VS3 Series Retroreflective Mode Sensors

BANNER®
the photoelectric specialist

*Miniature self-contained sensors*

VS3 Series Retroreflective Mode Sensor Features

- Extremely compact self-contained miniature sensor
- Coaxial optics eliminate "blind" area at close range
- Visible red sensing beam (both polarized and non-polarized versions)
- Range to supplied retroreflector is 0 to 250 mm (up to 10")
- 10 to 30V dc operation
- Choice of integral cable or quick-disconnect connector
- 3-wire hookup; output load capacity to 50 mA
- Choose models with NPN (sinking) or PNP (sourcing) output
- Choose dark- or light-operate models

User Application Notes:

- The VS3...XLP series should be used for general sensing applications like packages, small parts, mirror-like surfaces, or documents. They are most effective when used with the supplied micro-prism reflector.

- When using glass bead tape, (e.g., 3M model 6870), non-polarized models (...XLV) must be used. These models should also be considered when a glass lens (as in the LP models) is not permitted in the sensing environment.

- For non-polarized sensors, an object's surface reflection (e.g., polished stainless steel), may be more reflective than low-grade retro-reflective tape, and "bright" object transition may never be detected by the non-polarized sensor.
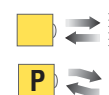
Visible Red, 680 nm

VS3 Series Retroreflective-Mode Sensors

Models		Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
Non-Polarized Models						
VS3AN5XLV VS3AN5XLVQ		2 m (6.5') 3-Pin Pico QD		NPN Light Operate		
VS3RN5XLV VS3RN5XLVQ	250 mm (10") using BRT32X20AM retro target (supplied)	2 m (6.5') 3-Pin Pico QD	10 to 30V dc	NPN Dark Operate		
VS3AP5XLV VS3AP5XLVQ		2 m (6.5') 3-Pin Pico QD		PNP Light Operate		
VS3RP5XLV VS3RP5XLVQ		2 m (6.5') 3-Pin Pico QD		PNP Dark Operate		
Polarized Models						
VS3AN5XLP VS3AN5XLPQ		2 m (6.5') 3-Pin Pico QD		NPN Light Operate		
VS3RN5XLP VS3RN5XLPQ	250 mm (10") using BRT32X20AM retro target (supplied)	2 m (6.5') 3-Pin Pico QD	10 to 30V dc	NPN Dark Operate		
VS3AP5XLP VS3AP5XLPQ		2 m (6.5') 3-Pin Pico QD		PNP Light Operate		
VS3RP5XLP VS3RP5XLPQ		2 m (6.5') 3-Pin Pico QD		PNP Dark Operate		

See Safety Use Warning on Back Page.

VS3 Series Retroreflective Mode

VS3 Series Overview

VS3 Series miniature self-contained sensors are designed for retroreflective sensing in small areas previously accessible only to remote or fiber optic models. Typical applications include mounting on small feeder tracks, packaging machines, and conveyors, where larger sensors will not fit.

The coaxial optics of the VS3 allow the retroreflective target to be placed as close to the sensor lens as needed – there is no "blind" response area, as is typical of most retroreflective sensors. The VS3 is supplied with a Banner model BRT32X20AM retroreflective target (see right). The specifications shown on page 1 assume use of this target.

Other retroreflective materials may be substituted. For example, using the standard BRT-3 target, the range becomes 400 mm (16"); standard BRT-THG retroreflective tape yields a 150 mm (6") range. Contact Banner Engineering for sensing performance when using other retroreflective targets.
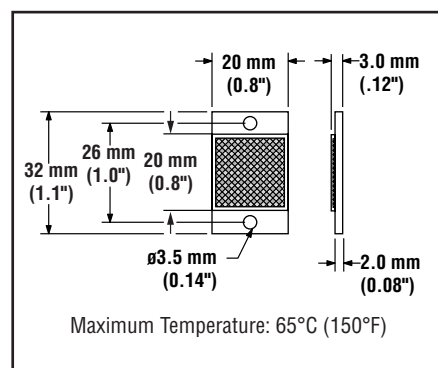

Maximum Temperature: 65°C (150°F)

Figure 1. Retroreflective target, model BRT-32X20AM (supplied with each sensor)

