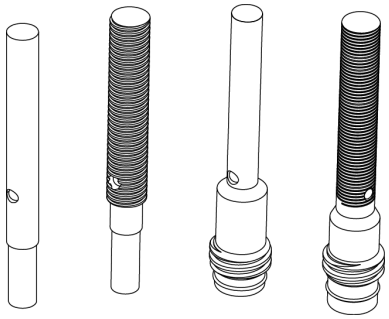
VSM-2 Series Micro Sensor

more sensors, more solutions

Datasheet

Miniature self-contained sensor in a stainless steel housing



- Available with 4 mm diameter smooth barrel or 5 mm threaded barrel for mounting in the smallest spaces
- Diffuse and opposed mode sensing options to meet a wide variety of application requirements
- IO-Link communication for remote configuration and monitoring, simple device replacement, and advanced diagnostics
- Visible red beam for easy alignment
- Dual color LED indicator for clear visualization of sensor status
- Focused beam allows for reliable presence detection even when the sensor is fully embedded within the machine

WARNING:

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

Models with a 4 mm Smooth Barrel

Opposed Mode Models must be purchased in pairs: one emitter and one receiver					
NPN Models	**PNP Models with IO-Link**	**Emitter Models**	**Range**	**Output Type**	**Connection**
VSM-2S4RNR500-2M	VSM-2S4RPR500-2M	VSM-2S4NAEL-2M	0 to 500 mm (0 to 19.7 in)	DO	2 m (6.5 ft) unterminated 3-wire PUR-jacketed cable
VSM-2S4RNR500-Q3	VSM-2S4RPR500-Q3	VSM-2S4NAEL-Q3			150 mm (6 in) PUR cable with a 3-pin M8/Pico-style quick disconnect
VSM-2S4RNR500-Q7	VSM-2S4RPR500-Q7	VSM-2S4NAEL-Q7			Integral 3-pin M8/Pico-style quick disconnect

Diffuse Mode Models				
NPN Models	**PNP Models with IO-Link**	**Range**	**Output Type**	**Connection**
VSM-2S4AND10-2M	VSM-2S4APD10-2M	0 to 10 mm (0 to 0.39 in)	LO	2 m (6.5 ft) unterminated 3-wire PUR-jacketed cable
VSM-2S4AND10-Q3	VSM-2S4APD10-Q3			150 mm (6 in) PUR cable with a 3-pin M8/Pico-style quick disconnect
VSM-2S4AND10-Q7	VSM-2S4APD10-Q7			Integral 3-pin M8/Pico-style quick disconnect
VSM-2S4AND20-2M	VSM-2S4APD20-2M	0 to 20 mm (0 to 0.79 in)		2 m (6.5 ft) unterminated 3-wire PUR-jacketed cable
VSM-2S4AND20-Q3	VSM-2S4APD20-Q3			150 mm (6 in) PUR cable with a 3-pin M8/Pico-style quick disconnect
VSM-2S4AND20-Q7	VSM-2S4APD20-Q7			Integral 3-pin M8/Pico-style quick disconnect
VSM-2S4AND50-2M	VSM-2S4APD50-2M	0 to 50 mm (0 to 2 in)		2 m (6.5 ft) unterminated 3-wire PUR-jacketed cable
VSM-2S4AND50-Q3	VSM-2S4APD50-Q3			150 mm (6 in) PUR cable with a 3-pin M8/Pico-style quick disconnect
VSM-2S4AND50-Q7	VSM-2S4APD50-Q7			Integral 3-pin M8/Pico-style quick disconnect
VSM-2S4AND100-2M	VSM-2S4APD100-2M	0 to 100 mm (0 to 4 in)		2 m (6.5 ft) unterminated 4-wire PUR-jacketed cable
VSM-2S4AND100-Q3	VSM-2S4APD100-Q3			150 mm (6 in) PUR cable with a 4-pin M8/Pico-style quick disconnect

