# VSM-2 Series Micro Sensor

Original Instructions
p/n: 211301 Rev C
23-Oct-26
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ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

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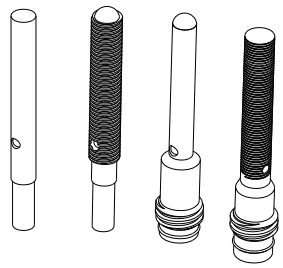
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# Chapter 1 Features

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 | | | 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-jacketed cable with a 3-pin M8 quick-disconnect connector |
| VSM-2S4RNR500-Q7 | VSM-2S4RPR500-Q7 | VSM-2S4NAEL-Q7 | | | Integral 3-pin M8 quick disconnect connector |

*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 | | | | 150 mm (6 in) PUR-jacketed cable with a 3-pin M8 quick-disconnect connector |
| VSM-2S4AND10-Q7 | VSM-2S4APD10-Q7 | | | Integral 3-pin M8 quick disconnect connector |
| 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 | | | | 150 mm (6 in) PUR-jacketed cable with a 3-pin M8 quick-disconnect connector |
| VSM-2S4AND20-Q7 | VSM-2S4APD20-Q7 | | | Integral 3-pin M8 quick disconnect connector |
| 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 |

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Continued from page 3

| NPN Models | PNP Models with IO-Link | Range | Output Type | Connection |
|---|---|---|---|---|
| VSM-2S4AND50-Q3 | | 0 to 100 mm (0 to 4 in) | | 150 mm (6 in) PUR-jacketed cable with a 3-pin M8 quick-disconnect connector |
| VSM-2S4AND50-Q7 | VSM-2S4APD50-Q7 | | | Integral 3-pin M8 quick disconnect connector |
| VSM-2S4AND100-2M | VSM-2S4APD100-2M | | | 2 m (6.5 ft) unterminated 4-wire PUR-jacketed cable |
| VSM-2S4AND100-Q3 | VSM-2S4APD100-Q3 | | | 150 mm (6 in) PUR-jacketed cable with a 4-pin M8 male quick-disconnect connector |

In light operate (LO) mode, the output is ON when the target returns the same or more light to the sensor and OFF when the sensor detects less light than the configured/taught target. In dark operate (DO) mode, the output is ON when the target returns less light to the sensor than the configured target and OFF when the sensor detects more light than the configured/ taught target.

In **opposed** sensing modes, light operate means the output is on when the beam is unblocked and dark operate means the output is on when the beam is blocked. In **diffuse** sensing modes, light operate means the output is on when the target is present and within the sensing range. Dark operate means the output is on when no target is detected.

The following models are no longer available for order but are still covered by the information in this document.

- VSM-2S4RPR500-2M
- VSM-2S4NAEL-2M
- VSM-2S4APD10-Q3
- VSM-2S4APD20-Q3
- VSM-2S4APD50-Q3

# 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-jacketed cable with a 3-pin M8 quick-disconnect connector |
| VSM-2M5RNR500-Q7 | VSM-2M5RPR500-Q7 | VSM-2M5NAEL-Q7 | | | Integral 3-pin M8 quick disconnect connector |

*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 | | | | 150 mm (6 in) PUR-jacketed cable with a 3-pin M8 quick-disconnect connector |
| VSM-2M5AND10-Q7 | VSM-2M5APD10-Q7 | | | Integral 3-pin M8 quick disconnect connector |
| 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 | | | | 150 mm (6 in) PUR-jacketed cable with a 3-pin M8 quick-disconnect connector |
| VSM-2M5AND20-Q7 | VSM-2M5APD20-Q7 | | | Integral 3-pin M8 quick disconnect connector |
| 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 | | | | 150 mm (6 in) PUR-jacketed cable with a 3-pin M8 quick-disconnect connector |
| VSM-2M5AND50-Q7 | VSM-2M5APD50-Q7 | | | Integral 3-pin M8 quick disconnect connector |

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Continued from page 4

| NPN Models | PNP Models with IO-Link | Range | Output Type | Connection |
|---|---|---|---|---|
| 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 | | | | 150 mm (6 in) PUR-jacketed cable with a 4-pin M8 male quick-disconnect connector |

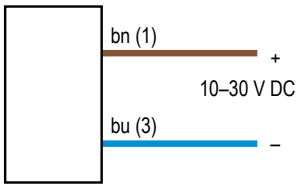
The following models are no longer available for order but are still covered by the information in this document.

