


VALU-BEAM® Sensors

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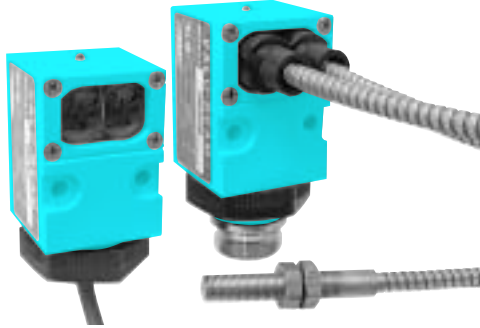


 VALU-BEAM sensors are not suitable for use in personnel safety applications! See WARNING on inside front cover of catalog.

VALU-BEAM 912 Series Sensors

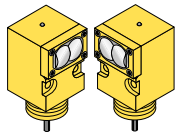
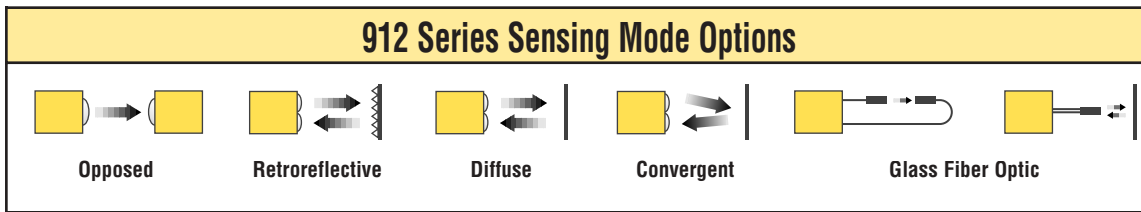
With Solid-State Outputs

VALU-BEAM 912 cabled diffuse mode (left) and quick-disconnect glass fiber optic mode (right) shown



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

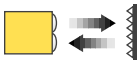
† U. S. Patent #4356393



Infrared, 880 nm

912 Series Opposed Mode Emitter (E) and Receiver (R)

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
SMA91E SM91R SMA91EQD SM91RQD	60 m (200')	2 m (6.5') 2 m (6.5') 3-Pin Mini QD 4-Pin Mini QD	Emitter: 10-250V ac/dc Receiver: 10-30V dc	Bipolar NPN/PNP		<p>Effective Beam: 13 mm</p>
SMA91E SM2A91R SMA91EQD SM2A91RQD		2 m (6.5') 2 m (6.5') 3-Pin Mini QD 3-Pin Mini QD	Emitter: 10-250V ac/dc Receiver: 24-250V ac	SPST SCR Solid-state 2-Wire		
SMA91ESR SM91RSR SMA91ESRQD SM91RSRQD	3 m (10')	2 m (6.5') 2 m (6.5') 3-Pin Mini QD 4-Pin Mini QD	Emitter: 10-250V ac/dc Receiver: 10-30V dc	Bipolar NPN/PNP		<p>Effective Beam: 3.5 mm</p>
SMA91ESR SM2A91RSR SMA91ESRQD SM2A91RSRQD		2 m (6.5') 2 m (6.5') 3-Pin Mini QD 3-Pin Mini QD	Emitter: 10-250V ac/dc Receiver: 24-250V ac	SPST SCR Solid-state 2-Wire		



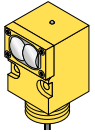
Visible red, 650 nm

Non-Polarized



Polarized

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 722 for more information.



Non-Polarized, Polarized

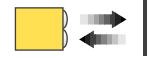
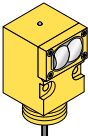
912 Series Retroreflective Mode

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
Non-Polarized						
SM912LV SM912LVQD	0.15 - 9 m (6" - 30')	2 m (6.5') 4-Pin Mini QD	10-30V dc	Bipolar NPN/PNP		
SM2A912LV SM2A912LVQD		2 m (6.5') 3-Pin Mini QD	24-250V ac	SPST SCR Solid-state 2-Wire		
Polarized*						
SM912LVAG SM912LVAGQD	0.3 - 4.5 m (1 - 15')	2 m (6.5') 4-Pin Mini QD	10-30V dc	Bipolar NPN/PNP		
SM2A912LVAG SM2A912LVAGQD		2 m (6.5') 3-Pin Mini QD	24-250V ac	SPST SCR Solid-state 2-Wire		

*Use polarized models when shiny objects will be sensed

For VALU-BEAM 912 Series Sensors:

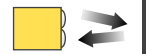
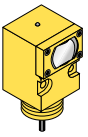
- i) 9 m (30') cables are available by adding suffix "W/30" to the model number of any cabled sensor (e.g. - SM912LV W/30)
- ii) A model with a QD connector requires an accessory mating cable. See pages 368 and the Accessories section for more information.



Infrared, 880 nm

912 Series Diffuse Mode

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Performance based on 90% reflectance white test card	
SM912D SM912DQD	760 mm (30")	2 m (6.5') 4-Pin Mini QD	10-30V dc	Bipolar NPN/PNP		
SM2A912D SM2A912DQD		2 m (6.5') 3-Pin Mini QD	24-250V ac	SPST SCR Solid-state 2-Wire		
SM912DSR SM912DSRQD	380 mm (15")	2 m (6.5') 4-Pin Mini QD	10-30V dc	Bipolar NPN/PNP		
SM2A912DSR SM2A912DSRQD		2 m (6.5') 3-Pin Mini QD	24-250V ac	SPST SCR Solid-state 2-Wire		



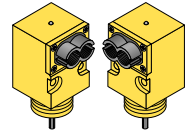
See Sensing Beam Information Below

912 Series Convergent Mode

Models	Focus	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Performance based on 90% reflectance white test card	
Visible Red 650 nm						
SM912CV SM912CVQD	38 mm (1.5")	2 m (6.5') 4-Pin Mini QD	10-30V dc	Bipolar NPN/PNP		
SM2A912CV SM2A912CVQD	Spot Size at Focus: 1.5 mm (0.06")					
Infrared 880 nm						
SM912C SM912CQD	38 mm (1.5")	2 m (6.5') 4-Pin Mini QD	10-30V dc	Bipolar NPN/PNP		
SM2A912C SM2A912CQD		2 m (6.5') 3-Pin Mini QD	24-250V ac	SPST SCR Solid-state 2-Wire		



Infrared 880 nm

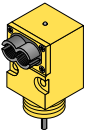


912 Series Glass Fiber Optic Emitter (E) and Receiver (R)

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
SMA91EF SM91RF SMA91EFQD SM91RFQD	Range varies with fiber used	2 m (6.5') 2 m (6.5') 3-Pin Mini QD 4-Pin Mini QD	Emitter: 10-250V ac/dc Receiver: 10-30V dc	Bipolar NPN/PNP		
SMA91EF SM2A91RF SMA91EFQD SM2A91RFQD		2 m (6.5') 2 m (6.5') 3-Pin Mini QD 3-Pin Mini QD	Emitter: 10-250V ac/dc Receiver: 24-250V ac	SPST SCR Solid-state 2-Wire		



Infrared 880 nm






912 Series Glass Fiber Optic Mode

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Diffuse mode performance based on 90% reflectance white test card	
SM912F SM912FQD	Range varies with fiber optics used.	2 m (6.5') 4-Pin Mini QD	10-30V dc	Bipolar NPN/PNP		
SM2A912F SM2A912FQD		2 m (6.5') 3-Pin QD	24-250V ac	SPST SCR Solid-state 2-Wire		

For VALU-BEAM 912 Series Sensors:

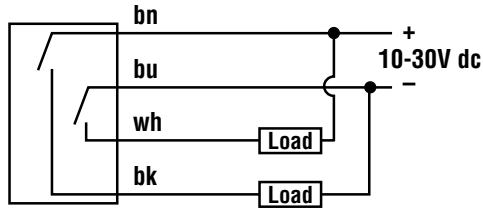
- i) 9 m (30') cables are available by adding suffix "W/30" to the model number of any cabled sensor (e.g. - SM912D W/30)
- ii) A model with a QD connector requires an accessory mating cable. See pages 368 and the Accessories section for more information.

912 Series DC Specifications

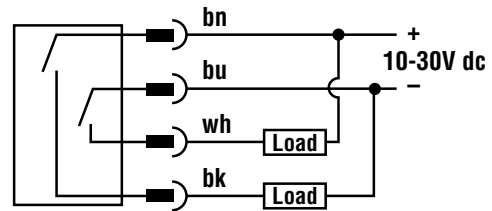
Supply Voltage and Current	10 to 30V dc at 20 mA maximum, exclusive of load (except for SMA91E, ESR and EF emitters, which operate from 10 to 250V ac or dc, 10 mA max.)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Bipolar: One current sourcing (PNP) and one current sinking (NPN) open-collector transistor
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 10mA and less than 1 volt at 250 mA
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short-circuit of outputs
Output Response Time	4 milliseconds ON/OFF (except receiver-only units which are 8 milliseconds ON and 4 milliseconds OFF); independent of signal strength (NOTE: 100 millisecond delay on power-up; outputs non-conducting during this time)
Repeatability	Opposed and Glass Fiber Optic Emitter-Receiver pairs: 1.0 millisecond; Retro, Diffuse, Convergent and Glass Fiber Optic: 1.3 milliseconds
Adjustments	LIGHT/DARK OPERATE select switch and SENSITIVITY control potentiometer, both located at rear of sensor
Indicators	Exclusive, patented Alignment Indicating Device (AID™, US patent #4356393) lights a top 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). Models SMA91E & SM91ESR emitter have a visible-red “tracer beam” which indicates “power on” and enables easy “line-of-sight” alignment.
Construction	Reinforced thermoplastic polyester housing, totally encapsulated, molded acrylic lenses and stainless steel hardware
Environmental Rating	Meets NEMA standards 1, 2, 3, 3S, 4, 4X, 12 and 13; IEC IP66
Connections	PVC-jacketed 2 m (6.5') or 9 m (30') cables or 4-pin mini-style quick-disconnect (QD) fitting available. Note: Opposed mode emitters use 3-pin mini-style QD fitting. See page 368 and the Accessories section.
Operating Conditions	Temperature: -20° to +70° C (-4° to +158°F) Maximum relative humidity: 90% at 50°C (non-condensing)
Certifications	  

