

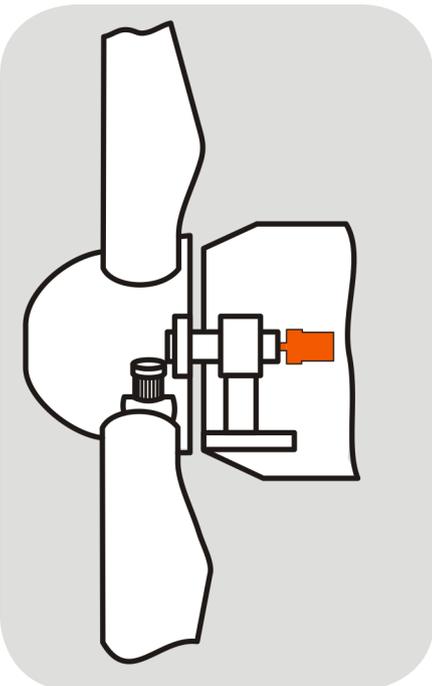
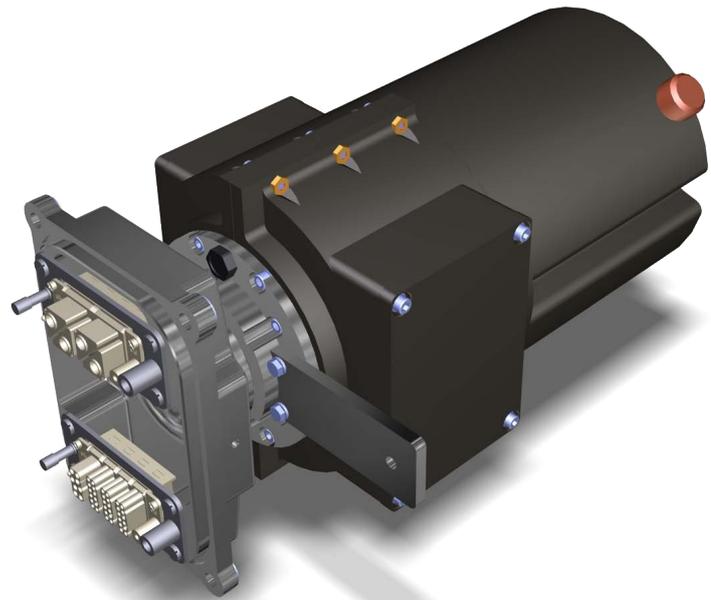
# SIGNAL TRANSFER SYSTEMS

