

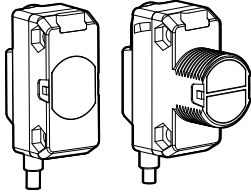


THE DATASHEET OF
QS18VN6FF100Q8



Instruction Manual

Miniature Self-Contained Photoelectric Sensors in Universal Housing



- Easily fits (or retrofits) almost any mounting situation
- Exceptional optical performance, comparable to larger “MINI-style” or barrel sensors
- 10 V dc to 30 V dc operation, with complementary (SPDT) NPN or PNP outputs, depending on model
- Bright LED operating status indicators are visible from 360°
- Rugged sealed housing, protected circuitry
- Models available with or without 18 mm threaded “nose”
- Less than 1 millisecond output response for excellent sensing repeatability
- Choose 2 m (6.5 ft) or 9 m (30 ft) cable or 150 mm (6 inch) Pico-style cabled QD



WARNING: Not To Be Used for Personnel Protection

Never use this device as a sensing device for personnel protection. Doing so could lead to serious injury or death. This device 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.

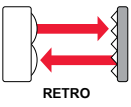
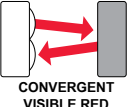
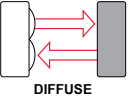
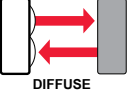
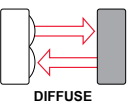
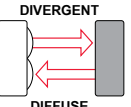
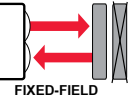
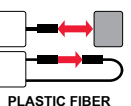
Models

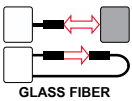
| Model ¹ | Opposed Mode | Range | Output |
|------------------------------|--------------------------------------|---------------|--------|
| QS186EV (624 nm Visible red) | Effective beam: 13 mm (0.5 inch) | 20 m (66 ft) | — |
| QS186E (940 nm Infrared) | | | — |
| QS18VN6R | | | NPN |
| QS18VP6R | | | PNP |
| QS186EB (940 nm Infrared) | Effective beam: 13 mm (0.5 inch) | 3 m (10 ft) | — |
| QS18VN6RB | | | NPN |
| QS18VP6RB | | | PNP |
| Model ¹ | Polarized Retroreflective Mode | Range | Output |
| QS18VN6LP | 630 nm Visible red | 3.5 m (12 ft) | NPN |
| QS18VP6LP | | | PNP |

¹

- To order the 9 m (30 ft) PVC cable model, add the suffix "W/30" to the cabled model number. For example, QS186E W/30.
- To order the 4-pin M12/Euro-style integral quick disconnect model, add the suffix "Q8" to the model number. For example, QS186EQ8.
- To order the 4-pin M8/Pico-style integral quick disconnect model, add the suffix "Q7" to the model number. For example, QS186EQ7.
- To order the 150 mm (6 in) PVC cable model with a 4-pin M12/Euro-style quick disconnect, add the suffix "Q5" to the model number. For example, QS186EQ5.
- To order the 150 mm (6 in) PVC cable model with a 4-pin M8/Pico-style quick disconnect, add the suffix "Q" to the model number. For example, QS186EQ.
- Models with a quick disconnect require a mating cordset.

