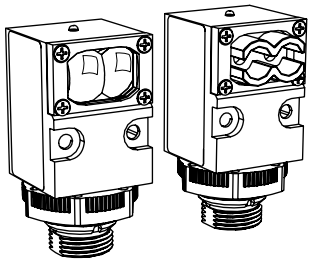
# SM912 Series VALU-BEAM® Sensor

## Features

AC- and DC-powered sensors with solid-state outputs

To view or download the latest technical information about this product, including specifications, dimensions, accessories, and wiring, go to www.bannerengineering.com.



- Choose models for 10 to 30 V DC or 24 to 250 V AC operation
- DC models have bipolar solid-state outputs: one NPN (sinking) and one PNP (sourcing)
- AC models have an SPST solid-state output rated for up to 3/4 amp with simple 2-wire connection
- All models have a rear panel sensitivity adjustment and light/dark operate switch
- DC models include Banner's Alignment Indicating Device (AID™) system
- Choose models with integral 2 m (6.5 ft) cable or Mini-style QD (quick-disconnect) connector; 9 m (30 ft) cables are also available

**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.

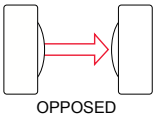
## Models

To order the 9 m (30 ft) PVC cable model, add the suffix "W/30" to the cabled model number. For example, **SMA91E W/30**.

A model with a QD connector requires a mating cable; see "Quick-Disconnect Cables" on page 10.

### SMx91x Opposed Mode Emitter (E) and Receiver (R) Models

Infrared, 880 nm



OPPOSED

| Models | Range | Connection | Supply Voltage | Output Type |
|---|---|---|---|---|
| SMA91E | 60 m (200 ft) | 2 m (6.5 ft) cable | 10 to 250 V AC/DC | - |
| SMA91EQD | | 3-pin Mini Male Quick Disconnect | | |
| SM91R | | 2 m (6.5 ft) cable | 10 to 30 V DC | Bipolar NPN/PNP |
| SM91RQD | | 4-pin Mini Male Quick Disconnect | | |
| SM2A91R | | 2 m (6.5 ft) cable | 24 to 250 V AC | SPST SCR Solid-state 2-wire |
| SM2A91RQD | | 3-pin Mini Male Quick Disconnect | | |
| SMA91ESR | 3 m (10 ft) | 2 m (6.5 ft) cable | 10 to 250 V AC/DC | - |
| SMA91ESRQD | | 3-pin Mini Male Quick Disconnect | | |
| SM91RSR | | 2 m (6.5 ft) cable | 10 to 30 V DC | Bipolar NPN/PNP |
| SM91RSRQD | | 4-pin Mini Male Quick Disconnect | | |
| SM2A91RSR | | 2 m (6.5 ft) cable | 24 to 250 V AC | SPST SCR Solid-state 2-wire |
| SM2A91RSRQD | | 3-pin Mini Male Quick Disconnect | | |

Original Instructions
05-Aug-26

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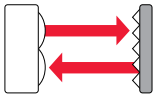
p/n: 03467 Rev. J

ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

# SMx912 Retroreflective Mode Models

Visible red, 650 nm

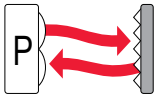
Retroreflective range is specified using one model BRT-3 retroreflector (3-inch diameter). Actual sensing range may be more or less than specified, depending upon the efficiency and reflective area of the retroreflector used.



RETRO

*Non-polarized retroreflective models*

| Models | Range | Connection | Supply Voltage | Output Type |
|---|---|---|---|---|
| SM912LV | 0.15 to 9 m (6 in to 30 ft) | 2 m (6.5 ft) cable | 10 to 30 V DC | Bipolar NPN/PNP |
| SM912LVQD | | 4-pin Mini Male Quick Disconnect | | |
| SM2A912LV | | 2 m (6.5 ft) cable | 24 to 250 V AC | SPST SCR Solid-state 2-Wire |
| SM2A912LVQD | | 3-pin Mini Male Quick Disconnect | | |



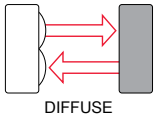

POLAR RETRO

*Polarized retroreflective models*

| Models [1] | Range | Connection | Supply Voltage | Output Type |
|---|---|---|---|---|
| SM912LVAG | 0.3 to 4.5 m (1 ft to 15 ft) | 2 m (6.5 ft) cable | 10 to 30 V DC | Bipolar NPN/PNP |
| SM912LVAGQD | | 4-pin Mini Male Quick Disconnect | | |
| SM2A912LVAG | | 2 m (6.5 ft) cable | 24 to 250 V AC | SPST SCR Solid-state 2-Wire |
| SM2A912LVAGQD | | 3-pin Mini Male Quick Disconnect | | |

