QS18AFF40 Mechanically Adjustable Foreground Suppression Sensor (15-40mm)

Features

Compact sensors featuring precise adjustment of cutoff distance and foreground 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
- 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

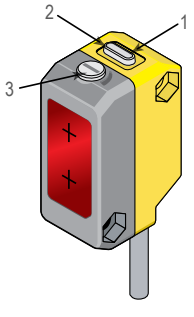
Model	Sensing Range	Output	Connection
QS18VP6AFF40Q5	15 to 40 mm adjustable range	PNP	150 mm (6 in) cable with a 4-pin M12 male quick disconnect (QD)
QS18AB6AFF40Q5		Bipolar (1 NPN and 1 PNP)	

Models with a QD require an accessory mating cordset. See "Quick-Disconnect (QD) Cordsets" on page 6.

For a list of discontinued models, see Discontinued Models.

Overview

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



The WORLD-BEAM QS18AFF40 Adjustable Field Sensor with Foreground Suppression detects 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 varies, 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 changes when an object passes between the sensor and the background.

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 with even sharper background suppression.

Installation Instructions

Sensor Orientation

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

Original Instructions
20-May-26

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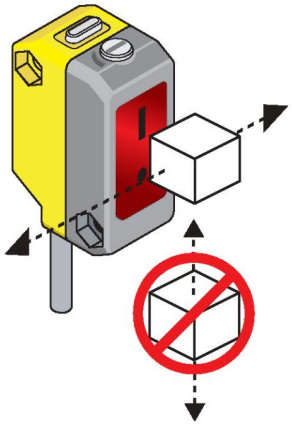
149289
p/n: 149289 Rev. H

ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

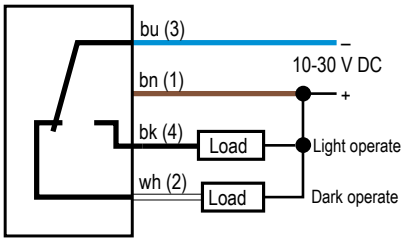
Optimal Orientation of Target to Sensor



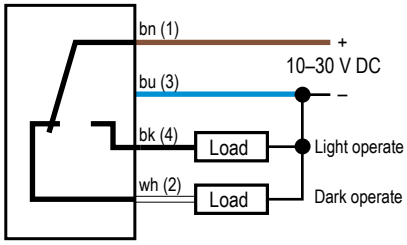
Wiring

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

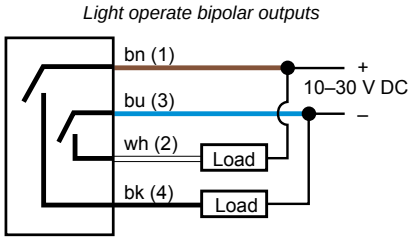
NPN (sinking) outputs



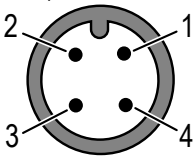
PNP (sourcing) outputs



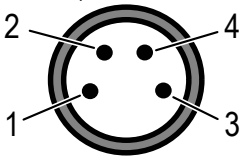
Light operate bipolar outputs



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.

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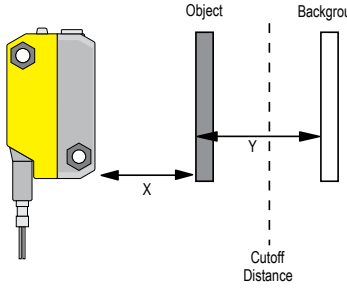
Configure the QS18AF with Foreground Suppression (FGS)

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.

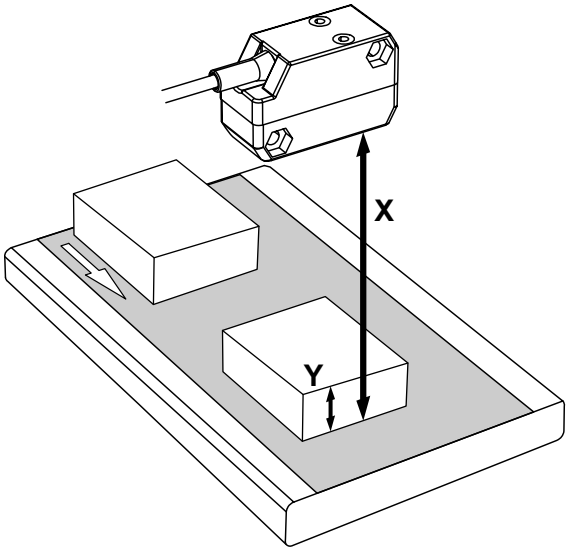
To ensure reliable foreground suppression, a minimum separation distance between the object and the background is necessary. See Performance Curves to determine the minimum separation distance.

