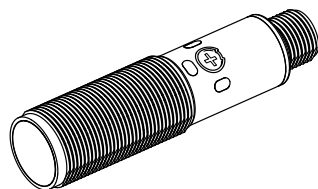


# S18-2 Plastic 18 mm Barrel Sensors



## 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:  $-40^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$  to  $+158^{\circ}\text{F}$ )
- Robust  $250^{\circ}$  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 <sup>1</sup> |          |                                |                   |
|--------------------------------------|----------|--------------------------------|-------------------|
| 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 <sup>1</sup> |                                                      |                   |
|-----------------------------------------------|------------------------------------------------------|-------------------|
| Model                                         | Range                                                | Output            |
| S18-2VNLP-2M                                  | 6 m (19.7 ft) with BRT-84 reflector                  | Complementary NPN |
| S18-2VPLP-2M                                  |                                                      | Complementary PNP |
| S18-2VNLPC-2M                                 | 6 m (19.7 ft) with BRT-84 reflector, with adjustment | Complementary NPN |
| S18-2VPLPC-2M                                 |                                                      | Complementary PNP |

| Retroreflective Models <sup>1</sup> |                                                        |                   |
|-------------------------------------|--------------------------------------------------------|-------------------|
| 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 |

<sup>1</sup> Integral 2 m (6.5 ft) unterminated cable models are listed.

- To order the 9 m (30 ft) PVC cable model, add the suffix "9M" to the model number. For example, S18-2VNDL-9M.
- To order the 4-pin M12/Euro-style integral quick disconnect model, add the suffix "Q8" to the model number. For example, S18-2VNDL-Q8.
- 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, S18-2VNDLQ5.
- To order the 150 mm (6 in) PVC cable model with a 4-pin M8/Pico-style quick disconnect, add the suffix "Q3" to the model number. For example, S18-VNDL-Q3.



| Diffuse Models <sup>1</sup> |                                  |                   |
|-----------------------------|----------------------------------|-------------------|
| 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

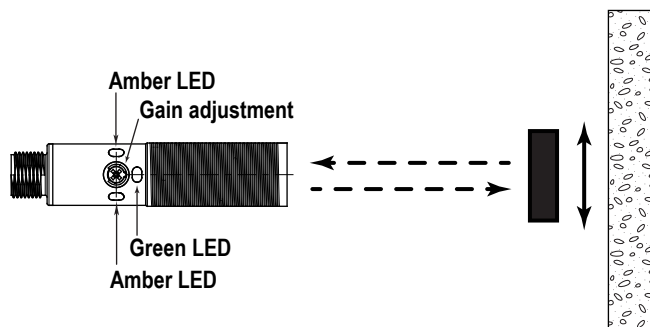
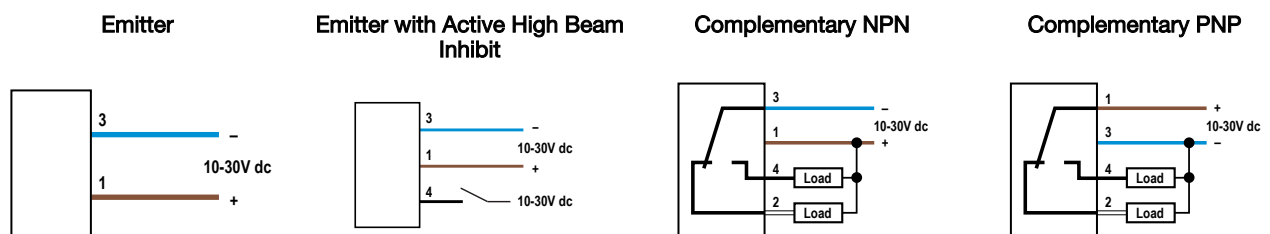


Figure 1. S18-2 Features and Installation

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.

