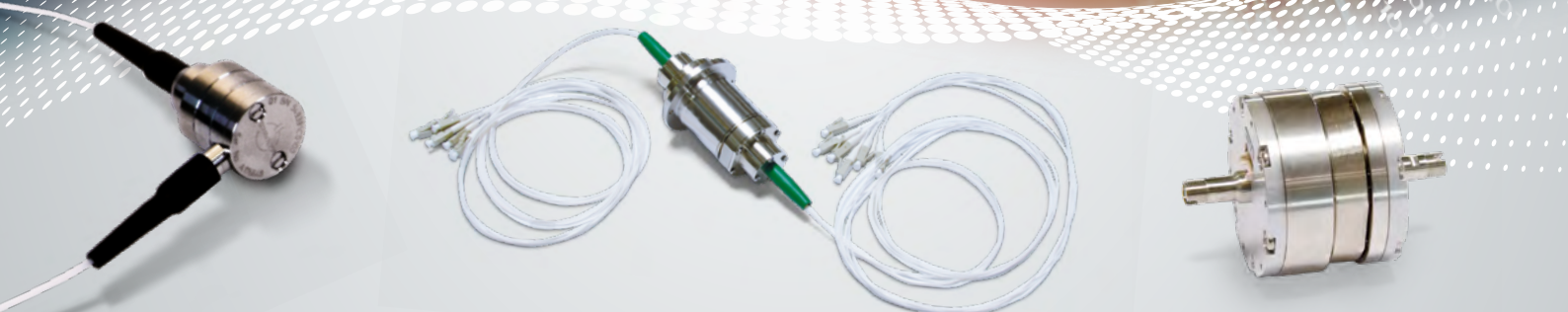


# SPINNER

## Rotating Solutions



## Fiber Optic Rotary Joints

Edition E/2018

HIGH FREQUENCY PERFORMANCE WORLDWIDE  
[www.spinner-group.com](http://www.spinner-group.com)



## SPINNER Fiber Optic Rotary Joints

**SPINNER is one of the world's leading producers of high-performance rotary joints. Fiber optic rotary joints (FORJ) in particular call for extremely exacting assembly of all optical and mechanical components in cleanroom environments. And SPINNER provides both from a single source.**

We also supply combinations of fiber optic rotary joints with radio frequency (RF) rotary joints, contactless power transmission modules, slip rings, multi-media joints and

contactless data transmission. Our specialties also include integrated data and power transmission solutions with a small form factor.



### Benefits of Fiber Optic Connections

#### Digital Data Transmission:

- Up to 40 Gbit/s per channel
- Wavelength-division multiplexing (WDM) allows transmission of multiple data channels via a single fiber optic link
- Highly configurable

#### Analog Signal Transmission:

- High sensitivity
- Short-haul systems

#### Fiber Optic Sensors:

- Robust sensors for a wide range of applications EMI; EMI-free signal transmission
- Fiber Bragg Sensors over FORJ
- Fiber optic technology is excellent for resolving problems

### Customized Fiber Optic Rotary Joints

**The SPINNER FORJ portfolio permits flexible accommodation of your needs with:**

- Special fibers
- Extended fiber lengths
- Up to 81 channels
- Extended wavelength range
- Special labeling
- Custom flanges
- Mixed-fiber assembly, e.g. multi- and single-mode fiber in a multi-channel FORJ
- Customized insertion loss values
- Insertion loss bands across different channels
- Customized pre-shipment inspection with testing of certain parameters



# Fiber Optic Core Features

## Optical Performance Parameters

- Low insertion loss
- High return loss values
- Low variation while rotating

## Optical Parameter Tracking While Rotating

- Narrow insertion loss band across all channels of a multi-channel fiber optic rotary joint
- Multi-channel fiber optic rotary joints provide excellent phase stability

## Fiber Types

- Single-mode E9/125  $\mu\text{m}$
- Multi-mode G50/125  $\mu\text{m}$  (also G62.5/125  $\mu\text{m}$ )
- Special fibers, e.g. for low bending radiuses or large-core fibers

## Environmental Conditions

- IP code protection for harsh environmental conditions
- High-temperature capability for implementation in RF systems
- Hydrostatic pressure capability for deep-sea applications

## ISO Class 7 Cleanroom Environment for Fiber Optics

All fiber-optic components are assembled in an ISO Class 7 cleanroom environment and 100% tested. Every component is assigned a unique serial number.