## FOR WIND POWER GENERATORS

TECHNICAL GUIDE

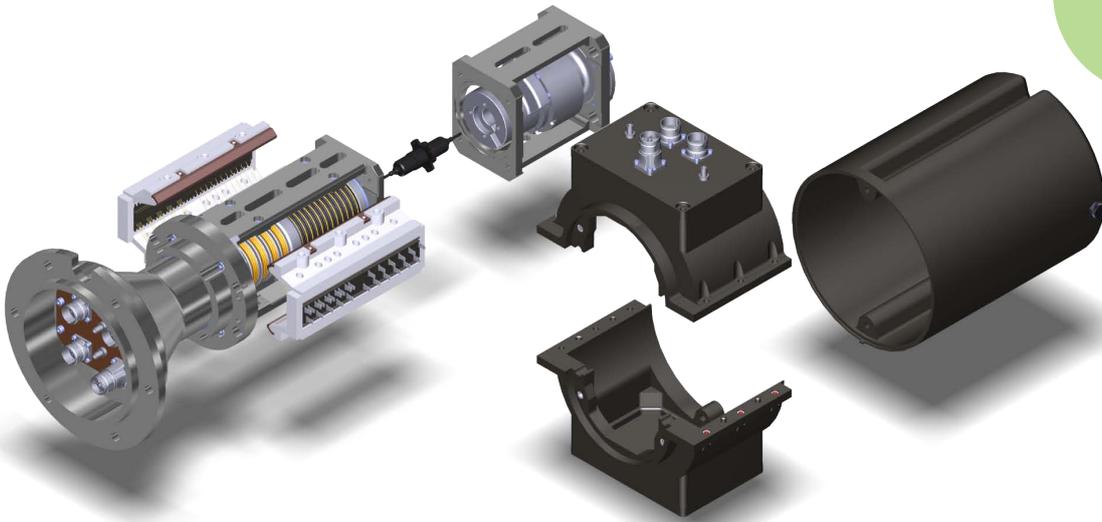


**MERSEN**



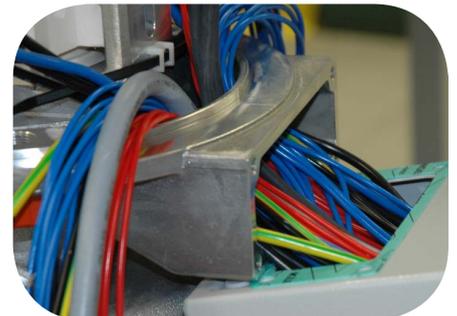
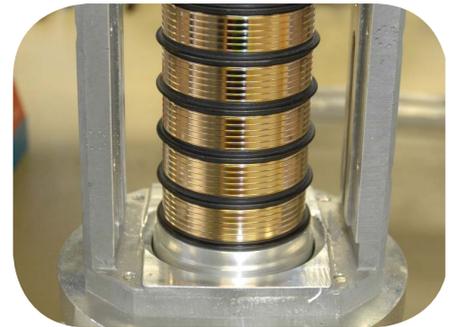
## Signal Transfer Systems: Electric Interface to the Nacelle.

Electric rotor blade positioning mechanisms, or so-called pitch systems, have become an essential component in modern wind energy generators. They help provide optimal output over the entire operating range of the converter. Signal transfer systems are employed to transmit currents and signals to the rotating part of the generator. At Mersen we have specialized in developing and producing slip ring assemblies and electric components for wind generators in close cooperation with our customers. Our engineering and manufacturing expertise, our relationships with our customers, and our creativity are the characteristics which have made Mersen a reliable and long-standing innovation and engineering partner in the wind power industry.



## Modular Set-Up for More Flexibility.

Mersen signal transfer systems are designed for specific operating conditions. With focus on the standard transmissions of different currents and signals, Mersen signal transfer systems can also be fine-tuned to seal with the individual demands placed on today's converters. The modules leave enough leeway for us to develop superior transmission concepts in partnership with our customers. Wire systems, precision bearings, robust housings, and state-of-the-art electronics are the components that make up a first-rate transmission system, i.e. the all-important interface for an efficient wind energy converter.

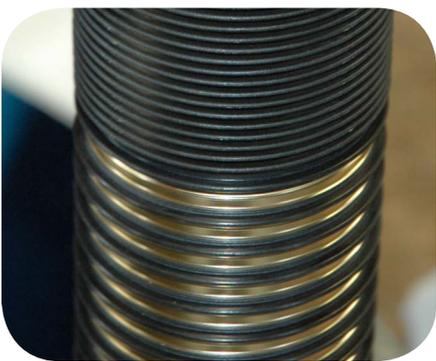


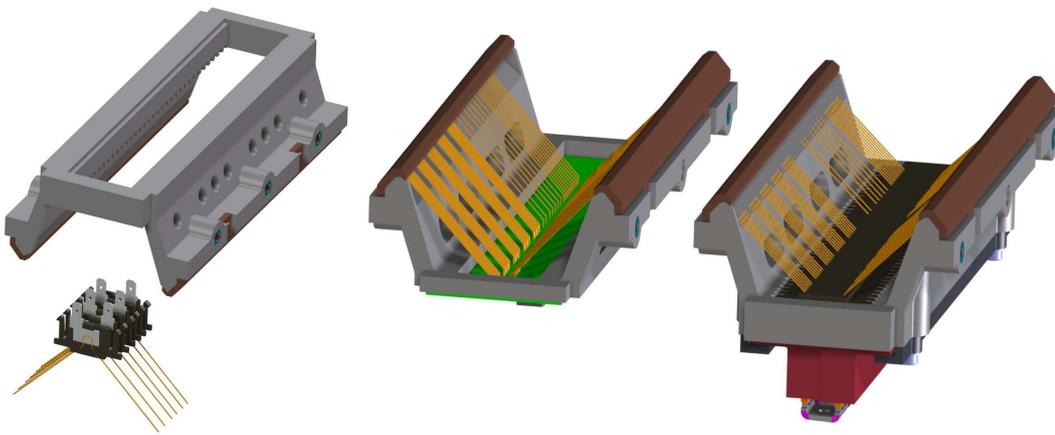


# Layouts Tailored to

## Slip Ring Segments

The core of our contact systems are the slip ring segments and the wire groups which they support. All of these ring segments have identical cross sections and diameters. The number of wires per slip ring segment determines the nominal current of that ring. All segments are separated from each other by insulating discs and can be arranged as needed. This flexibility allows us to integrate current, control, and bus signals into one single system. To transmit higher current loads we recommend employing carbon brush or hybrid systems.

