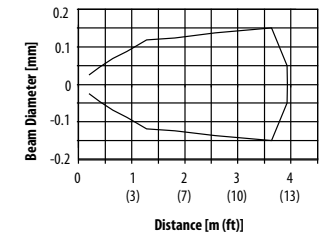
**Standard Retroreflective**



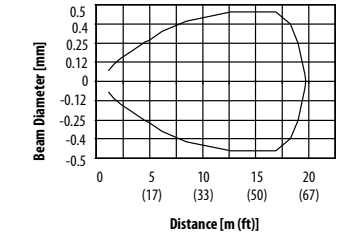
**Diffuse Beam Pattern**



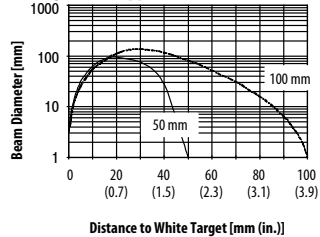
**Transmitted Beam—4 m Beam Pattern**



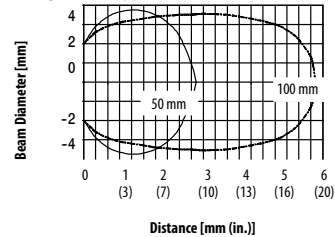
**Transmitted Beam—20 m Beam Pattern**



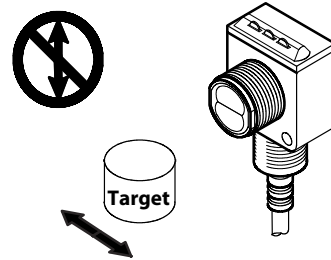
**Background Suppression**



**Background Suppression Beam Pattern**

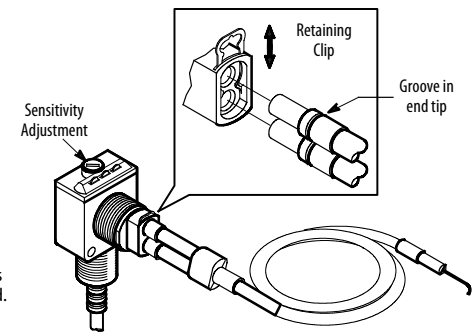


## Background Suppression Sensors



**Note:** Due to the detection method, targets traveling horizontal to the sensor's optics are detected. Targets traveling vertically may not be accurately detected. For reliable background suppression, a minimum separation distance of 6 mm (0.24 in.) is recommended between the target and the backgrounds.

## Glass Fiber Optic Sensors



**Table 1: LED Function**

Label	Color	State	Status
Output	Yellow	OFF	Output de-energized
		ON	Output energized
		Flashing	Output SCP active (DC models only)
Margin	Orange	OFF	Margin <2.5
		ON	Margin >2.5
		Flashing	Output SCP active (AC models only)
Status	Green	OFF	Sensor not powered, output active, SCP active
		ON	Sensor powered

**Note:** For DC models, output and margin LEDs alternate flashing when SCP is active.

## Sensor Alignment

The orange LED is an alignment aid which indicates that a margin of 2.5 has been reached. This means that the sensor is receiving at least 2.5 times the signal strength back from the target needed to trigger an output signal. In general, it is desirable to have a higher margin to help overcome any deteriorating environmental conditions, i.e., dust build-up on the sensor's lens. When aligning the sensor, the best performance can be obtained if this margin indicator is illuminated with the target in place.

When aligning diffuse mode sensors, ensure that the sensitivity be set at its maximum setting using the single-turn adjustment knob on the front panel. Pan the sensor left, right, up, and down to center the beam on the target. It may then be necessary to decrease this setting to prevent the sensor from detecting a background object. If this problem persists, the application will require the use of a background suppression, sharp cutoff diffuse, or retroreflective sensing mode.

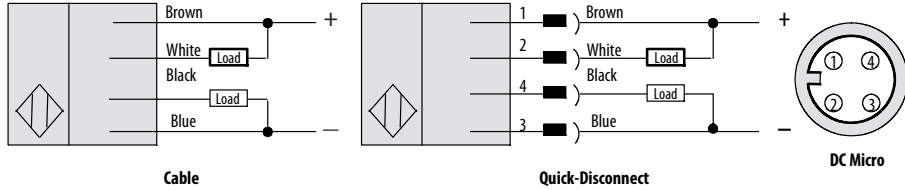
## Short-Circuit Protection

RightSight photoelectric sensors provide short-circuit protection (SCP) on the output leads. This feature is intended to protect the sensor from damage in the event that the output load is shorted to ground. If this condition does occur, the SCP will activate and the orange LED will flash until the source is removed (power must be reset for AC/DC models). The SCP limits are set to 100 mA over the entire voltage range for both DC and AC/DC models.