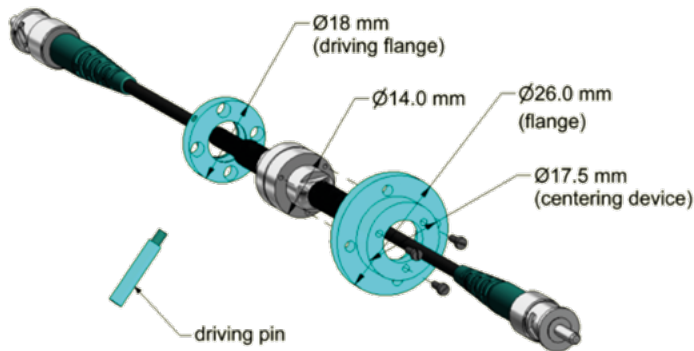
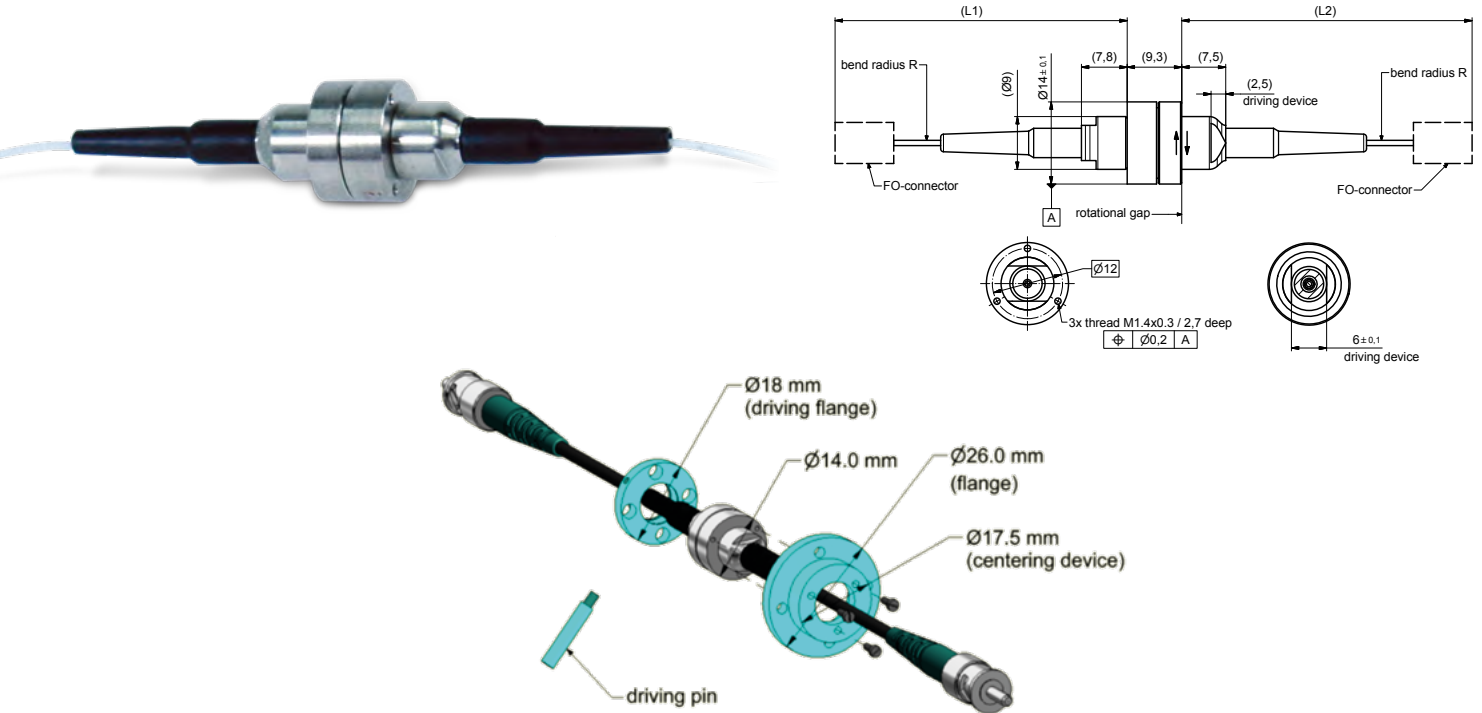


Two clean rooms with 18 and 100 m<sup>2</sup> of space are available

# SPINNER FORJ Single-Channel

## SPINNER FORJ 1.14

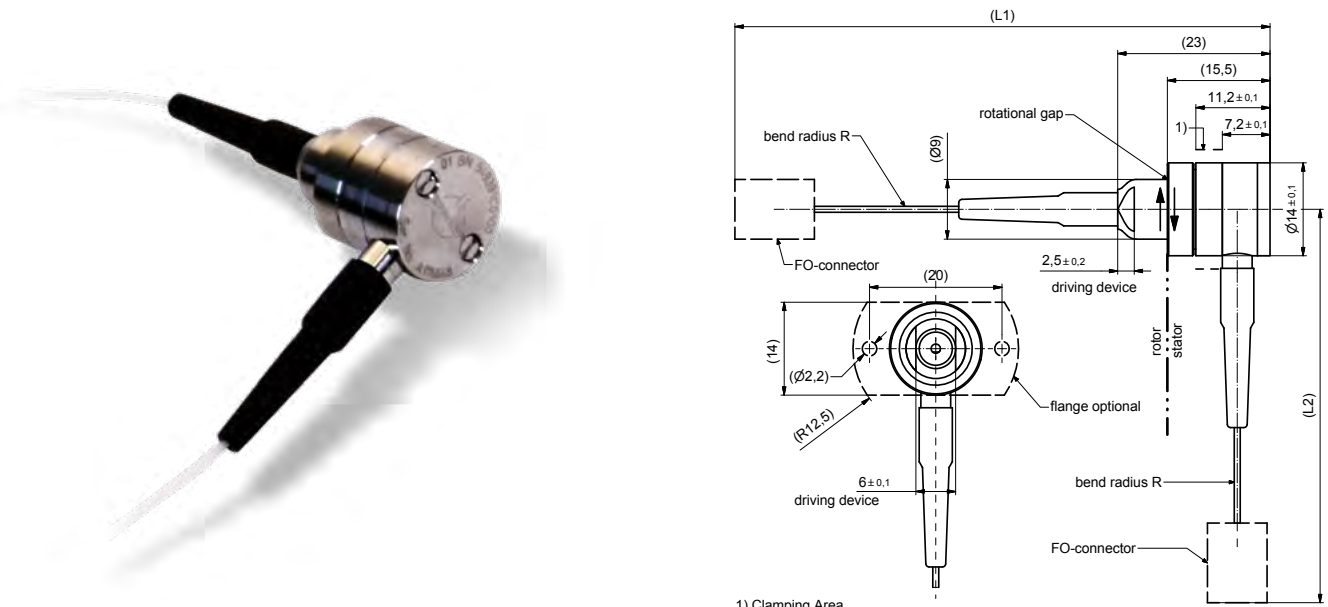
The FORJ 1.14 of SPINNER's single-channel family features top performance and extremely compact dimensions. Due to its superior design with single-mode fibers, the typical insertion losses are less than 1.0 dB. Its small dimensions and low weight of only 18 g permit rotational speeds of 10,000 rpm and more. Typically used in industrial applications.



The SPINNER FLEXIFLANGE make it easy to adapt our single-channel FORJs to your application. Just let us know your requirements.

## SPINNER FORJ 1.14L

For very low-profile designs in which even the minimum bending radius of optical fiber is a constraint, the SPINNER FORJ 1.14L lets the optical beam turn a tight 90° corner. Based on the SPINNER FORJ 1.14, it features equally outstanding performance. Typically used in studio cameras or defence and security.