## Wiring Diagrams



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

## Specifications

### Supply Voltage

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

- $\leq 50$  mA total current for ambient temperatures  $> 55^{\circ}\text{C}$
- $\leq 100$  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

### 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

### 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

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

### Environmental Rating

IEC IP67

### Certifications



Class 2 power ; UL  
Environmental Rating: Type 1

### 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
- Mounting nuts: 30% glass filled PBT

### 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.

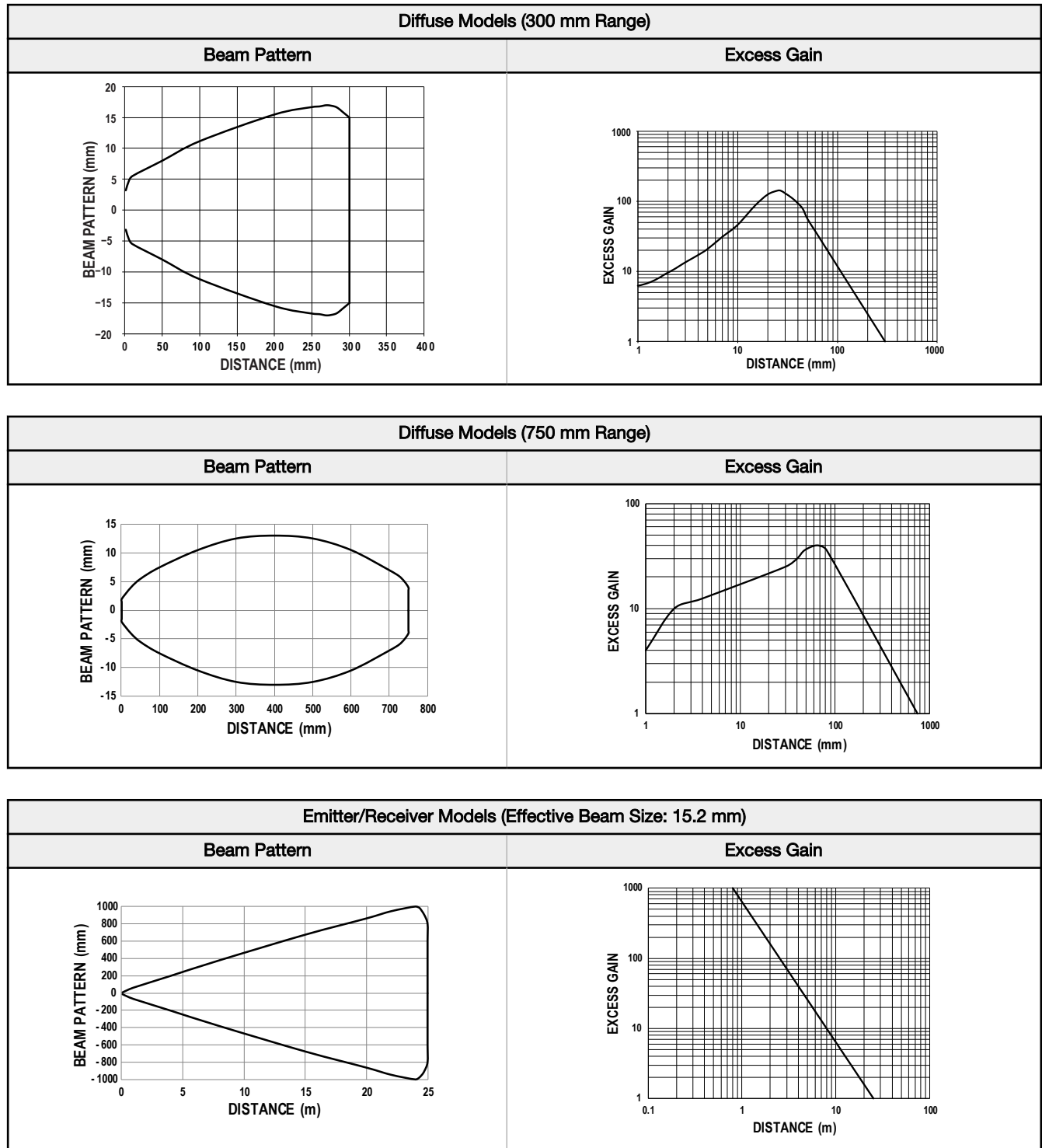
Overcurrent protection may be provided with external fusing or via Current Limiting, Class 2 Power Supply.