1. Mount the sensor within 30 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 = 30 mm
Y: Minimum Separation Between Object and Background > 0.7 mm

The sensor is positioned above a black conveyor belt at a distance of 30 mm. The objects on the conveyor are boxes of varying colors. According to the *Minimum Separation Distance* figure in Performance Curves, the box height must be greater than 0.7 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 "Configure the QS18AF with Foreground Suppression (FGS)" on page 3.

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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, 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

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	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.

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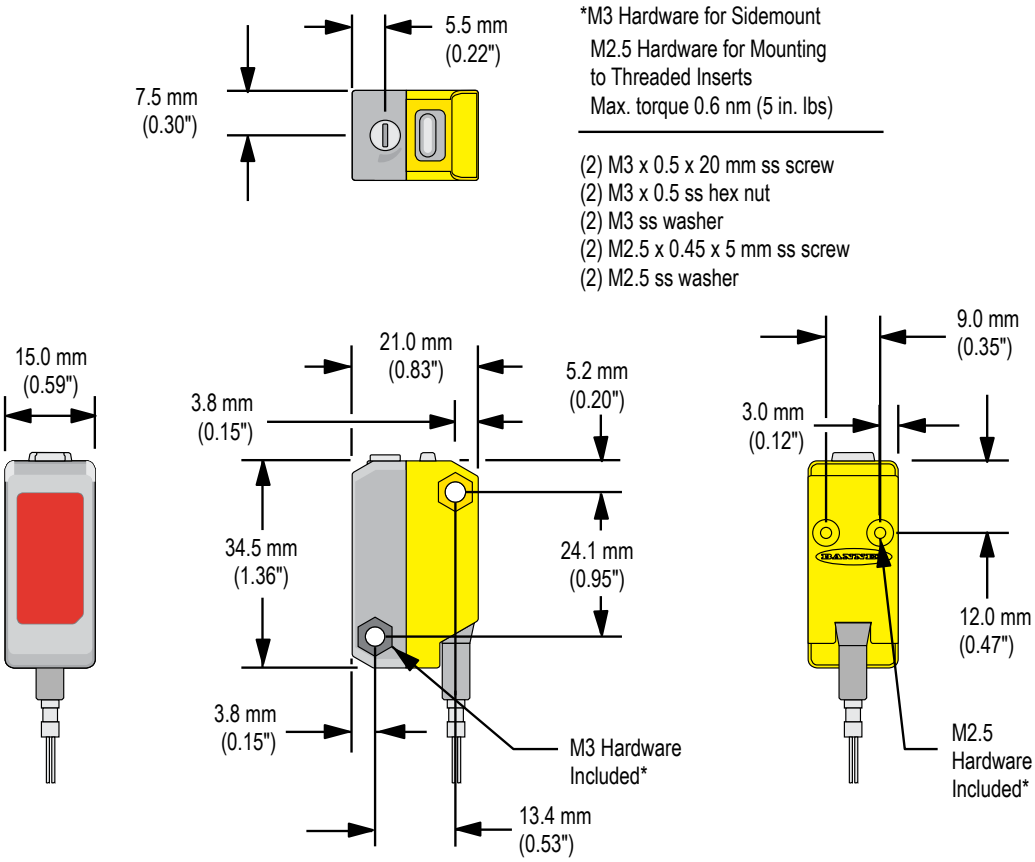
Industry Canada ICES-003(A)

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.

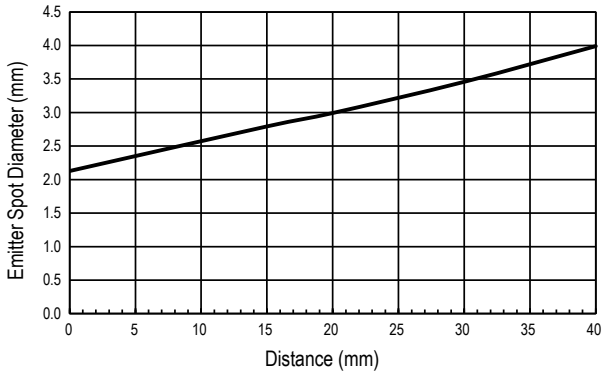
Dimensions

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



Performance Curves

Typical Emitter Spot Diameter vs. Distance



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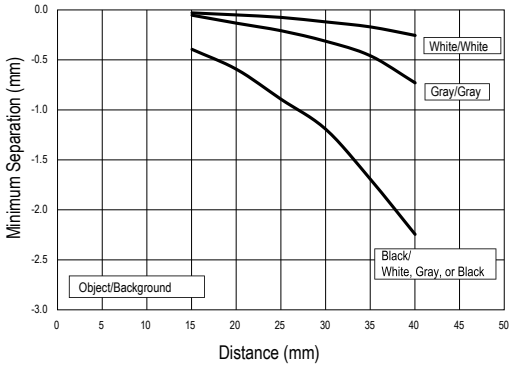
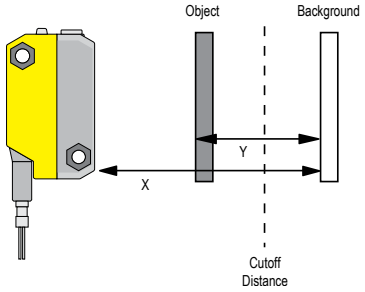
Continued from page 5