# SMx912 Diffuse Mode Models

Infrared, 880 nm

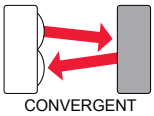


DIFFUSE

| Models | Range | Connection | Supply Voltage | Output Type |
|---|---|---|---|---|
| SM912D | 760 mm (30 in) | 2 m (6.5 ft) cable | 10 to 30 V DC | Bipolar NPN/PNP |
| SM912DQD | | 4-pin Mini Male Quick Disconnect | | |
| SM2A912D | | 2 m (6.5 ft) cable | 24 to 250 V AC | SPST SCR Solid-state 2-Wire |
| SM2A912DQD | | 3-pin Mini Male Quick Disconnect | | |
| SM912DSR | 380 mm (15 in) | 2 m (6.5 ft) cable | 10 to 30 V DC | Bipolar NPN/PNP |
| SM912DSRQD | | 4-pin Mini Male Quick Disconnect | | |
| SM2A912DSR | | 2 m (6.5 ft) cable | 24 to 250 V AC | SPST SCR Solid-state 2-Wire |
| SM2A912DSRQD | | 3-pin Mini Male Quick Disconnect | | |

# SMx912x Convergent Mode Models

Visible red or infrared



CONVERGENT

[1] Use polarized models when shiny objects will be sensed.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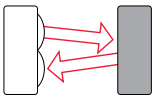
*Visible red models*

| Models (Visible Red, 650 nm) | Range | Cable* | Supply Voltage | Output Type |
|---|---|---|---|---|
| SM912CV | 38 mm (1.5 in)<br>Spot Size at Focus: 1.5 mm (0.06 in) | 2 m (6.5 ft) cable | 10 to 30 V DC | Bipolar NPN/PNP |
| SM912CVQD | | 4-pin Mini Male Quick Disconnect | | |
| SM2A912CV | | 2 m (6.5 ft) cable | 24 to 250 V AC | SPST SCR Solid-state 2-Wire |
| SM2A912CVQD | | 3-pin Mini Male Quick Disconnect | | |



CONVERGENT

*Infrared models*

| Models (Infrared, 880 nm) | Range | Cable* | Supply Voltage | Output Type |
|---|---|---|---|---|
| SM912C | 38 mm (1.5 in) | 2 m (6.5 ft) cable | 10 to 30 V DC | Bipolar NPN/PNP |
| SM912CQD | | 4-pin Mini Male Quick Disconnect | | |
| SM2A912C | | 2 m (6.5 ft) cable | 24 to 250 V AC | SPST SCR Solid-state 2-Wire |
| SM2A912CQD | | 3-pin Mini Male Quick Disconnect | | |

## SMx91x Glass Fiber Optic Individual Emitter or Receiver Models

Infrared, 880 nm . Use where the separation between emitting and receiving fibers is more than a few feet, or where it is inconvenient to run both fibers from a single sensor. Watertight o-ring-sealed sensor/fiber interface.

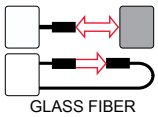


GLASS FIBER
TWO SENSORS

| Models | Range | Connection | Supply Voltage | Output Type |
|---|---|---|---|---|
| SMA91EF | Range varies with the fiber used | 2 m (6.5 ft) cable | 10 to 250 V AC/DC | – |
| SMA91EFQD | | 3-pin Mini Male Quick Disconnect | | |
| SM91RF | | 2 m (6.5 ft) cable | 10 to 30 V DC | Bipolar NPN/PNP |
| SM91RFQD | | 4-pin Mini Male Quick Disconnect | | |
| SM2A91RF | | 2 m (6.5 ft) cable | 24 to 250 V AC | SPST SCR Solid-state 2-Wire |
| SM2A91RFQD | | 3-pin Mini Male Quick Disconnect | | |

## SMx912x Glass Fiber Optic Models

Infrared, 880 nm . Watertight o-ring-sealed sensor/fiber interface.