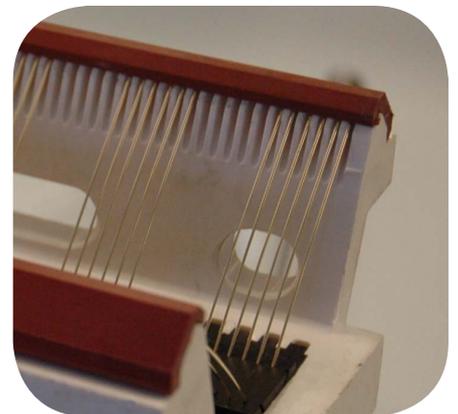
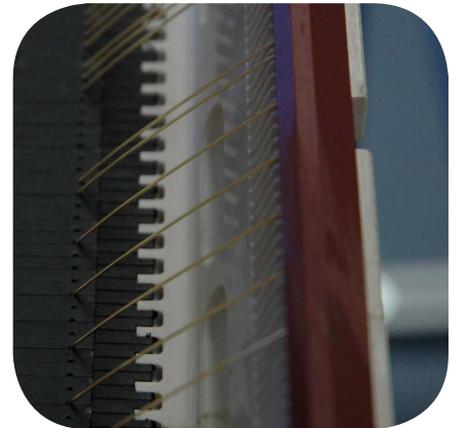


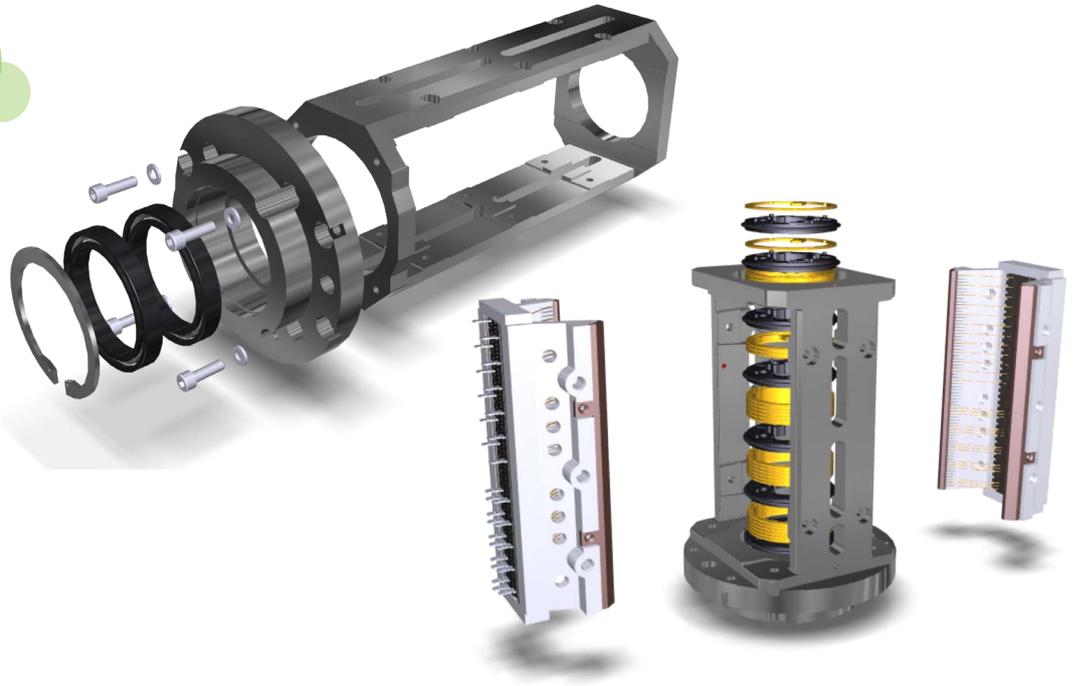


# to Your Needs.

## Wire Systems

The pressure of each and every wire is individually calibrated and guarantees constant and uninterrupted contact with the slip ring track. The number of tracks in a slip ring segment determines the number of supported wires. All wires are grouped together in individual retainers which are mounted on both sides of the slip rings. Consequently, the slip rings can be accessed for maintenance in no time at all.

