

SPINNER Rotating Solutions



Contactless Data (Real Time) & Power Transmission

Edition E/2017

ETHERNET

POWERLINK

HIGH FREQUENCY PERFORMANCE WORLDWIDE

www.spinner-group.com



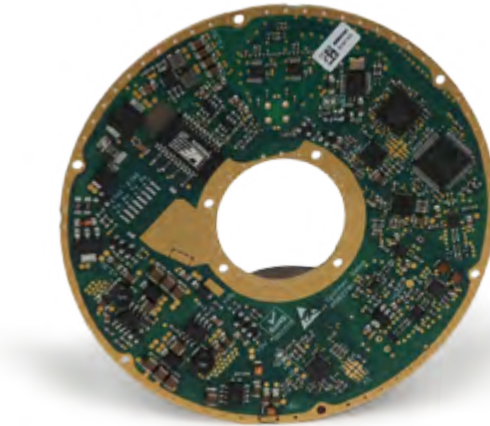
Contactless Data (Real Time) & Power Transmission

For more than 70 years, the SPINNER Group has been setting new standards worldwide in high frequency technology. SPINNER has become one of the leading manufacturers in rotary joints due to our innovative approach, technical expertise, and high standards of quality.

Our products are used in maritime applications (both above and below water), on land, in the air, and in space. Across all applications, the trend toward digitization and increasing data transmission rates is continuing. Our contactless modules for rotating systems deliver benefits whenever slip rings are inadequate due to large outer diameters and/or high data transmission rates.

Applications:

- Wind Power Stations
- Robotic Systems
- Packaging Solutions
- Nondestructive Material Testing
- Civilian and Military Radar Systems
- Optical Surveillance Systems



Key Features:

- Real time data transmission @ 100 Mbit/s and 99% bus traffic; multiplexing of two independent channels
- Supported real time bus protocols: Powerlink, EtherCat, Profinet class A-C (IRT), Sercos III, Bluecom
- 1 GBit/s version supports Ethernet protocols according to IEEE 803.2
- Automatic recognition of the bus speed for Ethernet-based protocols up to a net data rate of 1 Gbit/s, BER lower than 1×10^{-12}
- Multi-channel designs available, as well as simultaneous transmission of other bus protocols parallel to real time protocols
- Various non-Ethernet protocols supported: CAN (repeater mode up to 500 kbit/s), Profibus, RS485 and RS422 – available on request
- Maximum immunity to interference due to enclosed design, no Wi-Fi used
- Works at any direction of rotation and rotational speed from 0 to 5000 r/min with constant transmission quality; ready for use immediately after system power-up
- All-in-one design: No adjustments, no additional gateways or data converter necessary
- Maximum reliability and long service life thanks to frictionless, maintenance-free operation
- Modules with clear inner diameters of up to 360 mm available on request
- Combinations available with contactless power transmission of up to 300 W at 24 V DC



SPINNER can customize solutions for special conditions.
Don't hesitate to contact us to discuss your needs!

Contactless Data Transmission in Real Time

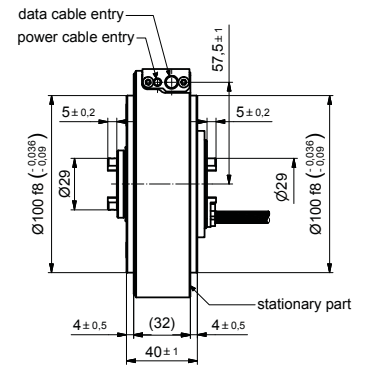
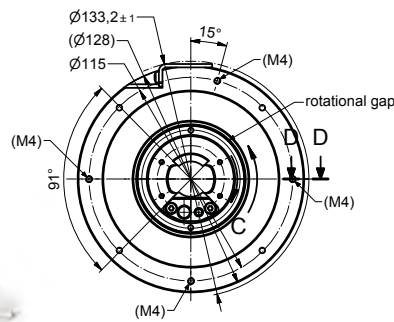
Like in many other areas of technology, Ethernet is used as a standard interface for data transmission. SPINNER has developed a contactless coupler (module) that is available with different inner diameters.

In contrast to transmission via a conventional slip ring, the Ethernet module also supports Gigabit Ethernet regardless of its dimensions. The correct standard is automatically detected and transmitted: 10BASE-T (10 Mbit/s), Fast Ethernet (100 Mbit/s), Gigabit Ethernet (1 Gbit/s) or fixed at 100 Mbit/s in case of real time data transfer.

Without requiring any adjustments, all ethernet data transmitters are fully compatible with Profinet (class A and B). The real time version, Profinet class C (IRT), also supports other real time protocols.

