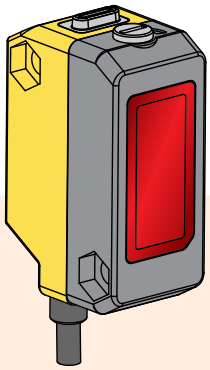
QS18AFF200 Mechanically Adjustable Foreground Suppression Sensor (30-200mm)

Features

Compact sensors featuring extended range and foreground suppression mode

- Exceptional optical performance; up to 200 mm sensing range in compact QS18 housing
- Foreground suppression models for reliable detection when a fixed background is present and the object color or shape varies
- Objects detected to the face of the sensor (no dead zone)
- 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	Supply Voltage	Sensing Range	Output Type
QS18VN6AFF200	10 to 30 V dc	Adjustable Cutoff: 30 to 200 mm	NPN
QS18VP6AFF200			PNP
QS18AB6AFF200			Bipolar (1 NPN & 1 PNP)

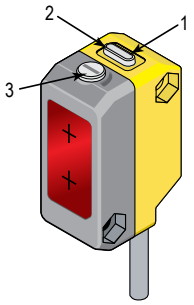
Only standard 2 m (6.5 ft) cable models are listed.

- To order 9 m (30 ft) cable models: add suffix "**W/30**" to the model number (for example, **QS18VN6AFF200 W/30**).
- To order 150 mm (6 in) pigtail with a 4-pin M8 connector models, add suffix "**Q**" to the model number (for example,**QS18VN6AFF200Q**)
- To order 150 mm (6 in) pigtail with a 4-pin M12 connector models, add suffix "**Q5**" to the model number (for example, **QS18VN6AFF200Q5**)

Overview

WORLD-BEAM QS18AFF200 Mechanically Adjustable Sensor with Foreground Suppression detect the light reflected from the background. The output changes when the light from the background is blocked.

In general, if the background is fixed and the color or shape of the objects in the foreground vary, foreground suppression mode will provide reliable detection. A foreground suppression sensor uses the background in the same way a retroreflective sensor would use a reflector. The sensor output will change whenever an object passes between itself and the background.



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

Installation Instructions

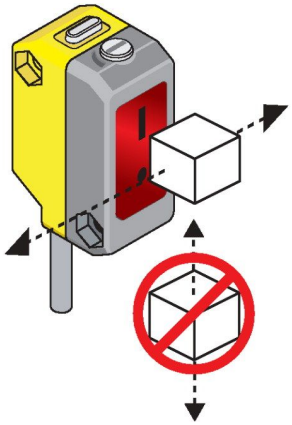
Sensor Orientation

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

Original Instructions
26-Sep-24

148770
p/n: 148770 Rev. I

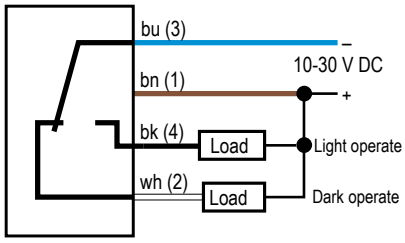
Optimal Orientation of Target to Sensor



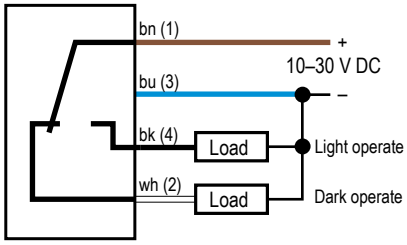
QS18 Wiring Diagrams

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

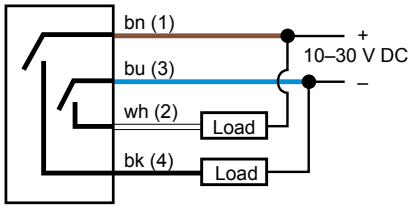
NPN (sinking) outputs



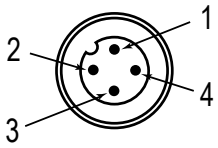
PNP (sourcing) outputs



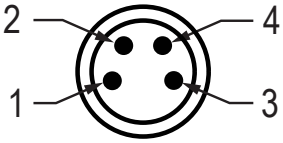
Light operate bipolar outputs



4-pin M12 Male



4-pin M8 Male



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

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.

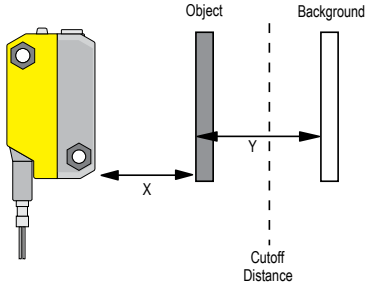
In **adjustable field** sensing modes, light operate is active when the target is present and dark operate is active when the target is absent.

