

PVD Series Parts Verification Sensor

Diffuse or retroreflective sensor for error proofing of bin-picking operations



Patent pending



Features

- One-component system is easy to mount and even easier to use. Automatically operates in either diffuse or retroreflective mode, depending on the application.
- Automatic setup and adjustment; wide beam pattern provides easy alignment.
- Range is up to 2 m (6.5') when used with retroreflective target; 400 mm (15.7") when used in diffuse mode.
- Large green job lights on either side of the metal housing can be remotely controlled to initiate user action with a solid or a blinking light. Job lights turn red to indicate bin-picking errors.
- Compact package size; only 30 mm wide x 15 mm deep (1.2" x 0.6"). Available in 2 lengths: 100 mm or 225 mm (4" or 9") to fit existing parts bin sizes and configurations.
- Easy DIP-switch adjustments: PNP/NPN output, normally open/normally closed operation, solid/flashing job light, and gate polarity for job light activation.
- Two LEDs indicate power ON and output ON.
- Choose 2 m (6.5') unterminated cable or 2 m (6.5') cable with 5-pin Euro-style quick-disconnect connector.
- Heavy-duty protective brackets available.
- 12-30V dc operation.



Visible Red, 630 nm

Models

Model Number	Range	Array	Cable*	Supply Voltage	Output
PVD100	Retroreflective Mode: up to 2 m (6.5')	100 mm (4") Long, 4 Beams	2 m (6.5') 5-wire cable, unterminated	12 to 30V dc	User-selectable NPN/PNP
PVD100Q	Diffuse Mode: up to 400 mm (15.7")		2 m (6.5') cable, terminated in a QD connector		
PVD225	All models may be used in either sensing mode.	225 mm (9") Long, 8 Beams	2 m (6.5') 5-wire cable, unterminated		
PVD225Q			2 m (6.5') cable, terminated in a QD connector		

*9 m (30') cables are available by adding suffix "W/30" to the model number of any cabled sensor (e.g., PVD100 W/30).

150 mm (6") cable terminated in a QD connector available by adding "W/6IN" to model number of any terminated sensor (e.g., PVD100Q W/6IN).

A model with a QD connector requires a mating cable; see page 7.



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.

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Overview

The PVD is a one-component, easy-to-use light screen suited to many part assembly, pick-to-light, and error-proofing applications. The PVD self-contained, solid-state emitter/receiver array is capable of functioning in either diffuse or retroreflective sensing mode. No configuration is required for this selection. If a retroreflective target is installed opposite the sensor, it will function in retroreflective mode. If not, it will function in diffuse mode. The sensor's ongoing self-adjustment feature requires no user adjustment; the sensor adapts to the sensing conditions after 15 seconds when blocked. Sensor range is decreased when no retroreflector is installed.

The DIP-switch-selectable PNP/NPN output easily interfaces to a system controller, which is pre-programmed by a supervisor for a specific sequence of tasks. Mounted with its visible red beams stretching across each parts bin, the PVD signals the assembler via its large green job lights:

- Which bins contain items to be picked in a given operation; and
- In what order they should be picked.

As the assembler reaches into each bin, the system senses if the correct part has been taken, then signals the next bin in the sequence. If the assembler reaches into a bin out of sequence, the PVD turns on its output to signal the system controller and turns on its red job light to signal the assembler that an incorrect pick has occurred.

Using the PVD system increases task efficiency, due to simplified job training, increased quality control (no skipped components), and reduced rework and inspections. The PVD speeds the resumption of work after breaks and other distractions, and it is ideal for multilingual workplaces where communication may be an issue.

Standard configuration options are selected by means of a bank of four DIP switches behind a press-on black rubber cover (see page 3). DIP switch options include:

- PNP or NPN output
- Normally Open or Normally Closed operation
- Steady or flashing job light
- Job light control input

Using specialized Banner software, additional configuration options can be adjusted. These options are programmed via the gray Datacom wire. Consult the factory or your Banner sales representative for more information. These additional options include:

- Operating frequency
- Channel blanking
- Automatic update rates
- ON and OFF delays
- Customized job light configurations

