PVS28 Parts Verification Sensor Product Manual

Original Instructions
p/n: 233619 Rev. B
25-Sep-25
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ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

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Chapter 1 Features

28 mm Programmable Multicolor Optical Sensor and Indicator



- Programmable using Banner's Pro Editor software and Pro Converter Cable
- Up to 3 colors in one device (7 colors using Pro Editor)
- Devices are completely self-contained—no controller needed
- Teachable modes with color feedback for ease of use
- Touchless activation removes the need for physical force to activate
- Rated IP54
- 12 V DC to 30 V DC operation
- Resistant to ambient light, EMI, and RFI interference
- Sensing and indication in one device

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

Model Key

Family	Sensing Mode	Array Length	Connector
PVS28	**D**	**100**	**QP**
Parts Verification Sensor, 28 mm width	D = Diffuse / Distance	100 = 100 mm 225 = 225 mm	QP = 150 mm (6 in) PVC-jacketed cable with a 5-pin M12 male quick-disconnect connector

PVS28D100QP: 28 mm width by 100 mm length, with Diffuse/Distance sensing mode and 150 mm (6 in) PVC-jacketed cable with a 5-pin M12 male quick-disconnect connector

PVS28D225QP: 28 mm width by 225 mm length, with Diffuse/Distance sensing mode and 150 mm (6 in) PVC-jacketed cable with a 5-pin M12 male quick-disconnect connector

Overview

The PVS28 Parts Verification Sensor is an adjustable field optical sensor that can detect a wide variety of materials and objects.

Configure the sensor using software or remote input wires to sense objects up to a specific distance, ignoring objects beyond this distance (background suppression), or within a windowed range.

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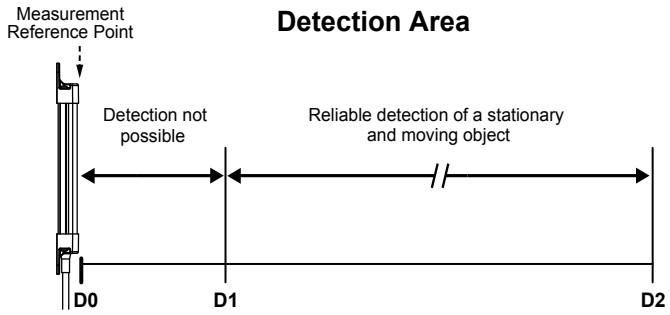


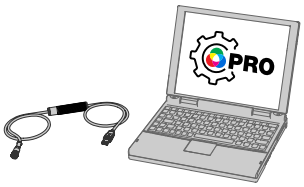
Model	D0 (mm)	Switch Point D1 (mm)	Switch Point D2 (mm)
PVS28D	0	20	500

Device Status Indicators

The PVS28 Parts Verification Sensor has two indicators: one to indicate power, and one to indicate output.

Indicator	Color	Description
Power Status	Green	ON: Sensor is powered OFF: Sensor is not powered
Output Status	Amber	ON: Output is active, sourcing in PNP mode or sinking in NPN mode OFF: Output is not active

Pro Editor



Use Banner's Pro Editor software and Pro Converter Cable to create custom configurations by selecting different colors, flash patterns, and animations. For more information visit www.bannerengineering.com/proeditor.

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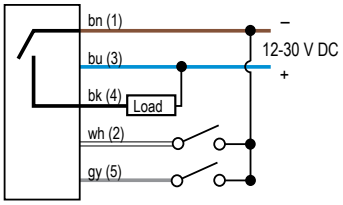
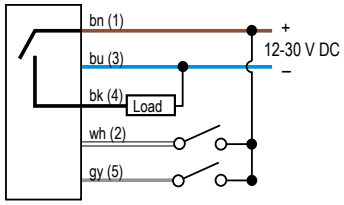
Chapter 2 Wiring

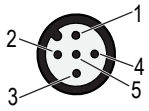
NPN



PNP



5-pin M12 Male Pinout



Pin 1 = Brown
Pin 2 = White
Pin 3 = Blue
Pin 4 = Black
Pin 5 = Gray
(Remote Input)

Four-State Full Logic

Green	Input active, no detection
Yellow	Input active, detection
Red	No input, detection
Off	Power applied, but no input or detection

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Chapter 3 Configuring a Sensor

The PVS28 Parts Verification Sensor has three Teach modes. These modes are indicated with a Teach Status color.

