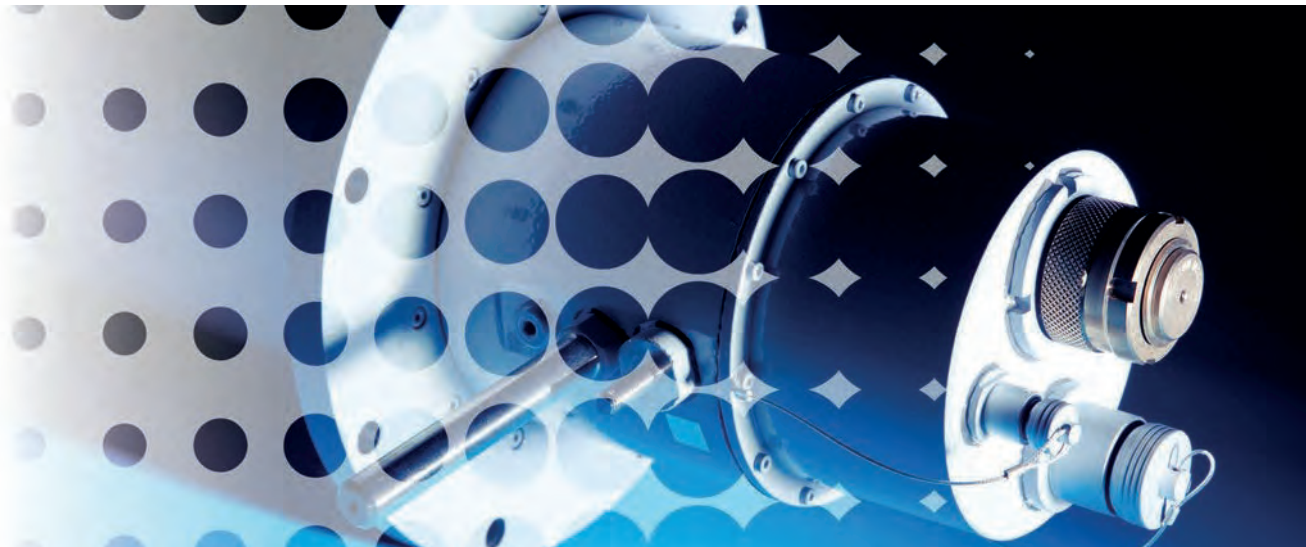




SCHLEIFRING

Slip Ring Solutions | **Surveillance**



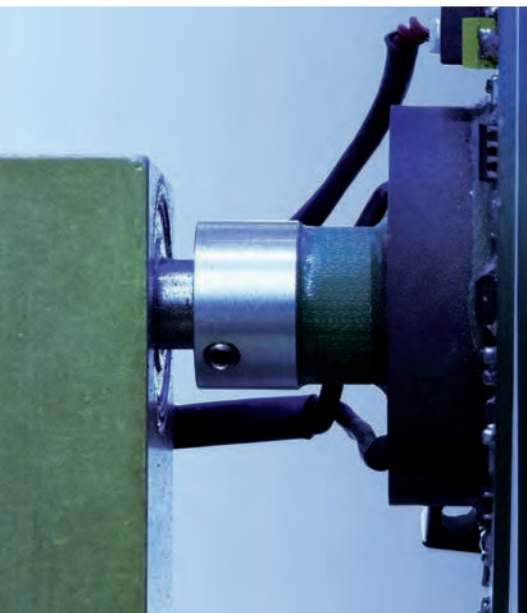


SCHLEIFRING Headquarters in Fürstfeldbruck, Germany

Quality in Detail

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About SCHLEIFRING



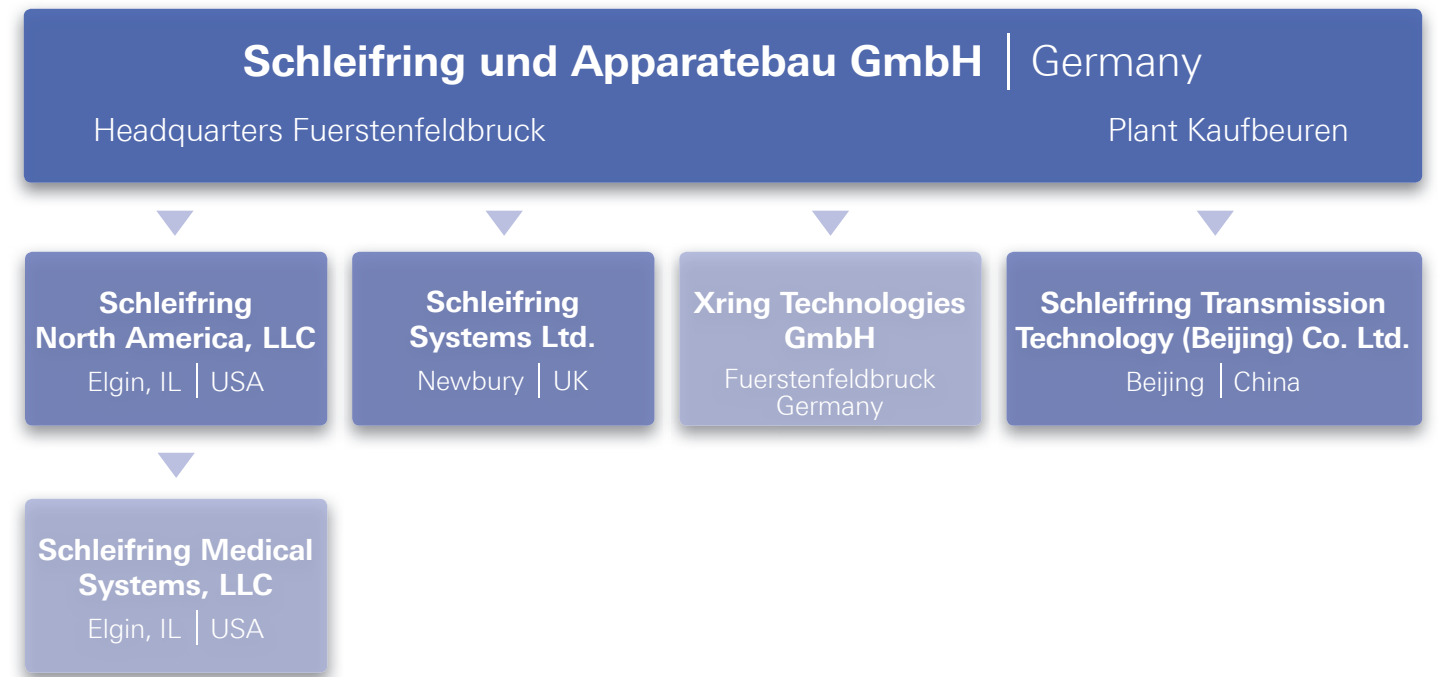
More than 3,000 customers rely on SCHLEIFRING solutions. Our customers are specialists in complex technical products in the surveillance sector, the energy & automation industry as well as the medical sector.

