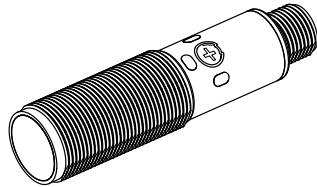


Datasheet

Next generation self-contained dc-operated sensors



- Economical photoelectric sensors for cost sensitive and high volume installations
- Powerful and bright visible red emitter beam for easy alignment and set-up
- Highly visible output and dual-function power and stability indicators
- Wide operating temperature range: -40°C to $+70^{\circ}\text{C}$ (-40°F to $+158^{\circ}\text{F}$)
- Robust 250° adjustment potentiometer on select models
- Stable detection in the presence of fluorescent lights for non through-beam applications



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

Emitter/Receiver Models ¹			
Model		Range	Output
S18-2NAEL-2M	Emitter	25 m (82 ft)	None
S18-2NAEJ-2M		25 m (82 ft) with beam inhibit	
S18-2NAES-2M		25 m (82 ft) with adjustment	
S18-2VNRL-2M	Receiver	25 m (82 ft)	Complementary NPN
S18-2VPRL-2M			Complementary PNP
S18-2VNRS-2M		25 m (82 ft) with adjustment	Complementary NPN
S18-2VPRS-2M			Complementary PNP

Polarized Retroreflective Models ¹		
Model	Range	Output
S18-2VNLP-2M	6 m (19.7 ft) with BRT-84 reflector	Complementary NPN
S18-2VPLP-2M		Complementary PNP
S18-2VNLP-2M	6 m (19.7 ft) with BRT-84 reflector, with adjustment	Complementary NPN
S18-2VPLP-2M		Complementary PNP

Retroreflective Models ¹		
Model	Range	Output
S18-2VNLV-2M	7.5 m (24.6 ft) with BRT-84 reflector, with adjustment	Complementary NPN
S18-2VPLV-2M		Complementary PNP

¹ Only 2 m (6.5 ft) PVC cable models are listed. To order 9 m (30 ft) PVC cable models, add suffix "9M" (for example, S18-2VNDL-9M). To order 4-pin Euro M12 integral QD models, add suffix "Q8" (for example, S18-2VNDL-Q8). To order 4-pin Euro M12 pigtail QD models, add suffix "Q5" (for example, S18-2VNDL-Q5). To order 4-pin Pico M8 pigtail QD models, add suffix "Q3" (for example, S18-2VNDL-Q3).



Diffuse Models ¹		
Model	Range	Output
S18-2VNDL-2M	750 mm (29.5 in) with adjustment	Complementary NPN
S18-2VPDL-2M		Complementary PNP
S18-2VNDS-2M	300 mm (11.8 in) with adjustment	Complementary NPN
S18-2VPDS-2M		Complementary PNP

Fixed Field Models		
Model	Range	Output
S18-2VNFF30-2M	30 mm	Complementary NPN
S18-2VPFF30-2M		Complementary PNP
S18-2VNFF50-2M	50 mm	Complementary NPN
S18-2VPFF50-2M		Complementary PNP
S18-2VNFF75-2M	75 mm	Complementary NPN
S18-2VPFF75-2M		Complementary PNP
S18-2VNFF100-2M	100 mm	Complementary NPN
S18-2VPFF100-2M		Complementary PNP
S18-2VNFF150-2M	150 mm	Complementary NPN
S18-2VPFF150-2M		Complementary PNP
S18-2VNFF200-2M	200 mm	Complementary NPN
S18-2VPFF200-2M		Complementary PNP