912 Series DC Hookup Diagrams

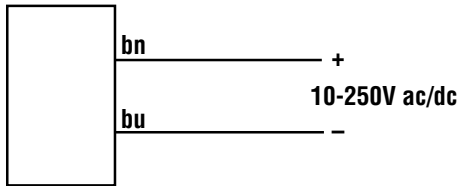
DC Sensors with Attached Cable



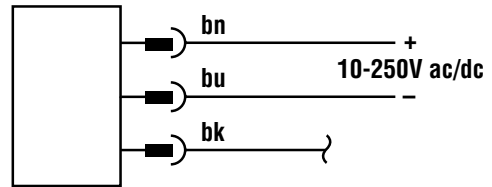
DC Sensors with Quick-Disconnect (4-Pin Mini-Style)



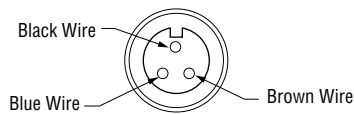
Emitters with Attached Cable



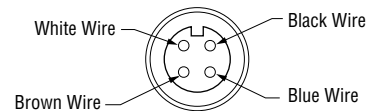
Emitters with Quick-Disconnect (3-Pin Mini-Style)



3-Pin Mini-Style Pin-out (Cable Connector Shown)



4-Pin Mini-Style Pin-out (Cable Connector Shown)




Quick-Disconnect (QD) Option

DC 912 Series VALU-BEAM sensors are sold with either a 2 m (6.5') or a 9 m (30') attached PVC-covered cable, or with a 4-pin mini-style QD cable fitting. Opposed mode emitters use 3-pin mini-style QD cable fitting.

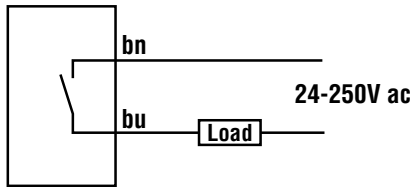
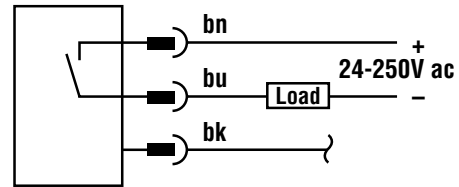
DC QD sensors are identified by the letters "QD" in their model number suffix. Mating cable for QD 912 Series sensors is model MBCC-412. Mating cable for opposed mode emitters is model MBCC-312. Cables are supplied in a standard length of 4 m (12'). For more information on QD cables, see page 368 and the Accessories section.

912 Series AC Specifications

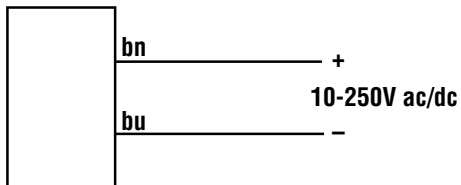
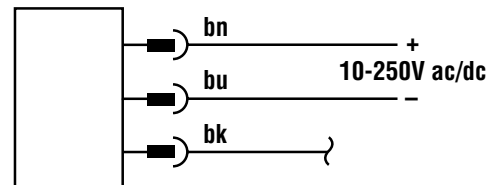
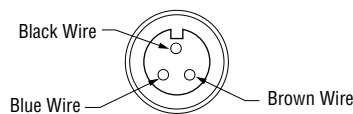
Supply Voltage and Current	24 to 250V ac (50/60 Hz), except for SMA91E, ESR and EF emitters, which operate from 10 to 250V ac or dc
Supply Protection Circuitry	Protected against transient voltages
Output Configuration	SPST SCR solid-state relay with either normally closed or normally open contact (light/dark operate selectable); 2-wire hookup
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 sec. (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
Output Protection Circuitry	Protected against false pulse on power-up
Output Response Time	8 milliseconds ON and OFF (except receiver-only units, which are 8 milliseconds ON and 4 milliseconds OFF; independent of signal strength) 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 important (NOTE: 300 millisecond delay on power-up; outputs are non-conducting during this time)
Repeatability	Opposed and Glass Fiber Optic Emitter-Receiver pairs: 1.0 millisecond; Retro, Diffuse, Convergent and Glass Fiber Optic: 2.6 milliseconds
Adjustments	LIGHT/DARK OPERATE select switch and SENSITIVITY control potentiometer, both located at rear of sensor
Indicators	Top-mounted red LED indicator lights when output is conducting. Models SMA91E & SM91ESR emitter have a visible-red “tracer beam” which indicates “power on” and enables easy “line-of-sight” alignment.
Construction	Reinforced thermoplastic polyester housing, totally encapsulated, molded acrylic lenses and stainless steel hardware
Environmental Rating	Meets NEMA standards 1, 2, 3, 3S, 4, 4X, 12 and 13; IEC IP66
Connections	PVC-jacketed 2 m (6.5') or 9 m (30') cables or 3-pin mini-style quick-disconnect (QD) fitting available. See page 368 and the Accessories section.
Operating Conditions	Temperature: -20° to +70° C (-4° to +158°F) Maximum relative humidity: 90% at 50°C (non-condensing)
Application Notes	i) 912 Series ac sensors 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 parallel with mechanical switch contacts
Certifications	

912 Series AC Hookup Diagrams

AC Sensors with Attached Cable

AC Sensors with Quick-Disconnect
(3-Pin Mini-Style)

Emitters with Attached Cable

Emitters with Quick-Disconnect
(3-Pin Mini-Style)Mini-Style Pin-out
(Cable Connector Shown)

Quick-Disconnect (QD) Option

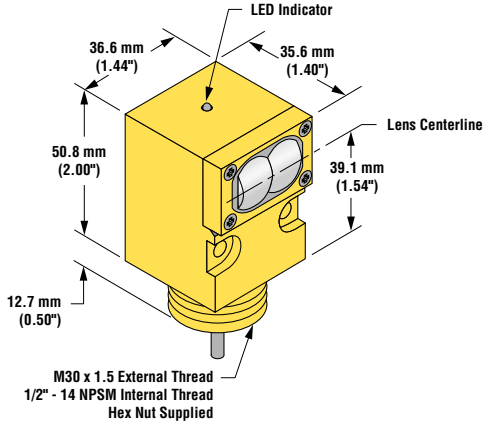
AC 912 Series VALU-BEAM sensors are sold with either a 2 m (6.5') or a 9 m (30') attached PVC-covered cable, or with a 3-pin mini-style QD cable fitting.

AC QD sensors are identified by the letters "QD" in their model number suffix. Mating cables for QD 912 Series sensors are model MBCC-312. Cables are supplied in a standard length of 4 m (12'). For more information on QD cables, see page 368 and the Accessories section.

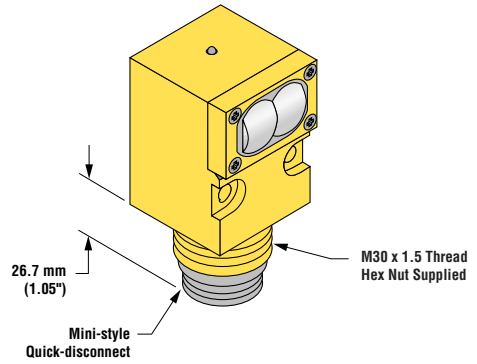
912 Series Dimensions

912 Series Opposed, Retro, and Diffuse Sensing Modes
(model suffix E, ESR, R, RSR, LV, D & DSR)

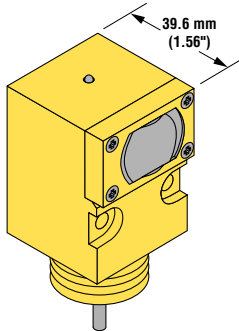
912 Series Sensor with Attached Cable



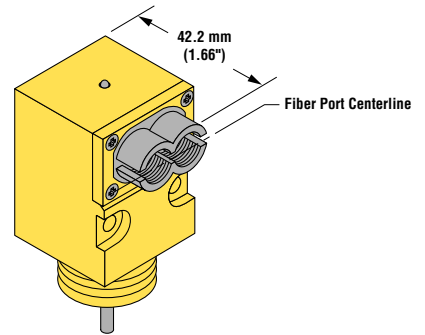
912 Series Sensor with Quick-Disconnect



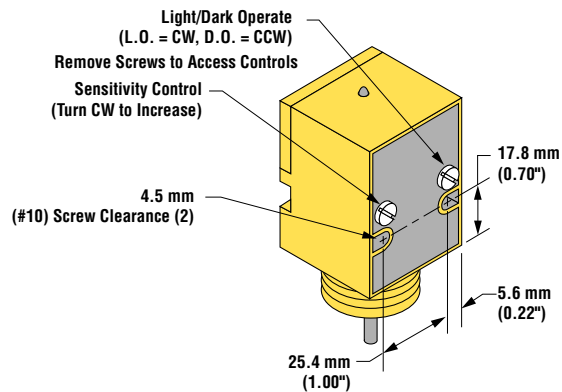
912 Series Sensor - Convergent Sensing Mode
(model suffix LVAG, C & CV)



912 Series Sensor - Glass Fiber Optic
(model suffix F, EF & RF)



912 Series Sensor - Rear View



NOTES:

