

Diode Pointer Installation Instructions



SYNRAD

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Diode Pointer

Introduction

The Diode Pointer consists of a housing containing a ZnSe beam combiner and diode laser. The angle of the splitter is adjustable for establishing far field coincidence between the CO₂ laser and diode beams and can also be translated for near field coincidence between the beams. The pointer is shipped with both near and far field adjustments set approximately to their nominal positions. If your SYNRAD laser is shipped with a Diode Pointer installed, it is pre-aligned and ready for operation.

Required Tools

Assemble the following tools and hardware to install the Diode Pointer:

- One 1/4" open end ignition wrench
- Two 1/8" Allen hex wrenches (included)
- Four 8-32 x 1/4" hex head screws (included)
- Thermal image cards
- Fire brick or similar stable beam stop

Hex Head
Cap Screws 



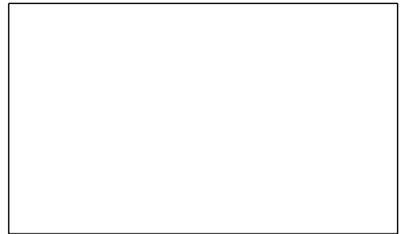
Ignition
Wrench



Allen Hex
Wrench



Thermal Image Cards



Fire Brick

Required Tools

Installation

Step One

Insert the four 8-32 x 1/4" hex head screws into the front of the laser a few turns so that the threads are engaged. Allow at least 1/8" clearance between the screw head and the laser's front plate (see Figure 1).

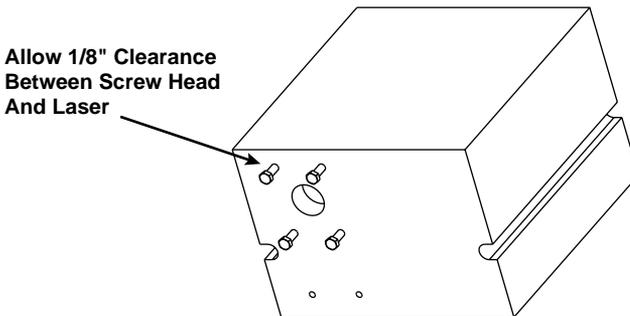


Figure 1

Diode Pointer

Step Two

Remove the black plastic cover from the rear mounting plate of the Diode Pointer. Place the pointer mounting plate over the heads of the screws and slide it so that the screw heads cover the slots (see Figure 2). A good nominal position is all the way to the end of the slots. Tighten the four screws with the 1/4" ignition wrench.

Note: Physical orientation of the Diode Pointer is not important, however you should install it so that you have access to the near and far field adjuster screws with the hex Allen wrench, and can reach the On/Off switch.

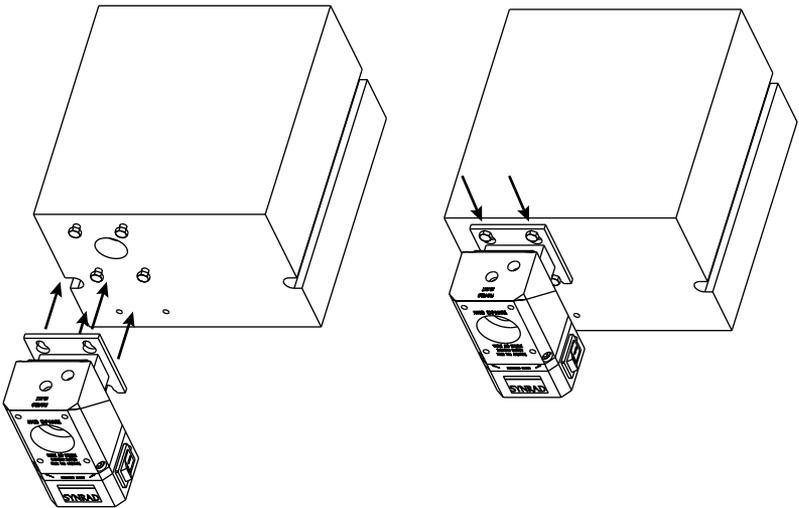


Figure 2

Step Three

To power the Diode Pointer, connect the supplied power cable between the 5 VDC jack on the side of the pointer and the laser's diode pointer power connector. If your laser does not provide a power connection for the Diode Pointer, then connect the plug from the supplied wall-plug transformer into the 5 VDC jack on the side of the pointer.

