# QS18AF40 Mechanically Adjustable Background Suppression Sensor (15-40mm)

## Features

Compact sensors featuring precise adjustment of cutoff distance and background suppression mode



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

**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

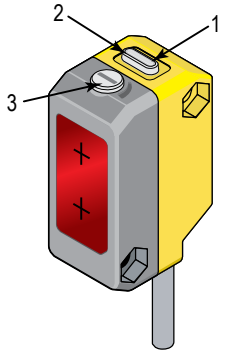
| Model | Sensing Range | Output Type | Connection |
|---|---|---|---|
| QS18VN6AF40 | 15 to 40 mm adjustable range | NPN | 2 m (6.5 ft) cable |
| QS18VP6AF40 | | PNP | |
| QS18AB6AF40 | | Bipolar (1 NPN & 1 PNP) | |
| QS18VN6AF40Q5 | | NPN | 150 mm (6 in) cable with a 4-pin M12 male quick disconnect (QD) |
| QS18VP6AF40Q5 | | PNP | |
| QS18AB6AF40Q5 | | Bipolar (1 NPN & 1 PNP) | |

For a list of discontinued models, see Discontinued Models.

## Overview

WORLD-BEAM QS18AF40 Adjustable Field Sensor 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

Original Instructions
20-May-26

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149288
p/n: 149288 Rev. I

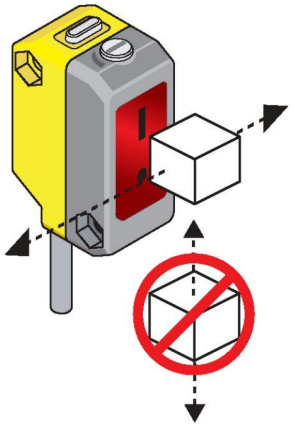
ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

# Installation Instructions

## Sensor Orientation for a QS18AF BGS

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

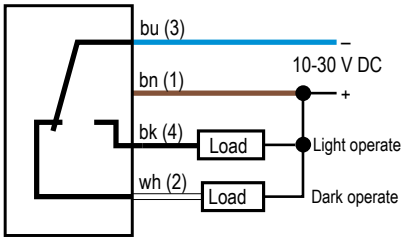
*Optimal Orientation of Target to Sensor*



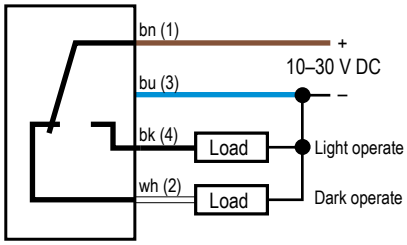
## Wiring Diagrams

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

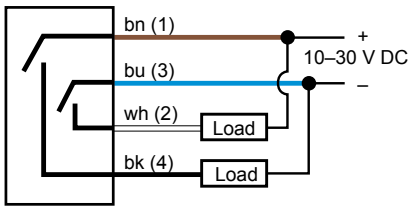
*NPN (sinking) outputs*



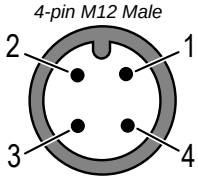

*PNP (sourcing) outputs*



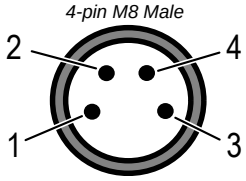

*Light operate bipolar outputs*




*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.

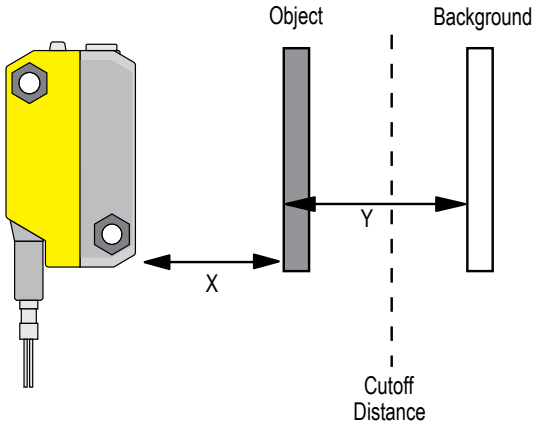
## Configure the QS18AF with Background Suppression (BGS)

**Background Suppression:** Objects beyond the set cutoff distance are not 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 Performance Curves to determine the minimum separation distance.