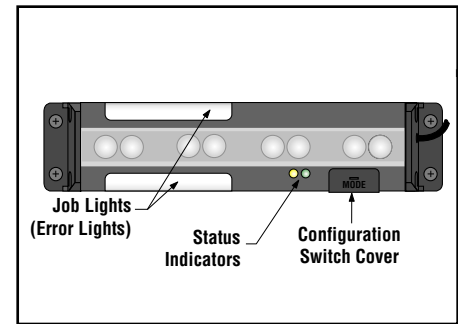


Figure 1. Sensor features

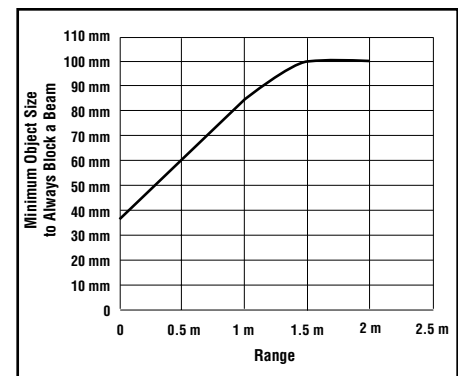




Figure 2. Minimum object detection size (retroreflective operation)

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Specifications

Supply Voltage and Current	Input Voltage: 12 to 30V dc (10% maximum ripple @ 10% duty cycle) Input Current: less than 40 mA @ 24V dc and less than 70 mA @ 12V dc (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient over-voltage
Sensing Beam	630 nm visible red
Sensing Range	Retroreflective applications: 2 m (6.5'), using 25 mm (1") wide retroreflective tape Diffuse applications: 400 mm (15.7"), with 18% reflectivity gray card target
Sensing Height	4-channel models: 111 mm (4.4") 8-channel models: 240 mm (9.4")
Beam Spacing	28.6 mm (1.125")
Sensing Resolution	Retroreflective: 51 mm at 406 mm range, 100 mm at 2 m (2.0" dia. at 16" range, 3.9" at 6.5') See Figure 2. Diffuse: 55 mm dia. at 400 mm range (2.16" at 15.7" range) See Figure 10 for Minimum Object Detection Zone.
Output Configuration	User-selectable via DIP switch: 1 open-collector PNP (current sourcing) or 1 open-collector NPN (current sinking)
Output Rating	150 mA maximum Off-state leakage current: less than 10 microamps On-state saturation voltage: NPN: less than 1.0V dc at 150 mA PNP: less than 2.0V dc at 150 mA
Output Protection Circuitry	Protected against false pulse at power-up and short circuit of outputs
Output Response Time	400 ms (Includes standard 100 ms ON-delay and 100 ms OFF-delay)
Delay at Power-Up	Less than 1.0 second
Status Indicators	See Figure 1 and page 3. Green LED: Power ON/OFF Yellow LED: Output ON/OFF Job Light: (Diffused Green LED) Turned ON and OFF by applying an external signal to the Job input (white wire; see page 7). The job lights will be active high or active low, depending on user selection of DIP switch 4. Error Light: (Diffused Red LED) Turned ON and OFF by detection of an output event when job light is not ON.
Adjustments	4 DIP switches, located behind access panel († denotes default setting): 1. <i>PNP†</i> / NPN output 2. <i>Normally Open operation†</i> / Normally Closed 3. <i>Job light ON solid†</i> / Job light flashing 4. <i>Job light input high†</i> / Job light input low
Construction	Black painted aluminum housing; acrylic lenses; thermoplastic polyester end caps; thermoplastic elastomer programming switch cover; stainless steel mounting brackets and hardware
Environmental Rating	NEMA 2; IEC IP62
Connections	5-conductor PVC-jacketed 2 m (6.5') cable which is either unterminated or terminated with a 5-pin Euro-style quick-disconnect connector, depending on model. Cable diameter is 3.3 mm (0.13").
Operating Conditions	Temperature: 0° to +50°C (+32° to 122°F) Relative Humidity: 90% relative humidity @ 50°C (non-condensing)
Certifications	 

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Dimensions

Hardware packet p/n 50532 (included with each sensor):

- 4 Stainless steel Phillips panhead machine screws (M4 x 0.7 x 12)
- 2 Stainless steel Phillips panhead machine screws (M4 x 0.7 x 6)
- 2 Stainless steel Phillips panhead machine screws (M4 x 0.7 x 18)
- 4 Stainless steel hex nuts (M4 x 0.7)
- 4 Stainless steel lock washers (M4 x 0.7)
- 1 Plastic screwdriver (36 mm/1.4" long)

