



1x1 Fiber-optic Rotary Joint

User Manual

Version 2.2.2

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Overview

1.1 1x1 Fiber-optic Rotary Joint

In neurosciences, freely-moving optogenetics experiments require a stable light input to the brain of animal subjects. The Doric *1x1 Fiber Rotary Joint* allows near frictionless fiber-to-fiber rotation while maintaining light transmission. It consists of high precision bearings and a lens system that allows rotation-insensitive optical power transfer. The fixed part of the rotary joint allows the connection to a light source and the rotating part releases the twisting of the optical fiber connected to the animal (Fig. 1.2). Fiber-optic Rotary Joints avoid damaging optical fibers while minimizing light fluctuations when rotating.



Figure 1.1: *1x1 Fiber-optic Rotary Joint*

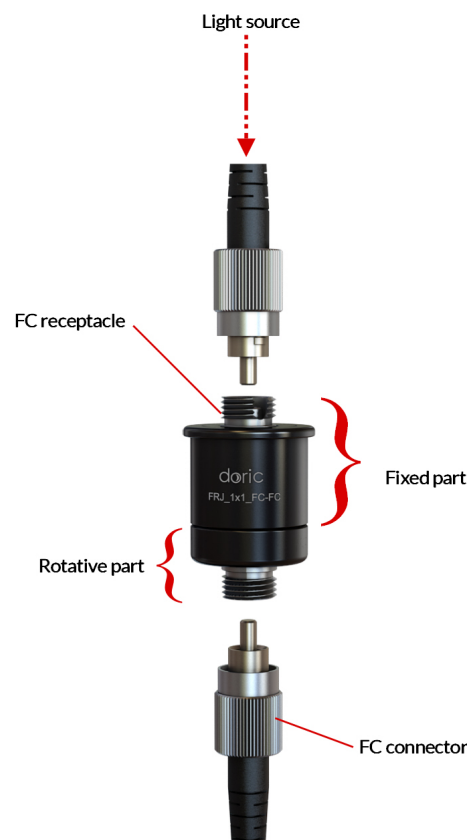


Figure 1.2: *1x1 Fiber-optic Rotary Joint connections*

1.2 1x1 Fiber-optic Rotary Joint Holders

The standard *Holder_FRJ_small* (Table 1.1) is sold separately from the rotary joint. The gimbal mount *GH_FRJ* (Table 1.1) can be purchased separately. It allows the rotary joint to be held while still allowing some movement on other axes of rotation.

Table 1.1: 1x1 Fiber-optic Rotary Joint Holders

Holder_FRJ_small	
Gimbal Holder (GH_FRJ)	

1.2.1 Pigtailed 1x1 Fiber-optic Rotary Joint

The pigtailed variant of the **1x1 Fiber-optic Rotary Joint** (Fig. 1.3) includes FC connectorized fiber-optic patch cords pigtailed on both sides of the rotary joint. This involves pre-alignment of the optical fibers, which reduces intensity variation in rotation normally observed. They have been designed for applications where optical power variation must be minimized, such as fiber photometry. These rotary joints are optimized for use with 400 μm and 200 μm diameter core optical fibers, with an NA of 0.37 or 0.48.

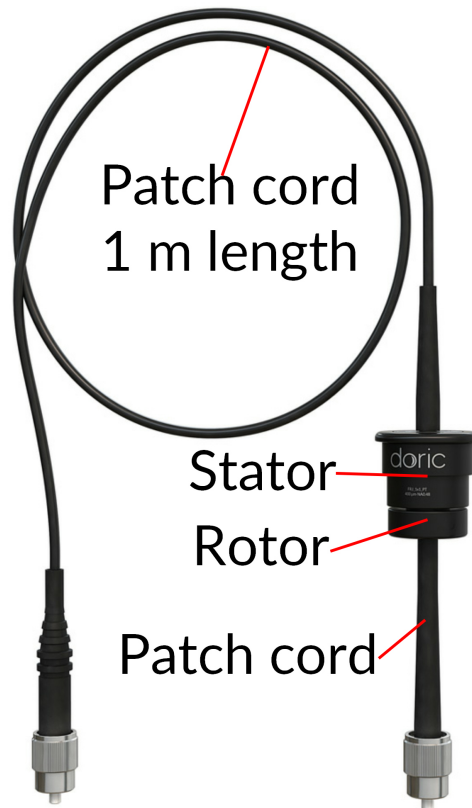


Figure 1.3: Pigtailed 1x1 Fiber-optic Rotary Joint

Operations Guide

2.1 Rotary Joint Holders

2.1.1 Holder_FRJ_small

If using the *Holder_FRJ_small* standard holder, first secure the holder to the experimental set-up fixture using 1/4 (or M6) size screws. Place the rotary joint vertically in the holder, with the lip of the rotary joint above the holder. Use the nylon-tipped #8-32 set screw on the side to secure the rotary joint in the holder. To ensure free rotation, the set screw must be placed as shown in Figure 2.1.