VS3 Series Specifications

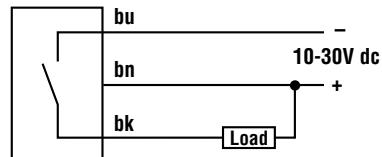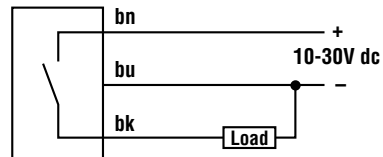|	
Supply Voltage and Current	10 to 30V dc (10% maximum ripple) at less than 25 mA (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	SPST solid-state switch Choose NPN (current sinking) or PNP (current sourcing) models Choose light operate (N.O.) or dark operate (N.C.) models
Output Rating	50 mA maximum **OFF-state leakage current:** < 1 microamp at 24V dc **ON-state saturation voltage:** < 0.25V at 10 mA dc; < 0.5V at 50 mA dc
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs Overload trip point ≥ 100 mA
Output Response Time	1 millisecond ON and OFF (NOTE: 150 millisecond delay maximum on power-up: output does not conduct during this time)
Repeatability	160 microseconds
Indicators	Two LEDs: Green and Yellow 　　　**Green ON steady:** power to sensor is ON 　　　**Green flashing:** output overload 　　　**Yellow ON steady:** light is sensed
Construction	**XLV Models:** Black ABS housing with acrylic lens **XLP Models:** Black ABS housing with glass lens and acrylic cover
Environmental Rating	IEC IP67; NEMA 6
Connections	2 m (6.5') attached cable: three #28 ga stranded conductors with PE insulation; PVC outer cable jacket; or 3-pin Pico-style threaded quick-disconnect fitting. QD cables are ordered separately.
Operating Conditions	**Temperature:** -20° to +55°C (-4° to +131°F) **Maximum Relative Humidity:** 80% at 50°C (non-condensing)
Vibration and Mechanical Shock	**Vibration:** All models meet IEC 60068-2-6, IEC 60947-5-2, UL491 Section 40, MIL-STD-202F Method 201A; 10 to 60 Hz, 0.5 mm peak to peak **Shock:** All models meet IEC 60068-2-27, IEC 60947-5-2; 30g peak acceleration, 11 millisecond pulse duration, half-sine wave pulse shape
Application Notes	M3 stainless steel mounting hardware included. Optional mounting brackets are available (page 4).
Certifications	CE

VS3 Series Sensor Hookups

Sensors with NPN Outputs
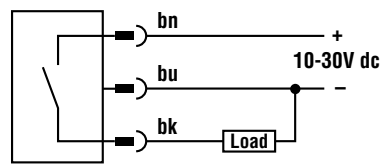**Cabled Models**

bu —
bn 10-30V dc +
bk Load

Sensors with PNP Outputs
Cabled Models

bn +
bu 10-30V dc —
bk Load

Quick-Disconnect Models

bu —
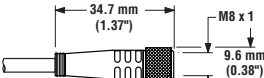bn 10-30V dc +
bk Load

Quick-Disconnect Models

bn +
bu 10-30V dc —
bk Load
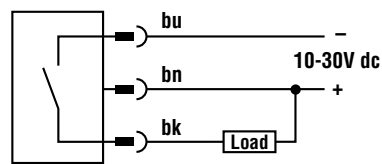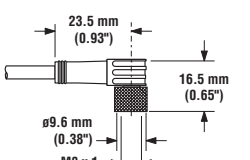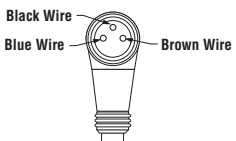
VS3 Series Retroreflective Mode Sensor Dimensions

VS3…5XLV

9 mm (0.35")
4.5 mm (0.18")
16.4 mm (0.65")
25.4 mm (1.00")

VS3…5XLVQ

15.6 mm (0.61")
12.6 mm (0.50")
ø3.2 mm (0.13")
14.2 mm (0.56")
7.3 mm (0.29")
35.2 mm (1.39")

With Integral Cable

30 mm (1.2")

VS3…5XLP

9 mm (0.35")
4.5 mm (0.18")
16.4 mm (0.65")
25.4 mm (1.00")

VS3…5XLPQ

16.6 mm (0.65")
13.6 mm (0.54")
ø3.2 mm (0.13")
14.2 mm (0.56")
7.3 mm (0.29")
35.2 mm (1.39")

With Straight QD Cable

75 mm (3.0")

