M18-4 Stainless Steel 18 mm Barrel Sensors

Original Instructions
p/n: 188320 Rev. G
14-Apr-26
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ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

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Chapter 1 Features

Next generation of self-contained DC-operated sensors



- Complete family of sensors, all housed in the popular 18 mm threaded metal barrel
- Chemically robust stainless steel sensors for wash-down applications
- Powerful and bright visible red emitter beam for easy alignment and set-up
- Highly visible output and dual-function power and stability indicators
- Advanced ASIC technology is resistant to optical and electrical noise source
- Wide operating temperature range: –40 °C to +70 °C (–40 °F to +158 °F)
- Robust 250° adjustment potentiometer on select models

WARNING:

- **Do not use this device for personnel protection**
- Using this device for personnel protection could result in serious injury or death.
- This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A device failure or malfunction can cause either an energized (on) or de-energized (off) output condition.

Models

Emitter/receiver models

Model Number		Range	Output
M18-4NAEL-2M	Emitter	25 m (82 ft)	None
M18-4NAEJ-2M		25 m (82 ft) with beam inhibit	
M18-4NAES-2M		25 m (82 ft) with adjustment	
M18-4VNRL-2M	Receiver	25 m (82 ft)	Complementary NPN
M18-4VPRL-2M			Complementary PNP
M18-4VNRS-2M		25 m (82 ft) with adjustment	Complementary NPN
M18-4VPRS-2M			Complementary PNP

Polarized retroreflective models

Model Number	Range	Output
M18-4VNLP-Q8	6 m (19.7 ft) with BRT-84 reflector	Complementary NPN
M18-4VPLP-2M		Complementary PNP
M18-4VNLPC-2M	6 m (19.7 ft) with BRT-84 reflector, with adjustment	Complementary NPN
M18-4VPLPC-2M		Complementary PNP

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Retroreflective models

Model Number	Range	Output
M18-4VNLV-2M	7.5 m (24.6 ft) with BRT-84 reflector, with adjustment	Complementary NPN
M18-4VPLV-2M		Complementary PNP

Diffuse models

Model Number	Range	Output
M18-4VNDL-Q8	750 mm (29.5 in) with adjustment	Complementary NPN
M18-4VPDL-2M		Complementary PNP
M18-4VNDS-2M	300 mm (11.8 in) with adjustment	Complementary NPN
M18-4VPDS-2M		Complementary PNP

Fixed-field models

Model Number	Range	Output
M18-4VNFF30-2M	30 mm (1.2 in)	Complementary NPN
M18-4VPFF30-Q8		Complementary PNP
M18-4VNFF50-2M	50 mm (1.9 in)	Complementary NPN
M18-4VPFF50-Q8		Complementary PNP
M18-4VPFF75-2M	75 mm (2.9 in)	Complementary PNP
M18-4VNFF100-2M	100 mm (3.9 in)	Complementary NPN
M18-4VPFF100-Q8		Complementary PNP
M18-4VNFF150-2M	150 mm (5.9 in)	Complementary NPN
M18-4VPFF150-Q8		Complementary PNP
M18-4VNFF200-Q8	200 mm (7.8 in)	Complementary NPN
M18-4VPFF200-2M		Complementary PNP

Models ending in -2M are the 2 m (6.5 ft) unterminated cable models. Models ending in -Q8 have a 4-pin M12 quick disconnect integrated into the housing. If a model is listed ending in -Q8 in the model tables, the -2M option is no longer available for order.

- To order the 4-pin M12 integral quick disconnect model, add the suffix "Q8" to the model number. For example, M18-4VNDL-Q8.
- To order the 150 mm (6 in) PVC cable model with a 4-pin M12 quick disconnect, add the suffix "Q5" to the model number. For example, M18-4VPFF50-Q5. The -Q5 option now only applies to some of the fixed-field models. The other sensing mode models no longer have the -Q5 option available for order, but existing models are covered by the contents of this document.