GLASS FIBER

| Models | Range | Connection | Supply Voltage | Output Type |
|---|---|---|---|---|
| SM912F | Range varies with sensing mode and fiber optics used | 2 m (6.5 ft) cable | 10 to 30 V DC | Bipolar NPN/PNP |
| SM912FQD | | 4-pin Mini Male Quick Disconnect | | |
| SM2A912F | | 2 m (6.5 ft) cable | 24 to 250 V AC | SPST SCR Solid-state 2-Wire |
| SM2A912FQD | | 3-pin Mini Male Quick Disconnect | | |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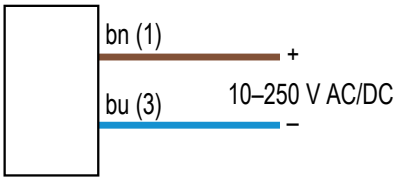
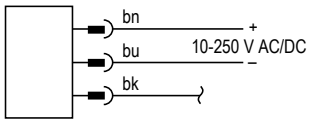
# Wiring Diagrams

## DC Wiring Diagrams

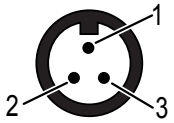
*Emitters - cabled*




*Emitters - QD (3-pin Mini)*




*3-pin Mini male pinout*

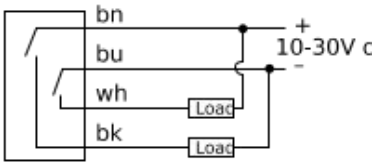



1 = Black

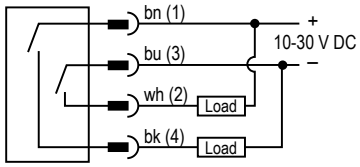
2 = Brown

3 = Blue

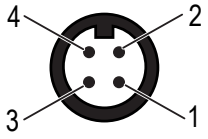
*Other DC models - cabled*




*Other DC models - QD (4-pin Mini)*




*4-pin Mini male pinout*




1 = Brown

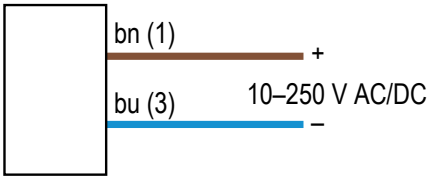
2 = White

3 = Blue

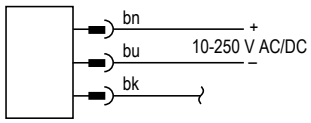
4 = Black

## AC Wiring Diagrams

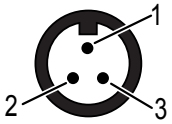
*Emitters - cabled*



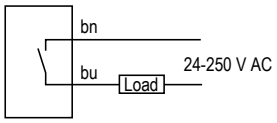

*Emitters - QD (3-pin Mini male)*



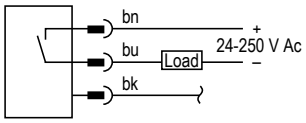

*3-pin Mini male pinout*




*Other AC models - cabled*




*Other AC models - QD (3-pin Mini male)*




1 = Black

2 = Brown

3 = Blue

# Specifications

## 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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# DC Models Specifications

**Supply Voltage and Current**

10 to 30 V DC at 20 mA maximum, exclusive of load;

except for SMA91E, ESR, and EF emitters, which operate from 10 to 250 V AC or DC, 10 mA maximum

**Supply Protection Circuitry**

Protected against reverse polarity and transient voltages

**Output Configuration**

Bipolar: One current sourcing (PNP) and one current sinking (NPN) open-collector transistor

**Construction**

Reinforced thermoplastic polyester housing, totally encapsulated, molded acrylic lenses, and stainless steel hardware

**Output Response Time**

**Receivers only:** 8 milliseconds ON and 4 milliseconds OFF, independent of signal strength.

**All other models:** 4 milliseconds ON/OFF

> **NOTE:** 100 millisecond delay on power-up; outputs do not conduct during this delay.

**Repeatability**

**Opposed and Glass Fiber Optic Emitter-Receiver pairs:** 1.0 millisecond

**Retro, Diffuse, Convergent, and Glass Fiber Optic Models:** 1.3 milliseconds

**Adjustments**

Light/Dark Operate select switch and Sensitivity control potentiometer, both located at the rear of the sensor

**Output Rating**

250 mA continuous, each output

**Off-state leakage current:** less than 10 microamps

**Output saturation voltage:** (PNP output) less than 1 volt at 10 mA and less than 2 volts at 250 mA

**Output saturation voltage:** (NPN output) less than 200 millivolts at 10 mA and less than 1 volt at 250 mA

**Indicators**

Alignment Indicating Device (AID™) lights a top-mounted red LED indicator whenever the sensor sees a “light” condition; its pulse rate is proportional to the light signal strength (the stronger the signal, the faster the pulse rate).

