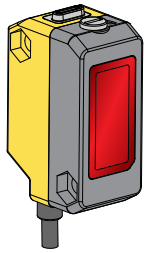
WORLD-BEAM® QS18AF Mechanically Adjustable Background Suppression Sensor (30-350mm)

Datasheet

Compact sensors featuring extended range and background suppression mode



- Exceptional optical performance; up to 350 mm sensing range in compact QS18 housing
- Background suppression models for reliable detection of objects when the background condition is not controlled or fixed
- Simple multi-turn screw adjustment of cutoff distance
- Enhanced immunity to fluorescent lights
- Crosstalk immunity algorithm allows two sensors to be used in close proximity
- Visible red emitter

WARNING:

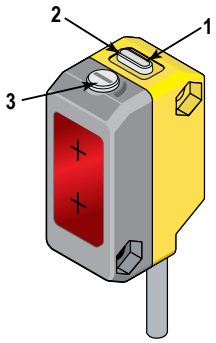
- **Do not use this device for personnel protection**
- Using this device for personnel protection could result in serious injury or death.
- This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A device failure or malfunction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

Models

Models[1]	Supply Voltage	Sensing Range	Output Type
QS18VN6AF350	10 V DC to 30 V DC	Adjustable Cutoff: 30 mm to 350 mm Minimum Sensing Range: 1.5 mm to 3 mm, depending on cutoff	NPN
QS18VP6AF350			PNP
QS18AB6AF350			Bipolar (1 NPN & 1 PNP)

Overview

WORLD-BEAM® QS18 Adjustable-Field Sensors with Background Suppression ignore objects beyond the set cutoff distance. Background suppression mode can be used in most situations with varying object color and position or with varying background conditions.



1	Green: Power Indicator
2	Yellow: Light Sensed Indicator (Flashes for Marginal Conditions)
3	Cutoff Point Adjustment Screw

Figure 1. Sensor features

[1] Only standard 2 m (6.5 ft) cable models are listed.

- To order 9 m (30 ft) cable models: add suffix "**W/30**" to the model number (for example, **QS18VN6AF350 W/30**).
- To order 150 mm (6 in) pigtail with a 4-pin Pico-style connector models, add suffix "**Q**" to the model number (for example, **QS18VN6AF350Q**)
- To order 150 mm (6 in) pigtail with a 4-pin Euro-style connector models, add suffix "**Q5**" to the model number (for example,**QS18VN6AF350Q5**)

Sensor Orientation

To ensure reliable detection, orient the sensor as shown in relation to the target to be detected.

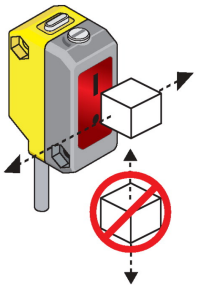
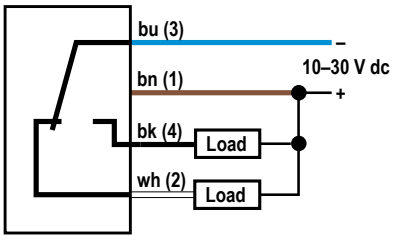


Figure 2. Optimal Orientation of Target to Sensor

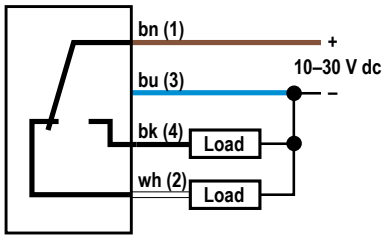
Wiring Diagrams

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

NPN (Sinking) Outputs



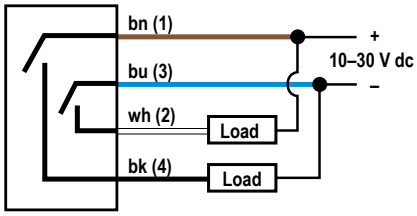
PNP (Sourcing) Outputs



Wiring Key

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

Bipolar Outputs



Sensor Setup - Background Suppression

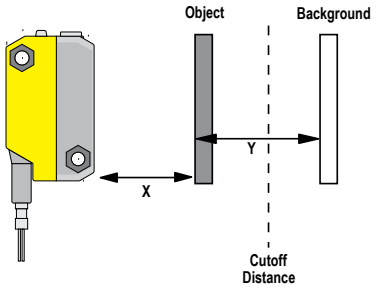
Background Suppression Mode: Objects beyond the set cutoff distance will not be detected.

