



# QS18VxAF250 Electronically Adjustable Background Suppression Sensor (30-250mm)

Original Instructions

p/n: 201339 Rev. G

18-Aug-25

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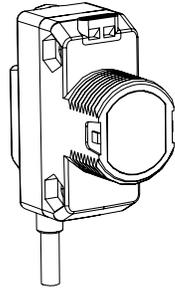
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# Chapter 1 Features

Compact sensors featuring adjustable range background suppression mode

- Two optical designs optimized for reliable long-range target detection and stable detection of colorfully printed packages
  - High visibility red LED spot AF250 model recommended for long-range detection to 250 mm on black or white targets
  - Small bright red LED spot AF120 model recommended for reliable detection of colorfully printed packages and small parts or features
- Simple single-turn potentiometer adjustment of cutoff distance
- Enhanced immunity to fluorescent lights
- Crosstalk immunity algorithm allows two sensors to be used in close proximity
- High-intensity, bright red LED spot makes sensor alignment fast and easy
- Convenient mounting options are available for 18 mm barrel or side mount
- Bright indicator LEDs show operating status from 360°



**WARNING:**



- **Do not use this device for personnel protection**
- Using this device for personnel protection could result in serious injury or death.
- This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A device failure or malfunction can cause either an energized (on) or de-energized (off) output condition.

## Models

Model	Output Type	Sensing Range	Supply Voltage
QS18VN6AF250	Complementary NPN	Adjustable Cutoff: 30 mm to 250 mm	10 V DC to 30 V DC
QS18VP6AF250	Complementary PNP		
QS18K6AF250Q8	IO-Link		
QS18VN6AF120	Complementary NPN	Adjustable Cutoff: 30 mm to 120 mm	
QS18VP6AF120	Complementary PNP		
QS18K6AF120Q8	IO-Link		

2 m (6.5 ft) PVC cabled models are listed for the complementary output models. 2 m (6.5 ft) and 9 m (30 ft) PVC cabled options are not available on IO-Link models.

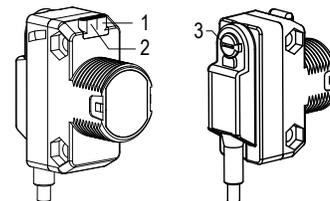
- To order the 9 m (30 ft) PVC cable model, add the suffix "W/30" to the cabled model number. For example, QS18VN6AF250 W/30.
- To order the 4-pin M12 integral quick disconnect model, add the suffix "Q8" to the model number. For example, QS18VN6AF250Q8.
- To order the 4-pin M8 integral quick disconnect model, add the suffix "Q7" to the model number. For example, QS18VN6AF250Q7.
- To order the 150 mm (6 in) PVC cable model with a 4-pin M12 quick disconnect, add the suffix "Q5" to the model number. For example, QS18VN6AF250Q5.
- To order the 150 mm (6 in) PVC cable model with a 4-pin M8 quick disconnect, add the suffix "Q" to the model number. For example, QS18VN6AF250Q.

- Models with a quick disconnect require a mating cordset.

## Overview

The WORLD-BEAM QS18AF250 Series Sensor detects targets within the cutoff distance while ignoring objects in the background. Background suppression mode is recommended when target position is repeatable, but target color and background conditions vary.

- 1 Green LED: Power Indicator
- 2 Amber LED: Light Sensed Indicator (Flashes for Marginal Conditions)
- 3 Cutoff Point Adjustment Potentiometer



## Specifications

### Supply Voltage

10 V DC to 30 V DC (10% maximum ripple within specified limits)

### Maximum Power Consumption (exclusive of load)

AF120 Models less than 300 mW  
AF250 Models less than 475 mW

### Sensing Beam

Visible red LED, 640 nm

### Supply Protection Circuitry

Protected against reverse polarity and transient voltages

### Output Configuration

Solid-state complementary: NPN or PNP, or push/pull, depending on model

Rating: 50 mA per output

**Output Voltage High:** Greater than  $V_{supply} - 2.5 V$

**Output Voltage Low:** Less than 2.5 V

For loads less than 1 Meg Ohm

Protected against false pulse on power-up and continuous overload or short circuit of outputs

