Diode Pointer Quick Start Guide

Important Note: Read all Danger, Warning, Caution terms, symbols, and instructions located on our website. The diode pointer provides a safety measure by enabling operators to monitor the location of the CO₂ beam. Reference the Diode Pointer Specifications located on our website https://www.synrad.com/products/accessories/visible-diode-pointer.

Diode Pointer Unpacking and Installation Preparation:

1. Remove the Diode Pointer from it’s packaging and set aside. Take note of the box contents. 

   1.1 Collect the required tools per the Installation Instructions included in your box and remove the two dust cover(s) one in front and another in the back.

![Diode Pointer](image)

**Warning**
Serious personal injury
Assure the laser and the diode pointer are turned off during install.

The pointer has both near and far field adjustments set at the factory. If alignment is still required after installation, see the following sections for guidance. If your SYNRAD® laser is shipped with a Diode Pointer installed, it is also factory pre-aligned and ready for operation.

2. Upon arrival, inspect all shipping containers for signs of damage. If you discover shipping damage, document the damage (photographically if possible), then immediately notify the shipping carrier (responsible party for any transportation damage) and SYNRAD.

3. Remove the two dust covers. One of the covers is on the front of the Diode Pointer face, the other is on the back. Click here to see an instructional video, also reference the following figures.
### Important Notes:

Series 48 lasers manufactured after August 1998 provide a Diode Pointer power connector on the faceplate. Some lasers require installation of the provided others, use the supplied wall-plug transformer power supply.

### Mounting:

4. Insert the four screws into the front of the laser a few turns so that the threads are engaged. This allows adequate clearance between the screw head and the laser’s front plate to hang the diode pointer.

5. Once the pointer is ‘hung’ over the heads of the screws, assure access to both the near/ far field adjuster screws accessible. Tighten the four screws with the ignition wrench.

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#### Warning

Serious personal injury

Do not stare directly into the red laser light emitted from the Diode Pointer OR the laser. The light is intense enough to injure the eye with exposure. Always wear eye protection!

CO₂ laser emits invisible laser radiation. Since direct or diffuse laser radiation can inflict severe corneal injuries. Remain clear of the beam while performing adjustments; direct or diffuse laser radiation can seriously burn human tissue. Always wear safety goggles.

Always use shielded cable when connecting your PWM Command signal source to PWM Positive/PWM Negative inputs. Never stare into a laser beam!
**Electrical:**

6. If your laser provides a power connection for the Diode Pointer, install the supplied power cable by removing the faceplate of the laser (and the hex nut on the cable), connect the cable by the 5 VDC jack, reinstall the hex nut on the outside of the faceplate affixing the cable. Re-install the face plate and refer to the prior page for mounting.
7. If your laser does not provide a power connection for the Diode Pointer, use the plug from the supplied wall-plug transformer into the 5 VDC jack on the side of the pointer.

8. Press 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:

9. Assure the diode pointer dust cover is removed. Take safety precautions (protective eye wear), and always assure your laser and pointer are ‘OFF’ prior to adjusting anything in your work area. Tape a thermal card to the firebrick (beam block) and place it approximately 30cm in front of the laser & pointer. Once the thermal card & beam block (taped to a brick) are in position, turn on your laser and diode, lower the laser’s power so that it is barely visible on your beam block (approximately 10-20 watts). Note the lasers coincidence with the diode pointer.

10. If the beam requires adjusting, insert the two Allen wrenches (included) into the near field hex head(s) and turn each observing the effect on the beam alignment. If alignment is successful, remove the Allen wrenches, turn the laser off. The diode pointer install procedure is complete. If alignment is not achieved, try the overcompensation adjustment procedure on the next page after far field adjustment.

9.1 Example of laser and diode pointer coincidence (within 0.1mm). Diode Pointer install and setup complete!

9.1 Example of a diode pointer that requires adjustment.

A
Near field
Approx.
30cm

30cm

Near field distance
adjustment screws moves the
beam vertical and diagonal.

Good beam coincidence

Bad beam coincidence
Adjustment (Continued):

11. Using safety precautions, reposition the thermal card to a new location on the brick, then move the brick to the far field (3-10 m). Fire the CO$_2$ laser again at low power (approximately 10-20 watts) until you get a good burn image on the thermal card and observe the diode pointers coincidence with the beam. Insert the two Allen wrenches (included) into the two far field hex head(s). Adjust the far field so that the red diode beam is centered on the CO$_2$ burn image as accurately as possible. Average out any beam asymmetries. Turn the laser off.

![Far field distance](image)

Far field distance adjustment screws move the beam left and right.

**Important 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.

12. Reposition the thermal card on the brick as you did before, and move them to the near field proximity to the laser as you did in the prior steps. Power on and fire the CO$_2$ laser again at low power (approximately 10-20 watts) until you get a good burn image on the thermal card and observe the diode pointers coincidence with the beam. You should have good coincidence by now. If not, see the above Important note, before proceeding to the next section.

13. Overcorrection (overcompensating) example: Using the near field screws one can shift the beam down and to the left. See the beam moved from the upper left hand corner of the beam down to the center.

**Note:** If the adjustments above have not brought your beam into coincidence, a larger or coarse adjustment may be needed.
Coarse Adjustment:

14. **Assure the laser is off!** Loosen the four diode pointer mounting hex head screws on the face of the laser enough to move the pointer in the direction necessary to center the beam in the CO₂ burn. Re-tighten and repeat the far and near field adjustment steps. If this does not bring the pointer into adequate coincidence with the laser, proceed to the next step.

**Important Note:** 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.

15. **Assure the laser is off!** Remove the diode pointer from the laser.

16. Refer to the figures below 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. Reinstall the pointer to the front of the laser and repeat the near/far field adjustment as you did before until the pointer is in adequate coincidence with the laser beam.

**IF further coarse adjustment needed:** Loosen the screws holding mounting plate to pointer.

**Rotate the pointer mounting plate 180 degrees:** re-tighten the screws holding mounting plate to pointer.

**Re-install and tighten the two screws.**
Coarse Adjustment (Continued):

15. Repeat the near and far field adjustments steps mentioned previously.

The goal of the adjustment procedure is to get the CO\textsubscript{2} beam and the Diode Pointer coincident within 100 microradians, which is equivalent to 1 mm at 10 meters of misalignment as the recommended outside tolerance of alignment. Anything more precise and accurate is desirable, but not necessary. Final accuracy and precision alignment is completely dependent on the final use of the pointer. Most articulated arm applications require 100 micro-radians, while a simple lens system requires only 1 milliradian. The outside tolerance or acceptable misalignment is 1 milliradian, or 1 mm at 1 meter.

Congratulations!

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