Configure the QS18AF with Foreground Suppression (FGS)

X: Distance to Background

Y: Minimum Separation Between Object and Background

Set the cutoff distance in front of the fixed background



Foreground Suppression Mode (also called Background Detection): The light reflected off the background is detected. The output changes when the light from the background is blocked. In general, if the background is fixed and the color or shape of the objects in the foreground vary, foreground suppression mode will provide reliable detection. A foreground suppression sensor uses the background in the same way a retroreflective sensor would use a reflector. The sensor output will change whenever an object passes between itself and the background.

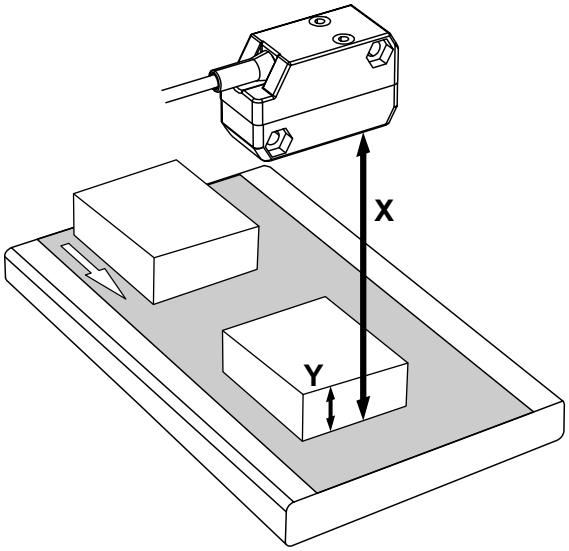
To ensure reliable foreground suppression, a minimum separation distance between the object and the background is necessary. See to determine the minimum separation distance.

1. Mount the sensor within 200 mm mm of the fixed background.
2. Turn the adjustment potentiometer **clockwise** until it clicks (5 turns).
3. Turn the adjustment potentiometer **counter-clockwise** until the yellow indicator turns **on**. This places the cutoff distance in front of the fixed background.
4. Place the application's darkest object into the sensor's field of view at the maximum sensor to the object distance and verify that the yellow indicator turns **off**. The sensor is optimized for detecting thin objects close to the fixed background and is ready for operation. For maximum sensing reliability in applications with variations in background position or color (for example, conveyor belts with flutter), follow these additional steps.
    a. Turn the adjustment potentiometer **counter-clockwise**, counting the revolutions, until the yellow indicator turns **on**.
    b. Turn the adjustment potentiometer **clockwise** half the number of revolutions from the previous step. This places the cutoff distance midway between the object and the background. The sensor is optimized for reliable detection in applications with thick objects and modest variation in background.

    The sensor is ready for operation.

Example QS18AF FGS Configuration

Foreground Suppression Mode application example



1. Object
2. Background (Conveyor)

X: Distance to Background = 200 mm
Y: Minimum Separation Between Object and Background > 10 mm

The sensor is positioned above a black conveyor belt at a distance of 200 mm. The objects on the conveyor are boxes of varying colors. According to the *Minimum Separation Distance* figure in , the box height must be greater than 10 mm for reliable detection against a black background. In this application, reliable detection will be achieved when set up according to the procedure outlined in .

Output States

Foreground Suppression Mode			
Sensor Model Type	**Output**	**Object Between Sensor Face and Cutoff Distance**	**No Object Between Sensor Face and Fixed Background**
All Models	Yellow Indicator Light	OFF	ON
Complementary Models	Black Wire (Pin 4)	OFF	ON
	White Wire (Pin 2)	ON	OFF
Bipolar Models	Black Wire (Pin 4)	OFF	ON
	White Wire (Pin 2)	OFF	ON

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

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.

Construction

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

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

Two LED indicators on sensor top:

Green solid: Power on

Amber solid: Light sensed

Amber flashing: Marginal sensing condition

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 M8 or M12 150 mm (6 in) cable quick-disconnect connector, 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)

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.

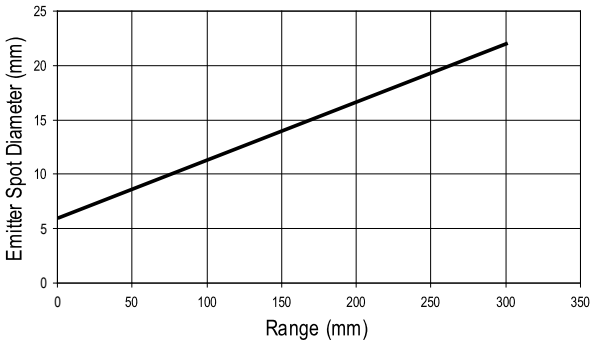
Supply wiring leads < 24 AWG shall not be spliced.