### Output Response

1.7 milliseconds ON; 1.1 milliseconds OFF

**Note:** 200-millisecond delay on power-up; outputs do not conduct during this time

### Adjustments

Single-turn adjustment potentiometer sets the cutoff distance between minimum and maximum positions

### Repeatability

130  $\mu s$  (standard mode)

### Indicators

Two LED indicators on sensor top:

Green solid: Power on

Amber: Light sensed

Amber flashing: Marginal sensing condition

### Construction

ABS housing, acrylic lens cover, nickel-plated brass connector, acetal adjustment pot

### Connections

2 m (6.5 ft) unterminated 4-wire PVC-jacketed cable; 9 m (30 ft) unterminated 4-wire PVC-jacketed cable; 150 mm (6 in) PVC-jacketed cable with a 4-pin M8 male quick-disconnect connector; 150 mm (6 in) PVC-jacketed cable with a 4-pin M12 male quick-disconnect connector; Integral 4-pin M8 male quick-disconnect connector or Integral 4-pin M12 male quick-disconnect connector, depending on model

Models with a quick disconnect require a mating cordset

### Environmental Rating

IEC IP67; NEMA 6; UL Type 1

### IO-Link Interface

Supports Smart Sensor Profile: Yes

Baud Rate: 38400 bps

Process Data Widths: 16 bits

IODD Files: Provides all programming options plus additional functionality; please see the IO-Link Data Reference Guide for more details

### Operating Conditions

95% relative humidity at 50 °C (non-condensing)

-40 °C to +60 °C (-40 °F to +140 °F)

### Certifications



Banner Engineering BV  
Park Lane, Culliganlaan 2F bus 3  
1831 Diegem, BELGIUM



Turck Banner LTD Blenheim House  
Blenheim Court  
Wickford, Essex SS11 8YT  
GREAT BRITAIN



### Required Overcurrent Protection



**WARNING:** Electrical connections must be made by qualified personnel in accordance with local and national electrical codes and regulations.

Overcurrent protection is required to be provided by end product application per the supplied table.

Overcurrent protection may be provided with external fusing or via Current Limiting, Class 2 Power Supply.

Supply wiring leads < 24 AWG shall not be spliced.

For additional product support, go to [www.bannerengineering.com](http://www.bannerengineering.com).

Supply Wiring (AWG)	Required Overcurrent Protection (A)	Supply Wiring (AWG)	Required Overcurrent Protection (A)
20	5.0	26	1.0
22	3.0	28	0.8
24	2.0	30	0.5

## FCC Part 15 Class A for Unintentional Radiators

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

(Part 15.21) Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

## Industry Canada ICES-003(A)

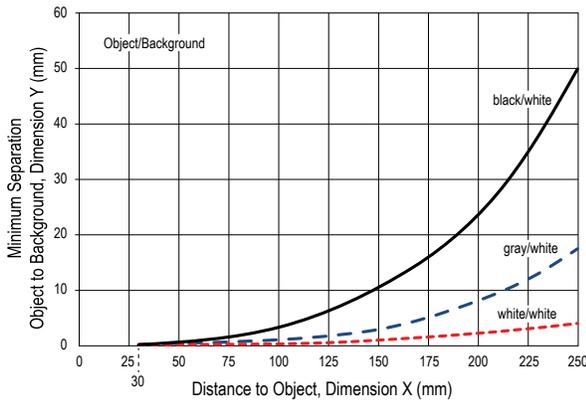
This device complies with CAN ICES-3 (A)/NMB-3(A). Operation is subject to the following two conditions: 1) This device may not cause harmful interference; and 2) This device must accept any interference received, including interference that may cause undesired operation.