All other models that fit into these model number patterns are no longer available for order, but are covered by the contents of this document.

Specifications

Supply Voltage

10 V to 30 V DC for ambient temperature ≤ 55 °C

10 V to 24 V DC for ambient temperature > 55 °C

Supply Protection Circuitry

Protected against reverse polarity and transient voltages

Output Protection Circuitry

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

Output Rating

≤ 50 mA total current for ambient temperatures > 55 °C

≤ 100 mA total current through both outputs ≤ 55 °C

OFF-State Leakage Current: < 50 µA at 30 V DC

ON-State Saturation Voltage: < 1.5 V at 10 mA; < 3.0 V at 100 mA

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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: 16 mA

Output Configuration

Complementary PNP or NPN by model number

Output Response Time

Response is independent of signal strength

Opposed mode: 1.5 milliseconds ON, 1.0 milliseconds OFF

Retro, Polarized Retro, and Diffuse: 1.5 milliseconds ON, 0.75 milliseconds OFF

Fixed-Field: 1.5 milliseconds ON, 1.0 milliseconds OFF

Delay on Power-up: 100 milliseconds; outputs do not conduct during this time

Indicators

Three LEDs (One green, two amber)

Green solid: indicates power applied and sensor ready

Green flashing: indicates marginal sensing signal

Amber solid: indicates Pin 4 (black wire) output conducting

Emitter LED

Visible red

Repeatability

Repeatability is independent of signal strength

Opposed mode: 170 microseconds

Retro, Polarized Retro, and Diffuse modes: 100 microseconds

Fixed-Field mode: 100 microseconds

Construction

Housing: 316L stainless steel

Front window: PMMA

Indicator windows: Clear polysulfone (PSU)

Indicator cover and gain pot driver: Black PSU

Cable: PVC jacket

Pigtail QD: 316L stainless steel and PVC jacket

QD connector and mounting nuts: 316L stainless steel

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 V to 30 V dc for beam inhibit

Operating Conditions

–40 °C to +70 °C (–40 °F to +158 °F)

95% at +50 °C maximum relative humidity (non-condensing)

Environmental Rating

IEC 60529 IP67, IP68, and IP69K

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)

Certifications

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1831 Diegem, BELGIUM

Turck Banner LTD Blenheim House
Blenheim Court
Wickford, Essex SS11 8YT
GREAT BRITAIN

Industrial Control Equipment 3TJJ

Class 2 power ; UL Environmental Rating: Type 1

Chemical Compatibility Certified.

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Required Overcurrent Protection

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

Overcurrent protection is required to be provided by end product application per the supplied table.

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

Supply wiring leads < 24 AWG shall not be spliced.

For additional product support, go to www.bannerengineering.com.

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

FCC Part 15 Class A for Unintentional Radiators

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

(Part 15.21) Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Industry Canada ICES-003(A)

This device complies with CAN ICES-3 (A)/NMB-3(A). Operation is subject to the following two conditions: 1) This device may not cause harmful interference; and 2) This device must accept any interference received, including interference that may cause undesired operation.

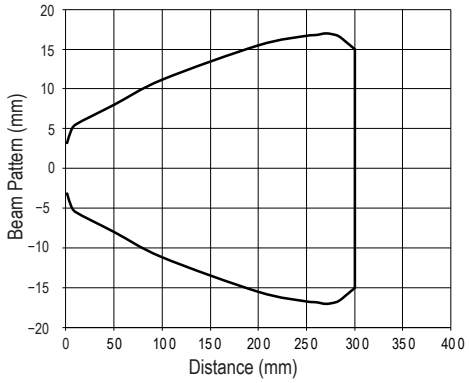
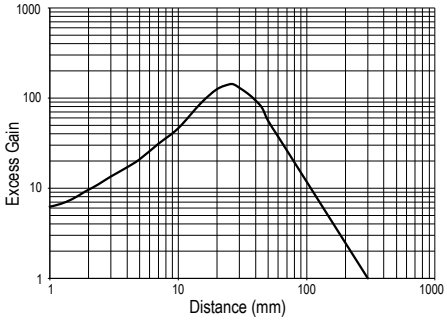
Cet appareil est conforme à la norme NMB-3(A). Le fonctionnement est soumis aux deux conditions suivantes : (1) ce dispositif ne peut pas occasionner d'interférences, et (2) il doit tolérer toute interférence, y compris celles susceptibles de provoquer un fonctionnement non souhaité du dispositif.