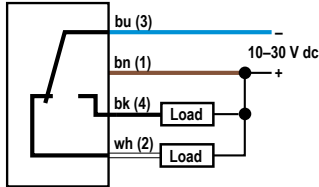


| Model ¹ | Retroreflective Mode | Range | Output |
|-----------------------------------|---|--|--------|
| QS18VN6LV | 628 nm Visible red | 6.5 m (21 ft) | NPN |
| QS18VP6LV |  | | PNP |
| Model ¹ | Convergent Mode | Range | Output |
| QS18VN6CV15 | 630 nm Visible red  | 16 mm (0.63 in) | NPN |
| QS18VP6CV15 | | | PNP |
| QS18VN6CV45 | | 43 mm (1.7 in) | NPN |
| QS18VP6CV45 | | | PNP |
| Model ¹ | Diffuse Mode | Range | Output |
| QS18VN6D | 940 nm Infrared  | 450 mm (18 in) | NPN |
| QS18VP6D | | | PNP |
| QS18VN6DL | | 600 mm (24 in) | NPN |
| QS18VP6DL | | | PNP |
| QS18VN6DVS (Diffuse, Visible red) | 630 nm Visible red  | 250 mm (10 in) | NPN |
| QS18VP6DVS (Diffuse, Visible red) | | | PNP |
| QS18VN6DB (Diffuse, wide) |  | 450 mm (18 in) | NPN |
| QS18VP6DB (Diffuse, wide) | | | PNP |
| Model ¹ | Divergent Mode | Range | Output |
| QS18VN6W (Divergent, Infrared) | 940 nm Infrared  | 100 mm (4 in) | NPN |
| QS18VP6W (Divergent, Infrared) | | | PNP |
| Model ¹ | Fixed Field Mode | Range | Output |
| QS18VN6FF50 | 630 nm Visible red  | 50 mm (2 in) | NPN |
| QS18VP6FF50 | | PNP | |
| QS18VN6FF100 | | 100 mm (4 in) | NPN |
| QS18VP6FF100 | | PNP | |
| QS18VP6FF125 | | 125 mm (5 in) | PNP |
| QS18VN6FF150 | | 150 mm (6 in) | NPN |
| QS18VP6FF150 | | | PNP |
| Model ¹ | Plastic Fiber Optic Mode | Range | Output |
| QS18VN6FP | 660 nm Visible Red  | Range varies by sensing mode and fiber optics used | NPN |
| QS18VP6FP | | | PNP |

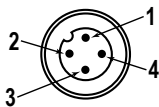
| Model ¹ | Glass Fiber Optic Mode | Range | Output |
|--------------------|--|--|--------|
| QS18VN6F | 940 nm Infrared | Range varies by sensing mode and fiber optics used | NPN |
| QS18VP6F |  GLASS FIBER | | PNP |

Wiring Diagrams

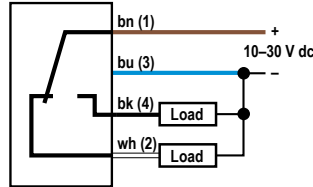
QS18 with NPN Outputs



4-pin M12/Euro-style Models (Male)



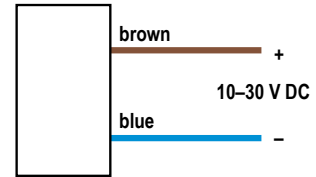
QS18 with PNP Outputs



4-pin M8/Pico-style Models (Male)



QS18 Emitters



Key

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

Installing Fibers

Cutting Unterminated Plastic Fibers QS18V..6FP

Unterminated plastic fibers are designed to be cut by the user to the length required for the application.

To facilitate cutting, a Banner model PFC-1 cutting device is supplied with the fiber. Cut the fiber as follows:

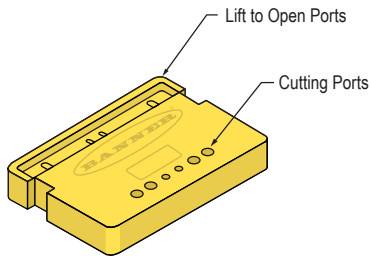


Figure 1. PFC-1 Cutting Device

Use small ports for fiber sizes:

- 0.25 mm (0.01 inches)
- 0.5 mm (0.02 inches)

Use large ports for fiber sizes:

- 0.75 mm (0.03 inches)
- 1.0 mm (0.04 inches)
- 1.5 mm (0.06 inches)

1. Locate the control end of the fiber (the unfinished end).
2. Determine the length of fiber required for the application. If using a bifurcated fiber, separate the two halves of the fiber at least 51 mm (2 inches) beyond the fiber cutting location.
3. Lift the top (blade) of the cutter to open the cutting ports.
4. Insert one of the control ends through one of the cutting ports on the cutter so that the excess fiber protrudes from the back of the cutter.
5. Double-check the fiber length, and close the cutter until the fiber is cut.
6. Using a different cutting port, cut the second control end to the required length.



Note: To ensure a clean cut each time, do not use a cutting port more than once.

7. Gently wipe the cut ends of the fiber with a clean, dry cloth to remove any contamination. Do not use solvents or abrasives on any exposed optical fiber.