(a) Place the rotary joint vertically in the holder



(b) The set screw secures the rotary joint in the holder

Figure 2.1: Installation of the 1x1 Fiber-optic Rotary Joint in the Holder_FRJ_small

2.1.2 Gimbal_FRJ

If using the *GH_FRJ* gimbal mount, secure it in the experimental set-up using #8-32 screws. The rotary joint is placed vertically in the holder, with the lip of the rotary joint above the holder. The rotary joint is held in place by gravity, with no set-screws.



(a) FRJ 1x1



(b) Pigtailed FRJ 1x1

Figure 2.2: 1x1 Fiber-optic Rotary Joint in the Gimbal Holder

2.2 Input and Output Patch Cords

1. Clean the optical fiber connector before insertion. Use isopropanol and a lint-free wipe.
2. With an FC connector, the connector key must be oriented to enter within the receptacle slot to ensure proper connection (Fig. 2.3).

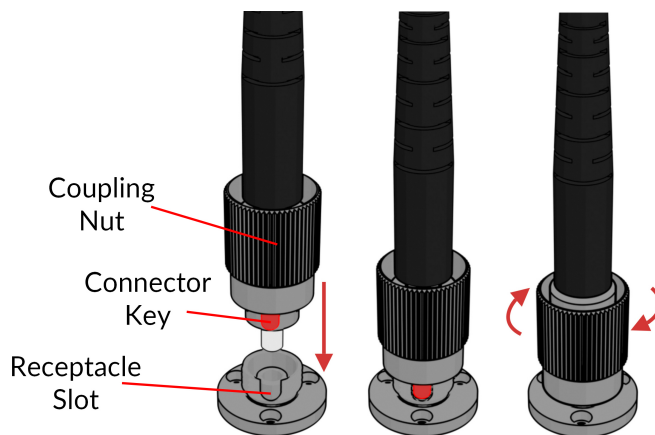


Figure 2.3: FC connector, Fiber Installation

⚠ To reduce the risk of eye injury, **it is sound practice to NOT CONNECT/DISCONNECT OPTICAL FIBERS when the light source is turned on.**

Specifications

Table 3.1: *FRJ 1x1 General Specifications*

SPECIFICATIONS	VALUE	NOTES
Transmission	>85%	Tested with 200 μm core, NA 0.22 fiber
Wavelength Range	450-650 nm	Others available on request
Power variation in rotation	$\pm 3\%$ of the mean	Tested with 200 μm core, NA 0.22 fiber
Fiber Type	Core 200 to 600 μm , NA 0.22 to 0.50	Works with other fiber types, but transmission can be affected
Starting Torque	20 $\mu\text{N}\cdot\text{m}$	Typical Value
Outer diameter	17.0 mm	-
Length	30.0 mm	-
Mass	18.0 g	-

Table 3.2: *Pigtailed FRJ 1x1 General Specifications*

SPECIFICATIONS	VALUE	NOTES
Transmission	>70%	Tested with 400 μm core, NA 0.48 fiber
Wavelength Range	450-650 nm	Others available on request
Power variation in rotation	< 1% peak to peak	Tested with 400 μm core, NA 0.48 fiber
Pigtailed patch cord type	Core 400 μm , NA 0.48	-
Input patch cord length	100 cm	-
Output patch cord length	6+ cm	-
Starting Torque	20 $\mu\text{N}\cdot\text{m}$	Typical Value
Outer diameter	17.0 mm	-
Length	30.0 mm	Without pigtailed patch cords
Mass	18.0 g	Without pigtailed patch cords

Table 3.3: *Recommended Environmental Specifications*

DESCRIPTION	OPERATION	STORAGE
Use	Indoor	Indoor
Temperature	0-40 $^{\circ}\text{C}$	0-40 $^{\circ}\text{C}$
Humidity	40-60% RH, non condensing	40-60% RH, non condensing

Support

4.1 Maintenance

The product does not require any maintenance. Do not open the enclosure. Contact Doric Lenses for return instructions if the unit does not work properly and needs to be repaired.

4.2 Warranty

This product is under warranty for a period of 12 months. Contact Doric Lenses for return instructions. This warranty will not be applicable if the unit is damaged or needs to be repaired as a result of improper use or operation outside the conditions stated in this manual. For more information, see our [Website](#).

4.3 Contact us

For any questions or comments, do not hesitate to contact us by:

Phone 1-418-877-5600

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