



2x2 Assisted Fiber-optic & Electric Rotary Joint

User Manual

Version 1.0.2

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System Overview

1.1 2x2 Assisted Fiber-optic & Electric Rotary Joint

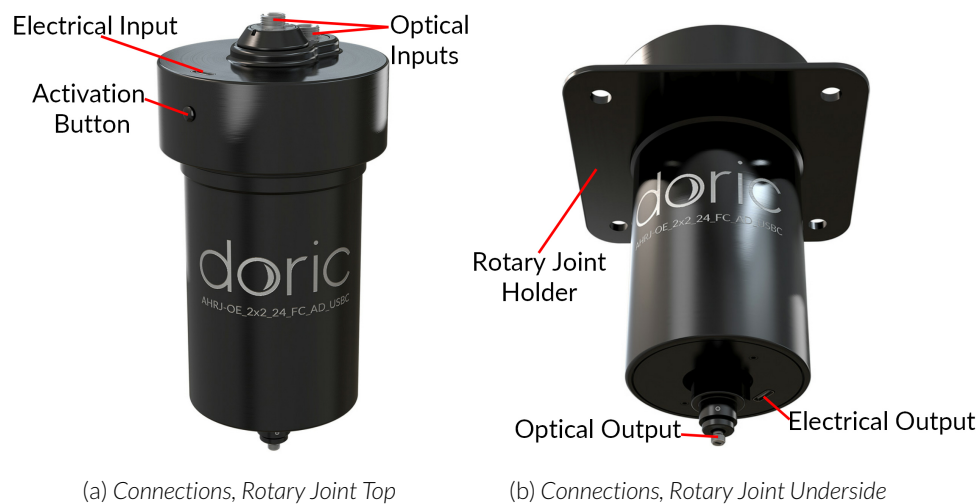


Figure 1.1: 2x2 Assisted Fiber-optic & Electric Rotary Joint

The Doric 2x2 Assisted Fiber-optic & Electric Rotary Joint is used to transmit optical and electrical signal from a moving sample to a fixed recording system. Thanks to an integrated motor, it allows effectively frictionless movement of the rotary joint. The rotary joint contains the following elements.

- The **Optical Inputs** (Fig. 1.1a) are used to connect patch cords from each light source to the two optical channels.
- The **Electrical Input** (Fig. 1.1a) is used to receive power and transmit electrical signal using a USB-C receptacle. It must be connected to a computer to draw power for the assistance to function.
- The **Activation Button** (Fig. 1.1a) is used to activate/deactivate the assistance function.
- The **Optical Output** (Fig. 1.1b) is used to emit light from the rotary joint, and is situated on the rotor, using a GS (Guiding Socket) receptacle. A GS connectorized dual patch cord is necessary to use the output.
- The **Electrical Output** is the electrical output of the rotary joint, using a USB-C receptacle. The rotary joint can be used with nothing connected to this output. Adapter are provided should another electrical connector type be required.

1.2 Pigtailed 2x2 Assisted Fiber-optic & Electric Rotary Joint



Figure 1.2: *Pigtailed 2x2 Assisted Fiber-optic & Electric Rotary Joint*

The *Pigtailed 2x2 Assisted Fiber-optic & Electric Rotary Joint* is a pigtailed variant of the standard *2x2 Assisted Fiber-optic & Electric Rotary Joint*. This pigtailed variant is ideal in experiments requiring extremely stable transmission, such as fiber photometry. These rotary joints have a pigtailed 1 m input patch cords using a 200 or 400 μm diameter, NA 0.37 or NA 0.48 optical fiber. The output does not require a pigtailed patch cord for optimal function.

1.3 Connector Adapter

As not all systems use USB-C electrical connectors, the rotary joint is provided with several different types of connector adapters.