SCHLEIFRING stands for the highest precision and reliability in the transfer of data, energy and media (air/ liquids) between moving and stationary components.

In radar applications, for example, we transfer energy, coolant liquids and data in several different channels within a single integrated system.

Such top performance shows the progress we have made in our branch of industry for over forty years now.

We maintain a global network of sales and service establishments so that we can be close to our customers in over fifty countries throughout the world.



Contactless Transmission | **Capacitive Data Link GigaCAP®**

The application of industrial standard protocols, like digital video protocols, is in high demand. Communication standards such as Gigabit Ethernet or Fibre Channel are supported and allow for data rates up to 10 Gbit/s. Thus, the system integration of the data channels is simplified as components from the IT marketplace can be used. The modular design allows the system to be quickly and easily adapted to customer-specific applications.



Features:

- Multiple stackable channels
- Unidirectional or bidirectional
- Max. diameter: 2,000 mm
- Height: 25 mm/1" per stack plus housing
- Shapes: two circuit boards for 2 channels in a metal housing
- Rotational speed: only limited by mechanical restrictions

Classic applications

- Radar, periscopes
- Vehicles
- Automation, industrial scanners
- Customer-specific applications

Wear-resistant, high noise immunity combined with excellent EMC qualities, high reliability and bit error rates of $< 10^{-12}$. Qualified for security shock and vibration resistance as well as temperatures of -40°C to 65°C .

Contactless Transmission | **Inductive Power**

In addition to contacting slip rings, contactless rotary joints are very popular.

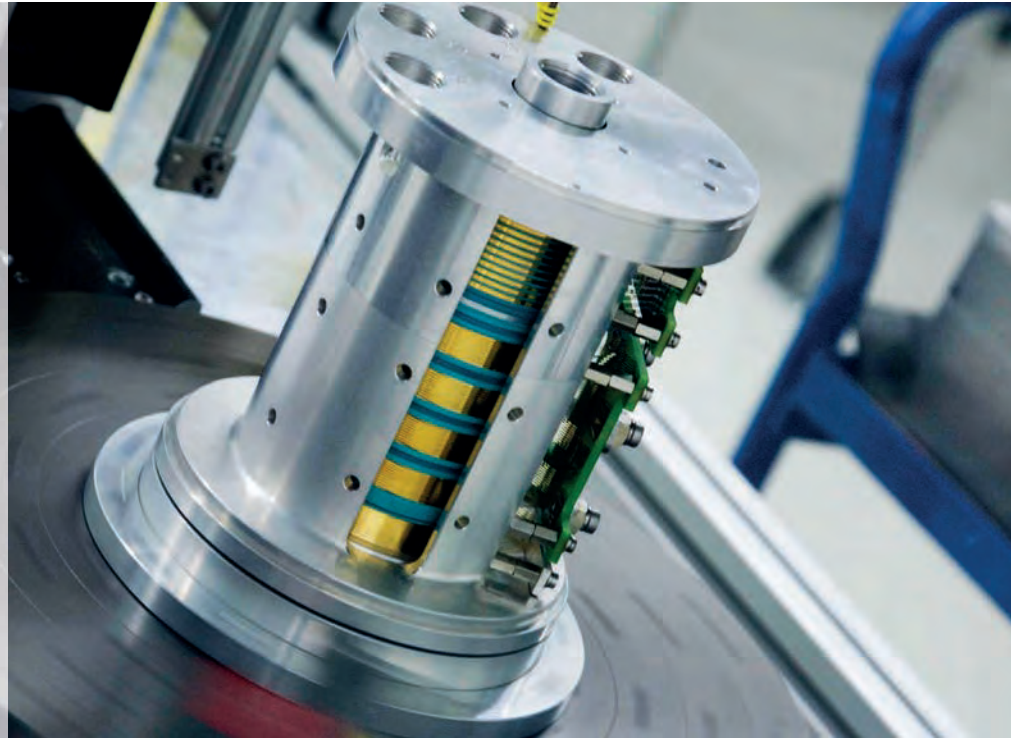
SCHLEIFRING's worldwide-patented technology for inductive, contactless power transmission allows voltages of 24 V up to 400 V within a range of 1 W to 10 KW. Especially in applications with high rotational speeds, our contactless slip rings ensure a long, wear-free service life, which cannot be achieved with a contacting transmission system.



This compact hybrid unit combines contactless power and signal transmission, allowing temperature monitoring of rollers in foil processing machines for instance. Contactless power and signal transmission provides a wide range of options for security innovations.

