



MINI-BEAM®

Product Line Catalog

MINI-BEAM Features

- MINI-BEAM sets the performance standards for small photo-electric sensors
- Choose standard or intrinsically safe (NAMUR) models
- Rear-panel alignment indicator and 15-turn sensitivity adjustment
- Choice of integral unterminated cable or quick-disconnect connector
- Wide array of mounting options, including 18 mm in-line thread
- Solid-state circuitry is epoxy-encapsulated in reinforced VALOX® housing



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MINI-BEAM®

Small sensors that excel in close-quarter, opposed, convergent, retroreflective, diffuse and fiber optic sensing modes.



Banner MINI-BEAMs are small sensors with large-sensor performance. Available in both ac and dc models and in all sensing modes (opposed, convergent, divergent, retroreflective, diffuse, and fiber optic), **MINI-BEAMs** offer superior close-quarters sensing performance with sensing ranges until now found only in larger photoelectric sensors.

NAMUR intrinsically safe dc sensors are available for use in hazardous (volatile) sensing environments (see page 18).

A **MINI-BEAM** system incorporates a powerful, modulated LED light source, a sensitive phototransistor, an LED alignment indicator, and a custom-designed, state-of-the-art CMOS modulator/demodulator/amplifier circuit; it features inherently high immunity to ambient light interface. A convenient control enables selection of either “light operate” or “dark operate” in the same sensor, and a rugged, 15-turn Gain control allows precise adjustment of sensitivity. A red LED alignment indicator on the rear of the sensor lights to simplify alignment, adjustment, and performance monitoring. DC models have Banner’s exclusive patented Alignment Indicating Device (AID™) system, which lights an LED indicator whenever the sensor

sees a “light” condition, and pulses the LED at a rate proportional to the received light signal strength. **MINI-BEAMs** are totally self-contained (sensor and amplifier in one complete compact package). No external amplification is required. **MINI-BEAMs** are totally solid-state for unlimited life.

Leakage current and saturation voltage are low for easy interfacing to PLCs and to other solid state circuitry. Additionally, ac models connect directly (in series) with compatible ac loads, and dc models interface directly to Banner logic modules. **MINI-BEAMs** are protected against false pulse on power-up, inductive load transients, and various output conditions (see SPECIFICATIONS, pages 12 and 14).

The **MINI-BEAM**’s wide array of mounting options (pages 28 and 29) enables installation in nearly any location. Stacking capability on 1/2" centers allows multiple units to be nested together for scanning large areas or for code-reading applications.

All Banner **MINI-BEAM** sensors are CE and CSA certified and UL recognized.



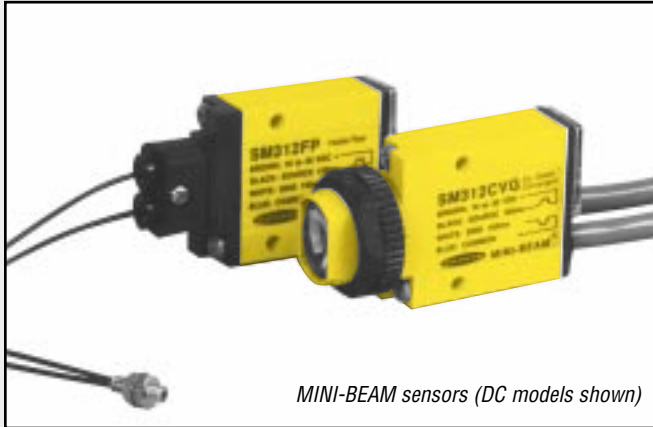
WARNING . . . Not A Safety Device

These photoelectric presence sensors do NOT include the self-checking redundant circuitry necessary to allow their use in personnel safety applications. A sensor failure or malfunction can result in either an energized or a de-energized sensor output condition.

Never use these products as sensing devices for personnel protection. Their use as a safety device may create an unsafe condition which could lead to serious injury or death.

Only MICRO-SCREEN™, MINI-SCREEN®, MULTI-SCREEN®, MACHINE-GUARD™, and PERIMETER-GUARD™ Systems, and other systems so designated, are designed to meet OSHA and ANSI machine safety standards for point-of-operation guarding devices. No other Banner sensors or controls are designed to meet these standards, and they must NOT be used as sensing devices for personnel protection.

MINI-BEAM Standard Sensors



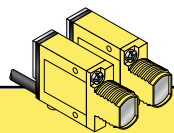
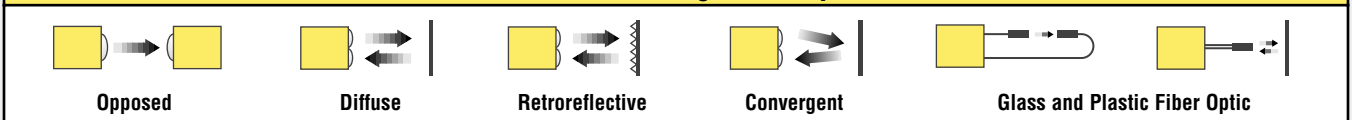
MINI-BEAM sensors (DC models shown)



MINI-BEAM STANDARD SENSORS

- Select 4-wire dc or simple 2-wire ac models
- DC models have bipolar outputs (one NPN and one PNP)
- Rear-panel Light/Dark Operate Select switch
- DC models include patented Alignment Indicating Device (AID™) signal strength monitoring indicator
- Models with blue or green light source for use in mainstream color mark-sensing applications
- 2 m (6.5') integral cable length is standard; 9 m (30') length is also available
- Integral quick-disconnect (QD) fitting is standard; 150 mm (6") pigtail QD cable is also available
- DC models may be ordered with 0.3 millisecond response (add suffix "MHS" to model number)

MINI-BEAM Sensing Mode Options



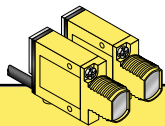
Their small effective beam size is ideal for accuracy-dependent applications, particularly when used with an aperture (see page 27). They have the capability to burn through even contaminated areas and may even sense opaque materials through a thin-walled container.



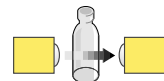
MINI-BEAM Opposed Mode Emitter (E) and Receiver (R)

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
SM31E SM31R SM31EQD SM31RQD	3 m (10')	2 m (6.5') 2 m (6.5') 4-Pin Euro-style QD 4-Pin Euro-style QD	10-30V dc	Bipolar NPN/PNP		
SMA31E SM2A31R SMA31EQD SM2A31RQD		2 m (6.5') 2 m (6.5') 3-Pin Micro-style QD 3-Pin Micro-style QD	24-240V ac	SPST Solid-state 2-Wire		
SM31EL SM31RL SM31ELQD SM31RLQD	30 m (100')	2 m (6.5') 2 m (6.5') 4-Pin Euro-style QD 4-Pin Euro-style QD	10-30V dc	Bipolar NPN/PNP		
SMA31EL SM2A31RL SMA31ELQD SM2A31RLQD		2 m (6.5') 2 m (6.5') 3-Pin Micro-style QD 3-Pin Micro-style QD	24-240V ac	SPST Solid-state 2-Wire		

MINI-BEAM Standard Sensors



Opposed-mode sensors' unique optical arrangement reliably detects clear plastic, differentiating it from all other materials.



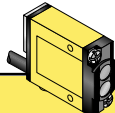
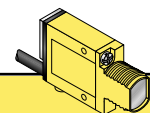
Visible red, 650 nm

MINI-BEAM Opposed-Mode Clear Plastic Detection System

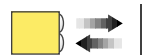
Models	Range	Cable	Supply Voltage	Output Type	Application Information
SM31EPD SM31RPD SM31EPDQD SM31RPDQD	0 - 0.3 m (0 - 1')	2 m (6.5') 2 m (6.5') 4-Pin Euro-style QD 4-Pin Euro-style QD	10-30V dc	Bipolar NPN/PNP	<ul style="list-style-type: none"> Commonly used for manufacture or processing of clear plastic bottles or webs All MINI-BEAM Clear Plastic Detection System sensors include a mounting bracket <p>Actual range is dependent upon the light transmission properties of the plastic material being sensed. Some clear plastic materials may not be detected due to their molecular structure. When in doubt, ask your salesperson to evaluate material samples.</p>
SMA31EPD SM2A31RPD SMA31EPDQD SM2A31RPDQD		2 m (6.5') 2 m (6.5') 3-Pin Micro-style QD 3-Pin Micro-style QD	24-240V ac	SPST Solid-state 2-Wire	

D Models

DBZ and W Models



These economical single-unit sensors are excellent for sensing objects of adequate size and reflectivity at short range. Divergent models are useful for sensing small items and translucent or transparent materials at close range.

