rgb photonics

Fiber Coupler
FCSM-PM

User Manual

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User Manual
RGB Photonics GmbH
Fiber Coupler FCSM-PM
Version: 2.3
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Product specifications and descriptions in this manual are subject to change without notice. RGB Photonics GmbH will not be responsible for errors and omissions in this manual or for direct or incidental damages in connection with the use of this device or information.

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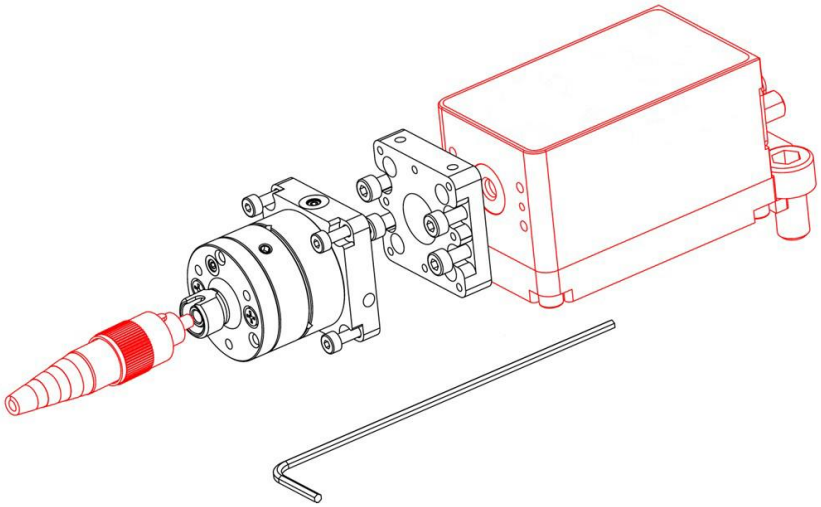
1 Introduction

The FCSM-PM couples a collimated laser beam into a single mode polarization-maintaining optical fiber. It can also be used with non-polarization-maintaining and multi mode fibers. It is intended to be used with the Lambda beam series of compact laser modules, but should also work fine with other lasers.

In order to get the best coupling efficiency, the laser beam must be precisely focused on the end of the optical fiber. Because this requires micrometer precision, the alignment needs to be done by the user after the laser and the optical fiber are attached to the fiber coupler.

The following chapter describes in detail the steps necessary to align the fiber coupler. You may need some patience, but if you follow the instructions closely, you should be able to align the fiber coupler in less than thirty minutes. As with all optical alignments, it may take longer the first time, but you'll quickly gain experience and learn how to do it faster.

If you have trouble aligning the fiber coupler, please contact our support department via phone or e-mail. You can find the contact details on our website:– http://www.rgb-photonics.com



2 Alignment

In order to get the best coupling efficiency, you need an optical power meter to measure the actual output on the other end of the optical fiber. If you don't have a power meter, you can also direct the other end of the fiber towards a white sheet of paper and observe the visible intensity of the spot (use an IR detector card if you have an IR laser). However, this may not be as accurate as a power meter.

Alternatively, you may also find it faster to do a coarse alignment first without a power meter and then the final alignment with a power meter.

Preparations

1. Make sure that the Laser is switched off.
2. Attach the fiber coupler to the laser module (see figure on previous page).
3. Connect one end of the fiber to the fiber adapter. The other end should point at a power meter to monitor the output power.
4. Now switch on the laser using low laser power (<10mW) to avoid damage to the fiber during further adjustments.
5. Never look directly into the fiber and observe all laser safety precautions as described in the user manual for your laser.

Figure 1

Start adjusting the fiber coupler by turning the three positioning screws one after the other up to half a turn in each direction, until the power meter detects a signal. If a signal is already being detected, try to increase it by turning the positioning screws one after the other up to half a turn in the direction that maximizes the output power. The positioning screws are located in the beveled drill holes and are labeled in figure 1. Once the output power is maximized, the laser power can be increased to a desired value in order to make further adjustments easier. (Please note the difference between laser power and fiber output power!)

Figure 2

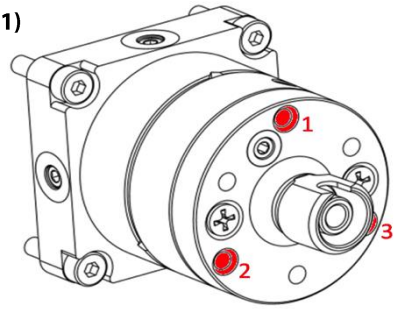
Continue adjusting the fiber coupler by turning the z-screw shown in figure 2 in the direction in which the output power increases. Once the maximum power is reached, repeat the steps explained in figure 1 and adjust the z-screw once again. The more output power you gain, the smaller are the adjustments necessary to get a further increase.