Minimum Separation Distance Between Object and Background

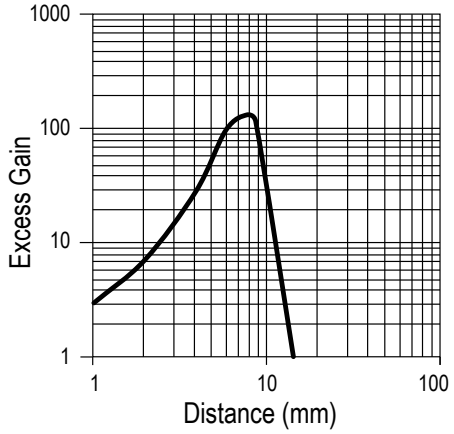




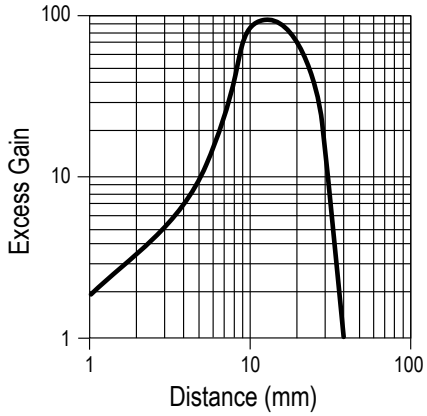
X: Distance to Background (mm)

Y: Minimum Separation Between Object and Background (mm)

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



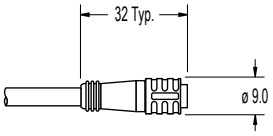
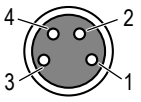
Excess Gain Curve with 40 mm Cutoff (based on 90% White Card)



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

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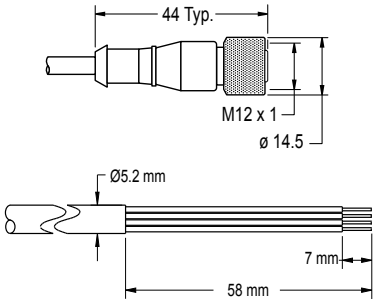
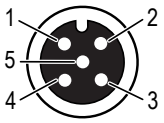
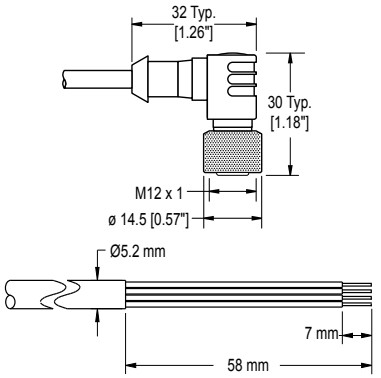
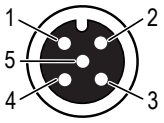
4-pin Single-Ended M12 Female Cordsets (datasheet p/n 235937)				
Model	**Length**	**Dimensions (mm)**	**Pinout (Female)**	
BC-M12F4-22-1	1 m (3.28 ft)			1 = Brown 2 = White 3 = Blue 4 = Black 5 = Unused c UL us LISTED
BC-M12F4-22-2	2 m (6.56 ft)			
BC-M12F4-22-5	5 m (16.4 ft)			
BC-M12F4-22-8	8 m (26.25 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 2 = White 3 = Blue 4 = Black 5 = Unused 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)			

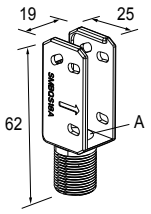
Mounting Brackets

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

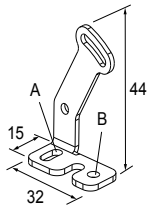
Hole size: A = ø 15.3



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.

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Model	Output	Connection
QS18VN6AFF40	NPN	2 m (6.5 ft) cable
QS18VN6AFF40 W/30		9 m cable
QS18VN6AFF40Q		150 mm (6 in) cable with a 4-pin M8 male QD
QS18VN6AFF40Q5		150 mm (6 in) cable with a 4-pin M12 male QD
QS18VP6AFF40	PNP	2 m (6.5 ft) cable
QS18VP6AFF40 W/30		9 m cable
QS18VP6AFF40Q		150 mm (6 in) cable with a 4-pin M8 male QD
QS18AB6AFF40	Bipolar (1 NPN and 1 PNP)	2 m (6.5 ft) cable
QS18AB6AFF40 W/30		9 m cable
QS18AB6AFF40Q		150 mm (6 in) cable with a 4-pin M8 male QD

Contact Us

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

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