The Signal Level color flashes in between the Teach Status color. The color of the Signal Level depends on the signal strength of the target:

Green: Best signal, accepts Teach
Yellow: Acceptable signal, can accept Teach
Red: Poor signal, rejects Teach

Remote Input

Use the remote input to program the sensor remotely.

The remote input provides limited programming options and is Active High in PNP mode (V+ to brown wire), or Active Low in NPN mode (V+ to blue wire). For Active High, pulse the gray wire to V+ (12 V DC to 30 V DC). For Active Low, pulse the gray wire to ground (0 V DC).

The remote input wire is enabled by default. Pulse the remote input wire 7 times or use the Banner Pro Editor software to enable or disable the feature. When the remote input feature is enabled, pulse the remote input according to the diagram and the instructions provided in this manual. Remote teach can also be performed using the button on the Pro Converter Cable.

The length of the individual programming pulses is equal to the value T: **0.04 seconds ≤ T ≤ 0.8 seconds**.

Exit remote programming modes by cycling power or by waiting for 30 seconds.

> **NOTE:** If a factory reset is performed through the Banner Pro Editor Software, the remote input wire becomes enabled (factory default setting). If the sensor is returned to factory defaults by using the remote input wire, the input wire remains enabled and the rest of the settings are restored to factory defaults.

Remote Teach

Use the following procedure to teach the Set Point.

1. Pulse the remote input:
   - 3x - Object Teach: The indicator alternates between a blue Teach Status color and the Signal Level color.
   - 4x - Background Teach: The indicator alternates between a magenta Teach Status color and the Signal Level color.
   - 5x - Window Teach: The indicator alternates between a cyan Teach Status color and the Signal Level color.
   - 6x - Retroreflective Teach: The indicator performs a chase animation with a blue Teach Status color, with the Signal Level color as the background.
2. Present the Set Point.
3. Teach the Set Point.

Action		Result
Single pulse the remote input.		**Teach Accepted** The indicator stops flashing and the device returns to operation. **Teach Not Accepted** The Signal Level color turns red during the teach procedure, and then the indicator stops flashing. Retry teaching the set point.

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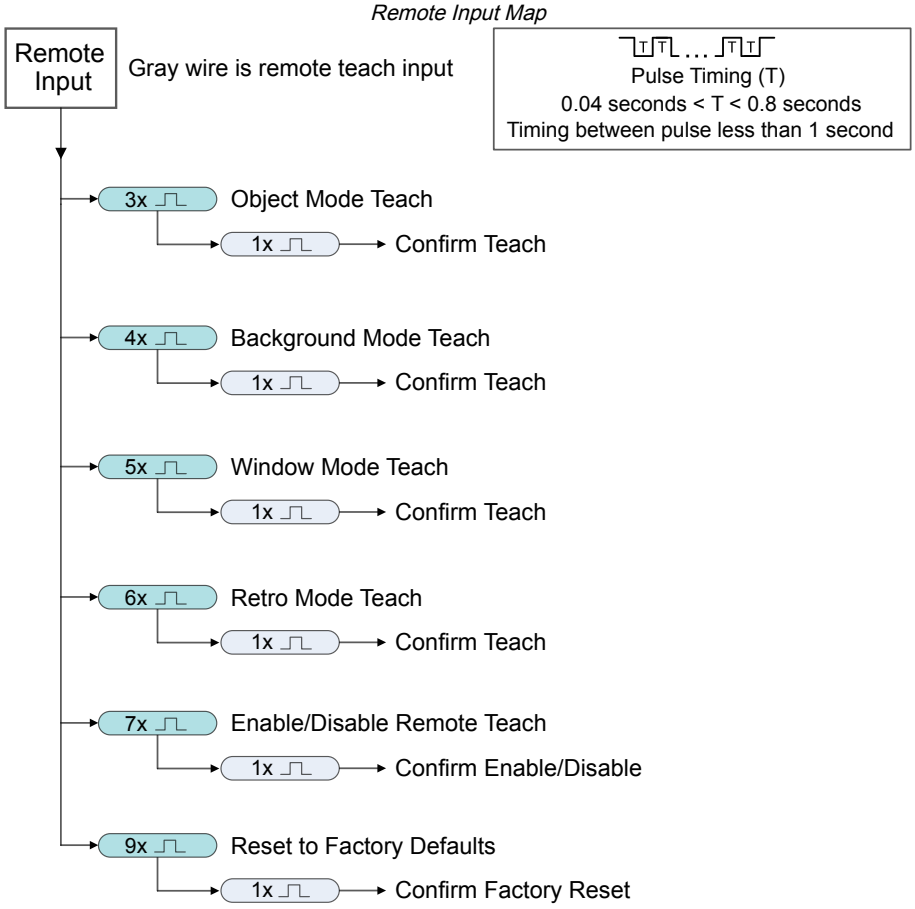
Remote Input Map