**Model SMA91E and SM91ESR emitters:** visible-red “tracer beam” indicates “Power ON” and enables line-of-sight alignment.

**Environmental Rating**

IP66

**Connections**

PVC-jacketed 2 m (6.5 ft) or 9 m (30 ft) cables or 4-pin 7/8 in-16UNF quick-disconnect (QD) fitting available.

> **NOTE:** Opposed-mode emitters use 3-pin 7/8 in-16UNF QD fitting. See "Quick-Disconnect Cables" on page 10.

**Operating Conditions**

**Temperature:** –20 °C to +70 °C (–4 °F to +158 °F)

90% at +50 °C maximum relative humidity (non-condensing)

**Certifications**

Banner Engineering BV
Park Lane, Culliganlaan 2F bus 3
1831 Diegem, BELGIUM

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

**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 |

# AC Models Specifications

**Supply Voltage and Current**

24 to 250 V AC (50/60 Hz);

except for SMA91E, ESR, and EF emitters, which operate from 10 to 250 V AC or DC

**Supply Protection Circuitry**

Protected against transient voltages

**Output Configuration**

SPST SCR solid-state relay with either normally closed or normally open contact (light/dark operate selectable); 2-wire hookup

**Construction**

Reinforced thermoplastic polyester housing, totally encapsulated, molded acrylic lenses, and stainless steel hardware

**Output Rating**

Minimum load current 10 mA, max. steady-state load capability 750 mA to 50 °C ambient (122 °F), 500 mA to 70 °C ambient (158 °F)

**Inrush capability:** 4 amps for 1 second (non-repetitive)

**Off-state leakage:** current less than 1.7 mA rms

**On-state voltage drop:** ≤ 5 volts rms at 750 mA load, ≤ 10 volts rms at 15 mA load


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### Output Response Time

**Receivers only:** 8 milliseconds ON and 4 milliseconds OFF, independent of signal strength.

**All other models:** 4 milliseconds ON/OFF

OFF time does not include load response of up to 1/2 AC cycle (8.3 milliseconds).

Response time specification of the load should be considered when total response time is important.

> **NOTE:** 300 millisecond delay on power-up; outputs do not conduct during this delay.

### Repeatability

**Opposed and Glass Fiber Optic Emitter-Receiver pairs:** 1.0 millisecond

**Retro, Diffuse, Convergent, and Glass Fiber Optic Models:** 2.6 milliseconds

### Adjustments

Light/Dark Operate select switch and Sensitivity control potentiometer, both located at the rear of the sensor

### Indicators

Top-mounted red LED indicator lights when the output is conducting.

**Model SMA91E and SM91ESR emitters:** visible-red “tracer beam” indicates “Power ON” and enables line-of-sight alignment.

### Output Protection Circuitry

Protected against false pulse on power-up

### Application Notes

1. 912 Series AC sensors can be destroyed by overload conditions.
2. Use on low-voltage requires careful analysis of the load to determine if the leakage current or on-state voltage of the sensor will interfere with the proper operation of the load.
3. The false-pulse protection feature may cause a momentary drop-out of the load when the sensor is wired in series or parallel with mechanical switch contacts.

### Environmental Rating

IP66

### Connections

PVC-jacketed 2 m (6.5 ft) or 9 m (30 ft) cables or 3-pin 7/8 in-16UNF (QD) fitting available. See "Quick-Disconnect Cables" on page 10.

### Operating Conditions

**Temperature:** –20 °C to +70 °C (–4 °F to +158 °F)

90% at +50 °C maximum relative humidity (non-condensing)

### Certifications

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Blenheim Court
Wickford, Essex SS11 8YT
GREAT BRITAIN

### 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 |


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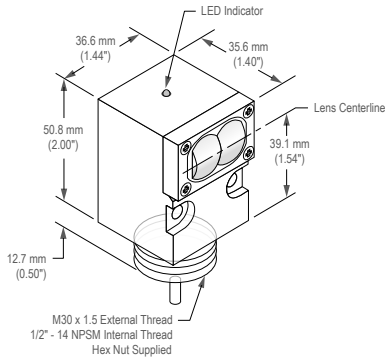
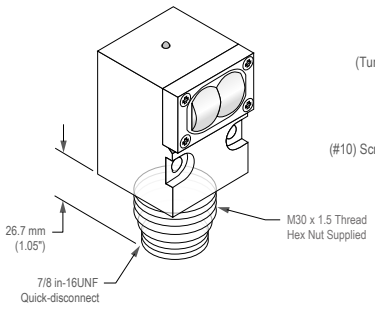
# Dimensions

