



**CE** NOTE: CE certification applies to all models except PD45V..C300 Series

**Features**

- Compact and lightweight; ideal for use on robotic end effectors
- Class 2 laser diode light source.
- Convergent beam models have precise, high-energy sensing spot at focus, available in four focal lengths: 50 mm (2"), 100 mm (4"), 200 mm (8"), and 300 mm (12").
- Retroreflective models have precise, narrow beam; excellent for sensing the presence of tiny parts at close range, small parts at medium ranges and for accurate sensing over long distances.
- Fast, 0.2 millisecond sensing response for high-speed sensing or counting.
- 10 to 30V dc operation; choice of NPN (sinking) or PNP (sourcing) complementary solid state output.
- Choose models with 2 m (6.5') or 9 m (30') unterminated cable, or with 150 mm (6") Euro-style pigtail quick-disconnect (QD) connector

*Excellent for applications where high sensing power and small beam size are important. Operates over sensing ranges typically accomplished only by conventional opposed-mode photoelectrics; uses a special filter to polarize the emitted light, filtering out unwanted reflections from shiny objects.*



Visible Red; Class 2 laser; 650 nm

**Retroreflective-Mode Models**

Models	Range**	Cable*	Supply Voltage	Output Type	Excess Gain
					Performance based on BRT-36X40BM retro target
PD45VN6LLP	0.2 to 10.6 m (8" to 35')	2 m (6.5') cable	10-30V dc	NPN	
PD45VN6LLPQ		5-pin QD 150 mm (6") pigtail			
PD45VP6LLP		2 m (6.5') cable		PNP	
PD45VP6LLPQ		5-pin QD 150 mm (6") pigtail			

\*9 m (30') cables are available by adding the suffix "W/30" to the model number of any cabled sensor (e.g., PD45VN6LLP W/30). Models with QD connectors require an optional mating cable; see page 6.

\*\*Tested using a BRT-36x40BM retro target (included with each sensor). Actual range depends on the efficiency and size of the retroreflective target used. Some targets have produced ranges up to 39.6 m (130'); see page 8.



**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.

# PD45 Series PicoDot® Sensors



Excels at sensing small parts and profiles and uses fixed-field technology to ignore objects beyond the maximum sensing distance.



Visible Red; Class 2 laser; 650 nm

## Convergent-Mode Models

Models	Focus	Cable*	Supply Voltage	Output Type	Excess Gain	Beam Width
					Performance based on 90% white test card	
PD45VN6C50	50 mm (2.0")	2 m (6.5') cable	10-30V dc	NPN		
PD45VN6C50Q		5-pin Euro-style QD 150 mm (6") pigtail				
PD45VP6C50		2 m (6.5') cable		PNP		
PD45VP6C50Q		5-pin Euro-style QD 150 mm (6") pigtail				
PD45VN6C100	102 mm (4.0")	2 m (6.5') cable	10-30V dc	NPN		
PD45VN6C100Q		5-pin Euro-style QD 150 mm (6") pigtail				
PD45VP6C100		2 m (6.5') cable		PNP		
PD45VP6C100Q		5-pin Euro-style QD 150 mm (6") pigtail				
PD45VN6C200	203 mm (8.0")	2 m (6.5') cable	10-30V dc	NPN		
PD45VN6C200Q		5-pin Euro-style QD 150 mm (6") pigtail				
PD45VP6C200		2 m (6.5') cable		PNP		
PD45VP6C200Q		5-pin Euro-style QD 150 mm (6") pigtail				
PD45VN6C300	305 mm (12.0")	2 m (6.5') cable	10-30V dc	NPN		
PD45VN6C300Q		5-pin Euro-style QD 150 mm (6") pigtail				
PD45VP6C300		2 m (6.5') cable		PNP		
PD45VP6C300Q		5-pin Euro-style QD 150 mm (6") pigtail				

\*9 m (30') cables are available by adding the suffix "W/30" to the model number of any cabled sensor (e.g., PD45VN6C100 W/30). Models with QD connectors require an optional mating cable; see page 6.

## Retroreflective Sensor Alignment

Because the PicoDot laser sensor has such a long sensing range, and because its beam is so narrow (compared to the beam of typical retro sensors), its alignment is somewhat less forgiving and more difficult to accomplish. As Figure 3 indicates, the effect of angular misalignment can be dramatic, especially over distance.

For example, with one 2" reflective target mounted at a distance of 20' from the sensor, only one degree of angular misalignment will cause the center of the laser beam to miss the center of the target by 4", and miss the target altogether by almost 3".

**Alignment tip:** When using a small retroreflective target at medium or long range, it is often useful to temporarily attach (or suspend) a strip of retroreflective tape (such as BRT-THG-2-100) along a line that intersects the real target. The visible red laser beam is easily seen in normal room lighting; sight along the beam toward the target, from behind the sensor. Move the sensor to scan the laser beam back and forth across the tape strip, to guide the beam onto the target.

