



## Features

- Intrinsically safe sensors with MINI-BEAM performance and small size
- For use with approved switching amplifiers with intrinsically safe input circuits
- Output 1 mA or less in the dark and 2 mA or more in the light
- Models with integral cable or quick-disconnect

## Models

Sensing Mode	Model*	Sensing Beam and Range	Output Type	Excess Gain	Beam Pattern
				Diffuse mode performance based on 90% reflectance white test card	
Opposed	MI9E Emitter	Infrared, 880 nm Range: 6 m (20')	Constant Current ≤ 1.2 mA dark ≥ 2.1 mA light		
	MIAD9R Receiver				
Polarized Retroreflective	MIAD9LVAG	Visible Red, 650 nm Range: 50 mm to 2 m (2" to 7')			

\*Only standard 2 m (6.5') cable models are listed.

For 4-pin Euro-style Integral QD models: add suffix "Q" to the model number (e.g., MIAD9RQ); accessory mating cable required, see page 7.

*Additional models on following pages.*



### WARNING . . . Not To Be Used for Personnel Protection

**Never use these products as sensing devices for personnel protection. Doing so could lead to serious injury or death.** These sensors do NOT include the self-checking redundant circuitry necessary to allow their use in personnel safety applications. A sensor failure or malfunction can cause either an energized or de-energized sensor output condition. Consult your current Banner Safety Products catalog for safety products which meet OSHA, ANSI and IEC standards for personnel protection.

# MINI-BEAM® MIAD9 Series — NAMUR

## Models, continued

Sensing Mode	Model*	Sensing Beam and Range	Output Type	Excess Gain	Beam Pattern
				Diffuse mode performance based on 90% reflectance white test card	
Retroreflective	MIAD9LV	Visible Red, 650 nm Range: 50 mm to 2 m (2" to 7')	Constant Current ≤ 1.2 mA dark ≥ 2.1 mA light		
Diffuse	MIAD9D	Infrared, 880 nm Range: 380 mm (15")			
Divergent Diffuse	MIAD9W	Infrared, 880 nm Range: 75 mm (3")			
Convergent	MIAD9CV	Visible Red, 650 nm Range: 16 mm (0.6")			
	MIAD9CV2	Visible Red, 650 nm Range: 43 mm (1.7")			

\*Only standard 2 m (6.5') cable models are listed.

For 4-pin Euro-style Integral QD models: add suffix "Q" to the model number (e.g., MIAD9RQ); accessory mating cable required, see page 7.

# MINI-BEAM® MIAD9 Series — NAMUR

## Models, continued

Sensing Mode	Model*	Sensing Beam and Range	Output Type	Excess Gain	Beam Pattern
				Diffuse mode performance based on 90% reflectance white test card	
Fiber Optic (Glass)	MIAD9F	Infrared, 880 nm Range varies by sensing mode and fiber optics used	Constant Current ≤ 1.2 mA dark ≥ 2.1 mA light		

\* Only standard 2 m (6.5') cable models are listed.

For 4-pin Euro-style Integral QD models: add suffix "Q" to the model number (e.g., MIAD9RQ); accessory mating cable required, see page 7.

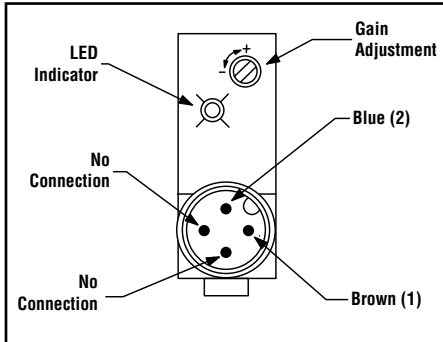


Figure 1. Features (rear of sensor, quick-disconnect model shown)

## Overview

MIAD9 Series NAMUR Sensors are small, rugged, self-contained two-wire sensors designed for use with approved switching amplifiers with intrinsically safe input circuits. MIAD9 Series sensors are designed in accordance with DIN 19 234.

These sensors vary the impedance across the sensor output, which passes 1 mA or less in the "dark" condition and 2 mA or more in the "light" condition. A red LED on the rear of the sensor lights whenever the sensor sees the "light" condition. A rugged, clutched, 15-turn slotted brass screw Gain control potentiometer enables precise adjustment of system sensitivity.

Models are available with either a 2 m (6.5') or 10 m (30') long attached PVC-covered cable, or a 4-pin Euro-style quick disconnect (QD) connector. Quick disconnect models (with "Q" in the model number suffix) use MQD9-4.. mating cable (either straight or right-angle connector; see page 7). Contact the factory for availability of sensor models with 10 m (30') long attached cable.

NOTE: If sensors with output characteristics according to DIN 19 234 are used in hazardous areas, they must be used with approved switching amplifiers with intrinsically safe input circuits.