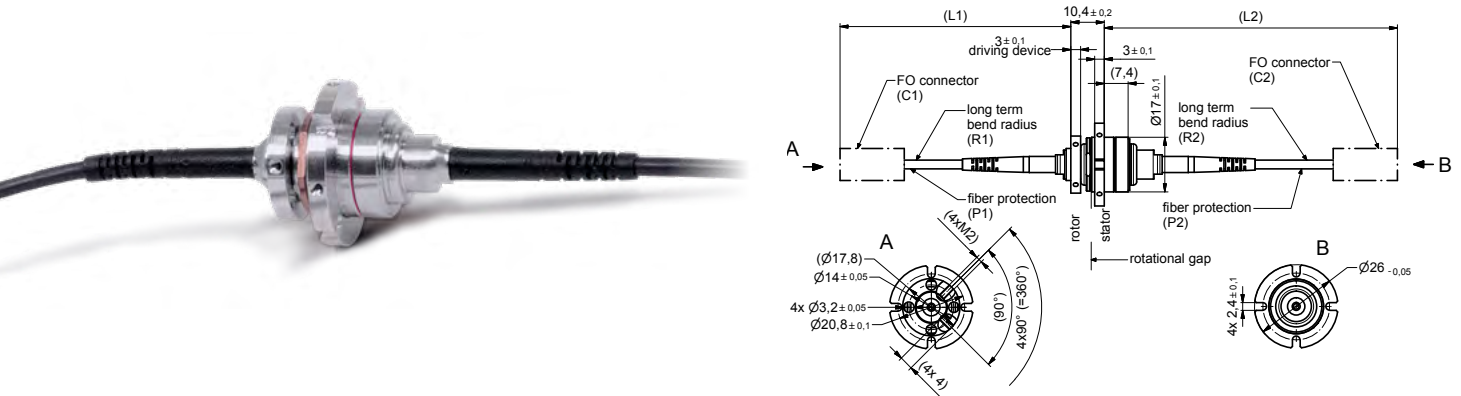
1) Clamping Area

# SPINNER FORJ Single-Channel

## SPINNER FORJ 1.17 / 1.17pc

Developed for the harshest environments, the SPINNER FORJ 1.17 is able to withstand strong vibrations and jolts, high humidity, and immersion in seawater.

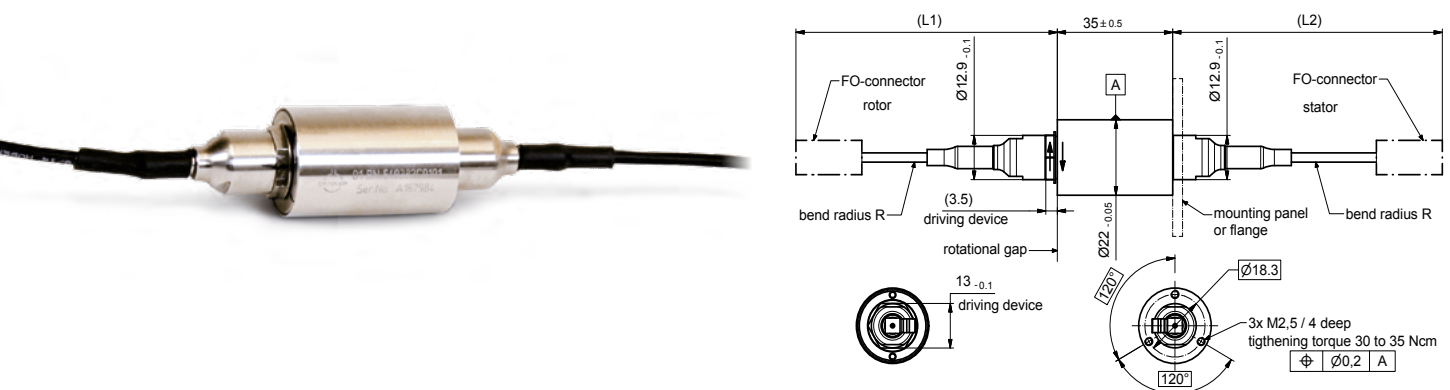
In wind power stations, this fiber optic rotary joint ensures highly reliable 24/7 data transmission. Its IP68-rated design meets the needs of offshore and underwater vehicles. For deep sea applications as far down as 4500 m, this single-channel fiber optic rotary joint is also available with pressure compensation as the SPINNER FORJ 1.17pc.



## SPINNER FORJ 1.22

The SPINNER FORJ 1.22 features IP65-class protection from dust and humidity for industrial applications in harsh environmental conditions. Protective tubing prevents damage to fibers during handling and installation.

In wind power stations, SPINNER FORJ 1.22 with an IP65 rating increases the reliability in 24/7 operations. Whereas in current designs the use of slip rings can increase both down time and servicing costs, the SPINNER FORJ 1.22 ensures highly reliable data transmission up to speeds of several Gbit/s.