Note: SYNRAD Series 48 lasers manufactured after August 1998 and all Evolution lasers provide a Diode Pointer power connector on the front faceplate. Series 48 lasers built prior to August 1998 and all Series 57 and 60 lasers will require the use of a wall-plug transformer power supply.

Warning: Do not stare directly into the red laser light emitted from the Diode Pointer. The light is intense enough to injure the eye with prolonged exposure.

Step Four

Remove the cover from the front of the Diode Pointer. Turn on the Diode Pointer by pressing the On/Off switch. The red LED below the switch illuminates to indicate the pointer is on and laser diode emission should be visible.

Adjustment

The next steps involve firing the CO₂ laser across a clear distance of 3 to 10 meters. Take adequate safety precautions to restrict access to the area where the CO₂ beam will be projected through the room. Ideally, the minimum clear distance required is twice the longest distance anticipated to the process-focusing lens. If this clear distance is not available, select a point equaling the maximum position of travel the beam is likely to achieve. Ensure that all necessary laser safety precautions are taken to avoid injuries to persons and ignition of combustible items by the invisible CO₂ beam.

Diode Pointer

The adjustment process consists of two procedures: (1) adjusting the near field diode position coincident with near field CO₂ beam and (2) adjusting the far field diode position coincident with the far field CO₂ beam.

This is an iterative process requiring each step to be rechecked, and possibly readjusted, at least once.

Warning: The CO₂ laser emits invisible laser radiation. Since direct or diffuse laser radiation can inflict severe corneal injuries, always wear eye protection when in the same area as an exposed laser beam. Remain clear of the beam while performing adjustments; direct or diffuse laser radiation can seriously burn human tissue. Follow safety precautions in the laser's Operator's Manual.

Step One

Remove the cover from the front of the Diode Pointer prior to firing the laser. Tape a thermal card to the firebrick and place it about 30 cm in front of the pointer (see Figure 3). Fire the CO₂ laser at low power (approximately 10-20 watts) for a long enough time to get a good burn image on the thermal card.

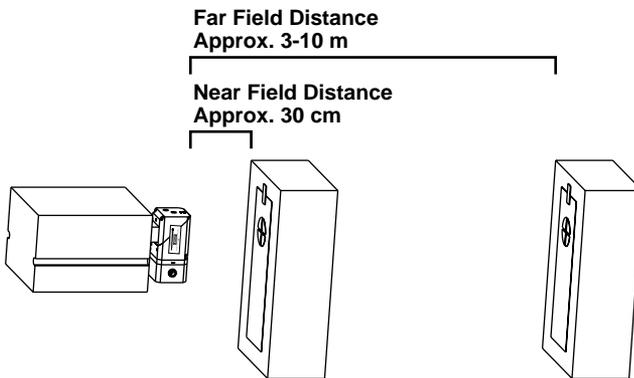


Figure 3

Step Two

If the red diode beam is centered on the burn within 0.1 mm proceed to Step Three. If not, make coarse adjustments to the beam position by loosening the four hex head screws holding the pointer to the laser and moving the pointer in the direction necessary to center the beam in the CO₂ burn. If the pointer is all the way to its limit in the slots, it may be necessary to rotate the mounting plate in relation to the pointer housing. To do this, remove the pointer from the laser and remove the two socket head cap screws holding the mounting plate to the pointer body. Rotate the mounting plate 180 degrees then reinstall and tighten the two screws (see Figure 4). Reinstall the pointer to the front of the laser and repeat the process until the pointer is secured in a position where the red diode beam is roughly centered on the CO₂ burn image.

