



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.

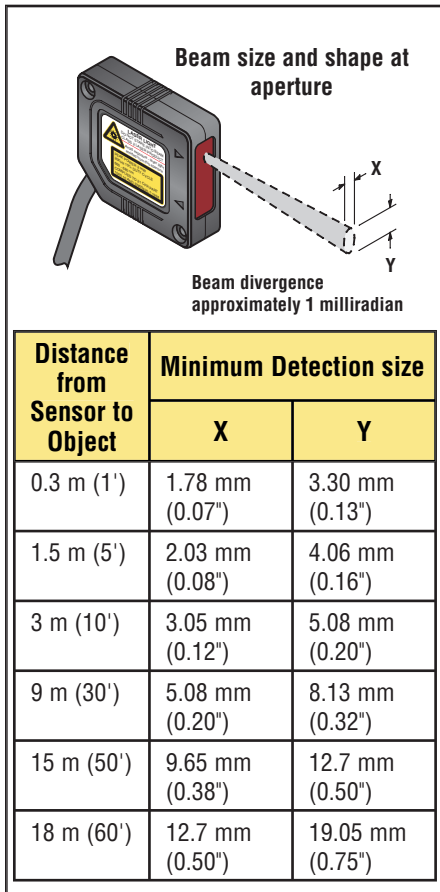


Figure 1. Minimum object detection size, as distance from the sensor increases

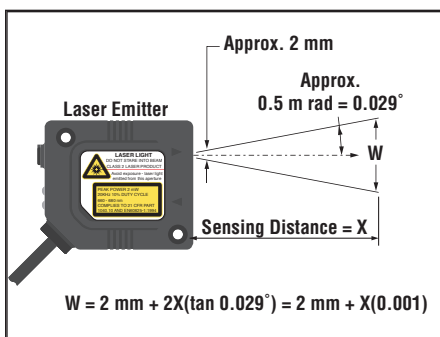


Figure 2. PicoDot laser beam divergence at 25°C (beam size vs. distance)

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.

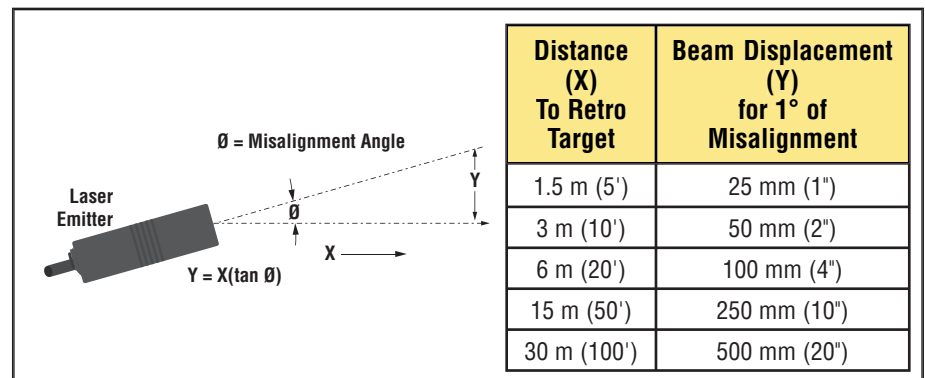


Figure 3. Beam displacement per degree of misalignment

PD45 Series PicoDot® Sensors

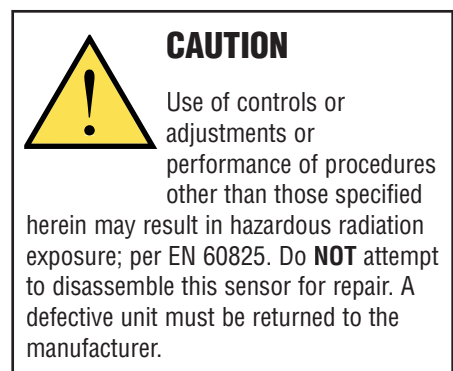
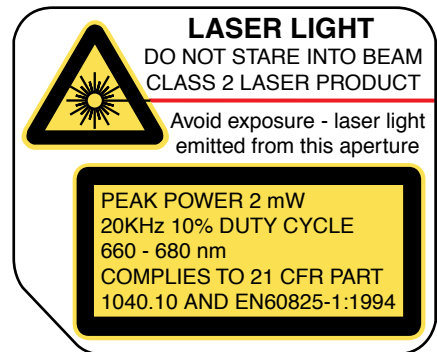
Installation Notes

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.