Installing Plastic Fibers QS18V..6FP

Follow these steps to install the plastic fibers.

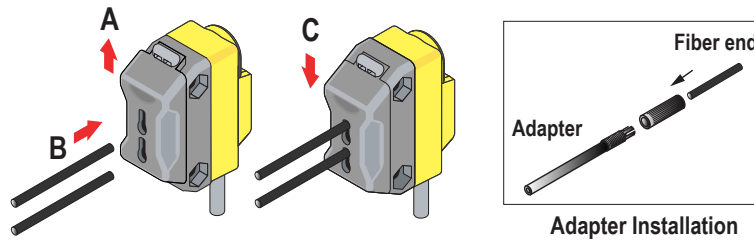


Figure 2. Installing Plastic Fibers

1. Slide the fiber gripper up to unlock it (A).
2. If using 0.25 mm or 0.5 mm core fibers, slide the plastic fiber adapters onto the fibers, flush with the fiber ends.
3. Carefully insert the prepared plastic fiber ends into the ports (B) as far as possible without applying extra force.
4. Slide the fiber gripper down to lock the fibers in place (C).

Installing Glass Fibers QS18V..6F

Follow these steps to install the glass fibers.

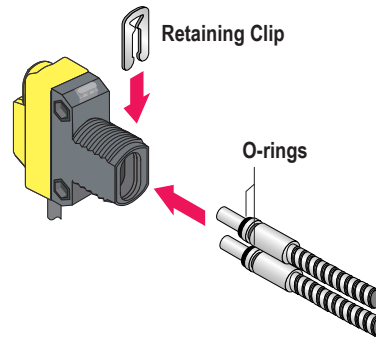


Figure 3. Installing Glass Fibers

1. Slide the supplied o-ring on the sensor end of the fibers, as shown.
2. Press the fiber ends firmly into the ports located on the front of the sensor.
3. Slide the supplied u-shaped retaining clip into the slot in the sensor's barrel until the clip snaps into place.

Specifications

Supply Voltage

10 V dc to 30 V dc (10% maximum ripple) at less than 25 mA, exclusive of load
Protected against reverse polarity and transient voltages

Light Source

Glass Fiber Optic, Opposed and Diffuse mode models: Infrared, 940 nm
Plastic Fiber Optic, Retroreflective, Convergent models: Visible red, 660 nm
Fixed-Field and DVS models: Visible red, 630 nm

Adjustments

Glass Fiber Optic, Plastic Fiber Optic, Convergent, Diffuse, and Retroreflective mode models (only): Single-turn sensitivity (Gain) adjustment potentiometer

Indicators

2 LED indicators on sensor top
Green: Power on
Amber: Light sensed
Amber flashing: Marginal excess gain (1 to 1.5 times excess gain)

Repeatability

Opposed Mode: 100 microseconds
DVS, DL and FF Modes: 90 microseconds
All Other Modes: 150 microseconds

Output Configuration

Solid-state complementary (SPDT): NPN or PNP (current sinking or sourcing), depending on model;
Rating: 100 mA maximum each output at 25 °C
DVS, DL and FF Modes ON-state Saturation Voltage: less than 1.5 V at 10 mA; less than 3 V at 100 mA
All Other Modes: ON-state Saturation Voltage: less than 1 V at 10 mA; less than 1.5 V at 100 mA
Protected against false pulse on power-up and continuous overload or short circuit of outputs

Output Response

Opposed Mode: 750 microseconds ON; 375 microseconds OFF
DVS, FF and DL Modes: 850 microseconds ON/OFF
All Other Modes: 600 microseconds ON/OFF
100 millisecond delay on power-up; outputs do not conduct during this time

Certifications



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 |

Construction

ABS housing
 3 mm mounting hardware included

Connections

2 m (6.5 ft) 4-wire PVC cable; 9 m (30 ft) 4-wire PVC cable; 4-pin M8/Pico-style or M12/Euro-style QD; or 150 mm (6 in) cable with a 4-pin M8/Pico-style or M12/Euro-style QD, depending on model

Environmental

IEC IP67; NEMA 6

Operating Conditions

-20 °C to +70 °C (-4 °F to +158 °F)
 95% at +50 °C maximum relative humidity (non-condensing)

