



SCHLEIFRING



customized slip ring solutions
: **WIND ENERGY**

- compact ▶
- classic ▶
- custom ▶
- hybrid ▶
- making of ▶

Wind turbines operate continuously in harsh environments – often in remote locations where maintenance and monitoring are difficult and costly.

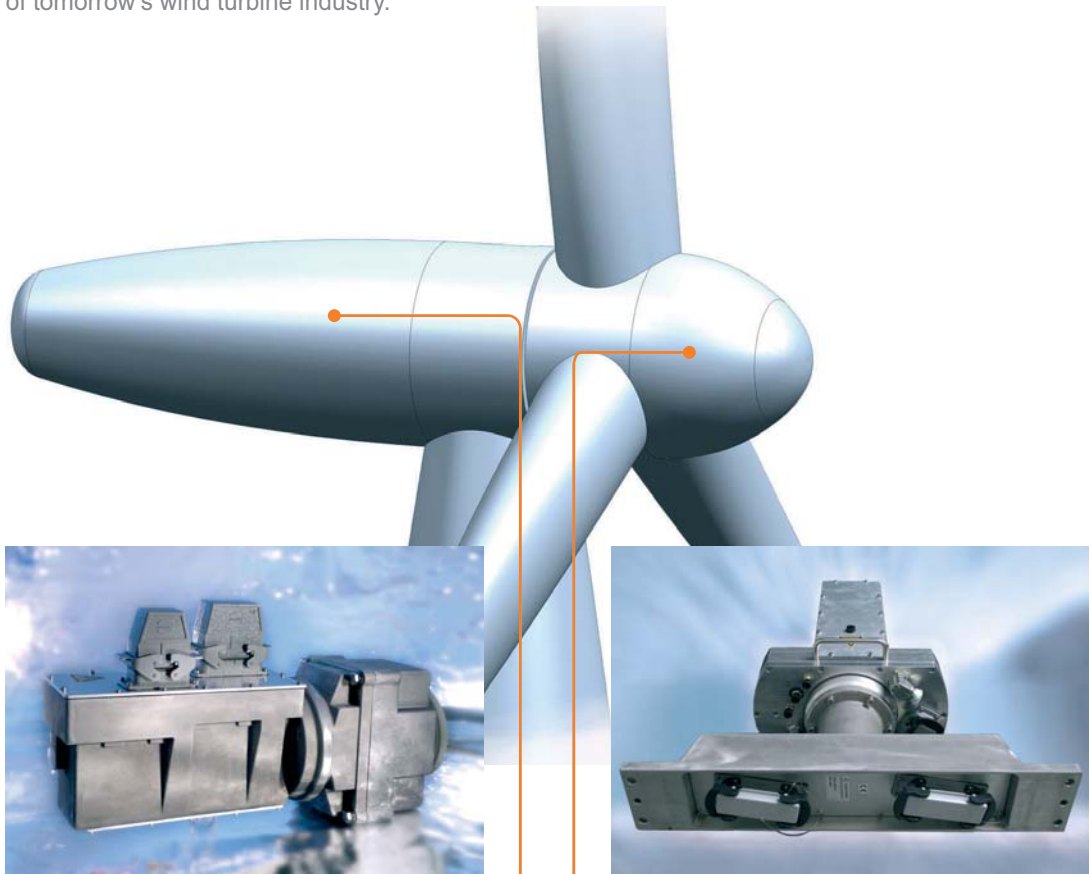
Develop approaches to identify client needs

Today's large wind turbines are almost solely pitch controlled. Obviously the quality of the slip ring is a key determinant in the quality of the overall system. Wind turbine application slip rings used in hydraulic or electrical pitch drive systems, from 0.70 MW through to 6 MW, pose a multitude of challenges. Onshore and offshore slip rings have to provide reliable power, signal and data coupling under the most rugged environmental conditions.

SCHLEIFRING's combines field-proven slip ring designs, from specific small batch series and standard solutions through to large scale production with several thousand units, with high-volume tooling techniques resulting in highly reliable low maintenance units tough enough to meet these challenges.

Although predominantly wind turbine slip rings utilizing precious metal sliding contact technology, SCHLEIFRING developed non-contacting capacitive and optical transmission principles as well as hybrid systems combining various transmission technologies in one unit.

SCHLEIFRING – with its cross-sector portfolio, technological leadership and worldwide presence – is better-positioned than any other company to provide the solutions needed to meet the requirements of tomorrow's wind turbine industry.