**Rotate Mounting
Plate 180°**

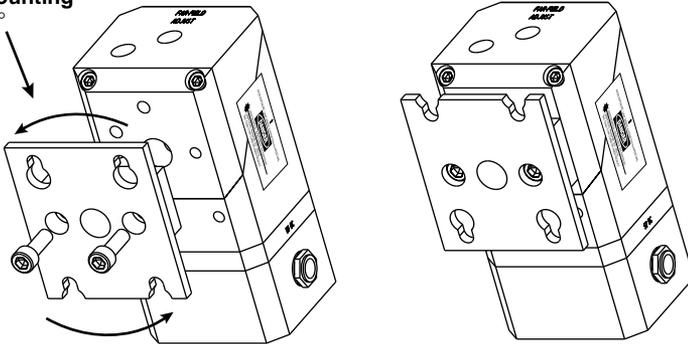


Figure 4

Make fine adjustments to the diode beam position by adjusting both near field adjuster screws (see Figure 5) with the 1/8" Allen hex wrenches until the red diode beam is centered in the middle of the CO₂ burn. Since the diode spot is not perfectly round, visually average the shape to the center of the CO₂ burn image (see Figure 6).

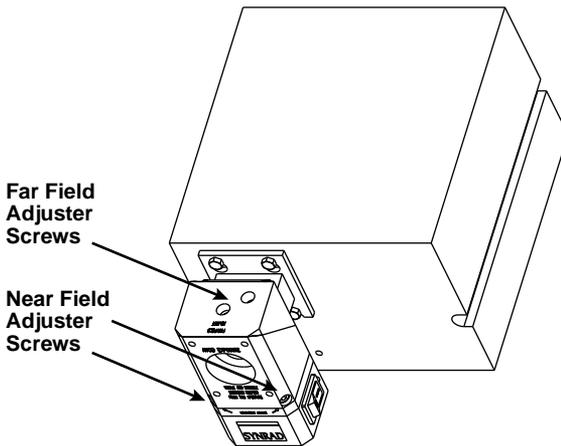


Figure 5

Step Three

Reposition the thermal card to a new location on the brick, then move the brick to the far field (see Figure 3). Fire the CO₂ laser again at low power (approximately 10-20 watts) until you get a good burn image on the thermal card. Adjust both far field screws (see Figure 5) on the Diode Pointer so that the red diode beam is centered on the CO₂ burn image as accurately as possible (see Figure 6). Average out any asymmetries of the diode beam.

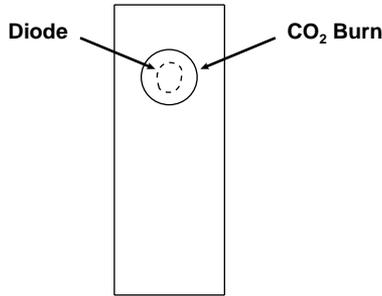


Figure 6

Step Four

Move the brick back to the near-field position and repeat the near field procedure in Step Two.

Note: Since adjusting the beam affects both near and far fields in the same direction, you may need to overcompensate towards the opposite side of center in one field and then bring both back to center in the other.

Step Five

Repeat the far field procedure in Step Three once more. The goal of the adjustment procedure is to get the CO₂ beam and the Diode Pointer coincident within 100 microradians, which is equivalent to 1 mm in 10 meters of misalignment. The eventual use of the pointer determines the accuracy required. Most articulated arm applications require 100 microradians, while a simple lens system requires only 1 milliradian. The worst misalignment acceptable is 1 milliradian, or 1 mm in 1 meter.

Congratulations

The Diode Pointer is now correctly installed and the rest of the beam delivery system can now be installed.