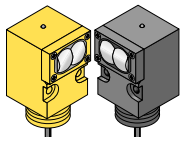
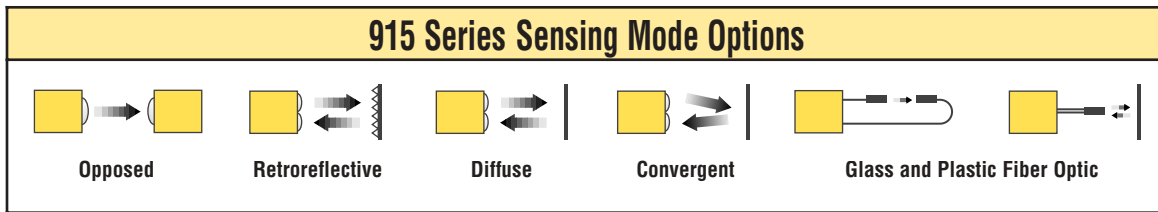
VALU-BEAM 915 Series Sensors

with Electromechanical Relay Output

VALU-BEAM 915 Series quick-disconnect (left) and cabled (right) versions shown



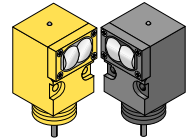
- Models available for either 12 to 28V ac/dc, 90 to 130V ac, or 210 to 250V ac
- SPDT electromechanical relay output is rated for up to 5 amps switching capacity
- Rear panel sensitivity adjustment; top-mounted alignment indicator
- Choose models with integral 2 m (6.5') cable or mini-style QD (quick-disconnect) connector; 9 m (30') cables are also available



Infrared, 880 nm

915 Series Opposed Mode Emitter (E) and Receiver (R)

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
SMA91E SMW95R SMA91EQD SMW95RQD	60 m (200')	2 m (6.5') 2 m (6.5') 3-Pin Mini QD 5-Pin Mini QD	Emitter: 10-250V ac/dc Receiver: 12-28V ac/dc	SPDT E/m Relay		
SMA91E SMA95R SMA91EQD SMA95RQD		2 m (6.5') 2 m (6.5') 3-Pin Mini QD 5-Pin Mini QD	Emitter: 10-250V ac/dc Receiver: 90-130V ac			
SMA91E SMB95R SMA91EQD SMB95RQD		2 m (6.5') 2 m (6.5') 3-Pin Mini QD 5-Pin Mini QD	Emitter: 10-250V ac/dc Receiver: 210-250V ac			



Infrared 880 nm

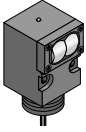
915 Series Opposed Mode Emitter (E) and Receiver (R)

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
SMA91ESR SMW95RSR SMA91ESRQD SMW95RSRQD	3 m (10')	2 m (6.5') 2 m (6.5') 3-Pin Mini QD 5-Pin Mini QD	Emitter: 10-250V ac/dc Receiver: 12-28V dc	SPDT E/m Relay		<p>Effective Beam: 3.5 mm</p>
SMA91ESR SMA95RSR SMA91ESRQD SMA95RSRQD		2 m (6.5') 2 m (6.5') 3-Pin Mini QD 5-Pin Mini QD	Emitter: 10-250V ac/dc Receiver: 90-130V ac			
SMA91ESR SMB95RSR SMA91ESRQD SMB95RSRQD		2 m (6.5') 2 m (6.5') 3-Pin Mini QD 5-Pin Mini QD	Emitter: 10-250V ac/dc Receiver: 210-250V ac			

For VALU-BEAM 915 Series Sensors:

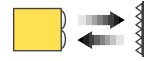
- i) 9 m (30') cables are available by adding suffix “W/30” to the model number of any cabled sensor (e.g. - SMA91E W/30)
- ii) A model with a QD connector requires an accessory mating cable. See pages 368 and the Accessories section for more information.

VALU-BEAM® 915 Series Sensors



Non-Polarized, Polarized

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 722 for more information.



Non-Polarized



Visible red, 650 nm

Polarized

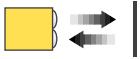
915 Series Retroreflective Mode

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
Non-Polarized						
SMW915LV SMW915LVQD	0.15 - 9 m (6" - 30')	2 m (6.5') 5-Pin Mini QD	12-28V ac/dc	SPDT E/m Relay		
SMA915LV SMA915LVQD		2 m (6.5') 5-Pin Mini QD	90-130V ac			
SMB915LV SMB915LVQD		2 m (6.5') 5-Pin Mini QD	210-250V ac			
Polarized*						
SMW915LVAG SMW915LVAGQD	0.3 - 4.5 m (1 - 15')	2 m (6.5') 5-Pin Mini QD	12-28V ac/dc	SPDT E/m Relay		
SMA915LVAG SMA915LVAGQD		2 m (6.5') 5-Pin Mini QD	90-130V ac			
SMB915LVAG SMB915LVAGQD		2 m (6.5') 5-Pin Mini QD	210-250V ac			

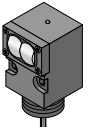
*Use polarized models when shiny objects will be sensed

For VALU-BEAM 915 Series Sensors:

- i) 9 m (30') cables are available by adding suffix "W/30" to the model number of any cabled sensor (e.g. - **SMW915D W/30**)
- ii) A model with a QD connector requires an accessory mating cable. See pages 368 and the Accessories section for more information.

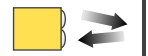
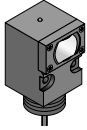


Infrared 880 nm



915 Series Diffuse Mode

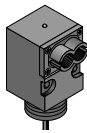
Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Performance based on 90% reflectance white test card	
SMW915D SMW915DQD	760 mm (30")	2 m (6.5') 5-Pin Mini QD	12-28V ac/dc	SPDT E/m Relay		
SMA915D SMA915DQD		2 m (6.5') 5-Pin Mini QD	90-130V ac			
SMB915D SMB915DQD		2 m (6.5') 5-Pin Mini QD	210-250V ac			
SMW915DSR SMW915DSRQD	380 mm (15")	2 m (6.5') 5-Pin Mini QD	12-28V ac/dc	SPDT E/m Relay		
SMA915DSR SMA915DSRQD		2 m (6.5') 5-Pin Mini QD	90-130V ac			
SMB915DSR SMB915DSRQD		2 m (6.5') 5-Pin Mini QD	210-250V ac			



Visible red 650 nm

915 Series Convergent Mode

Models	Focus	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Performance based on 90% reflectance white test card	
SMW915CV SMW915CVQD	38 mm (1.5") Spot Size at Focus: 1.5 mm (0.06")	2 m (6.5') 5-Pin Mini QD	12-28V ac/dc	SPDT E/m Relay		
SMA915CV SMA915CVQD		2 m (6.5') 5-Pin Mini QD	90-130V ac			
SMB915CV SMB915CVQD		2 m (6.5') 5-Pin Mini QD	210-250V ac			



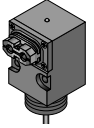
Infrared, 880 nm

915 Series Glass Fiber Optic Mode

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Diffuse mode performance based on 90% reflectance white test card	
SMW915F SMW915FQD	Range varies by sensing mode and fiber used.	2 m (6.5') 5-Pin Mini QD	12-28V ac/dc	SPDT E/m Relay		
SMA915F SMA915FQD		2 m (6.5') 5-Pin Mini QD	90-130V ac			
SMB915F SMB915FQD		2 m (6.5') 5-Pin Mini QD	210-250V ac			



Visible red, 650 nm




915 Series Plastic Fiber Optic Mode

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Diffuse mode performance based on 90% reflectance white test card	
SMW915FP SMW915FPQD	Range varies by sensing mode and fiber used.	2 m (6.5') 5-Pin Mini QD	12-28V ac/dc	SPDT E/m Relay		
SMA915FP SMA915FPQD		2 m (6.5') 5-Pin Mini QD	90-130V ac			
SMB915FP SMB915FPQD		2 m (6.5') 5-Pin Mini QD	210-250V ac			

For VALU-BEAM 915 Series Sensors:

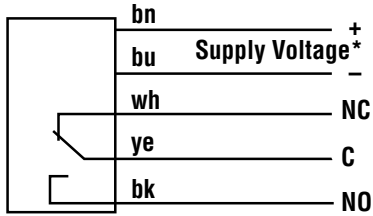
- i) 9 m (30') cables are available by adding suffix "W/30" to the model number of any cabled sensor (e.g. - SMW915FP W/30)
- ii) A model with a QD connector requires an accessory mating cable. See pages 368 and the Accessories section for more information.

915 Series Specifications

Supply Voltage and Current	<p>SMW915 Series: 12 to 28V ac or dc at 50 mA maximum, exclusive of load SMA915 Series: 90 to 130V ac (50-60 Hz) at 20 mA maximum, exclusive of load SMB915 Series: 210 to 250V ac (50-60 Hz) at 20 mA maximum, exclusive of load Exceptions: SMA91E and ESR emitters, which operate from 10-250V ac (50-60 Hz) or dc (10 mA max.)</p>
Supply Protection Circuitry	Protected against transient voltages
Output Configuration	One internal “form C” (single-pole double-throw) electromechanical relay
Output Rating	<p>Max. switching power (resistive load) = 150 W, 600 VA Max. switching voltage (resistive load) = 250V ac or 30 V dc (120V ac max. per UL & CSA) Max. switching current (resistive load) = 5A Min.. voltage and current = 1 amp at 5V dc, 0.1 amp at 24V dc Peak switching voltage = 750V ac (transient suppression recommended) Mechanical life of relay = 10,000,000 operations</p>
Output Protection Circuitry	Protected against false pulse on power-up
Output Response Time	20 milliseconds ON and OFF; independent of signal strength (NOTE: 100 millisecond relay on power-up; relay de-energized during this time)
Adjustments	SENSITIVITY control on rear of sensor allows precise gain setting (turn clockwise to increase gain)
Indicators	Top-mounted red LED indicator lights whenever the sensor sees “light” condition. Models SMA91E and SMA91ESR emitters have visible-red “tracer beam” which indicates “power on” and enables easy “line-of-sight” alignment.
Construction	Reinforced black thermoplastic polyester housing, totally encapsulated, molded acrylic lenses and stainless steel hardware
Environmental Rating	Meets NEMA standards 1, 2, 3, 3S, 4, 4X, 12 and 13; IEC IP66
Connections	PVC-jacketed 2 m (6.5') or 9 m (30') cable or 5-pin mini-style quick-disconnect (QD) fitting available. See page 368 and Accessories section.
Operating Conditions	<p>Temperature: -40° to +50° C (-40° to +122°F) Maximum relative humidity: 90% at 50°C (non-condensing)</p>
Application Notes	Install transient suppressor (MOV) across any output contact which switches an inductive load
Certifications	

