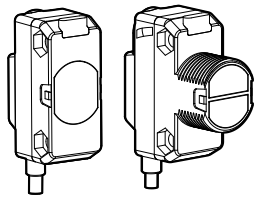
WORLD-BEAM® QS18 Series Sensor

Instruction Manual

Miniature Self-Contained Photoelectric Sensors in Universal Housing

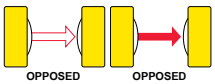
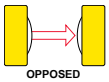


- Easily fits (or retrofits) almost any mounting situation
- Exceptional optical performance, comparable to larger “MINI-style” or barrel sensors
- 10 V dc to 30 V dc operation, with complementary (SPDT) NPN or PNP outputs, depending on model
- Bright LED operating status indicators are visible from 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

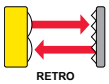
WARNING: Not To Be Used for Personnel Protection

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

Model [1]	Retroreflective Mode	Range	Output
QS18VN6LV	628 nm Visible red 	6.5 m (21 ft)	NPN
QS18VP6LV			PNP

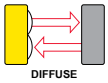
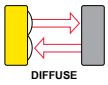
[1]
- To order the 9 m (30 ft) PVC cable model, add the suffix "W/30" to the cabled model number. For example, QS186E W/30.
- To order the 4-pin M12/Euro-style integral quick disconnect model, add the suffix "Q8" to the model number. For example, QS186EQ8.
- To order the 4-pin M8/Pico-style integral 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.

Original Document
197052 Rev. C

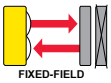
4 December 2017

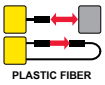
197052

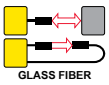
Model [1]	Convergent Mode	Range	Output
QS18VN6CV15	630 nm Visible red 	16 mm (0.63 in)	NPN
QS18VP6CV15			PNP
QS18VN6CV45		43 mm (1.7 in)	NPN
QS18VP6CV45			PNP

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
QS18VN6DB (Diffuse, wide)		450 mm (18 in)	NPN
QS18VP6DB (Diffuse, wide)			PNP

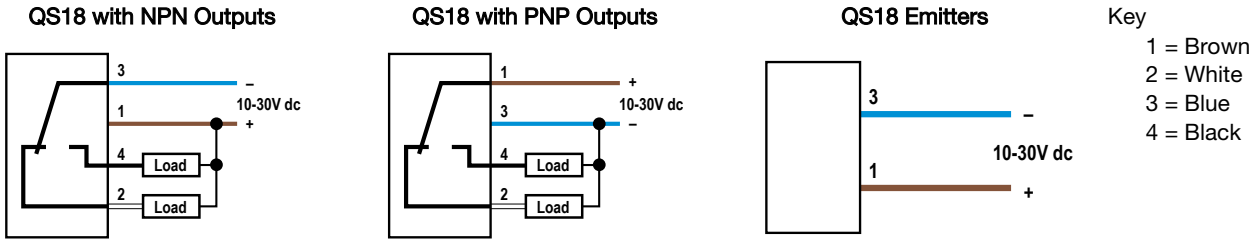
Model [1]	Divergent Mode	Range	Output
QS18VN6W	940 nm Infrared 	100 mm (4 in)	NPN
QS18VP6W			PNP

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
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			PNP

Wiring Diagrams



Quick disconnect (QD) wiring diagrams are functionally identical.

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:

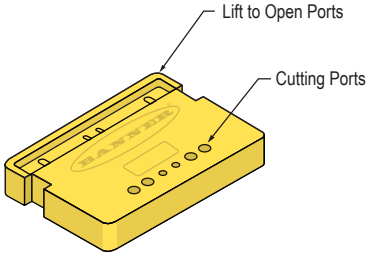


Figure 1. PFC-1 Cutting Device

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.

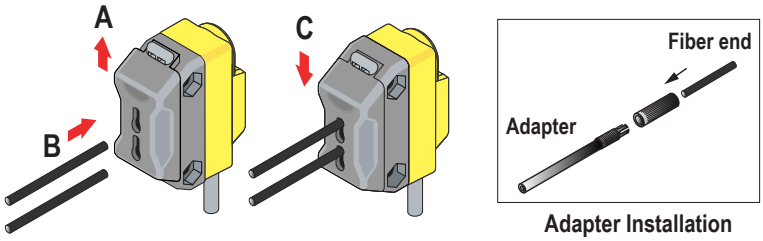


Figure 2. Installing Plastic Fibers

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.