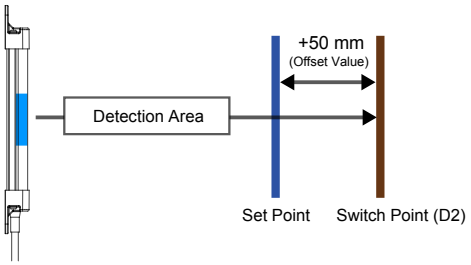
Teach Modes and Operation

Object Mode (default)

Teach Status Color: Blue

The PVS28 Parts Verification Sensor is configured to Object Mode by default. Object Mode sets the total Detection Area from the sensor to the Set Point plus the Offset Value (50 mm default). Use Object Mode to trigger a change in state when an object is present between the sensor minimum (20 mm default) and the taught distance plus the offset.

Three-pulse the remote input to enable Object Mode. Successfully entering Object Mode causes the device to alternate between the Teach Status color (Blue) and the Signal Level color.



Background Mode

Teach Status Color: Magenta

Background Mode sets the total Detection Area from the sensor to the Set Point minus the Offset Value (50 mm default). Use Background Mode when there is a constant background object present and a state change is desired when another object is in front of that background.

Four-pulse the remote input to enable Background Mode. Successfully entering Background Mode causes the device to alternate between the Teach Status color (Magenta) and the Signal Level color.

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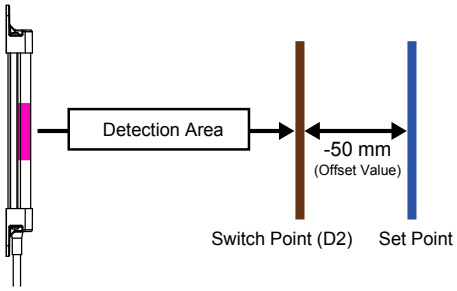
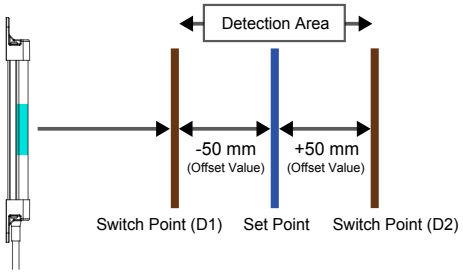


Window Mode

Teach Status Color: Cyan

Window Mode centers the total Detection Area at the Set Point plus and minus the Offset Value (50 mm default). Configuring a window near the minimum and maximum ranges shifts this window to ensure that it maintains this value. Use Window Mode when a change in state is desired within a specific narrow area, and not when outside this area.

Five-pulse the remote input to enable Window Mode. Successfully entering Window Mode causes the device to alternate between the Teach Status color (Cyan) and the Signal Level color.



