

QS18 AF Sensors with Background Suppression

Compact sensors featuring extended range and background suppression mode



Features

- Short-range models for precise adjustment of cutoff distance
- Exceptional optical performance; 15 to 40 mm adjustable 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

Models

Short Range Models			
Models	Supply Voltage	Sensing Range	Output Type
QS18VN6AF40	10 to 30V dc	15 to 40 mm adjustable range	NPN
QS18VP6AF40			PNP
QS18AB6AF40			Bipolar (1 NPN & 1 PNP)

* Only standard 2 m (6.5') cable models are listed.

For 9 m (30') cable, add suffix "W/30" to the model number (e.g., **QS18WE W/30**).

QD models: For 150 mm (6") pigtail cable with 4-pin AC Micro-style QD, add suffix "Q2" to the model number (e.g., **QS18WEQ2**).

A model with a QD connector requires an accessory mating cordset; see [Quick-Disconnnet \(QD\) Cordsets](#) on page 7.

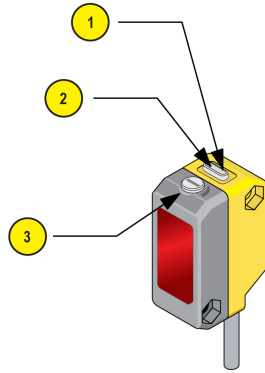
600V cable models: Standard models are supplied with 300V cable. For 600V cable, add suffix "C1" to the model number (e.g., **QS18WEC1**).

† MOSFET: Metal oxide semiconductor field-effect transistor.



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. The short range models offer precise cutoff capability for short range applications. With an adjustable cutoff distance of 15 to 40 mm, thinner objects closer to the background can be detected.



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

Figure 1. Sensor features

Sensor Installation

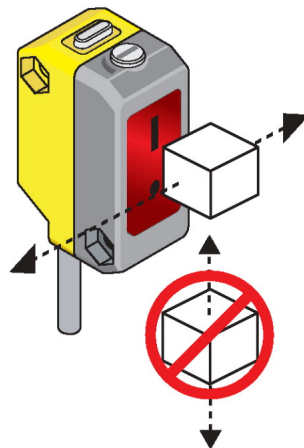


Figure 2. Required Orientation of Object to Sensor



WARNING: Not To Be Used for Personnel Protection

Never use this product as a sensing device for personnel protection. Doing so could lead to serious injury or death. This product does NOT include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A sensor failure or malfunction can cause either an energized or de-energized sensor output condition.

Sensor Setup - Background Suppression

1. Mount the sensor with the darkest object at the longest application distance (the distance to object must be less than shown in Figure 7 for your object color).
2. Turn adjustment pot **counter-clockwise** until it the yellow indicator turns **off** (5 turns max.).
3. Turn the adjustment pot **clockwise** until the yellow indicator turns **on**.
4. Replace darkest object with the brightest background at the closest application distance.
5. Turn the adjustment pot **clockwise**, counting the revolutions, until the yellow indicator turns **on**.
6. Turn the adjustment pot **counter-clockwise** half the number of turns from step 5. This will place the cutoff distance midway between the object and the background switchpoints (See Figure 3). The sensor is ready for operation.

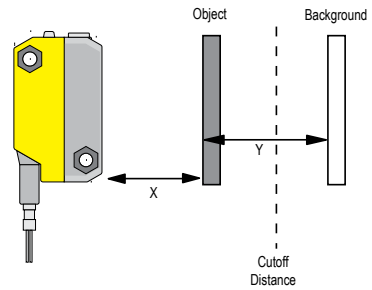


Figure 3. Set cutoff distance approximately midway between the farthest target and the closest background

X: Distance to Object

Y: Minimum Separation Between Object and Background

Setup Example

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 color and position or with varying background conditions.

To ensure reliable background suppression, a minimum separation distance between the object and the background is necessary. See "Minimum Separation Distance Between Object and Background: Background Suppression Mode" (Figure 7) to determine the minimum separation distance.

Example: An object with a reflectivity similar to black paper is set 30 mm away from the sensor. A background with reflectivity similar to white paper is set 40 mm away from the sensor. According to Figure 7, the minimum separation distance between the object and the background is 0.7 mm. In this application, reliable detection will be achieved when set up according to the procedure outlined [Sensor Setup - Background Suppression](#) on page 3.