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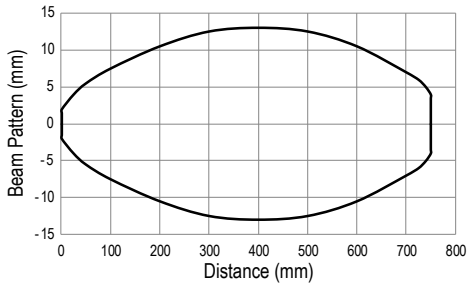
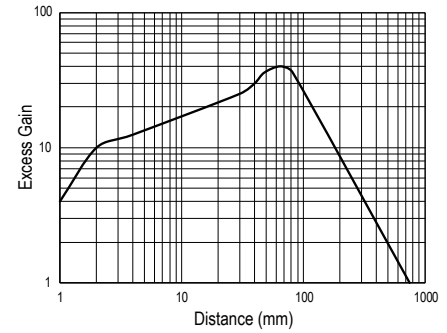
Performance Curves

Diffuse and **fixed-field** mode sensor performance is based on the use of a 90% reflectance white test card.

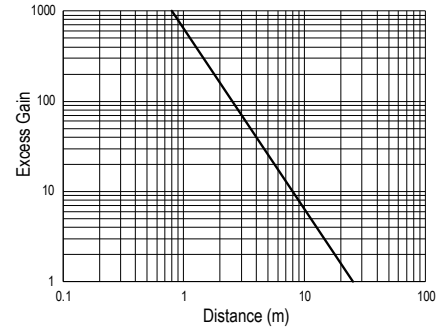
Diffuse models (300 mm range)

Beam Pattern	Excess Gain
	

Diffuse models (750 mm range)

Beam Pattern	Excess Gain
	

Emitter/receiver models (effective beam size: 15.2 mm)

Beam Pattern	Excess Gain
	

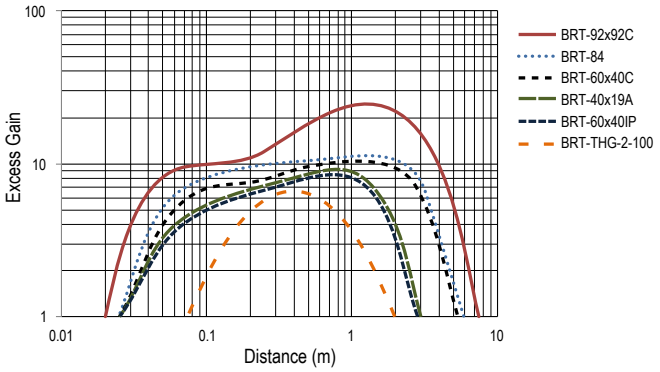
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Polarized retroreflective models