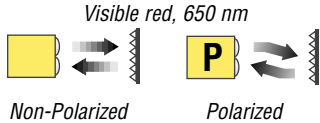


Infrared, 880 nm

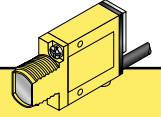
MINI-BEAM Diffuse-Mode Sensors

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Performance based on 90% reflectance white test card	
SM312D SM312DQD	380 mm (15")	2 m (6.5') 4-Pin Euro-style QD	10-30V dc	Bipolar NPN/PNP	<p>SM312D SM2A312D Diffuse Mode</p>	<p>SM312D, SM2A312D Diffuse Mode</p>
SM2A312D SM2A312DQD		2 m (6.5') 3-Pin Micro-style QD	24-240V ac	SPST Solid-state 2-Wire		
SM312DBZ SM312DBZQD	300 mm (12")	2 m (6.5') 4-Pin Euro-style QD	10-30V dc	Bipolar NPN/PNP	<p>SM312DBZ SM2A312DBZ Diffuse Mode</p>	<p>SM312DBZ/SM2A312DBZ Diffuse Mode</p>
SM2A312DBZ SM2A312DBZQD		2 m (6.5') 3-Pin Micro-style QD	24-240V ac	SPST Solid-state 2-Wire		
Divergent Diffuse					<p>SM312W SM2A312W Diffuse Mode</p>	<p>SM312W, SM2A312W Diffuse Mode</p>
SM312W SM312WQD	130 mm (5")	2 m (6.5') 4-Pin Euro-style QD	10-30V dc	Bipolar NPN/PNP		
SM2A312W SM2A312WQD		2 m (6.5') 3-Pin Micro-style QD	24-240V ac	SPDT Solid-state 2-Wire		

MINI-BEAM Standard Sensors



Excellent for sensing even small items where sensing is possible from one side only. Recommended for relatively clean environments where excess gain is not required. Polarized models filter out unwanted reflections.



MINI-BEAM Retroreflective-Mode Sensors

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
Non-Polarized					<p>SM312LV SM2A312LV</p> <p>SM312LVAG SM2A312LVAG</p> <p>Retroreflective Mode</p> <p>With BRT-3 Reflector</p>	<p>SM312LV, SM2A312LV</p> <p>Retroreflective Mode</p> <p>With BRT-3 Reflector</p>
SM312LV SM312LVQD	5 m (15')	2 m (6.5') 4-Pin Euro-style QD	10-30V dc	Bipolar NPN/PNP		
SM2A312LV SM2A312LVQD		2 m (6.5') 3-Pin Micro-style QD	24-240V ac	SPST Solid-state 2-Wire		
Polarized					<p>SM312LVAG SM2A312LVAG</p> <p>Retroreflective Mode</p> <p>With BRT-3 Reflector</p>	<p>SM312LVAG, SM2A312LVAG</p> <p>Retroreflective Mode</p> <p>With BRT-3 Reflector</p>
SM312LVAG SM312LVAGQD	50 mm to 2 m (2" to 7')	2 m (6.5') 4-Pin Euro-style QD	10-30V dc	Bipolar NPN/PNP		
SM2A312LVAG SM2A312LVAGQD		2 m (6.5') 3-Pin Micro-style QD	24-240V ac	SPST Solid-state 2-Wire		
Polarized Extended Range					<p>SM312LP SM2A312LP</p> <p>Retroreflective Mode</p> <p>With BRT-3 Reflector</p>	<p>SM312LP/SM2A312LP</p> <p>Retroreflective Mode</p> <p>With BRT-3 Reflector</p>
SM312LP SM312LPQD	10 mm to 3 m (0.4" to 10')	2 m (6.5') 4-Pin Euro-style QD	10-30V dc	Bipolar NPN/PNP		
SM2A312LP SM2A312LPQD		2 m (6.5') 3-Pin Micro-style QD	24-240V ac	SPST Solid-state 2-Wire		

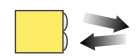
NOTE: Retroreflective range is specified using one model BRT-3 retroreflector (3" diameter). Actual sensing range may be more or less than specified, depending upon the efficiency and reflective area of the retroreflector(s) in use. See page 26 for more information.

For Standard MINI-BEAMS:

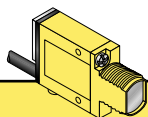
- 9 m (30') cables are available by adding suffix **"W/30"** to the model number of any cabled sensor (e.g., **SM312LV W/30**).
- A 150 mm (6") long pigtail cable with attached QD connector is available by adding suffix **"QDP"** to the model number of any MINI-BEAM sensor (e.g., **SM312LVQDP**). See page 25 for more information.
- A model with a QD connector requires an accessory mating cable. See page 24 for more information.
- 10 to 30V dc models may be ordered with 0.3 millisecond ON/OFF response by adding suffix **"MHS"** to the model numbers (e.g., **SM312LVMHS**). This modification reduces sensing range (and excess gain).

MINI-BEAM Standard Sensors

Convergent-mode sensors feature high excess gain and can detect objects of low reflectivity. They also are a good choice for counting radiused objects with no space between them, for accurate position sensing, and for sensing of clear materials that travel near the scan beam's focus.



See Sensing Beam Information Below



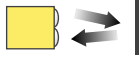
MINI-BEAM Convergent-Mode Sensors

Models	Focus	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Performance based on 90% reflectance white test card	
Infrared 880 nm						
SM312C SM312CQD	16 mm (0.65")	2 m (6.5') 4-Pin Euro-style QD	10-30V dc	Bipolar NPN/PNP		
SM2A312C SM2A312CQD		2 m (6.5') 3-Pin Micro-style QD	24-240V ac	SPST Solid-state 2-Wire		
SM312C2 SM312C2QD	43 mm (1.7")	2 m (6.5') 4-Pin Euro-style QD	10-30V dc	Bipolar NPN/PNP		
SM2A312C2 SM2A312C2QD		2 m (6.5') 3-Pin Micro-style QD	24-240V ac	SPST Solid-state 2-Wire		
Visible Red 650 nm						
SM312CV SM312CVQD	16 mm (0.65")	2 m (6.5') 4-Pin Euro-style QD	10-30V dc	Bipolar NPN/PNP		
SM2A312CV SM2A312CVQD	Spot Size at Focus: 1.3 mm (0.05")	2 m (6.5') 3-Pin Micro-style QD	24-240V ac	SPST Solid-state 2-Wire		
SM312CV2 SM312CV2QD	43 mm (1.7")	2 m (6.5') 4-Pin Euro-style QD	10-30V dc	Bipolar NPN/PNP		
SM2A312CV2 SM2A312CV2QD		Spot Size at Focus: 3.0 mm (0.12")	2 m (6.5') 3-Pin Micro-style QD	24-240V ac		

For Standard MINI-BEAMs:

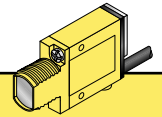
- 9 m (30') cables are available by adding suffix **"W/30"** to the model number of any cabled sensor (e.g., **SM312CV W/30**).
- A 150 mm (6") long pigtail cable with attached QD connector is available by adding suffix **"QDP"** to the model number of any MINI-BEAM sensor (e.g., **SM312CVQDP**). See page 25 for more information.
- A model with a QD connector requires an accessory mating cable. See page 24 for more information.
- 10 to 30V dc models may be ordered with 0.3 millisecond ON/OFF response by adding suffix **"MHS"** to the model numbers (e.g., **SM312CVMHS**). This modification reduces sensing range (and excess gain).

MINI-BEAM Standard Sensors



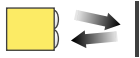
Recommended for color mark sensing.

Visible green, 525 nm



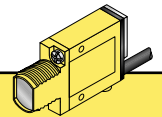
Green LED MINI-BEAM Convergent-Mode Sensors

Models	Focus	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Performance based on 90% reflectance white test card	
Visible Green 525 nm					<p>SM312CVG, SM2A312CVG Convergent Mode</p>	<p>SM312CVG, SM2A312CVG Convergent Mode</p>
SM312CVG SM312CVGQD	16 mm (0.65")	2 m (6.5') 4-Pin Euro-style QD	10-30V dc	Bipolar NPN/PNP		
SM2A312CVG SM2A312CVGQD		2 m (6.5') 3-Pin Micro-style QD	24-240V ac	SPST Solid-state 2-Wire		
SM312CV2G SM312CV2GQD	49 mm (1.9")	2 m (6.5') 4-Pin Euro-style QD	10-30V dc	Bipolar NPN/PNP	<p>SM312CV2G Convergent Mode</p>	<p>SM312CV2G Convergent Mode</p>

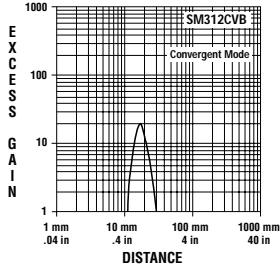
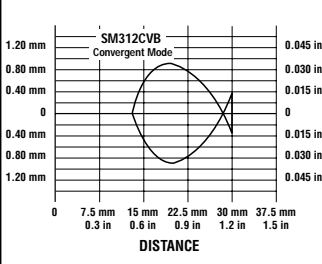
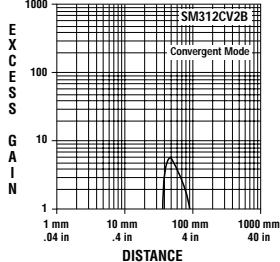
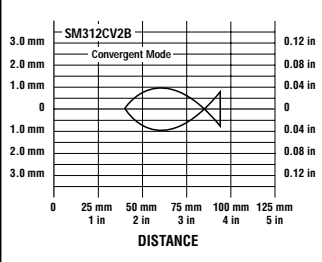


Recommended for color mark sensing.

Visible blue, 475 nm

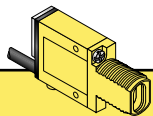


Blue LED MINI-BEAM Convergent-Mode Sensors

Models	Focus	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Performance based on 90% reflectance white test card	
Visible Blue 475 nm						
SM312CVB SM312CVBQD	16 mm (0.65")	2 m (6.5') 4-Pin Euro-style QD	10-30V dc	Bipolar NPN/PNP		
SM312CV2B SM312CV2BQD	49 mm (1.9")	2 m (6.5') 4-Pin Euro-style QD	10-30V dc	Bipolar NPN/PNP		

MINI-BEAM Standard Sensors

An excellent option where sensing must be accomplished in tight, inaccessible or volatile areas. Withstands vibration and shock; immune to electrical noise. Glass fibers withstand high temperatures, extreme moisture and corrosive materials. Not recommended for applications requiring bending or repeated flexing of fibers.