Installing the S18-2 Sensor

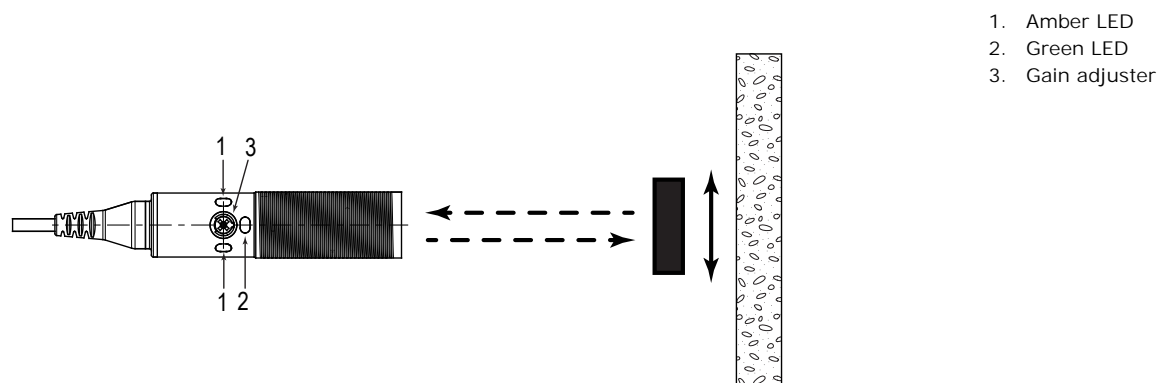


Figure 1. S18-2 Features and Installation

To install the S18-2 Sensor:

1. Align the sensor as required for the application. For the most sensitive object detection, align the sensor so that the objects move across the sensor's axis.
2. Secure the sensor to a bracket.
3. Wire sensor as shown in the wiring diagrams.
4. Adjust the gain adjuster (sensitivity pot) if necessary.

Specifications

Supply Voltage

- 10 to 30 V dc for ambient temperature $\leq 55^{\circ}\text{C}$
- 10 to 24 V dc for ambient temperature $> 55^{\circ}\text{C}$

Supply Current (Exclusive of Load Current)

- Diffuse: 16 mA
- Opposed Mode Emitters: 17 mA
- Opposed Mode Receivers: 8 mA
- Retroreflective and Polarized Retroreflective: 16 mA
- Fixed Field: 22 mA

Output Protection Circuitry

- Protected against false pulse on power-up and continuous short circuit of outputs. Short circuit protection at elevated temperature may require a power cycle to reset.

Supply Protection Circuitry

- Protected against reverse polarity and transient voltages

Output Rating

- ≤ 50 mA total current for ambient temperatures $> 55^{\circ}\text{C}$
- ≤ 100 mA total current through both outputs $\leq 55^{\circ}\text{C}$
- OFF-State Leakage Current: $< 50\ \mu\text{A}$ at 30 V dc
- ON-State Saturation Voltage: < 1.5 V at 10 mA; < 3.0 V at 100 mA

Output Configuration

- Complementary PNP or NPN by model number

Emitter LED

- Visible Red

Vibration and Mechanical Shock

- All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06 in acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)

Operating Conditions

- -40°C to $+70^{\circ}\text{C}$ (-40°F to $+158^{\circ}\text{F}$)
- 95% at $+50^{\circ}\text{C}$ maximum relative humidity (non-condensing)

Environmental Rating

- IEC 60529 IEC IP67

Certifications



Output Response Time

- Response is independent of signal strength
- Opposed models: 1.5 milliseconds ON, 1 millisecond OFF
- Retro, Polarized Retro, and Diffuse models: 1.5 milliseconds ON, 0.75 milliseconds OFF
- Fixed Field models: 2 milliseconds ON, 2 milliseconds OFF
- Delay on Power-up: 100 milliseconds; outputs do not conduct during this time

Repeatability

- Repeatability is independent of signal strength
- Opposed models: 170 microseconds
- Retro, Polarized Retro, and Diffuse models: 100 microseconds
- Fixed Field models: 200 microseconds

Adjustments

- Diffuse (DL, DS), Emitter (ES), Receiver (RS), Polarized Retroreflective (LPC), Retroreflective (LV) models: Single turn sensitivity (gain) adjustment potentiometer
- Emitter Beam Inhibit (EJ) models: Tie black wire to 10 to 30 V dc for beam inhibit