- VSM-2M5APD10-Q3
- VSM-2M5APD20-Q3
- VSM-2M5APD50-Q3
- VSM-2M5APD100-Q3

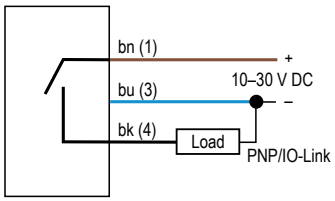

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# Chapter 2 Wiring

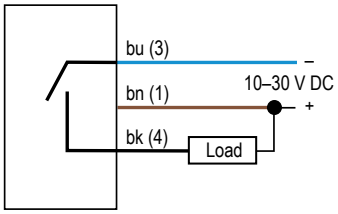
*Emitters*



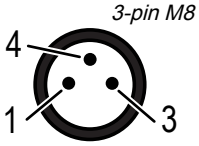

*PNP/IO-Link models*




*NPN models*




*3-pin M8 male pinout*



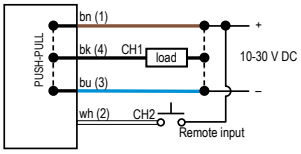

**Key**
1 - Brown

3 - Blue
4 - Black

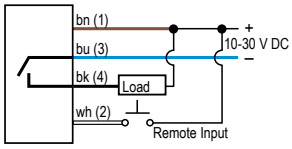
*4-pin M8 male pinout*




*PNP/IO-Link models*




*NPN models*




Key

1. Brown
2. White
3. Blue
4. Black


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# Chapter 3 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 the 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.


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# Chapter 4 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

**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)

**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

**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**

IP67

**Connection**

2 m (6.5 ft) unterminated 3-wire PUR-jacketed cable; 150 mm (6 in) PUR-jacketed cable with a 3-pin M8 quick-disconnect connector; Integral 3-pin M8 quick disconnect connector; 2 m (6.5 ft) unterminated 4-wire PUR-jacketed cable; or 150 mm (6 in) PUR-jacketed cable with a 4-pin M8 male quick-disconnect connector, 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**

**Required Overcurrent Protection**

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

Overcurrent protection is required to be provided by end product application per the supplied table.

Overcurrent protection may be provided with external fusing or via Current Limiting, Class 2 Power Supply.

Supply wiring leads < 24 AWG shall not be spliced.

For additional product support, go to www.bannerengineering.com.

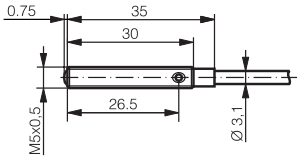
| Supply Wiring (AWG) | Required Overcurrent Protection (A) | Supply Wiring (AWG) | Required Overcurrent Protection (A) |
|---|---|---|---|
| 20 | 5.0 | 26 | 1.0 |
| 22 | 3.0 | 28 | 0.8 |
| 24 | 2.0 | 30 | 0.5 |


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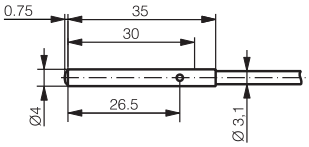
# Dimensions

All measurements are listed in millimeters, unless noted otherwise. The measurements provided are subject to change.