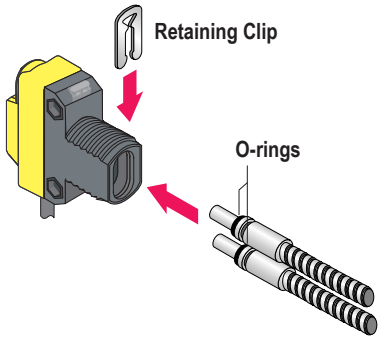


Figure 3. Installing Glass Fibers

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 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 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 solid: Power on
Amber solid: Light sensed
Amber flashing: Marginal excess gain (1 to 1.5 times excess gain)

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

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

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 Pico-style or Euro-style QD, 4-pin Pico-style or Euro-style 150 mm (6 in) QD, depending on model

Environmental
IEC IP67; NEMA 6

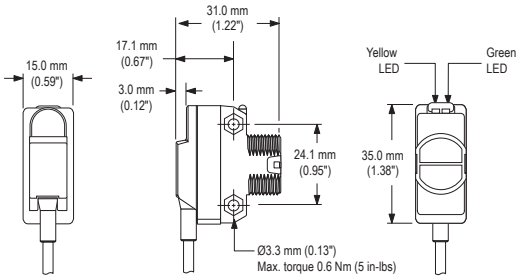
Operating Conditions
Temperature: –20 °C to +70 °C (–4 °F to +158 °F)
95% at +50 °C maximum relative humidity (non-condensing)

Certifications

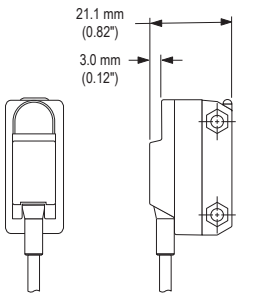
Note: For performance specifications of the FF50 and FF100 models built prior to date code 17090, refer to document p/n *63908*.

Dimensions and Features

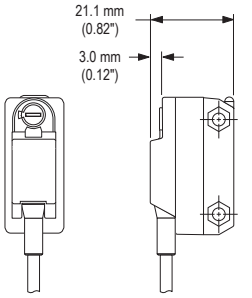
Model Suffix E, EV, R, and FF



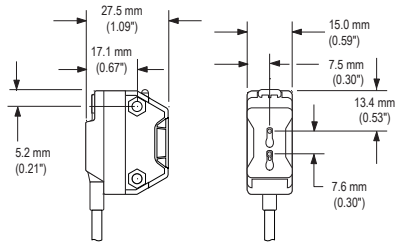
Model Suffix EB, RB



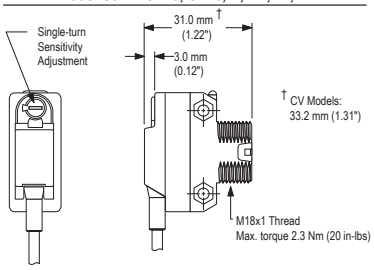
Model Suffix DB, W



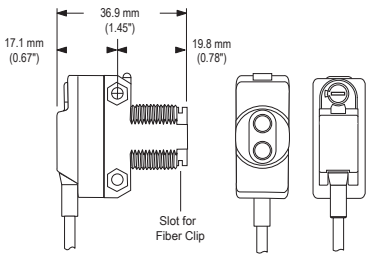
Model Suffix FP



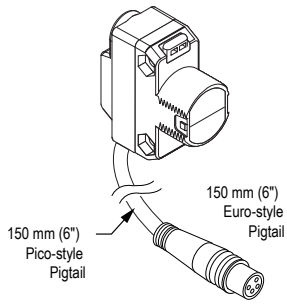
Model Suffix CV15, CV45, D, DL, LV, LP



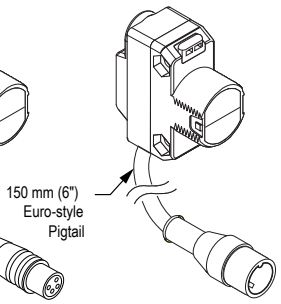
Model Suffix F



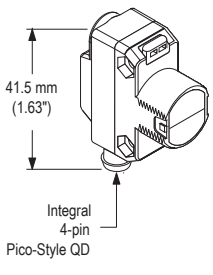
Model Suffix Q
(e.g. QS186EQ)



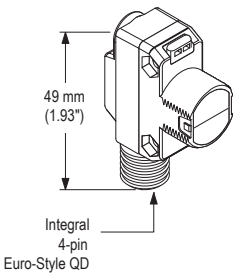
Model Suffix Q5
(e.g. QS186EQ5)