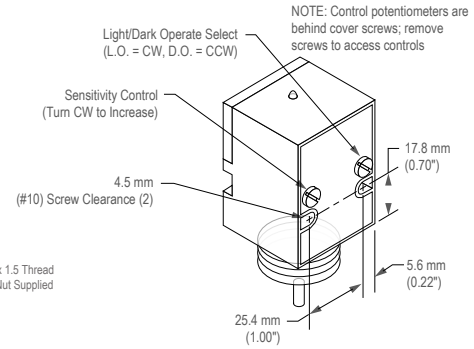
Cabled Models



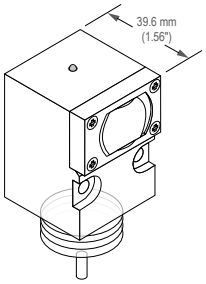

QD Models



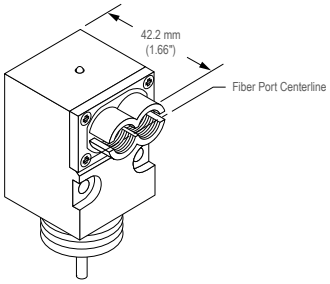

Rear View



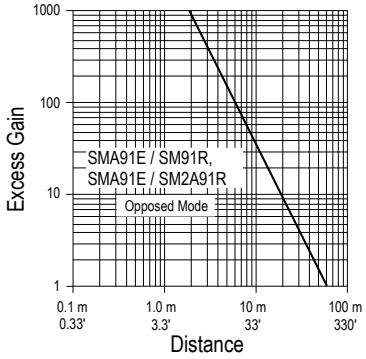
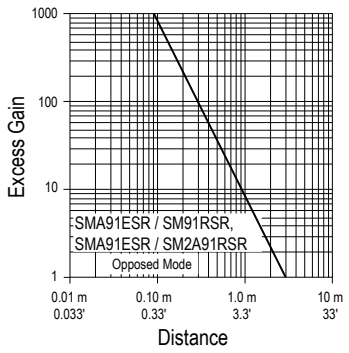
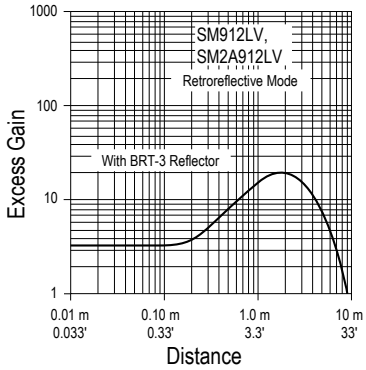
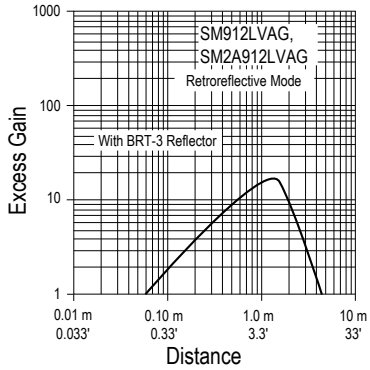

Convergent Sensing Mode
(model suffix LVAG, C and CV)




Glass Fiber Optic
(model suffix F, EF and RF)




# Excess Gain

| | | |
|---|---|---|
| **Opposed Mode Emitter and Receiver Models** |   |   |
| **Retroreflective Mode Models** |   |   |