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




X: Distance to the Object

Y: Minimum Separation Between the Object and the Background

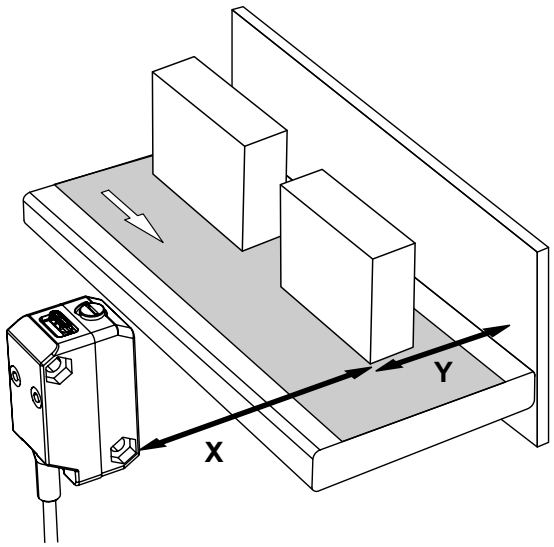
1. Mount the sensor with the darkest object at the longest application distance. The distance to the object must be less than shown in the *Minimum Separation Distance* figure in Performance Curves for your object color.
2. Turn the adjustment potentiometer **counter-clockwise** until the yellow indicator 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.
   The sensor is ready for operation.

## Example QS18AF BGS Sensor Configuration

An object with a reflectivity similar to black paper is set 30 mm away from the sensor. A background with a reflectivity similar to white paper is set 40 mm away from the sensor.

According to the *Minimum Separation Distance* figure in Performance Curves, the minimum separation distance between the object and the background is 0.7 mm. In this application, reliable detection is achieved when set up according to the procedure outlined in "Configure the QS18AF with Background Suppression (BGS)" on page 2.

*Background Suppression Mode Application Example*




1. Object
2. Conveyor
3. Background

X: Distance to the Object = 30 mm


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Y: Minimum Separation Between the Object and the 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 |

# 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, 630 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; 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**

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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 | 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


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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.

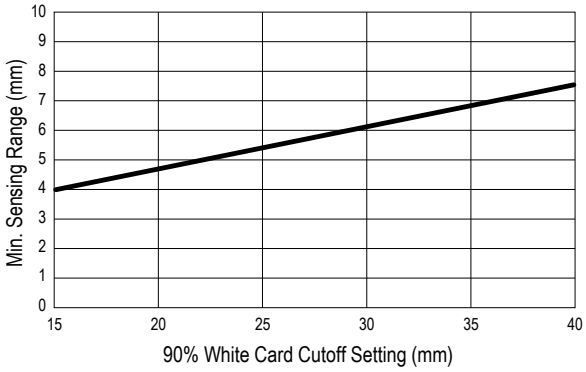
# Industry Canada ICES-003(A)

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.

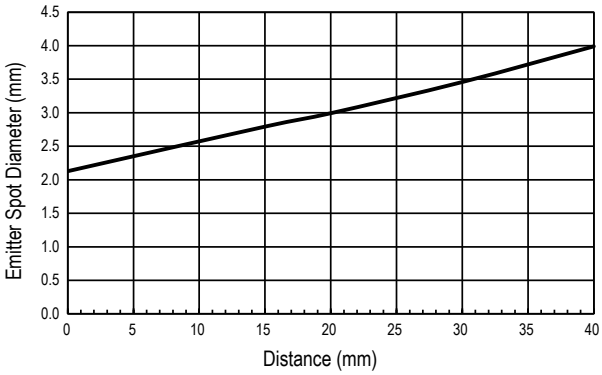
Cet appareil est conforme à la norme NMB-3(A). Le fonctionnement est soumis aux deux conditions suivantes : (1) ce dispositif ne peut pas occasionner d'interférences, et (2) il doit tolérer toute interférence, y compris celles susceptibles de provoquer un fonctionnement non souhaité du dispositif.

# Performance Curves

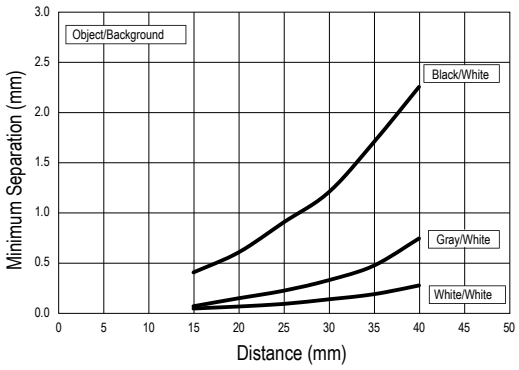
*Minimum Sensing Range (Dead Zone) vs. 90% White Cutoff Setting*