Slip ring design for **nacelle** installation

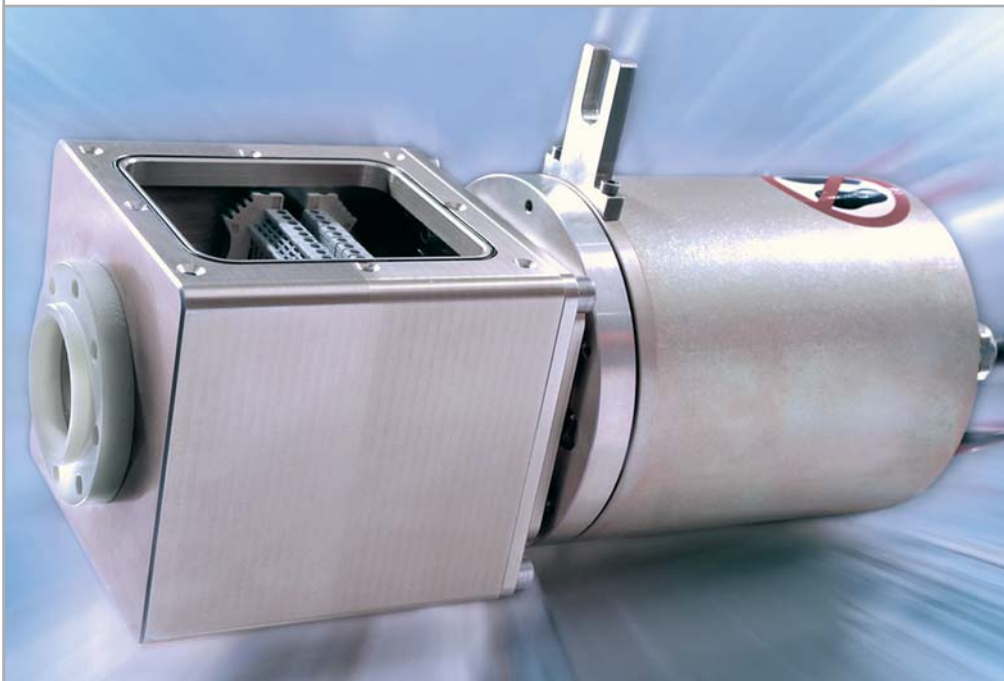
Slip ring design for **hub** installation

compact
classic
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making of



Low power + data / compact designs

Electrical or hydraulic pitch drive slip ring systems designed for low power requirements.



Proven gold wire technology allows a compact design for low current up to 30 A and a maximum of 20 transmission paths.

Compact, versatile designs with different connection elements (junction box, cable and connector, connectors or pigtails) can be engineered according to customer specification.

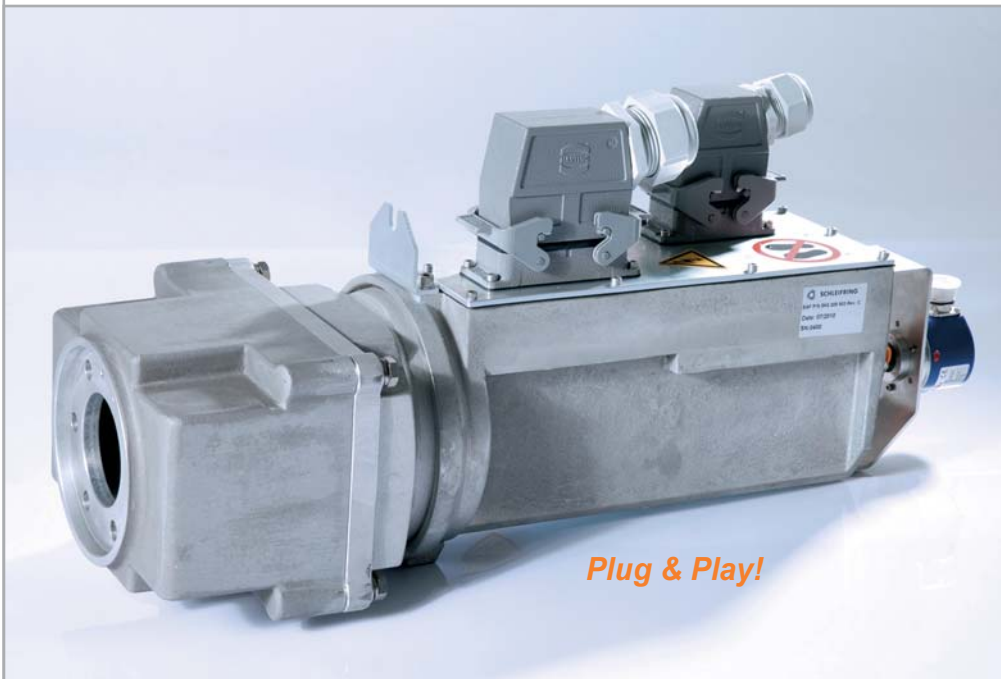


Options

- Absolute or incremental encoder
- Heating elements for low temperature environment
- Customized coating

High power 80 A + data / classic designs

Slip ring system for wind turbines designed for electrical pitch drive up to 80 A + supply power + data.



The versatile Classic Design in gold wire technology

Modular architecture and robust mechanical design in aluminum encasement offer easy adaption for a wide range of demanding applications. Standard connectors and flange allow quick installation.