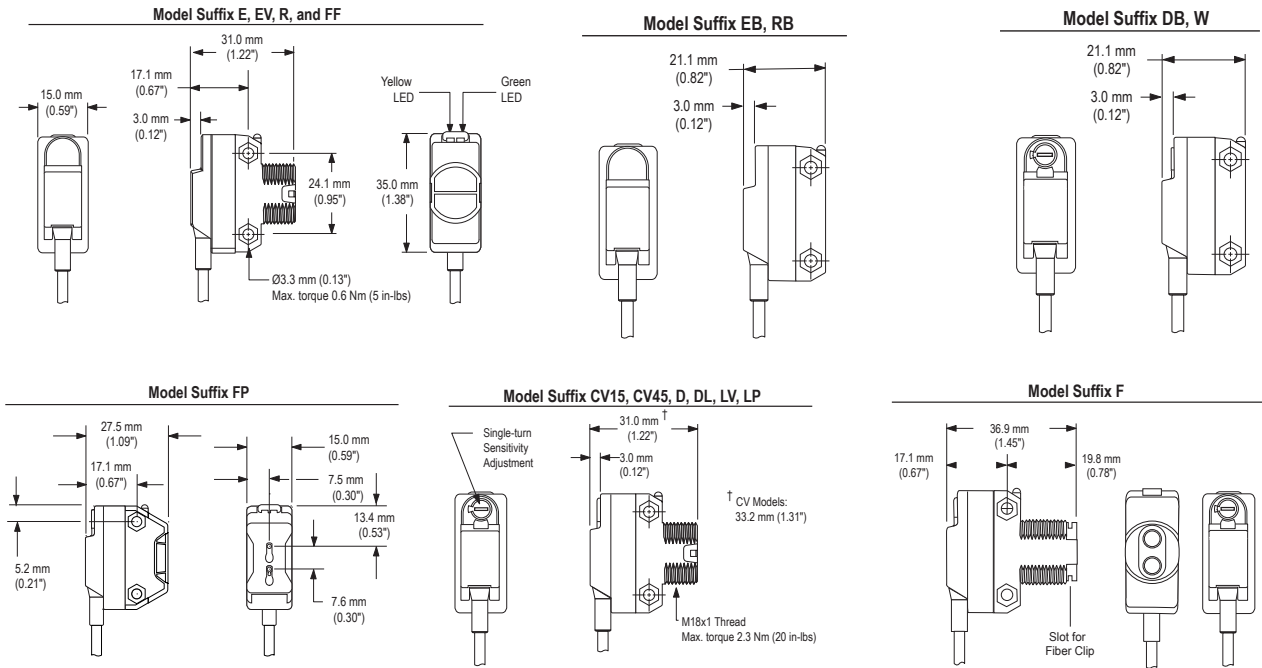
Vibration and Mechanical Shock

All models meet MIL-STD-202F, Method 201A (Vibration: 10 Hz to 60 Hz maximum, 0.06 inch (1.52 mm) double amplitude, 10G maximum acceleration) requirements. Also meets IEC 60947-5-2 (Shock: 30G 11 ms duration, half sine wave) requirements.



Note: For performance specifications of the FF50 and FF100 models built prior to date code 17090, refer to document p/n [63908](#).

Dimensions

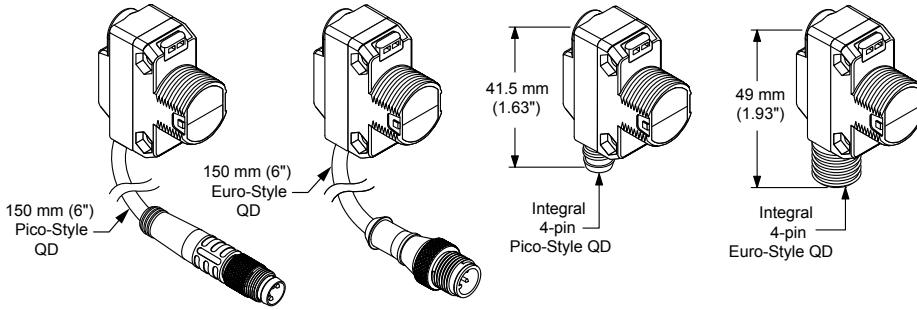


Model Suffix Q
(e.g. QS186EQ)

