

Alignment Tip: The visible red beam of the laser emitter is easily seen in subdued lighting. At opposed distances of up to 10 feet, attach a sheet of white paper directly in front of the receiver lens and mark the location of the lens center on the paper. Using the mark as an aiming target, sight along the beam from directly behind the laser emitter. Adjust the emitter mounting until the dot of red light is centered exactly on the mark. Remove the paper and check the response of the receiver.

For longer distances (up to 25 feet), replace the white paper with a 4 x 4 inch square of high-grade retroreflective tape (Banner model BRT-THG-4X4-5 or equivalent; see [Figure 2](#) on page 3). For greater distances, use a larger sheet of retroreflective material (see [Retroreflective Tape](#) on page 6).

At long distances, use retroreflective tape to locate the beam at the desired location. Never use a mirror as an alignment target.

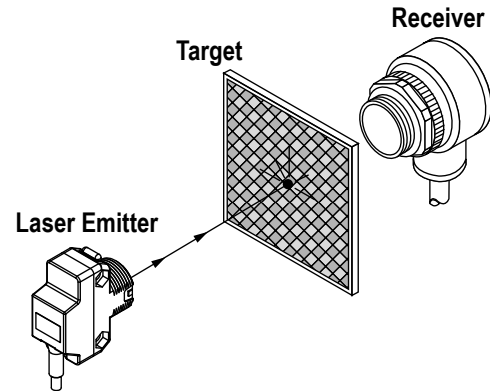


Figure 2. Long Distance Alignment

	Opposed Distance (X)	Beam Displacement (Y) for 1° of Misalignment
$\text{Y} = \text{X}(\tan \text{Ø})$	1.5 m (5')	25 mm (0.98")
	3 m (10')	50 mm (1.96")
	6 m (20')	100 mm (3.92")
	15 m (50')	250 mm (9.84")
	30 m (100')	500 mm (19.7")

Figure 3. Beam Displacement per Degree of Misalignment

Table 2: Typical Beam Size vs Distance (Class 2 Lasers)

Typical Beam Size vs. Distance, Class 2 Lasers							
Small Spot (Model QS186LE2)							
Distance	1.5 m (5 ft)	3 m (10 ft)	6 m (20 ft)	15 m (50 ft)	30 m (100 ft)	-	-
Spot Size	3.8 mm (0.15 in)	5.1 mm (0.2 in)	10.2 mm (0.4 in)	17.8 mm (0.7 in)	30.5 mm (1.2 in)	-	-
Circle (Model QS186LE210) ⁴							
Distance	0.4 m (1.3 ft)	0.8 m (2.6 ft)	1 m (3.3 ft)	2 m (6.6 ft)	3 m (10 ft)	4 m (13 ft)	5 m (16 ft)
Circle Diameter	17.8 mm (0.7 in)	33 mm (1.3 in)	41.9 mm (1.65 in)	82.3 mm (3.25 in)	122 mm (4.8 in)	160 mm (6.3 in)	198 mm (7.8 in)
Vertical Line (Model QS186LE211) ⁵							
Distance	0.2 m (0.6 ft)	0.4 m (1.3 ft)	0.6 m (1.9 ft)	0.8 m (2.6 ft)	1 m (3.3 ft)	1.5 m (5 ft)	2 m (6.6 ft)
Line Size	72.1 x 2.5 mm (2.8 x 0.1 in)	150 x 2.5 mm (5.9 x 0.1 in)	208 x 2.5 mm (8.2 x 0.1 in)	284 x 2.5 mm (11.2 x 0.1 in)	350 x 2.5 mm (13.8 x 0.1 in)	502 x 2.5 mm (19.8 x 0.1 in)	660 x 2.5 mm (26 x 0.1 in)
Horizontal Line (Model QS186LE212) ⁵							
Distance	0.2 m (0.6 ft)	0.4 m (1.3 ft)	0.6 m (1.9 ft)	0.8 m (2.6 ft)	1 m (3.3 ft)	1.5 m (5 ft)	2 m (6.6 ft)
Line Size	74 x 2.5 mm (2.9 x 0.1 in)	159 x 2.5 mm (6.25 x 0.1 in)	224 x 2.5 mm (8.8 in x 0.1 in)	330 x 2.5 mm (13 x 0.1 in)	406 x 2.5 mm (16 x 0.1 in)	610 x 2.5 mm (24 x 0.1 in)	800 x 2.5 mm (31.5 x 0.1 in)
Cross (Model QS186LE214) ⁴							
Distance	0.4 m (1.3 ft)	0.8 m (2.6 ft)	1 m (3.3 ft)	2 m (6.6 ft)	3 m (10 ft)	4 m (13 ft)	5 m (16 ft)
Line Size	61 mm (2.4 in)	125 mm (4.9 in)	155 mm (6.1 in)	312 mm (12.3 in)	467 mm (18.4 in)	620 mm (24.4 in)	760 mm (29.9 in)

⁴ May contain a small collimated spot in the center of the pattern. For best focus, view circle at distances greater than 1 meter and cross at distances greater than 0.3 m (image is not crisp at closer distances).

⁵ Light distribution is non-uniform, having less light at ends. The horizontal line is more uniform than the vertical line.

Description of Laser Classes

Class 1 Lasers. Lasers that are safe under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing.

Reference IEC 60825-1:2001, section 8.2.

Class 1 Laser Characteristics: see specifications.



Class 2 Lasers. Low-power lasers are by definition incapable of causing eye injury within the duration of the blink (aversion response) of 0.25 seconds. This reaction may be expected to provide adequate protection under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing. 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.

Reference IEC 60825-1:2001, section 8.2.

Class 2 Laser Characteristics: see specifications.



CAUTION: Do Not Disassemble for Repair

This device contains no user-serviceable components. Do not attempt to disassemble for repair. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure. A defective unit must be returned to the manufacturer.

Installation

To mount the QS186LE into bracket models SMB18A or SMB46A, follow these steps.

1. Insert the laser emitter into the hole in the bracket.
2. Tighten the hex jam nut to the bracket until the emitter is held securely in place.
3. Mount the bracket using user-supplied screws or bolts. The SMB18A bracket uses M4 or #8 screws or bolts and the SMB46A bracket uses M5 or #10 screws or bolts.
4. Check the sensor alignment, see [Alignment](#) on page 2. If you are using the adjustable bracket (model SMB46A), tighten or loosen one or two of the precision alignment screws, using the supplied 2 mm Allen wrench, until the laser is accurately aligned.

Specifications

Power	General
Supply Voltage and Current 10 to 30 V dc (10% maximum ripple) at less than 35 mA	Indicators Green LED, indicates power applied
Supply Protection Circuitry Protected against reverse polarity	Construction ABS housing, PMMA window 3 mm mounting hardware included
Delay at Power Up Class 1 Models: 250 ms Class 2 Models: 10 ms	Connections PVC-jacketed 2 m (6.5 ft) attached cable, or 4-pin Euro-style quick-disconnect (QD) fitting