For additional product support, go to www.bannerengineering.com.

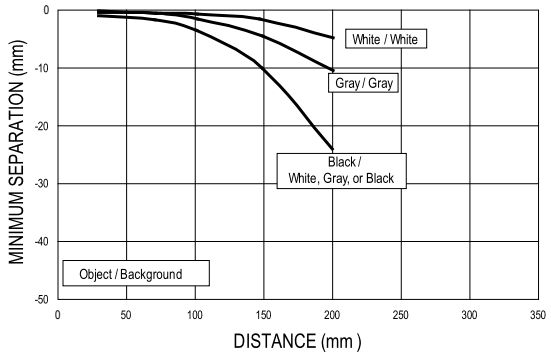
Supply Wiring (AWG)	Required Overcurrent Protection (A)	Supply Wiring (AWG)	Required Overcurrent Protection (A)
20	5.0	26	1.0
22	3.0	28	0.8
24	1.0	30	0.5

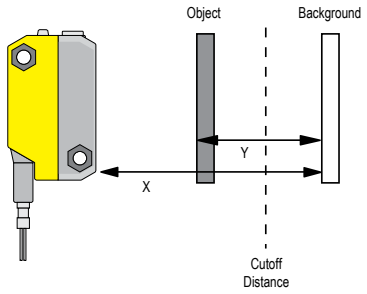
Performance Curves

Typical Emitter Spot Diameter vs. Distance



Minimum Separation Distance Between Object and Background

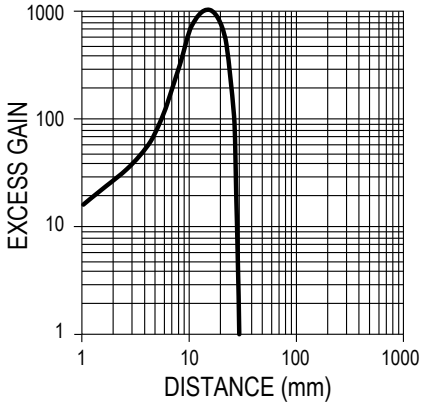




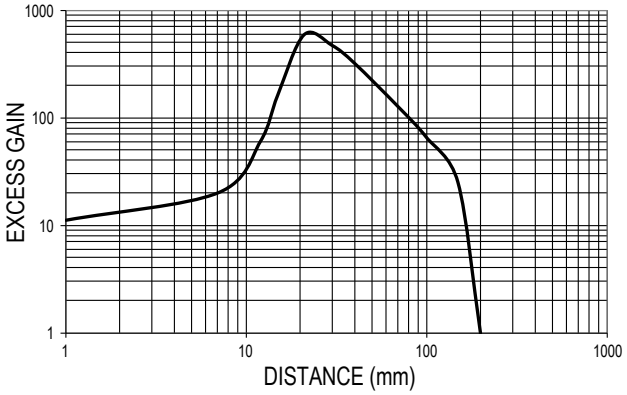
X: Distance to Background (mm)

Y: Minimum Separation Between Object and Background (mm)