See Sensing Beam Information Below

MINI-BEAM Glass Fiber Optic Sensors

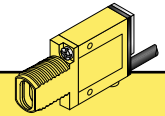
Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Diffuse mode performance based on 90% reflectance white test card	
Infrared 880 nm					OPPOSED MODE – INDIVIDUAL FIBERS	
SM312F SM312FQD	Range varies by sensing mode and fiber optics used	2 m (6.5') 4-Pin Euro-style QD	10-30V dc	Bipolar NPN/PNP		
SM2A312F SM2A312FQD		2 m (6.5') 3-Pin Micro-style QD	24-240V ac	SPST Solid-state 2-Wire		
Visible Red 650 nm					OPPOSED MODE – INDIVIDUAL FIBERS	
SM312FV SM312FVQD	Range varies by sensing mode and fiber optics used	2 m (6.5') 4-Pin Euro-style QD	10-30V dc	Bipolar NPN/PNP		
SM2A312FV SM2A312FVQD		2 m (6.5') 3-Pin Micro-style QD	24-240V ac	SPST Solid-state 2-Wire		

MINI-BEAM Standard Sensors



Recommended for color mark sensing.

Visible green, 525 nm



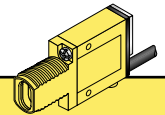
Green LED MINI-BEAM Glass Fiber Optic Sensors

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Diffuse mode performance based on 90% reflectance white test card	
SM312FVG SM312FVGQD	Range varies by sensing mode and fiber optics used	2 m (6.5') 4-Pin Euro-style QD	10-30V dc	Bipolar NPN/PNP		



Recommended for color mark sensing.

Visible blue, 475 nm



Blue LED MINI-BEAM Glass Fiber Optic Sensors

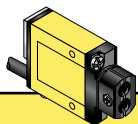
Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Diffuse mode performance based on 90% reflectance white test card	
SM312FVB SM312FVBQD	Range varies by sensing mode and fiber optics used	2 m (6.5') 4-Pin Euro-style QD	10-30V dc	Bipolar NPN/PNP		

For Standard MINI-BEAMS:

- 9 m (30') cables are available by adding suffix "W/30" to the model number of any cabled sensor (e.g., **SM312FV W/30**).
- A 150 mm (6") long pigtail cable with attached QD connector is available by adding suffix "QDP" to the model number of any MINI-BEAM sensor (e.g., **SM312FVQDP**). See page 25 for more information.
- A model with a QD connector requires an accessory mating cable. See page 24 for more information.
- 10 to 30V dc models may be ordered with 0.3 millisecond ON/OFF response by adding suffix "MHS" to the model numbers (e.g., **SM312FVMHS**). This modification reduces sensing range (and excess gain).

MINI-BEAM Standard Sensors

An excellent option where sensing must be accomplished in tight, inaccessible or volatile areas. Withstands vibration and shock; immune to electrical noise. Plastic fibers function well at temperatures between -30° and +70°C (-20°F to +158°F), and stand up to repeated flexing. Most are easy to shorten in the field, to develop custom installations. Not recommended for severe environments.



Visible red, 650 nm

MINI-BEAM Plastic Fiber Optic Sensors

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Diffuse mode performance based on 90% reflectance white test card	
Infrared 880 nm					OPPOSED MODE – INDIVIDUAL FIBERS	
SM312FP SM312FPQD	Range varies by sensing mode and fiber optics used	2 m (6.5') 4-Pin Euro-style QD	10-30V dc	Bipolar NPN/PNP		
SM2A312FP SM2A312FPQD		2 m (6.5') 3-Pin Micro-style QD	24-240V ac	SPST Solid-state 2-Wire		

For Standard MINI-BEAMs:

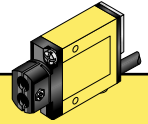
- 9 m (30') cables are available by adding suffix "W/30" to the model number of any cabled sensor (e.g., **SM312FP W/30**).
- A 150 mm (6") long pigtail cable with attached QD connector is available by adding suffix "QDP" to the model number of any MINI-BEAM sensor (e.g., **SM312FPQDP**). See page 25 for more information.
- A model with a QD connector requires an accessory mating cable. See page 24 for more information.
- 10 to 30V dc models may be ordered with 0.3 millisecond ON/OFF response by adding suffix "MHS" to the model numbers (e.g., **SM312FPMHS**). This modification reduces sensing range (and excess gain).

MINI-BEAM Standard Sensors



Recommended for color mark sensing.

Visible green, 525 nm



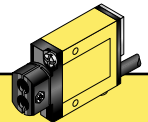
Green LED MINI-BEAM Plastic Fiber Optic Sensors

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Diffuse mode performance based on 90% reflectance white test card	
SM312FPG SM312FPGQD	Range varies by sensing mode and fiber optics used	2 m (6.5') 4-Pin Euro-style QD	10-30V dc	Bipolar NPN/PNP		



Recommended for color mark sensing.

Visible green, 525 nm






Blue LED MINI-BEAM Plastic Fiber Optic Sensors

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Diffuse mode performance based on 90% reflectance white test card	
SM312FPB SM312FPBQD	Range varies by sensing mode and fiber optics used	2 m (6.5') 4-Pin Euro-style QD	10-30V dc	Bipolar NPN/PNP		

MINI-BEAM Standard Sensors

Specifications for All DC-powered MINI-BEAM Standard Series Sensors

Supply Voltage and Current	10 to 30V dc (10% maximum ripple) at less than 25 mA (exclusive of load)
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
Δ⁴ Output Rating	150mA maximum each output at 25°C, derated to 100 mA at 70°C (derate ≈1 mA per °C) Off-state leakage current: less than 1 microamp Output saturation voltage: (PNP output) less than 1 volt at 10 mA and less than 2 volts at 150 mA Output saturation voltage: (NPN output) less than 200 millivolts at 10 mA and less than 1 volt at 150 mA
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short-circuit of outputs
Output Response Time	Sensors will respond to either a “light” or a “dark” signal of 1 millisecond or longer duration, 500 Hz max. 0.3 millisecond response modification is available. NOTE: 100 millisecond delay on power-up; outputs are non-conducting during this time.
Repeatability	Opposed: 0.14 milliseconds; Non-Polarized and Polarized Retro, Diffuse, Convergent, Glass and Plastic Fiber Optic: 0.3 milliseconds. Response time and repeatability specifications are independent of signal strength.
Adjustments	Light/Dark Operate Select switch, and 15-turn slotted brass screw Gain (sensitivity) adjustment potentiometer (clutched at both ends of travel). Both controls are located on rear panel of sensor and are protected by a gasketed, clear acrylic cover.
Indicators	Exclusive, patented Alignment Indicating Device system (AID™, US patent #4356393) lights a rear-panel-mounted red LED indicator whenever the sensor sees a “light” condition, with a superimposed pulse rate proportional to the light signal strength (the stronger the signal, the faster the pulse rate).
Construction	Reinforced VALOX® housing, totally encapsulated, o-ring sealing, acrylic lenses, and stainless steel screws.
Environmental Rating	Meets NEMA standards 1, 2, 3, 3S, 4, 4X, 12, and 13; IEC IP67.
Connections	PVC-jacketed 4-conductor 2 m (6.5') or 9 m (30') unterminated cables, or 4-pin Euro-style quick-disconnect (QD) fitting are available. QD cables are ordered separately; see page 24.
Operating Temperature	Temperature: -20° to +70°C (-4° to +158°F) Maximum relative humidity: 90% at 50°C (non-condensing)
Application Notes	The NPN (current sinking) output of dc MINI-BEAM sensors is directly compatible as an input to Banner logic modules, including all non-amplified MAXI-AMP and MICRO-AMP modules. MINI-BEAMs are TTL compatible.
Certifications	  

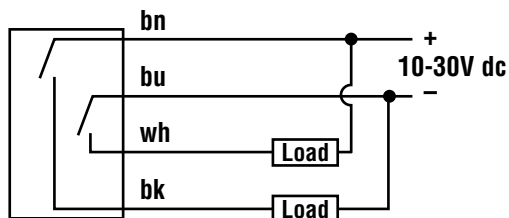
VALOX® is a registered trademark of General Electric Co.

NOTE: DC MINI-BEAMs may be ordered with 0.3 millisecond ON/OFF response by adding suffix “MHS” to the model number (e.g., **SM312LVMHS**). This modification reduces sensing range (and excess gain).