Retroreflective Mode

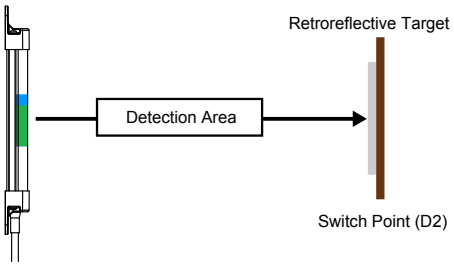
Teach Status Color: Blue chase animation

Retroreflective Mode extends the total Detection Area beyond the set point limit (500 mm) by using a reflective target up to 1000 mm away.

Place the retroreflective target at the desired switch point. The minimum distance is the set point limit (500 mm) plus the offset value (50 mm default). The device operates normally up to the set point limit. Beyond this point, 50% of the reflective target area must be blocked to trigger the output. When using retroreflective tape, use widths of 3 inches or less, and lengths between 3 inches and 10 inches, depending on desired detection area.

Six-pulse the remote input to enable Retroreflective Mode. Successfully entering Retroreflective Mode causes the device to perform the Teach Status animation (Blue chase animation) with the Signal Level color as the background.

> **NOTE:** There is a short delay when entering and exiting Retroreflective Mode. The outer four indicators turn red during this time to indicate that the device is switching modes. The device resumes the Teach Status animation for the corresponding teach mode once it has completed switching modes.



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Reset the Sensor to Factory Defaults

Reset the sensor to factory default settings using one of two methods.

> **NOTE:** If a factory reset is performed through the Banner Pro Editor software, the remote input wire becomes disabled (factory default setting). If the sensor is returned to factory default settings by using the remote input wire, the input wire remains enabled and the rest of the settings are restored to factory defaults.

Reset Using the Banner Pro Editor Software

Go to **Sensor › Factory Reset**. The sensor indicators flash once, the sensor is reset back to the factory default settings, and a confirmation message displays.

Reset Using the Remote Input

Nine-pulse the remote input to reset the device to factory default settings. The device then flashes white on success.

Pulse the remote input once more to apply the factory defaults.

Factory Default Settings via Remote Teach Mode

Default Settings

Setting	Factory Default
Discrete Output and Remote Input	Bimodal
Remote Input Wire	Enabled
Teach Offset Distance	50 mm (2 in)
Operation Mode	Object Mode
D1	20 mm (0.8 in)
D2	500 mm (19.7 in)
NO/NC	Normally open
On Delay	0 ms
Off Delay	0 ms

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Chapter 4 Specifications

Supply Voltage (Vcc)

12 V DC to 30 V DC

Supply Current

Maximum current (exclusive of load):

100 mm: 85 mA
225 mm: 150 mA

Typical current at 24 V DC (exclusive of load):

100 mm: 35 mA
225 mm: 55mA

Supply Protection Circuitry

Protected against output short-circuit

Leakage Current Immunity

400 µA

Range

The sensor can detect an object at the following ranges, depending on the material and size of the target: 20 mm to 500 mm

Retroreflective mode extends the maximum distance to 1000 mm

Output Ratings

Maximum Load: 150 mA

ON-State Saturation Voltage:

< 2 V DC at 10 mA
< 2.5 V DC at 150 mA

OFF-State Leakage Current: < 10 µA at 30 V DC

Remote Input

Allowable Input Voltage Range: 0 to Vsupply

Active High (internal weak pull-down): High state > (Vsupply - 2.25 V) at 2 mA maximum

Active Low (internal weak pull-up): Low state < 2.25 V at 2 mA maximum

Delay at Power-up

< 1 s

Response Time

Object Mode/Diffuse Mode:

Switching Frequency: 4 Hz
Discrete Output Response: 120 ms

Retroreflective Mode:

Switching Frequency: 2 Hz
Discrete Output Response: 240 ms

Sensor Array and Beam Spacing

100 mm model: 2 sensors, 50 mm

225 mm model: 4 sensors, 60 mm

Application Note

For best performance, allow 5 minutes for the sensor to warm up

Construction

Housing: Polycarbonate

End Caps: ABS

Connections

150 mm (6 in) PVC-jacketed cable with a 5-pin M12 male quick-disconnect connector

Models with a quick disconnect require a mating cordset

> **NOTE:** A shielded cable is required if the sensor is mounted outdoors or if the cable is longer than 30 m (98.4 ft).