Contacting Transmission | **Signal & Data Transmission**

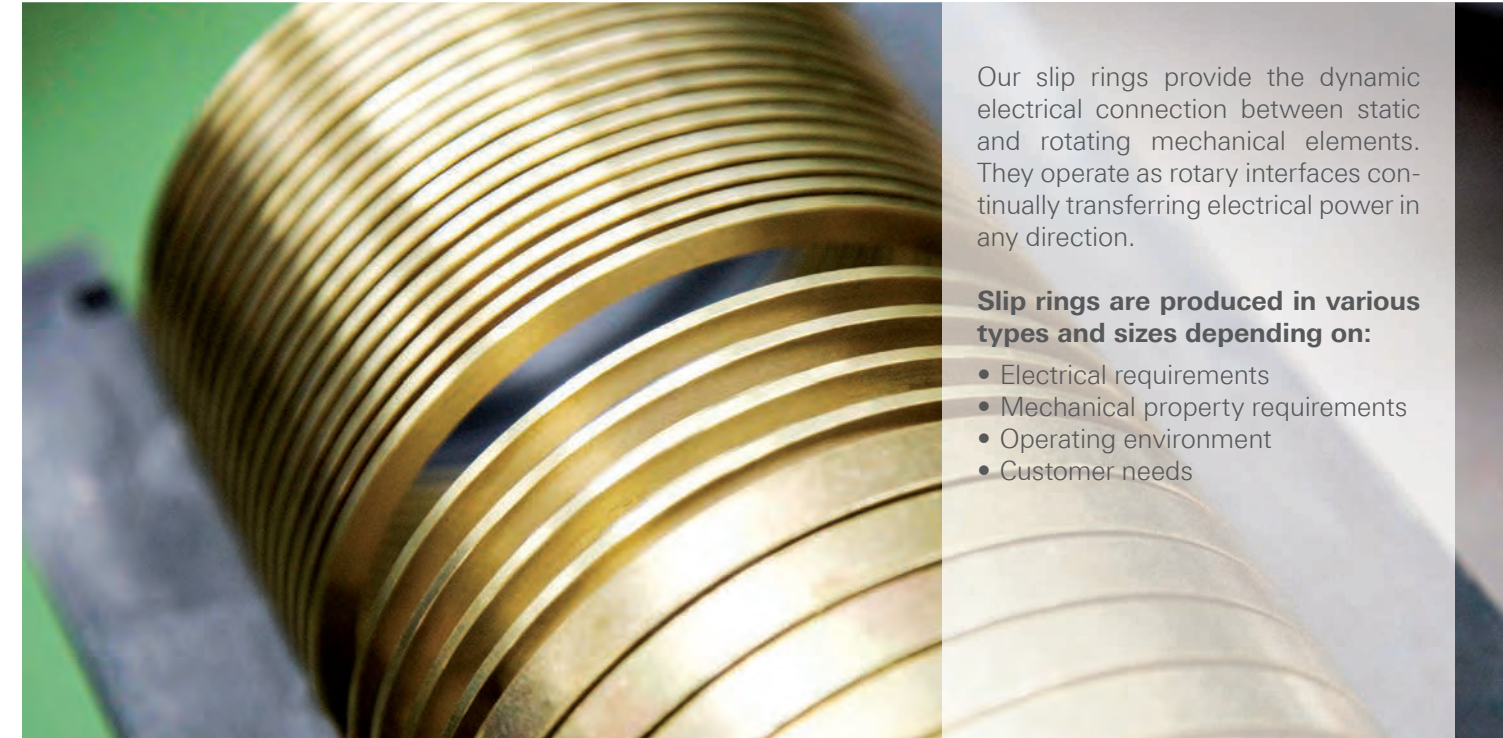
The slip ring is an essential device for the supply of power and the transmission of electrical signals. The quality of the slip ring is therefore a key factor for the quality of the overall system. Due to the constantly increasing volume of transmitted data nowadays, contacting slip ring systems use precious metal sliding technology to counter the physical limitations.



Sensitive data and digital signals e.g. piezoelectric or strain gauge signals
SCHLEIFRING's gold wire technology and the contact configuration of silver-graphite brushes on hard silver rings allow excellent signal and data transmission:

- Extremely low electrical noise and contact resistance
- Long, low-maintenance service life
- High contact reliability
- Crosstalk isolation
- Reliable operation under shock, vibration and extreme temperatures
- Transmission of all common bus systems

Contacting Transmission | **Power Transmission**



Our slip rings provide the dynamic electrical connection between static and rotating mechanical elements. They operate as rotary interfaces continually transferring electrical power in any direction.

Slip rings are produced in various types and sizes depending on:

- Electrical requirements
- Mechanical property requirements
- Operating environment
- Customer needs

From low to high power

SCHLEIFRING's silver braid brushes or silver-graphite brushes on brass rings as well as the gold wire technology provide optimum power transmission.

Depending on the technical requirements, they allow excellent transmission of low power up to and above 1,000 A at high rotational speeds and with a long service life.

Optical Transmission | **Fiber-Optic Rotary Joints**

Optical fibers transmit high data rates reliably over long distances. SCHLEIFRING offers fiber-optic rotary joints to provide a direct link to optical fibers. FORJs transmit any kind of digital or analogue optical signals regardless of the data protocol.

Highlights:

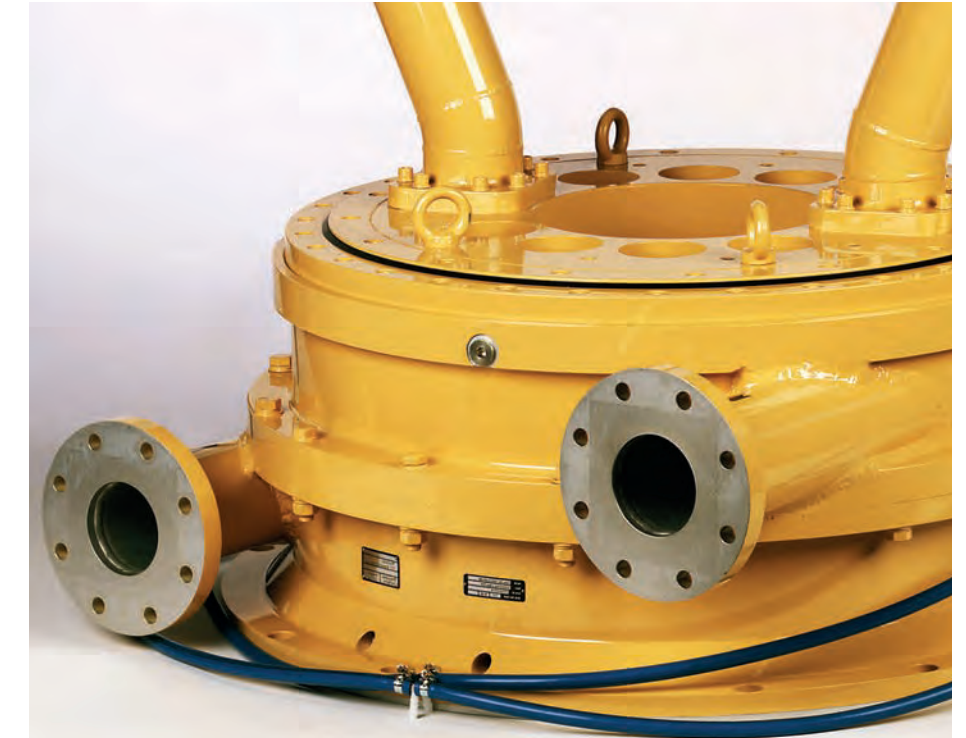
- Data rates of 10 Gbit/s or higher
- Not affected by EMI
- Temperature range: -40 °C to 85 °C
- Up to a capacity of 60 fibers