The mechanical system is designed to allow the incorporation of one or two transmission modules, also in combination with the DC/DC converter described below. The converter is designed so that more than 50 watts and an output voltage of 24 V are still available for the user in addition to the rotor's own power supply.

Data Transmission Module BN 637421:



Available Configurations for BN 637421C000X:

Type X	
1	1000BASE-T Ethernet
3	CAN-channel (repeater 500 kbit/s)
4 + 5	1 channel 100BASE-TX, for real time Ethernet applications
7 + 8	2 channels 100BASE-TX, multiplexed, for real time Ethernet applications

Contactless Data Transmission Module in Real Time

Example: Type 1 - BN 637421C0001 (1 Gbit/s Ethernet)

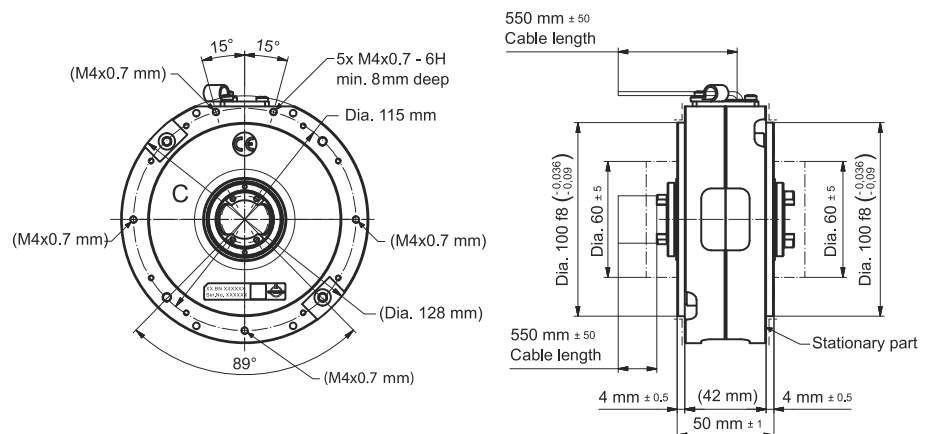
1000BASE-T Ethernet-Channel	One contactless coupler for one channel
Supported Ethernet standards	10BASE-T (IEEE 802.3 clause 14) 100BASE-TX (IEEE 802.3 clause 25) 1000BASE-T (IEEE 802.3 clause 40) Auto negotiation provided to select Ethernet-Standard and full/ half duplex mode automatically
OSI layer operation	Layer 1 - 2
Supported protocols	Profinet CC-A, CC-B
Ethernet frame loss ratio according to RFC2544	$\leq 1 \times 10^{-9}$ Measured for 800s with 64 byte frames at 99% channel utilization, corresponds to BER $\leq 1 \times 10^{-12}$
Data interface connection	Cat. 6A S/FTP 4x2xAWG26/7 (PiMF) at stator and rotor side

Example: Type 7 - BN 637421C0007 (2 Channel Multiplexed Profinet Class C)

100BASE-TX Ethernet Channel	Two signal channels over one contactless transmission channel, signals are multiplexed, no redundancy	
	Type 7	Type 8
Supported Ethernet standards	100BASE-TX (IEEE 802.3 clause 25), autonegotiation (full duplex only)	100BASE-TX (IEEE 802.3 clause 25), autonegotiation (half duplex only)
Supported protocols	Profinet CC-A, CC-B, CC-C (IRT), POWERLINK	
OSI layer operation	Layer 1 (physical)	
Multiplexer	Time domain multiplexing	
Ethernet frame loss ratio according to RFC2544	$\leq 1 \times 10^{-9}$ Measured for 8000s with 64 byte frames at 99% channel utilization, corresponds to BER $\leq 1 \times 10^{-12}$	
Data interface connection	Cat. 6A S/FTP 4x2xAWG26/7 (PiMF) at stator and rotor side	

BN 637421: Requires 24 V/0.3 A on both rotor and stator side (i.e. with slip ring)

BN 636699CXXXX Includes Two Independent Working Data Transfer Modules Like BN 637421:

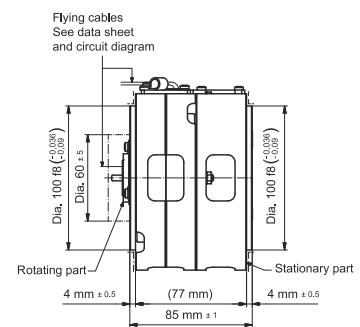
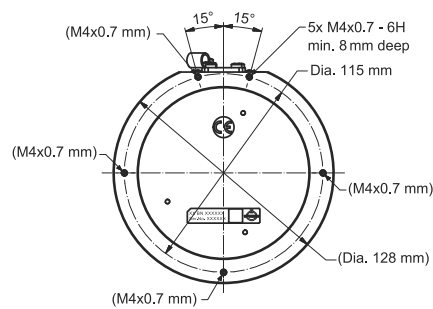


Power Transmission Module

SPINNER's contactless power transmission system is a rotationally symmetrical system for contactless transmission of electric energy. This transmission system is used to supply DC voltage to control systems, sensors, or other consumers on rotating shafts.