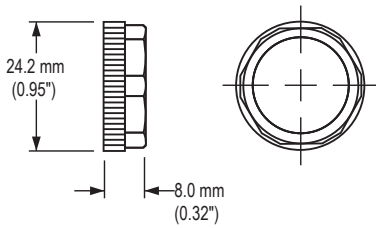
Model Suffix Q5
(e.g. QS186EQ5)

Model Suffix Q7
(e.g. QS186EQ7)

Model Suffix Q8
(e.g. QS186EQ8)



M18 x 1 Jam Nut



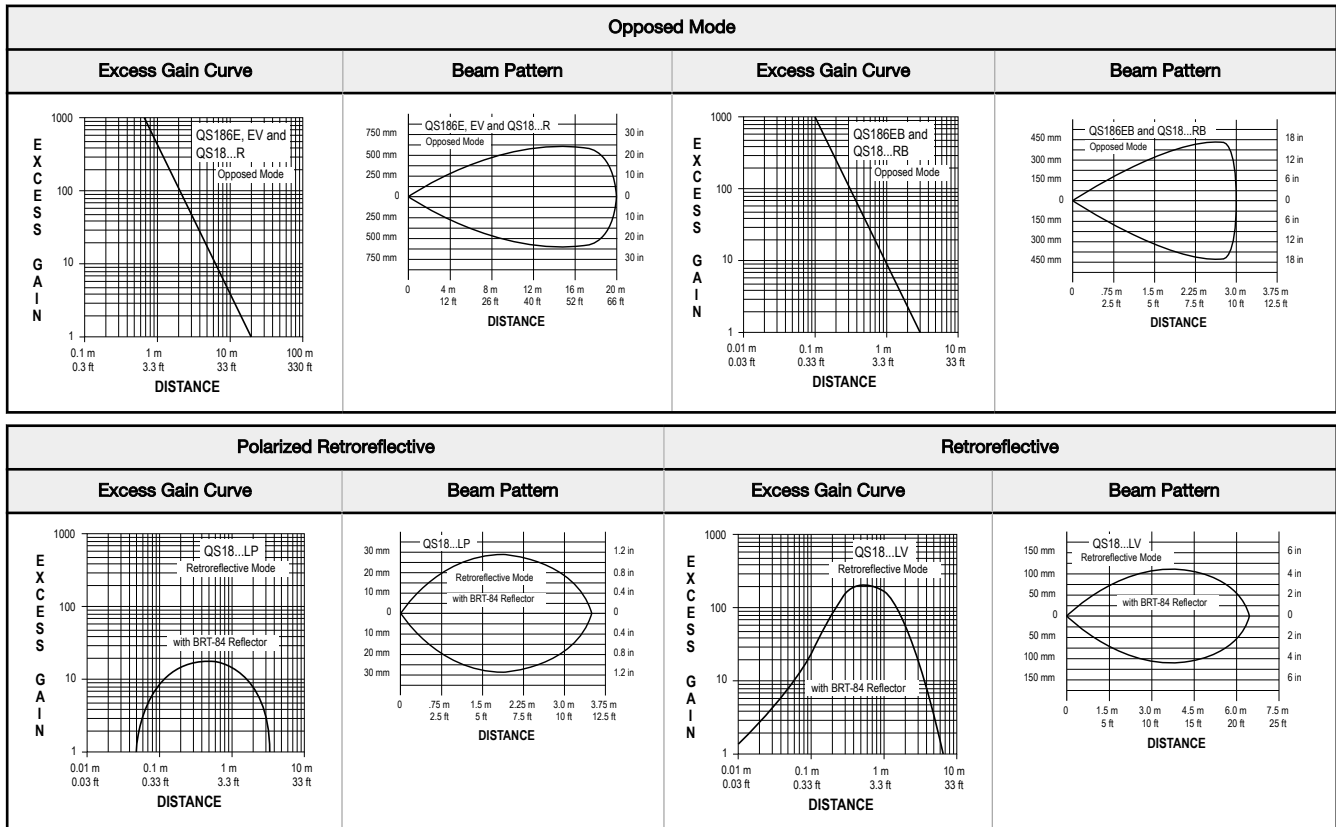
M3 hardware packet contents:

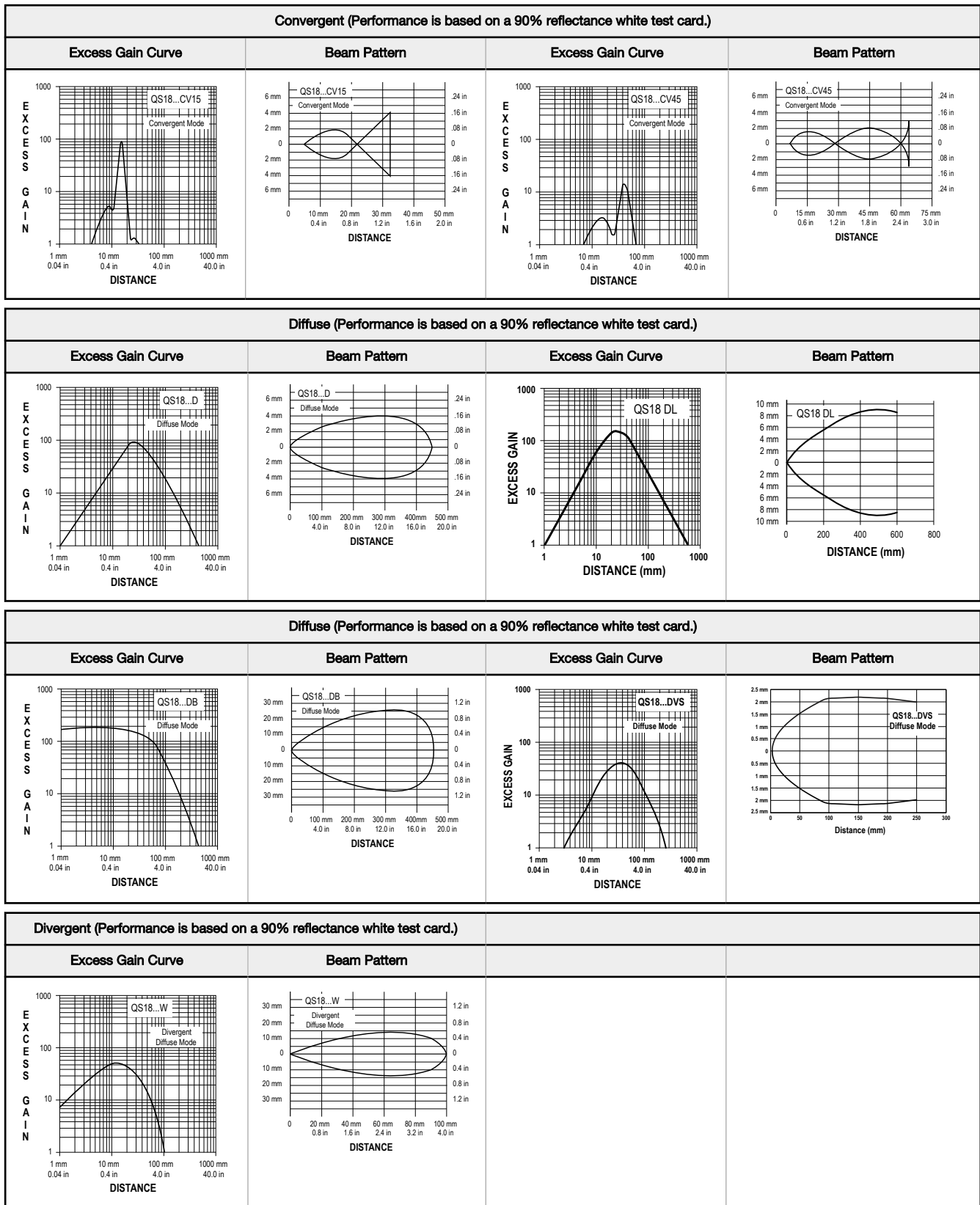
- 2 - M3 x 0.5 x 20 mm stainless steel screw
- 2 - M3 x 0.5 stainless steel hex nut
- 2 - M3 stainless steel washer