Classic applications:

- Ground and marine radar systems
- Offshore industry
- Unmanned aerial vehicles (UAV)
- Mining industry

Contacting Transmission | **Media Rotary Joints**



SCHLEIFRING offers sophisticated solutions for the transmission of fluids such as water, oil and coolants, as well as gas and air – optimized to the customer's application.

Media rotary joints integrated within slip ring assemblies are also available as complete rotary joint units consisting of media slip rings, optical rotary joints, encoders and/or microwave rotary joints.

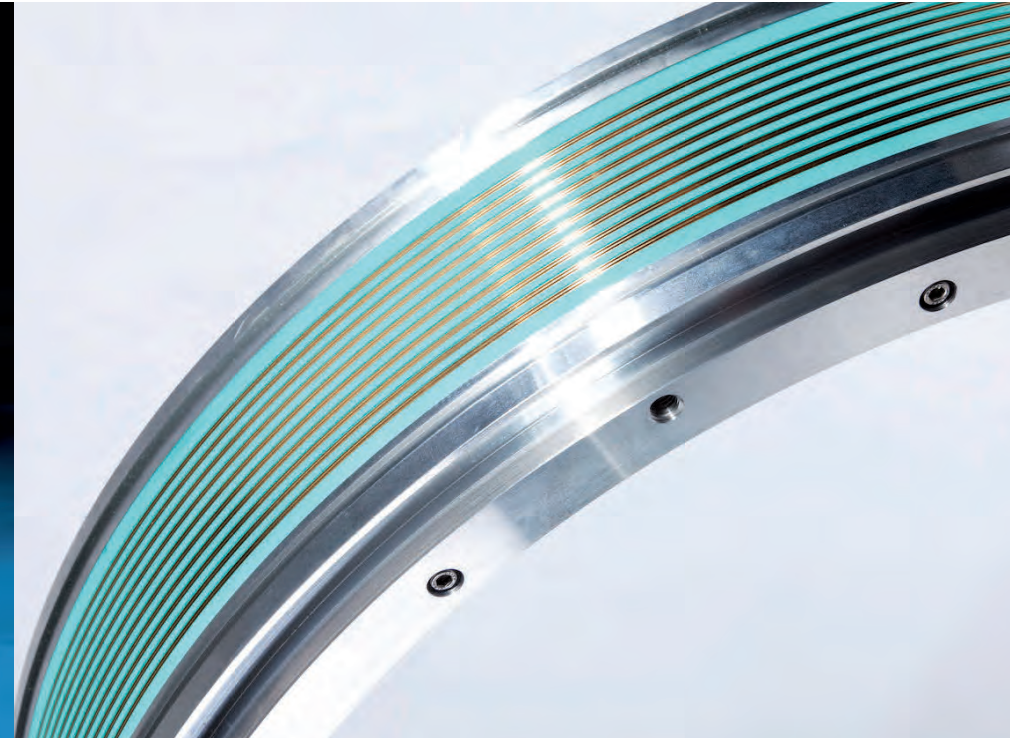
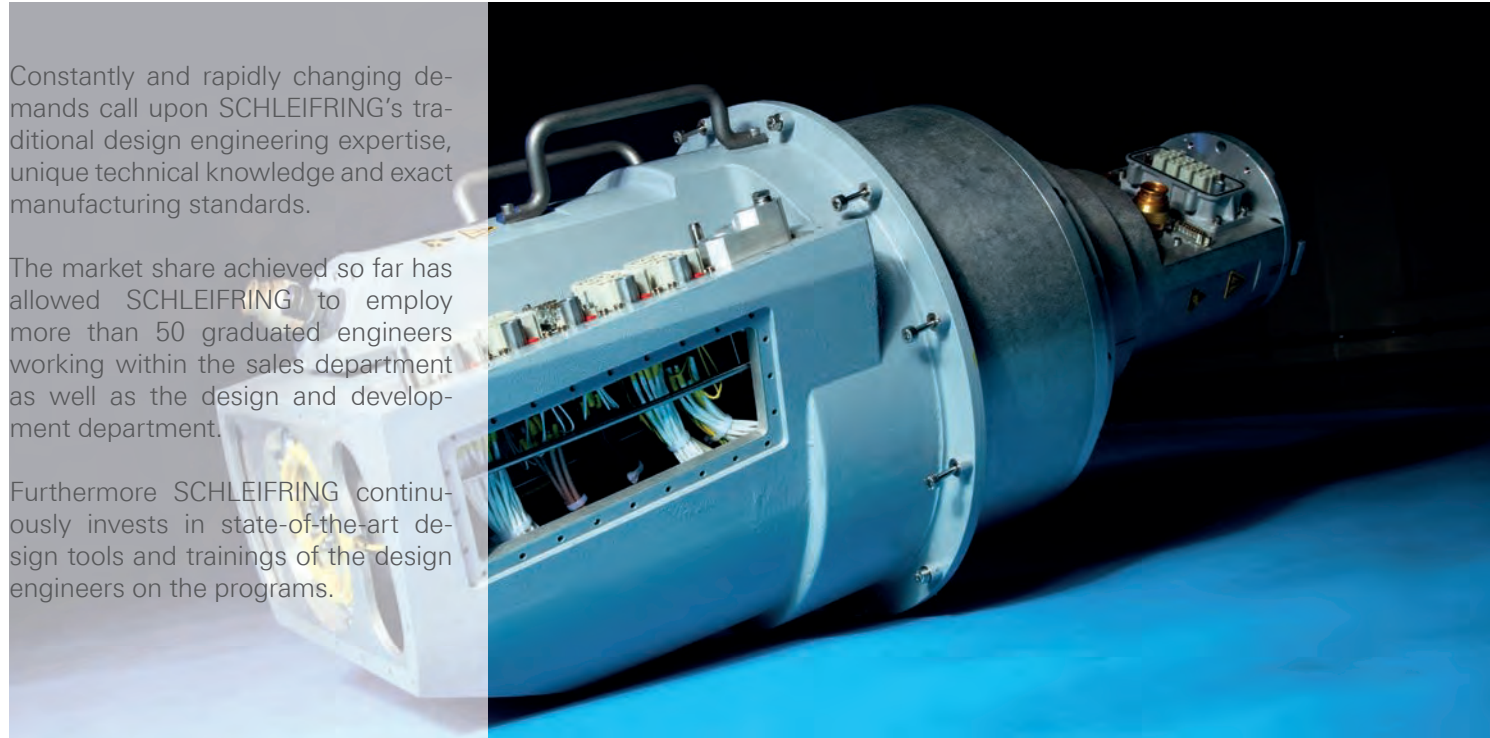
No matter whether our customer needs specific solutions for high pressures, high speeds or high flow rates – SCHLEIFRING provides the highest quality systems for optimum service lives.