Diode Pointer

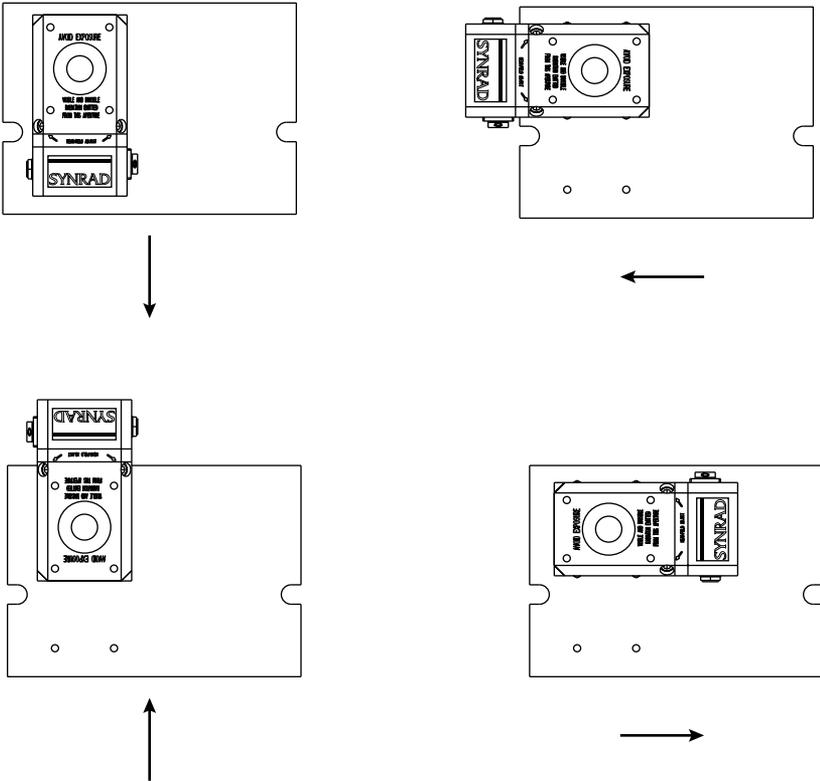
Beam Delivery Setup

The Diode Pointer, when properly mounted to the laser, produces a beam centerline shift of 1 mm from its original exiting point on the laser. The direction of this offset is dependent upon the orientation of the Diode Pointer to the laser (see Figure 7). The CO₂ beam leaving the Diode Pointer is centered to the exiting bore of the pointer, however the beam centerline itself has shifted in relation to any beam delivery components not directly mounted on the pointer. Make necessary adjustments to your beam delivery setup in order to compensate for this 1 mm offset. When mounting components directly to the Diode Pointer, the CO₂ beam is centered and no additional adjustments are required.

Specifications

Operational Voltage	3 to 5 VDC
Operational Current	<50 mA
Optical Power Output	<5 mW
Laser Diode Output (Power, max.)	5 mW
Wavelength	650 nm ±10 nm
Beam Diameter	3 mm
Divergence	<2 mrad
Optics	Aspheric plastic lens
Ellipticity	1.2:1

- Notes:** 1. Copper case not grounded
2. Reverse polarity protected



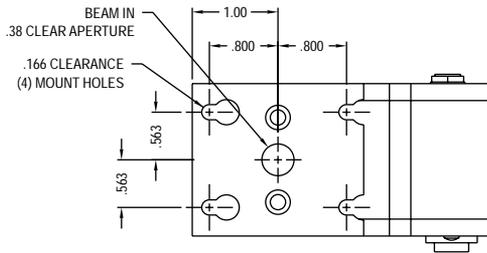
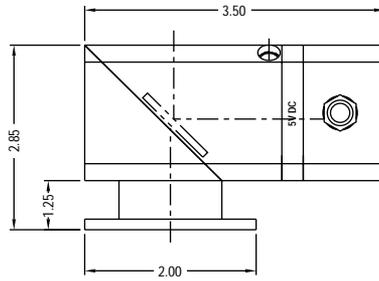
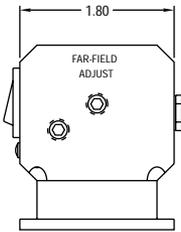
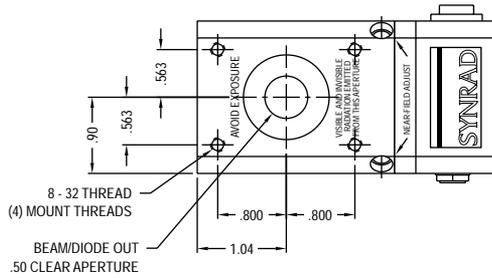
Direction Of Beam Centerline Shift For Diode Pointer Orientations

Figure 7

Diode Pointer



Dimensions



Safety Labels