Beam Pattern



Excess Gain

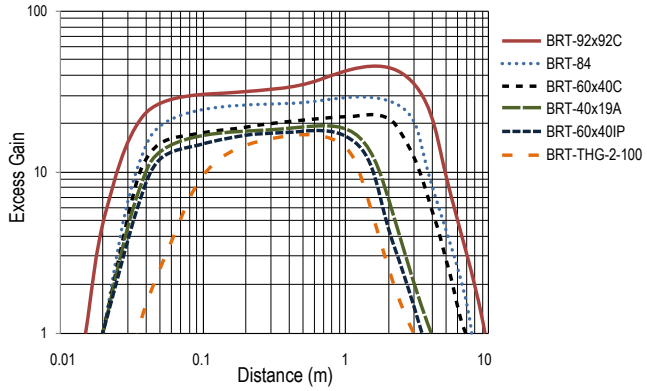


Retroreflective models

Beam Pattern

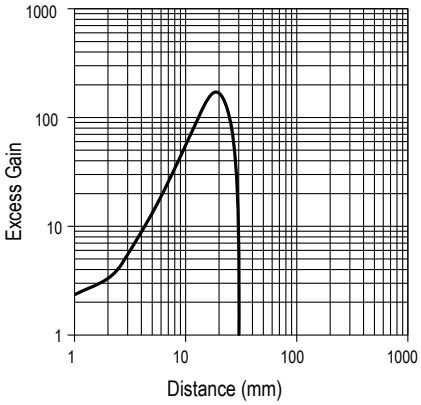


Excess Gain



Fixed-field models

Excess Gain

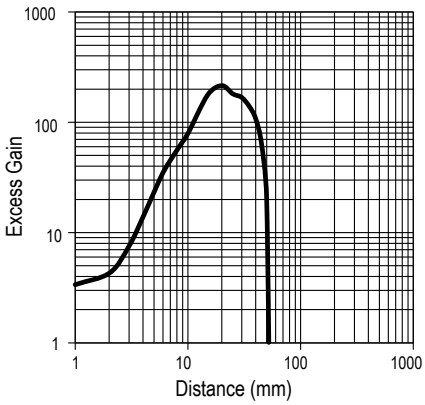


M18-4FF30

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

18% Gray Test Card: Cutoff distance will be 98% of value shown

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



M18-4FF50

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

18% Gray Test Card: Cutoff distance will be 98% of value shown

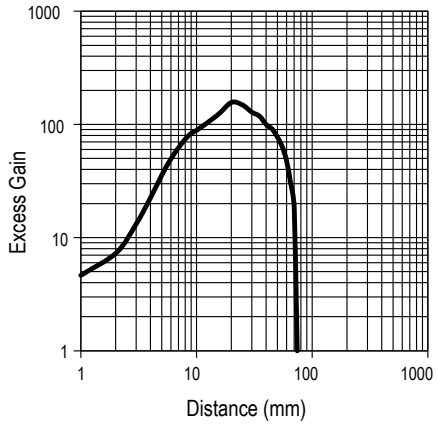
6% Black Test Card: Cutoff distance will be 95% of value shown