With Right-angle QD Cable

47 mm (1.9")
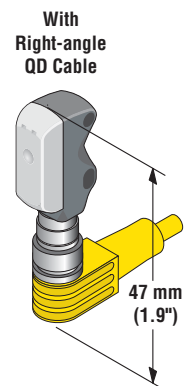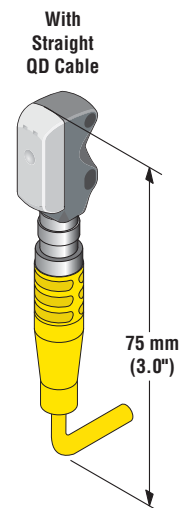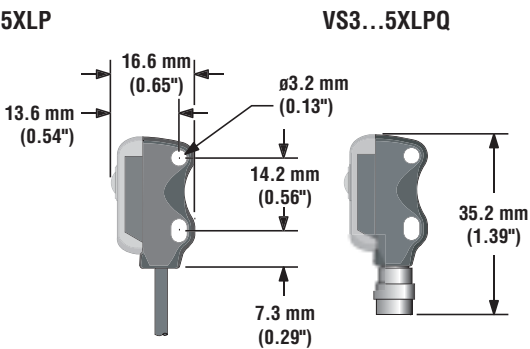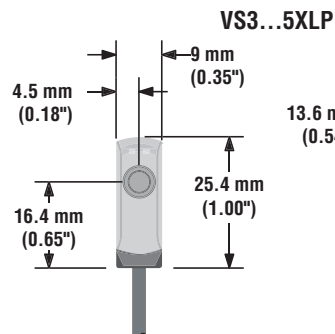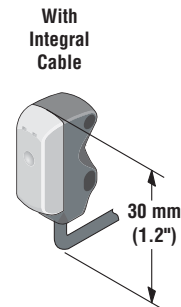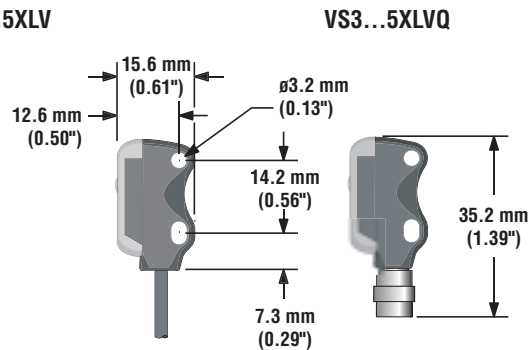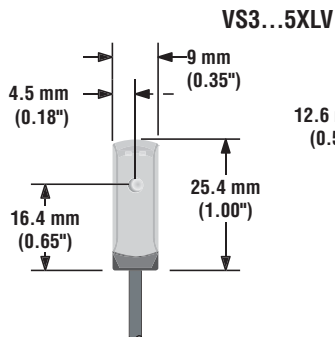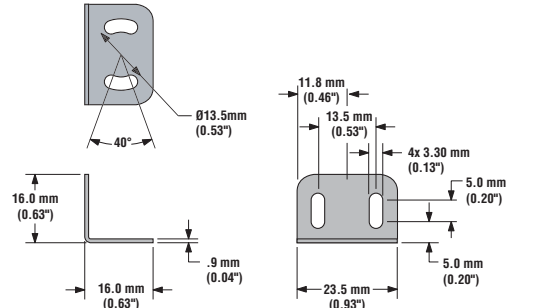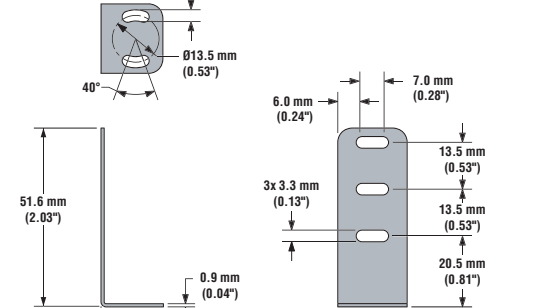
VS3 Series Retroreflective Mode

Accessories

Quick-Disconnect (QD) Cables

Style	Models	Length	For Use With	Dimensions	Pinout
3-pin Pico Style Straight	**PKG3M-2**	2 m (6.5')	All VS3 Series sensors with model suffix "Q".	34.7 mm (1.37") • M8 x 1 • 9.6 mm (0.38")	Black Wire, Blue Wire, Brown Wire
	PKG3M-9	9 m (30')			
3-pin Pico Style Right-angle	**PKW3M-2**	2 m (6.5')		23.5 mm (0.93") • 16.5 mm (0.65") • ø9.6 mm (0.38") • M8 x 1	Black Wire, Blue Wire, Brown Wire
	PKW3M-9	9 m (30')			

VS3 Series Mounting Brackets

SMBVS3S	• Right-angle bracket • 300 series stainless steel	SMBVS3T	• Right-angle tall bracket • 300 series stainless steel

Ø13.5mm (0.53") — 40° — 16.0 mm (0.63") — .9 mm (0.04") — 16.0 mm (0.63") — 11.8 mm (0.46") — 13.5 mm (0.53") — 4x 3.30 mm (0.13") — 5.0 mm (0.20") — 5.0 mm (0.20") — 23.5 mm (0.93")

2x 3.2 mm (0.13") — Ø13.5 mm (0.53") — 40° — 51.6 mm (2.03") — 18.0 mm (0.71") — 0.9 mm (0.04") — 6.0 mm (0.24") — 7.0 mm (0.28") — 3x 3.3 mm (0.13") — 13.5 mm (0.53") — 13.5 mm (0.53") — 20.5 mm (0.81")

BANNER ®

the photoelectric specialist

⚠ **WARNING . . .** Not To Be Used for Personnel Protection

Never use these products as sensing devices for personnel protection. Doing so could lead to serious injury or death.

These sensors do NOT include the self-checking redundant circuitry necessary to allow their use in personnel safety applications. A sensor failure or malfunction can cause either an energized or de-energized sensor output condition. Consult your current Banner Safety Products catalog for safety products which meet OSHA, ANSI and IEC standards for personnel protection.

WARRANTY: Banner Engineering Corp. warrants its products to be free from defects for one year. Banner Engineering Corp. will repair or replace, free of charge, any product of its manufacture found to be defective at the time it is returned to the factory during the warranty period. This warranty does not cover damage or liability for the improper application of Banner products. This warranty is in lieu of any other warranty either expressed or implied.