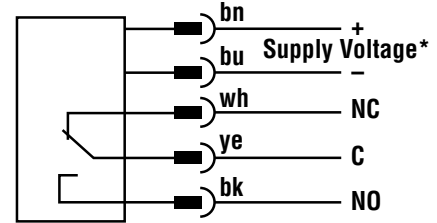
915 Series Hookup Diagrams

Sensors with Attached Cable



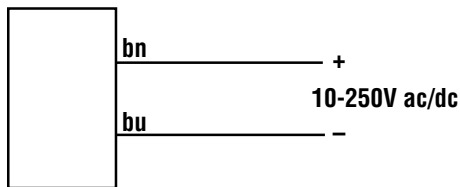
*see Specifications

Sensors with Quick-Disconnect (5-Pin Mini-Style)

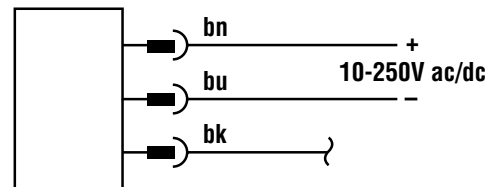


*see Specifications

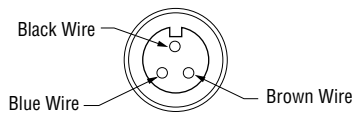
Emitters with Attached Cable



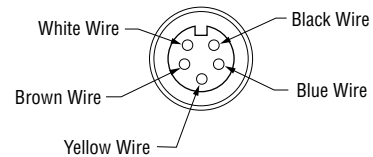
Emitters with Quick-Disconnect (3-Pin Mini-Style)



3-Pin Mini-Style Pin-out (Cable Connector Shown)



5-Pin Mini-Style Pin-out (Cable Connector Shown)



Quick-Disconnect (QD) Option

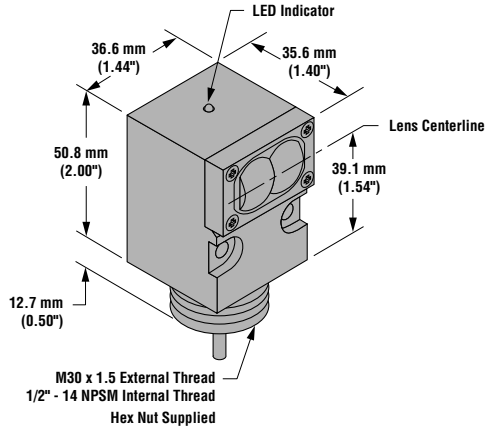
915 Series VALU-BEAM sensors are sold with either a 2 m (6.5') or a 9 m (30') attached PVC-covered cable, or with a 5-pin mini-style QD cable fitting. Opposed mode emitters use 3-pin mini-style QD cable fitting.

QD sensors are identified by the letters "QD" in their model number suffix. Mating cables for QD 915 Series sensors are model MBCC-512. Cables are supplied in a standard length of 4 m (12'). For more information on QD cables, see page 368 and the Accessories section.

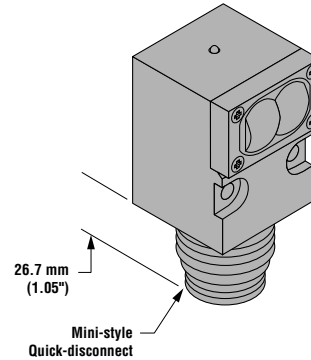
915 Series Dimensions

915 Series Opposed, Retro, and Diffuse Sensing Modes
(model suffix E, ESR, R, RSR, LV, D & DSR)

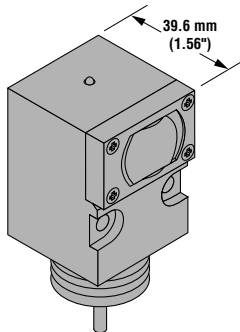
915 Series Sensor with Attached Cable



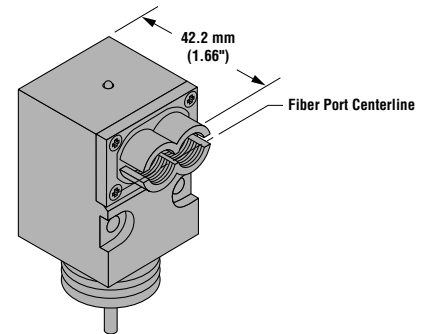
915 Series Sensor with Quick-Disconnect



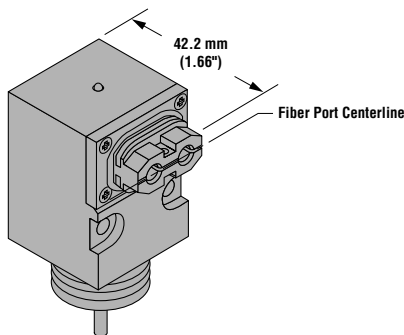
915 Series Sensor - Convergent Sensing Mode
(model suffix LVAG & CV)



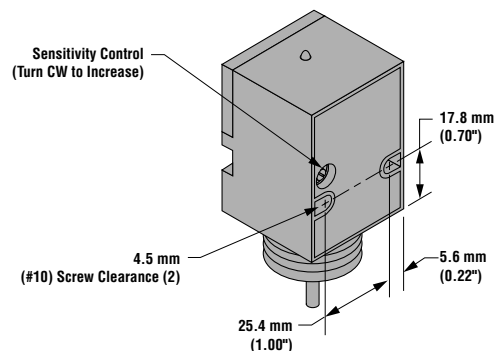
915 Series Sensor - Glass Fiber Optic
(model suffix F)



915 Series Sensor - Plastic Fiber Optic
(model suffix FP)



915 Series Sensor - Rear View



NOTES:

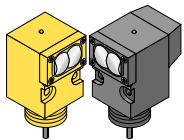
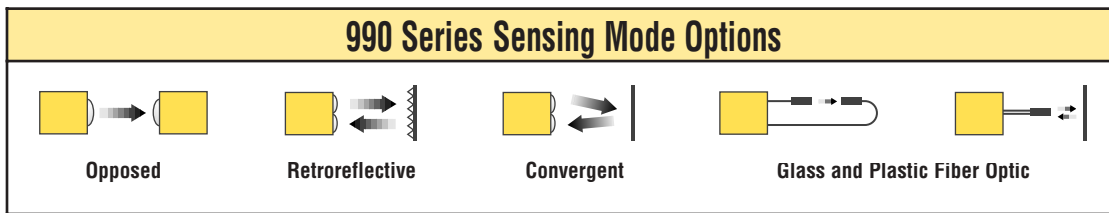
VALU-BEAM 990 Series Sensors

With Built-In Totalizing Counter

VALU-BEAM 990 Series quick-disconnect and cabled models shown



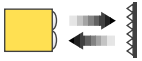
- Each sensor is an economical, one-piece photoelectric counting system
- Simple, 2-wire hookup to universal voltage: 12 to 115V dc or 10 to 250V ac
- Six-digit totalizer is reset upon power-up, or by touching the top of the sensor with a permanent magnet
- Models are available with memory backup to “hold” count for up to 100 hours with power removed (order model suffix “MB”)
- Specially-designed infrared retroreflective version is available for counting people passing through entryways



Infrared, 880 nm

990 Series Opposed Mode Emitter (E) and Receiver (R)

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
SMA91E SMA99R SMA91EQD SMA99QD	60 m (200')	2 m (6.5') 2 m (6.5') 3-Pin Mini QD 3-Pin Mini QD	Emitter: 10-250V ac/dc Receiver: 10-250V ac or 12-115V dc	Built-in 6-digit totalizing counter		<p>Effective Beam: 12.7 mm</p>
SMA91ESR SMA99RSR SMA91ESRQD SMA99RSRQD	3 m (10')	2 m (6.5') 2 m (6.5') 3-Pin Mini QD 3-Pin Mini QD	Emitter: 10-250V ac/dc Receiver: 10-250V ac or 12-115V dc	Built-in 6-digit totalizing counter		<p>Effective Beam: 3.5 mm</p>

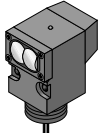


Visible red 650 nm and Infrared 940 nm
Non-Polarized



Polarized

NOTE: 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(s) in use. See page 722 for more information.



990 Series Retroreflective Mode

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
Non-Polarized (Visible red, 650 nm)						
SMA990LV SMA990LVQD	0.15 - 9 m (6" - 30')	2 m (6.5') 3-Pin Mini QD	10-250V ac or 12-115V dc	Built-in 6-digit totalizing counter		
Non-Polarized (Infrared, 940 nm)*						
SMA990LT SMA990LTQD	9 m (30')	2 m (6.5') 3-Pin Mini QD	10-250V ac or 12-115V dc	Built-in 6-digit totalizing counter		
Polarized (Visible red, 650 nm)†						
SMA990LVAG SMA990LVAGQD	0.3 - 4.5 m (1 - 15')	2 m (6.5') 3-Pin Mini QD	10-250V ac or 12-115V dc	Built-in 6-digit totalizing counter		

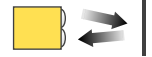
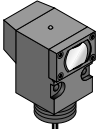
* Note: "LT" models include 0.1 second delays to minimize multiple counts in "people counting" applications.

† Use polarized models when shiny objects will be counted.

For VALU-BEAM 990 Series Sensors:

- i) 9 m (30') cables are available by adding suffix "W/30" to the model number of any cabled sensor (e.g. - SMA990LV W/30)
- ii) A model with a QD connector requires an accessory mating cable. See pages 368 and the Accessories section for more information.