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Excess Gain

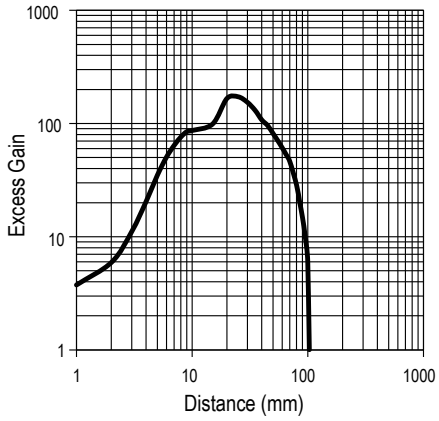


M18-4FF75

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

18% Gray Test Card: Cutoff distance will be 98% of value shown

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

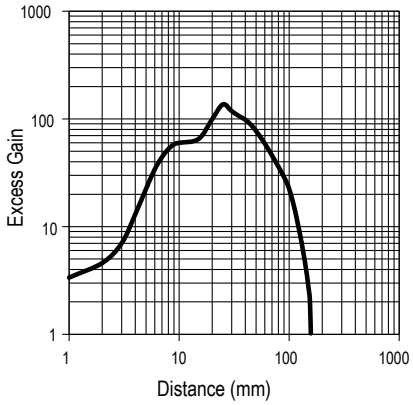


M18-4FF100

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

18% Gray Test Card: Cutoff distance will be 95% of value shown

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

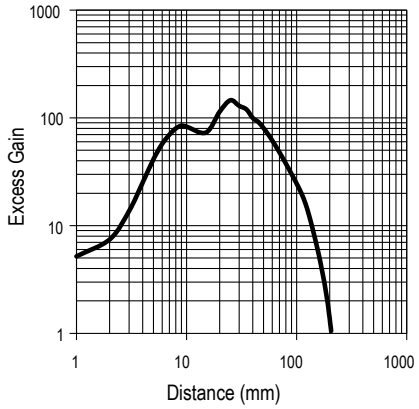


M18-4FF150

Emitter Image Size: 5 mm square at 75 mm and 8 mm square at 150 mm

18% Gray Test Card: Cutoff distance will be 90% of value shown

6% Black Test Card: Cutoff distance will be 70% of value shown



M18-4FF200

Emitter Image Size: 5 mm square at 100 mm and 8 mm square at 200 mm

18% Gray Test Card: Cutoff distance will be 85% of value shown

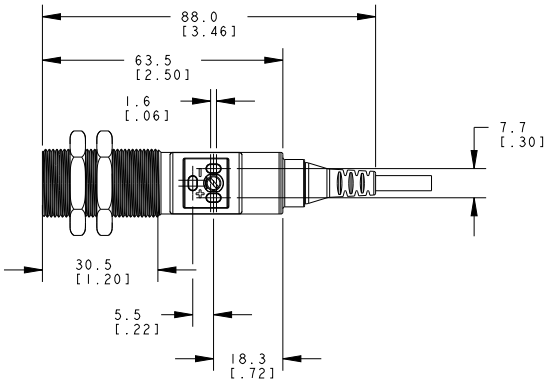
6% Black Test Card: Cutoff distance will be 60% of value shown

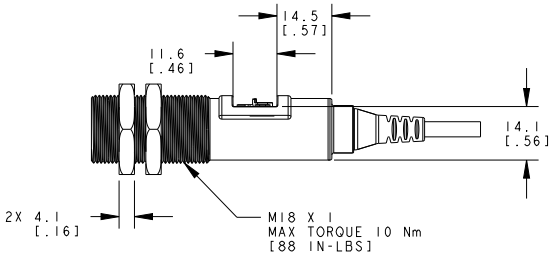
Dimensions

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

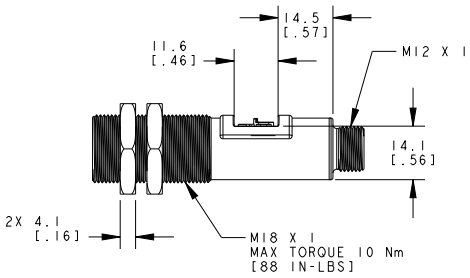
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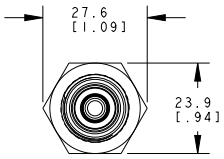
Cable Models





QD Models





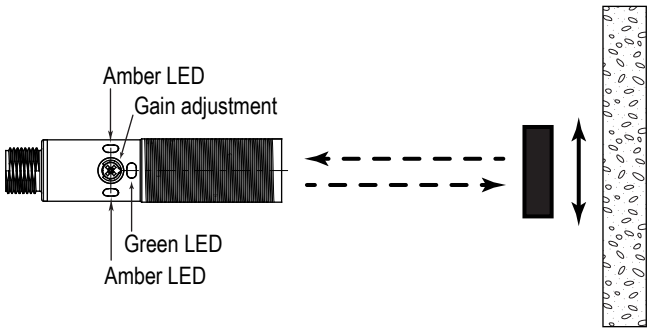
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Chapter 2 Install the M18-4 Barrel Sensor

M18-4 Features and Installation

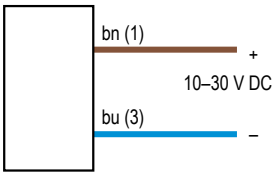


To install the M18-4 Barrel Sensor:

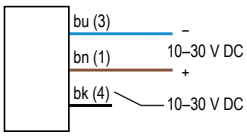
1. Align the sensor as required for the application. For the most sensitive object detection, align the sensor so that the objects move across the sensor's axis.
2. Secure the sensor to a bracket.
3. Wire sensor as shown in the wiring diagrams.
4. Adjust the gain adjuster (sensitivity pot) if necessary.