Specific Housings

Constantly and rapidly changing demands call upon SCHLEIFRING's traditional design engineering expertise, unique technical knowledge and exact manufacturing standards.

The market share achieved so far has allowed SCHLEIFRING to employ more than 50 graduated engineers working within the sales department as well as the design and development department.

Furthermore SCHLEIFRING continuously invests in state-of-the-art design tools and trainings of the design engineers on the programs.



Cylindrical housings

- Aluminum, coated steel or stainless steel
- Material durability tested even in very aggressive environments

Specific Housings



Free inner bore

Specific applications require slip rings with a large free inner bore. SCHLEIFRING designs meet these high demands, offering free inner bores ranging from 6 mm up to 2,000 mm.

Compact design

Even at high rotational speeds resilient miniature slip rings are the ideal solution for signal transmission whenever space is tight and/or weight is a limiting factor. These slip rings require no maintenance during their nominal service life.

Customized Slip Rings | **Customized Service**



Our world wide service is made up of a team of highly qualified service engineers. Systematic support and maintenance by our experts solves potential problems before they arise.

We support our clients throughout the entire service life of the product right up to its disposal.

High quality standards, secured by our quality management system, deliver our customers with first class products.

Every employee is trained in due consideration of the SCHLEIFRING quality philosophy. The current state of DIN EN ISO 9001:2008 is continuously controlled and yearly inspected by TÜV Süd.

We support our clients throughout the entire operating life of the product right through to its disposal.



SCHLEIFRING

Life-Cycle Management

DEVELOPMENT SUPPORT

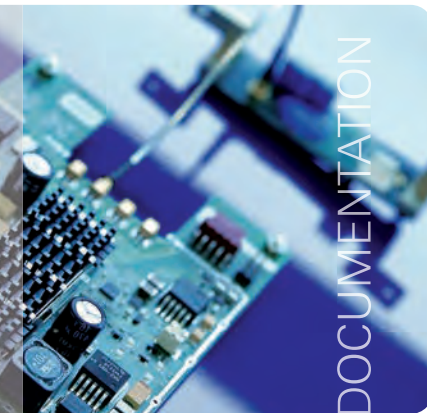


DEVELOPMENT SUPPORT

We offer our customers expert advice and services on all questions concerning products and development. In doing so, we can provide customized prototyping and product qualification.

DOCUMENTATION

We offer precise documentation of all important development steps, control of all documents and certificates, as well as manuals for installation and maintenance to guarantee trouble-free life time.



DOCUMENTATION

ON-SITE REPAIR



ON-SITE REPAIR

Of course, our service engineers have the necessary training for the job, having, for example, offshore certification to BOSIET, HUET and EBS, allowing them to reach remote sites by helicopter.

SPARE PART SUPPLY

Quality, delivery and cost efficiency drives our process in production as well as after-sales.



SPARE PART SUPPLY



LIFE CYCLE MANAGEMENT

PRODUCT RECYCLING



PRODUCT RECYCLING

SCHLEIFRING attaches great importance to the responsible use of natural resources, environmental protection and targeted environmental management as key prerequisites for sustainable development.

REPAIR & MODERNIZATION

Proficient technical support and maintenance over the entire service life ensure that your slip rings always run on state-of-the-art technology.

We constantly monitor all necessary processes and provide maintenance and support according to MIL-standards.