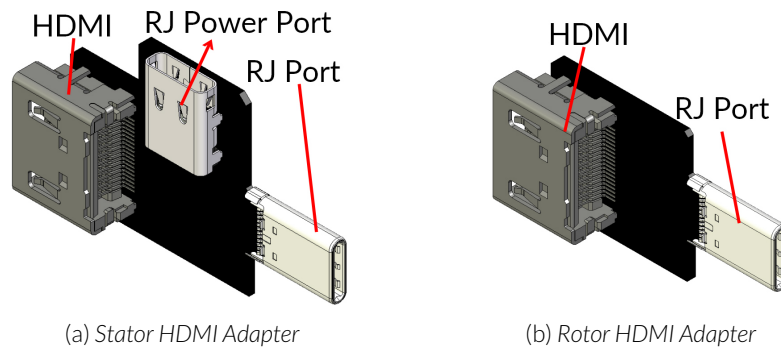


Figure 1.3: HDMI Rotary Joint Adapters

- The **HDMI** adapter (Fig. 1.3) is used with HDMI connectors.
- The **Microscope** adapter (Fig. 1.4) is used with many electrophysiology systems, as well as our *2-color* & *efocus Miniature Fluorescence Microscopes*.

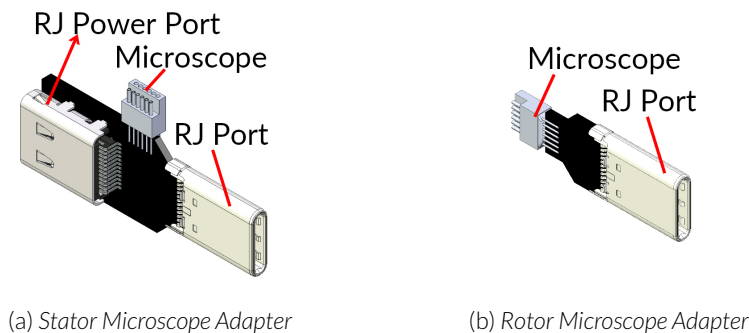


Figure 1.4: Microscope Rotary Joint Adapters

Each adapter comes with several ports.

- The **Rotary Joint (RJ) Port** is inserted into the standard USB-C port of the rotary joint.
- The **RJ Power Port** is used to provide power to the device. This is necessary, as specialized cables may not provide the power feed necessary to run the device.
- The **[Connector Type]** port is used to connect the non-standard cables.

Operations Guide

2.1 Rotary Joint Holder

The *Holder_AHRJ-OE_2x2* must first be secured in the setup using 1/4 screws and nuts. The rotary joint can then be placed in the holder; it is held in place by a rubber o-ring integrated into the rotary joint.

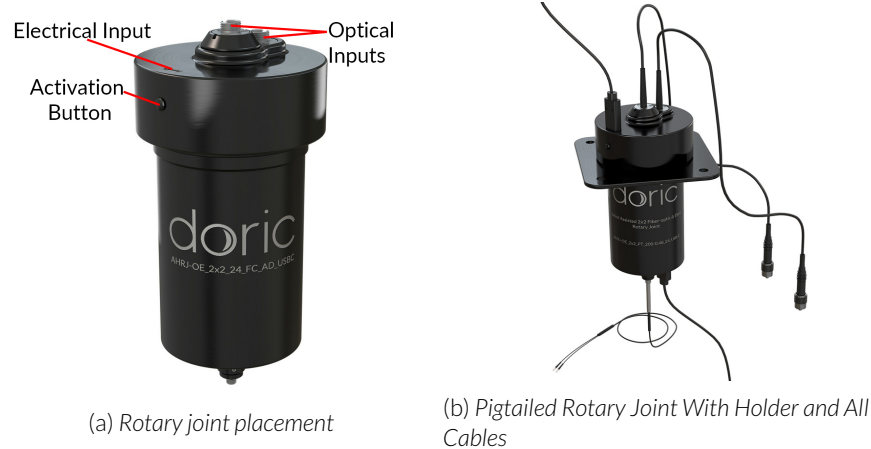


Figure 2.1: Assisted Fiber-optic & Electric 2x2 Rotary Joint Installation

2.2 Activation & Power Supply

The rotary joint requires electrical power to activate its rotation assistance function.