The use of mounting bracket SMB-46A (see page 7) may simplify alignment, because of its precision-positioning feature. After mounting the bracket and the sensor, tighten the screws in the two corners of the bracket to position the beam in the exact spot needed.

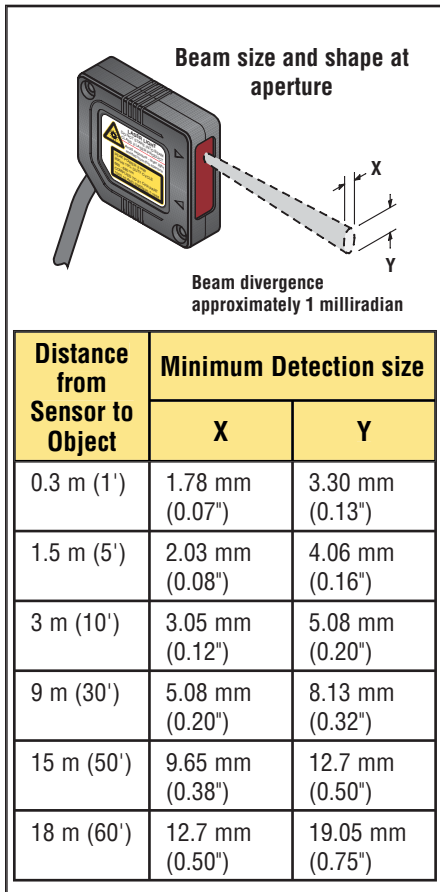


Figure 1. Minimum object detection size, as distance from the sensor increases

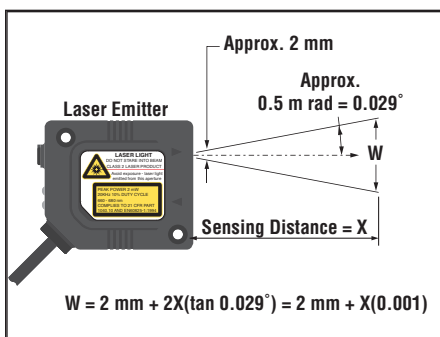


Figure 2. PicoDot laser beam divergence at 25°C (beam size vs. distance)

## Retroreflective Sensor Effective Beam Size

Unlike conventional retroreflective sensors, the retroreflective laser has the ability to sense relatively small profiles. Figure 1 demonstrates the diameter of the smallest opaque rod that will reliably break the laser beam at several sensor-to-object distances. These values assume an excess gain of about 10X. Flooding effects are possible when the gain is much higher (reduce sensor gain in this situation in order to reliably detect minimum object sizes).

Note that the shape of the beam is elliptical and its size increases as the distance from the sensor increases (see Figure 1). Minimum object detection sizes are dependent on both the object's distance from the sensor, and the direction (with respect to the beam's X and Y axes) in which the object crosses the beam.

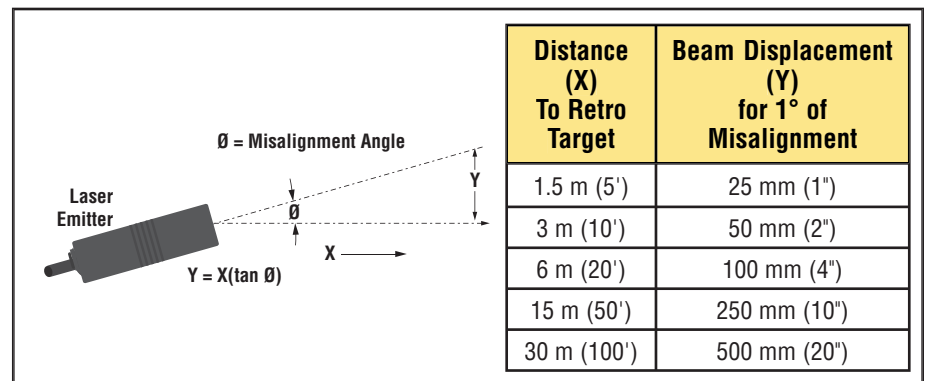


Figure 3. Beam displacement per degree of misalignment

# PD45 Series PicoDot<sup>®</sup> Sensors

## Installation Notes

### Class 2 Laser Safety Notes

Low-power lasers are by definition incapable of causing eye injury within the duration of the blink (aversion response) of 0.25 seconds. They also must emit only visible wavelengths (400 - 700 nm). Therefore, an ocular hazard can exist only if an individual overcomes their natural aversion to bright light and stares directly into the laser beam.

For safe laser use:

- Do not permit a person to stare at the laser from within the beam.
- Do not point the laser at a person's eye at close range.
- The beam emitted by a Class 2 laser product should be terminated at the end of its useful path. Open laser beam paths should be located above or below eye level where practical.