Cet appareil est conforme à la norme NMB-3(A). Le fonctionnement est soumis aux deux conditions suivantes : (1) ce dispositif ne peut pas occasionner d'interférences, et (2) il doit tolérer toute interférence, y compris celles susceptibles de provoquer un fonctionnement non souhaité du dispositif.

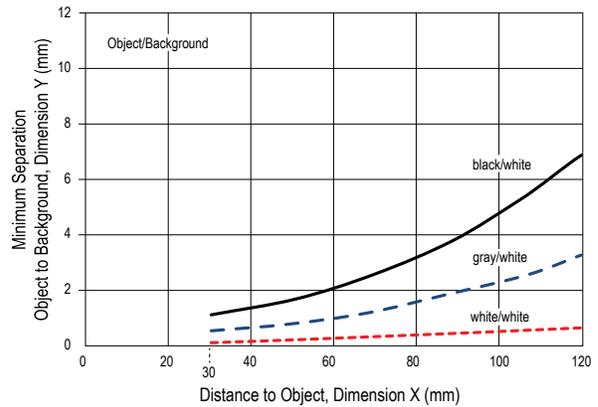
## Performance Curves

Long Range: The minimum sensing range is 8 mm for 6% reflectivity. Short Range: The minimum sensing range is 13 mm for 6% reflectivity.

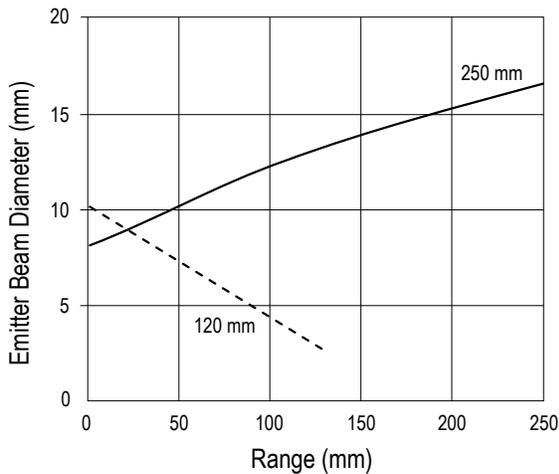
Minimum separation between object and background (Background Suppression Mode) for AF250 models



Minimum separation between object and background (Background Suppression Mode) for AF120 models



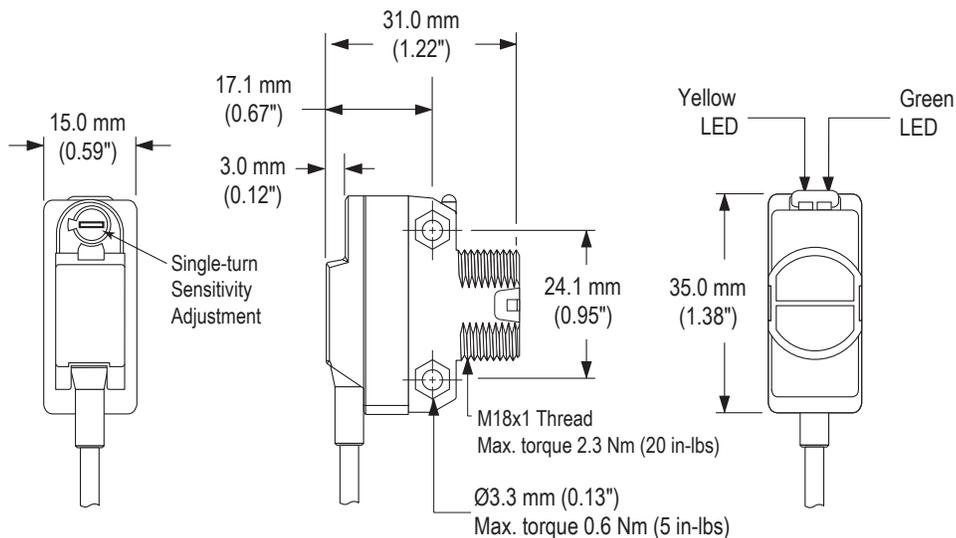
Typical emitter spot diameter vs. distance for AF250 and AF120



## Dimensions

All measurements are listed in millimeters, unless noted otherwise. The measurements provided are subject to change.