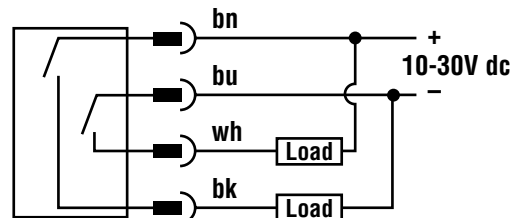
MINI-BEAM Standard Sensors

Hookups for All DC-powered MINI-BEAM Standard Series Sensors

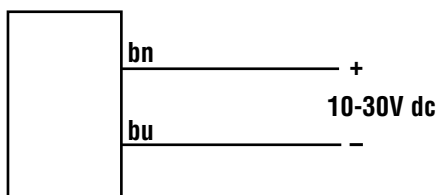
DC Sensors with Attached Cable



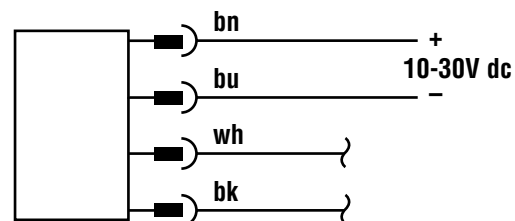
DC Sensors with Quick-Disconnect (4-Pin Euro-Style)



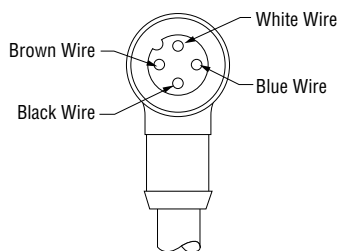
DC Emitters with Attached Cable



DC Emitters with Quick-Disconnect (4-Pin Euro-style)



4-Pin Euro-style Pin-out (Cable Connector Shown)






Quick-Disconnect (QD) Option

DC MINI-BEAM sensors are sold with either a 2 m (6.5') or a 9 m (30') unterminated attached PVC-covered cable, or with a 4-pin Euro-style QD cable fitting.

DC QD sensors are identified by the suffix letters "QD" in their model numbers. For information on mating QD cables, see page 24.

MINI-BEAM Standard Sensors

Specifications for All AC-powered MINI-BEAM Standard Series Sensors

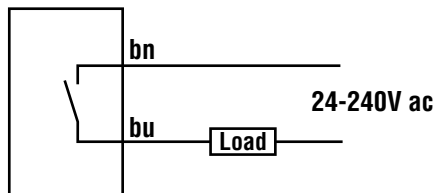
Supply Voltage and Current	24 to 240V ac (50/60 Hz), 250V ac max
Supply Protection Circuitry	Protected against transient voltages
Output Configuration	SPST SCR solid-state relay with either normally closed or normally open contact (light/dark operate selectable); 2-wire hookup
Output Rating	Minimum load current 5 mA; maximum steady-state load capability 300 mA to 50°C ambient (122°F) 100 mA to 70°C ambient (158°F) Inrush capability: 3 amps for 1 second (non repetitive); 10 amps for 1 cycle (non repetitive) Off-state leakage current: Less than 1.7 mA rms On-state voltage: Drop ≤5 volts at 300 mA load, ≤10 volts at 15 mA load
Output Protection Circuitry	Protected against false pulse on power-up
Output Response Time	Opposed Mode: 2 millisecond on and 1 millisecond off; Non-Polarized and Polarized Retro, Convergent, Plastic Fiber Optic: 4 milliseconds on and off; Diffuse and Glass Fiber Optic: 8 milliseconds on and off. OFF response time specification does not include load response of up to 1/2 ac cycle (8.3 milliseconds). Response time specification of load should be considered when important. (NOTE: 300 millisecond delay on power-up.)
Repeatability	Opposed: 0.3 milliseconds; Non-Polarized and Polarized Retro, and Convergent and Plastic Fiber Optic: 1.3 milliseconds; Diffuse and Glass Fiber Optics: 2.6 milliseconds. Response time and repeatability specifications are independent of signal strength.
Adjustments	Light/Dark Operate Select switch and 15-turn slotted brass screw Gain (sensitivity) adjustment potentiometer (clutched at both ends of travel). Both controls are located on rear panel of sensor and are protected by a gasketed, clear acrylic cover.
Indicators	Red indicator LED on rear of sensor is ON when the load is energized.
Construction	Reinforced VALOX® housing, totally encapsulated, o-ring sealing, acrylic lenses, and stainless steel screws.
Environmental Rating	Meets NEMA standards 1, 2, 3, 3S, 4, 4X, 12, and 13; IEC IP67.
Connections	PVC-jacketed 2-conductor 2 m (6.5') or 9 m (30') unterminated cables, or 3-pin Micro-style quick-disconnect (QD) fitting are available. QD cables are ordered separately; see page 24.
Operating Temperature	Temperature: -20° to +70°C (-4° to +158°F) Maximum Relative Humidity: 90% at 50°C (non-condensing)
Application Notes	i) AC MINI-BEAMs may be destroyed from overload conditions. ii) 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 proper operation of the load. iii) The false-pulse protection feature may cause momentary drop-out of the load when the sensor is wired in series or in parallel with mechanical switch contacts.
Certifications	  

VALOX® is a registered trademark of General Electric Co.

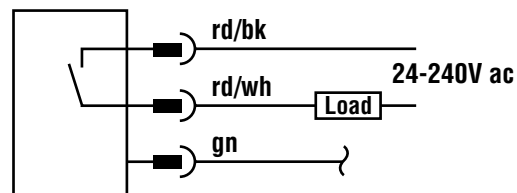
MINI-BEAM Standard Sensors

Hookups for All AC-powered MINI-BEAM Standard Series Sensors

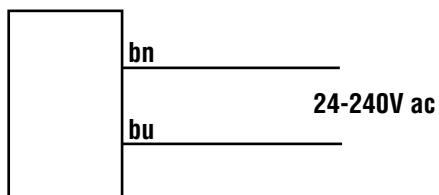
AC Sensors with Attached Cable



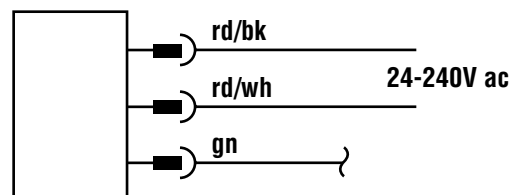
AC Sensors with Quick-Disconnect (3-Pin Micro-style)



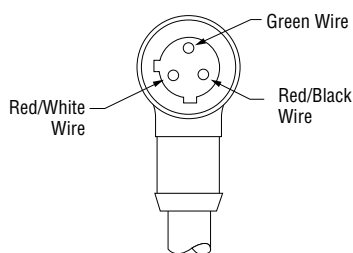
AC Emitters with Attached Cable



AC Emitters with Quick-Disconnect (3-Pin Micro-style)



3-Pin Micro-style Pin-out (Cable Connector Shown)



Quick-Disconnect (QD) Option

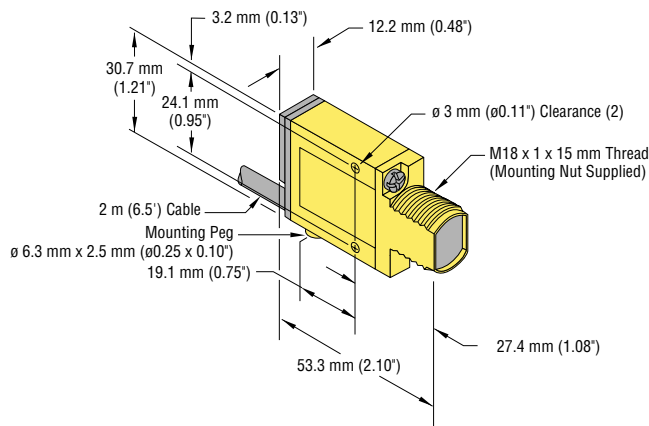
AC MINI-BEAM sensors are sold with either a 2 m (6.5') or a 9 m (30') attached PVC-covered unterminated cable, or with a 3-pin Micro-style QD cable fitting.

AC QD sensors are identified by the suffix letters "QD" in their model numbers. For information on mating QD cables, see page 24.

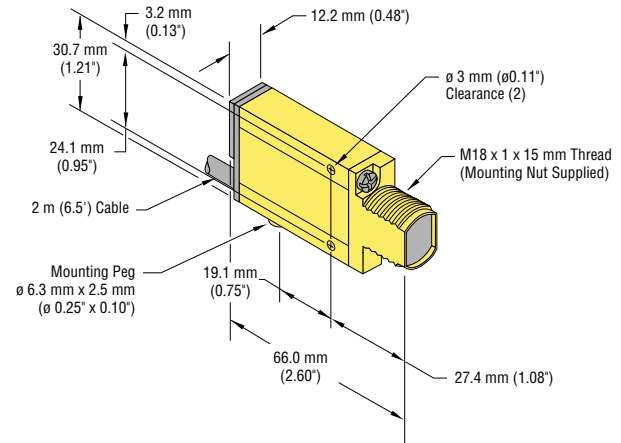
MINI-BEAM Standard Sensors

Dimensions for All MINI-BEAM Standard Series Sensors

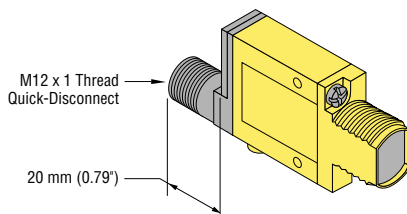
MINI-BEAM DC Sensor



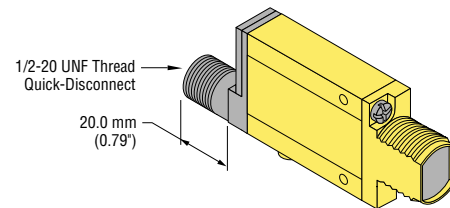
MINI-BEAM AC Sensor



MINI-BEAM DC Sensor with Quick-Disconnect

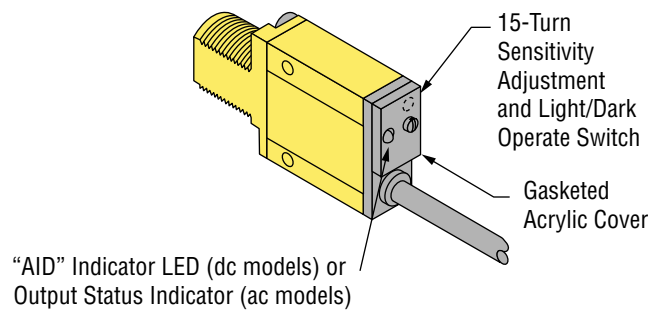


MINI-BEAM AC Sensor with Quick-Disconnect



NOTE: The above four drawings apply to model numbers with suffix E, EL, EPD, R, RL, RPD, LV, LVAG, D, C, C2, CV, CV2, CVB, CV2B, CVG and CV2G.