1. Connect the USB-C cable to the rotary joint. This cable must be connected either to a computer (using a USB-A/USB-C cable) or using the 5 V power supply.
 - Once the rotary joint is powered, the **Activation Button** will shine red. This indicates that it is powered, but that the rotation assistance is inactive.
 - Whenever power is restored to the rotary joint, it will be inactive.
2. Press the **Activation Button** to activate rotation assistance.
 - When rotary assistance is active, the button will shine green.

2.3 Input and Output Cables

2.3.1 FC Connectors

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. 2.2).

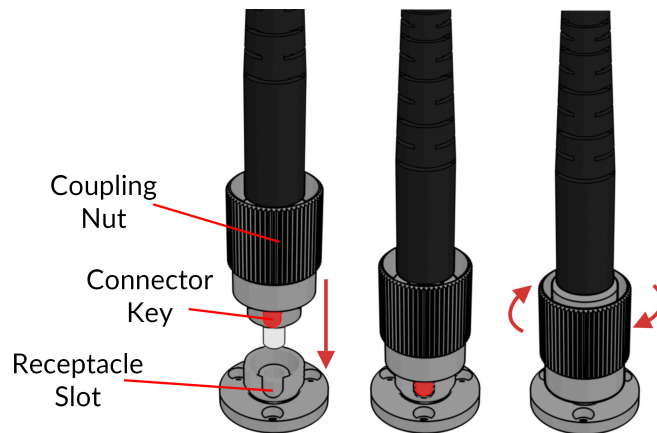


Figure 2.2: FC connector, Fiber Installation

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

2.3.2 GS Connectors & Patch Cord

The **Optical Output** uses a Dual ferrule GS-type receptacle. This allows two optically isolated fibers in a compact connector.

- Clean the optical fiber connector before insertion. Use isopropanol and a lint-free wipe.
- Place the connector into the rotary joint receptacle. Ensure the connector is properly aligned in the receptacle, as scraping the tip on the receptacle edge can scratch the fiber tip.
- When not in use, place a plastic cap on the connectors for protection and cleanliness.

2.3.3 Electrical connectors

The rotary joint uses USB-C electrical receptacles. As they are symmetrical, improper placement can result in inverted contacts. Ensure the A side of the USB-C connector is oriented towards the exterior of the rotary joint (Fig. 2.3). The A side is indicated by the small Doric symbol.



Figure 2.3: Assisted Fiber-optic & Electric 2x2 Rotary Joint USB-C Connector Placement

Electrical Connector Adapters

The following sections describes how to use the rotary joint electrical adapters.

1. Remove protective caps from the electrical connectors.
2. Observe the upper side of the adapter. Two indicators, **Edge** and **Center**. The **Edge** indicator should oriented towards the exterior of the rotary joint.
3. Insert the underside USB-C connector into the rotary joint **Electrical Output**.
4. Repeat the previous 3 steps on the opposite side of the rotary joint with the second *Connector Adapter* of the same type.

Electrical Cable Placement

The following section describes how to properly place electrical cables for the rotary joint to move properly. Without proper placement, the cables can become tangled, or will not turn properly due to insufficient torque.

1. Ensure that the electrical connectors are free of dust using an air duster before installing the cables.
2. The length of electrical cable attached to the **Output Electric Receptacle** should be equal or longer that the optical fiber patch cord used. Should the electrical cable be too long, loop it to ensure the dangling length is equal to that of the patch-cord.
3. Attach the electrical cable to the patch cord using a twist-tie or other small fastener.
 - The patch-cord needs to stay centred to properly balance the rotary joint. Ensure that the electrical cable is attached and centred on the patch-cord.
 - Attaching the cable to the patch cord to close to the rotary joint will not allow proper torque transfer. Ensure the cable is attached at least 5 cm from the base of the **Rotor**.
4. When not in use, install plastic caps on connectors for protection and cleanliness.

