A complete product line of fiber optic rotary solutions for the most demanding applications.

- Robotics
- Vehicle Turrets
- Radar Antennas
- Medical Systems
- Security Systems
- Sensor Platforms
- Material Handling Systems
- Remotely Operated Vehicles
- Fiber Optic Cable Reels
- Video Surveillance Systems
- Marine Propulsion Systems
- Wind Energy Turbines
Fiber Optic Rotary Joints (FORJs) are to optical signals what electrical slip rings are to electrical signals, a means to pass signals across rotating interfaces, particularly when transmitting large amounts of data. FORJs maintain the intrinsic advantages of fiber end to end. Moog Components Group has been producing Fiber Optic Rotary Joints for over twenty-five years.

Single or Multi-channel
FORJs are available in single and multi-channel options. The most cost and size efficient options are the single and dual channel designs. If more than two fibers are present in a system, multiplexing solutions are available to combine multiple channels onto one or two fibers to allow the use of a one or two channel FORJ.

In cases where more than two fibers are required, Moog has several designs: FO190, FO242, and FO291 where single channels are stacked to achieve the desired number of channels. The FO300 uses a common de-rotating optical element for all fiber channels.

Singlemode or Multimode
Singlemode fibers allow the propagation of a singlemode of optical energy due to their small core size and small numerical aperture and for this reason they exhibit very high bandwidths. Most singlemode fiber systems operate at 1300 nm and 1550 nm wavelengths because of lower fiber attenuation at these wavelengths. Because of these smaller core sizes and numerical aperture, singlemode FORJs must be designed with very precise mechanical alignments.

Multimode fibers have large cores and large numerical apertures allowing the propagation of multiple modes of optical energy. These features allow larger amounts of light to be transmitted from sources such as LEDs and VCSELs, but result in higher attenuation and dispersion. Because of these attenuation and dispersion features, multimode fiber systems are typically used for shorter datacom links. Most multimode systems operate at 850 nm and 1300 nm.

Size
Physical constraints are important in the selection of a FORJ. The FORJ Specification Data table shows product dimensions. Drawings for each product can be found in our product documentation. In addition to the on-axis models, we also have a through-bore FORJ design available for off-axis systems.

Fiber Optic Rotary Joint Features
• Ruggedized for harsh environments
• Compact sizes
• Variety of configuration options
• Custom designs available

Protocols
All FORJs listed in this brochure are passive devices that will work with any optical protocol suitable for the type of optical fiber used. Our FORJs operate with the following data protocols:
• SERCOS™
• PROFIBUS
• PROFINET
• INTERBUS-S
• MIL-STD-1553
• CANBUS™
• IRIG-B
• HD-SDI (HDTV)
• MS-900 / 97
• Ethernet (10 / 100 / 1000)
• ECL
• OC-48 (2.5 Gbps) and OC-192 (10 Gbps)
• SONET Protocols and 10 GB Ethernet
• SERDES Protocols (e.g. TAXI, HotLink, GLINK)
• SDI
• Tritech ARCNET
• IEEE-1394

Outstanding Reliability
Our FORJs are designed for the most demanding conditions and are tested to rigorous environmental and performance standards. All materials and components have been selected to ensure the highest reliability in extreme environments, including shock and vibration, temperature, humidity and dust. These FORJ designs have proven performance records in both industrial and military applications with these environmental conditions.

FORJ Models

<table>
<thead>
<tr>
<th>Multi-Channel</th>
<th>Singlemode</th>
<th>Multimode</th>
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<tbody>
<tr>
<td>FO242</td>
<td>FO300</td>
<td>FO215 / FO292 / FO257</td>
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<tr>
<td>FO291</td>
<td></td>
<td>FO190</td>
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<tr>
<td>FO206</td>
<td>FO282</td>
<td>FO286</td>
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<tr>
<td>FO285</td>
<td>FO228</td>
<td>FO197</td>
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Comprehensive Product Range
Complete Rotary Interface
Typically, fiber optic rotary joints are part of a more comprehensive rotary interface; in addition to the fiber passes there are electrical power and signal channels. As the largest slip ring supplier in the world, Moog Components Group is able to select the appropriate slip ring to integrate with any of the FORJs shown. A number of these integrated slip ring / FORJ assemblies are shown below.

Fiber Optic Multiplexing
To exploit the full bandwidth of fiber, multiplexing combines many signals of various types — video, serial data, network data, control lines — onto one optical fiber. Multiplexers that combine a number of signals electrically are typically called time division multiplexers (TDM); discrete parts of each input signal are assigned a time slot in the outgoing data stream. Moog Components Group has a wide range of TDM options that allow multiple electrical channels to be multiplexed onto one or more optical fibers.

Moog Components Group is also able to integrate fluid rotary unions to allow the transfer of liquid or gas across the rotary interface. This includes both low pressure fluid lines such as would be used for a coolant or high pressure hydraulic lines. It is also common to incorporate other rotary components, such as resolvers, encoders, motors and actuators into advanced rotary interface assemblies.

These rotary interface solutions can be provided to meet unique environmental requirements from deep space to 5500 meters below the ocean surface. The integration of FORJs into more complete rotary interface assemblies allows optimum performance at the lowest cost to the customer.

Moog Components Group multiplexers accommodate the ever-increasing data rates needed for digital video and industrial data protocols, as well as high speed networks such as Ethernet and IEEE-1394 (Firewire).

Combined Rotary Interface
Coal Stacker / Reclaimer hybrid slip ring with 800 amps circuits for conveyor motors plus signal circuits, position encoder and two pass Model FO190 fiber optic rotary joint for voice communications and PLC data.

Fiber Optic Multiplexing System
This compact turnkey solution is used in a wind turbine application.
Moog Component Group FORJs support high shock and vibration environments, long life requirements of more than 200,000 hours and long data links over 100 km of fiber. Units are available that are tested to MIL-STD-167-1, MIL-STD-202, MIL-STD-204 for vibration and MIL-STD-810D/E/F and MIL-STD-901D for shock.

Options
- Supply and installation of customer specific connectors and fibers
- Customization of mounting configurations, housing materials and drive couplers
- Fluid filling and pressure compensation for underwater use

Specifications and information are subject to change without prior notice.

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