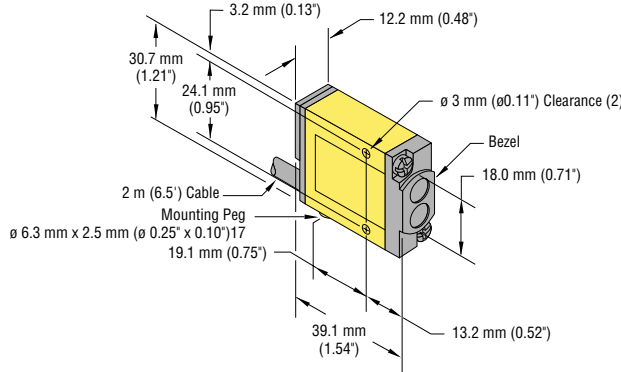
MINI-BEAM Sensor – Rear View



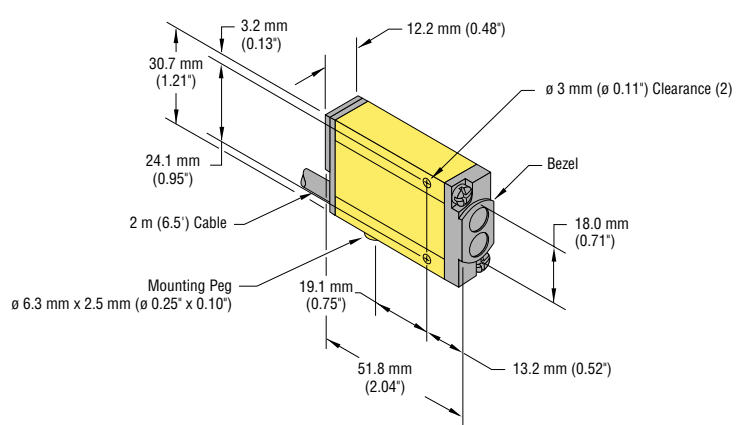
MINI-BEAM Standard Sensors

Dimensions for All MINI-BEAM Standard Series Sensors

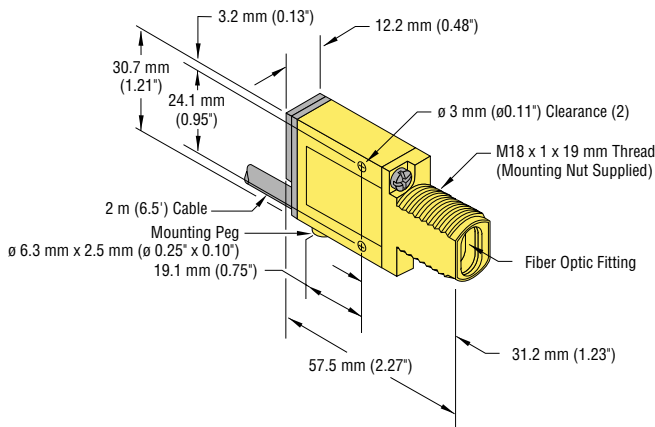
MINI-BEAM DC Sensor – Diffuse Mode (models with suffix DBZ and W)



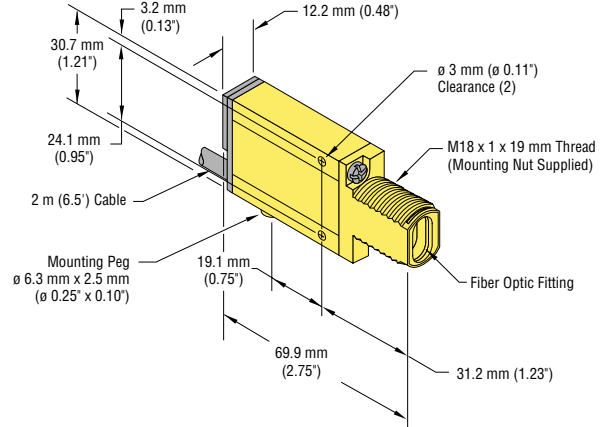
MINI-BEAM AC Sensor – Diffuse Mode (models with suffix DBZ and W)



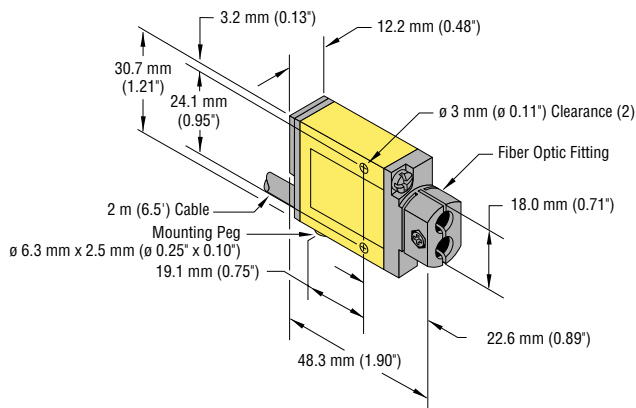
MINI-BEAM DC Sensor – Glass Fiber Optic (models with suffix F, FV, FVB and FVG)



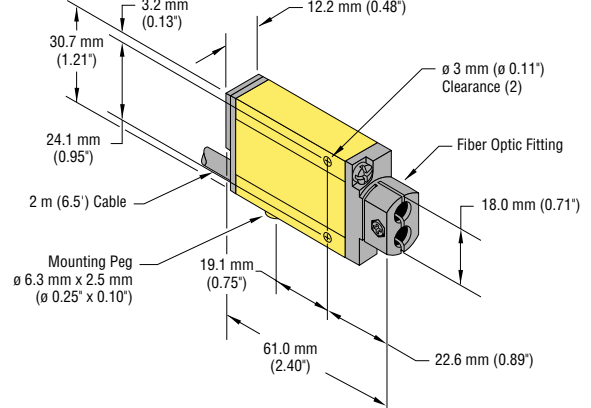
MINI-BEAM AC Sensor – Glass Fiber Optic (models with suffix F & FV)



MINI-BEAM DC Sensor – Plastic Fiber Optic (models with suffix FP, FPB and FPG)



MINI-BEAM AC Sensor – Plastic Fiber Optic (models with suffix FP)



MINI-BEAM NAMUR Sensors

Model MIAD9CV2Q shown with accessory model SMB312S bracket and optional MQD9-415RA QD cable



NAMUR INTRINSICALLY SAFE DC SENSOR SERIES

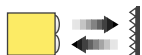
for use in hazardous (volatile) environments

- Intrinsically safe sensors offering MINI-BEAM performance and small size
- Use with approved switching amplifiers which have intrinsically safe input circuits
- Output passes ≤ 1 mA in the “dark” condition and ≥ 2 mA in the “light” condition
- Choose models with unterminated integral cable or quick-disconnect connector

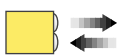
MINI-BEAM Sensing Mode Options



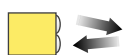
Opposed



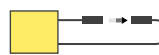
Retroreflective



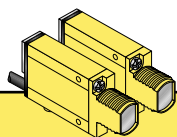
Diffuse



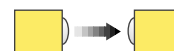
Convergent



Glass Fiber Optic



Their small effective beam size is ideal for accuracy-dependent applications. Recommended for use in volatile environments.



Infrared, 880 nm

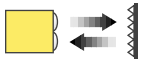
NAMUR Opposed-Mode Emitter (E) and Receiver (R)

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
MI9E MIAD9R MI9EQ MIAD9RQ	6 m (20')	2 m (6.5') 2 m (6.5') 4-Pin Euro-style QD 4-Pin Euro-style QD	5-15V dc	Constant current ≤ 1 mA dark ≥ 2 mA light		

For NAMUR MINI-BEAMS:

- 9 m (30') cables are available by adding suffix “W/30” to the model number of any cabled sensor (e.g., MIAD9R W/30).
- A model with a QD connector requires an accessory mating cable. See page 24 for more information.
- The MINI-BEAM mounting bracket shown in the photographs is optional. See page 28 for bracket information.

MINI-BEAM NAMUR Sensors

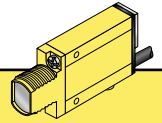


Visible red, 650 nm



Excellent for sensing even small items where sensing is possible from one side only, especially for relatively clean environments. Recommended for use in volatile environments.

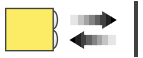
Non-Polarized, Polarized



NAMUR Retroreflective-Mode Sensors

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
Non-Polarized						
MIAD9LV MIAD9LVQ	5 m (15')	2 m (6.5') 4-Pin Euro-style QD	5-15V dc	Constant Current ≤1 mA dark ≥2 mA light		
Polarized						
MIAD9LVAG MIAD9LVAGQ	50 mm to 2 m (2" to 7')	2 m (6.5') 4-Pin Euro-style QD	5-15V dc	Constant Current ≤1 mA dark ≥2 mA light		

NOTE: Retroreflective range is specified using one model BRT-3 retroreflector (3" diameter). Actual sensing range may be more or less than specified, depending upon the efficiency and reflective area of the retroreflector(s) used. See the Banner Photoelectric Catalog for more information.