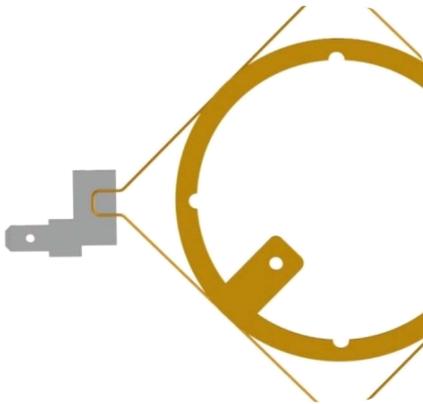




# Materials for Uninterrupted Contact.

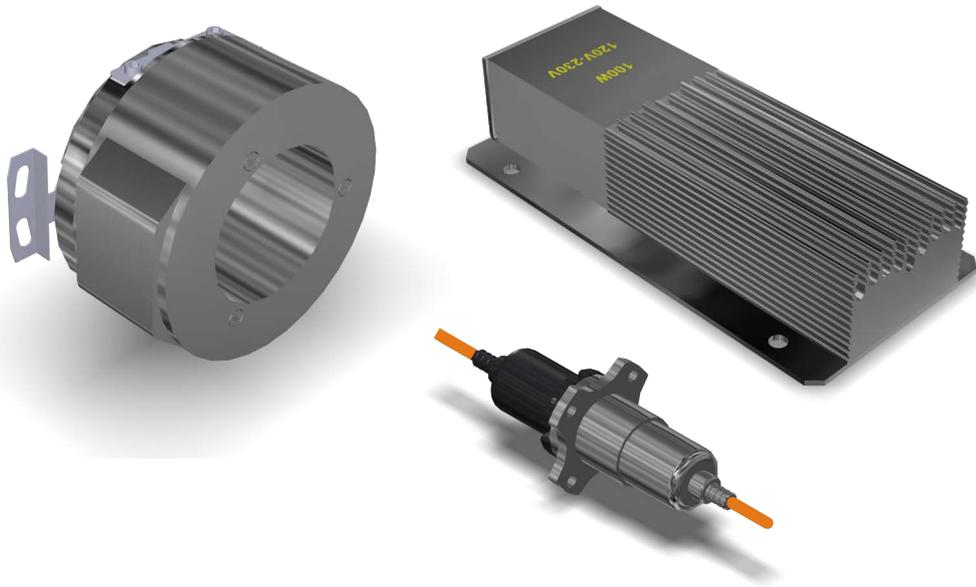
## Contact Properties

Various contact materials are available for power, control, bus, or Ethernet currents. In very demanding applications, for example, we use gold-plated contact elements. This contact material guarantees uninterrupted current and signal transmission, is characterized by very little dynamic transfer resistance, and is less susceptible to wear.



### Tribology

Tribology is the science and engineering of interacting surfaces in relative motion. It includes the study and application of friction and wear, including lubrication.



# A Perfect System - With Perfect Options.

## Temperature and Transmission Components



### Space Heaters

For constant and optimal temperature within the housing to prevent the formation of condensation.



### Temperature Sensors

For measuring temperatures within the housing.



### Fiber Optic Rotary Joints

For signal and data transfer starting at 1 Gbit/s.



### Angle Encoder, Resolvers, or Incremental Encoders

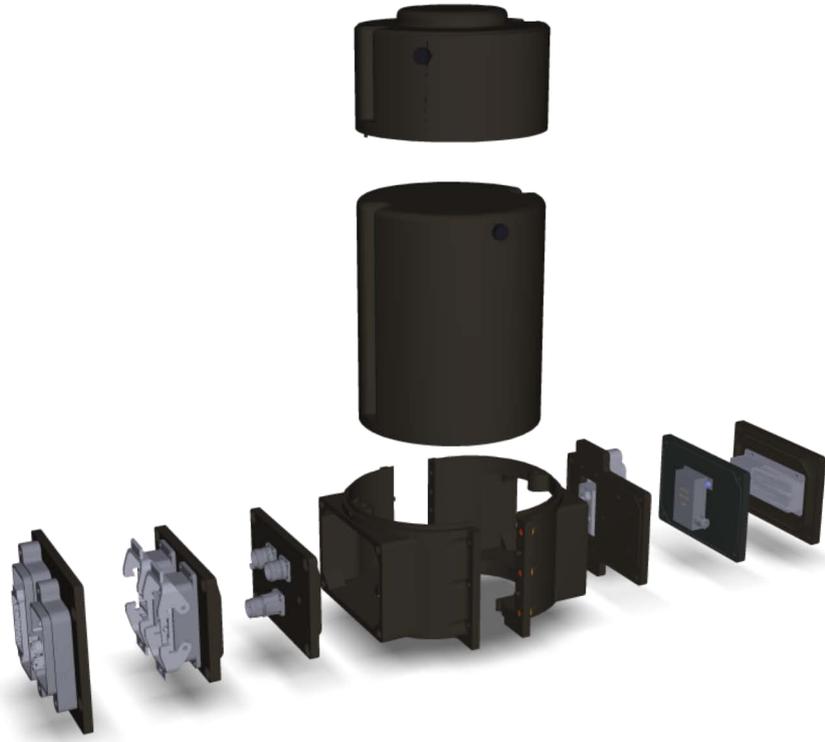
For measuring angle changes.