Construction

- Housing, connector, gain pot driver: ABS; Front Window: PMMA; Indicator Windows: Clear ABS; Cable: PVC jacket; Pigtail QD: Nickel-plated brass and PVC jacket; Mounting Nuts: 30% glass filled PBT

Indicators

- Three LEDs (1 green, 2 amber)
- Green solid: indicates power applied and sensor ready
- Green flashing: indicates marginal sensing signal
- Amber solid: indicates Pin 4 (black wire) output conducting

Required Overcurrent Protection

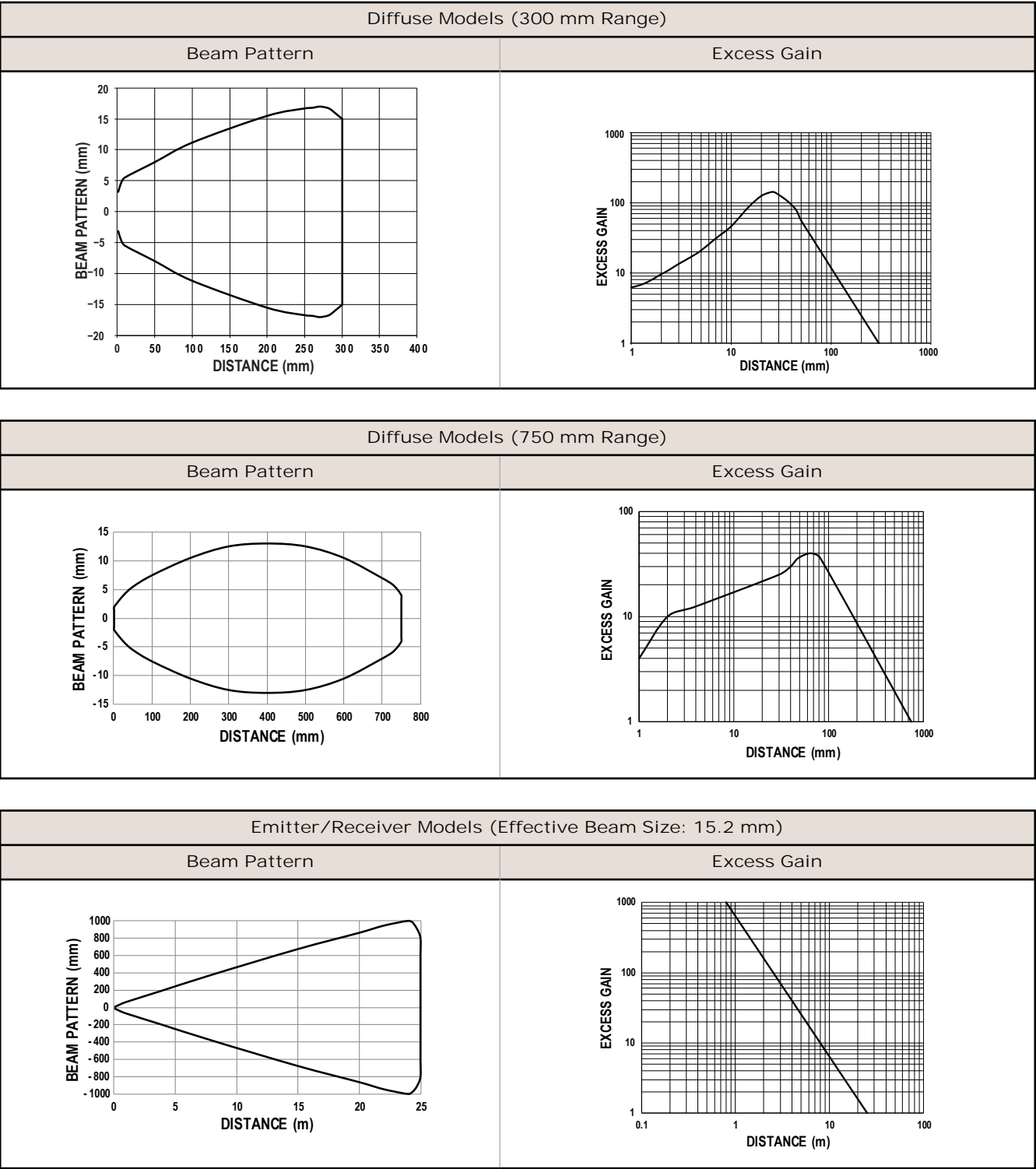


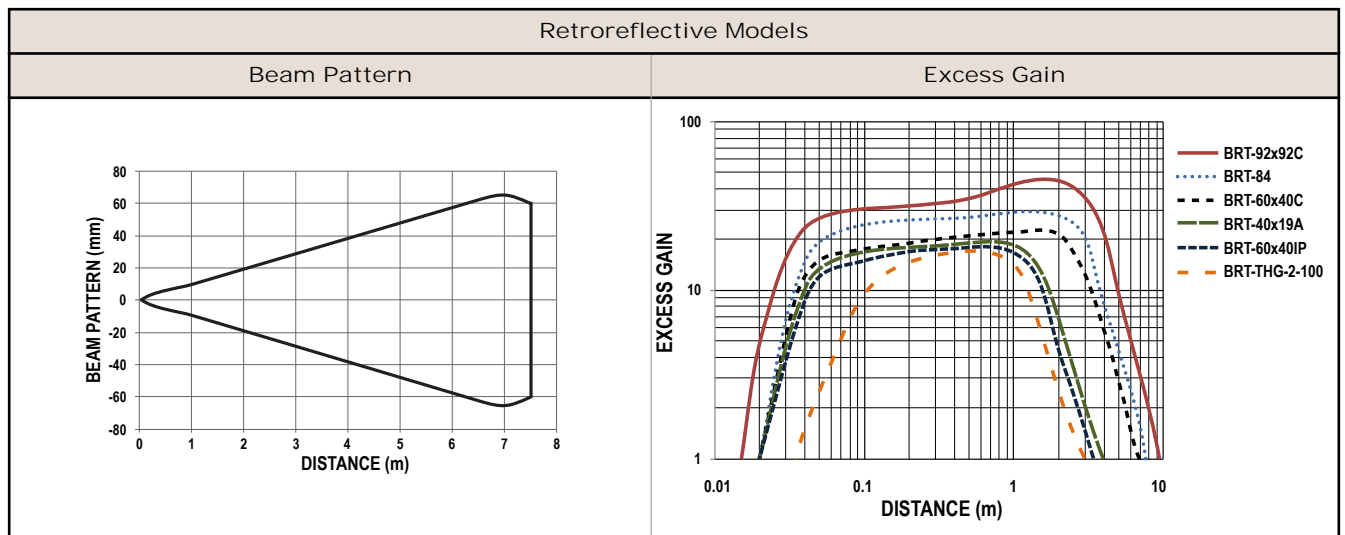
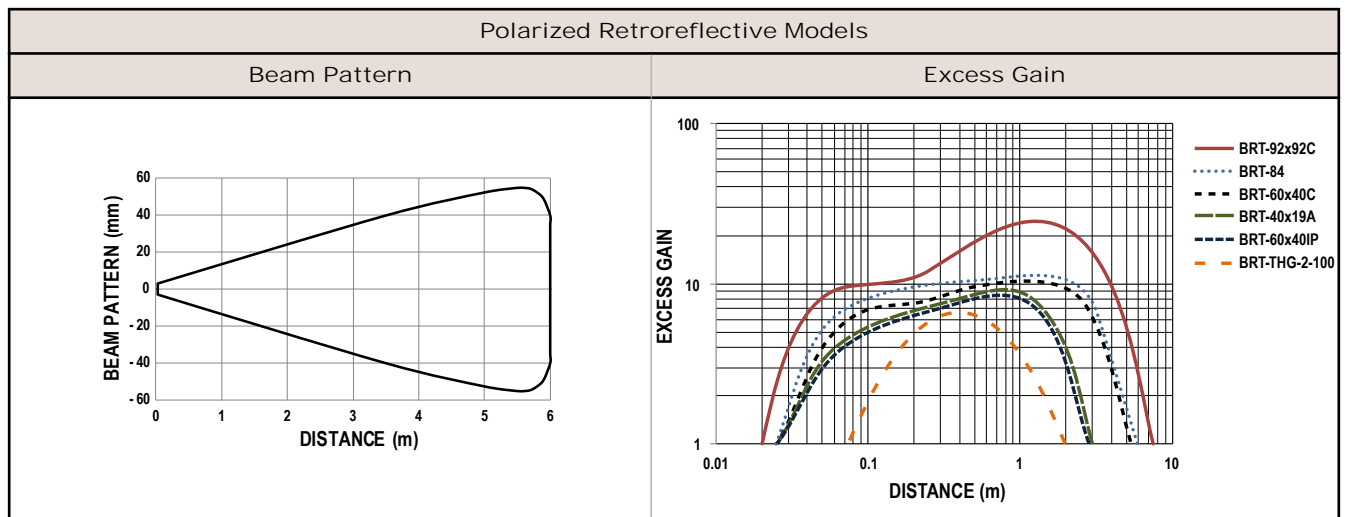
WARNING: Electrical connections must be made by qualified personnel in accordance with local and national electrical codes and regulations.