Specifications

3.1 Specifications

Table 3.1: USB-C Electrical Connector Pinout

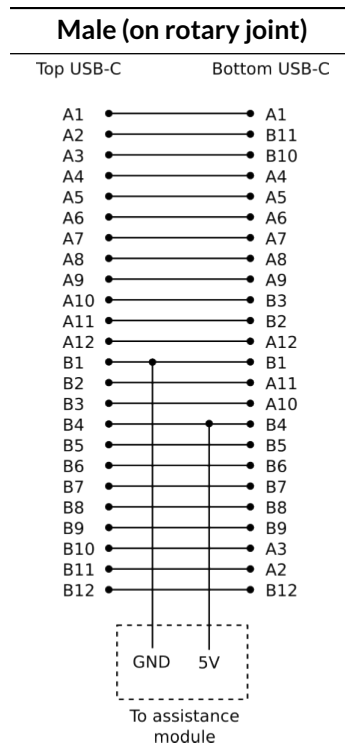


Table 3.2: USB-C Microscope Adapter Pinout

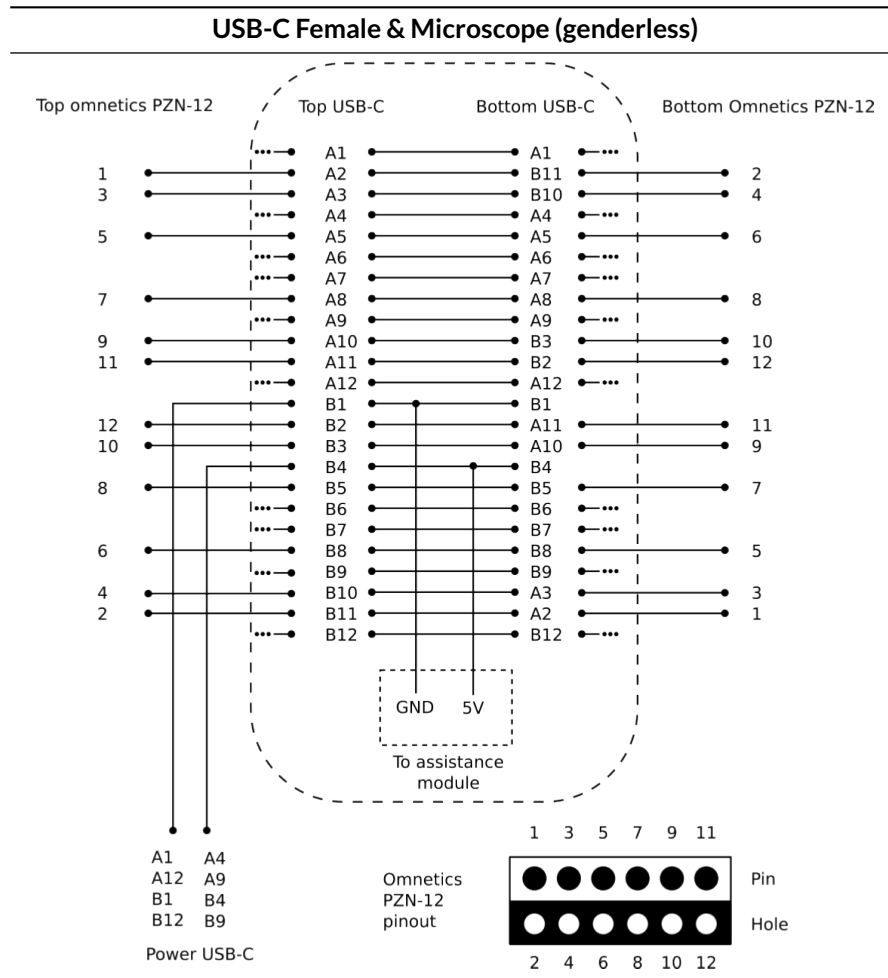


Table 3.3: USB-C HDMI Adapter Pinout

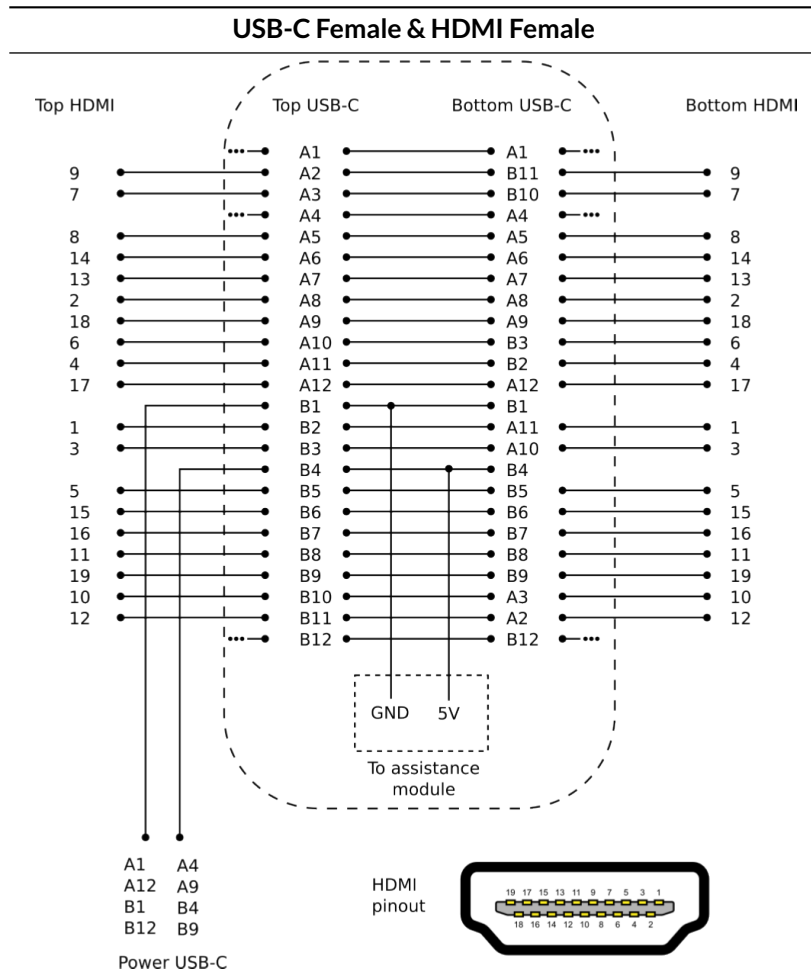


Table 3.4: Assisted 2x2 Fiber-optic & Electric Rotary Joints Specifications

SPECIFICATION	VALUE
Optical Channels	2 independent
Wavelength Range	450-600 nm
Maximum variation	<3 % peak to peak
Optimal Wavelength (nm)	Achromatic
Start up torque	< 20 μ N·m
Input Fiber Connector	2 FC
Input Patch Cord Length	1 m
Output Fiber Connector	GS 1.0
Electrical Inputs	22 data contacts, 2 power contacts
Electrical Outputs	22 data contacts, 2 power contacts
Contact material	Gold
Contact resistance	< 1 Ω
Maximum Current Rating	250 mA per contact
Resistance variation during rotation (constant rotation)	< 100 m Ω at 5 VDC
Recommended Optical Fiber Patch Cord	200 μ m/0.22
Transmission (Typical) ¹	60%

Table 3.5: Pigtailed Assisted 2x2 Fiber-optic & Electric Rotary Joints Specifications

SPECIFICATION	VALUE			
Optical Channels	2 independent			
Wavelength Range	450-600 nm			
Maximum variation	<1.5 % peak to peak			
Optimal Wavelength (nm)	530 nm			
Start up torque	< 20 μ N·m			
Input Fiber Connector	2 FCM			
Input Patch Cord Length	1 m			
Output Fiber Connector	GS 1.0			
Electrical Inputs	22 data contacts, 2 power contacts			
Electrical Outputs	22 data contacts, 2 power contacts			
Contact material	Gold			
Contact resistance	< 1 Ω			
Resistance variation during rotation (constant rotation)	< 100 m Ω at 5 VDC			
Maximum Current Rating	250 mA per contact			
Fiber Core/NA	200 μ m/0.37	200 μ m/0.48	400 μ m/0.37	400 μ m/0.48
Transmission (Typical) ²	50%	45%	40%	30%

¹Includes an output patch cord of the same type

²Includes an output patch cord of the same type

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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