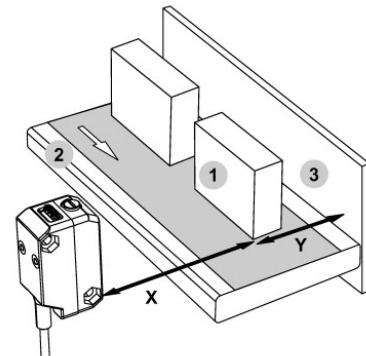


Figure 4. Background Suppression Mode Application Example

1. Object
2. Conveyor
3. Background

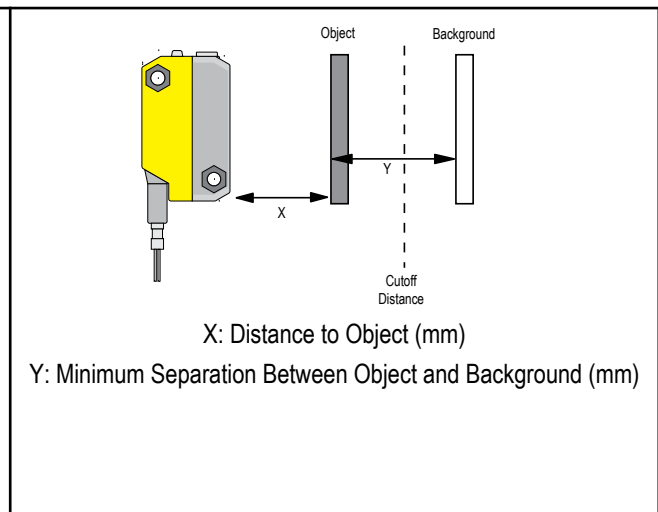
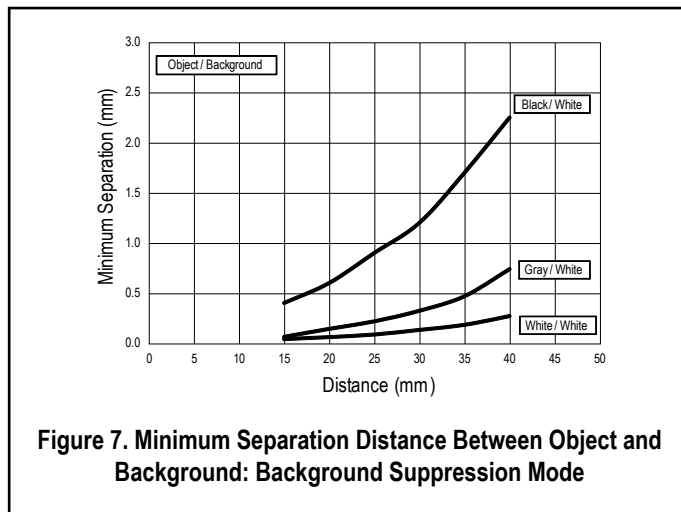
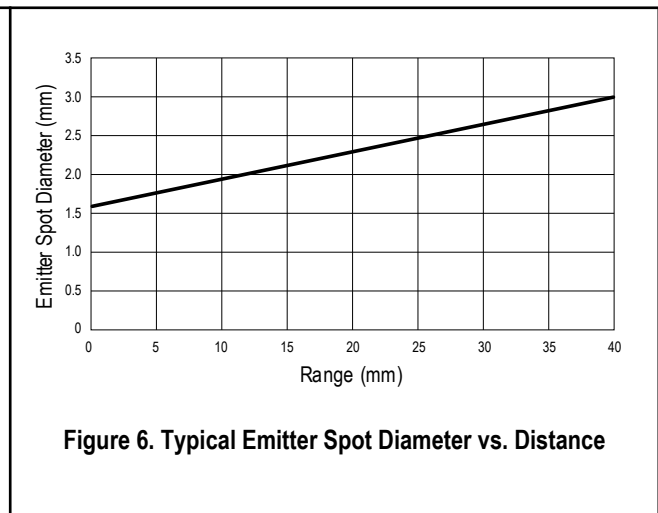
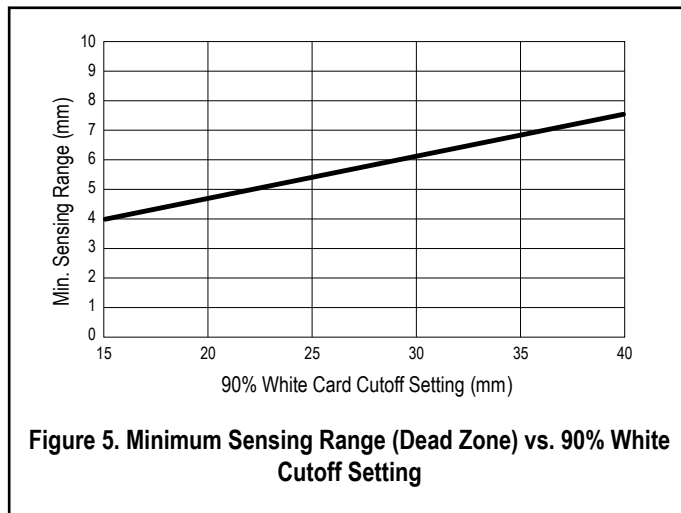
X: Distance to Object = 30 mm