The transmission system works like a galvanically isolated DC voltage transmitter. It keeps the output voltage nearly constant over a wide input range, regardless of the load. The output has a short-circuit-proof and open-circuit-proof design. A major advantage is the presence of a hollow shaft, thus permitting combinations with optical single-channel or multi-channel rotary joints for data transmission. This DC/DC converter conforms to all common industry standards with respect to safety, interference immunity, and emitted interference. DC/DC converters for 24 V are available for up to 300 W; converters for high output voltages and up to 11 kW are also available on request.

Combination of Ethernet and Power Module BN 636684C0001 (1Gbit/s Ethernet, DC/DC Converter 24 V DC 100 W)



BN 636688 - 100 W



BN 636685 - 240 W



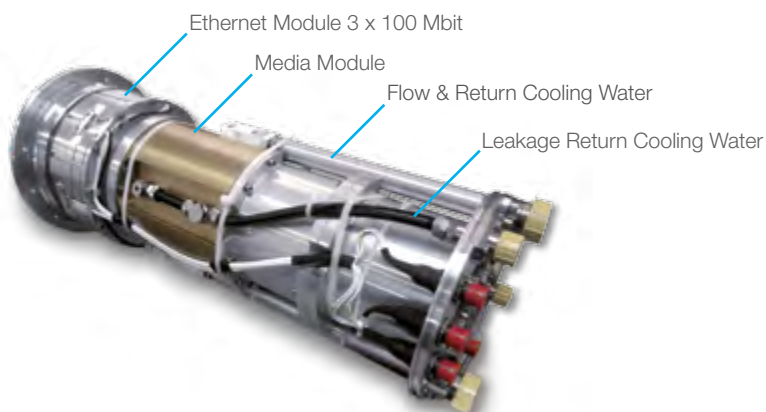
Standalone Module DC/DC Converter BN 636688

Input voltage	21.6 V - 28.0 V DC
Output voltage	24 V DC ± 3%
Nominal output current	4 A
Max. output ripple	80 mV
Efficiency, typ.	85% @ full load
Max. rotational speed / optionally up to	600 rpm / 1500 rpm
Min. service life	200 x 10 ⁶ revolutions
MTBF	300,000 hours
Standards	DIN EN 55022, DIN EN 61000-4-2, DIN EN 61000-4-3, DIN EN 61000-4-4, DIN EN 61000-4-6
EU Directive	EMC Directive 2004/108/EC

Civilian and Military Radar Systems

In the radar technology sector, the trend toward installing active components right on the antenna is continuing. The resulting significant reduction in cabling makes the system lighter and more efficient. However, steadily increasing amounts of data with high transmission rates also call for better digital data transmission solutions. For radar rotary joints, this means that conventional RF modules for different frequency bands are replaced with a variety of media couplers and power signal transmission paths.

Transmission amplifiers, which are now installed on the rotatable part of the radar antenna, require media couplers to create a cooling circuit. Power is traditionally supplied via a slip ring. The electrical signals to and from the active antenna equipment are no longer transmitted by a contacting slip ring but instead of by via a multi-channel fiber-optic rotary joint or contactless coupler. Because the new contactless modules can be supplied with virtually any inner diameter, all conceivable versions of hybrid rotary joints are possible.



This hybrid rotary joint does not include a conventional RF rotary joint. Instead, contactless data transmission systems control the radar transceivers on the rotating platform.



Wind Power Stations and Optical Surveillance Systems

Contactless digital transmission can increase the reliability of wind power stations. Bus systems including Ethernet, Profinet, Profibus and CAN are currently used for this, with the signals being transmitted by slip rings. Due to natural wear of the slip rings, down-times for maintenance are inevitable. SPINNER's contactless data transmitters for popular BUS systems help to minimize down-times and reduce operating and maintenance costs. The data transmitters can also be combined with a fiber-optic rotary joint.

Since 2013, SPINNER has been supplying a completely contactless rotary joint system consisting of a DC power transmission module and an optical channel. In this system, the optical channel is highly integrated into the DC power module, resulting in an extremely compact form factor with permissible rotational speeds of up to 3,000 rpm. The nominal output voltage of the contactless power transmitter is 12 V, but the technology used permits adjustment to higher output voltages such as 24 V (industry standard).



Real time data transmission module



SPINNER FORJ 1.22 for wind power stations



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

360° Camera System





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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