### Base dimensions for the QS18 models



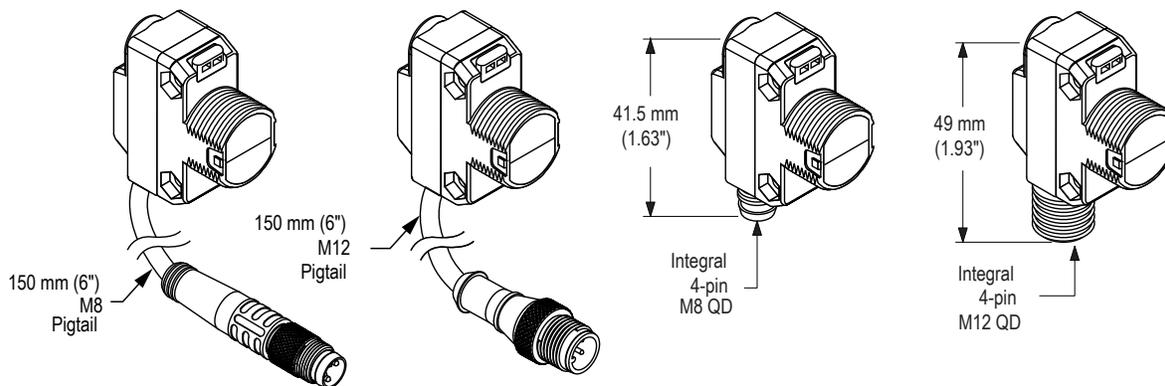
### Dimensions for each connection type

Model Suffix Q  
(e.g. QS18VN6AF250Q)

Model Suffix Q5  
(e.g. QS18VN6AF250Q5)

Model Suffix Q7  
(e.g. QS18VN6AF250Q7)

Model Suffix Q8  
(e.g. QS18VN6AF250Q8)



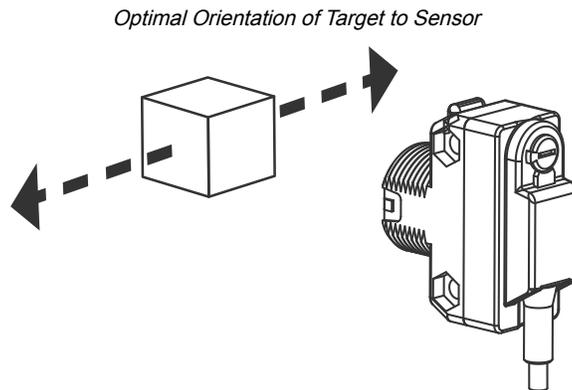
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# Chapter 2 Installation Instructions

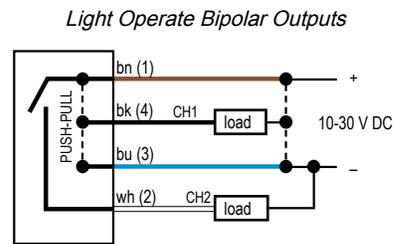
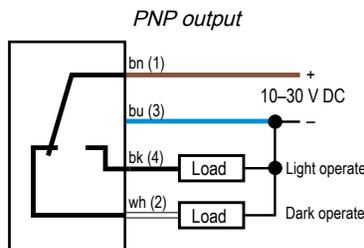
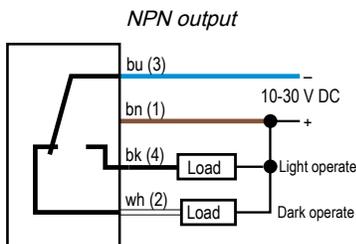
## Sensor Orientation

Optimize detection reliability and minimum object separation performance with correct sensor-to-target orientation. To ensure reliable detection, orient the sensor as shown in relation to the target to be detected.