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 <http://www.bannerengineering.com>.

Supply Wiring	Required Overcurrent Protection
20	5.0 Amps
22	3.0 Amps
24	2.0 Amps
26	1.0 Amps
28	0.8 Amps
30	0.5 Amps

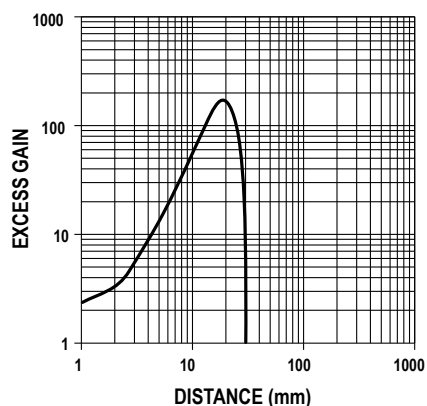
Performance Curves





Fixed Field Models - Excess Gain

Target for Excess Gain Curves use a 90% Reflective White Card

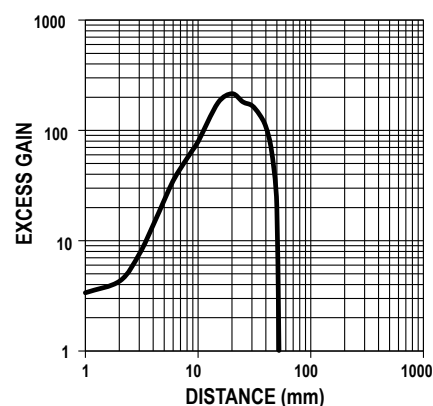


S18-2FF30

Emitter Image Size: 4.0 mm square at 15 mm and 3.5 mm square at 30 mm

20% Gray Test Card: Cutoff distance will be 98% of value shown

6% Black Test Card: Cutoff distance will be 95% of value shown

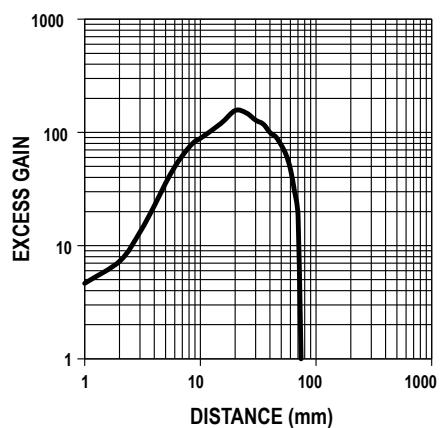


S18-2FF50