### Special Conditions for Safe Use

Parts of the enclosure are non-conducting and may generate an ignition-capable level of ESD. Cleaning of the equipment shall be done only with a damp cloth.

### Hazardous Area Application

Associated apparatus may include amplifiers and barriers to monitor apparatus supply current, which is the apparatus output signal. Associated apparatus must limit both supply voltage and supply current in the event of failures.

# MINI-BEAM® MIAD9 Series — NAMUR

## Installation Notes

### Hazardous Area Application

**Entity Parameters:** Associated Apparatus may include amplifiers and barriers to monitor apparatus supply current, which is the apparatus output signal. Associated apparatus must limit both supply voltage and supply current in the event of failures.

#### Associated Apparatus

$V_{oc} \leq 15V$  dc

$I_{sc} \leq 60$  mA

$C_a \geq C(\text{cable})^* + C_i$

$L_a \geq L(\text{cable})^* + L_i$

Cable Parameters (if unknown)

\*  $C(\text{cable}) = 60$  pF/ft.

$L(\text{cable}) = 0.2$   $\mu$ H/ft.

#### Sensor Apparatus

$V_{max} = 15V$  dc

$I_{max} = 60$  mA

$C_i = 0.3$   $\mu$ F

$L_i = 0$

$P_i = 225$  mW

### FM Installation:

1. Associated Apparatus (barrier) entity parameters must meet the following requirements:

$V_{oc} \leq V_{max}$

$I_{sc} \leq I_{max}$

$C_a \geq C_i + C_{cable}$

$L_a \geq L_i + L_{cable}$

2. The Associated Apparatus shall not be connected to any device that uses or generates in excess of 250 Volts rms or dc.

3. Intrinsic safety ground, if required for the Associated Apparatus, shall be less than 1 ohm.

4. Installation shall be in accordance with the National Electrical Code (ANSI/NFPA70), local codes, Associated Apparatus manufacturer's installation requirements and ANSI/ISA RP12.6 for hazardous (classified) location installation.

5. Associated Apparatus is not required for installation of the devices within a Division 2 hazardous (classified) location. The maximum voltage for Division 2 installation is 15V dc.

6. Maximum connector torque: 6 ft-lbs

### CSA Installation:

1. Associated Apparatus (barrier) entity parameters must meet the following requirements:

$V_{oc} \leq V_{max}$

$I_{sc} \leq I_{max}$

$C_a \geq C_i + C_{cable}$

$L_a \geq L_i + L_{cable}$

2. The Associated Apparatus shall not be connected to any device that uses or generates in excess of 250 Volts rms or dc.

3. Intrinsic safety ground, if required for the Associated Apparatus, shall be less than 1 ohm.

4. Installation shall be in accordance with the Canadian Electrical Code, Part 1.

5. Associated Apparatus (barrier) shall be installed in accordance with the manufacturer's instructions.

6. Associated Apparatus is not required for installation of the devices within a Division 2 hazardous (classified) location when installed in, or through the wall of a suitable enclosure with provision for connection of rigid metal conduit per the Canadian Electrical Code, as acceptable to the local inspection authority having jurisdiction. The maximum rating for Division 2 installation is 15V dc, 60 mA.

7. In Division 2 installations, observe the WARNING at right.








**WARNING . . .**  
**Explosion Hazard**

**Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.**

# MINI-BEAM® MIAD9 Series — NAMUR

## Specifications

<b>Supply Voltage and Current</b>	5 to 15V dc (provided by the amplifier to which the sensor is connected)
<b>Output</b>	Constant current output: $\leq 1.2$ mA in the "dark" condition and $\leq 2.1$ mA in the "light" condition
<b>Output Response Time</b>	<b>Opposed mode:</b> 2 ms ON/400 $\mu$ s OFF <b>All other modes:</b> 5 ms ON/OFF (does not include amplifier response)
<b>Adjustments</b>	15-turn slotted brass screw GAIN (sensitivity) adjustment potentiometer (clutched at both ends of travel); located on rear panel and protected by a clear gasketed acrylic cover
<b>Indicators</b>	Red LED Alignment Indicator Device (AID) located on rear panel lights when the sensor sees a "light" condition; pulse rate is proportional to signal strength (the stronger the signal, the faster the pulse rate).
<b>Construction</b>	Reinforced thermoplastic polyester housing, totally encapsulated, o-ring sealing, acrylic lenses, and stainless steel screws
<b>Environmental Rating</b>	Meets NEMA standards 1, 2, 3, 3S, 4, 4X, 6, 12 and 13; IEC IP67
<b>Connections</b>	PVC-jacketed 2-conductor 2 m or 9 m cables, or special 4-pin Euro-style quick-disconnect (QD) fitting are available; QD cables are ordered separately. See page 381.
<b>Operating Conditions</b>	<b>Temperature:</b> -40 to +70° C (-40 to +158° F)
<b>Design Standards</b>	MIAD9 Series sensors comply with the following standards: DIN 19 234, EN 50 014 Part 1. 1977, EN50 020 Part 7. 1977, Factory Mutual #3610 and 3611, CSA 22.2 #157-92 and 22.2 #213-M1987
<b>Certifications</b>	     Exia NRTL/C