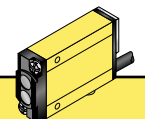
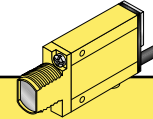


Infrared, 880 nm

These economical single-unit sensors are excellent for sensing objects of adequate size and reflectivity at short range. Divergent models are useful for sensing small, translucent or transparent items at close range. Recommended for use in volatile environments.

Diffuse

Divergent Diffuse



NAMUR Diffuse-Mode Sensors

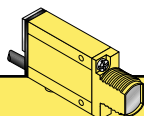
Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
Diffuse						
MIAD9D MIAD9DQ	380 mm (15")	2 m (6.5') 4-Pin Euro-style QD	5-15V dc	Constant current ≤1 mA dark ≥2 mA light		
Divergent Diffuse						
MIAD9W MIAD9WQ	75 mm (3")	2 m (6.5') 4-Pin Euro-style QD	5-15V dc	Constant current ≤1 mA dark ≥2 mA light		

MINI-BEAM NAMUR Sensors

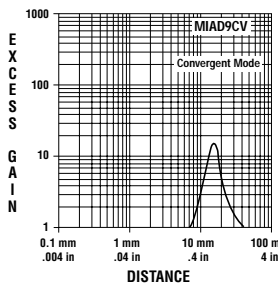
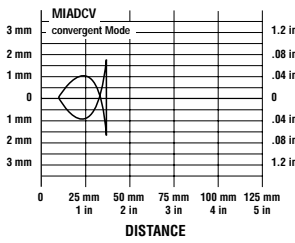
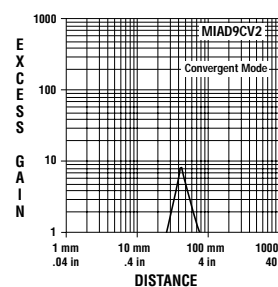
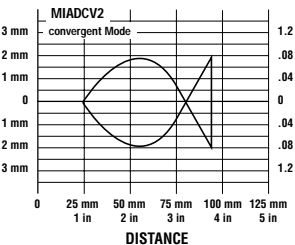
Convergent-mode sensors feature high excess gain and can detect objects of low reflectivity. They also are a good choice for counting radiused objects with no space between them, for accurate position sensing, and for sensing of clear materials that travel near the scan beam's focus. Recommended for use in volatile environments.



Visible red, 650 nm



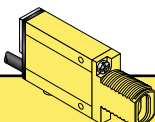
NAMUR Convergent-Mode Sensors

Models	Focus	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Performance based on 90% reflectance white test card	
MIAD9CV MIAD9CVQ	16 mm (0.65")	2 m (6.5') 4-Pin Euro-style QD	5-15V dc	Constant current ≤1 mA dark ≥2 mA light		
MIAD9CV2 MIAD9CV2Q	43 mm (1.7")	2 m (6.5') 4-Pin Euro-style QD	5-15V dc	Constant current ≤1 mA dark ≥2 mA light		

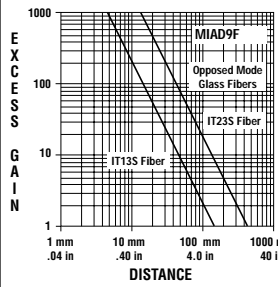
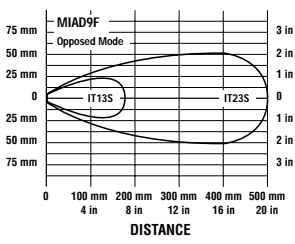
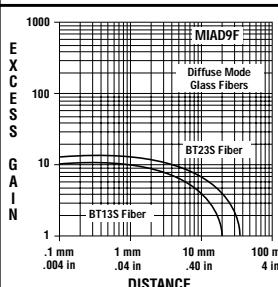
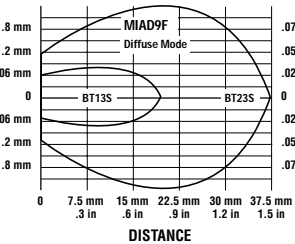
An excellent option for sensing in tight or inaccessible areas. Withstands vibration and shock; immune to electrical noise. Glass fibers withstand high temperatures, extreme moisture and corrosive materials. Recommended for use in volatile environments.








Infrared, 880 nm



NAMUR Glass Fiber Optic Sensors

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Diffuse mode performance based on 90% reflectance white test card	
MIAD9F MIAD9FQ	Range varies by sensing mode and fiber optics used	2 m (6.5') 4-Pin Euro-style QD	5-15V dc	Constant current ≤1 mA dark ≥2 mA light	OPPOSED MODE – INDIVIDUAL FIBERS	
						
					DIFFUSE MODE – BIFURCATED FIBERS	
						

Specifications for All MINI-BEAM NAMUR Series Sensors

Supply Voltage	5 to 15V dc (provided by the amplifier to which the sensor is connected).
Output	Constant current output: ≤ 1 mA in the “dark” condition and ≥ 2 mA in the “light” condition
Output Response Time	Opposed mode receiver: 2 milliseconds on/400 μ s off; All other models: 5 milliseconds on/off (does not include amplifier response)
Adjustment	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.
Indicator	Red LED alignment indicator located on rear panel lights when the sensor sees a “light” condition
Construction	Reinforced VALOX® housing, totally encapsulated, o-ring sealing, acrylic lenses, and stainless steel screws
Environmental Rating	Meets NEMA standards 1, 2, 3, 3S, 4, 4X, 12 and 13; IEC IP 67
Connections	PVC-jacketed 2-conductor 2 m (6.5') or 9 m (30') unterminated cables, or 4-pin Euro-style quick-disconnect (QD) fitting are available. QD cables are ordered separately; see page 24.
Operating Temperature	Temperature: -40° to +70°C (-40° to +158°F) Maximum Relative Humidity: 90% at 50°C (non-condensing)
Design Standards	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
Certifications	    

VALOX® is a registered trademark of General Electric Co.

APPROVALS

CSA:	#LR 41887	Intrinsically Safe, with Entity for: Class I, Groups A-D Class I, Div. 2, Groups A-D
FM:	#J.I. 5Y3A4.AX	Intrinsically Safe, with Entity for: Class I, II, III, Div. 1, Groups A-G Class I, II, III, Div. 2, Groups A-D and G
KEMA:	#Ex-94.C.7937	EEx ia IIC T6
ETL:	#553868	

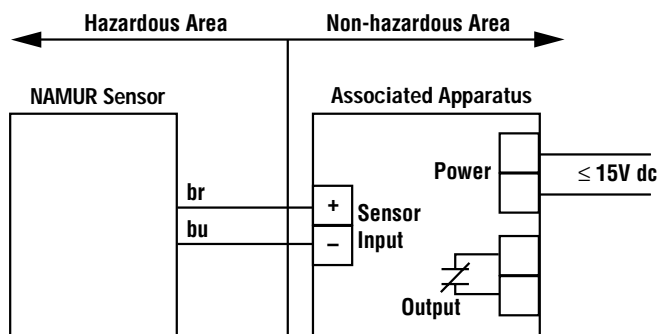
For NAMUR MINI-BEAMs:

- 9 m (30') unterminated cables are available by adding suffix “**W/30**” to the model number of any cabled sensor (e.g., **MIAD9CV W/30**).
- A model with a QD connector requires an accessory mating cable. See page 24 for more information.
- The MINI-BEAM mounting bracket shown in the photographs is optional. See page 28 for bracket information.

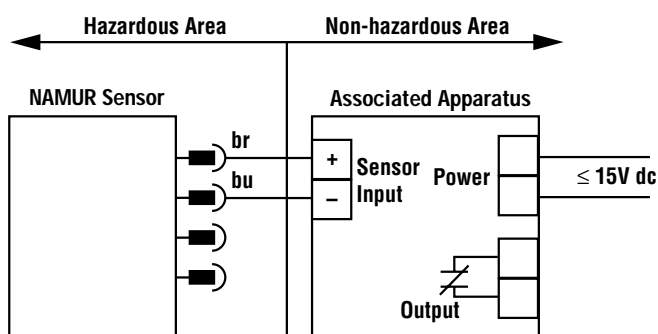
MINI-BEAM NAMUR Sensors

Hookups for All MINI-BEAM NAMUR Series Sensors

Sensors with Attached Cable



Sensors with Quick-Disconnect (QD)



Entity Parameters

Associated Apparatus

$$\begin{aligned} V_{oc} &\leq 15V \text{ dc} \\ I_{sc} &\leq 60 \text{ mA} \\ C_a &\leq *C(\text{cable}) + C_i \\ L_a &\leq *L(\text{cable}) + L_i \\ *C(\text{cable}) &= 60 \text{ pF/ft} \end{aligned}$$

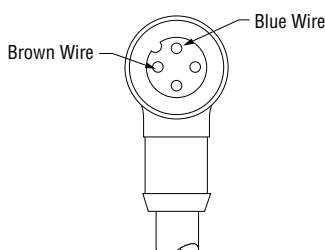
Sensor

$$\begin{aligned} V_{max} &= 15V \text{ dc} \\ I_{max} &= 60 \text{ mA} \\ C_i &= 0 \\ L_i &= 0 \\ *L(\text{cable}) &= 0.2 \text{ μH/ft} \end{aligned}$$

Application Notes

The “Associated Apparatus” may include intrinsically safe amplifiers and barriers to monitor the sensor supply current, which is the sensor’s output signal. The associated apparatus must limit both supply voltage and supply current in the event of failure.