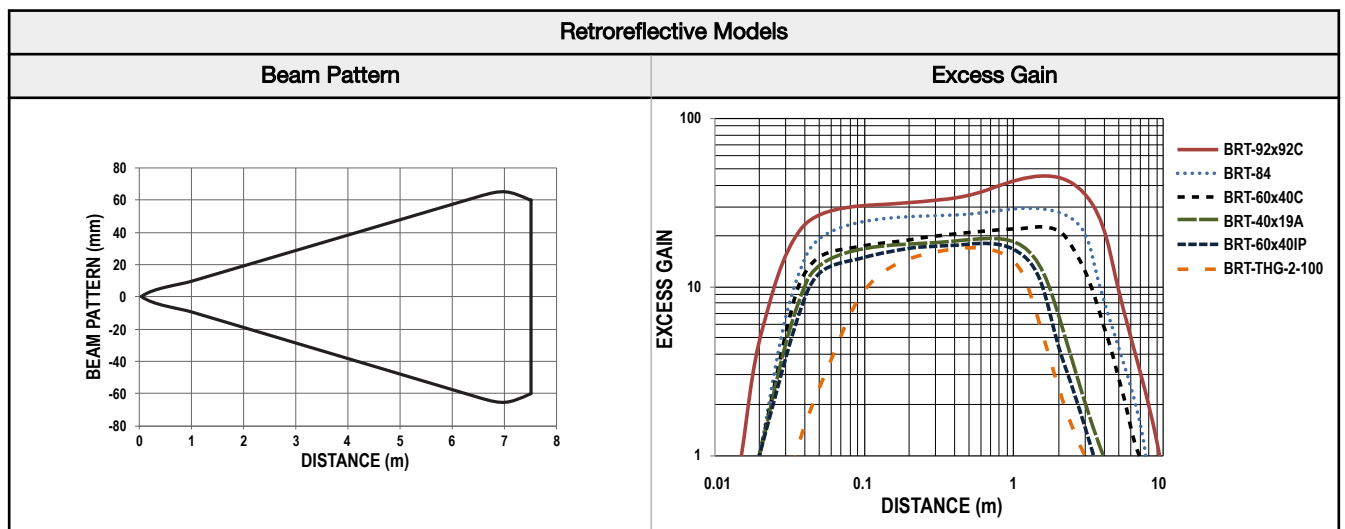
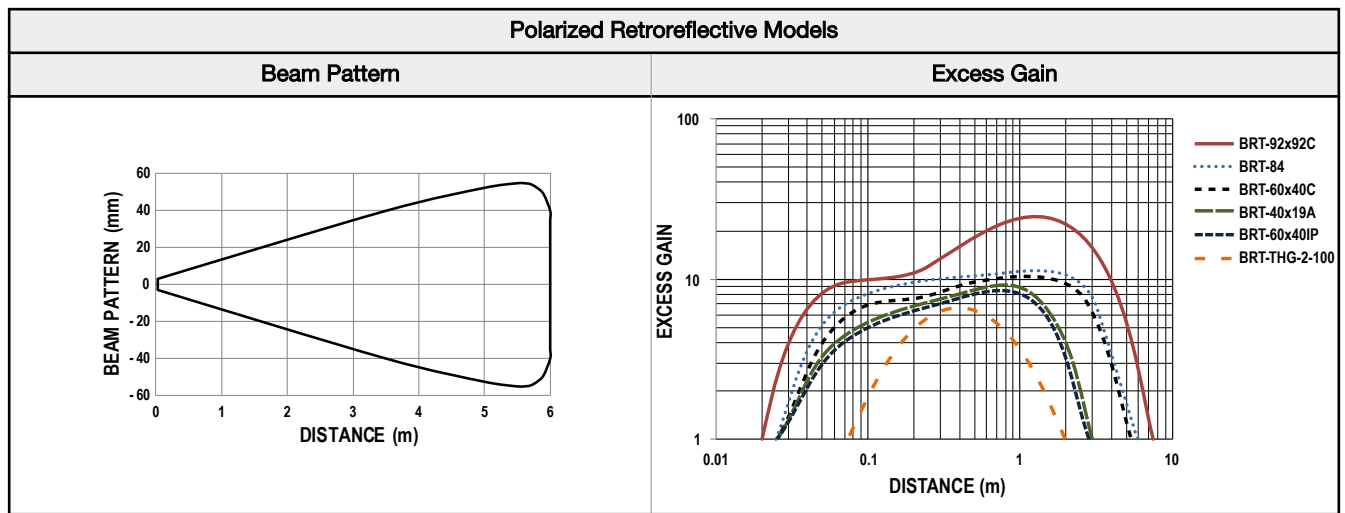
Supply wiring leads  $< 24$  AWG shall not be spliced.