### Transmission Cables

For pneumatic or hydraulic rotary joints.





# Compact Versatility in

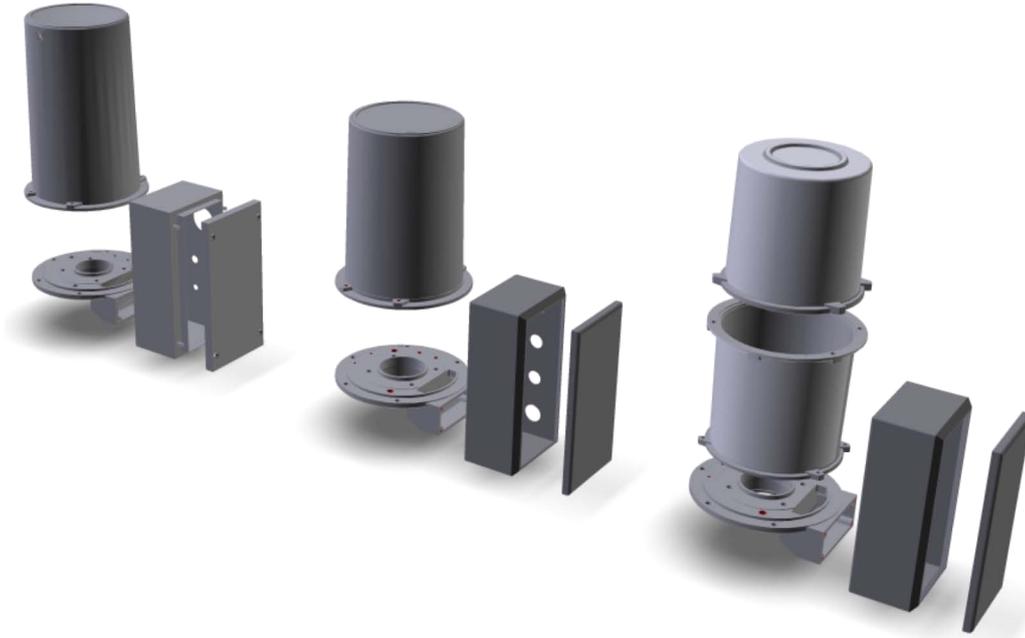
## Thermoset Plastic Housings

Our polymer housing design is unique in the market. The construction allows customer-tailored adaptations without changing the base form. This very compact design is especially practical in wind energy converters with limited installation space. You can also choose plug connectors which allow easy mounting and dismantling even in confined spaces. As an option the system can be equipped with pre-assembled cables of different lengths.

### Polymer Housing Characteristics

- Completely insulated polymer housing to VDE 0100
- Highest quality and longest life (even in aggressive environments)
- Can be equipped with different plug, rotating, and screw connections
- Damaged components can be easily replaced





# Any Environment.

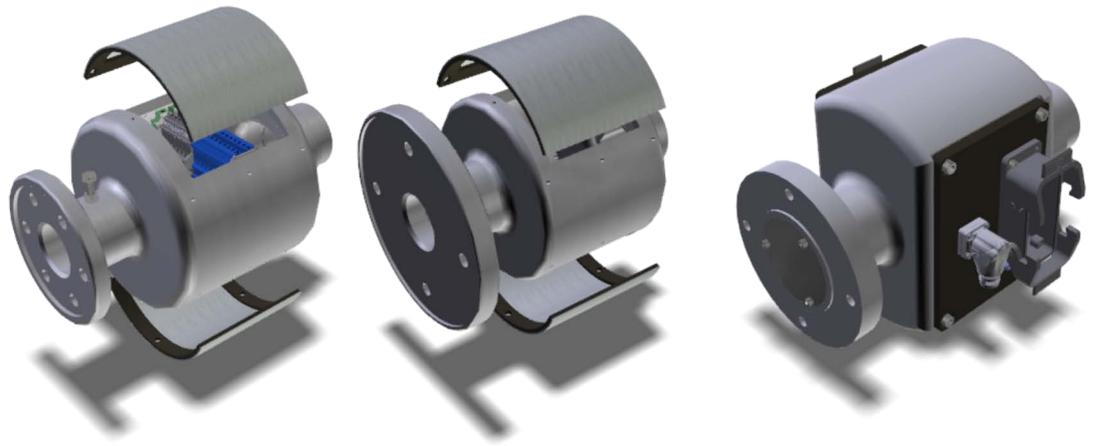
## Cast Aluminum Housings

High current loads in combination with high data flow require high volume. Our cast aluminum housings are available in any customer-specific size. The cables are easily accessed by opening the quick-release fastener of the terminal box and undoing the 5 set-screws.