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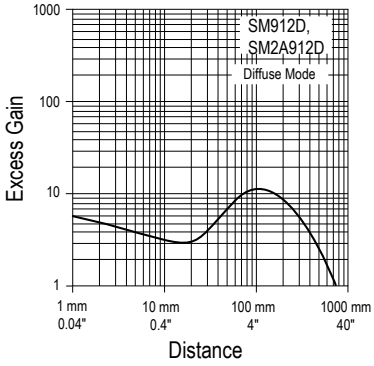
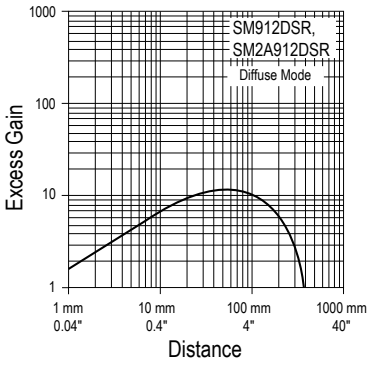
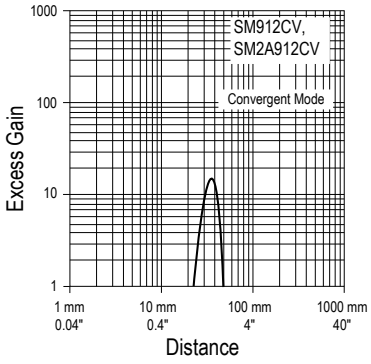
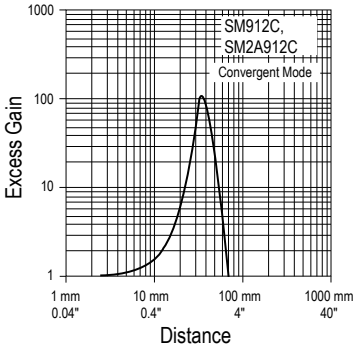
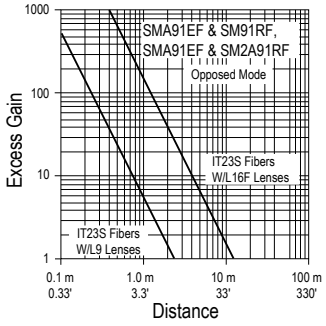
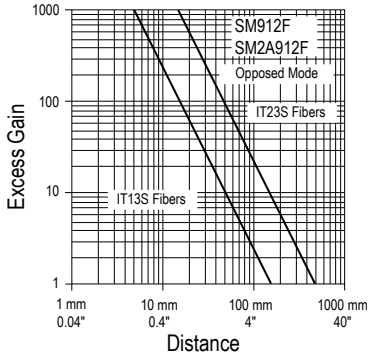
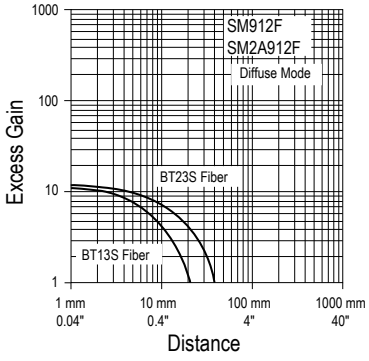
Continued from page 7

| | | |
|---|---|---|
| **Diffuse Mode Models** |  |  |
| **Convergent Mode Models** | **Visible Red 650 nm**<br> | **Infrared 880 nm**<br> |
| **Glass Fiber Optic Individual Emitter or Receiver Models** |  | |
| **Glass Fiber Optic Models** |  |  |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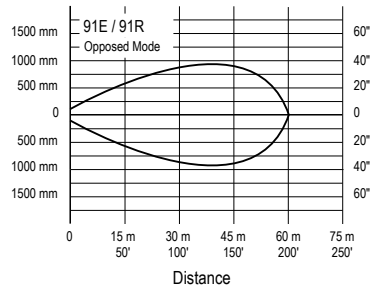
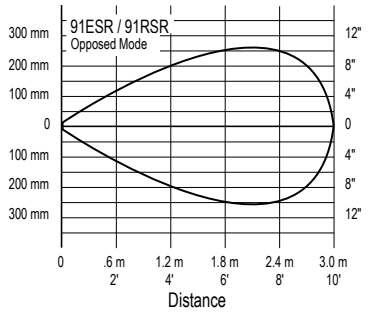
# Beam Patterns

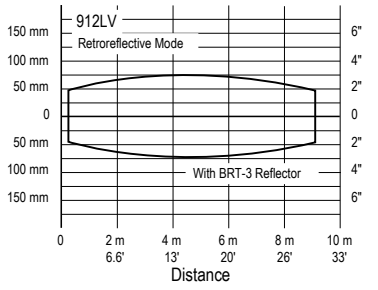
**Opposed Mode Emitter and Receiver Models**