Pro Editor Configuration

Connection to Pro Editor software enables control of:

- **Animation:** Steady, Flash, Two Color Flash, 50/50, 50/50 Rotate, Chase, Intensity Sweep, Color Sweep
- **Color:** Green, Red, Yellow, Blue, White, Cyan, Magenta
- **Intensity:** Low, Medium, High
- **Speed:** Slow, Standard, Fast
- **Output State:** Normally Open, Normally Closed, Momentary, Latching, On Delay, Off Delay
- **Logic Type:** Four State Full Logic

Pro Converter Cable required to interface between PC and indicator, see accessories

Vibration and Mechanical Shock

Meets IEC 60068-2-6 requirements (Vibration: 10 Hz to 55 Hz, 1.0 mm amplitude, 5 minutes sweep, 30 minutes dwell)

Meets IEC 60068-2-27 requirements (Shock: 30G 11 ms duration, half sine wave)

Impact: IK06 (IEC 6006-2-27)

Operating Temperature

–20 °C to +50 °C (–4 °F to +122 °F)

Storage Temperature

–40 °C to +70 °C (–40 °F to +158 °F)

Sensing Beam

Infrared, 940 nm

Environmental Rating

IP54

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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

Certifications

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1831 Diegem, BELGIUM

Turck Banner LTD Blenheim House
Blenheim Court
Wickford, Essex SS11 8YT
GREAT BRITAIN

FCC Part 15 Class B for Unintentional Radiators

(Part 15.105(b)) This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

(Part 15.21) Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Industry Canada ICES-003(B)

This device complies with CAN ICES-3 (B)/NMB-3(B). Operation is subject to the following two conditions: 1) This device may not cause harmful interference; and 2) This device must accept any interference received, including interference that may cause undesired operation.

Cet appareil est conforme à la norme NMB-3(B). Le fonctionnement est soumis aux deux conditions suivantes : (1) ce dispositif ne peut pas occasionner d'interférences, et (2) il doit tolérer toute interférence, y compris celles susceptibles de provoquer un fonctionnement non souhaité du dispositif.

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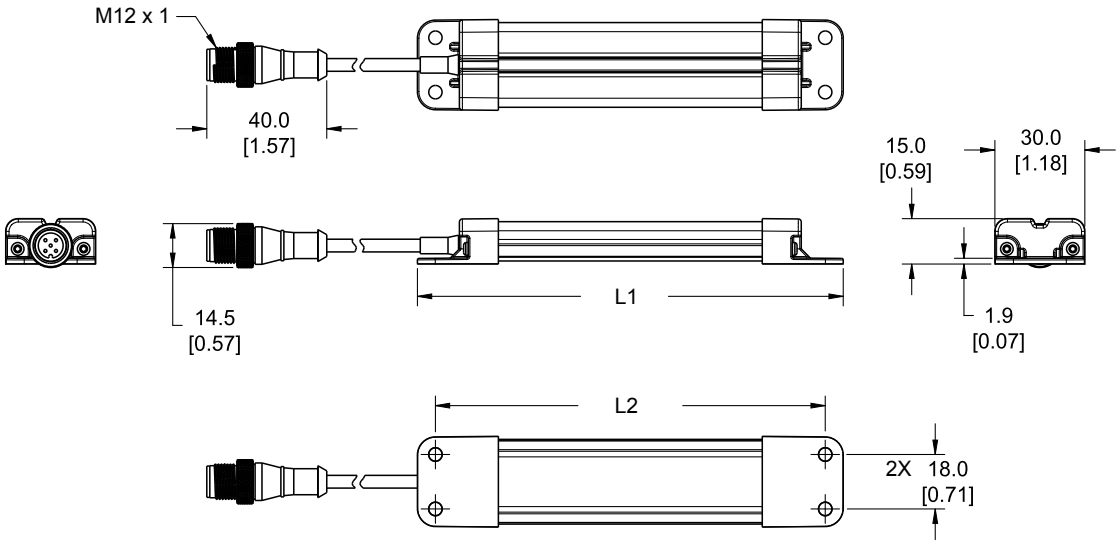
Dimensions