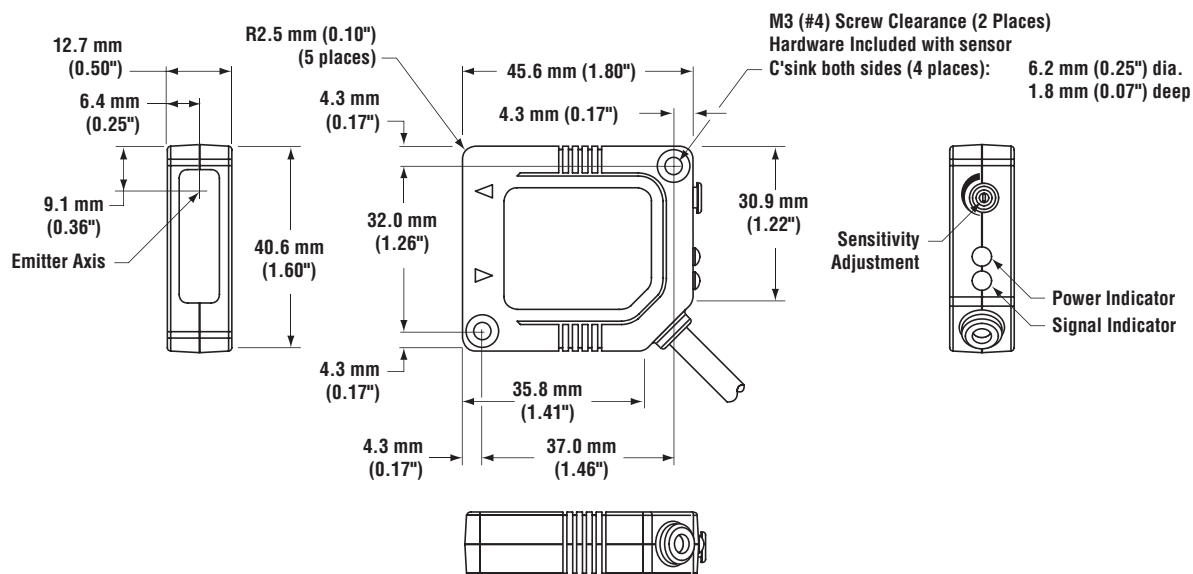


Specifications

Sensing Beam	Visible red Class 2 laser, 650 nm
Supply Voltage	10 to 30V dc (10% max ripple) at less than 20 mA, exclusive of load
Beam Size at Aperture	3.75 mm x 1.85 mm (0.15" x 0.07") (Retroreflective Models)
Beam Divergence	Approximately 1 milliradian (Retroreflective Models)
Supply Voltage	10 to 30V dc (10% maximum ripple) at less than 20 milliamps, exclusive of load
Laser Classification	Class 2 safety (CDRH (FDA) 1040.10 and IEC 60875-1)
Supply Protection Circuitry	Protected against reverse polarity, over voltage, and transient voltages
Delay at Power Up	< 1 second
Output Configuration	SPDT (complementary) solid-state switch; choose NPN (current sinking) or PNP (current sourcing) models Light operate: Normally-open output conducts when the sensor sees its own modulated light Dark operate: Normally-closed output conducts when the sensor sees dark
Output Rating	150 mA maximum (each output) OFF-state leakage current: < 1 microamp at 30V dc ON-state saturation voltage: < 0.3V at 10 mA dc; < 0.8V at 150 mA dc
Output Protection	Protected against continuous overload or short-circuit of outputs; Overload trip point ≥ 220 milliamps
Output Response Time	0.2 milliseconds (200 microseconds) ON and OFF
Repeatability	50 microseconds
Adjustments	12-turn slotted brass Gain (sensitivity) adjustment potentiometer (clutched at both ends of travel)
Extinguishing Wire	Gray wire held "low" for laser operation; "high" to turn laser OFF; Low ≤ 1.0V dc; High ≥ V _{supply} -4.0V dc (< 30V dc) or disconnect wire; 100 ms delay upon enable
Indicators	Two LEDs: Green and Yellow Green glowing steadily: power to sensor is ON Yellow glowing steadily: light is sensed; normally open output is conducting Green blinking: output overloaded Yellow blinking: marginal excess gain
Construction	Housings are heat-resistant ABS alloy, UL94-VO rated; acrylic lens cover
Environmental Rating	NEMA 3; IEC IP54
Connections	2 m (6.5') or 9 m (30') attached cable, or 5-pin Euro-style 150 mm (6") pigtail quick-disconnect fitting; mating cables for QD models are ordered separately (see page 6).
Operating Conditions	Temperature: -10° to +45°C (+14° to +113°F) Maximum relative humidity: 90% at 50°C (non-condensing)
Weight	Sensor only: 22g (0.8 oz) Sensor plus 2 m cable: 62g (2.2 oz)
Application Notes	False pulse may occur < 1 second after power-up
Certifications (all models except PD45V..C300 Series)	