# SPINNER FORJ Single-Channel

## Configure Your SPINNER FORJ Single-Channel:

| Rotary Joint   | Fiber Optic | Channel Count | Housing Type       | Fiber Type | Connector / Polish C1          | Connector / Polish C2 | Length L1  | Length L2  | Fiber Protection P1 / P2 | Unique Id1 | Unique Id2 |          |           |          |          |          |   |
|--|-------------|---------------|--------------------|------------|--------------------------------|-----------------------|------------|------------|--------------------------|------------|------------|----------|-----------|----------|----------|----------|---|
| <b>R</b>   | <b>O</b>    | <b>01</b>     | <b>-</b>           | <b>X</b>   | <b>Z</b>                       | <b>-</b>              | <b>XXX</b> | <b>ZZZ</b> | <b>-</b>                 | <b>XX</b>  | <b>ZZ</b>  | <b>-</b> | <b>XZ</b> | <b>-</b> | <b>X</b> | <b>Z</b> |   |
| Ø 14 mm (1.14) IP54 (Standard)   |             |               | G                  |            |                                |                       |            |            |                          |            |            |          |           |          |          |          |   |
| Ø 14 mm (1.14L) IP54   |             |               | H                  |            |                                |                       |            |            |                          |            |            |          |           |          |          |          |   |
| Ø 17 mm (1.17) IP65  |             |               | F                  |            |                                |                       |            |            |                          |            |            |          |           |          |          |          |   |
| Ø 22 mm (1.22) IP65  |             |               | E                  |            |                                |                       |            |            |                          |            |            |          |           |          |          |          |   |
| Single-mode E9 / 125 (Standard)  |             |               |                    | S          |                                |                       |            |            |                          |            |            |          |           |          |          |          |   |
| Single-mode SMF28 Ultra  |             |               |                    | U          |                                |                       |            |            |                          |            |            |          |           |          |          |          |   |
| Multi-mode G50/125 (Standard)  |             |               |                    | M          |                                |                       |            |            |                          |            |            |          |           |          |          |          |   |
| Multi-mode G62.5/125   |             |               |                    | N          |                                |                       |            |            |                          |            |            |          |           |          |          |          |   |
| Connector Type C1 & C2   |             |               |                    |            |                                |                       |            |            |                          |            |            |          |           |          |          |          |   |
| <b>Single Mode</b>   |             |               | <b>Multi Mode</b>  |            |                                |                       |            |            |                          |            |            |          |           |          |          |          |   |
| Connector/Polish   |             |               | Connector/Polish   |            |                                |                       |            |            |                          |            |            |          |           |          |          |          |   |
| LC / APC (Standard)  |             |               |                    |            |                                |                       | LCA        |            |                          |            |            |          |           |          |          |          |   |
| LC / UPC   |             |               |                    |            |                                |                       | LCU        |            |                          |            |            |          |           |          |          |          |   |
| LC / PC  |             |               | LC / PC            |            |                                |                       | LCP        |            |                          |            |            |          |           |          |          |          |   |
| FC / APC   |             |               |                    |            |                                |                       | FCA        |            |                          |            |            |          |           |          |          |          |   |
| FC / UPC   |             |               |                    |            |                                |                       | FCU        |            |                          |            |            |          |           |          |          |          |   |
| FC / PC  |             |               | FC / PC (Standard) |            |                                |                       | FCP        |            |                          |            |            |          |           |          |          |          |   |
| SC / APC   |             |               |                    |            |                                |                       | SCA        |            |                          |            |            |          |           |          |          |          |   |
| SC / UPC   |             |               |                    |            |                                |                       | SCU        |            |                          |            |            |          |           |          |          |          |   |
| SC / PC  |             |               | SC / PC            |            |                                |                       | SCP        |            |                          |            |            |          |           |          |          |          |   |
| ST / UPC   |             |               |                    |            |                                |                       | STU        |            |                          |            |            |          |           |          |          |          |   |
| ST / PC  |             |               | ST / PC            |            |                                |                       | STP        |            |                          |            |            |          |           |          |          |          |   |
| Other connectors   |             |               |                    |            |                                |                       | OTH        |            |                          |            |            |          |           |          |          |          |   |
| LSA, LuxCis, Molex, Special, Expanded Beam etc. unique id                    |             |               |                    |            |                                |                       |            |            |                          |            |            |          |           |          |          |          |   |
| Length L1 in m [0.2 ... 4.5] (Standard 4.5m for 900µm, 1.5m for 3mm and 2mm) |             |               |                    |            |                                |                       |            |            |                          |            |            |          |           |          |          |          |   |
| Length L2 in m [0.2 ... 4.5] (Standard 4.5m for 900µm, 1.5m for 3mm and 2mm) |             |               |                    |            |                                |                       |            |            |                          |            |            |          |           |          |          |          |   |
| Fiber protective tube 900µm buffer   |             |               |                    |            | 30mm bending radius (Standard) |                       |            |            |                          |            |            |          |           |          |          | 1        |   |
| Fiber protective tube 3mm (kevlar/aramid armor)                              |             |               |                    |            | 30mm bending radius            |                       |            |            |                          |            |            |          |           |          |          |          | 3 |
| Fiber protective tube 2mm SMF28 Ultra  |             |               |                    |            | 20mm bending radius            |                       |            |            |                          |            |            |          |           |          |          |          | 2 |
| Options  |             |               |                    |            |                                |                       |            |            |                          |            |            |          |           |          |          |          |   |
| Bare fiber only SMF28 Ultra  |             |               |                    |            | 15mm bending radius            |                       |            |            |                          |            |            |          |           |          |          |          | 0 |
| Metallic sleeve  |             |               |                    |            |                                |                       |            |            |                          |            |            |          |           |          |          |          | M |
| 1.14 premium version with lower IL and IL WOW                                |             |               |                    |            | Unique identifier              |                       |            |            |                          |            |            |          |           |          |          |          |   |
| Customer specific unique identifier  |             |               |                    |            |                                |                       |            |            |                          |            |            |          |           |          |          |          |   |

# SPINNER FORJ Single-Channel



SPINNER FORJ 1.17 / 1.17pc: designed for communicating with ROVs operating at depths down to 4500 m

## SPINNER FORJ Single-Channel Specifications for Single-Mode (SM) and Multi-Mode (MM) Fiber

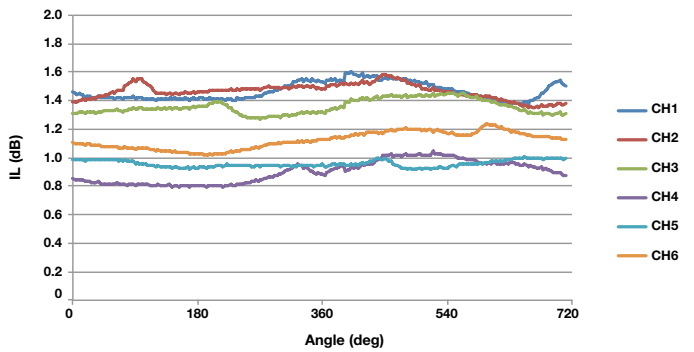
| SPINNER FORJ  | 1.14s   | 1.14p                | 1.14L                | 1.17/ 1.17pc*           | 1.22                 |
|---|---|----------------------|----------------------|-------------------------|----------------------|
| Max. insertion loss (dB)                              | 1.5 (SM)<br>2.5 (MM)                            | 1.0 (SM)<br>2.0 (MM) | 3.0 (SM)<br>4.0 (MM) | 1.5 (SM)<br>2.5 (MM)    | 2.0 (SM)<br>3.0 (MM) |
| Max. variation of insertion loss during rotation (dB) | 1.0   | 0.5                  | 1.0                  | 1.0                     | 1.0                  |
| Min. return loss (dB)                                 | 50 (SM) / 35 (MM)                               |                      |                      |                         |                      |
| Wavelength  | 1310 nm / 1550 nm (SM) or 850 nm / 1300 nm (MM) |                      |                      |                         |                      |
| Rotational speed                                      | 3,000 rpm                                       | 10,000 rpm           | 3,000 rpm            | 60 rpm                  | 1,000 rpm            |
| Weight (excl. connectors)                             | 18 g  | 18 g                 | 20 g                 | 60 g                    | 130 g                |
| Torque  | 0.06 Nm   | 0.06 Nm              | 0.06 Nm              | 0.3 Nm                  | 0.3 Nm               |
| Degree of protection                                  | IP54  | IP54                 | IP54                 | IP68*, seawater resist. | IP65                 |
| Recommended temperature range                         | -40°C to +85°C                                  |                      |                      |                         |                      |