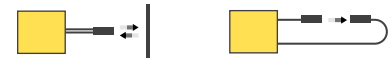
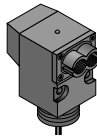
VALU-BEAM® 990 Series Sensors



Visible red 650 nm

990 Series Convergent Mode

Models	Focus	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Performance based on 90% reflectance white test card	
SMA990CV SMA990CVQD	38 mm (1.5") Spot Size at Focus: 1.5 mm (0.06")	2 m (6.5') 3-Pin Mini QD	10-250V ac or 12-115V dc	Built-in 6-digit totalizing counter		



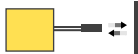
Infrared, 880 nm

990 Series Glass Fiber Optic

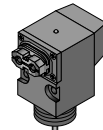
Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Diffuse mode performance based on 90% reflectance white test card	
SMA990F SMA990FQD	Range varies by sensing mode and fiber optics used	2 m (6.5') 3-Pin Mini QD	10-250V ac or 12-115V dc	Built-in 6-digit totalizing counter		

For VALU-BEAM 990 Series Sensors:

- i) 9 m (30') cables are available by adding suffix "W/30" to the model number of any cabled sensor (e.g. - SMA990CV W/30)
- ii) A model with a QD connector requires an accessory mating cable. See pages 368 and the Accessories section for more information.




Visible red, 650 nm



990 Series Plastic Fiber Optic

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Diffuse mode performance based on 90% reflectance white test card	
SMA990FP SMA990FPQD	Range varies by sensing mode and fiber optics used	2 m (6.5') 3-Pin Mini QD	10-250V ac or 12-115V dc	Built-in 6-digit totalizing counter	<p>The graph plots Excess Gain (log scale 1 to 1000) against Distance (log scale 1 mm to 1000 mm). It shows curves for SMA990FP, PIT26U Fiber, and PIT46U Fiber. A note indicates 'Opposed Mode Plastic Fibers'.</p>	<p>The diagram shows the beam pattern for SMA990FP in Opposed Mode. The vertical axis shows diameters from 15 mm to 45 mm, and the horizontal axis shows distances from 0 to 125 mm. Two fiber types, PIT26U and PIT46U, are indicated.</p>
					<p>The graph plots Excess Gain (log scale 1 to 1000) against Distance (log scale .1 mm to 100 mm). It shows curves for SMA990FP Diffuse Mode Plastic Fibers, PIT26U Fiber, and PIT46U Fiber.</p>	<p>The diagram shows the beam pattern for SMA990FP in Diffuse Mode. The vertical axis shows diameters from 1.2 mm to 3.8 mm, and the horizontal axis shows distances from 0 to 37.5 mm. Two fiber types, PIT26U and PIT46U, are indicated.</p>

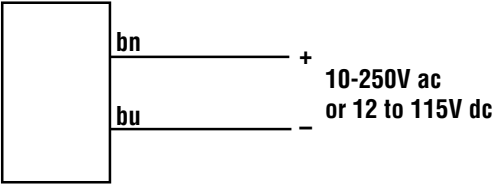
990 Series Specifications

Supply Voltage and Current	990 Series sensors wire directly to either 10 to 250V ac (50/60 Hz) or 12 to 115V dc at less than 20 milliamps
Supply Protection Circuitry	Protected against transient voltages
Sensor Response Time	15 milliseconds LIGHT; 15 milliseconds DARK (except model SMA990LT); independent of signal strength NOTE: 100 millisecond delay on power up (no counts are entered during this time)
Count Entry	Counts are entered on DARK-to-LIGHT transition
Count Reset	In standard models, counter is reset to zero automatically upon applying power to the sensor. All models may be reset by touching the housing on top of the sensor with permanent magnet (supplied with sensor)
Indicators	Top-mounted red LED indicator lights whenever the sensor sees “light” condition. Models SMA91E and SMA91ESR emitters have visible-red “tracer beam” which indicates “power on” and enables easy “line-of-sight” alignment.
Construction	Reinforced thermoplastic polyester housing, totally encapsulated, o-ring sealed lenses or fiber fittings, stainless steel hardware
Environmental Rating	Meets NEMA standards 1, 2, 3, 3S, 4, 4X, 12 and 13; IEC IP66
Connections	PVC-jacketed 2-conductor 2 m (6.5') or 9 m (30') cables or 3-pin mini-style quick-disconnect (QD) fitting are available. QD cables are ordered separately. See page 368 and Accessories section.
Operating Conditions	Temperature: 0° to 50°C (32° to 122°F) Maximum relative humidity: 90% at 50°C (non-condensing)
Application Notes	Models with memory backup have no power-up delay. Some models with memory backup may increment 1 count upon reapplication of power
Certifications	

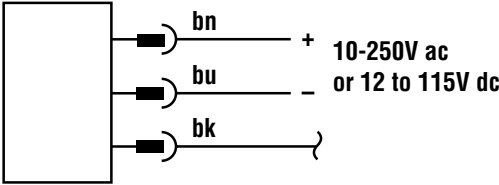
Note: 990 Series sensors with internal memory backup (MB) for maintaining “count memory” are available by special order by adding the suffix “**MB**” to the model number (eg.- **SMA990LVMB**).

990 Series Hookup Diagrams

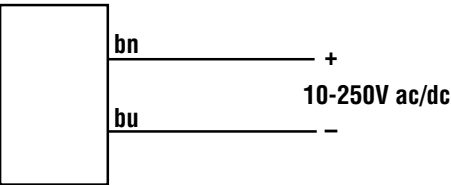
Sensors with Attached Cable



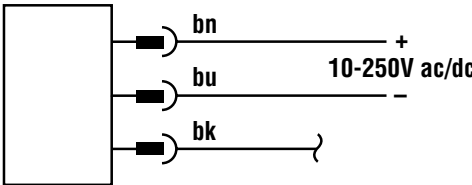
Sensors with Quick-Disconnect 3-Pin Mini-Style



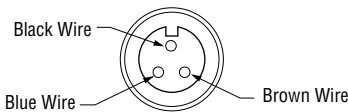
Emitters with Attached Cable



Emitters with Quick-Disconnect 3-Pin Mini-Style



3-Pin Mini-Style Pin-out (Cable Connector Shown)



Quick-Disconnect (QD) Option

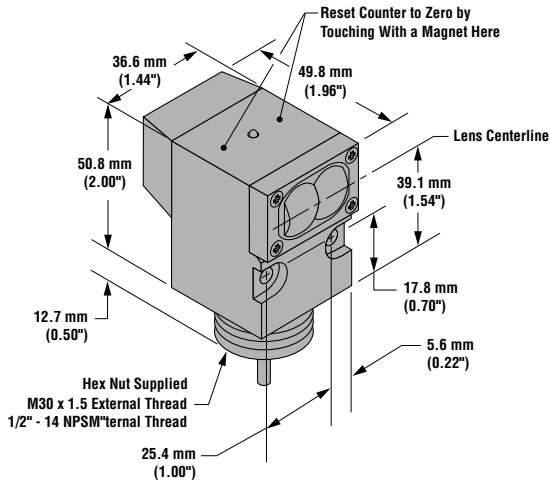
990 Series VALU-BEAM sensors are sold with either a 2 m (6.5') or a 9 m (30') attached PVC-covered cable, or with a 3-pin mini-style QD cable fitting.

QD sensors are identified by the letters "QD" in their model number suffix. Mating cables for QD 990 Series sensors are model MBCC-312. Cables are supplied in a standard length of 4 m (12'). For more information on QD cables, see page 368 and the Accessories section.

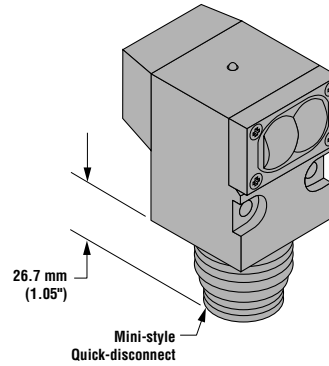
990 Series Dimensions

990 Series Opposed, Retro, and Diffuse Sensing Modes
(model suffix E, ESR, R, RSR, LV & LT)

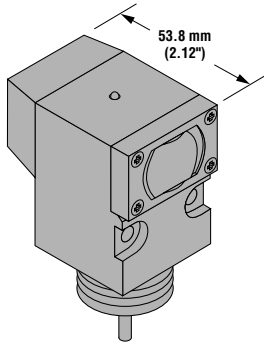
990 Series Sensor with Attached Cable



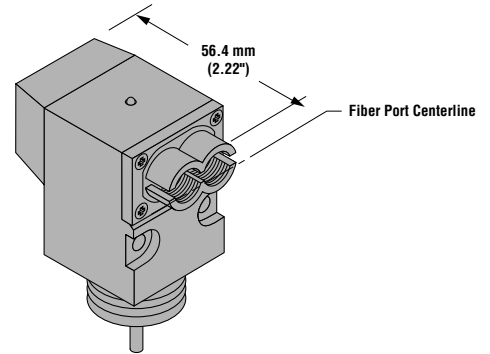
990 Series Sensor with Quick-Disconnect



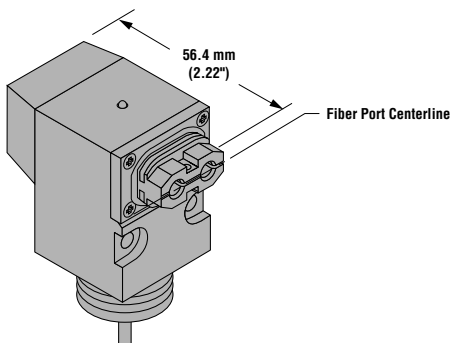
990 Series Sensor - Convergent Sensing Mode
(model suffix LVAG & CV)



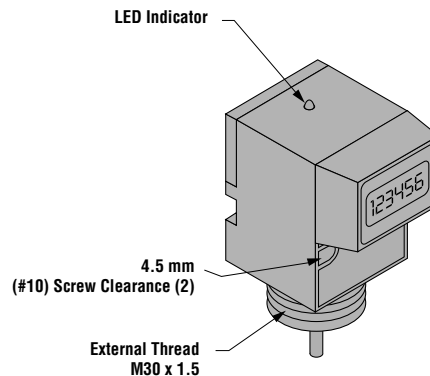
990 Series Sensor - Glass Fiber Optic
(model suffix F)