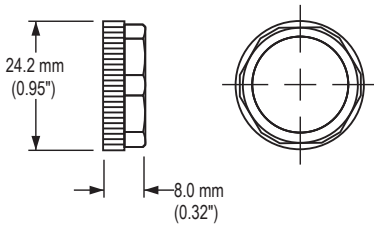
Model Suffix Q7
(e.g. QS186EQ7)



Model Suffix Q8
(e.g. QS186EQ8)



M18 x 1 Jam Nut



Packing List

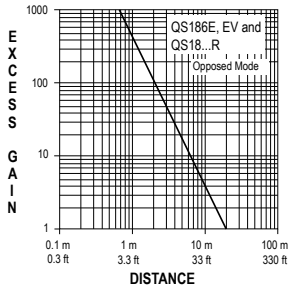
M3 hardware packet contents:
- 2 - M3 x 0.5 x 20 mm stainless steel screw
- 2 - M3 x 0.5 stainless steel hex nut
- 2 - M3 stainless steel washer

- Sensor
- M18 x 1 jam nut
- M3 hardware packet
- Installation sheet, p/n 63687

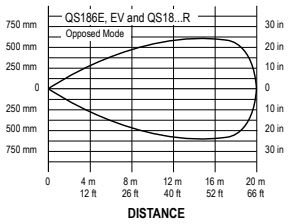
Performance Curves

Opposed Mode

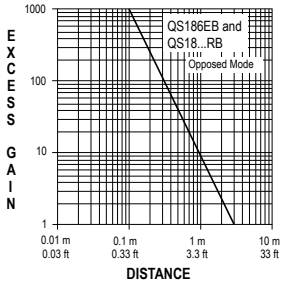
Excess Gain Curve



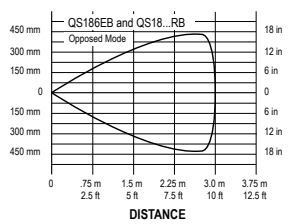
Beam Pattern



Excess Gain Curve

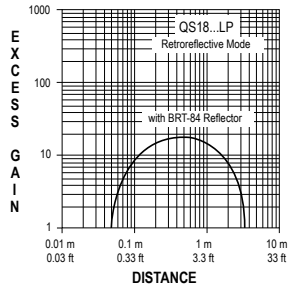


Beam Pattern

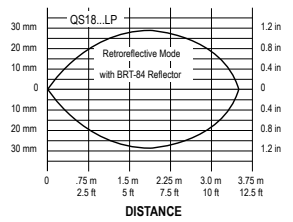


Polarized Retroreflective

Excess Gain Curve

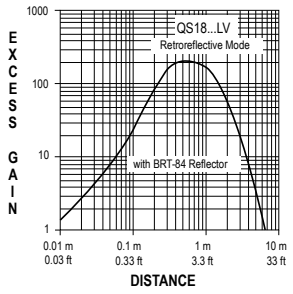


Beam Pattern

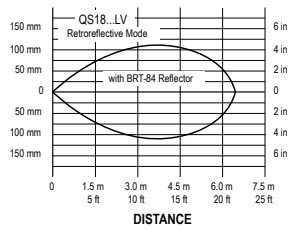


Retroreflective

Excess Gain Curve

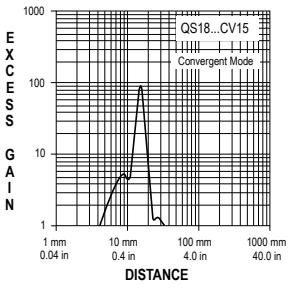


Beam Pattern

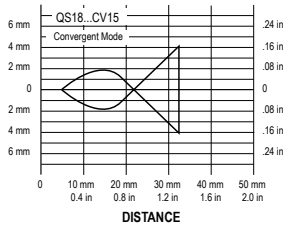


Convergent (Performance is based on a 90% reflectance white test card.)

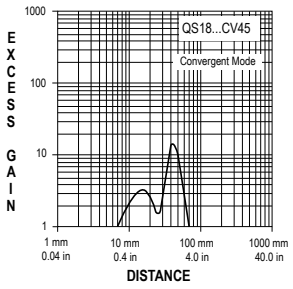
Excess Gain Curve



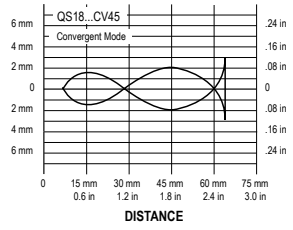
Beam Pattern



Excess Gain Curve

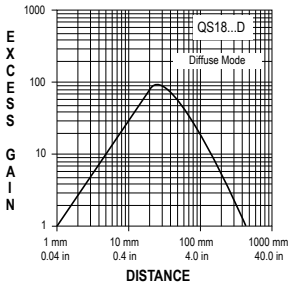


Beam Pattern

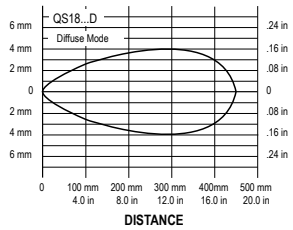


Diffuse (Performance is based on a 90% reflectance white test card.)

