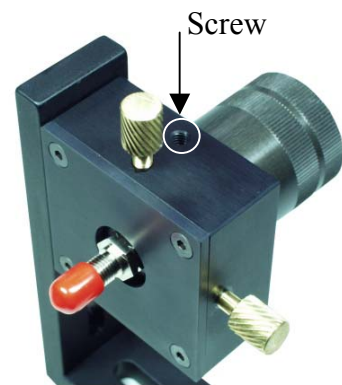


## Fiber Optics alignment

1. Decrease laser power to very little power in order to prevent the fiber burning.
2. Put a dark, non-inflammable screen about 50-70cm behind the place where the input coupler will be mounted. Mark the laser beam spot on the screen.
3. Both translator axis of the input coupler should roughly be centered, by turning the adjustment screws.
4. Mount the input optics in front of the laser or PCAOM so your beam goes straight into the optics, centered with respect to the entrance aperture. **Be careful to mount it straight.** Move and rotate the L-bracket horizontally and the input coupler vertically that the out-coming dot lies concentric to the mark on the screen. The dot has to be smooth and round. The out-coming beam has to be exactly centered.

Attention: The power of the incident laser beam must not exceed 500mW during the alignment procedure.

If the tube of the input Coupler is loose, tighten the screw as shown in the figure. A second screw is located at the bottom side. Do carefully tighten the screw, to much force will damage the tube. The tube is not glued into the mechanics, so that lenses can easily be accessed for cleaning or replacement.



5. Remove the protective cover of the fiber and check if the fiber connector is clean. It is recommended that you always clean the fiber, even if you think the fiber is clean. Also, clean the other end of the fiber. Read the “Cleaning of the Fiber” chapter in any case !
6. Put the clean connector carefully into the SMA adapter of the input coupler. Avoid the metal of the SMA adapter touching the front surface of the connector, as the ends of the fiber couplers are very sensitive.
7. **Do not mount the output optics yet.** If you are very lucky you already see a light coming out of the fiber at this point. If not, adjust X and Y on the input coupler very carefully until you find the brightest spot. Stop at the brightest point at X and Y. If you have the right position the output „jumps“ to very bright.
8. Now adjust X and Y until the transmitted dot is at the smallest diameter. Now adjust Z (the focus of the input optics) by rotating the cylindrical lens holder in order to get an even smaller diameter. Adjust X, Y and Z to the best and smallest beam diameter. **Note, that the optimal beam coming out of the fiber is not round but looks frayed.**
9. Now connect the second SMA connector the output coupler and adjust the focus of the output optics to lowest divergence angle.

## ***TIPS & TRICKS***

- ✓ If you want to align a fiber in a fix installation, the easiest way to successfully couple in the fiber is to use a second fiber following steps 5-8. After setting up the fiber replace the fiber with the installed fiber. Make sure that the fiber connector is clean! In most cases you would only need to fine tune the alignment and the focus.
- ✓ If you have difficulties efficiently coupling in the fiber, or finding the focus in a totally misaligned setup follow these instructions:
- ✓ Turn the lens clockwise to the stop. Move the X-Y translators until you find the brightest spot. Slowly turn the lens counterclockwise. The transmitted laser beam pattern should become brighter. Optimize the translators. Turning the lens ½ turn and realigning the translators will decrease the spot diameter. Optimize the system for the smallest and brightest beam spot.
- ✓ When using the fiber in a high power setup you might apply the following trick to protect your fiber against damage. After setting up the fiber system with low power turn the cylindrical lens holder 1/3 turn clockwise, before you increase the power of your laser source. By doing so, you move the focal-spot into the glass material. This will cause the beam profile to become a little worse (hot spot becomes bigger and beam pattern a little less frayed) but avoids an excess of power-density destroying the core of the fiber.
- ✓ Do circumstances force you to use a damaged fiber, use the defective connector at the output end, esp. for beam shows ( ...clean as well!). However, for graphic projection opposite strategy may be opportune.

## ***CLEANING OF THE SMA CONNECTOR***

The front surfaces of both (input and output) fiber connectors must be 100% clean and free of any dust particles. A dirty or dust contaminated connector will be easily damaged, even at low input power levels!

**Protective caps:** Please remove only, if necessary. Store the caps nearby the coupler, using for example tape and taping these caps onto the L-mount, or projector device cover etc, open side downwards.

**Connector check:** use a 8 - 10 x magnifier ( ... with flashlight ... !) or a special handheld fiber microscope, or just even a good standard or **special fiber SMA microscope**. Provide good illumination, while examining the connectors! You can order suitable microscopes at Medialas GmbH

**Connector cleaning:** This is the most important point especially for applications, where high power lasers are used. Clean connector front surfaces are essential !!! More than 85% of all damages are caused by non or non properly cleaned SMA-connectors. The right cleaning procedure is similar to „laser optics cleaning“: use optical grade methanol or acetone, hemostat, and KODAK lens cleaning paper, and clean the front surface in the usual way. In any case check the result with magnifier or microscope.

**Damaged connector?** Test: Direct this connector to any suitable screen (wall), distance 0.5 - 2 m. Connect the other end to laser/input device. An intact connector projects a circular spot with a defined edge. Scattered light outside this circle indicates either a dirty or dusty, or already damaged connector.

## ***TECHNICAL DATA***

### **HQ Economic Fiber Coupler**

1 input coupler mounted on large L-bracket  
Achromatic lens  $f=20\text{mm}$ , x-y adjustment with thumbscrews, focus (z-) adjustment, SMA Connector

1 output coupler mounted on small L-bracket  
Achromatic lens  $f=25\text{mm}$  (optionally available 20mm for a larger divergence and 16mm for an even larger divergence), focus (z-)adjustment , SMA Connector

### **State of the Art Fiber Coupler**

1 input coupler mounted on large L-bracket  
High Quality Achromatic lens  $f=20\text{mm}$ , x-y adjustment with fine pitch screws, focus (z-) adjustment , SMA Connector

1 output coupler mounted on small L-bracket  
High Quality Achromatic lens  $f=16\text{mm}$  (optionally available 20mm for a smaller divergence), focus (z-) adjustment , SMA Connector