990 Series Sensor - Plastic Fiber Optic
(model suffix FP)

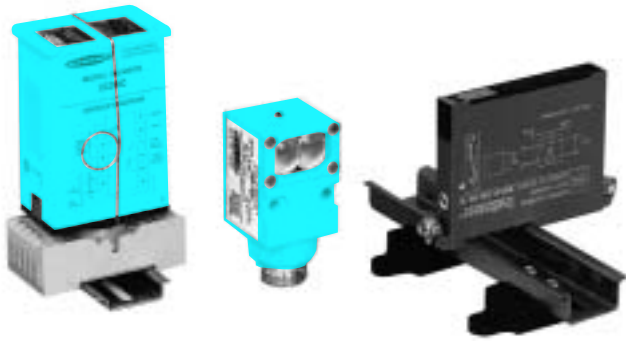


990 Series Sensor - Rear View



NOTES:

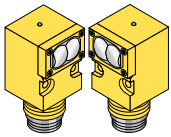
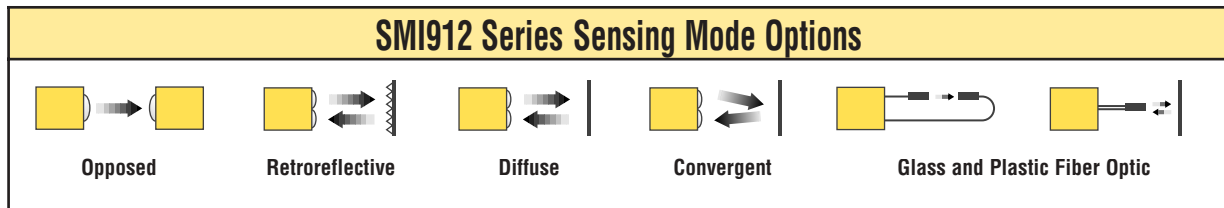
VALU-BEAM SMI912 Series Sensors



SMI912 Series sensor, with C13RC2 current amplifier module (left) and intrinsic safety barrier (right)

- Intrinsically safe sensors with the performance of VALU-BEAM Sensors
- Use with approved intrinsic safety barriers and model C13RC2 current trip point amplifier (see hookup diagram on page 361)
- Certified for use in all Classes, Groups and Divisions of hazardous locations as defined by Article 500 of the National Electrical Code when used with approved I.S. barriers
- All models have rear panel sensitivity control and light/dark operate switch, plus Banner's exclusive† Alignment Indicating Device system (AID™)
- 3-pin mini-style quick-disconnect (QD) connector is standard on all models; mating cables are ordered separately

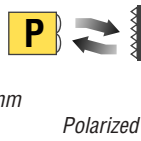
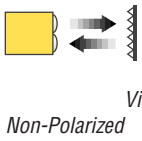
† U.S. Patent #4356393



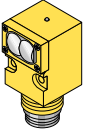
Infrared, 880 nm

SMI912 Series Opposed Mode Emitter (E) and Receiver (R)

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
SMI91EQD SMI91RQD	60 m (200')	3-Pin Mini QD	10-30V dc	Receiver: NPN		Effective Beam: 13 mm
SMI91ESRQD SMI91RSRQD	3 m (10')	3-Pin Mini QD	10-30V dc	Receiver: NPN		Effective Beam: 3.5 mm

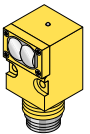
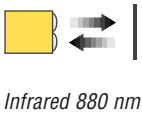


NOTE: Use polarized model when shiny objects will be sensed. Retroreflective range is specified using one model BRT-3 retroreflector (3" diameter). Actual sensing range may be more or less than specified, depending upon the efficiency and reflective area of the retroreflector(s) in use. See page 722 for more information.



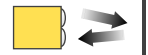
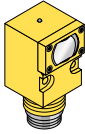
SMI912 Series Retroreflective Mode

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
Non-Polarized					<p>SMI912LVQD Retroreflective Mode With BRT-3 Reflector</p>	<p>SMI912LVQD Retroreflective Mode With BRT-3 Reflector</p>
SMI912LVQD	0.15 - 9 m (6" - 30')	3-Pin Mini QD	10-30V dc	NPN		
Polarized					<p>SMI912LVAGQD Retroreflective Mode With BRT-3 Reflector</p>	<p>SMI912LVAGQD Retroreflective Mode With BRT-3 Reflector</p>
SMI912LVAGQD	0.3 - 4.5 m (1 - 15')	3-Pin Mini QD	10-30V dc	NPN		



SMI912 Series Diffuse Mode

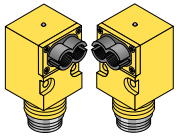
Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Performance based on 90% reflectance white test card	
SMI912DSRQD	390 mm (15")	3-Pin Mini QD	10-30V dc	NPN	<p>SMI912DSRQD Diffuse Mode</p>	<p>SMI912DSRQD Diffuse Mode</p>
SMI912DQD	780 mm (30")	3-Pin Mini QD	10-30V dc	NPN	<p>SMI912DQD Diffuse Mode</p>	<p>SMI912DQD Diffuse Mode</p>



Visible red 650 nm

SMI912 Series Convergent Mode

Models	Focus	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Performance based on 90% reflectance white test card	
SMI912CVQD	38 mm (1.5") Spot Size at Focus: 1.5 mm (0.06")	3-Pin Mini QD	10-30V dc	NPN		



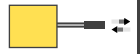
Infrared, 880 nm

SMI912 Series Glass Fiber Optic Emitter (E) and Receiver (R)

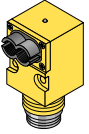
Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
SMI91EFQD SMI91RFQD	Range varies with fiber optics used	3-Pin Mini QD	10-30V dc	NPN	 	

For VALU-BEAM SMI912 Series Sensors:

- i) All models require a mating cable. See page 368 for more information.



Infrared, 880 nm

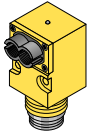


SMI912 Series Glass Fiber Optic

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Diffuse mode performance based on 90% reflectance white test card	
SMI912FQD	Range varies by sensing mode and fiber optics used	3-Pin Mini QD	10-30V dc	NPN		







Visible red, 650 nm



SMI912 Series Plastic Fiber Optic

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Diffuse mode performance based on 90% reflectance white test card	
SMI912FPQD	Range varies by sensing mode and fiber optics used	3-Pin Mini QD	10-30V dc	NPN		

SMI912 Series Specifications

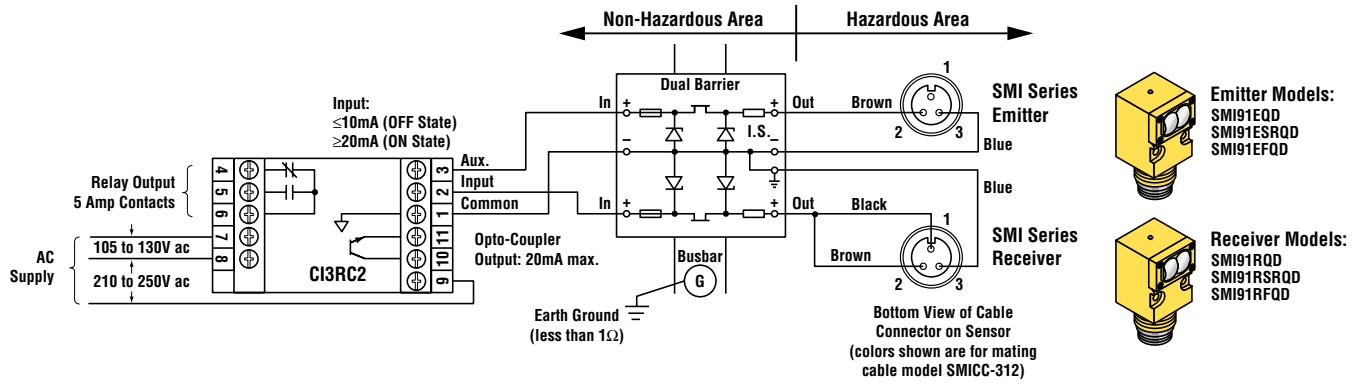
Supply Voltage and Current	10 to 30V dc for sensor, 25 mA maximum Division 1 use, with barriers, requires a minimum system supply voltage of 10V
Output Configuration	Current sinking NPN open collector transistor
Output Rating	3-wire hookup sinks 15 mA maximum, continuous 2-wire hookup sinks ≤10 mA (OFF-state) and ≥20 mA (ON state)
Output Protection Circuitry	Protected against false pulse on power-up and short circuit of output
Output Response Time	4 milliseconds ON and OFF, except for opposed mode receivers, which are 8 ms ON, 4 ms OFF; independent signal strength (NOTE: 100 millisecond delay on power-up: output is non-conducting during this time)
Repeatability	Opposed: 1.0 millisecond; Retro, Diffuse, Convergent, Plastic and Glass Fiber Optic: 1.3 milliseconds
Adjustments	LIGHT/DARK OPERATE select switch on rear of sensor Sensitivity control on rear of sensor allows precise gain setting (turn clockwise to increase gain)
Indicators	Exclusive, patented Alignment Indicating Device (AID™, US patent #4356393) lights at top 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 thermoplastic polyester housing, totally encapsulated, molded acrylic lenses, stainless steel hardware
Environmental Rating	Meets NEMA standards 1, 2, 3, 3S, 4, 4X, 12 and 13; IEC IP66
Connections	Supplied with 3-pin quick-disconnect (QD) fitting and requires the use of mating cable model SMICC-312. Cable is not supplied with sensors. See page 368 and Accessories section.
Operating Conditions	Temperature: -20° to +70°C (-4 to +158°F) Relative relative humidity: 90% at 50°C (non-condensing)
Certifications	   