Emitter Image Size: 4 mm square at 25 mm and 3 mm square at 50 mm

20% Gray Test Card: Cutoff distance will be 98% of value shown

6% Black Test Card: Cutoff distance will be 95% of value shown

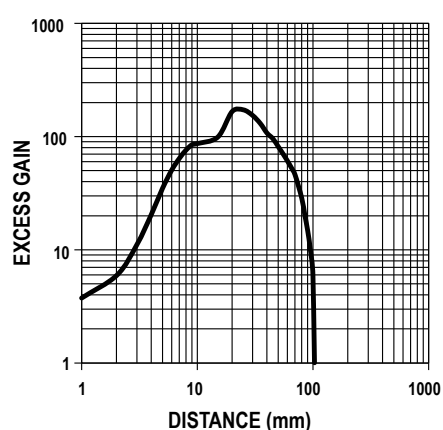


S18-2FF75

Emitter Image Size: 4.5 mm square at 37 mm and 4.0 mm square at 75 mm

20% Gray Test Card: Cutoff distance will be 98% of value shown

6% Black Test Card: Cutoff distance will be 95% of value shown

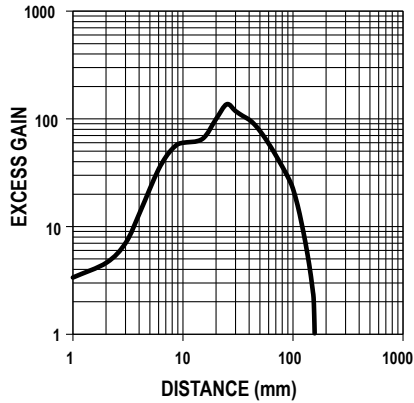
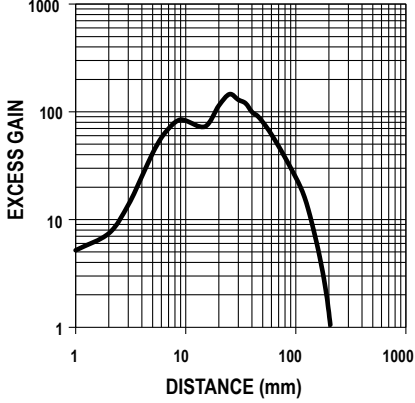


S18-2FF100

Emitter Image Size: 4.5 mm square at 50 mm and 4.5 mm square at 100 mm

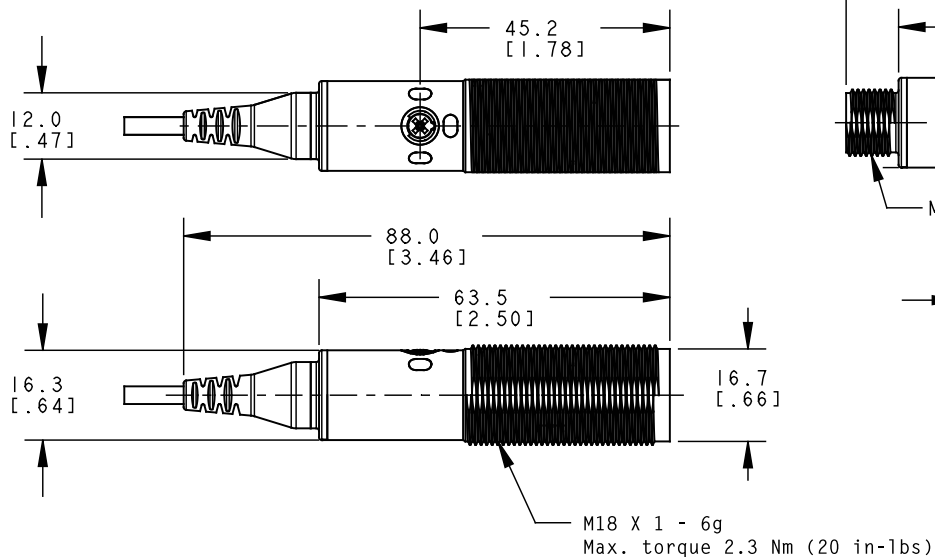
20% Gray Test Card: Cutoff distance will be 95% of value shown