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. See Figure 7 on p. 5 to determine the minimum separation distance.

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 7 on p. 5 for your object color.
2. Turn the adjustment potentiometer **counter-clockwise** until the yellow indicator turns **off** (5 turns maximum).
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**, counting the revolutions, until the yellow indicator turns **on**.
6. Turn the adjustment potentiometer **counter-clockwise** half of the number of turns from step 5. This places the cutoff distance midway between the object and the background switchpoints (see Figure 3 on p. 3).

   The sensor is ready for operation.



X: Distance to the Object

Y: Minimum Separation Between the Object and the Background

Figure 3.

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

Setup Example

An object with a reflectivity similar to black paper is set 150 mm away from the sensor. A background with a reflectivity similar to white paper is set 200 mm away from the sensor. According to Figure 7 on p. 5 , the minimum separation distance between the object and the background is 12 mm. In this application, reliable detection is achieved when set up according to the procedure outlined in Sensor Setup - Background Suppression on p. 2.

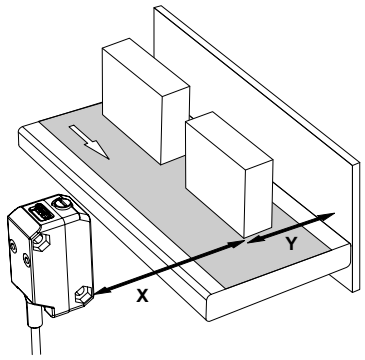


Figure 4. Background Suppression Mode Application Example

1. Object
2. Conveyor
3. Background

X: Distance to the Object = 150 mm

Y: Minimum Separation Between the Object and the Background > 12 mm

Output States

Background Suppression Mode				
Sensor Model Type	**Output**	**Object Inside Minimum Sensing Range**	**Object Between Minimum Sensing Range and Cutoff Distance**	**Object Beyond Cutoff Distance**
All Models	Yellow Indicator Light	Undefined	ON	OFF
Complementary Models	Black Wire (Pin 4)	Undefined	ON	OFF
	White Wire (Pin 2)	Undefined	OFF	ON
Bipolar Models	Black Wire (Pin 4)	Undefined	ON	OFF
	White Wire (Pin 2)	Undefined	ON	OFF

Specifications

Supply Voltage
10 V DC to 30 V DC (10% maximum ripple within specified limits) at less than 16 mA, exclusive of load

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 (current sinking or sourcing), or bipolar (both sinking and sourcing) depending on model;
Rating: 100 mA total output current
Off-state leakage current: < 50 µA at 30 V dc
ON-state saturation voltage: < 1.5 V at 10 mA; < 3.0 V at 100 mA
Protected against false pulse on power-up and continuous overload or short circuit of outputs

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.

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

Output Response
2.8 millisecond ON/OFF
Note: 200 millisecond delay on power-up; outputs do not conduct during this time

Adjustments
Five-turn adjustment screw sets cutoff distance between min. and max. positions, clutched at both ends of travel

Repeatability
250 µs

Indicators
2 LED indicators on sensor top:
Green solid: Power on
Amber solid: Light sensed
Amber flashing: Marginal sensing condition

Construction
ABS housing, rylic lens cover; PVC cable, nickel-plated brass connector, etal adjustment pot

Environmental Rating
IEC IP67; NEMA 6; UL Type 1

Connections
2 m (6.5 ft) 4-wire PVC cable, 9 m (30 ft) PVC cable, or 4-pin Pico-style or Euro-style 150 mm (6 in) pigtail QD, depending on model

Operating Conditions
Relative Humidity: 95% relative humidity at 50 °C (non-condensing)
Temperature: –20 °C to 55 °C (–4 °F to 131 °F)

Application Notes
For mirror-like objects, minimize the sensor to object mounting distance and tilt the sensor so reflected light is directed away from the sensor when the object is present.