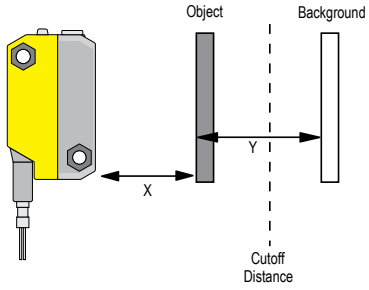



*Typical Emitter Spot Diameter vs. Distance*




*Minimum Separation Distance Between Object and Background: Background Suppression Mode*




X: Distance to Object (mm)

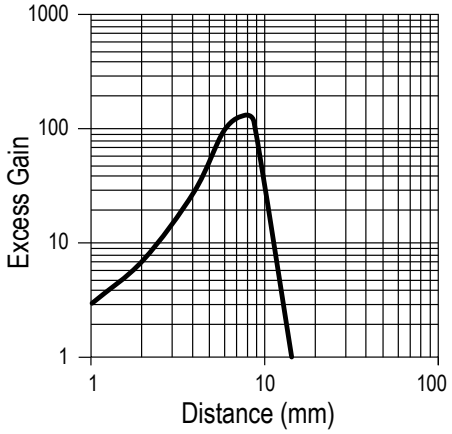
Y: Minimum Separation Between Object and Background (mm)

Continued on page 6

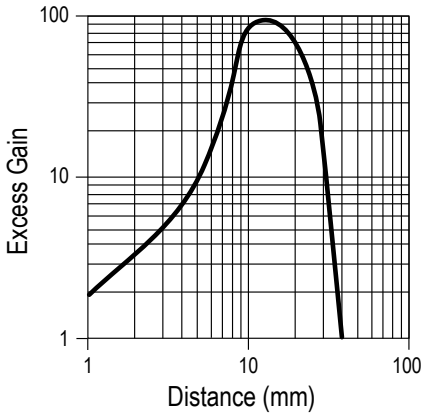

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Continued from page 5

*Excess Gain Curve with 15 mm Cutoff (based on 90% White Card)*

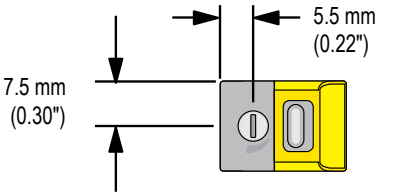


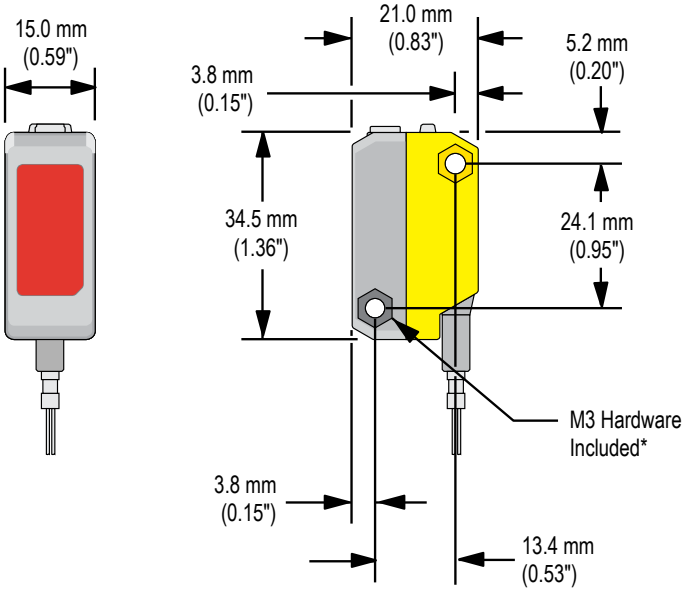

*Excess Gain Curve with 40 mm Cutoff (based on 90% White Card)*

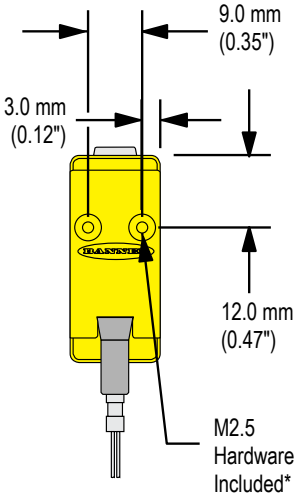



## Dimensions

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)