6% Black Test Card: Cutoff distance will be 90% of value shown

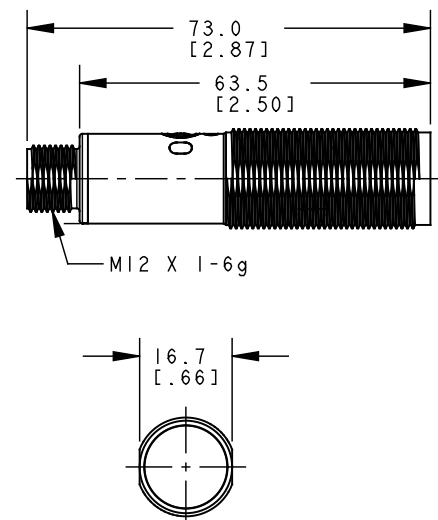
Fixed Field Models - Excess Gain	
Target for Excess Gain Curves use a 90% Reflective White Card	
 <p>S18-2FF150</p> <p>Emitter Image Size: 5 mm square at 75 mm and 8 mm square at 150 mm</p> <p>20% Gray Test Card: Cutoff distance will be 90% of value shown</p> <p>6% Black Test Card: Cutoff distance will be 70% of value shown</p>	 <p>S18-2FF200</p> <p>Emitter Image Size: 5 mm square at 100 mm and 8 mm square at 200 mm</p> <p>20% Gray Test Card: Cutoff distance will be 85% of value shown</p> <p>6% Black Test Card: Cutoff distance will be 60% of value shown</p>

Dimensions

Cable Models



QD Models



All measurements are listed in millimeters (inches), unless noted otherwise.

Wiring Diagrams

Emitter	Emitter with Active High Beam Inhibit
Complementary Current Sinking (NPN)	Complementary Current Sourcing (PNP)



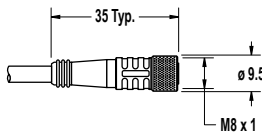
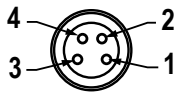
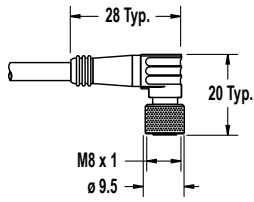
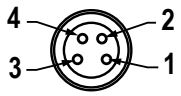
NOTE: Open lead wires must be connected to a terminal block.

Accessories




Cordsets

All measurements are listed in millimeters, unless noted otherwise.

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

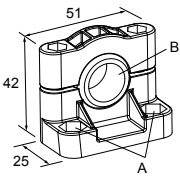
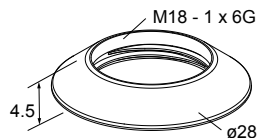
4-Pin Threaded M8/Pico-Style Cordsets				
Model	Length	Style	Dimensions	Pinout (Female)
PKG4M-2	2 m (6.56 ft)	Straight		 <p>1 = Brown 2 = White 3 = Blue 4 = Black</p>
PKG4M-5	5 m (16.4 ft)			
PKG4M-9	9 m (29.5 ft)			
PKW4M-2	2 m (6.56 ft)	Right Angle		 <p>1 = Brown 2 = White 3 = Blue 4 = Black</p>
PKW4M-5	5 m (16.4 ft)			
PKW4M-9	9 m (29.5 ft)			

Apertures

Model	Units	Aperture Description	Product
AP18SCN	3	Kit includes round apertures of 0.5 mm (0.02 in), 1.0 mm (0.04 in), and 2.5 mm (0.10 in) diameter.	
AP18SRN	3	Kit includes round apertures of 0.5 mm (0.02 in), 1.0 mm (0.04 in), and 2.5 mm (0.10 in) diameter. Kits include Teflon® FEP® lens, o-ring and thread-on housing.	
APG18S	1	Kit with glass lens to protect plastic sensor lens from chemical environments and weld splatter damage.	