\* 1.17pc, IP 68 up to 4,500 m operational depth - up to 7,500 m on request

# SPINNER FORJ Multi-Channel

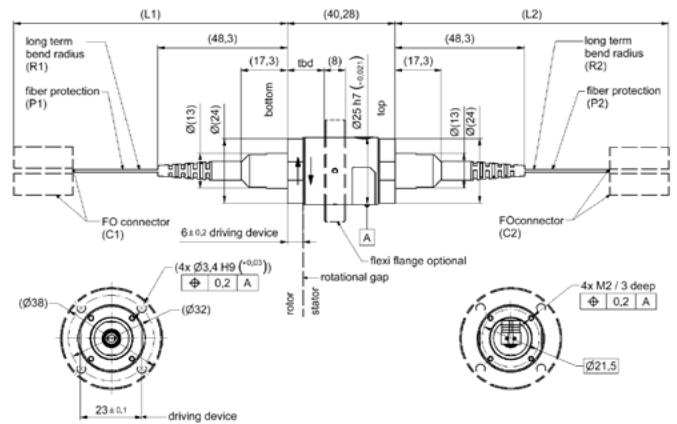
**SPINNER multi-channel rotary joints** use a dove prism to derotate images arriving via the input fiber for coupling with the output fiber. For up to 20 channels, SPINNER relies on discretely mounted collimators for the individual light propagation paths instead of an optical lens array.

This technology makes it possible to individually adjust and optimize the insertion loss values of each optical fiber channel. The result is superior tracking performance of optical channels during rotation. When rotating, the system's phase instability is less than 0.2°.



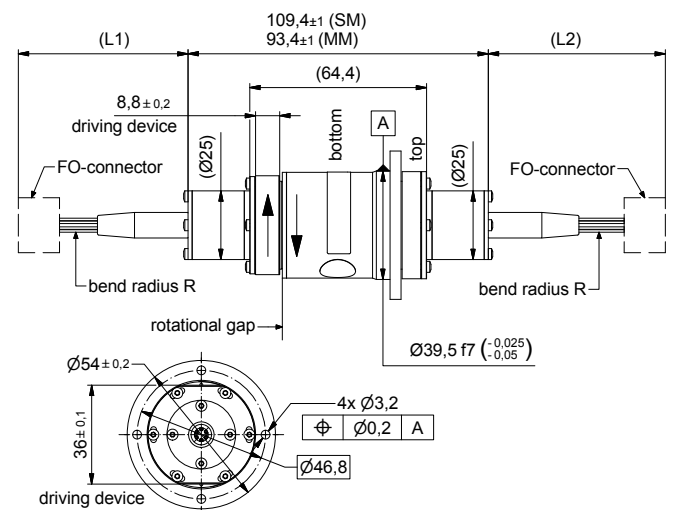
## SPINNER FORJ x.25

The SPINNER FORJ x.25 meets the need for a basic dual-channel, single-mode rotary joint. Its mechanical system makes it very compact. We can supply it with either multi-mode fibers only or a combination of single-mode and multi-mode fibers. IP65 is standard for this version. Smaller diameters are available. For higher rotational speeds version x.25 is available with IP54.



## SPINNER FORJ x.40

The SPINNER FORJ x.40 delivers market-leading compactness for multi-channel solutions with up to 8 channels, featuring an outer housing diameter of only 39.5 mm. It is available in single-mode, multi-mode, mixed fiber configurations and IP65.

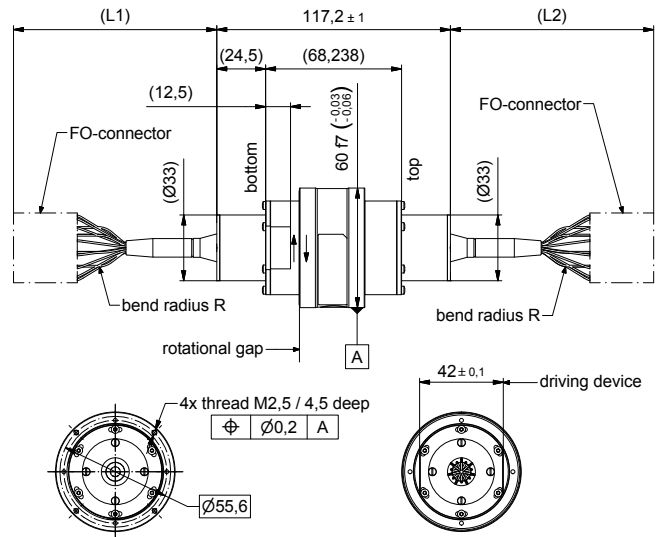




## SPINNER FORJ Multi-Channel

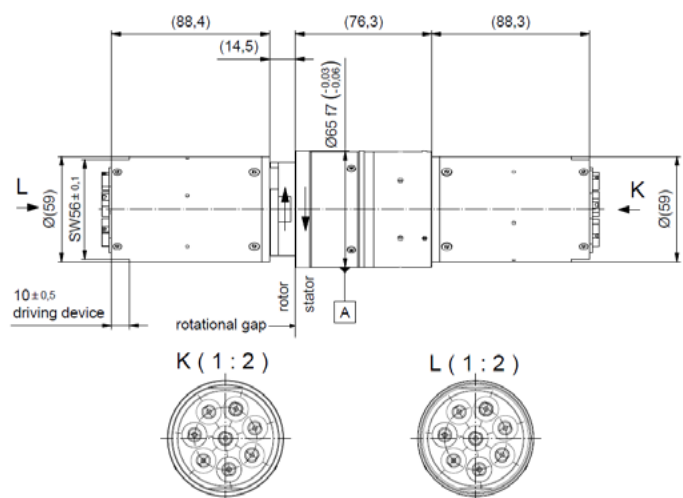
### SPINNER FORJ x.60

For multi-channel applications with more than six channels, the SPINNER FORJ x.60 covers the entire range from seven to 81 channels. It is also available in single-mode, multi-mode, mixed fiber configurations up to 20 channels and IP65.