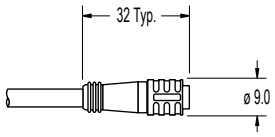
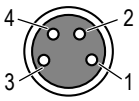
(2) M3 x 0.5 x 20 mm ss screw
(2) M3 x 0.5 ss hex nut
(2) M3 ss washer
(2) M2.5 x 0.45 x 5 mm ss screw
(2) M2.5 ss washer

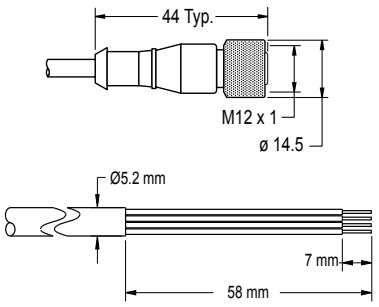
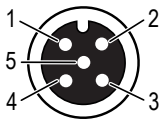

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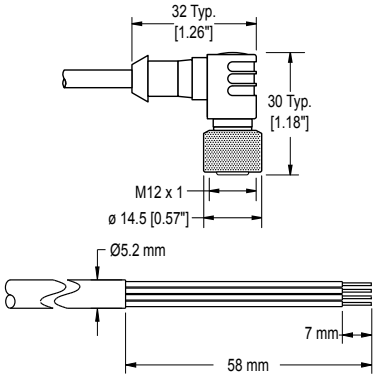
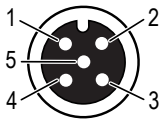
# Accessories

## Quick-Disconnect (QD) Cordsets

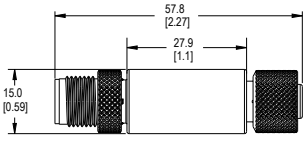
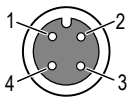
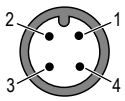
Use the M8 cordsets with QS18 with Q suffix; use the M12 cordsets with QS18 with Q5 suffix.

| 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<br>2 = White<br>3 = Blue<br>4 = Black |

| 4-pin Single-Ended M12 Female Cordsets (datasheet p/n 235937) | | | | |
|---|---|---|---|---|
| **Model** | **Length** | **Dimensions (mm)** | **Pinout (Female)** | |
| **BC-M12F4-22-1** | 1 m (3.28 ft) |  |  | 1 = Brown<br>2 = White<br>3 = Blue<br>4 = Black<br>5 = Unused<br>c UL us LISTED |
| **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 (datasheet p/n 235937) | | | | |
|---|---|---|---|---|
| **Model** | **Length** | **Dimensions (mm)** | **Pinout (Female)** | |
| **BC-M12F4A-22-1** | 1 m (3.28 ft) |  |  | 1 = Brown<br>2 = White<br>3 = Blue<br>4 = Black<br>5 = Unused<br>c UL us LISTED |
| **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) | | | |

## Sensor Status Indicators

| S15L Series In-Line Sensor Status Indicator | | | | | | |
|---|---|---|---|---|---|---|
| **Model** | **Input Type** | **LED Color** | **Dimensions** | **Female** | **Male** | **Wiring** |
| **S15LGYPQ** | PNP | Power ON = Green<br>Input Active = Yellow |  |  |  | 1 = Brown, 10 to 30 V DC<br>2 = White<br>3 = Blue, DC common<br>4 = Black, Sensor Input |
| **S15LGYNQ** | NPN | | | | | |


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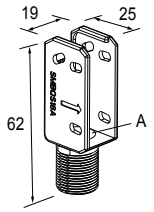
## Mounting Brackets

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
- CAD Files: DXF, PDF, IGS, STP

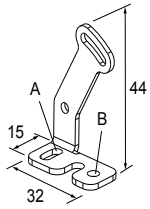
**Hole size:** A = ø 15.3




**SMBQS18AF**

- Right-angle mounting bracket
- 14-ga. 304 stainless steel
- CAD Files: DXF, PDF, IGS, STP

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




# 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.

## Discontinued Models

The following models are no longer available for order but are still covered by the information in this document.

| Model | Output Type | Connection |
|---|---|---|
| QS18VN6AF40 W/30 | NPN | 9 m cable |
| QS18VP6AF40 W/30 | PNP | |
| QS18AB6AF40 W/30 | Bipolar (1 NPN & 1 PNP) | |
| QS18VN6AF40Q | NPN | 150 mm (6 in) cable with a 4-pin M8 male QD |
| QS18VP6AF40Q | PNP | |
| QS18AB6AF40Q | Bipolar (1 NPN & 1 PNP) | |

## Contact Us

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