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User's Guide

Fiber-Pigtail Assemblies

Models 6209, 6213, 6215, & 6216

For the Velocity™ 6300 Series
External-Cavity Tunable Diode Lasers

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Introduction

The Fiber-Pigtail Assembly for our tunable External Cavity Diode Laser (ECDL) allows both free space and fiber-coupled laser output. As shipped, the laser is ready for free-space operation. (Note: Beam size out of the pigtail assembly is a factor of 4 smaller than the standard free space beam). The instructions for operation of the free-space ECDL and the 6300 Series Laser Controller are described in the accompanying user's manual.

The Fiber-Pigtail Assembly consists of a removable Optical Fiber and an Alignment Stage which is permanently aligned to the ECDL. The Alignment Stage provides for X, Y, θ_x, and θ_y adjustments. **Do not remove this stage from the ECDL head.** The Optical Fiber consists of a polarization-maintaining fiber, terminated at one end by an Input Housing and terminated at the other end by the customer-specified connector.

The Input Housing is polarization keyed along the slow axis and contains an optical isolator providing greater than 40 dB of isolation and a GRIN lens. All the optical elements are optimized for the wavelength band accessible with your tunable ECDL.

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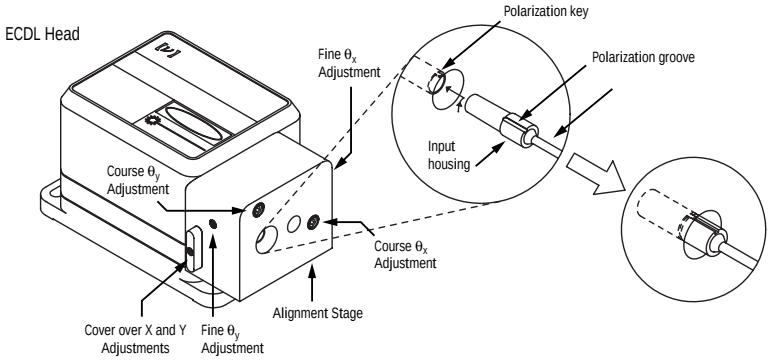
Operation

Converting from Free-Space to Fiber-Coupled Operation

To convert the laser output from free space to fiber coupled, simply insert the keyed Input Housing into the Alignment Stage and optimize the coupling using the angular adjustments. You will need an external power meter and the enclosed 1/16" and 1/8" Allen keys for this optimization.

Pigtail Aligning Procedure

1) Turn the laser on, adjust the wavelength to the middle of the specified wavelength range, and increase the current to the maximum recommended operating current. The power reading on the laser controller, which measures the power in the free space beam, should read greater than 1.0 mW. Allow the laser to warm up for approximately 30 minutes.



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2) Note that the pigtail stage is prealigned at the factory and may be misaligned on shipment. First check that the output beam is normal to the front of the Alignment Stage. If it is not, use the coarse θ_x and θ_y adjustment screws on the front of the Alignment Stage to roughly align the beam so that it is normal to the front of the Alignment Stage. This will aid in maximizing the throughput during the initial alignment steps.

3) Note that the internal workings of the Alignment Stage are spring loaded. When inserting the input housing, do not exert excess force on the springs. This will cause them to stretch and may misalign the collimating lens. Carefully remove the fiber from the box. Referring to the figure below, gently insert the Input Housing of the Optical Fiber into the Alignment Stage, noting that the polarization groove should be oriented slightly off the vertical axis. While gently pushing the Input Housing into the Alignment Stage, rotate the polarization groove towards the vertical axis. The Input Housing will drop snugly into position when the groove and polarization key are aligned; it will not “snap” into place.

4) Mount or fix the fiber so that it is butted up to a power meter detector. Measure the power exiting the fiber. If the power is less than 0.25 mW, use a 1/8” hex driver and the coarse θ_x and θ_y adjustments to increase the power throughput. This is done in iteration by turning one adjustment screw at a time. The coarse θ_x and θ_y adjustments should be very close to being aligned when you receive it. You should see a change of

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power well within 4 to 5 turns on each adjuster.

5) Observe the power out of the fiber as you slowly adjust coarse θ_x. Turn the adjustment screw, passing through the power peak and then return to the maximum power seen on the power meter. Remove the hex driver.

6) Repeat the same procedure as step five, for the coarse θ_y adjustment.

7) Return to coarse θ_x and readjust, then readjust the coarse θ_y until a maximum output is seen on the power meter.

8) Once you have maximized power with the coarse θ_x and θ_y adjustments, use a 1/16" driver to adjust the fine θ_x and θ_y screws, on the side of the stage, to further maximize coupling. The power exiting the fiber will exceed 0.5 mW when properly optimized.

If you are having problems adjusting the alignment to reach an output power of 0.5 mW, please call us for assistance.

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