Wiring Diagrams

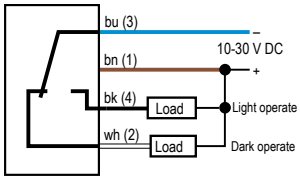
Emitter



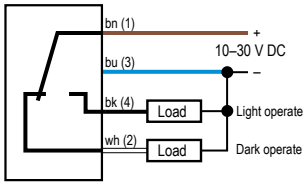
Emitter with Active High Beam Inhibit



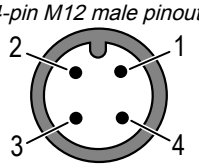
Complementary NPN



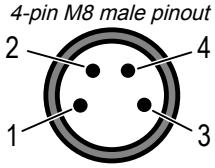
Complementary PNP



4-pin M12 male pinout



4-pin M8 male pinout



Key

1. Brown
2. White
3. Blue
4. Black

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

In light operate (LO) mode, the output is ON when the target returns the same or more light to the sensor and OFF when the sensor detects less light than the configured/taught target. In **opposed and retroreflective sensing modes**, light operate is active when the beam is unblocked. In **diffuse, fixed field, and adjustable field sensor modes**, light operate is active when the target is present.

In dark operate (DO) mode, the output is ON when the target returns less light to the sensor than the configured target and OFF when the sensor detects more light than the configured/taught target. In **opposed and retroreflective sensing modes**,

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dark operate is active when the beam is blocked. In **diffuse, fixed field, and adjustable field sensor modes**, dark operate is active when the target is absent.

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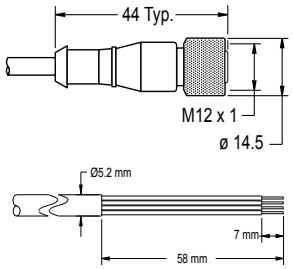
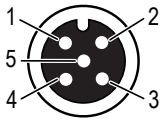
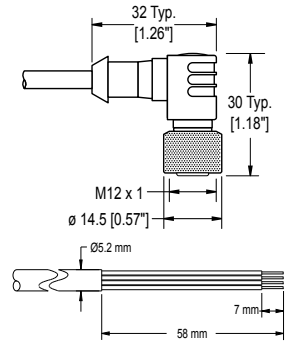
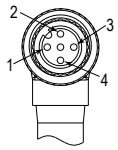
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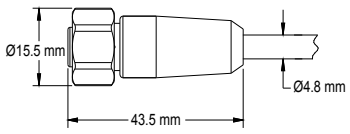
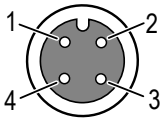
Chapter 3 Accessories

Cordsets

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

4-Pin Single-Ended M12 Female Cordsets					
Model	**Length**	**Style**	**Dimensions**	**Pinout (Female)**	
MQDC-406	2 m (6.56 ft)	Straight			1 = Brown 2 = White 3 = Blue 4 = Black 5 = Not used
MQDC-415	5 m (16.4 ft)				
MQDC-430	9 m (29.5 ft)				
MQDC-450	15 m (49.2 ft)				
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)				

Washdown Cordsets

4-Pin Single-Ended M12 Female Washdown, Stainless Steel Cordsets				
Model	**Length**	**Style**	**Dimensions**	**Pinout (Female)**
MQDC-WDSS-0406	2 m (6.56 ft)	Straight		 1 = Brown 2 = White 3 = Blue 4 = Black
MQDC-WDSS-0415	5 m (16.4 ft)			
MQDC-WDSS-0430	9 m (29.5 ft)			