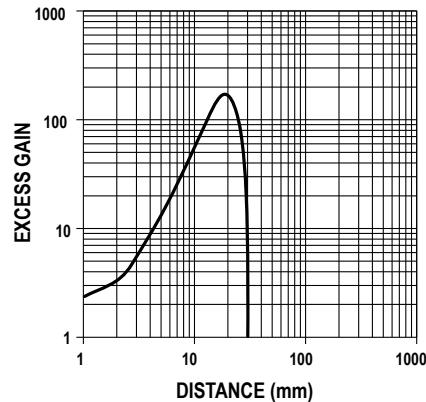
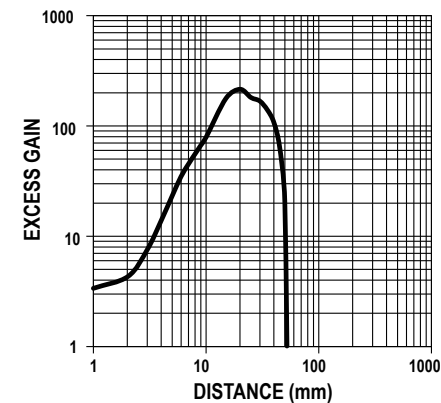
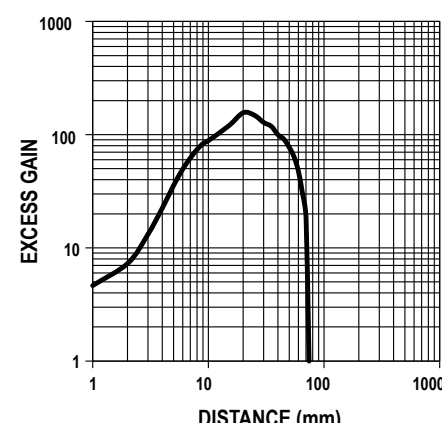
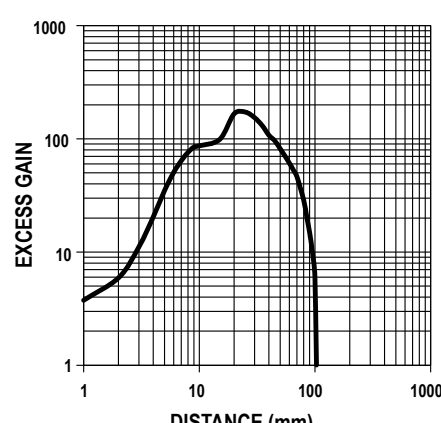
For additional product support, go to [www.bannerengineering.com](http://www.bannerengineering.com).