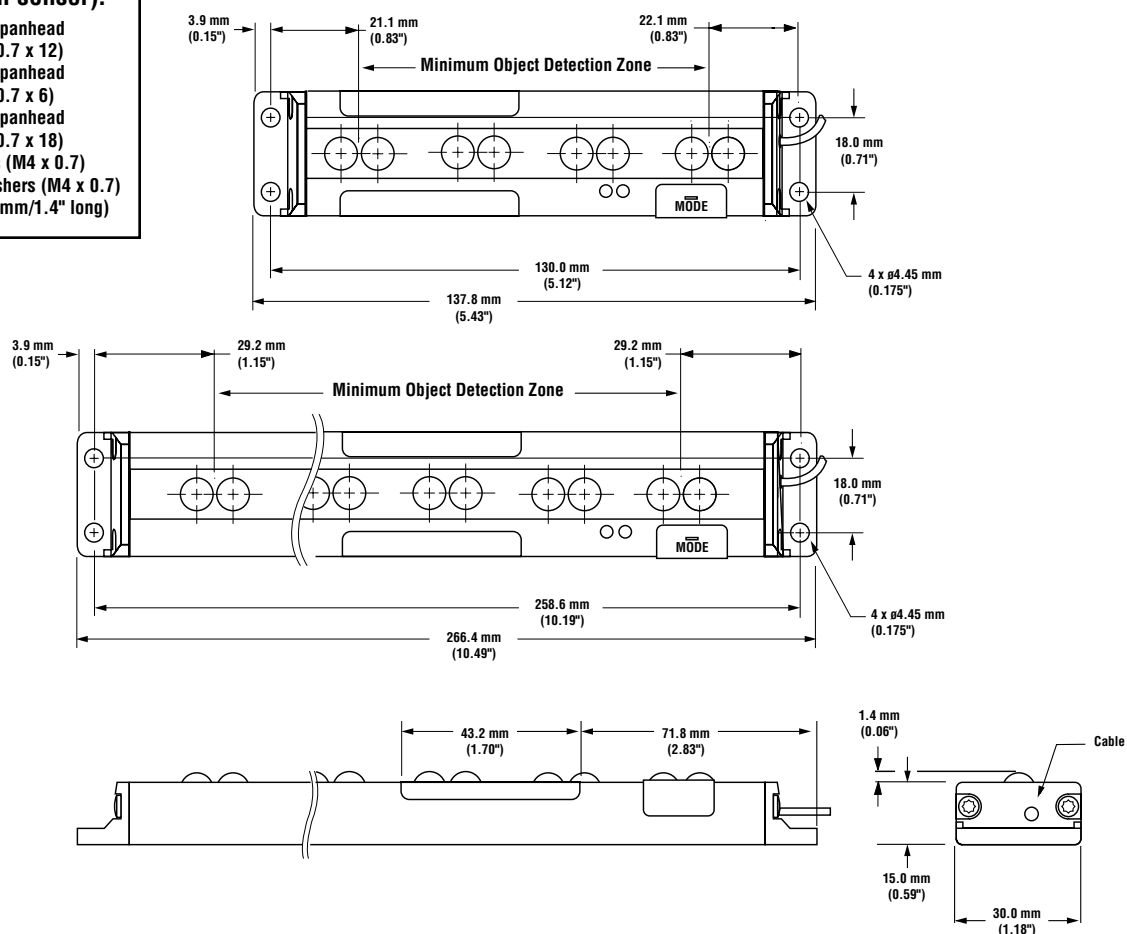


Figure 10. Sensor dimensions

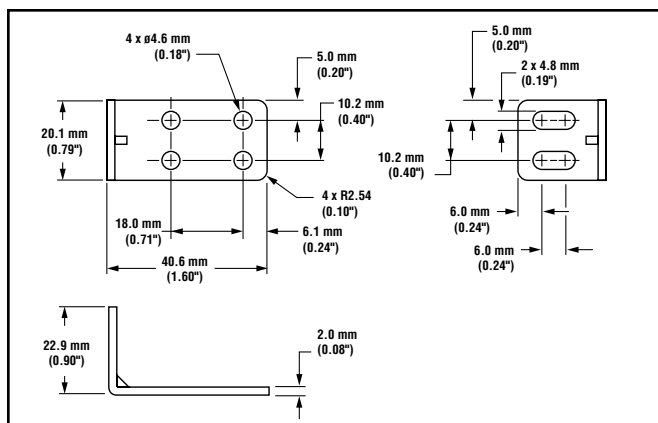


Figure 11. Bracket dimensions