## Wiring Diagrams

Cabled wiring diagrams are shown. Quick disconnect wiring diagrams are functionally identical.



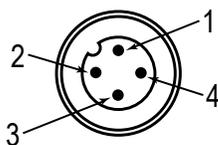
White wire: Light operate

Black wire: Configurable via IO-Link

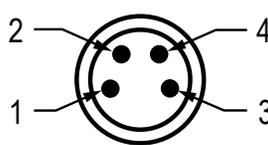
**Key**

- 1 = Brown
- 2 = White
- 3 = Blue
- 4 = Black

4-pin male M12 pinout



4-pin male M8 pinout



In dark operate (DO) mode, the output is ON when the target returns less light to the sensor than the configured target and OFF when the sensor detects more light than the configured/taught target.

In light operate (LO) mode, the output is ON when the target returns the same or more light to the sensor and OFF when the sensor detects less light than the configured/taught target.

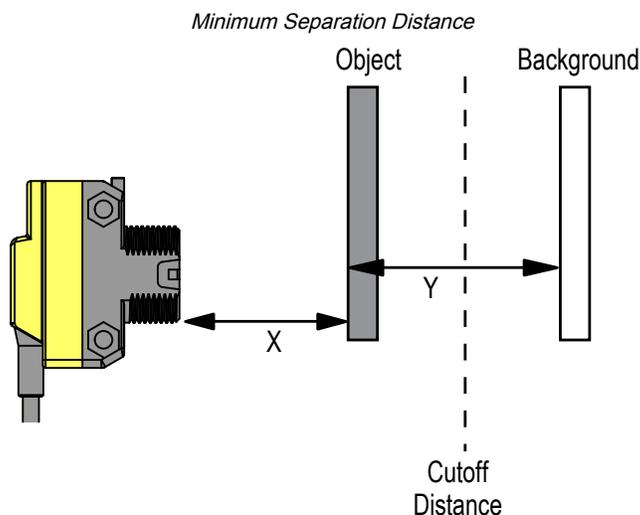
In **adjustable field** sensing modes, light operate is active when the target is present and dark operate is active when the target is absent.

## Sensor Setup (Background Suppression Mode)

Background Suppression Mode: Objects beyond the set cutoff distance will not be detected. Background suppression mode can be used in most situations with varying object colors and positions or with varying background conditions.

To ensure reliable background suppression, a minimum separation distance between the object and the background is necessary. To determine the minimum separation distance, see "[QS18VxAF250 Performance Curves](#)" on page 5.

1. Mount the sensor with the darkest object at the longest application distance. The distance to the object must be less than shown in "[Figure: Minimum separation between object and background \(Background Suppression Mode\) for AF250 models](#)" on page 5, or "[Figure: Minimum separation between object and background \(Background Suppression Mode\) for AF120 models](#)" on page 5 for your object color, depending on the model.
2. Turn the adjustment potentiometer counterclockwise until the yellow indicator turns off.
3. Turn the adjustment potentiometer clockwise until the yellow indicator turns on.
4. Replace the darkest object with the brightest background at the closest application distance.
5. Turn the adjustment potentiometer clockwise until the yellow indicator turns on.
6. Turn the adjustment potentiometer counterclockwise approximately half of the adjustment rotation from step 5. This places the cutoff distance approximately half-way between the object and the background switch points. If sufficient separation exists between the object and the background, the sensor is ready for operation.



X: Distance to the Object

Y: Minimum Separation Between the Object and the Background

Set the cutoff distance approximately midway between the farthest object and the closest background

## IO-Link Interface

IO-Link® <sup>(1)</sup> is a point-to-point communication link between a master device and sensor. Use IO-Link to parameterize sensors and transmit process data automatically.