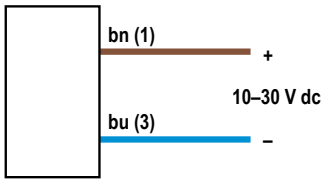
Models with a 5 mm Threaded Barrel

Opposed Mode Models must be purchased in pairs: one emitter and one receiver					
NPN Models	**PNP Models with IO-Link**	**Emitter Models**	**Range**	**Output Type**	**Connection**
VSM-2M5RNR500-2M	VSM-2M5RPR500-2M	VSM-2M5NAEL-2M	0 to 500 mm (0 to 19.7 in)	DO	2 m (6.5 ft) unterminated 3-wire PUR-jacketed cable
VSM-2M5RNR500-Q3	VSM-2M5RPR500-Q3	VSM-2M5NAEL-Q3			150 mm (6 in) PUR cable with a 3-pin M8/Pico-style quick disconnect
VSM-2M5RNR500-Q7	VSM-2M5RPR500-Q7	VSM-2M5NAEL-Q7			Integral 3-pin M8/Pico-style quick disconnect

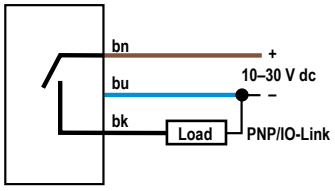
Diffuse Mode Models				
NPN Models	**PNP Models with IO-Link**	**Range**	**Output Type**	**Connection**
VSM-2M5AND10-2M	VSM-2M5APD10-2M	0 to 10 mm (0 to 0.39 in)	LO	2 m (6.5 ft) unterminated 3-wire PUR-jacketed cable
VSM-2M5AND10-Q3	VSM-2M5APD10-Q3			150 mm (6 in) PUR cable with a 3-pin M8/Pico-style quick disconnect
VSM-2M5AND10-Q7	VSM-2M5APD10-Q7			Integral 3-pin M8/Pico-style quick disconnect
VSM-2M5AND20-2M	VSM-2M5APD20-2M	0 to 20 mm (0 to 0.79 in)		2 m (6.5 ft) unterminated 3-wire PUR-jacketed cable
VSM-2M5AND20-Q3	VSM-2M5APD20-Q3			150 mm (6 in) PUR cable with a 3-pin M8/Pico-style quick disconnect
VSM-2M5AND20-Q7	VSM-2M5APD20-Q7			Integral 3-pin M8/Pico-style quick disconnect
VSM-2M5AND50-2M	VSM-2M5APD50-2M	0 to 50 mm (0 to 2 in)		2 m (6.5 ft) unterminated 3-wire PUR-jacketed cable
VSM-2M5AND50-Q3	VSM-2M5APD50-Q3			150 mm (6 in) PUR cable with a 3-pin M8/Pico-style quick disconnect
VSM-2M5AND50-Q7	VSM-2M5APD50-Q7			Integral 3-pin M8/Pico-style quick disconnect
VSM-2M5AND100-2M	VSM-2M5APD100-2M	0 to 100 mm (0 to 4 in)		2 m (6.5 ft) unterminated 4-wire PUR-jacketed cable
VSM-2M5AND100-Q3	VSM-2M5APD100-Q3			150 mm (6 in) PUR cable with a 4-pin M8/Pico-style quick disconnect

Wiring

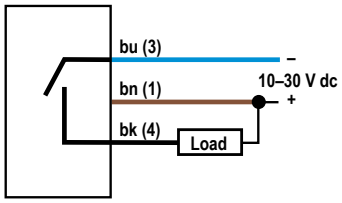
Emitters



PNP/IO-Link Models



NPN Models

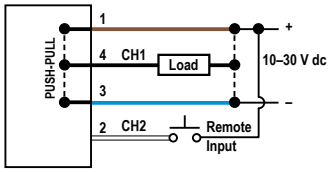


Integral 3-pin M8/Pico-style quick disconnect (male) Models

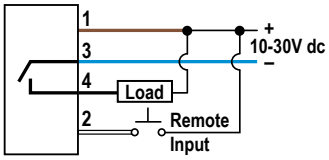
Key
1 - Brown
2 - White
3 - Blue
4 - Black