Micro-style Pin-out (Cable Connector Shown)



Quick-Disconnect (QD) Option for NAMUR Sensors

MINI-BEAM series MIAD9 NAMUR sensors are sold with either a 2 m (6.5') or 9 m (30') attached PVC-covered unterminated 2-wire cable or with a 4-pin QD cable fitting.

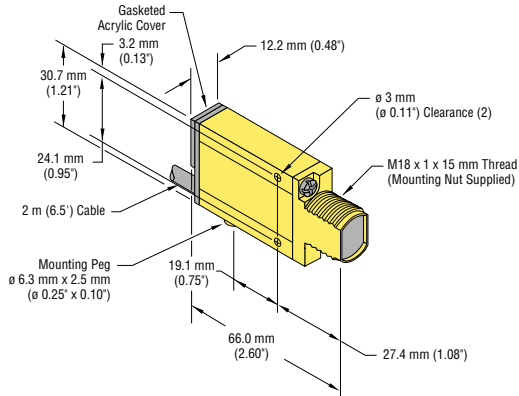
NAMUR QD sensors are identified by the suffix “Q” in their model numbers, and are provided with a 4-pin Euro-style connector. For more information on mating QD cables, see page 24.

MINI-BEAM NAMUR Sensors

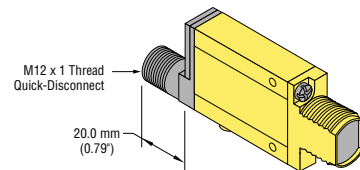
Dimensions for All MINI-BEAM NAMUR Series Sensors

NAMUR Opposed, Retro, Diffuse and Convergent Sensing Modes (model numbers with suffix E, R, LV, LVAG, D, CV & CV2)

NAMUR Sensor with Attached Cable

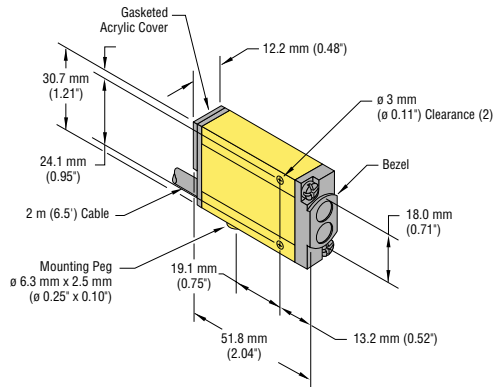


NAMUR Sensor with Quick-Disconnect

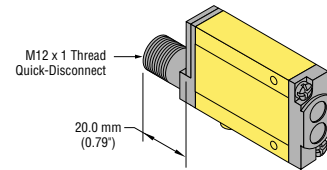


NAMUR Divergent Diffuse Sensing Mode (model numbers with suffix W)

NAMUR Sensor with Attached Cable

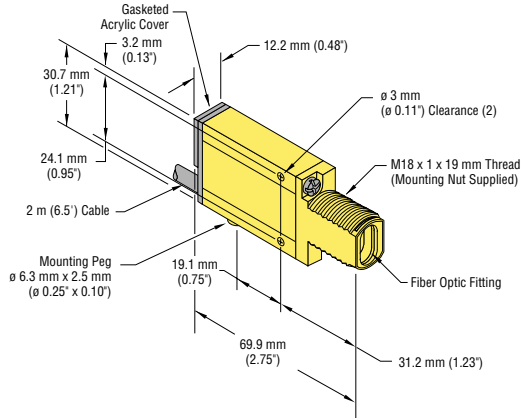


NAMUR Sensor with Quick-Disconnect

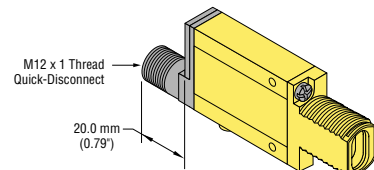


NAMUR Glass Fiber Optic Sensing (model numbers with suffix F)

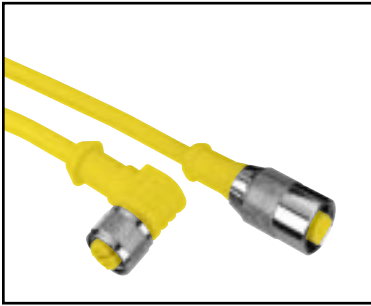
NAMUR Sensor with Attached Cable



NAMUR Sensor with Quick-Disconnect



MINI-BEAM Accessories



Accessory Mating Cables for Quick-Disconnect (QD) MINI-BEAM Models

The following is a selection of cables available for the MINI-BEAM QD models

Style	Model	Length	For use with	Dimensions	Pin-out
4-pin Euro-style straight	MQDC-406 MQDC-415 MQDC-430	2 m (6.5') 5 m (15') 9 m (30')	SM312 Series dc model MINI-BEAMs		
4-pin Euro-style right-angle	MQDC-406RA MQDC-415RA MQDC-430RA	2 m (6.5') 5 m (15') 9 m (30')			
3-pin Micro- style straight	MQAC-306 MQAC-315 MQAC-330	2 m (6.5') 5 m (15') 9 m (30')	SM2A312 Series ac model MINI-BEAMs		
3-pin Micro- style right-angle	MQAC-306RA MQAC-315RA MQAC-330RA	2 m (6.5') 5 m (15') 9 m (30')			
4-Pin Euro-style straight	MQD9-406 MQD9-415	2 m (6.5') 5 m (15')	NAMUR Series MINI-BEAMs		
4-Pin Euro-style right-angle	MQD9-406RA MQD9-415RA	2 m (6.5') 5 m (15')			

MINI-BEAM Modifications Available

Model Suffix	Modification	Description	Example of Model Number
W/30	9 m (30') cable	All MINI-BEAM sensors may be ordered with an integral 9 m (30') unterminated cable in place of the standard 2 m (6.5') cable	SM312LV W/30
MHS	Modified for High Speed	Standard dc MINI-BEAM sensors with 1 millisecond output response may be modified for 0.3 millisecond (300 μ s) response. NOTE: Faster response comes at the expense of lower excess gain.	SM312LVMHS
QDP	Pigtail Quick-Disconnect	All MINI-BEAMs may be built with a 150 mm (6") long integral cable which is terminated with the appropriate QD connector.	SM312LVQDP



MINI-BEAM Extension Cables (Without Connectors)

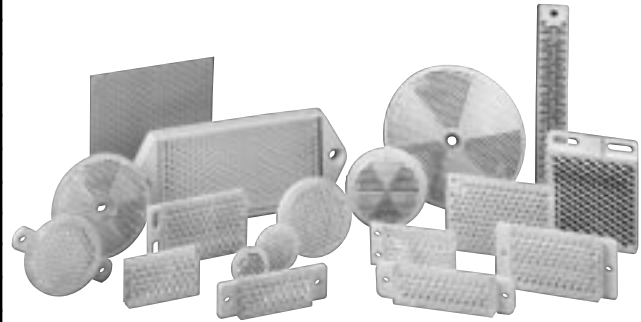
The following cables are available for extending the length of existing sensor cable. These are 30 m (100') lengths of MINI-BEAM cable. This cable may be spliced to existing cable. Connectors, if used, must be customer-supplied.

Model	Type	Used with:
EC312A-100	2-conductor	MINI-BEAM emitters, SM2A312 ac models
EC312-100	4-conductor	All MINI-BEAM SM312 dc models, except emitters
ECAD9-100	2-conductor	MINI-BEAM NAMUR models

MINI-BEAM Accessories

Retroreflective Targets

Model	Reflectivity Factor	Maximum Temperature	Size
BRT-3*	1.0	65°C (150°F)	84 mm diameter
BRT-2A	1.0	65°C (150°F)	56 mm diameter
BRT-50	1.0	65°C (150°F)	51 mm diameter
BRT-1.5	1.0	65°C (150°F)	46 mm diameter
BRT-1	1.0	65°C (150°F)	25 mm diameter
BRT-.6	1.0	65°C (150°F)	20 mm diameter
BRT-50D*	1.0	65°C (150°F)	51 mm diameter
BRT-42D	1.0	50°C (120°F)	42 mm diameter
BRT-50R*	1.0	50°C (120°F)	51 mm diameter
BRT-25R	1.0	50°C (120°F)	25 mm diameter
BRT-42A	1.0	50°C (120°F)	42 mm diameter
BRT-100X55A	1.5	50°C (120°F)	132 mm x 55 mm
BRT-92X92C*	3.0	50°C (120°F)	100 mm x 100 mm
BRT-77X77C*	2.0	50°C (120°F)	85 mm x 85 mm
BRT-100X50	1.5	50°C (120°F)	101 mm x 51 mm
BRT-2X2	1.0	50°C (120°F)	51 mm x 61 mm
BRT-36X40BM	1.2**	50°C (120°F)	51 mm x 61 mm
BRT-60X40C*	1.4	50°C (120°F)	41 mm x 60 mm
BRT-48X32	1.0	50°C (120°F)	33 mm x 48 mm
BRT-48X32A	1.0	50°C (120°F)	33 mm x 65 mm
BRT-48X32B	1.0	50°C (120°F)	33 mm x 57 mm
BRT-40X23	1.4	50°C (120°F)	24 mm x 40 mm
BRT-40X23B	1.4	50°C (120°F)	24 mm x 48 mm
BRT-35X20A	1.4	50°C (120°F)	24 mm x 55 mm
BRT-40X18A	1.0	50°C (120°F)	18 mm x 60 mm
BRT-53X19A	1.4	50°C (120°F)	19 mm x 72 mm
BRT-100X18A	1.4	50°C (120°F)	19 mm x 120 mm
BRT-L	.08	65°C (150°F)	165 mm x 19 mm
BRT-41AHT	1.0	200°C (390°F)	41 mm diameter
BRT-4HT***	.15	480°C (900°F)	100 mm x 100 mm



NOTE: The range of all retroreflective sensors is specified using target model BRT-3. Sensing range and signal strength at any given sensor-to-target distance will vary due to target reflectivity and target area. A "Reflectivity Factor" is included for each target model to help predict sensor performance, relative to the excess gain curve plotted for target model BRT-3. Consider, also, target area when predicting performance.