REPAIR & MODERNIZATION

Hybrid Units



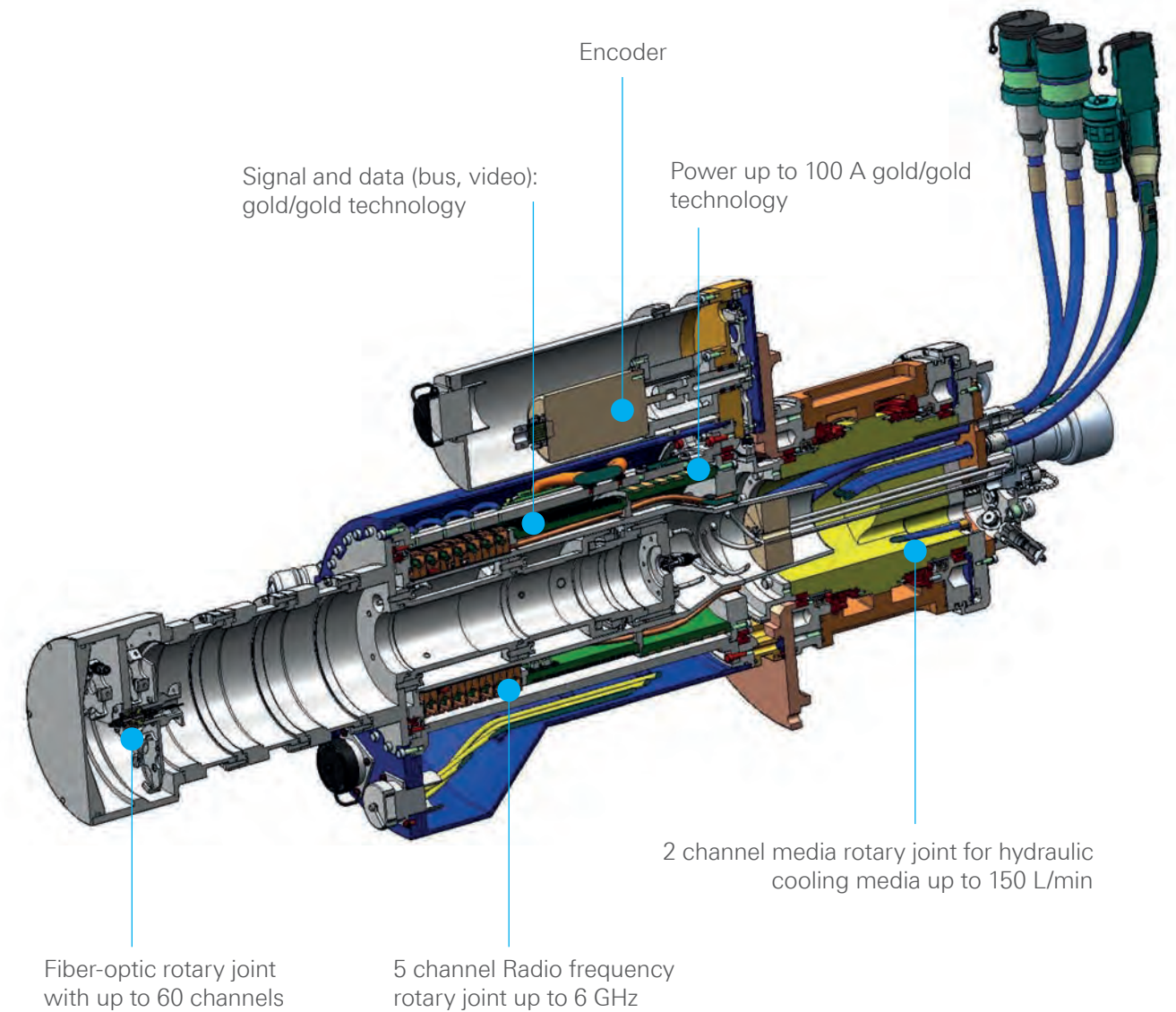
Slip ring systems combining a multitude of transmission technologies

Our products' range of applications covers standard designs for simple tasks up to highly complex customer-specific systems often involving several hundred rings. Hybrid slip ring units combine various transmission technologies to transmit electrical power, signals, bus data, RF signals and media in one system. Because of the great variety of demands made upon the slip ring assembly, it is imperative that the system designers give thought to the space available and performance expected early in the design stage.

The product shown contains gold/gold technology:

- Power up to 100 A gold/gold technology
- Signal and data (bus, video)
- 5 channel Radio frequency rotary joint up to 6 GHz
- Encoder
- Fiber-optic rotary joint with up to 60 channels
- 2 channel media rotary joint for hydraulic cooling media up to 150 L/min

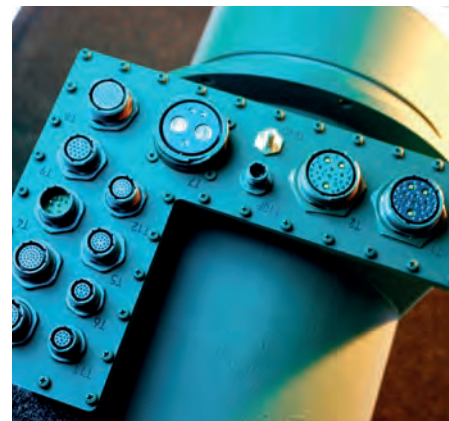
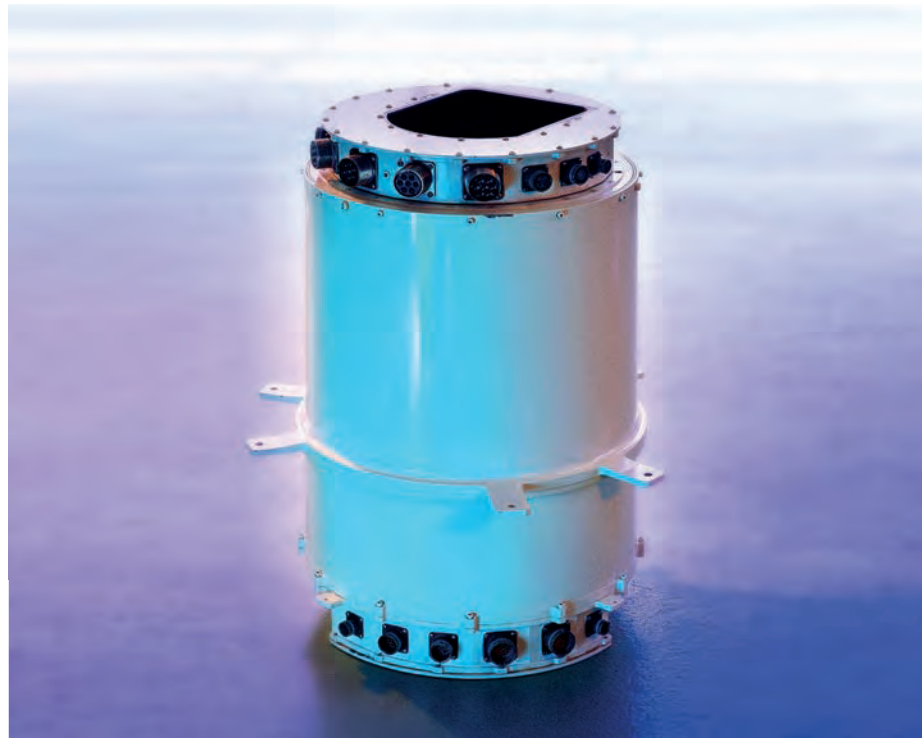
A cross section of this product is shown on the next page!