Integral 4-pin M8/Pico-style male quick disconnect Models

PNP/IO-Link Models



NPN Models



Remote Configuration Instructions—100 mm Diffuse Mode Models Only

One-Point TEACH

A one-point TEACH sets the threshold for ON/OFF using a single target.

A target that returns the same or more light to the sensor turns the output ON. A target that returns less light than the configured target turns the output OFF.

1. Position the target.
2. Hold the remote input wire (white) high for 1 to 3 seconds.
3. Release the remote input wire before 3 seconds.
   The amber LED is on for 3 seconds, indicating a valid configuration. After the configuration, the green/output LED is on.

When presenting a darker target than the one that was configured, the amber LED turns on as the threshold is approached. With a darker target, the green/output LED is off.

Two-Point TEACH

A two-point TEACH sets the threshold between two different targets.

A target that returns the same or more light to the sensor turns the output ON. A target that returns less light than the configured target turns the output OFF.

1. Position the target at the desired ON condition.

2. Hold the remote input wire (white) high for 6 to 15 seconds to teach the ON condition.
   The amber LED flashes for 3 seconds while the remote input wire is held high, turns off for 3 seconds, and then begins flashing again at 6 seconds.
3. Release remote input wire before 15 seconds.
4. Position the target at the desired OFF condition.
5. Hold the remote input wire high for 1 second.
   The amber LED is on for 3 seconds, indicating a valid configuration. The green/output LED and the sensor output are OFF.

A moving target causes the amber LED to turn on as the target reaches the threshold. After the target is at or above the threshold, the green/output LED and the sensor output are ON.

Specifications

Supply Voltage and Current
10 to 30 V dc (10% maximum ripple)
Less than 12 mA consumption without load

Supply Protection Circuitry
Protected against reverse polarity and transient voltages

Output Configuration
Single-output: 1 NPN or 1 PNP/IO-Link; light operate (LO) or dark operate (DO), depending on model

Output Rating
Current: Less than 100 mA
PNP On Voltage: Supply voltage – 2 V
PNP Off Voltage: Approximately 0 V
NPN On Voltage: Supply voltage
NPN Off Voltage: < 2.0 V

Output Protection Circuitry
Protected against false power-up and continuous overload or short circuit of outputs
Overload trip point ≥ 100 mA

Light Source
Opposed, Diffuse: 630 nm red LED

Required Overcurrent Protection

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

Overcurrent protection is required to be provided by end product application per the supplied table.
Overcurrent protection may be provided with external fusing or via Current Limiting, Class 2 Power Supply.
Supply wiring leads < 24 AWG shall not be spliced.
For additional product support, go to www.bannerengineering.com.

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

Response Time
Normal Mode: Less than 500 µs (default)
Fine Mode: Less than 1 ms (selectable via IO-Link)
Fast Mode: Less than 200 µs (selectable via IO-Link)

Switching Frequency
Normal Mode: Less than 1 kHz (default)
Fine Mode: Less than 500 Hz (selectable via IO-Link)
Fast Mode: Less than 2.5 kHz (selectable via IO-Link)

Delay at Power-Up
20 milliseconds

Repeatability
1 millisecond

Indicators
Green/output LED: Output is conducting
Amber LED: Marginal signal or near threshold of the sensor (ON to OFF or OFF to ON)

Light Spot Size
Diffuse: 5 mm dia (at 10 mm), 8 mm (at 20 mm), and 20 mm (at 50 mm)
Opposed: 50 mm dia (at 200 mm)

