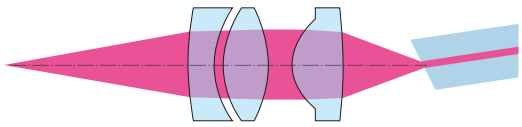
PRODUCING A FOCUS SPOT WITH MICRO FOCUS OPTICS

WHEN DO YOU NEED A SEPARATE MICRO FOCUS OPTICS?

For spots < 10 times the mode field MFD of the fiber, a good quality spot can no longer be achieved by simply refocusing the collimation optics. Instead, a combination of collimation and focusing optics is needed. The size of the spot and its Rayleigh range is determinded by the fiber properties and by the focal lengths of the fiber collimator and of the micro focus optics. For single-mode fibers the Gaussian intensity distribution and beam shape are maintained.

PRODUCING SPOTS BY USING A FIBER COLLIMATOR AND A MICRO FOCUS OPTICS



Beam path of collimated beam with micro focus optics exiting a single-mode fiber with angled connector FC APC.

The spot diameter $Ø_{spot}$ is determined from

$$\emptyset_{spot} = \frac{f'_{micro\ focus}}{f'_{collimator}} \cdot MFD$$

where MFD is the mode field diameter of the single-mode fiber. Please note that MFD varies with wavelength.

EXAMPLE

Fiber collimator f' = 4.5 mm
Micro focus lens f' = 11.0 mm
Mode field Ø MFD = 4.3 µm
Spot diameter Øspot = 10.5 µm

1:1 IMAGING OF THE MFD OR BETTER

Theoretically spot diameters are possible that are smaller than the original MFD of the fiber. In this case optical simulations are necessary that take the optic-specific aberrations and other parameters like NA of the fiber, wavelength etc. into account.
Please contact Schäfter+Kirchhoff if you want to realize such special spots.

This is a printout of the page
https://sukhamburg.com/support/technotes/fiberoptics/coupling/focusingsm/microfocus.html from 6/11/2025

CONTACT

For more information please contact:
Schäfter + Kirchhoff GmbH
Kieler Str. 212
22525 Hamburg
Germany
Tel: +49 40 85 39 97-0
Fax: +49 40 85 39 97-79

info@sukhamburg.com
www.sukhamburg.com

LEGAL NOTICE