### SPINNER FORJ x.65pc

Intended for use under the very harshest environmental conditions, the pressure compensated SPINNER FORJ x.65 is designed for the use in deepsea applications and withstands brutal vibrations and shocks, high humidity, and seawater. Its IP68-rated design meets the needs of offshore and military applications. Available for 2 to 8 channels in single-mode fiber configurations.



# SPINNER FORJ Multi-Channel

Configure your SPINNER FORJ Multi-Channel:

| Rotary Joint  | Fiber Optic | Channel Count    | Housing Type | Fiber Type                     | Connector / Polish C1 | Connector / Polish C2 | Length L1 | Length L2 | Fiber Protection P1/P2 | Unique Id1 | Unique Id2 |
|---|-------------|------------------|--------------|--------------------------------|-----------------------|-----------------------|-----------|-----------|------------------------|------------|------------|
| R   | O           | XX               | - X          | Z                              | - XXX                 | ZZZ                   | - XX      | ZZ        | - XZ                   | - X        | Z          |
| Ø 25 mm (Type x.25) (02...04)<br>Ø 40 mm (Type x.40) (02...08)<br>Ø 60 mm (Type x.60) (04...20)<br>Ø 60 mm (Type x.60 SLAT) (16...60) |             |                  |              |                                |                       |                       |           |           |                        |            |            |
| Type x.25   |             | IP65 D<br>IP54 K |              |                                |                       |                       |           |           |                        |            |            |
| Type x.40   |             | IP65 J<br>IP54 C |              |                                |                       |                       |           |           |                        |            |            |
| Type x.60   |             | IP65 I<br>IP54 B |              |                                |                       |                       |           |           |                        |            |            |
| Type x.60 SLAT  |             | IP65 L<br>IP54 M |              |                                |                       |                       |           |           |                        |            |            |
| Single-mode E9 / 125 (Standard)   |             |                  |              | S                              |                       |                       |           |           |                        |            |            |
| Single-mode SMF28 Ultra   |             |                  |              | U                              |                       |                       |           |           |                        |            |            |
| Multi-mode G50/125 (Standard)   |             |                  |              | M                              |                       |                       |           |           |                        |            |            |
| Multi-mode G62.5/125  |             |                  |              | N                              |                       |                       |           |           |                        |            |            |
| Connector Type C1 & C2  |             |                  |              |                                |                       |                       |           |           |                        |            |            |
| <b>Single Mode</b>  |             |                  |              | <b>Multi Mode</b>              |                       |                       |           |           |                        |            |            |
| Connector/Polish  |             |                  |              | Connector/Polish               |                       |                       |           |           |                        |            |            |
| LC / APC (Standard)   |             |                  |              | LCA                            |                       |                       |           |           |                        |            |            |
| LC / UPC  |             |                  |              | LCU                            |                       |                       |           |           |                        |            |            |
| LC / PC   |             |                  |              | LC / PC                        |                       |                       |           | LCP       |                        |            |            |
| FC / APC  |             |                  |              | FCA                            |                       |                       |           |           |                        |            |            |
| FC / UPC  |             |                  |              | FCU                            |                       |                       |           |           |                        |            |            |
| FC / PC   |             |                  |              | FC / PC (Standard)             |                       |                       |           | FCP       |                        |            |            |
| SC / APC  |             |                  |              | SCA                            |                       |                       |           |           |                        |            |            |
| SC / UPC  |             |                  |              | SCU                            |                       |                       |           |           |                        |            |            |
| SC / PC   |             |                  |              | SC / PC                        |                       |                       |           | SCP       |                        |            |            |
| ST / UPC  |             |                  |              | STU                            |                       |                       |           |           |                        |            |            |
| ST / PC   |             |                  |              | ST / PC                        |                       |                       |           | STP       |                        |            |            |
| Other connectors  |             |                  |              | OTH                            |                       |                       |           |           |                        |            |            |
| LSA, LuxCis, Molex, Special, Expanded Beam etc. unique id   |             |                  |              |                                |                       |                       |           |           |                        |            |            |
| Length L1 in m [0.2 ... 4.5] (Standard 4.5m for 900µm, 1.5m for 3mm and 2mm)  |             |                  |              |                                |                       |                       |           |           |                        |            |            |
| Length L2 in m [0.2 ... 4.5] (Standard 4.5m for 900µm, 1.5m for 3mm and 2mm)  |             |                  |              |                                |                       |                       |           |           |                        |            |            |
| Fiber protective tube 900µ buffer   |             |                  |              | 30mm bending radius (Standard) |                       |                       |           | 1         |                        |            |            |
| Fiber protective tube 3mm (kevlar/aramid armor)   |             |                  |              | 30mm bending radius            |                       |                       |           | 3         |                        |            |            |
| Fiber protective tube 2mm SMF28 Ultra   |             |                  |              | 20mm bending radius            |                       |                       |           | 2         |                        |            |            |
| Options   |             |                  |              |                                |                       |                       |           |           |                        |            |            |
| Bare fiber only SMF28 Ultra   |             |                  |              | 15mm bending radius            |                       |                       |           | 0         |                        |            |            |
| Metallic sleeve   |             |                  |              | M                              |                       |                       |           |           |                        |            |            |
| x.25p; x.40p; x.60p premium versions with lower values IL and IL WOW  |             |                  |              | Unique identifier              |                       |                       |           |           |                        |            |            |
| Customer specific unique identifier   |             |                  |              |                                |                       |                       |           |           |                        |            |            |

# SPINNER FORJ Multi-Channel



SPINNER FORJ x.65pc, IP68 and seawater resistant:  
designed for Tether Management Systems in offshore applications