### Cast Aluminum Housing Characteristics

- Housing can be opened and closed quickly
- Contact system is easily accessed
- Cast aluminum body is warp-free
- Housing is highly corrosion and salt-water resistant

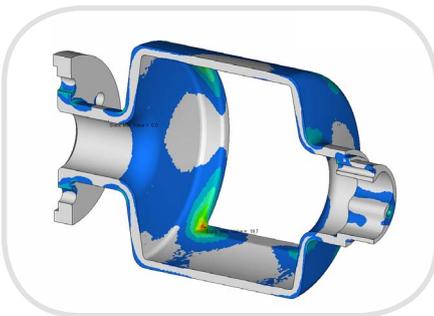


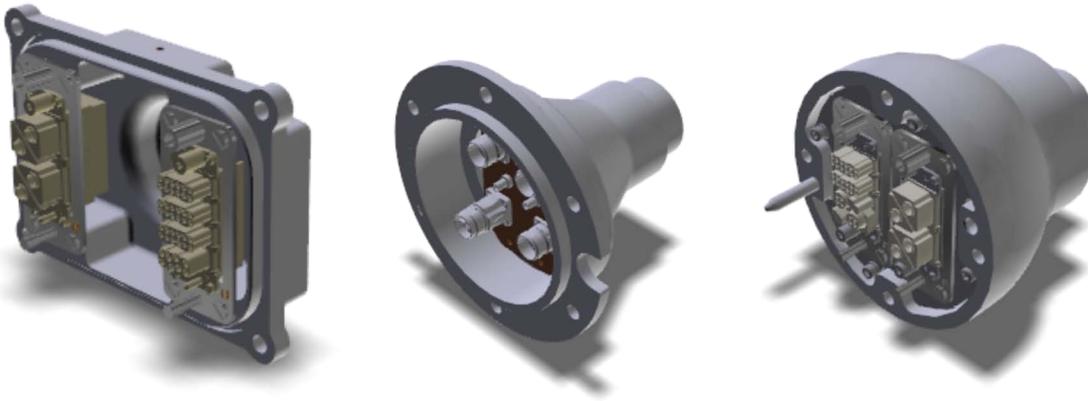


# Easy Replacement Me

## Adapter Couplings

Mersen adapter couplings can be used to mount slip ring assemblies without any special preparation. The transmitters can either be flange-mounted using simple screws or connected with the help of a clamping ring. After removing the metal covers the cables can be connected directly from the control box of the pitch motors to the easily accessible terminals.



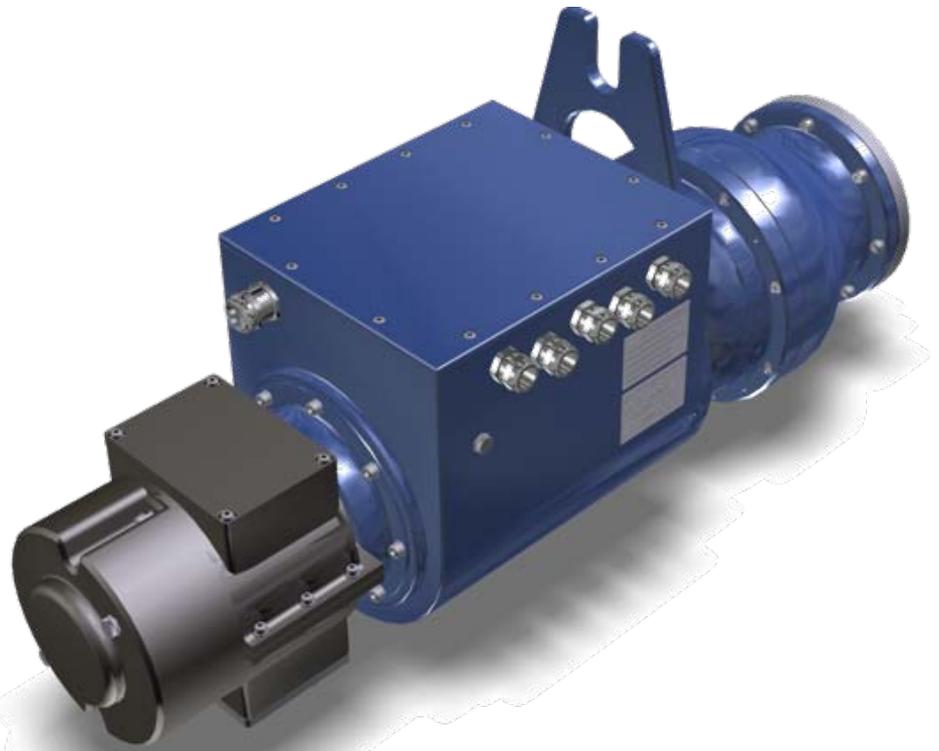


# Means Less Downtime.

## Plug Couplings

Plug couplings help simplify the replacement of slip ring transmitters and reduce overall downtime. During service the slip ring body can be easily exchanged without interfering with the pitch system and without having to remove the connecting cables. In addition to the electric interface, the plug couplings are equipped with integrated thermal barriers which protect against a rise in transmission temperatures.