Y: Minimum Separation Between Object and Background > 0.7 mm

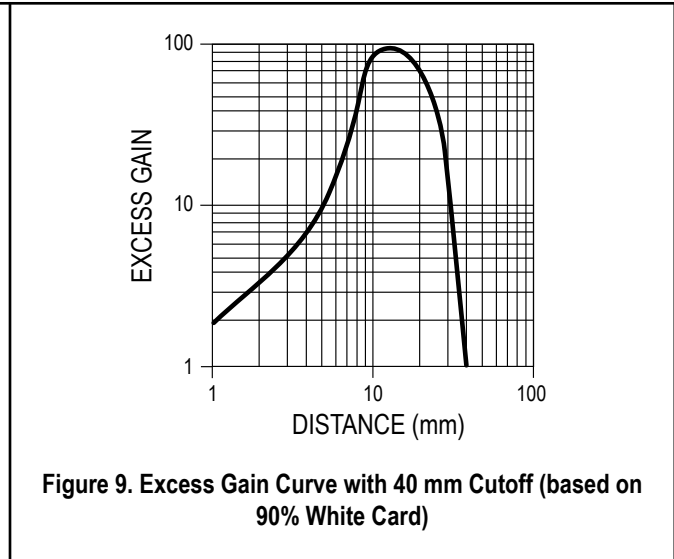
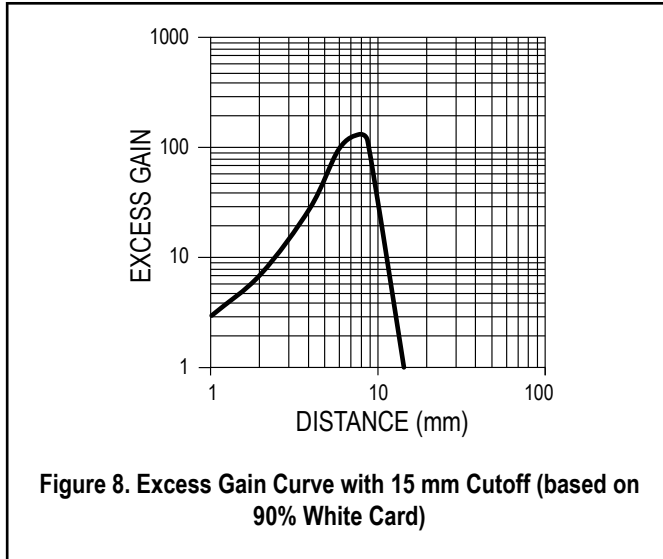
Output States

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

Performance Curves



Excess Gain Curves



Specifications

Supply Voltage

10 to 30V dc (10% maximum ripple within specified limits) at less than 27 mA, exclusive of load

Sensing Beam

Visible red LED, 630 nm

Supply Protection Circuitry

Protected against reverse polarity and transient voltages

Output Configuration

Solid-state complementary (SPDT): 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:

NPN: less than 200 μ A @ 30V dc (See Application Note 1)

PNP: less than 10 μ A @ 30V dc

ON-state saturation voltage:

NPN: less than 1.6V @ 100 mA

PNP: less than 3.0V @ 100 mA

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

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 μ s

Indicators

2 LED indicators on sensor top:

Green ON steady: Power ON

Yellow ON steady: Light sensed

Yellow flashing: Marginal sensing condition

Construction

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

Environmental Rating

Rated IEC IP67; NEMA 6; UL Type 1

Connections

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

Operating Conditions

Relative Humidity: 95% @ 50° C (non-condensing)

Temperature: -20° to +55° C (-4° to +131° F)

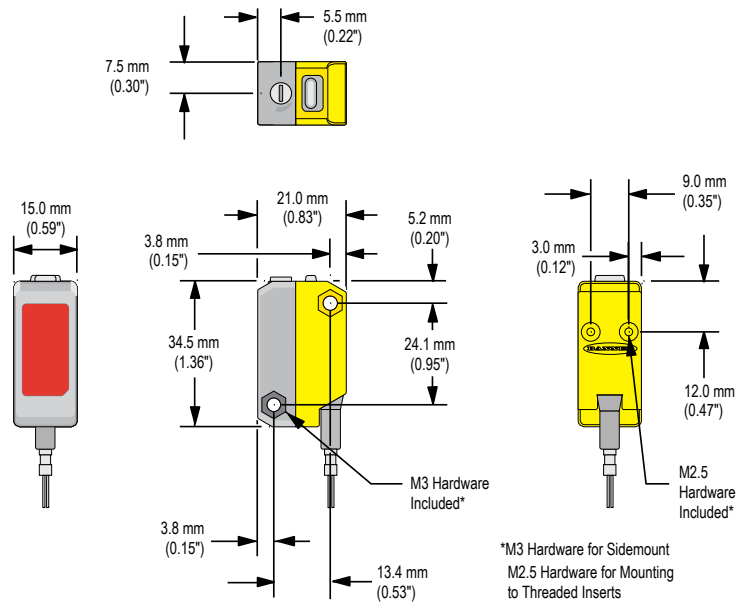
Application Notes

1. NPN off-state leakage current is < 200 μ A for load resistances > 3 k Ohms or optically isolated loads. For load current of 100 mA, leakage is < 1% of load current.
2. For emitter spot alignment, cover the receiver (top lens position) to temporarily turn emitter for maximum brightness.

Certifications



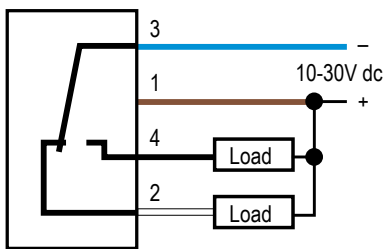
Dimensions



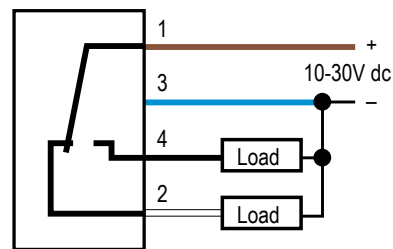
- (2) M3 x 0.5 x 20 mm ss screw
- (2) M3 x 0.5 ss hex nut
- (2) M3 ss washer
- (2) M2.5 x 0.45 x 5 mm ss screw
- (2) M2.5 ss washer

Wiring

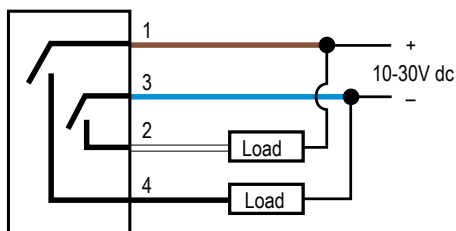
NPN (Sinking) Outputs



PNP (Sourcing) Outputs



Bipolar Outputs



Wiring Key

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

Quick-Disconnect (QD) Cordsets

Description	Dimensions	Pinouts	
4-Pin Pico-Style Cordsets (straight, snap-on, connector) PKG4-2, 2 m (6.5')			1 = Brown 2 = White 3 = Blue 4 = Black
4-Pin M12/Euro-Style Cordsets (straight connector) MQDC-406, 2 m (6.5') MQDC-415, 5 m (15') MQDC-430, 9 m (30')			

Mounting Brackets

SMBQS18A	<ul style="list-style-type: none"> • 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 	
SMBQS18AF	<ul style="list-style-type: none"> • Right-angle mounting bracket • 14-ga. 304 stainless steel 	

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