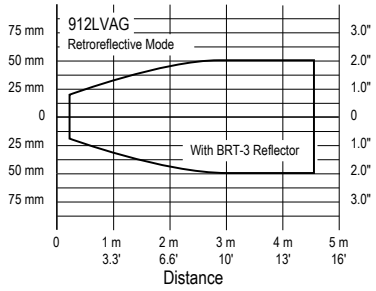




**Retroreflective Mode Models**

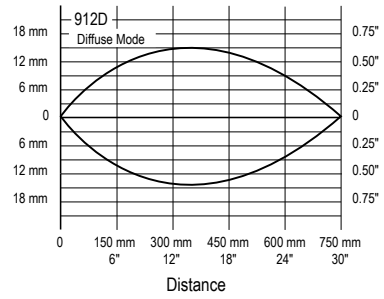
**Non-Polarized**

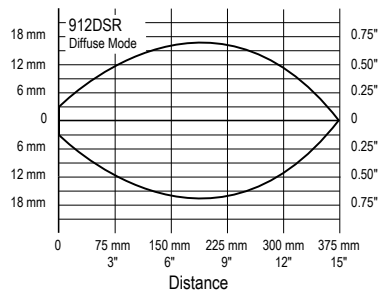



**Polarized**



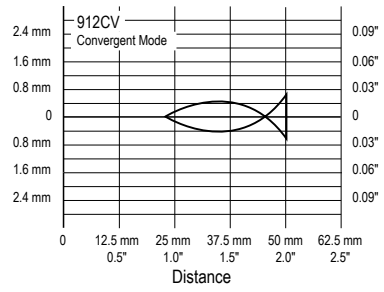

**Diffuse Mode Models**



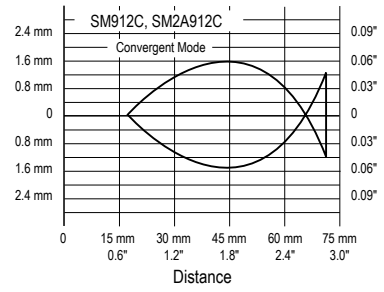




**Convergent Mode Models**

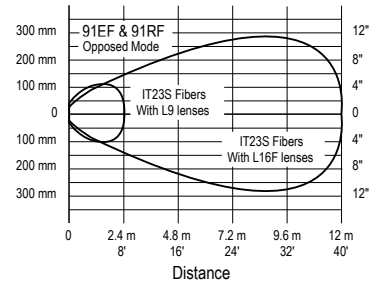
**Visible Red 650 nm**




**Infrared 880 nm**




**Glass Fiber Optic Individual Emitter or Receiver Models**

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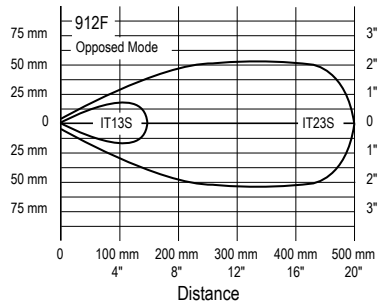
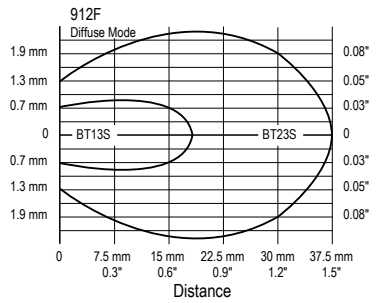
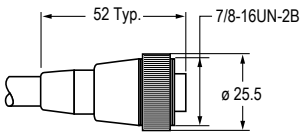
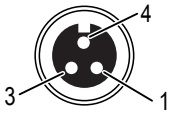
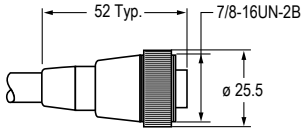
| | | |
|---|---|---|
| **Glass Fiber Optic Models** |  |  |

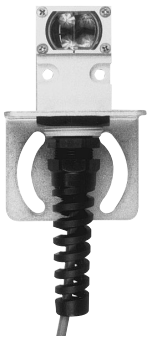
# Accessories

## Quick-Disconnect Cables

| 3-Pin Single-Ended Mini Female Cordsets | | | | |
|---|---|---|---|---|
| **Model** | **Length** | **Style** | **Dimensions** | **Pinout (Female)** |
| **MBCC-306** | 1.83 m (6 ft) | Straight |  | <br>1 = Brown<br>3 = Blue<br>4 = Black |
| **MBCC-312** | 3.66 m (12 ft) | | | |
| **MBCC-330** | 9.14 m (30 ft) | | | |

| 4-Pin Single-Ended Mini Female Cordsets | | | | |
|---|---|---|---|---|
| **Model** | **Length** | **Style** | **Dimensions** | **Pinout (Female)** |
| **MBCC-406** | 1.83 m (6 ft) | Straight |  | <br>1 = Brown<br>2 = White<br>3 = Blue<br>4 = Black |
| **MBCC-412** | 3.66 m (12 ft) | | | |
| **MBCC-430** | 9.14 m (30 ft) | | | |

