Prizmatix

Fiber Optic Low Friction*
Rotary Joint for Optogenetics

Ver. 12

*Patent Pending

Introduction

The fiber optic Rotary Joint enables optogenetics experiments with live animals, allowing for the free movement of animal and fiber optic cables with a minimum of torque while maintaining excellent light transmission.

High NA, large core polymer (POF) fibers of 1500um - 500um are coupled to Ultra High Power (UHP) LEDs at one end and attached to the Rotary Joint at the other end.

Small core fibers of 500um - 200um are coupled to the other side of the Rotary Joint, while connected to the free-moving animal during optogenetics experiments.

The concept of Ultra High Power LED light delivery from thick to thin core fibers enables the use of several thin fibers simultaneously, for example, to deliver light to both brain hemispheres simultaneously without loss of power at the cannula tip.

Key Features

- Extremely low rotation torque (see http://www.youtube.com/watch?v=q5RE14fove0)
- Efficiently connects large core to small core fibers
- Lightweight with a small footprint
- Ideal for coupling Prizmatix Optogenetics-LEDs to optogenetics fibers
- Fiber types: FC to FC.
- Stainless steel housing

Applications

- In-vivo Optogenetics: single or dual / multiple fiber outputs

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Specifications

Wavelength range	nm	350 – 1100
Connector for Optical fiber		FC - FC
Diameter	mm	18
Weight	g	10
Connection to other systems / supports		M2 thread
Rotational torque (static)	µN·m	<10
Typical additional optical loss (*)	dB	<0.5
Variation during rotation	dB	<0.2

* Measured in 1000um to 500um setup with rotary joint relative to fixed adaptor.

Additional Information

The Prizmatix Rotary Joint was specially designed for working with high NA fibers and LED light sources. Unlike Lasers, Prizmatix Ultra High Power LEDs have a high brightness and large light-emitting area. This characteristic is used to couple the LED's light efficiently into a high numerical aperture (NA ≥ 0.5), large core fiber such as 1000um – 1500um core.

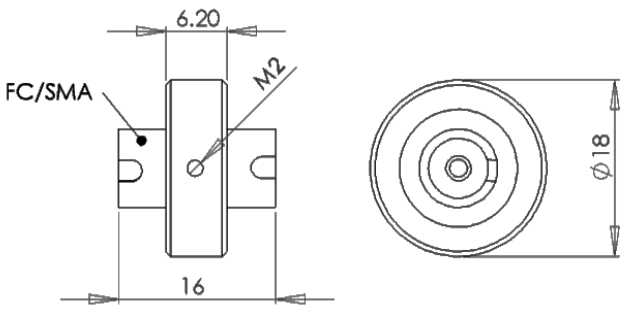
Due to the wide aperture of this fiber, coupling a secondary fiber (NA ≥ 0.5) with a smaller core, such as 500um, does not require precise axial alignment. Placing the small core in front of the larger core fiber enables efficient light coupling. The primary fiber is connected to the top port of the fiber optic Rotary Joint and the second fiber is connected to the lower half. The Rotary Joint contains special low-friction ball bearings which enable the two fibers to rotate freely upon each other.

Although the core diameter of the fiber optic components is reduced, If the high NA is maintained the LED's brightness (usually measured in mW/mm^2), is conserved along the fiber optic path from the LED to the Rotary Joint, and eventually into the cannula.

The large-to-small core coupling method allows for more than one secondary fiber to be attached using a single LED light source and without compromising the brightness. This is very useful for comprehensive research such as optogenetically manipulating two brain hemispheres or several locations simultaneously as shown on the first page.

Prizmatix Rotary Joint is one element of Prizmatix's Optogenetics Toolbox, which offers accessories for Optogenetics research, please see www.prizmatix.com

Mechanical Drawing



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