### Cable Models

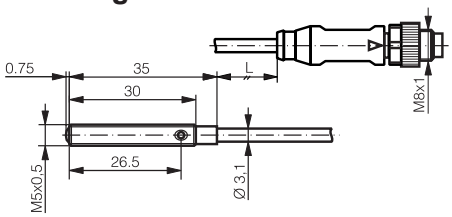



*(threaded)*

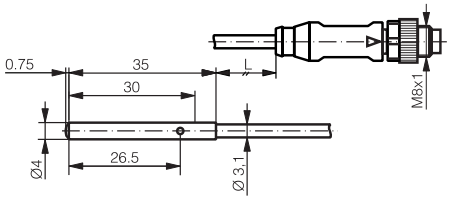



*(non-threaded)*

### Pigtail Models

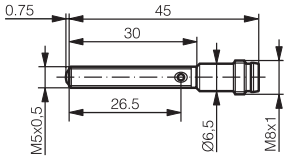



*(threaded)*

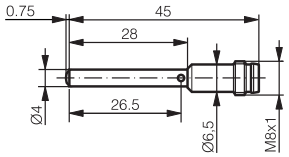



*(non-threaded)*

### Connector Models



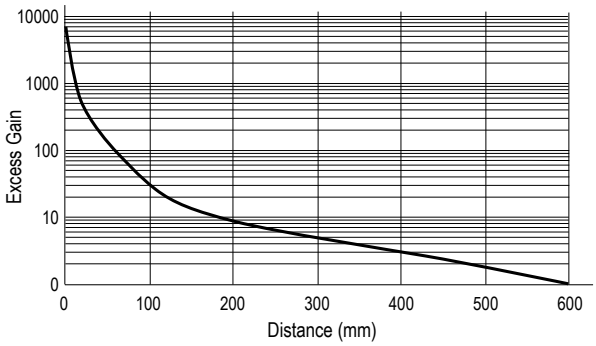

*(threaded)*




*(non-threaded)*

# Performance Curves

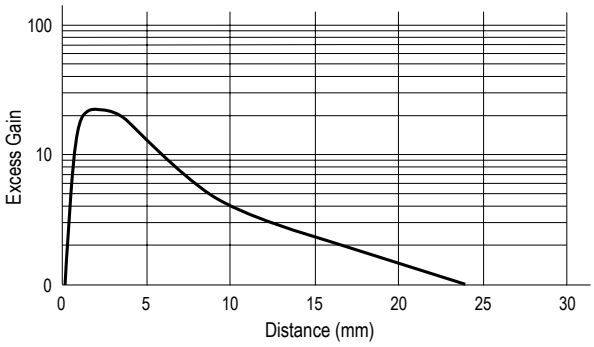
*Opposed mode models*



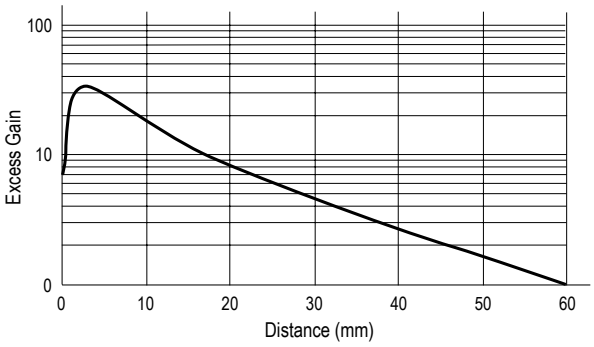

*Diffuse, 10 mm range models*




*Diffuse, 20 mm range models*




*Diffuse, 50 mm range models*

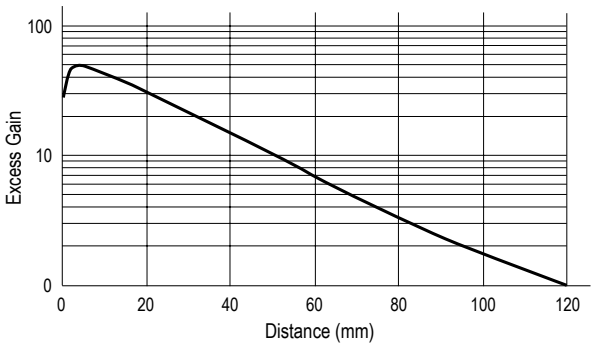



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*Diffuse, 100 mm range models*





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# Chapter 5 Accessories

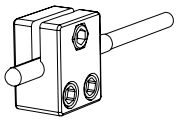
## Brackets

All measurements are listed in millimeters, unless noted otherwise. The measurements provided are subject to change.

**SMBVSM4**

- Mounting clamp for 4 mm barrel-style sensors
- Black impact-resistant plastic
- CAD Files: DXF, PDF, IGS, STP

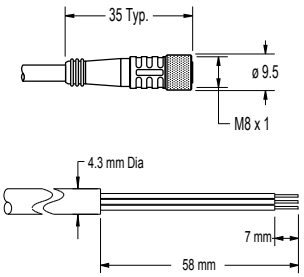
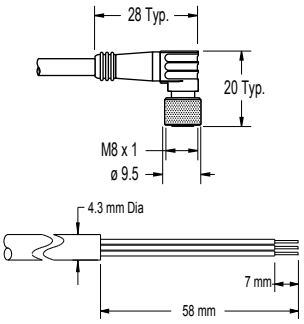
**Hole center spacing:** A = 8.0
**Hole size:** A = ø 3.3



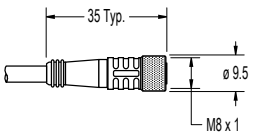
## Cordsets

All measurements are listed in millimeters, unless noted otherwise. The measurements provided are subject to change.

**3-Pin Single-Ended Threaded M8 Female Cordsets**

| Model | Length | Style | Dimensions | Pinout (Female) |
|---|---|---|---|---|
| PKG3M-2 | 2 m (6.56 ft) | Straight |  |  1 = Brown 3 = Blue 4 = Black |
| PKG3M-4 | 4 m (13.12 ft) | | | |
| PKG3M-5 | 5 m (16.4 ft) | | | |
| PKG3M-7 | 7 m (22.96 ft) | | | |
| PKG3M-9 | 9 m (29.52 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) | | | |

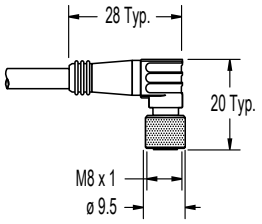
**4-Pin Single-Ended M8 Female Cordsets**

| 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 (29.52 ft) | | | | |

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| 4-Pin Single-Ended M8 Female Cordsets | | | | | |
|---|---|---|---|---|---|
| **Model** | **Length** | **Style** | **Dimensions** | **Pinout (Female)** | |
| **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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# Chapter 6 Banner Engineering Corp Limited Warranty

Banner Engineering Corp. warrants its products to be free from defects in material and workmanship for one year following the date of shipment. Banner Engineering Corp. will repair or replace, free of charge, any product of its manufacture which, at the time it is returned to the factory, is found to have been defective during the warranty period. This warranty does not cover damage or liability for misuse, abuse, or the improper application or installation of the Banner product.

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