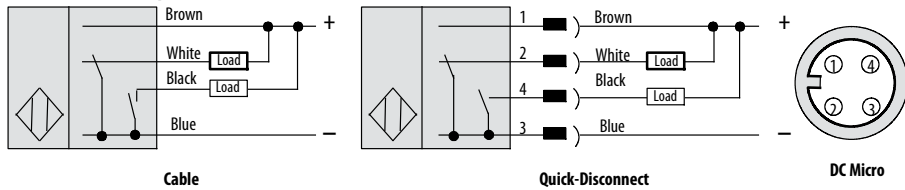
## Wiring Diagrams

### 10.8-30V DC Sensors

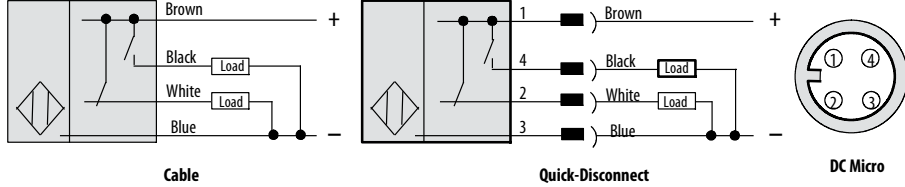
#### Models with Dual NPN and PNP Outputs



#### Models with NPN Outputs

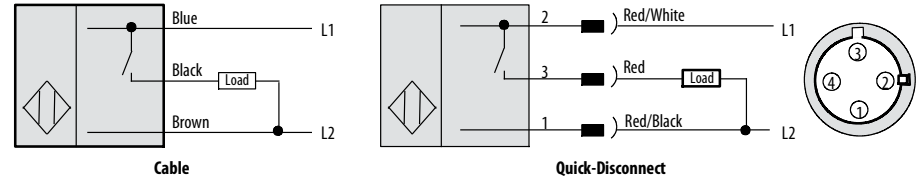


#### Models with PNP Outputs

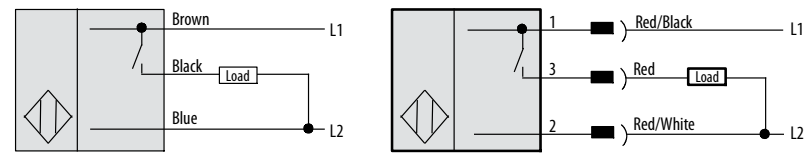


### 21.6-264V AC/DC Sensors

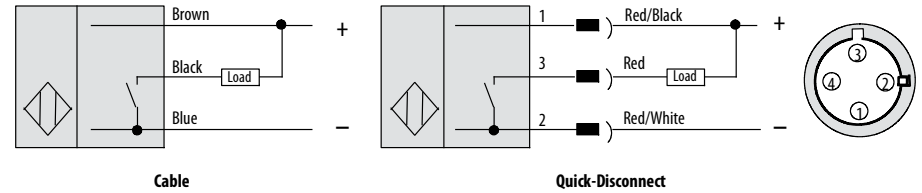
#### AC Wiring for 42EF-\_\_C\_\_ Models



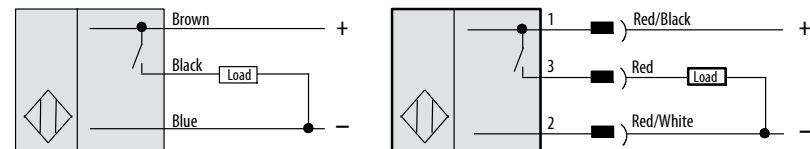
#### AC Wiring for 42EF-\_\_F\_\_ Models