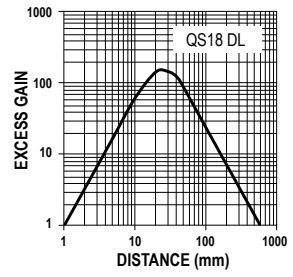
Excess Gain Curve



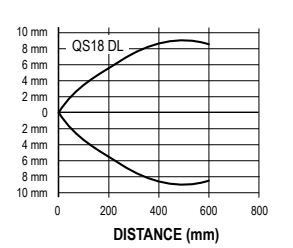
Beam Pattern



Excess Gain Curve

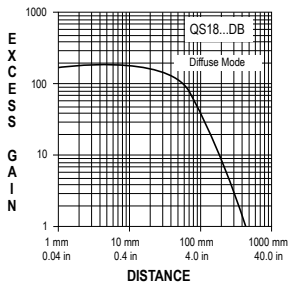


Beam Pattern

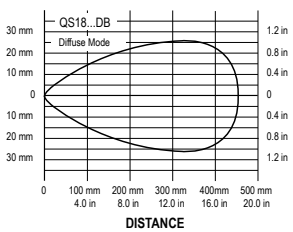


Diffuse (Performance is based on a 90% reflectance white test card.)

Excess Gain Curve

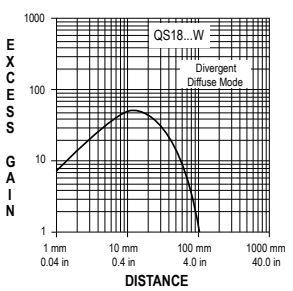


Beam Pattern

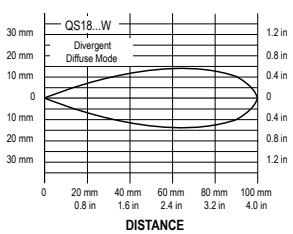


Divergent (Performance is based on a 90% reflectance white test card.)

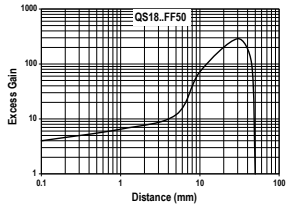
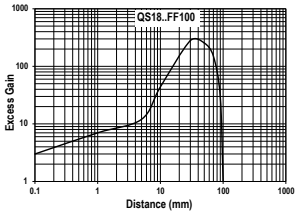
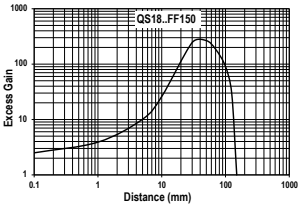
Excess Gain Curve

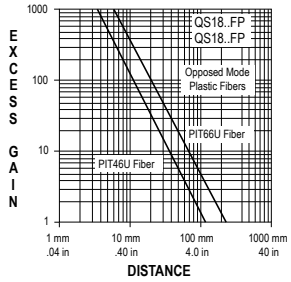
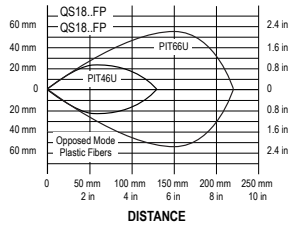
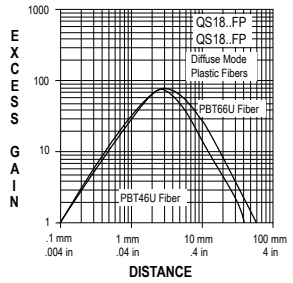
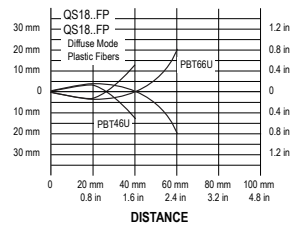