## Cabling Accessories

| Model | Description | |
|---|---|---|
| **AC-6** | 2 m (6.5 ft) armored cable jacket | I.D. 5/16-in; O.D. 7/16-in |
| **PVC-6** | 2 m (6.5 ft) flexible PVC tubing (not for QD models) | I.D. 1/4-in; O.D. 3/8-in |
| **RF1-2NPS** | Compression fitting for attaching armored cable or PVC tubing | – |
| **HF1-2NPS** | • Flexible black nylon cable protector<br>• Includes a neoprene gland that compresses around the VALU-BEAM cable to provide an additional seal against moisture<br>• Resistant to gasoline, alcohol, oil, grease, solvents and weak acids<br>• Working temperature range of –30 °C to +100 °C (–22 °F to +212 °F) |  |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## Extension Cables (without connectors)

The following cables are available for extending the length of the existing sensor cable. These are 30 m (100 ft) lengths of VALU-BEAM cable. This cable may be spliced to an existing cable. Connectors, if used, must be customer-supplied.

| Model | Type | Used With: |
|---|---|---|
| **EC312-100** | 4-conductor | SM912 Series DC sensors |
| **EC312A-100** | 2-conductor | For all emitters and SM2A912 Series AC sensors |

## Retroreflective Targets

Banner offers a wide selection of high-quality retroreflective targets. See www.bannerengineering.com for complete information.

**NOTE:** Polarized sensors require corner cube-type retroreflective targets. Non-polarized sensors may use any retroreflective target.



## Replacement Lens Assemblies

VALU-BEAM lens assemblies are field-replaceable. In addition, some lenses may be used to convert from one sensing mode to another, or to change the sensing range of a particular sensor. The possible conversions are listed in the table below.

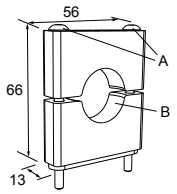
| Models | Description | Possible Sensing Mode or Range Changes |
|---|---|---|
| **UC-900AG** | Replacement lens for LVAG | Change LV to LVAG |
| **UC-900C** | Replacement lens for C and CV | Change LV to CV |
| **UC-900DSR** | Replacement lens for DSR, ESR, and RSR | Change D or F to DSR, EF to ESR, and RF to RSR |
| **UC-900F** | Replacement lens for F | Change D to F and DSR to F |
| **UC-900FP** | Replacement lens for FP | – |
| **UC-900L** | Replacement lens for E, R, LV, and D | Change LVAG to LV, CV to LV, DSR to D, and F to D |
| **UC-900J** | Attach to E, R, ESR, RSR, LV, and D models | Flat polycarbonate dust cover |

## Mounting Brackets

**SMB30C**

- 30 mm split clamp, black PBT bracket
- Stainless steel mounting hardware included
- Mounting hole for 30 mm sensor
- CAD Files: DXF, PDF, IGS, STP

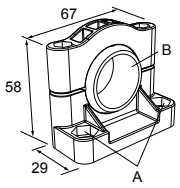
**Hole center spacing:** A=ø 45
**Hole size:** B=ø 27.2




**SMB30SC**

- Swivel bracket with 30 mm mounting hole for sensor
- Black reinforced thermoplastic polyester
- Stainless steel mounting and swivel locking hardware included
- CAD Files: DXF, PDF, IGS, STP

**Hole center spacing:** A=ø 50.8
**Hole size:** A=ø 7.0, B=ø 30.0





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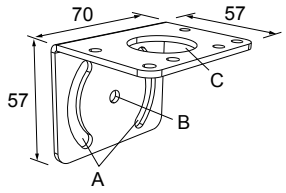
**SMB30MM**

- 12-gauge stainless steel bracket with curved mounting slots for versatile orientation
- Clearance for M6 (¼ in) hardware
- Mounting hole for 30 mm sensor
- CAD Files: DXF, PDF, IGS, STP

**Hole center spacing:** A=51, A to B=25.4
**Hole size:** A=42.6 × 7, B=ø 6.4, C=ø 30.1

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