Certifications

Performance Curves

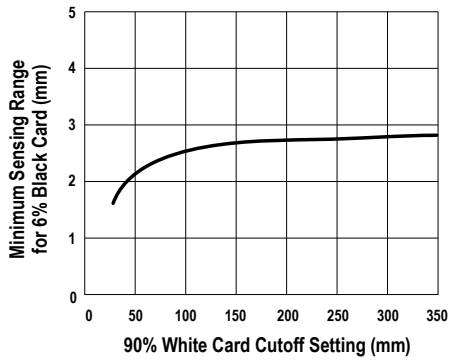


Figure 5. Minimum Sensing Range (Dead Zone) vs. 90% White Cutoff Setting

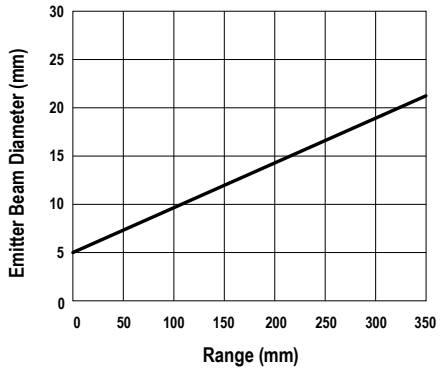


Figure 6. Typical Emitter Spot Diameter vs. Distance

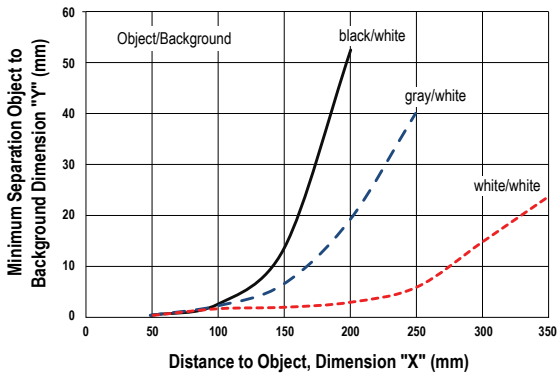
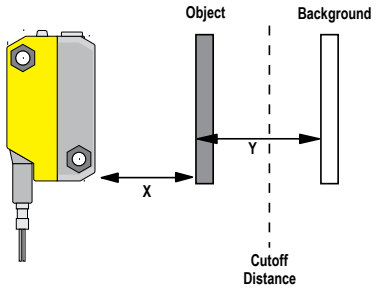


Figure 7. Minimum Separation Distance Between Object and Background: Background Suppression Mode



X: Distance to Object (mm)

Y: Minimum Separation Between Object and Background (mm)

Excess Gain Curves

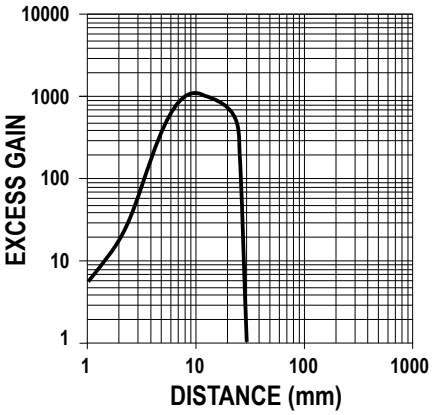


Figure 8. Excess Gain Curve with 30 mm Cutoff (based on 90% White Card)