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Apertures

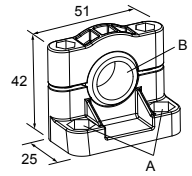
Model	Units	Aperture Description	Product
AP18SCN	3	Kit includes black acetal round apertures of 0.5 mm (0.02 in), 1.0 mm (0.04 in), and 2.5 mm (0.10 in) diameter.	
AP18SRN	3	Kit includes black acetal rectangular apertures of 0.5 mm (0.02 in), 1.0 mm (0.04 in), and 2.5 mm (0.10 in) wide. Each kit also 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

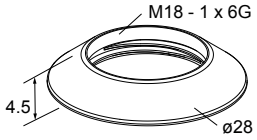
- 18 mm swivel bracket with M18 × 1 internal thread
- Black thermoplastic polyester
- Stainless steel swivel locking hardware included
- CAD Files: DXF, PDF, IGS, STP

Hole center spacing: A = 36.0
Hole size: A = ø 5.3, B = ø 18.0



SMBS18-2-1

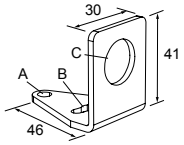
- 30% glass-filled PBT
- CAD Files: DXF, PDF, IGS, STP



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
- CAD Files: DXF, PDF, IGS, STP

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



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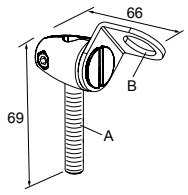
SMB18FA..

- 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=ø 18.1

Bolt Thread (A):

SMB18FA = 3/8 - 16 × 2 in
CAD Files: DXF, PDF, IGS, STP
SMB18FAM10 = M10 - 1.5 × 50
CAD Files: DXF, PDF, IGS, STP
SMB18FAM12 = n/a; no bolt included. Mounts directly to 12 mm (½ in) rods
CAD Files: DXF, PDF, IGS, STP



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

Reflectors

BRT-2X2

- Square, acrylic target
- Reflectivity factor: 1.0
- Maximum temperature: +50 °C (+122 ºF)
- Optional brackets are available
- Reflector size: 51 mm × 51 mm
- Approximate size: 51.3 mm × 61 mm
- Two 4.2 mm diameter slots for mounting
- CAD files: DXF, PDF, IGS, STP

BRT-2X2-25 Qty 25

BRT-2X2-100 Qty 100



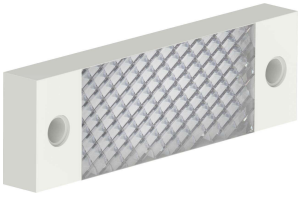
BRT-84X84A

- Square, acrylic target
- Reflectivity Factor: 2.0
- Temperature: –20 °C to +60 °C (–4 °F to +140 °F)
- Approximate size: 84 mm × 84 mm × 9 mm
- Two 4.2 mm diameter slots for mounting
- CAD Files: DXF, PDF, IGS, STP



BRT-40X19A

- Rectangular, acrylic target
- Reflectivity Factor: 1.3
- Temperature: –20 °C to +60 °C (–4 °F to +140 °F)
- Reflector size: 18 mm × 40 mm
- Approximate size: 18 mm × 60 mm × 7.3 mm
- Two 4 mm diameter mounting holes, 50 mm centers
- CAD Files: DXF, PDF, IGS, STP



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BRT-60X40C and **BRT-60X40CM** (Microprism)

- 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-60X40C** CAD Files: DXF, PDF, IGS, STP
- **BRT-60X40CM** CAD Files: DXF, PDF, IGS, STP



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
- CAD files: DXF, PDF, IGS, STP



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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Chapter 4 Product Support and Maintenance

Repairs

Contact Banner Engineering for troubleshooting of this device. **Do not attempt any repairs to this Banner device; it contains no field-replaceable parts or components.** If the device, device part, or device component is determined to be defective by a Banner Applications Engineer, they will advise you of Banner's RMA (Return Merchandise Authorization) procedure.

> **IMPORTANT:** If instructed to return the device, pack it with care. Damage that occurs in return shipping is not covered by warranty.

Contact Us

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

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