### Approvals

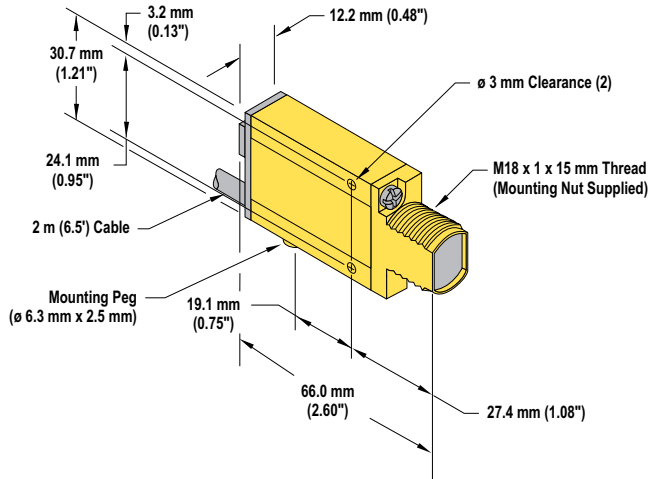
<b>CSA:</b> #LR 41887	Intrinsically Safe, with Enty for Class I, Groups A-D Class I, Div. 2, Groups A-D
<b>FM:</b> #J.I. 5Y3A4.AX	Intrinsically Safe, with Enty for Class I, II, III, Div. 1, Groups A-G Class I, II, III, Div. 2, Groups A-D and G
<b>KEMA:</b> #03ATEX1441X	II 1G EEx ia IIC T6
<b>ETL:</b> #553868	



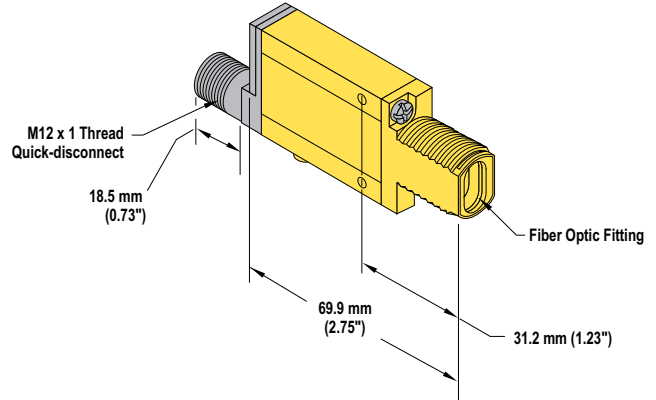
# MINI-BEAM® MIAD9 Series — NAMUR

## Dimensions

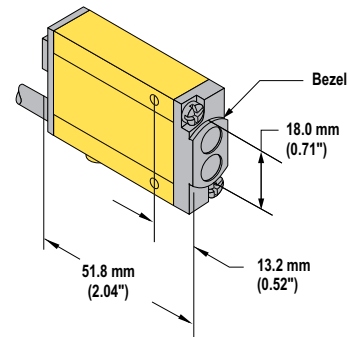
Opposed, Retro, Diffuse, Convergent Models  
(Suffix E, R, LV, D, and CV)



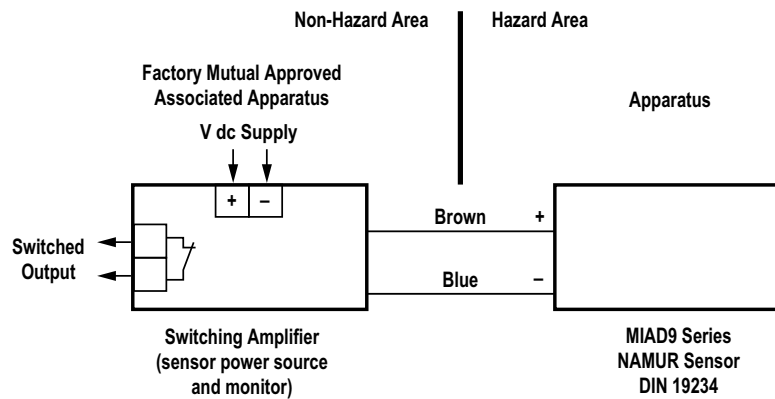
Diffuse Models (suffix W)