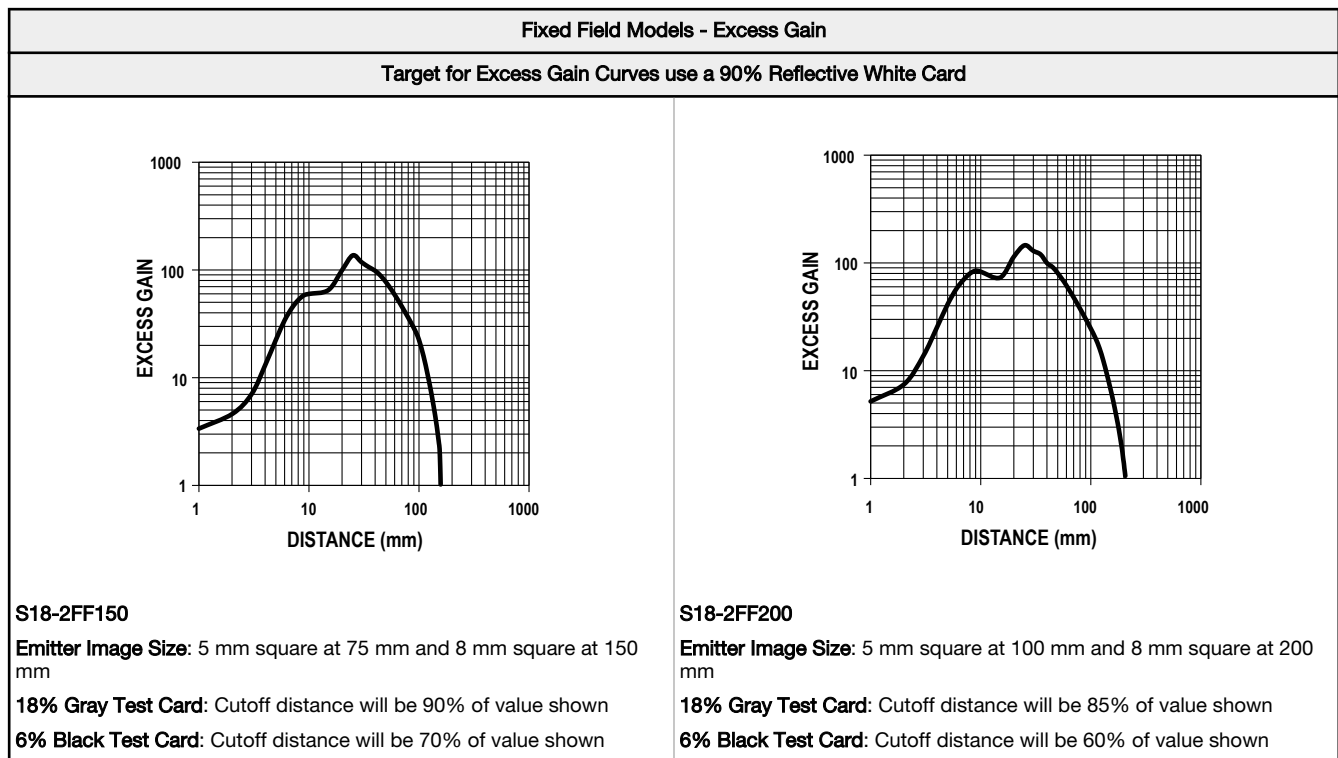
| Supply Wiring (AWG) | Required Overcurrent Protection (Amps) |
|---------------------|----------------------------------------|
| 20                  | 5.0                                    |
| 22                  | 3.0                                    |
| 24                  | 2.0                                    |
| 26                  | 1.0                                    |
| 28                  | 0.8                                    |
| 30                  | 0.5                                    |