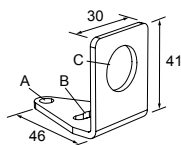
Brackets

For additional brackets, check the current Banner catalog or visit www.bannerengineering.com. All measurements are listed in millimeters, unless noted otherwise.

<p>SMB18SF</p> <ul style="list-style-type: none"> 18 mm swivel bracket with M18 × 1 internal thread Black thermoplastic polyester Stainless steel swivel locking hardware included <p>Hole center spacing: A = 36.0 Hole size: A = ø 5.3, B = ø 18.0</p> 	<p>SMBS18-2-1</p> <ul style="list-style-type: none"> 30% glass-filled PBT 
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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

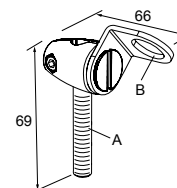


Hole center spacing: A to B = 24.2

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

SMB18FA..

- Swivel bracket with tilt and pan movement for precision adjustment
- Easy sensor mounting to extruded rail T-slots
- Metric and inch size bolts available
- 18 mm sensor mounting hole



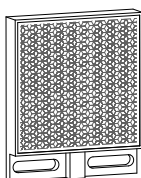
Hole size: B= \varnothing 18.1

Model	Bolt Thread (A)
SMB18FA	3/8 - 16 \times 2 in
SMB18FAM10	M10 - 1.5 \times 50
SMB18FAM12	n/a; no bolt included. Mounts directly to 12 mm (1/2 in) rods

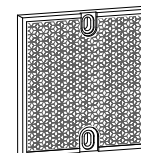
Reflectors

BRT-2X2

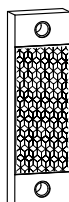
- Square, acrylic target
- Reflectivity factor: 1.0
- Max. temperature: +50 °C (+122 °F)
- Optional brackets are available
- Approximate size: 51 mm \times 51 mm

**BRT-84X84A**

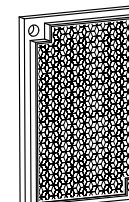
- Square, acrylic target
- Reflectivity Factor: 2.0
- Temperature: -20 °C to +60 °C (-4 °F to +140 °F)
- Approximate size: 84 mm \times 84 mm

**BRT-40X19A**

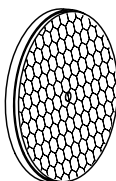
- Rectangular, acrylic target
- Reflectivity Factor: 1.3
- Temperature: -20 °C to +60 °C (-4 °F to +140 °F)
- Approximate size: 19 mm \times 60 mm overall; 19 mm \times 40 mm reflector

**BRT-60X40C**

- Rectangular, acrylic target
- Reflectivity Factor: 1.4
- Temperature: -20 °C to +60 °C (-4 °F to +140 °F)
- Optional brackets are available
- Approximate size: 40 mm \times 60 mm

**BRT-84**

- Round, acrylic target
- Reflectivity Factor: 1.4
- Temperature: -20 °C to +60 °C (-4 °F to +140 °F)
- Optional brackets are available
- Approximate size: 84 mm diameter
- Mounting Hole: 4.5 mm diameter

**Retroreflective Tape**

Model	Reflectivity Factor	Maximum Temperature	Size
BRT-THG-2-100	0.7	+60 °C (+140 °F)	50 mm (2 in) wide, 2.5 m (100 in) long

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