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

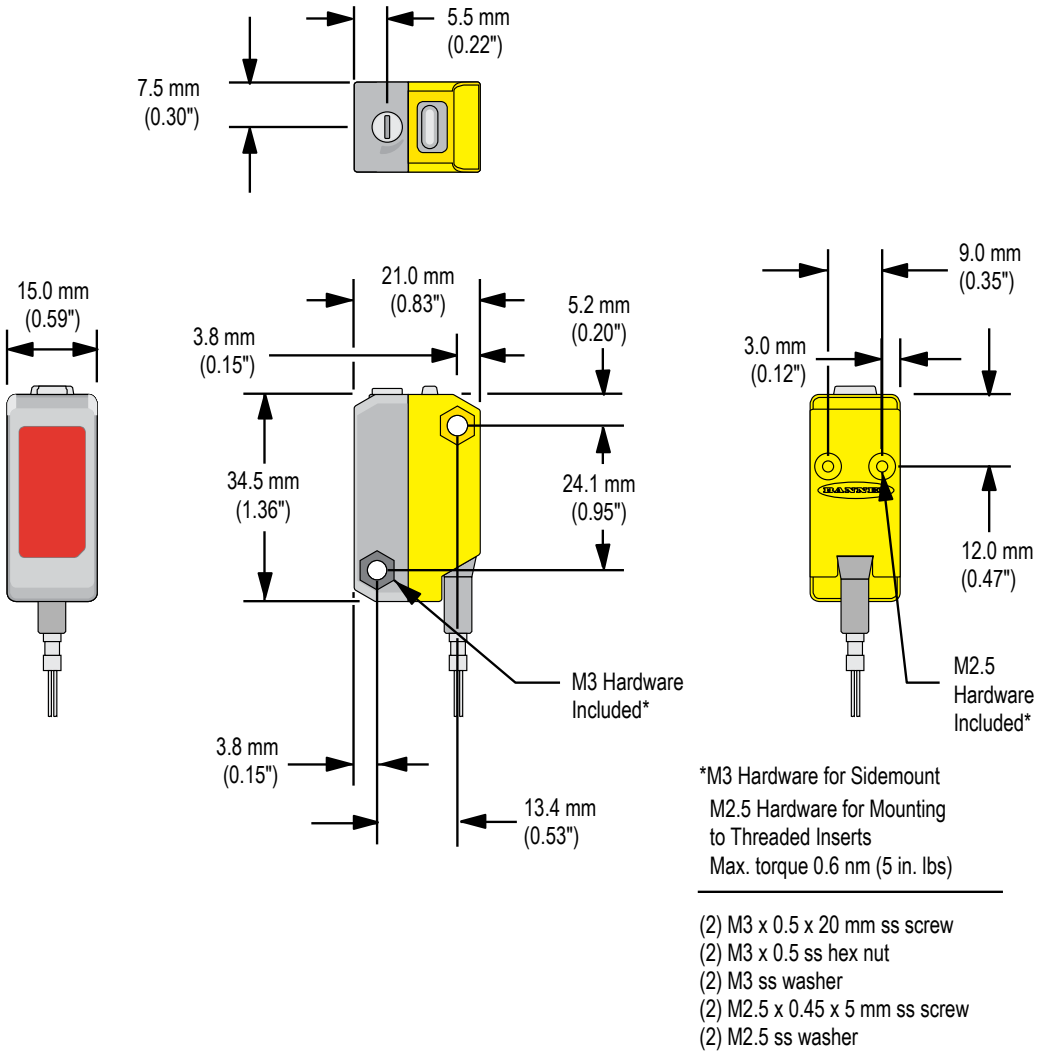


Excess Gain Curve with 200 mm Cutoff (based on 90% White Card)



Dimensions

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



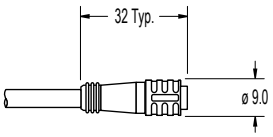
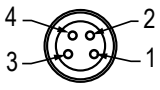
*M3 Hardware for Sidemount
M2.5 Hardware for Mounting to Threaded Inserts
Max. torque 0.6 nm (5 in. lbs)

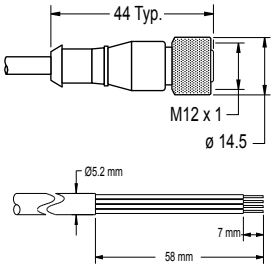
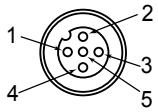
(2) M3 x 0.5 x 20 mm ss screw
(2) M3 x 0.5 ss hex nut
(2) M3 ss washer
(2) M2.5 x 0.45 x 5 mm ss screw
(2) M2.5 ss washer

Accessories

Quick-Disconnect (QD) Cordsets

Use the M8 cordsets with QS18 with Q suffix; use the M12 cordsets with QS18 with Q5 suffix.

4-Pin Single-Ended Snap-on M8 Female Cordsets					
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 Single-Ended M12 Female Cordsets					
Model	**Length**	**Style**	**Dimensions**	**Pinout (Female)**	
MQDC-403	1 m (3.28 ft)	Straight			1 = Brown 2 = White 3 = Blue 4 = Black 5 = Not used
MQDC-406	2 m (6.56 ft)				
MQDC-410	3 m (9.8 ft)				
MQDC-415	5 m (16.4 ft)				
MQDC-430	9 m (29.5 ft)				
MQDC-450	15 m (49.2 ft)				
MQDC-460	18.3 m (60 ft)				
MQDC-470	21 m (68.9 ft)				
MQDC-4100	30 m (98.43 ft)				

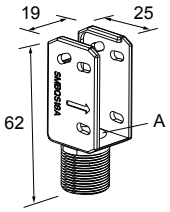
Mounting Brackets

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

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

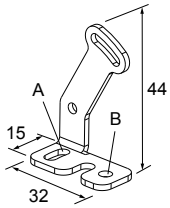
Hole size: A = ø 15.3



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



Product Support and Maintenance

Clean with Compressed Air Then Isopropyl Alcohol

Handle the sensor with care during installation and operation. Sensor windows soiled by fingerprints, dust, water, oil, etc. may 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.

Contact Us

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

For worldwide locations and local representatives, visit www.bannerengineering.com.

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