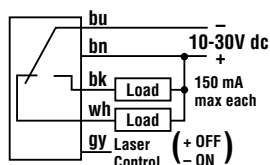
PD45 Series PicoDot® Sensors

Dimensions

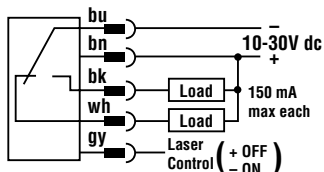


Hookups

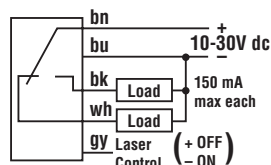
NPN Cabled Models



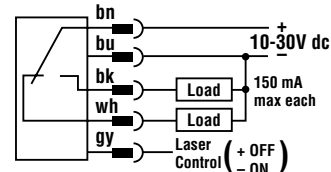
NPN Quick-Disconnect Models



PNP Cabled Models



PNP Quick-Disconnect Models



Accessories

Euro-Style Quick-Disconnect Cables

Cable: PVC jacket, polyurethane connector body, chrome-plated brass coupling nut
Conductors: 22 or 20 AWG high-flex stranded, PVC insulation, gold-plated contacts

Temperature: -40° to +90°C (-40° to +194°F)
Voltage Rating: 250V ac/300V dc

Style	Model	Length	Dimensions	Pin-Out (Female View)
5-Pin Straight	MQDC1-506 MQDC1-515 MQDC1-530	2 m (6.5') 5 m (15') 9 m (30')		
5-Pin Right-angle	MQDC1-506RA MQDC1-515RA MQDC1-530RA	2 m (6.5') 5 m (15') 9 m (30')		

Mounting Brackets

SMB46L	<ul style="list-style-type: none"> • Angled bracket • 303 stainless steel 	SMB46S	<ul style="list-style-type: none"> • S-shaped bracket • 303 stainless steel
SMB46U	<ul style="list-style-type: none"> • U-shaped bracket • 303 stainless steel 	SMB46A	<ul style="list-style-type: none"> • Stainless steel adjustable bracket • Comes with 2 mm short-arm hex key
SMB46DF	<ul style="list-style-type: none"> • Flat bracket holds two sensors at a fixed angle • Black anodized aluminum 		

PD45 Series PicoDot® Sensors

Retroreflectors

<p>BRT-36X40BM</p>	<ul style="list-style-type: none"> • Included with sensor • High-resolution corner-cube (micro-prism) reflector; 1.2 reflectivity factor* • 0.2 to 10.6 m (8" to 35') range • Maximum temperature 50°C (120°F) 	<p>BRT-2X2</p>	<ul style="list-style-type: none"> • Corner-cube reflector • 1.0 reflectivity factor* • 0.6 to 39.6 m (2' to 130') range • Maximum temperature 50°C (120°F)
<p>BRT-THG</p>	<ul style="list-style-type: none"> • Retroreflective tape, 0.7 reflectivity factor* • Many sizes and configurations available; see catalog • 0.2 to 6.1 m (8" to 20') range • Maximum temperature 60°C (140°F) 		

*Reflectivity factor when compared with standard BRT-3 reflector



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.