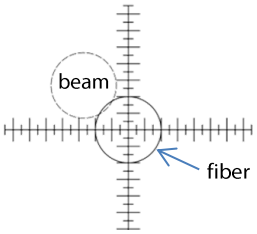
Figure 3 (for single mode fibers)

By repeating the steps explained in figure 1 and 2 several times, the output power should reach approximately 30 to 40 % of the laser power. Now the x/y-screws shown in figure 3 can be used to make slight adjustments of the fiber coupler in x and y direction. The x/y-

screws are less sensitive and can be adjusted more than once during the alignment procedure. The final adjustment of the fiber coupler should be done by turning the positioning screws very slightly until you reach a maximum output power of approximately 60 %.

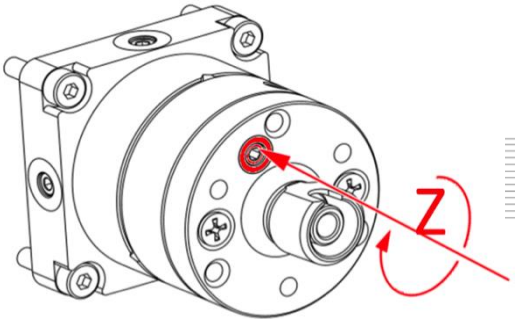
1)

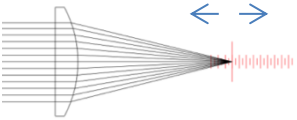




1) Centering the laser beam onto the fiber

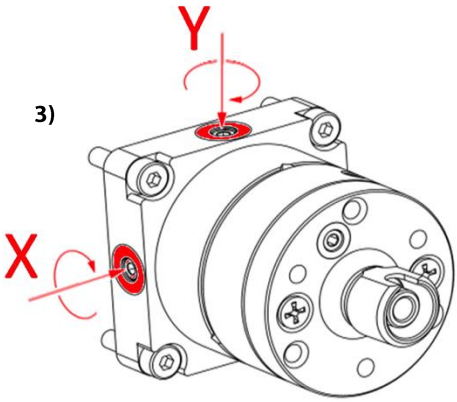
2)

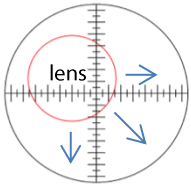




2) Adjusting the focal point to the fiber surface

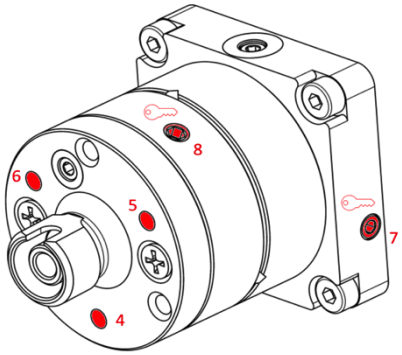
3)





3) Adjusting the focusing lens to an optimal position

4)



Locking the fiber coupler

After adjusting, the fiber coupler can be locked by turning the locking screws 7 and 8 shown in figure 4 clockwise until you feel a resistance. Locking the fiber coupler is not necessary if the laser module is fixed on a breadboard. If a single mode fiber is used, turning the locking screws can also decrease the output power.

Resetting the fiber coupler

If you have trouble obtaining any output power after several attempts, please reset the fiber coupler to its initial position:

Turn the positioning screws counter clockwise as far as it will go. Next turn the clamping screws 4, 5 and 6 shown in figure 4 counter-clockwise until you don't feel any resistance while screwing. Now find the position where the clamping screws start to take effect and keep turning them beyond that point clockwise by half a turn. In the same way turn the positioning screws clockwise by one turn. In a final step turn the z-screw clockwise as far as it will go and back it off by one turn.

3 Specifications

3.1 Optical Specifications

Wavelength ranges:	300 – 680 nm 650 – 1100 nm 1050 – 1600 nm
Coupling efficiency:	~ 50 – 70 %
Fiber connectors:	FC, FCAP 8°, SMA (alternatively)

3.2 Mechanical Specifications

Dimensions:	25.0 × 25.0 × 40.0 mm (including adapter plate)
Weight:	75 g

3D CAD files are available for download on www.rgb-photonics.com.