Construction
V2A stainless steel with PUR cable; PBT/PMMA optics

Environmental Rating
IEC IP67

Connection
2 m (6.5 ft) unterminated 3-wire PUR-jacketed cable; 150 mm (6 in) PUR cable with a 3-pin M8/Pico-style quick disconnect; Integral 3-pin M8/Pico-style quick disconnect; 2 m (6.5 ft) unterminated 4-wire PUR-jacketed cable; or 150 mm (6 in) PUR cable with a 4-pin M8/Pico-style quick disconnect, depending on the model

Operating Conditions
–25 °C to +65 °C (–13 °F to +149 °F)

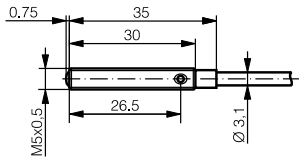
Vibration and Mechanical Shock
IEC 60947-5-2

Certifications

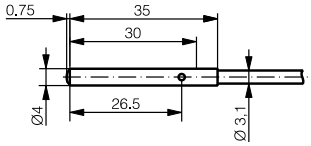
Dimensions

All measurements are listed in millimeters, unless noted otherwise.

Cable Models

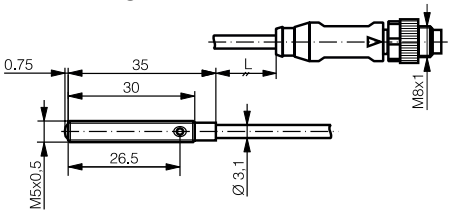


(threaded)



(non-threaded)

Pigtail Models



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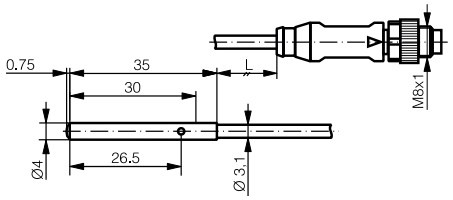

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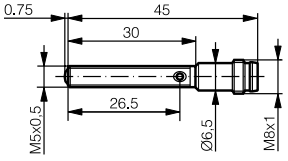
Connector Models



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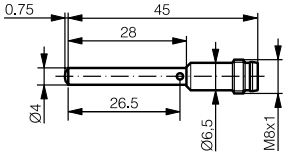
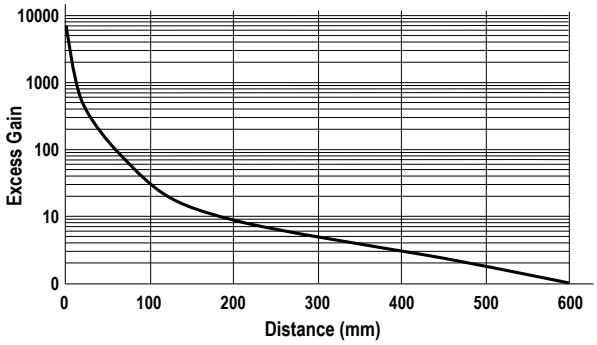


(non-threaded)