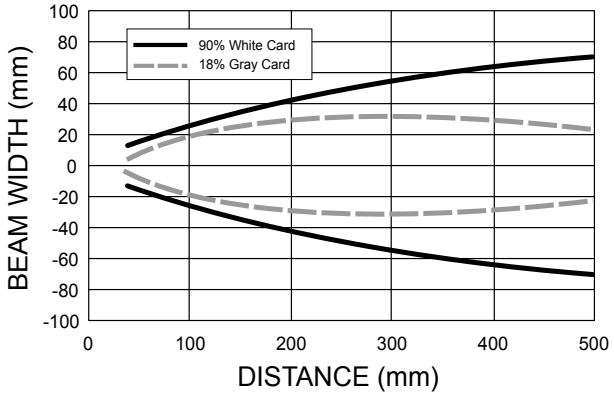
All measurements are listed in millimeters [inches], unless noted otherwise. The measurements provided are subject to change.



Model	L1	L2
PVS28D100QP	142 mm (5.59 in)	130 mm (5.12 in)
PVS28D225QP	270.6 mm (10.65 in)	258.6 mm (10.18 in)

Beam Pattern

Typical beam pattern per sensor, in millimeters



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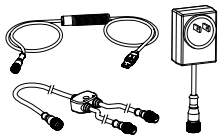
Chapter 5 Accessories

Pro Editor Hardware

PRO-KIT

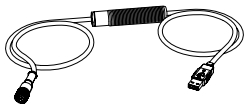
Includes:

- Pro Converter Cable (MQDC-506-USB)
- Splitter (CSB-M1251FM1251M)
- Power Supply (PSW-24-1)



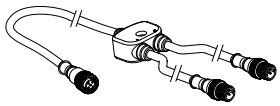
MQDC-506-USB

- Pro Converter Cable
- 1.83 m (6 ft) length 5-pin M12 quick disconnect to Device and USB to PC
- Required for connection to the configuration software



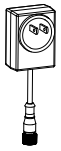
CSB-M1251FM1251M

- 5-pin parallel Y splitter (Male-Male-Female)
- For full Pro Editor preview capability
- Requires external power supply, sold separately



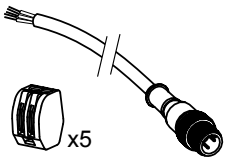
PSW-24-1

- 24 V DC, 1 A power supply
- 2 m (6.5 ft) PVC cable with M12 quick disconnect
- Provides external power with splitter cable, sold separately



ACC-PRO-CABLE5

- Mating accessory for cabled and terminal models
- 150 mm (6 inch) PVC cable with M12 quick disconnect
- Lever wire nuts included (qty 5)
- Required to connect cabled models and screw terminal models to Pro Converter Cable, sold separately



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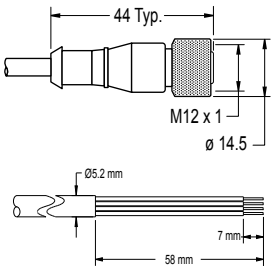
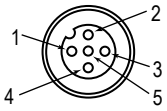
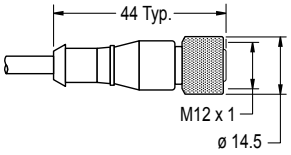
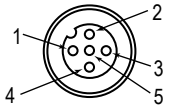
Cordsets

4-Pin Single-Ended M12 Female Cordsets					
Model	**Length**	**Style**	**Dimensions**	**Pinout (Female)**	
MQDC-403	1 m (3.28 ft)	Straight			1 = Brown 2 = White 3 = Blue 4 = Black 5 = Not used
MQDC-406	2 m (6.56 ft)				
MQDC-410	3 m (9.8 ft)				
MQDC-415	5 m (16.4 ft)				
MQDC-430	9 m (29.5 ft)				
MQDC-450	15 m (49.2 ft)				
MQDC-460	18.3 m (60 ft)				
MQDC-470	21 m (68.9 ft)				
MQDC-4100	30 m (98.43 ft)				