## SPINNER FORJ Multi-Channel Specification with Discrete Lens Technology for Single-Mode (SM) and Multi-Mode (MM) Fiber

| SPINNER FORJ                                | x.25  | x.40                       | x.60                       | x.60 SLAT  | x.65   |
|---|---|----------------------------|----------------------------|--|--|
| Channel count                               | 2-4   | 3-8                        | 7-20                       | 16-60 (81)   | 2-8  |
| Insertion loss max.                         | 3.5 dB (SM)<br>3.5 dB (MM)                          | 3.5 dB (SM)<br>3.5 dB (MM) | 3.5 dB (SM)<br>3.5 dB (MM) | 3.5 dB CH 16-32<br>4.5 dB CH 33-48<br>5.5 dB CH 49-60 (81) | 3.5 dB (typ. 1.5 dB) CH 2-4<br>4.5 dB (typ. 2.5 dB) CH 5-8                   |
| Insertion loss variation over rotation max. |   | 1.5 dB                     |                            | 2.5 dB (typ. 1.5 dB)                                       | 1.5 dB (typ. 0.75 dB)  |
| Return loss                                 |   | 50 dB                      |                            | 40 dB (typ. 45 dB)   | 40 dB (typ. 45 dB)   |
| Wavelength                                  | 1310 nm / 1550 nm (SM) or 850 nm / 1300 nm (MM)     |                            |                            | 1310 nm or 1550 nm   | 1310 nm / 1550 nm  |
| Fiber type                                  | Single-mode E9/125 or multi-mode 50/125 or 62.5/125 |                            |                            | Single-mode E9/125   | Single-mode E9/125   |
| Rotation speed                              | 1,000 rpm   | 1,000 rpm                  | 150 rpm                    | 150 rpm  | 60 rpm   |
| Weight (excl. connectors)                   | 250 g   | 700 g                      | 1,500 g                    | 1,500 g  | 3,000 g  |
| Torque                                      | 0.08 Nm   | 0.15 Nm                    | 0.15 Nm                    | 0.15 Nm  | 1 Nm   |
| Degree of protection                        | IP54, IP65  | IP54, IP65                 | IP54, IP65                 | IP54, IP65   | IP68 up to 4,500 m op. depth - up to 10,000 m on request, seawater resistant |
| Recommended temperature range               | -40 °C to +85 °C                                    |                            |                            |  | -10 °C to +75 °C   |

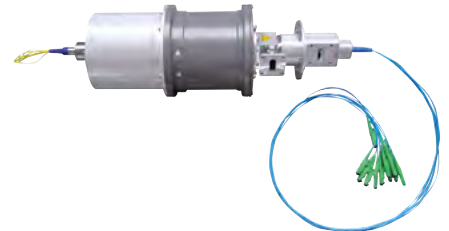
## Airborne and Military Radar Systems



SPINNER 2 channel FORJ 2.28 with slip ring for electro-optical sensor systems



SPINNER FORJ 1.14 for UAVs



SPINNER 12 channel FORJ x.60 with X band waveguide and slip ring for radar applications

**The low-profile, extremely lightweight SPINNER FORJ 1.14 is designed for environments characterized by strong vibrations and shocks. This FORJ is typically integrated in airborne targeting systems of UAVs, aircrafts or helicopters.**

In ground-based, naval and mobile military radar systems, it copes with the massive data volumes sent between the rotating antenna and the processing unit in the control shelter.

For these applications, SPINNER has combined a multi-channel FORJ with RF rotary joints, slip rings and rotary unions to deliver power and coolant to the antenna.



## Weather Radars



SPINNER FORJ 1.14L for helicopters



SPINNER FORJ 1.14 with waveguides and slip ring for weather radars



SPINNER FORJ 1.14L with slip ring

**For weather radar systems, SPINNER combines FORJs typically with single and dual channel RF rotary joints for frequency ranges in S-, C- and X-band.**

For weather radar systems, SPINNER combines FORJs typically with single and dual channel RF rotary joints for frequency ranges in S-, C- and X-band. Where in current weather radar systems a slip ring transfers data to the

antenna, the SPINNER FORJ brings data rates of several Gbit/s with highest reliability to weather radar systems around the globe.

## 360° Sight Systems



SPINNER single-channel FORJ with contactless power for 360° sight systems

**This is a completely contactless rotary joint system comprising a DC power transmission module and a fiber optic channel. The fiber optic channel is tightly integrated in the DC power module, resulting in an extremely compact form factor and permitting rotational speeds up to 3,000 rpm.**

The rotary joint has already been integrated and tested in the Rotating Image Generator (RIG™), which consists of a device and special software for generating 360° spherical moving pictures in real time. Its core components include a sensor and a lens that continuously rotate at high speed. The device captures a 360-degree array of images in a fraction of a second.

The software renders the sequence of images as spherical moving pictures that can be managed, recorded and transmitted in standard digital video or other formats.

The spherical movies can be displayed on multiple screens (such as LCDs) or special displays (e.g. an immersive full-dome environment or goggles) for real-time viewing.



## Wind Power Stations



Ethernet with SPINNER FORJ 1.22



SPINNER FORJ 1.22 for wind power stations

Today's wind turbines have to meet increasing demands with regard to energy yield, efficiency, and reliability. To meet them, the systems linking the rotor blades and the control electronics in the nacelle must transmit signals at ever-greater speeds. To optimize data transfer, SPINNER offers innovative solutions that have been specially developed to meet the requirements of the wind power market.

Day after day, wind turbines simply stop turning and power generation drops to zero, resulting in lost income. The possible causes vary greatly, but one of the principal ones is faulty transmission of data for pitch control, which sets the blades to the best angles for the wind to turn the rotor.

Data is normally transmitted via slip rings, but these are subject to wear. The result is eventual loss of dependability, and down times for maintenance are inevitable.

SPINNER's contactless couplers and fiber optic rotary joints, which now replace a part of the slip ring, take this into account and enable **fault-free data transmission in real time.**

## 4K / 8K Video Transmission over 360°



SPINNER FORJ 1.14 with slip ring:  
the perfect match for cable-suspended camera system

**SPINNER's miniature slip ring/FORJ combinations with diameters as small as 22 mm enable interference-free video data transmission in 4K and 8K quality, also with fast-moving images.**

They are ideal for low-profile applications, since they ensure the critical minimum fiber bending radius and unit length.

This is why manufacturers of leading-edge cable-suspended camera systems rely on SPINNER.