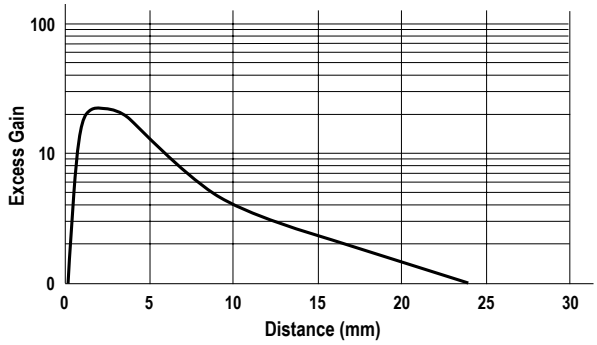
Performance Curves

Opposed Models

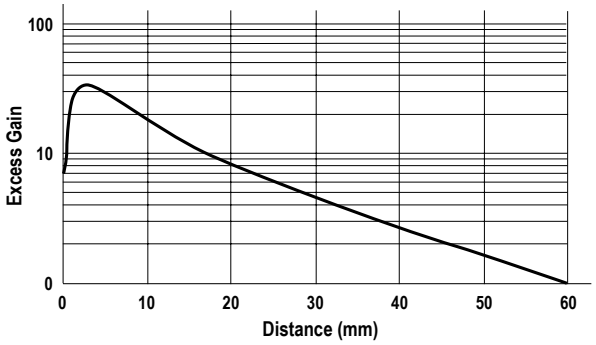


Diffuse, 10 mm Range Models

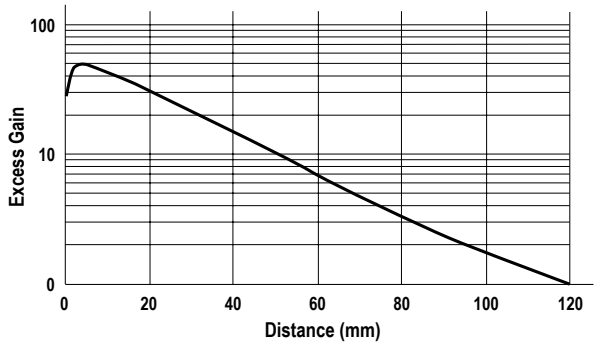
Diffuse, 20 mm Range Models



Diffuse, 50 mm Range Models



Diffuse, 100 mm Range Models



Accessories

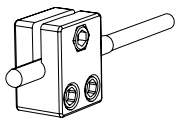
Brackets

All measurements are listed in millimeters, unless noted otherwise.

SMBVSM4

- Mounting clamp for 4 mm barrel-style sensors
- Black impact-resistant plastic

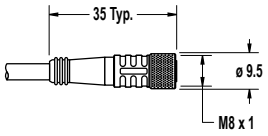
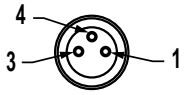
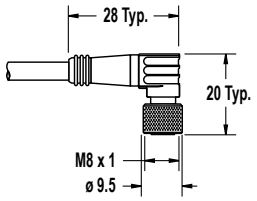
Hole center spacing: A = 8.0
Hole size: A = ø 3.3



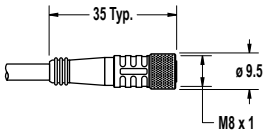
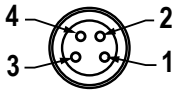
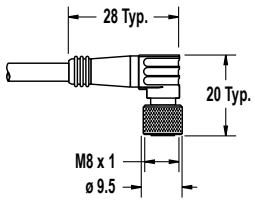
Cordsets

All measurements are listed in millimeters, unless noted otherwise.

3-Pin Threaded M8/Pico-Style Cordsets

Model	Length	Style	Dimensions	Pinout (Female)
PKG3M-2	2 m (6.56 ft)	Straight		 1 = Brown 3 = Blue 4 = Black
PKG3M-5	5 m (16.40 ft)			
PKG3M-7	7 m (22.97 ft)			
PKG3M-9	9 m (29.53 ft)			
PKG3M-10	10 m (32.81 ft)			
PKW3M-2	2 m (6.56 ft)	Right-Angle		
PKW3M-5	5 m (16.40 ft)			
PKW3M-9	9 m (29.53 ft)			

4-Pin Threaded M8/Pico-Style Cordsets—Single Ended

Model	Length	Style	Dimensions	Pinout (Female)
PKG4M-2	2 m (6.56 ft)	Straight		 1 = Brown 2 = White 3 = Blue 4 = Black
PKG4M-5	5 m (16.4 ft)			
PKG4M-9	9 m (29.5 ft)			
PKW4M-2	2 m (6.56 ft)	Right Angle		
PKW4M-5	5 m (16.4 ft)			
PKW4M-9	9 m (29.5 ft)			

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