Airborne Radar | Navigation

The airborne sector requires an unparalleled level of precision and technical reliability. Rotating couplers for airborne application require demanding customized developments, application specific solutions and versatile, absolute reliable performance even under extreme temperatures, shock, vibration and radiation.

Radar slip rings are, in most instances, linked to a high frequency rotary joint. SCHLEIFRING provides a total system solution for radar systems and antenna manufacturers worldwide.



High Altitude | Observation

SCHLEIFRING's high-density capsule slip rings are found in a great number of applications throughout the world, ranging from missile gyro systems and seeker heads through to sensor platforms, UAVs and ROVs.

Designed as light as possible, these slip ring capsules supply power for de-icing, folding of the rotor blades and the navigation lights.

In addition, these slip rings are used for the critical function of pitch adjustment of the tail rotor blades and flight control.

Microwave signal and data transfer capabilities are standard on many designs.

The operating environment is severe which makes the choice of materials and techniques all-important.



Naval Radar | Periscopes



Today's latest generation naval reconnaissance and radar systems demand the most exacting performance and reliability.

Special care is taken to ensure they are vibration and salt spray resistant as well as watertight up to IP 66 for surface vessels and IP 68-x for submarines.

Operating under extreme EMI conditions such as highly complex hybrid radar systems employ a contacting slip ring for very high power, integrated with a 4-channel contactless rotary joint for the transmission of RF signals, 11-channel coax rotary joint for IF signals, water cooled RF wave guide and a media rotary joint for cooling fluid.



Naval Surveillance



With its cross-sector portfolio, technological leadership and worldwide presence SCHLEIFRING is excellently equipped to meet the requirements of tomorrow's naval forces.

For a close-in marine weapon system (CIWS), this surveillance slip ring allows for the transmission of a large number of signals and combines very high power with low level signals.

A bore through the center of a slip ring module enables shaft-mounting or offers routing space for ammunition transport.

Available with either gold or silver contacts, these units carry a variety of power and/or signal channels.

These channels are available from one to several hundred, depending on the complexity of the application.



Hybrid slip ring systems with integrated multi-channel fiber optic rotary joint and RF rotary joint transmit high power as well as high data rates and signals (Fast Ethernet data bus).

SCHLEIFRING's state-of-the-art high-tech products enhance the effectiveness of naval systems combined with modern fire control units.

Rigorous testing is performed by our specialists in our environmental testing facilities.

Land Based Radar Systems

SCHLEIFRING has been supplying slip ring units for radar applications since the early 1980s. With a history of worldwide contracts for civil and military radar systems, SCHLEIFRING brings capability and experience to your project.

Waveguide & coaxial slip rings are the most common combinations for high performance radar systems. Normally, slip ring modules for power supply, data transmission and high power channels combined with several low power channels are additionally integrated.

A split slip ring unit can be mounted onto a shaft in situ, by making it into two halves that can be clamped around the shaft on site. These systems are often used in situations when a large number of circuits meets limited length requirements.

Features:

- Integration of HF channels
- Integration of optical and RF rotary joints
- Integration of all bus systems
- EMI/ RMI shielding
- Low maintenance



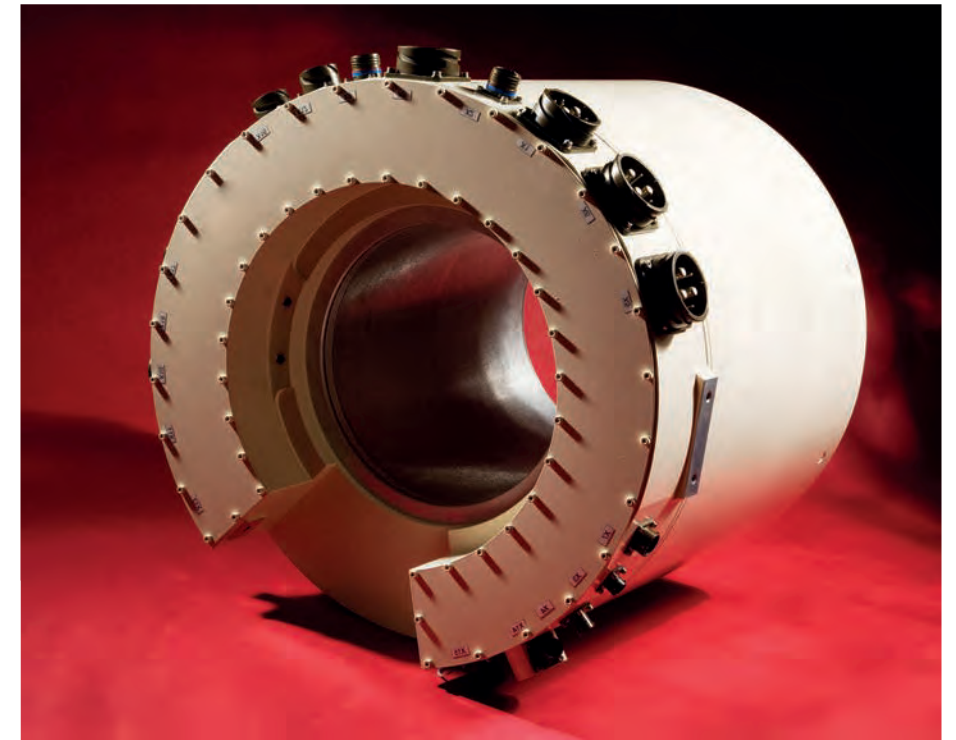
Vehicles

Packaged slip rings used in vehicle tank turrets pose a multitude of challenges. In each of these systems, slip rings have provided reliable signal and power coupling under the most rugged battlefield conditions. Hydraulically-actuated equipment in the turret may require the combination of conventional electrical slip rings with a hydraulic joint.