5-Pin Single-Ended M12 Female Cordsets				
Model	**Length**	**Style**	**Dimensions**	**Pinout (Female)**
MQDC1-501.5	0.5 m (1.5 ft)	Straight		 1 = Brown 2 = White 3 = Blue 4 = Black 5 = Gray
MQDC1-503	0.9 m (2.9 ft)			
MQDC1-506	2 m (6.5 ft)			
MQDC1-515	5 m (16.4 ft)			
MQDC1-530	9 m (29.5 ft)			
MQDC1-560	18 m (59 ft)			
MQDC1-5100	31 m (101.7 ft)			

Brackets

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

Bracket Selection Table

Bracket Model	Requires Use of Bracket Model(s)	May Be Used with Bracket Model(s)
SMBPVA1 (included with PVS System)	N.A.	**SMBPVA2**
SMBPVA5C **SMBPVA10C**	N.A.	**SMBPVA7** **SMBPVA8**
SMBPVA9	N.A.	N.A.
SMBPVA2	N.A.	N.A
SMBPVA7	**SMBPVA5C** or**SMBPVA10C**	N.A
SMBPVA8	**SMBPVA5C** or**SMBPVA10C**	N.A

NOTE: Standard mounting brackets are included with each PVS System. The following brackets are in addition to the standard brackets.

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SMBPVA2

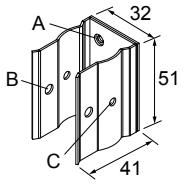
- Set of 4 molded brackets
- Snaps onto standard 28 mm (1.1 in) diameter pipe
- 2 brackets required per sensor



SMBPVA7

- One-piece bracket for mounting to 28 mm (1.1 in) diameter pipe
- Black-painted steel
- Requires SMBPVA..C for mounting at an angle ±90°

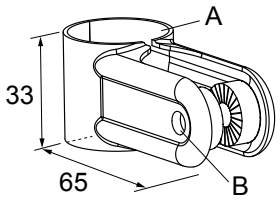
A = M4 x 0.5, B = ø 5.2, C = ø 4.2



SMBPVA8

- Heavy-duty 2-part bracket mounts to 28 mm (1.1 in) diameter pipe
- Cold-rolled steel with zinc finish
- Requires SMBPVA..C for mounting

A=ø 30.5, B=ø 7.1



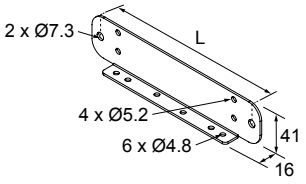
SMBPVA9

- Pair of two-piece swivel brackets
- Mount directly to sensor or to PVD or PVA protective brackets
- Designed for mounting sensor to look down



SMBPV..C

- Back-mounted bracket for mounting to SMBPVA7 or SMBPVA8 brackets
- Cold-rolled steel with zinc finish
- Different lengths **(L)** for two different models:
  - **SMBPVA5C** = 170 mm
  - **SMBPVA10C** = 298.5 mm



Retroreflective Tape

Model	Reflectivity Factor	Maximum Temperature	Size
BRT-THG-1-100	0.7	+60 °C (+140 °F)	25 mm (1 in) wide, 2.5 m (100 in) long
BRT-THG-2-100	0.7	+60 °C (+140 °F)	50 mm (2 in) wide, 2.5 m (100 in) long
BRT-THG-3-100	0.7	+60 °C (+140 °F)	75 mm (3 in) wide, 2.5 m (100 in) long

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Chapter 6 Product Support and Maintenance

Clean with Mild Detergent and Warm Water

Wipe down the device with a soft cloth dampened with a mild detergent and warm water solution. Do not use any other chemicals for cleaning.

Repairs

Contact Banner Engineering for troubleshooting of this device. **Do not attempt any repairs to this Banner device; it contains no field-replaceable parts or components.** If the device, device part, or device component is determined to be defective by a Banner Applications Engineer, they will advise you of Banner's RMA (Return Merchandise Authorization) procedure.

> **IMPORTANT:** If instructed to return the device, pack it with care. Damage that occurs in return shipping is not covered by warranty.

Contact Us

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For worldwide locations and local representatives, visit www.bannerengineering.com.

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