For the latest IO-Link protocol and specifications, see [www.io-link.com](http://www.io-link.com).

Each IO-Link device has an IODD (IO Device Description) file that contains information about the manufacturer, article number, functionality etc. This information can be easily read and processed by the user. Each device can be unambiguously

<sup>(1)</sup> IO-Link® is a registered trademark of PROFIBUS Nutzerorganisation e.V.

identified via the IODD as well as via an internal device ID. Download the QS18's IO-Link IODD package (p/n 206635) from Banner Engineering's website at [www.bannerengineering.com](http://www.bannerengineering.com).

Banner has also developed Add On Instruction (AOI) files to simplify ease-of-use between the QS18, multiple third-party vendors' IO-Link masters, and the Logix Designer software package for Rockwell Automation PLCs. Three types of AOI files for Rockwell Allen-Bradley PLCs are listed below. These files and more information can be found at [www.bannerengineering.com](http://www.bannerengineering.com).

**Process Data AOIs**—These files can be used alone, without the need for any other IO-Link AOIs. The job of a Process Data AOI is to intelligently parse out the Process Data word(s) in separate pieces of information. All that is required to make use of this AOI is an EtherNet/IP connection to the IO-Link Master and knowledge of where the Process Data registers are located for each port.

**Parameter Data AOIs**—These files require the use of an associated IO-Link Master AOI. The job of a Parameter Data AOI, when working in conjunction with the IO-Link Master AOI, is to provide quasi-realtime read/write access to all IO-Link parameter data in the sensor. Each Parameter Data AOI is specific to a given sensor or device.

**IO-Link Master AOIs**—These files require the use of one or more associated Parameter Data AOIs. The job of an IO-Link Master AOI is to translate the desired IO-Link read/write requests, made by the Parameter Data AOI, into the format a specific IO-Link Master requires. Each IO-Link Master AOI is customized for a given brand of IO-Link Master.

Add and configure the relevant Banner IO-Link Master AOI in your ladder logic program first; then add and configure Banner IO-Link Device AOIs as desired, linking them to the Master AOI as shown in the relevant AOI documentation.

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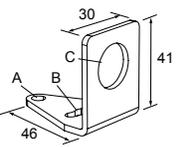
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# Chapter 3 Accessories

## Brackets

**SMB18A**

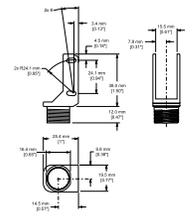
- Right-angle mounting bracket with a curved slot for versatile orientation
- 12-ga. stainless steel
- 18 mm sensor mounting hole
- Clearance for M4 (#8) hardware



**Hole center spacing:** A to B = 24.2  
**Hole size:** A =  $\varnothing$  4.6, B = 17.0 x 4.6, C =  $\varnothing$  18.5

**SMBQS18Y**

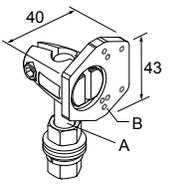
- Die-cast bracket for 18 mm holes
- Includes metal hex nut and lock washer
- Allows  $\pm 8^\circ$  for cabled sensors



**Hole size:** A =  $\varnothing$  15.3

**SMBQ4X..**

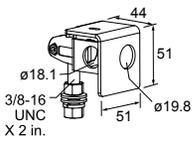
- Swivel bracket with tilt and pan movement for precision adjustment
- Easy sensor mounting to extruded rail T-slots
- Metric and inch size bolts are available
- Side mounting of some sensors with the 3 mm screws included with the sensor



**B** = 7 x M3 x 0.5  
**Bolt thread (A):** 3/8 - 16 x 2 1/4 in for SMBQ4XFA; M10 - 1.5 x 50 for SMBQ4XFAM10; n/a; no bolt included.  
 Mounts directly to 12 mm (1/2 in) rods for SMBQ4XFMA1