The introduction of an independently rotating commander station may require a slip ring large enough in diameter to encompass the station, yet very thin in cross-section, to minimize space requirements. For more than 40 years SCHLEIFRING has developed and produced quality slip rings for many demanding vehicular applications.

Highlights:

- Gold-on-gold contacts for signal and date integrity
- EMI shielding available
- High frequency coax channels
- Integration with resolvers, fiber optics, fluidic interfaces, hydraulics and pneumatics



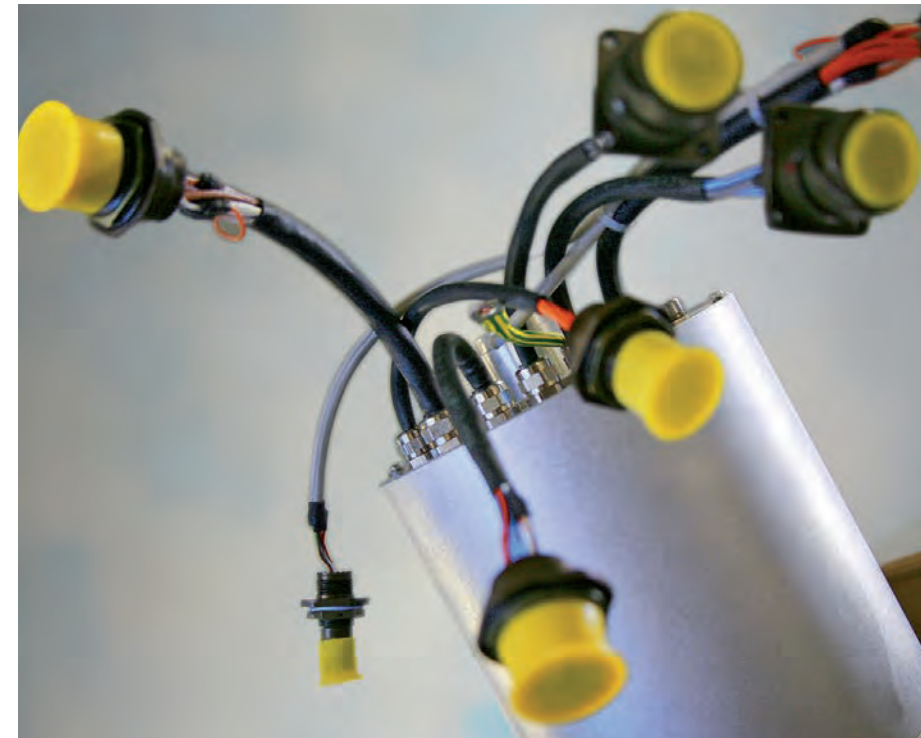
Turrets

Technological developments have yielded stabilized gun systems, laser target acquisition and fire control systems as well as high bandwidth data communication that create unique demands for vehicular slip rings. Combined field-proven slip ring designs with high-volume tooling techniques result in highly reliable units tough enough to meet the challenges of a wide variety of battlefields by low maintenance.

Signal requirements for vehicular slip ring capsules continue to be increasingly demanding. The circuit functions and electrical isolation requirements have a significant impact on the design of the slip ring capsule.



Remote Control Transmission



Slip ring assemblies for electrically driven, remote control provides steady continuity of communications, power and signal transmission throughout continuous 360 degrees of traverse. The power circuits conduct an average of 50 A of constant current between the chassis and the remote control. The signal circuits conduct a maximum of 7 A continuous current transmitting, e.g. signals of the arming system providing remote selection/arm capability at the gunner's station, weapon select and an armed indication provided to the gunner. The operation of the slip rings shall not introduce electrical noise or static into the communication system, which would impair intercommunication intelligibility.

The quality of the slip ring is a key determinant in the quality of the overall system. Designed for optimum size and weight when compact packaging is important, our slip ring systems integrated with an encoder for fire control and/or position indication provide high quality performance in critical defense applications.



Electro-Optic Systems

At the heart of these sophisticated systems all data, signals and power are passing through the slip ring unit. The circuit functions and electrical isolation requirements have a significant impact on the design of the slip ring.

Our engineering department tailors the slip ring for your application – also within the existing envelope of active designs.

360° surveillance, thermal imaging camera, laser rangefinder and CCD cameras

- Functional space and weight optimizing module and brush block designs
- High shock and vibration capabilities
- Multiple contact technologies suited for the application
- Wide operating temperature envelope -55° C , +85° C
- EMI shielding & Environmental sealing

Gold-on-gold contacts for signal and data integrity offer several advantages over conventional slip ring technology including multiple points of contact force per fiber and low contact wear rates. In addition, fiber brushes produce virtually no wear debris.



Winches

Special designs and production techniques are essential to give ultimate performance to slip ring solutions under the rigorous environmental conditions specified for sub-sea applications.

From cable reels for ROVs, Underwater Video Vehicles, Sub-Surface Telemetry Buoyancy units, sonar equipment, underwater winches as well as many other applications, SCHLEIFRING slip rings facilitate the transfer of electrical power and signals, data or bus systems between a stationary and a rotating platform.

The built-in quality extends the operating life of our products in underwater environments, which are aggressive by nature.



Design options:

- Integrated encoder and single-pass FORJ
- Stainless steel underwater connectors at both ends
- Immune stainless steel housing
- Water proof
- Pressure-compensated for underwater applications



www.schleifring.de | www.schleifring.com

Schleifring und Apparatebau GmbH

Am Hardtanger 10
82256 Füssenfeldbruck
Germany
Phone + 49 8141 403-0
Fax + 49 8141 403- 45
sales@schleifring.de

Schleifring Systems Ltd.

Abex Road
Newbury Berks, RG14 5EY
Great Britain
Phone + 44 1635 36363
Fax + 44 1635 38334
sales@schleifring.co.uk

Schleifring North America, LLC.

1420 Crispin Drive
Elgin Illinois 60123-5533
USA
Phone +1 847 429 9801
Fax +1 847 429 9802
sales@schleifringna.com