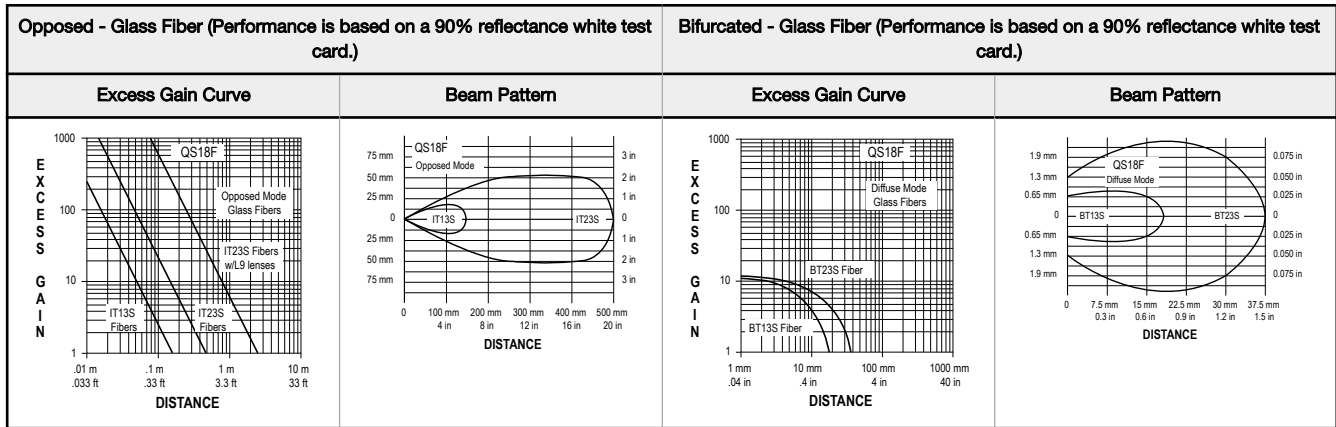
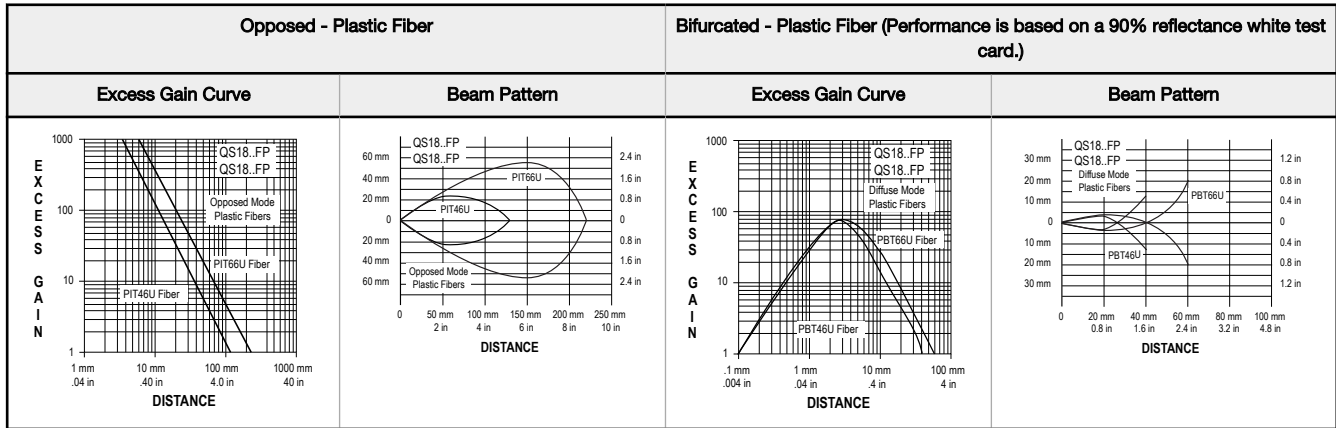
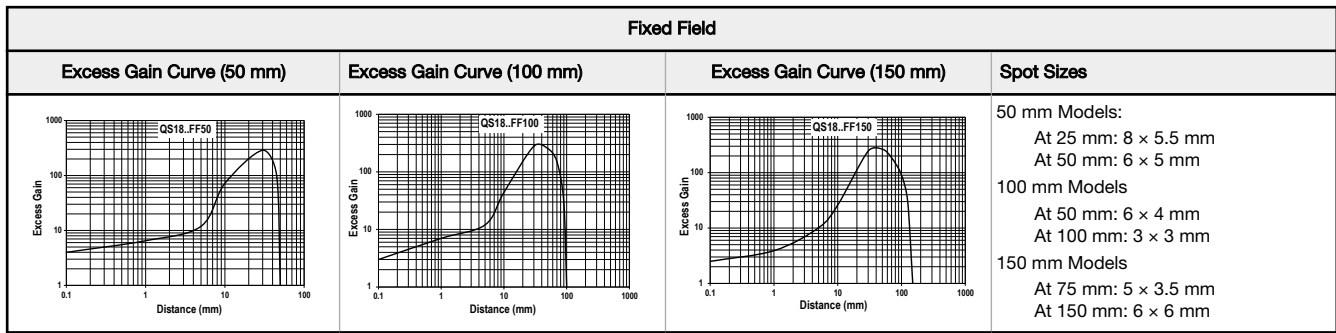
Packing list:

- Sensor
- M18 x 1 jam nut
- M3 hardware packet
- Quick Start Guide, p/n 63687

Performance Curves







Accessories

Cordsets

| 4-Pin Threaded M12/Euro-Style Cordsets—Single Ended | | | | |
|---|----------------|----------|------------|-----------------|
| Model | Length | Style | Dimensions | Pinout (Female) |
| MQDC-406 | 2 m (6.56 ft) | Straight | | |
| MQDC-415 | 5 m (16.4 ft) | | | |
| MQDC-430 | 9 m (29.5 ft) | | | |
| MQDC-450 | 15 m (49.2 ft) | | | |

| 4-Pin Threaded M12/Euro-Style Cordsets—Single Ended | | | | |
|---|----------------|-------------|------------|-----------------|
| Model | Length | Style | Dimensions | Pinout (Female) |
| MQDC-406RA | 2 m (6.56 ft) | Right-Angle | | |
| MQDC-415RA | 5 m (16.4 ft) | | | |
| MQDC-430RA | 9 m (29.5 ft) | | | |
| MQDC-450RA | 15 m (49.2 ft) | | | |

| 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 | | <p>1 = Brown 2 = White 3 = Blue 4 = Black</p> |
| PKW4Z-2 | 2 m (6.56 ft) | Right-Angle | | |

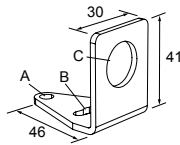
Sensor Status Indicators

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

WORLD-BEAM QS18 Brackets

SMB18A

- Right-angle mounting bracket with a curved slot for versatile orientation
- 12-ga. stainless steel
- 18 mm sensor mounting hole
- Clearance for M4 (#8) hardware

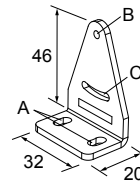


Hole center spacing: A to B = 24.2

Hole size: A = ϕ 4.6, B = 17.0 \times 4.6, C = ϕ 18.5

SMB312S

- Stainless steel 2-axis, side-mount bracket



A = 4.3 \times 7.5, B = diam. 3, C = 3 \times 15.3

All measurements are in millimeters.

Retroreflective Targets

Go to www.bannerengineering.com or see the Accessories section of your current Banner Engineering Corp catalog for complete information.



Note: Polarized sensors require corner cube type retroreflective targets only.

Plastic and Glass Fiber Optics

Go to www.bannerengineering.com or see the Accessories section of your current Banner Engineering Corp catalog for a list of plastic and glass fiber optic cables.

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For patent information, see www.bannerengineering.com/patents.

FCC Part 15 and CAN ICES-3 (B)/NMB-3(B)

This device complies with part 15 of the FCC Rules and CAN ICES-3 (B)/NMB-3(B). 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.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules and CAN ICES-3 (B)/NMB-3(B). These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the manufacturer.



more sensors, more solutions

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