## Performance Curves



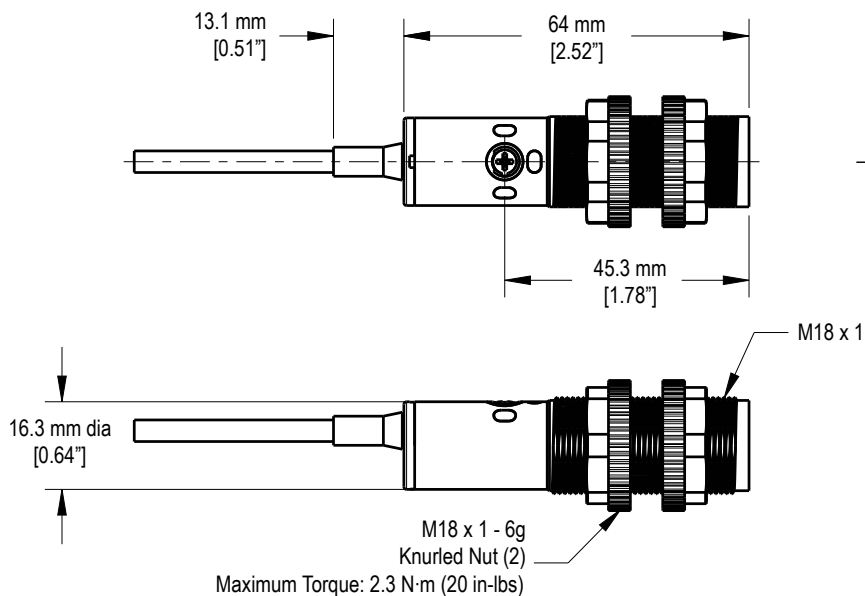


| Fixed Field Models - Excess Gain                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Target for Excess Gain Curves use a 90% Reflective White Card                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                       |
|  <p><b>S18-2FF30</b><br/> <b>Emitter Image Size:</b> 4.0 mm square at 15 mm and 3.5 mm square at 30 mm<br/> <b>18% Gray Test Card:</b> Cutoff distance will be 98% of value shown<br/> <b>6% Black Test Card:</b> Cutoff distance will be 95% of value shown</p>  |  <p><b>S18-2FF50</b><br/> <b>Emitter Image Size:</b> 4 mm square at 25 mm and 3 mm square at 50 mm<br/> <b>18% Gray Test Card:</b> Cutoff distance will be 98% of value shown<br/> <b>6% Black Test Card:</b> Cutoff distance will be 95% of value shown</p>        |
|  <p><b>S18-2FF75</b><br/> <b>Emitter Image Size:</b> 4.5 mm square at 37 mm and 4.0 mm square at 75 mm<br/> <b>18% Gray Test Card:</b> Cutoff distance will be 98% of value shown<br/> <b>6% Black Test Card:</b> Cutoff distance will be 95% of value shown</p> |  <p><b>S18-2FF100</b><br/> <b>Emitter Image Size:</b> 4.5 mm square at 50 mm and 4.5 mm square at 100 mm<br/> <b>18% Gray Test Card:</b> Cutoff distance will be 95% of value shown<br/> <b>6% Black Test Card:</b> Cutoff distance will be 90% of value shown</p> |

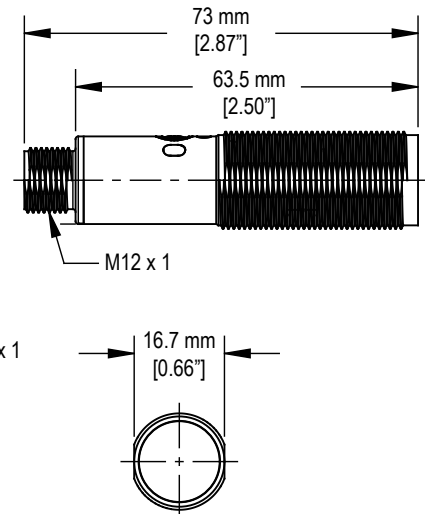


## Dimensions

### Cable Models



### QD Models

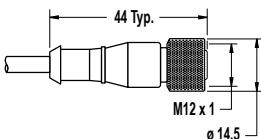
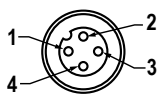
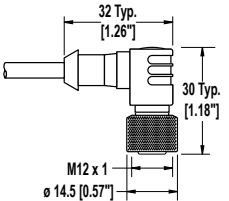


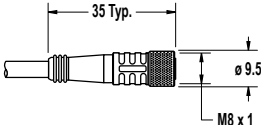
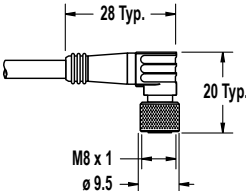
All measurements are listed in millimeters [inches], unless noted otherwise.