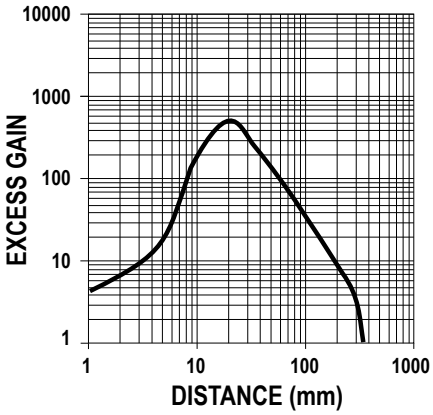
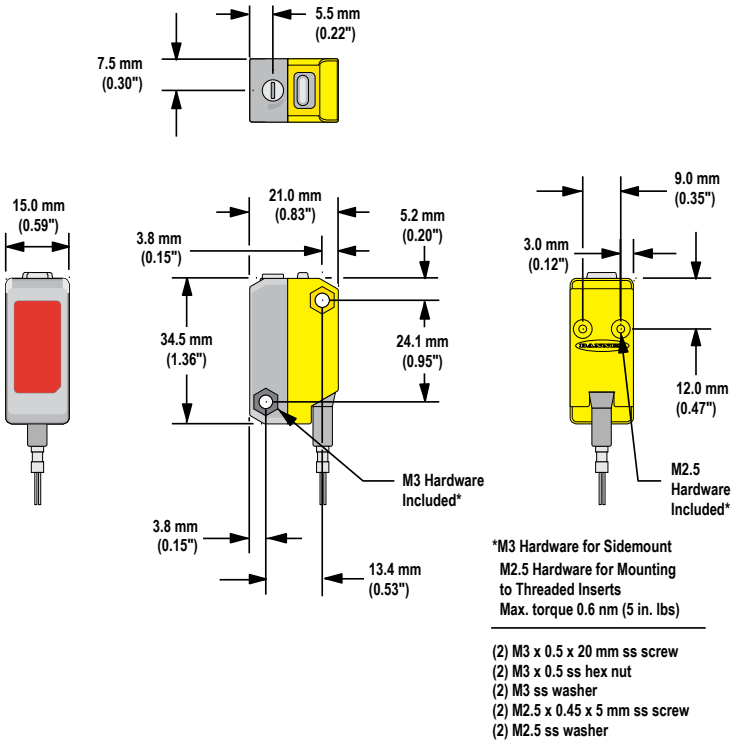


Figure 9. Excess Gain Curve with 350 mm Cutoff (based on 90% White Card)

Dimensions

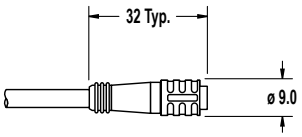
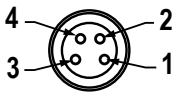
All measurements are listed in millimeters [inches], unless noted otherwise.



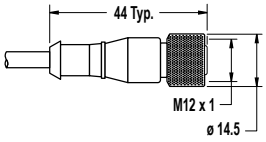
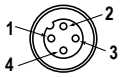
Accessories

Quick-Disconnect (QD) Cordsets

4-Pin Snap-on M8/Pico-Style Cordsets—Single Ended

Model	Length	Style	Dimensions	Pinout (Female)
PKG4-2	2.03 m (6.66 ft)	Straight		 1 = Brown 2 = White 3 = Blue 4 = Black

4-Pin Threaded M12/Euro-Style Cordsets—Single Ended

Model	Length	Style	Dimensions	Pinout (Female)
MQDC-406	1.83 m (6 ft)	Straight		 1 = Brown 2 = White 3 = Blue 4 = Black
MQDC-415	4.57 m (15 ft)			
MQDC-430	9.14 m (30 ft)			
MQDC-450	15.2 m (50 ft)			

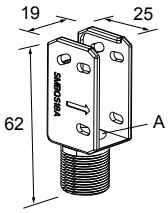
Mounting Brackets

All measurements are listed in millimeters, unless noted otherwise.

SMBQS18A

- Wrap-around protection bracket
- Die-cast bracket
- Base fits 18 mm threaded hole
- Metal hex nut, lock washer and grommet included
- Mounting holes specially designed for QS18AF sensors

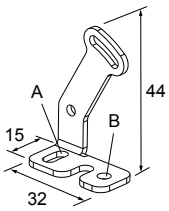
Hole size: A = ø 15.3



SMBQS18AF

- Right-angle mounting bracket
- 14-ga. 304 stainless steel

Hole center spacing: A to B = 20.3
Hole size: A = 4.3 × 9.4, B = ø 4.3



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