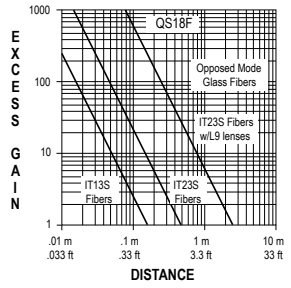
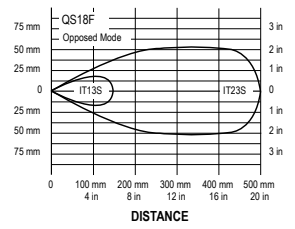
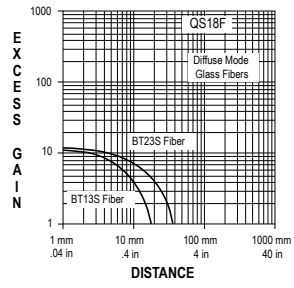
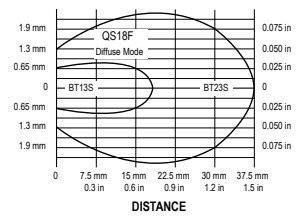
Beam Pattern



Fixed Field

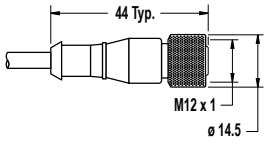
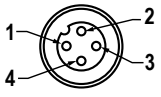
Excess Gain Curve (50 mm)	Excess Gain Curve (100 mm)	Excess Gain Curve (150 mm)	Spot Sizes
			50 mm Models: At 25 mm: 8 × 5.5 mm At 50 mm: 6 × 5 mm 100 mm Models At 50 mm: 6 × 4 mm At 100 mm: 3 × 3 mm 150 mm Models At 75 mm: 5 × 3.5 mm At 150 mm: 6 × 6 mm

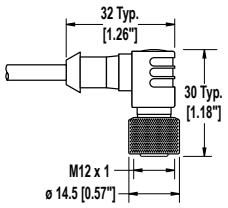
Opposed - Plastic Fiber		Bifurcated - Plastic Fiber (Performance is based on a 90% reflectance white test card.)	
Excess Gain Curve	**Beam Pattern**	**Excess Gain Curve**	**Beam Pattern**
			

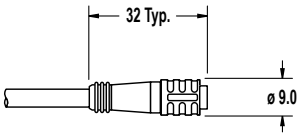
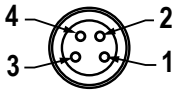
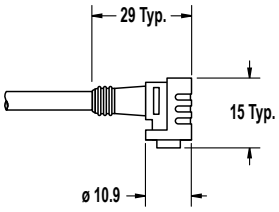
Opposed - Glass Fiber (Performance is based on a 90% reflectance white test card.)		Bifurcated - Glass Fiber (Performance is based on a 90% reflectance white test card.)	
Excess Gain Curve	**Beam Pattern**	**Excess Gain Curve**	**Beam Pattern**
			

Accessories

Cordsets

4-Pin Threaded M12/Euro-Style Cordsets				
Model	**Length**	**Style**	**Dimensions**	**Pinout (Female)**
MQDC-406	1.83 m (6 ft)	Straight		 1 = Brown 2 = White 3 = Blue 4 = Black
MQDC-415	4.57 m (15 ft)			
MQDC-430	9.14 m (30 ft)			
MQDC-450	15.2 m (50 ft)			

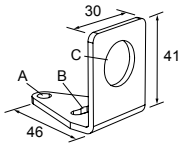
4-Pin Threaded M12/Euro-Style Cordsets				
Model	**Length**	**Style**	**Dimensions**	**Pinout (Female)**
MQDC-406RA	1.83 m (6 ft)	Right-Angle		
MQDC-415RA	4.57 m (15 ft)			
MQDC-430RA	9.14 m (30 ft)			
MQDC-450RA	15.2 m (50 ft)			

4-Pin Snap-on M8/Pico-Style Cordsets				
Model	**Length**	**Style**	**Dimensions**	**Pinout (Female)**
PKG4-2	2 m (6.56 ft)	Straight		 1 = Brown 2 = White 3 = Blue 4 = Black
PKW4Z-2	2 m (6.56 ft)	Right-Angle		

WORLD-BEAM QS18 Brackets

SMB18A

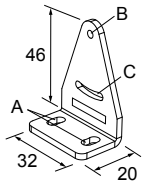
- Right-angle mounting bracket with a curved slot for versatile orientation
- 12-ga. stainless steel
- 18 mm sensor mounting hole
- Clearance for M4 (#8) hardware



Hole center spacing: A to B = 24.2
Hole size: A = ø 4.6, B = 17.0 × 4.6, C = ø 18.5

SMB312S

- Stainless steel 2-axis, side-mount bracket



A = 4.3 × 7.5, B = diam. 3, C = 3 × 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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