Glass Fiber Models (suffix F)



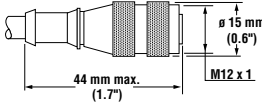
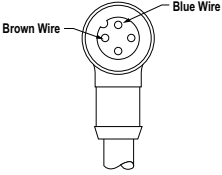
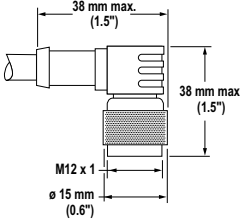
## Hookups



# MINI-BEAM® MIAD9 Series — NAMUR











## Accessories

### Quick-Disconnect (QD) Cables

Style	Model	Length	Dimensions	Pinout
4-pin Euro-style Straight (NAMUR)	<b>MQD9-406</b> <b>MQD9-415</b>	2 m (6.5') 5 m (15')		
4-pin Euro-style Right-angle (NAMUR)	<b>MQD9-406RA</b> <b>MQD9-415RA</b>	2 m (6.5') 5 m (15')		







## Mounting Brackets

Bracket dimensions are available online at [www.bannerengineering.com](http://www.bannerengineering.com).

<b>SMB312S</b>	<ul style="list-style-type: none"> <li>Stainless steel 2-axis, side-mount bracket</li> </ul>		<b>SMB46U</b>	<ul style="list-style-type: none"> <li>"U" bracket</li> <li>14 ga 316 stainless steel</li> </ul>	
<b>SMB312B</b>	<ul style="list-style-type: none"> <li>Stainless steel 2-axis, bottom-mount bracket</li> <li>Includes mounting foot</li> </ul>		<b>SMB18A</b>	<ul style="list-style-type: none"> <li>12-ga. stainless steel right-angle mounting bracket with curved mounting slot for versatile orientation</li> <li>Clearance for M4 (#8) hardware</li> </ul>	
<b>SMB312PD</b>	<ul style="list-style-type: none"> <li>Stainless steel 18 mm barrel-mount bracket</li> </ul>		<b>SMB18FA</b>	<ul style="list-style-type: none"> <li>14-ga. 304 stainless steel</li> <li>18 mm swivel bracket with tilt and pan movement for precision adjusting</li> </ul>	
<b>SMB46L</b>	<ul style="list-style-type: none"> <li>"L" bracket</li> <li>14 ga 316 stainless steel</li> </ul>		<b>SMB18Q</b>	<ul style="list-style-type: none"> <li>12-ga. stainless steel</li> <li>18 mm angled flanged bracket</li> </ul>	
<b>SMB46S</b>	<ul style="list-style-type: none"> <li>"S" bracket</li> <li>14 ga 316 stainless steel</li> </ul>		<b>SMB18SF</b>	<ul style="list-style-type: none"> <li>18 mm swivel, black reinforced thermoplastic polyester bracket</li> <li>Stainless steel mounting hardware included</li> </ul>	

# MINI-BEAM® MIAD9 Series — NAMUR

## Mounting Brackets, continued

SMB3018SC	<ul style="list-style-type: none"> <li>• 18 mm swivel; barrel- or side-mount</li> <li>• Black thermoplastic polyester</li> </ul>		SMB18UR	<ul style="list-style-type: none"> <li>• 2-piece universal swivel bracket</li> <li>• 300 series stainless steel</li> <li>• Includes stainless steel swivel locking hardware</li> </ul>	
SMB3018SUS	<ul style="list-style-type: none"> <li>• Side-mount swivel with extended range of motion</li> <li>• Black thermoplastic polyester</li> <li>• Includes stainless steel swivel locking hardware</li> </ul>		SMBAMS18P	<ul style="list-style-type: none"> <li>• 12-ga. 300 series stainless steel</li> <li>• Flat SMBAMS series bracket with 18 mm hole for mounting sensors</li> <li>• Articulation slots for 90+° of rotation</li> </ul>	
SMB30SK	<ul style="list-style-type: none"> <li>• Flat-mount swivel bracket with extended range of motion</li> <li>• Black thermoplastic polyester and 316 stainless steel</li> </ul>		SMBAMS18RA	<ul style="list-style-type: none"> <li>• 12-ga. 300 series stainless steel</li> <li>• Right-angle SMBAMS series bracket with 18 mm hole for mounting sensors</li> <li>• Articulation slots for 90+° of rotation</li> </ul>	



more sensors, more solutions

**WARRANTY:** Banner Engineering Corp. warrants its products to be free from defects for one year. Banner Engineering Corp. will repair or replace, free of charge, any product of its manufacture found to be defective at the time it is returned to the factory during the warranty period. This warranty does not cover damage or liability for the improper application of Banner products. This warranty is in lieu of any other warranty either expressed or implied.