## Revolving Stages



SPINNER FORJ 2.25 with slip ring for revolving stages in theatres on ocean liners

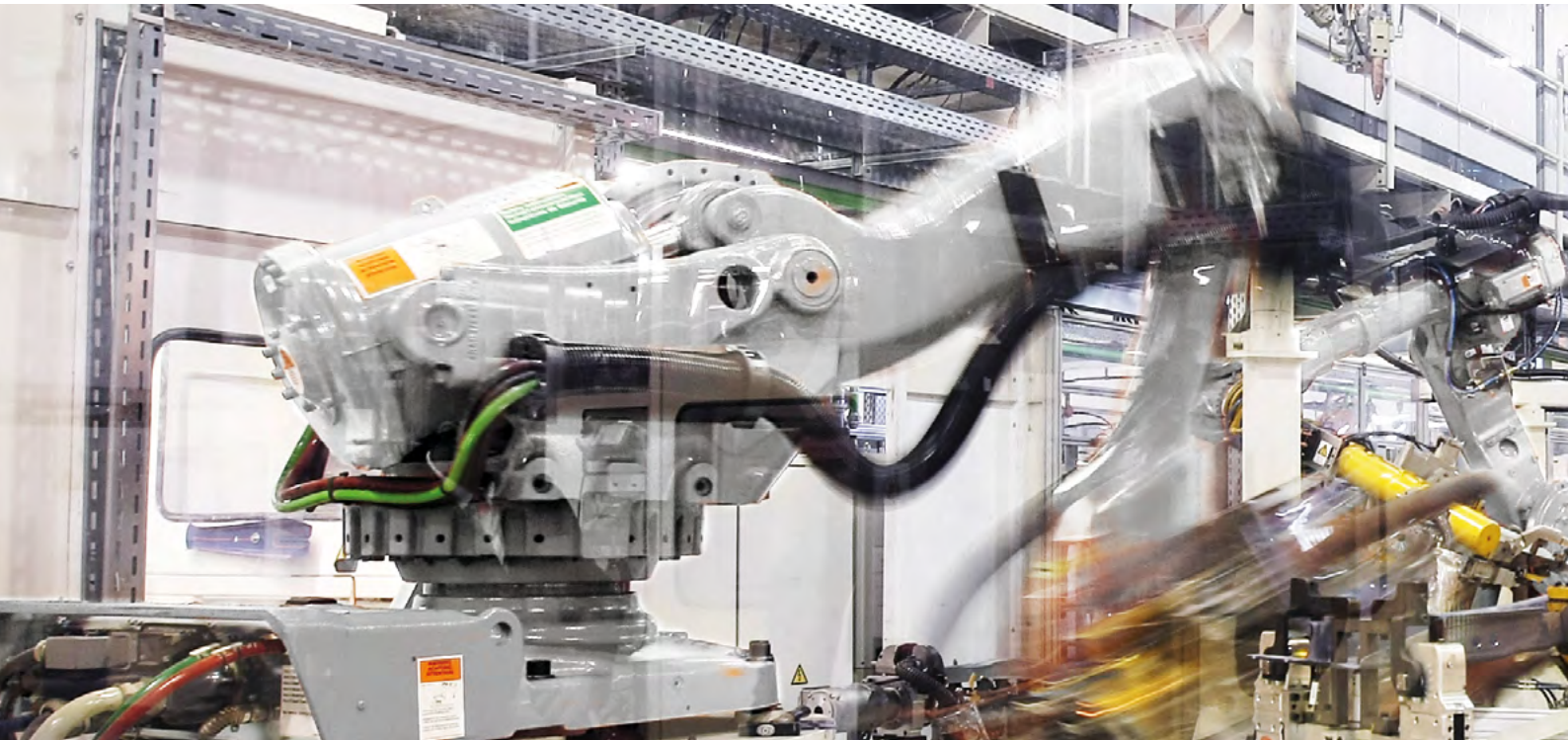


**Single- and multi-mode fiber optic rotary joints with between two and 20 channels are used whenever it isn't feasible to multiplex digital signals. This is the case in radar applications requiring high-performance transmission of multiple phased signals, in which A/D conversion errors would be unacceptable.**

The SPINNER FORJ 2.25 also offers excellent value for money since it separately transmits each channel, thus eliminating the need for complex active multiplexing technology.

A good example is revolving stages with power slip rings on ocean liners.

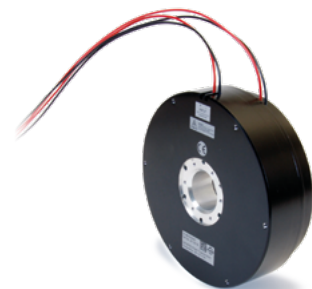
## Industrial Automation



SPINNER single-channel FORJ 1.14L



SPINNER 100 W contactless DC/DC converter with free inner diameter for FORJ



SPINNER 300 W contactless DC/DC converter with free inner diameter for FORJ

**For long-term continuous applications that require DC power and high data throughput, SPINNER supplies a completely contactless rotary joint system.**

It achieves a very small form factor by integrating the fiber optic channels into the DC power module at rotational speeds up to 3000 rpms. This hybrid rotary joint is typically implemented in high-end imaging systems and industrial machining applications.

Thanks to wavelength division multiplexing (WDM) technologies, the fiber-optic channels provide maximum flexibility for communications protocols and data channels. SPINNER

supplies contactless DC/DC converters together with fiber optic rotary joints, e.g. the right-angled FORJ 1.14L, as a single unit.

SPINNER can also adapt the assembly for harsh environments by using FC/PC adapters instead of flying cables and ordinary FC/PC connectors. The nominal output voltage of this system is 24 V DC, but the technology used also lets it be flexibly modified for a higher or lower voltage or current.





#### Fiber Optic Channel Characteristics:

|                               |                    |
|-------------------------------|--------------------|
| Interface type / material     | FC/APC             |
| Fiber type                    | E9/125 single-mode |
| Wavelength [nm]               | 1310 / 1550        |
| Min. / typical return loss    | 50 dB / 55 dB      |
| Max. insertion loss / typical | 3.0 dB / 2.0 dB    |
| Max. WOW insertion loss       | 1 dB               |
| Max. optical power            | 200 mW / 23 dBm    |

#### DC Power Transmission Channel Characteristics:

|                         |                       |
|-------------------------|-----------------------|
| Input voltage           | 21.6 to 27.6 V DC     |
| Output voltage          | 24 V DC $\pm$ 3%      |
| Continuous output power | 100 Watts / 300 Watts |



## HIGH FREQUENCY PERFORMANCE WORLDWIDE

SPINNER designs and builds cutting-edge radio frequency systems, setting performance and longevity standards for others to follow. The company's track record of innovation dates back to 1946, and many of today's mainstream products are rooted in SPINNER inventions.

Industry leaders continue to count on SPINNER's engineering excellence to drive down their costs of service and ownership with premium-quality, off-the-shelf products and custom solutions. Headquartered in Munich, Germany, the global frontrunner in RF components remains the first choice in simple-yet-smart RF solutions.

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