## 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    |                                                                                                                                                               | <br><br>1 = Brown<br>2 = White<br>3 = Blue<br>4 = Black |
| 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 |  |                                                                                                                                            |
| 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    |   | <br><br>1 = Brown<br>2 = White<br>3 = Blue<br>4 = Black |
| PKG4M-5                               | 5 m (16.4 ft) |             |                                                                                     |                                                                                                                                            |
| PKG4M-9                               | 9 m (29.5 ft) |             |                                                                                     |                                                                                                                                            |
| PKW4M-2                               | 2 m (6.56 ft) | Right Angle |  |                                                                                                                                            |
| PKW4M-5                               | 5 m (16.4 ft) |             |                                                                                     |                                                                                                                                            |
| PKW4M-9                               | 9 m (29.5 ft) |             |                                                                                     |                                                                                                                                            |

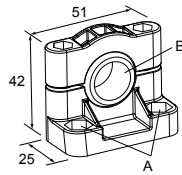
## Apertures

| 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 rectangular apertures of 0.5 mm (0.02 in), 1.0 mm (0.04 in), and 2.5 mm (0.10 in) wide. Each kit also includes a thread-on housing, Teflon® FEP® lens, and o-ring. |  |
| APG18S  | 1     | Kit with glass lens to protect plastic sensor lens from chemical environments and weld splatter damage.                                                                         |  |

## Brackets

### SMB18SF

- 18 mm swivel bracket with M18 × 1 internal thread
- Black thermoplastic polyester
- Stainless steel swivel locking hardware included

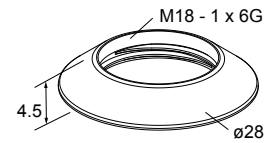


**Hole center spacing:** A = 36.0

**Hole size:** A =  $\varnothing$  5.3, B =  $\varnothing$  18.0

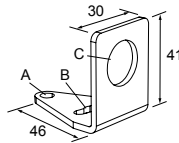
### SMBS18-2-1

- 30% glass-filled PBT



### 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

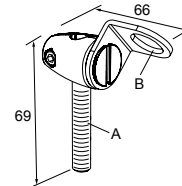


**Hole center spacing:** A to B = 24.2

**Hole size:** A =  $\varnothing$  4.6, B = 17.0 × 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

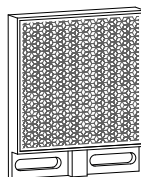
| Model      | Bolt Thread (A)                                             |
|------------|-------------------------------------------------------------|
| SMB18FA    | 3/8 - 16 × 2 in                                             |
| SMB18FAM10 | M10 - 1.5 × 50                                              |
| SMB18FAM12 | n/a; no bolt included. Mounts directly to 12 mm (½ in) rods |

For additional brackets, check the current Banner catalog or visit [www.bannerengineering.com](http://www.bannerengineering.com). All measurements are listed in millimeters, unless noted otherwise.

## Reflectors

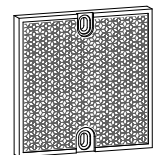
### BRT-2X2

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



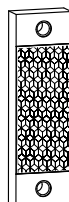
### BRT-84X84A

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



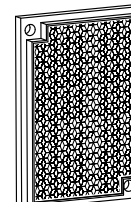
### BRT-40X19A

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



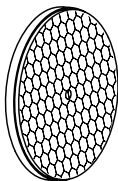
### BRT-60X40C

- 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 × 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
- Size: 84 mm diameter
- Mounting Hole: 4.5 mm diameter

**Retroreflective Tape**

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

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