APPROVALS

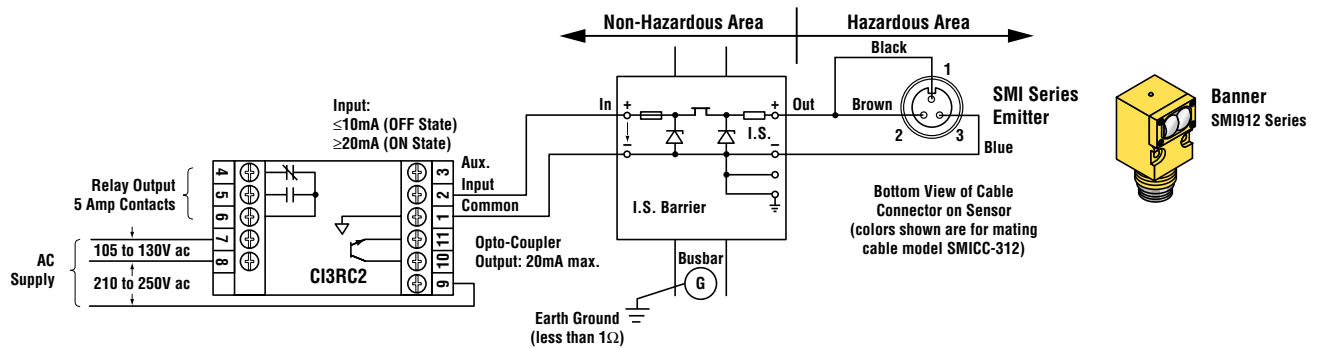
CSA:	#LR 41887	Intrinsically Safe, with Entity for: Class I, Groups A-D Class I, Div. 2, Groups A-D
FM:	#J.I. OR3HO.AX	Intrinsically Safe, with Entity for: Class I, II, III, Div. 1, Groups A-G Class I, II, III, Div. 2, Groups A-D and G
KEMA:	#Ex-96.D.0950	EEx ia IIC T6

SMI912 Series Hookup Diagrams

Opposed Mode Emitter and Receiver Hookup



SMI912 Series Retro, Diffuse, Convergent, Glass and Plastic Fiber Optic Hookup

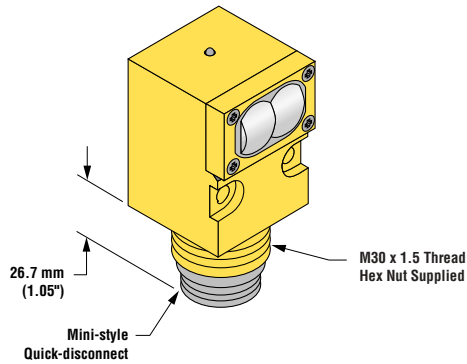


Intrinsic Safety Kits for Use with SMI912 Intrinsically Safe Sensors

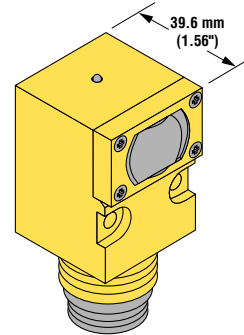
Model	Description	
C12BK-1	Kit includes a C13RC2 current amplifier, one RS-11 socket, one DIN-rail mount, and one single-channel intrinsically safe barrier (barriers also sold separately - see below)	
C12BK-2	Typically used in Opposed Mode setups, this kit includes a C13RC2 current amplifier, one RS-11 socket, one DIN-rail mount, and dual-channel intrinsically safe barrier (barriers also sold separately - see below)	
C1B-1	Single-channel barrier	
C12B-1	Dual-channel barrier	

SMI912 Series Dimensions

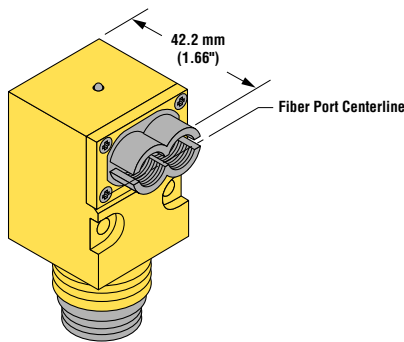
SMI912 Series Opposed, Retro, and Diffuse Sensing Modes
(model suffix E, ESR, R, RSR, LV, D & DSR)



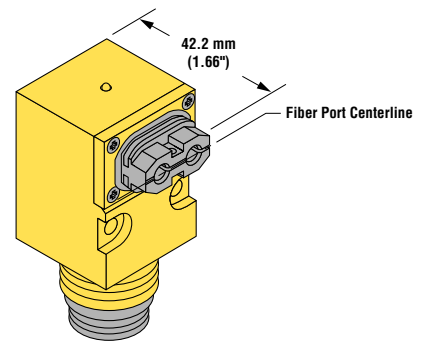
SMI912 Series Sensor - Convergent Mode
(model suffix LVAG & CV)



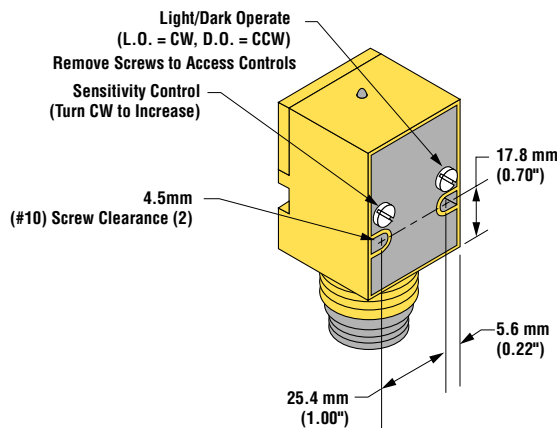
SMI912 Series Sensor - Glass Fiber Optic Mode
(model suffix F, EF & RF)



SMI912 Series Sensor - Plastic Fiber Optic Mode
(model suffix FP)



SMI912 Series Sensor - Rear View



NOTES:

SM91EN/RN Series Sensors

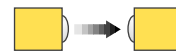
Enhanced Sunlight Immunity

VALU-BEAM SM91EN/RN Series quick-disconnect and cabled models shown

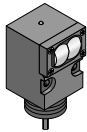


- Opposed mode sensing to 30 m (100') with enhanced sunlight immunity for difficult outdoor applications, or for indoor applications where there is intense light
- Choice of three modulation codes to allow adjacent sensor pairs to operate without crosstalk
- 10 to 30V dc operation; receivers have bipolar solid-state outputs: one NPN (sinking) and one PNP (sourcing)
- Circuitry is totally encapsulated in a rugged, molded thermoplastic polyester housing; rated IP67, NEMA 6P
- Exceptional EMI-RFI immunity

SM91EN/RN Series Sensing Mode Options



Opposed



Infrared, 880 nm

SM91EN Opposed Mode Emitter (E) and SM91RN Receiver (R) - Modulation Code A

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern†
SM91EAN SM91EANQD SM91RAN SM91RANQD	30 m (100')	2 m (6.5') 3-Pin Mini QD 2 m (6.5') 4-Pin Mini QD	10-30V dc	Bipolar NPN/PNP		<p>Effective Beam: 25 mm</p>

† Note: Beam Pattern response shown from 0 to 3 m (Excess Gain = 100x at 3 m)

For VALU-BEAM SM91EN/RN Series Sensors:

- 9 m (30') cables are available by adding suffix "W/30" to the model number of any cabled sensor (e.g. - SM91EAN W/30)
- A model with a QD connector requires an accessory mating cable. See pages 368 and the Accessories section for more information.

SM91EN Opposed Mode Emitter (E) and SM91RN Receiver (R) - Modulation Code B


Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern†
SM91EBN SM91EBNQD SM91RBN SM91RBNQD	30 m (100')	2 m (6.5') 3-Pin Mini QD 2 m (6.5') 4-Pin Mini QD	10-30V dc	Bipolar NPN/PNP		Effective Beam: 25 mm

SM91EN Opposed Mode Emitter (E) and SM91RN Receiver (R) - Modulation Code C

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern†
SM91ECN SM91ECNQD SM91RCN SM91RCNQD	30 m (100')	2 m (6.5') 3-Pin Mini QD 2 m (6.5') 4-Pin Mini QD	10-30V dc	Bipolar NPN/PNP		Effective Beam: 25 mm

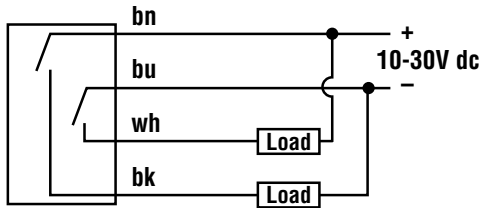
† Note: Beam Pattern response shown from 0 to 3 m (Excess Gain = 100x at 3 m)

SM91EN/RN Series Specifications

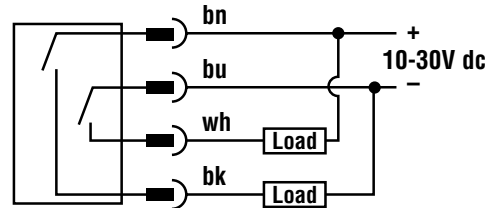
Supply Voltage and Current	10 to 30V dc at 20 mA maximum for receivers (exclusive of load current) and 25 mA maximum for emitters
Output Configuration	Bipolar: one current sourcing (PNP) and one current sinking (NPN) open-collector transistor
Output Response Time	12 to 28 milliseconds, depending upon code LIGHT operate only
Output Rating	150 mA maximum (continuous, each output) Off-state leakage current is 100 microamps, maximum On-state saturation voltage less than 1V at 10 mA and less than 2 V at 150 mA (PNP); less than 200 millivolts at 10 mA and less than 1V at 150 mA (NPN)
Indicators	Top-mounted LED indicator - a red LED (on receivers) lights when the output is conducting and pulses at a rate proportional to the strength of the received light signal; a green LED (on emitters) lights when the infrared sensing beam is "ON"
Construction	Reinforced black thermoplastic polyester housing, totally epoxy-encapsulated, replaceable acrylic lenses
Environmental Rating	Meets NEMA 6P and IEC IP67 standards
Connections	PVC-jacketed 2 m (6.5') or 9 m (30') cables or integral mini-style quick-disconnect (QD) fitting are available
Operating Conditions	Temperature: 0° to 70°C (+32 to 158°F) Maximum relative humidity: 90% at 50°C (non-condensing)
Water Immersion	Sensors will continue to operate during and after being submerged in water at a depth of 2 m (6') for a period of 48 hours NOTE: Immersion greatly reduces the efficiency of the lens, which results in greatly diminished sensing range
Sunlight Immunity	Receivers may be pointed into a light source of 120,000 lux without false-triggering, and will still respond only to the infrared beam from their modulated emitters. Receivers will not respond to sunlight reflected from water spray droplets.
Strobe Light Immunity	Receivers are totally immune to one Federal Signal Corp. "Fireball" model FB2PST strobe
EMI-RFI Immunity	Emitters and receivers will not respond to transmissions from a 5-watt output walkie-talkie on the test frequencies of 464.500 and 151.625 megahertz when the walkie-talkie's antenna is held 6" or more away from the sensor.
Certifications	