# Special Designs and On

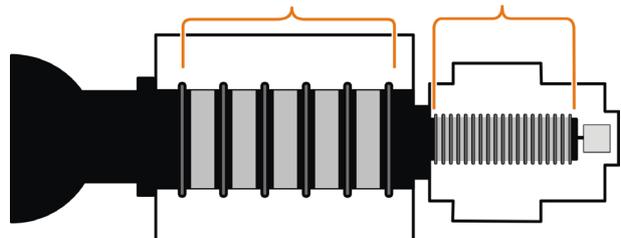
## Carbon Brushes and Hybrid Systems

Increasingly powerful wind energy converters and pitch systems require higher nominal currents. Current transfer exceeding 100A is possible with the help of carbon brushes. By adding a wire system the entire unit is turned into a hybrid transfer system.



### Hybrid System Set-Up

Carbon Brush System Wire System

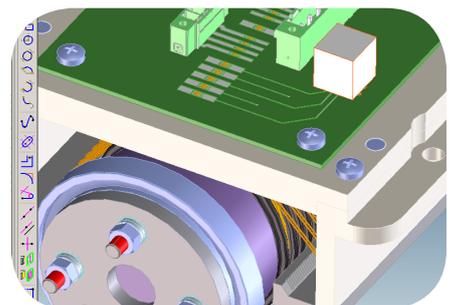




# Ongoing Developments.

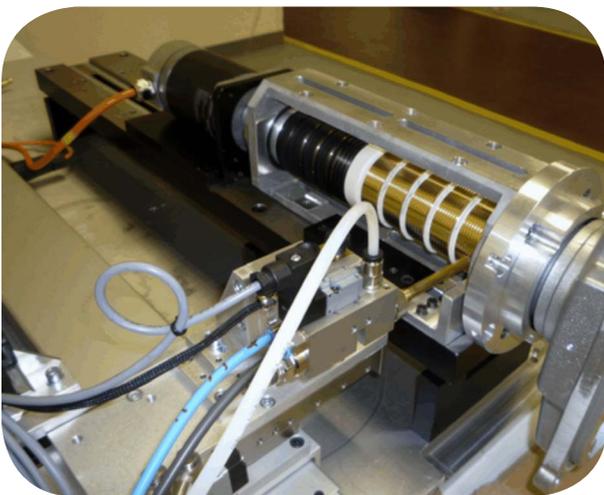
## Improvements Made to Order

From the initial idea to the final implementation - we support our customers with modern R&D methods and extensive production knowledge. Our prototype department is quick to react. Test samples can be provided in no time at all, and functionality, durability, and performance can be tested and optimized on test benches, test beds, and under real-life conditions. Our material development department can help select the materials most suitable for your application. We also concentrate on developing innovative surface coatings for higher life expectancy and reduced friction.



# Precision Manufacturing

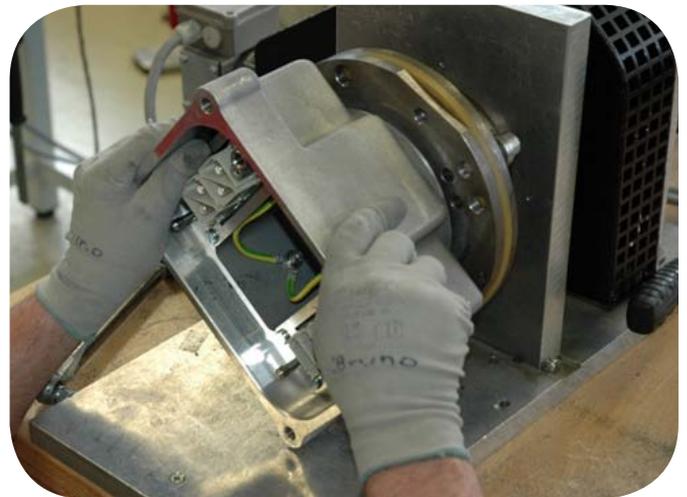
Skilled employees and state-of-the-art equipment guarantee our high quality products. All critical steps are performed in-house and the customer benefits from an outstanding cost-performance ratio.