Retroreflective Tape

Model	Reflectivity Factor	Maximum Temperature	Size	Unit
BRT-THG-3X3-10	0.7	60°C (140°F)	75 x 75 mm (3" x 3")	Package of 10
BRT-THG-4X4-5	0.7	60°C (140°F)	100 x 100 mm (4" x 4")	Package of 5
BRT-THG-8.5X11-2	0.7	60°C (140°F)	216 x 280 mm (8.5" x 11")	Package of 2
BRT-THG-18X36	0.7	60°C (140°F)	457 x 914 mm (18" x 36")	Single Sheet
BRT-THG-1-100	0.7	60°C (140°F)	25 mm (1") wide	2.5 m (100") length
BRT-THG-2-100	0.7	60°C (140°F)	50 mm (2") wide	2.5 m (100") length
BRT-THG-3-100	0.7	60°C (140°F)	75 mm (3") wide	2.5 m (100") length
BRT-T-100***	0.2	65°C (150°F)	25 mm (1") wide	2.5 m (100") length
BRT-THT-100***	0.07	175°C (350°F)	25 mm (1") wide	2.5 m (100") length



* Optional brackets are available; see Banner Photoelectric Product Catalog

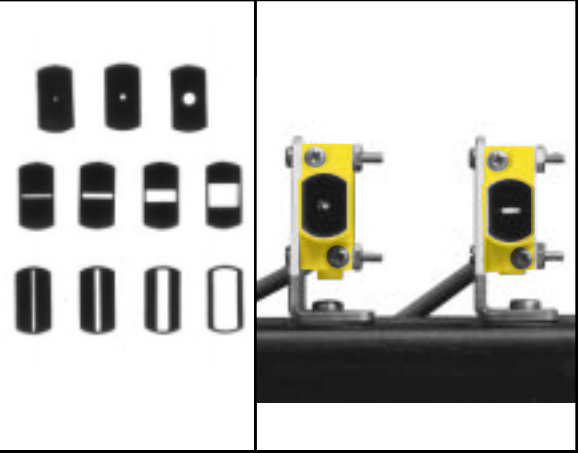
** Target has micro-prism geometry

*** Targets are not recommended for polarized retroreflective sensors

Apertures

Opposed-mode MINI-BEAM sensors may be fitted with apertures which narrow or shape the effective beam of the sensor to more closely match the size or profile of the object to be sensed, for example, the use of "line" (or "slit") apertures for sensing wire or thread. Each model contains 20 apertures.

Model	Description
AP31-020 AP31-040 AP31-100 AP31-020H AP31-040H AP31-100H AP31-200H AP31-020V AP31-040V AP31-100V AP31-200V AP31-DVHX2	0.5 mm (0.02") diameter, circular 1.0 mm (0.04") diameter, circular 2.5 mm (0.10") diameter, circular 0.5 x 6.4 mm (0.02" x 0.25"), horizontal slotted 1.0 x 6.4 mm (0.04" x 0.25"), horizontal slotted 2.5 x 6.4 mm (0.10" x 0.25"), horizontal slotted 5.1 x 6.4 mm (0.20" x 0.25"), horizontal slotted 0.5 x 12.7 mm (0.02" x 0.50"), vertical slotted 1.0 x 12.7 mm (0.04" x 0.50"), vertical slotted 2.5 x 12.7 mm (0.10" x 0.50"), vertical slotted 5.1 x 12.7 mm (0.20" x 0.50"), vertical slotted Kit containing two of each aperture



Range of MINI-BEAM Opposed-Mode Sensor Pairs when Used with Apertures

Definitions	Aperture(s) Used	RANGE Standard Group I and II Sensor Pairs				RANGE Group I Sensor Pairs with UC-300EL Upper Covers Substituted	
		Emitter & Receiver Both Apertured		Receiver Only Apertured		Emitter & Receiver Both Apertured	Receiver Only Apertured
		Group I Sensors	Group II Sensors	Group I Sensors	Group II Sensors		
GROUP I Emitter/ Receiver Pairs (see RANGE columns at right): SM31E/SM31R SMA31E/SM2A31R GROUP II Emitter/ Receiver Pairs (see RANGE columns at right): SM31EL/SM31RL SMA31EL/SM2A31RL Example: The MINI-BEAM SM31E/SM31R sensor pair is in Group I . With an AP31-040 circular aperture on the <i>receiver only</i> , range is 940 mm (37"). With AP31-040 apertures on <i>both emitter and receiver</i> , range is 330 mm (13"). Group I range with AP31-040 apertures and UC-300EL upper covers on both units is 483 mm (19"); range with only receiver apertures is 2.0 m (80").	AP31-020	89 mm (3.5")	102 mm (4.0")	457 mm (18")	1.5 m (60")	127 mm (5.0")	914 mm (36")
	AP31-040	330 mm (13")	457 mm (18")	940 mm (37")	3.2 m (10.5')	483 mm (19")	2.0 m (80")
	AP31-100	1.5 m (60")	3.0 m (10')	2.5 m (100")	8.2 m (27')	2.1 m (84")	5.8 m (19')
	AP31-020H	406 mm (16")	1.8 m (70")	965 mm (38")	9.1 m (30')	864 mm (34')	3.4 m (11')
	AP31-040H	914 mm (36")	4.0 m (13')	1.8 m (72")	12.5 m (41')	1.8 m (72")	5.2 m (17')
	AP31-100H	2.3 m (90")	10.4 m (34')	2.9 m (114")	20.7 m (68')	5.2 m (17')	8.5 m (28')
	AP31-200H	2.8 m (110")	21.3 m (70')	3.0 m (120")	24.4 m (80')	8.2 m (27')	11.0 m (36')
	AP31-020V	457 mm (18")	1.7 m (65")	1.0 m (40")	8.2 m (27')	1.0 m (40")	3.4 m (11')
	AP31-040V	1.0 m (40")	5.5 m (18')	1.8 m (70")	15.8 m (52')	2.1 m (84")	5.5 m (18')
	AP31-100V	2.3 m (90")	10.7 m (35')	2.9 m (114")	22.9 m (75')	6.1 m (20')	8.5 m (28')
	AP31-200V	2.8 m (110")	22.9 m (75')	3.0 m (120")	25.9 m (85')	8.5 mm (28')	11.0 m (36')

MINI-BEAM Mounting Brackets

Model	Description	Dimensions	
SMB312S	Stainless steel 2-axis, side mounting bracket		
SMB312PD	Stainless steel 18 mm barrel mounting bracket		
SMB312B	Stainless steel 2-axis, bottom mounting bracket		
SMB46L	<ul style="list-style-type: none"> • “L” bracket • 14 ga 316 stainless steel 		

MINI-BEAM Mounting Brackets

Model	Description	Dimensions	
SMB46S	<ul style="list-style-type: none"> “S” bracket 14 ga 316 stainless steel 	<p>Technical drawing of the SMB46S bracket. The top view shows a 54 mm (2.1") wide base with a 34 mm (1.3") wide top section. The side view shows a 65 mm (2.6") high vertical section and a 16 mm (0.6") high horizontal section. The bottom view shows a 54 mm (2.1") wide base with a 16 mm (0.6") high vertical section. Dimensions are provided in mm and inches.</p>	
SMB46U	<ul style="list-style-type: none"> “U” bracket 14 ga 316 stainless steel 	<p>Technical drawing of the SMB46U bracket. The top view shows a 54 mm (2.1") wide base with a 34 mm (1.3") wide top section. The side view shows a 65 mm (2.6") high vertical section and a 16 mm (0.6") high horizontal section. The bottom view shows a 54 mm (2.1") wide base with a 16 mm (0.6") high vertical section. Dimensions are provided in mm and inches.</p>	
SMB18C	<ul style="list-style-type: none"> 18 mm split clamp black VALOX® bracket Stainless steel mounting hardware included 	<p>Technical drawing of the SMB18C bracket. The top view shows a 40.0 mm (1.60") wide base with a 42.4 mm (1.67") high vertical section. The side view shows a 21.1 mm (0.83") high vertical section and a 2.5 mm (0.10") high horizontal section. Dimensions are provided in mm and inches.</p>	
SMB18S	<ul style="list-style-type: none"> 18 mm swivel, black VALOX® bracket Stainless steel mounting hardware included 	<p>Technical drawing of the SMB18S bracket. The top view shows a 46.0 mm (1.81") wide base with a 44.5 mm (1.75") high vertical section. The side view shows a 25.4 mm (1.00") high vertical section and a 2.5 mm (0.10") high horizontal section. Dimensions are provided in mm and inches.</p>	