#### DC Wiring for 42EF-\_\_C\_\_ Models

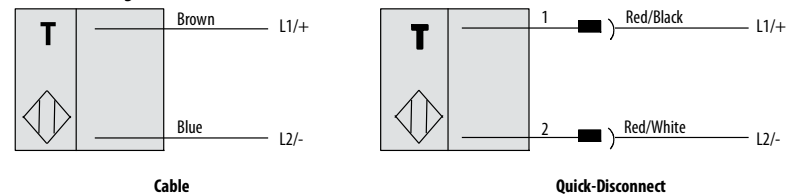


#### DC Wiring for 42EF-\_\_F\_\_ Models



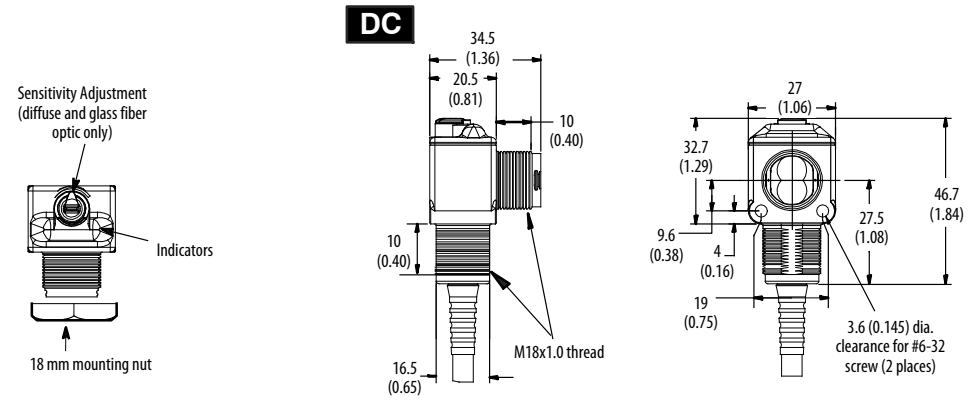
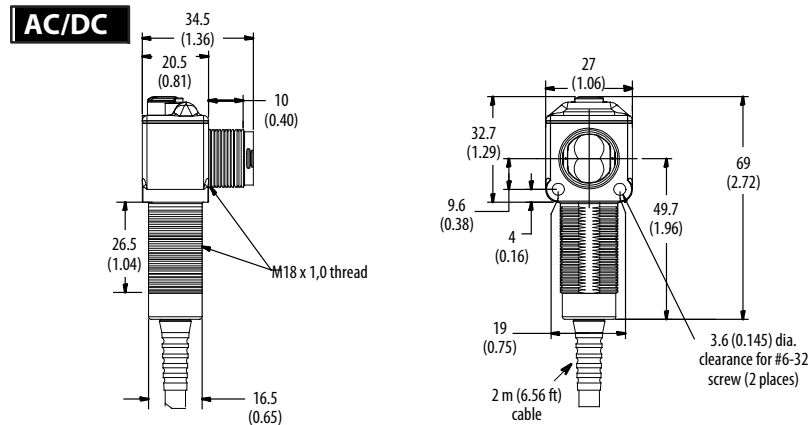
### Transmitted Beam Source

#### AC and DC Wiring

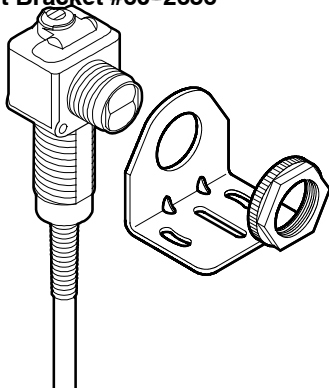


**Note:** All wire colors on quick-disconnect models shown refer to Allen-Bradley cordsets.

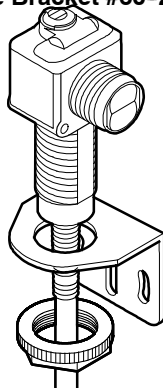
## Sensor Dimensions [mm (in.)]



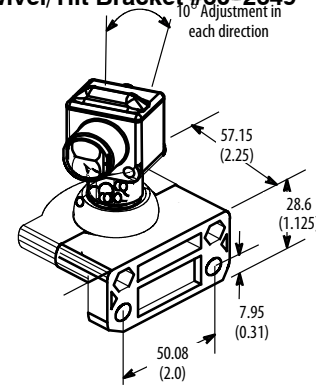
### Accessories Straight Bracket #60-2656



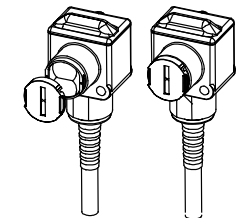
### Right Angle Bracket #60-2657



### Swivel/Tilt Bracket #60-2649



### Apertures Transmitted Beam and Retroreflective Sensing Modes only)



1 mm Qty. 20 #60-2660  
 2 mm Qty. 20 #60-2661  
 4 mm Qty. 20 #60-2662  
 Aperture Set (4 each) #60-2659

**Note:** 18 mm nut must be installed prior to installing aperture if threads on optics snout are to be used.

Accessories—Description	Catalog Number
Mounting Kit	60-2716
Clamp Style Bracket	871A-BP18
Flush Mount Adaptor	60-2590
Field Mount Terminal Chamber—4-pin DC micro	871A-TS4-DM
Field Mount Terminal Chamber—3-pin AC micro	871A-TS3-RM
Cordset—2 m (6.5 ft), 4-pin DC micro	889D-F4AC-2
Cordset—2 m (6.5 ft), 4-pin AC micro	889D-F4AEA-2
Reflector—1.25 inch diameter	92-47
Reflector—3 inch diameter	92-39
Fiber optic cable, glass, bifurcated, 5/16 in. threaded	43GR-TBB25SL
Fiber optic cable, glass, individual, 5/16 in. threaded	43FT-TBB25SL

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#### Notes

- Damage may occur to sensor housing if torque above 20 in-lb is applied to the 18 mm locknut.
- Fiber optic sensors come with two 18 mm locknuts (75012-025-01). All other RightSight sensors come with one thick 18 mm locknut (75012-097-01).
- Optional mounting kit (60-2716) comes with two 75012-025-01, one 75012-097-01 locknut, internal tooth star washer, and screws/nuts for through-hole mounting.

#### Voltage and current ratings of the overcurrent protection to be used per UL 508:

Max. Current/Minimum Voltage Rating of Overcurrent Protection	Conductor Size	
	AWG	Sq. mm
5 A/300V	20	0.52
3 A/300V	22	0.33
2 A/300V	24	0.21
1 A/300V	26	0.13
0.8 A/300V	28	0.08

[www.rockwellautomation.com](http://www.rockwellautomation.com)

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