# and Quality Standards.

## Mechanical, Electrical, and Optical Testing:

- Temperature tests
- IP protection inspections
- Wiring inspections
- Dielectric strength
- Transfer resistance
- Alignment and concentricity
- Wire pressure measurements
- Spacing measurements
- Surface inspections
- Automatic lubrication





# Success Through Optim

## On-site Wind Power Specialists

In order to support wind farm operators, Mersen created the Windtracker™ Team. The Windtrackers, dedicated wind engineers and technicians, bring you “up tower” services, diagnostics capabilities, specific technical support and training, allowing you to optimize your wind turbine performance. They are supported by a large network of specialists on the 5 continents, allowing us to respond to the needs of customers, wherever they are located.



### Our technical benefits in the field include:

- Dedicated engineers and technicians
- Expertise and diagnosis on site (on and offshore)
- All Windtracker™ members are certified in “tower safety training”
- Preventative maintenance and servicing (to prevent downtime)
- Component design and reconstruction
- Technical solutions for electrical rotating machine parts and anti-corrosion equipment, etc.

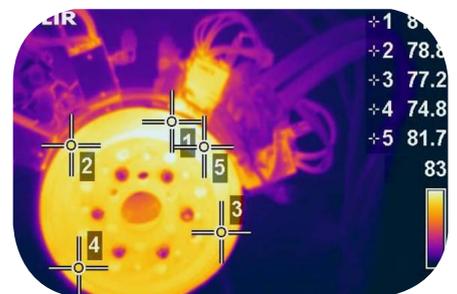
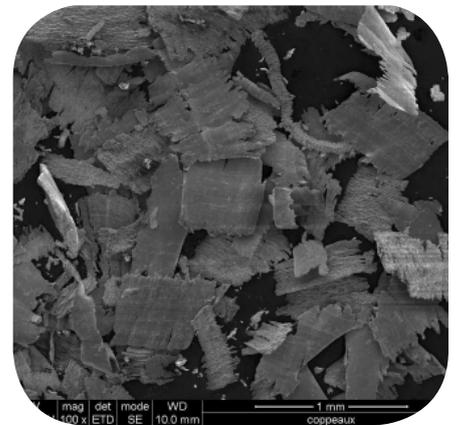
# ization and Development.

## Experts Around the Globe

Mersen cooperates with universities and colleges worldwide. We maintain highly specialized laboratories to drive the development of our contact systems even further and to support our customers in their efforts to come up with new innovative systems.

### Specialized Facilities and Labs

- International teams
- Labs for chemical and material analyses
- Electro-technical testing facilities
- Numerical and physical simulations





## Technical Summary

### Signal Transfer System

Currents of up to 100A (and higher with our hybrid system)

Voltages up to 680V

Data transfer: protocol, CAN, Ethernet, Profibus, etc.

Materials: non-ferrous alloys, precious metals, cables, etc.

Different plug connections available

Compliance with international standards: DIN, IEC,

UL, CCC, etc.

Onshore and offshore operation

Temperature range: -45°C to +60°C



Mersen provides a wide range of high performance solutions for electrical rotating machines: carbon brushes, brush-holders, slip ring assemblies, brush gears and current collection products.

Mersen is a global Expert in materials and solutions for extreme environments as well as in the safety and reliability of electrical equipment.

#### Our markets:

- **Energy:** ● Wind ● Hydroelectric ● Photovoltaic ● Nuclear Power ● Conventional Thermal Power ● Oil & Gas ● Mining
- **Transportation:** ● Railways ● Aerospace & Aeronautics ● Ports & Marine ● Electrical Vehicles
- **Chemicals & Pharmaceuticals:** ● Organic Chemicals ● Inorganic Chemicals ● Fine Chemicals & Pharmaceuticals
- **Electronics:** ● Polysilicon ● Power Electronics ● Semiconductors ● Compound Semiconductors ● Optical Fiber Production
- **Process Industries:** ● Metallurgy ● Mining ● Oil & Gas ● Cement ● Pulp & Paper ● Rubber & Plastic ● Wire & Wastewater Treatment ● Assembly Manufacturing ● Mould Industry ● Glass Industry ● Sintering ● Furnace Industry
- **Other Markets:** ● Commercial ● Residential ● Data Communication ● Elevators ● Forklifts





## A GLOBAL PLAYER

Global expert in materials and solutions for extreme environments as well as in the safety and reliability of electrical equipment, Mersen designs innovative solutions to address its clients' specific

needs to enable them to optimize their manufacturing process in sectors such as energy, transportation, electronics, chemical, pharmaceutical and process industries.

[www.mersen.com](http://www.mersen.com)