SM91EN/RN Series Hookup Diagrams

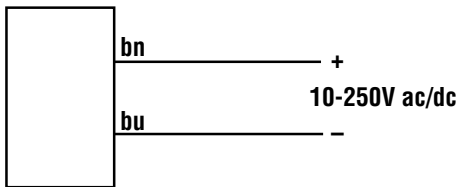
Sensors with Attached Cable



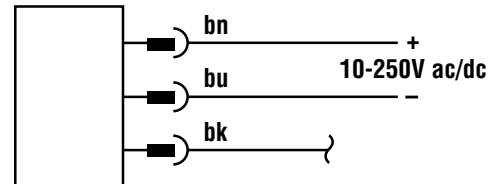
Sensors with Quick-Disconnect



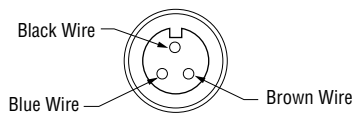
Emitters with Attached Cable



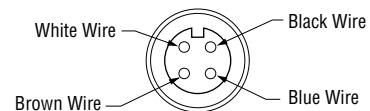
Emitters with Quick-Disconnect



3-Pin Mini-Style Pin-out
(Cable Connector Shown)



4-Pin Mini-Style Pin-out
(Cable Connector Shown)



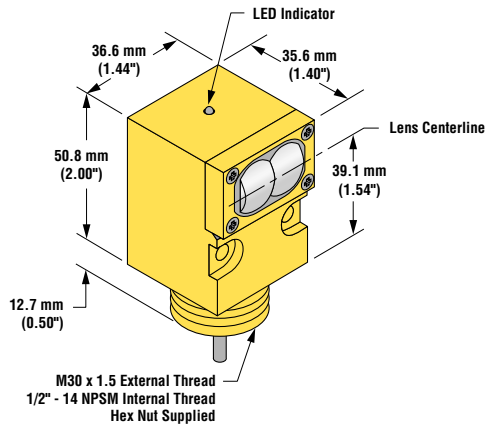
Quick-Disconnect (QD) Option

SM91EN/RN Series VALU-BEAM sensors are sold with either a 2 m (6.5') or a 9 m (30') attached PVC-covered cable, or with a mini-style QD cable fitting.

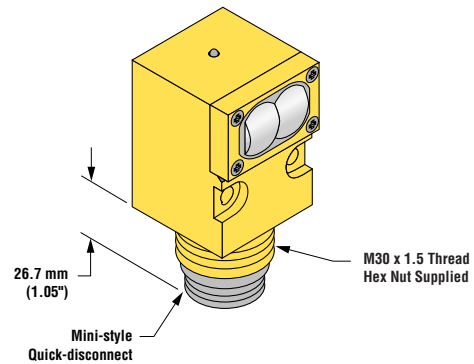
SM91EN/RN QD sensors are identified by the letters "QD" in their model number suffix. Mating cable for QD SM91EN sensors is model MBCC-312. Cable for QD SM91RN sensors is MBCC-412. Cables are supplied in a standard length of 4 m (12'). For more information on QD cables, see page 368 and the Accessories section.

SM91EN/RN Series Dimensions

SM91EN/RN Series Sensor



SM91EN/RN Series Sensor with Quick-Disconnect



Accessories


VALU-BEAM Modifications


Model Suffix	Modification	Description	Example of Model Number
W/30	9 m (30') cable	All VALU-BEAM sensors may be ordered with an integral 9 m (30') cable in place of the standard 2 m (6.5') cable	SM912D W/30

Quick-Disconnect (QD) Cables

Following is the selection of cables available for VALU-BEAM QD models. See the Accessories section for more cable information.

Style	Model	Length	Connector	Used with:
3-Pin Mini	MBCC-306 MBCC-312 MBCC-330	2 m (6.5') 4 m (12') 9 m (30')	Straight Straight Straight	All VALU-BEAM emitters 912 Series ac 990 Series
4-Pin Mini	MBCC-406 MBCC-412 MBCC-430	2 m (6.5') 4 m (12') 9 m (30')	Straight Straight Straight	912 Series dc SM91RN (sunlight immune)
5-Pin Mini	MBCC-506 MBCC-512 MBCC-530	2 m (6.5') 4 m (12') 9 m (30')	Straight Straight Straight	915 Series
3-Pin Mini	SMICC-306 SMICC-312 SMICC-330	2 m (6.5') 4 m (12') 9 m (30')	Straight Straight Straight	SMI912 Series (intrinsically safe)

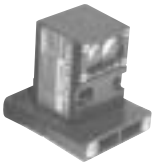
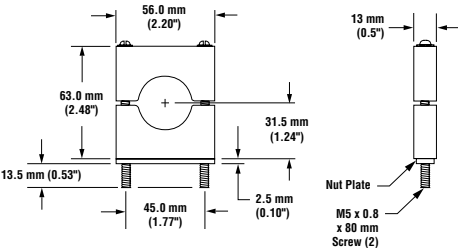
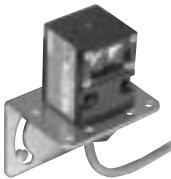
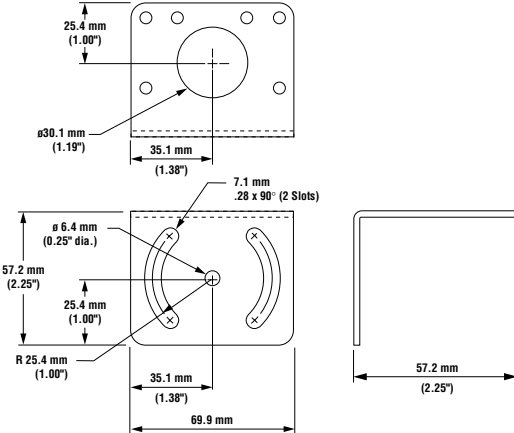
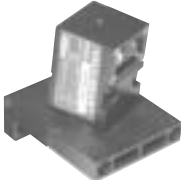
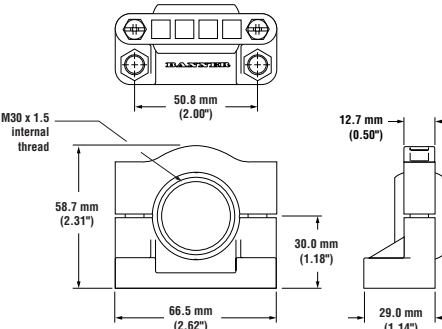
Cabling Accessories		
Model	Description	
AC-6 PVC-6 RF1-2NPS	2 m (6.5') armored cable jacket 2 m (6.5') flexible PVC tubing (not for QD models) Compression fitting for attaching armored cable or PVC tubing	I.D. 5/16"; O.D. 7/16" I.D. 1/4"; O.D. 3/8" —
HF1-2NPS	<ul style="list-style-type: none"> Flexible black nylon cable protector Includes a neoprene gland that compresses around the VALU-BEAM cable to provide an additional seal against moisture Resistant to gasoline, alcohol, oil, grease, solvents and weak acids Working temperature range of -30° to +100°C (-22° to +212°F) 	

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.			
Model	Description	Possible Sensing Mode or Range Changes	
UC-900AG UC-900C UC-900DSR UC-900F UC-900FP UC-900L UC-900J	Replacement lens for LVAG Replacement lens for C and CV Replacement lens for DSR, ESR & RSR Replacement lens for F Replacement lens for FP Replacement lens for E, R, LV & D Attach to VALU-BEAMs E, R, ESR, RSR, LV and D	Change LV to LVAG Change LV to CV Change D or F to DSR, EF to ESR and RF to RSR Change D to F and DSR to F — Change LVAG to LV, CV to LV, DSR to D & F to D Flat Lexan® dust cover	

Lexan® is a registered trademark of General Electric Co.

Extension Cables (without connectors)		
The following cables are available for extending the length of existing sensor cable. These are 30 m (100') lengths of VALU-BEAM cable. This cable may be spliced to 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, SM2A912 Series ac sensors and 990 Series sensors
EC915-100	5-conductor	915 Series sensors

Mounting Brackets

Model	Description	Dimensions
<p>SMB30C</p> 	<ul style="list-style-type: none"> • 30 mm split clamp bracket • Black reinforced thermoplastic polyester • Includes stainless steel mounting hardware 	
<p>SMB30MM</p> 	<ul style="list-style-type: none"> • 30 mm, 12-gauge, stainless steel bracket with curved mounting slots for versatility and orientation • Clearance for M6 (1/4") hardware 	
<p>SMB30SC</p> 	<ul style="list-style-type: none"> • 30 mm swivel bracket • Black reinforced thermoplastic polyester • Includes stainless steel mounting and swivel locking hardware 	

Retroreflective Targets

Banner offers a wide selection of high-quality retroreflective targets. See Accessories section for complete information.