**SMB18AFA..**

- Protective, swivel bracket with tilt and pan movement for precision adjustment
- Easy sensor mounting to extruded rail T-slots
- Metric and inch size bolts available
- Mounting hole for 18 mm sensors

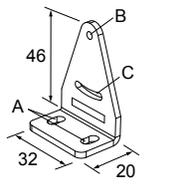


**Hole size:** B =  $\varnothing$  18.1  
**Bolt Thread (A):**  
 SMB18AFA = 3/8 - 16 x 2 in  
 SMB18AFAM10 = M10 - 1.5 x 50

**SMB312S**

- Stainless steel 2-axis, side-mount bracket

A = 4.3 x 7.5, B = diam. 3, C = 3 x 15.3



# Cordsets

Use the M12 cordsets with the QS18 models with an M12 quick disconnect connector. Use the M8 cordsets with the QS18 models with an M8 QD.

4-pin Single-Ended M12 Female Cordsets				
Model	Length	Dimensions (mm)	Pinout (Female)	
BC-M12F4-22-1	1 m (3.28 ft)			<p>1 = Brown 2 = White 3 = Blue 4 = Black 5 = Unused</p>
BC-M12F4-22-2	2 m (6.56 ft)			
BC-M12F4-22-5	5 m (16.4 ft)			
BC-M12F4-22-8	8 m (26.25 ft)			
BC-M12F4-22-10	10 m (30.81 ft)			
BC-M12F4-22-15	15 m (49.2 ft)			
BC-M12F4-22-20	20 m (65.61 ft)			
BC-M12F4-22-25	25 m (82.02 ft)			
BC-M12F4-22-30	30 m (98.42 ft)			

4-pin Single-Ended M12 Female Right-Angle Cordsets				
Model	Length	Dimensions (mm)	Pinout (Female)	
BC-M12F4A-22-1	1 m (3.28 ft)			<p>1 = Brown 2 = White 3 = Blue 4 = Black 5 = Unused</p>
BC-M12F4A-22-2	2 m (6.56 ft)			
BC-M12F4A-22-5	5 m (16.4 ft)			
BC-M12F4A-22-8	8 m (26.25 ft)			
BC-M12F4A-22-10	10 m (30.81 ft)			
BC-M12F4A-22-15	15 m (49.2 ft)			

4-pin Single-Ended M8 Female Cordsets				
Model	Length	Dimensions (mm)	Pinout (Female)	
BC-M8F4-24-0.5	0.5 m (1.64 ft)			<p>1 = Brown 2 = White 3 = Blue 4 = Black</p>
BC-M8F4-24-1	1 m (3.28 ft)			
BC-M8F4-24-2	2 m (6.56 ft)			
BC-M8F4-24-5	5 m (16.4 ft)			
BC-M8F4-24-8	8 m (26.25 ft)			
BC-M8F4-24-10	10 m (30.81 ft)			

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# Chapter 4 Product Support and Maintenance

## Clean Sensor with Compressed Air Then Isopropyl Alcohol

Handle the sensor with care during installation and operation. Sensor windows soiled by fingerprints, dust, water, oil, etc. create stray light that may degrade the peak performance of the sensor.

Blow dust from the sensor using filtered, compressed air. If the sensor is still dirty, gently wipe the sensor with a dry optical cloth. If the dry optical cloth does not remove all residue, use 70% isopropyl alcohol on a clean optical cloth, then dry with a clean dry optical cloth and blow with filtered, compressed air. Do not use any other chemicals for cleaning.

## Contact Us

Banner Engineering Corp. | 9714 Tenth Avenue North | Plymouth, MN 55441, USA | Phone: + 1 888 373 6767

For worldwide locations and local representatives, visit [www.bannerengineering.com](http://www.bannerengineering.com).

## Banner Engineering Corp Limited Warranty

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For patent information, see [www.bannerengineering.com/patents](http://www.bannerengineering.com/patents).