Classic Design slip rings in the performance category 0.7 MW – 3.0 MW have been chosen to operate on numerous wind turbines around the globe.

Accessories and Options

- Customized torque arm/ support
- Heating elements for cold climate version
- Coating for offshore usage



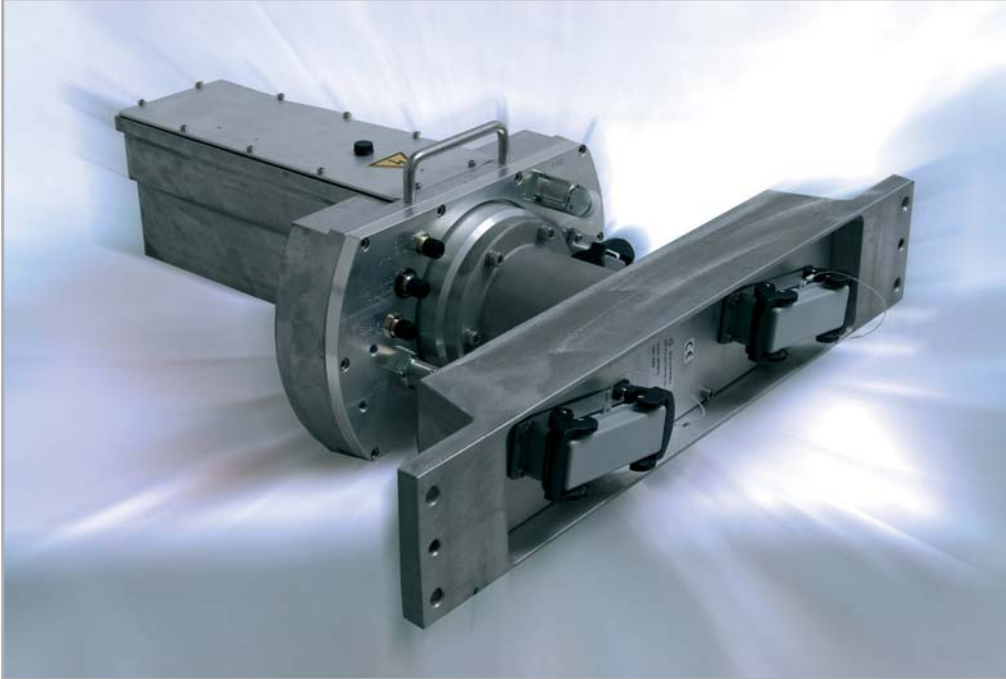
- Absolute or incremental encoder



- Customized electrical wiring

High power 80 A + data / custom designs

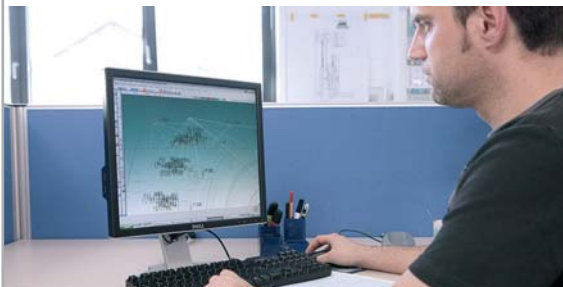
Wind turbine slip ring systems designed for specific demands.



Custom Designs in gold wire technology

Our team of engineers has focused its total resources toward one goal: tailor a slip ring for your application, often within the field-proven existing design envelope, to provide you with the best product possible.

Custom designs comprise for instance specific mechanical interfaces and connectors or integrated encoder systems as well as accessories such as surge voltage protection.



Hybrid Designs for multi MW turbines

Slip ring systems in hybrid design for MW wind turbines - Onshore/ Offshore -
for electrical pitch >80 A + supply power + data



In many instances SCHLEIFRING is called upon to incorporate various transmission technologies such as contacting slip ring for power and signal transmission, non-contacting rotary joint for data transmission and positioning systems into one slip ring assembly: highly reliable low maintenance hybrid systems built to withstand strong vibrations and harsh environments.

Possible combination of transmission principles:

- Carbon brush/ brass - gold wire technology
- Carbon brush/ brass - optical (data transmission)
- Carbon brush/ brass - EtherCAP® (contactless data transmission)
- Gold wire technology - EtherCAP® (contactless data transmission)
- Gold wire technology - optical (data transmission)



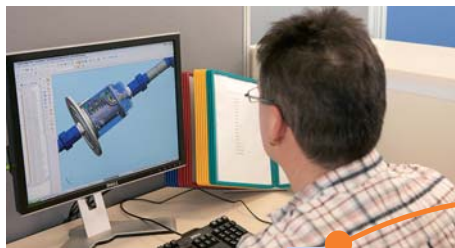
Completely non-contacting transmission of data and power

Upon request SCHLEIFRING exclusively offers non-contacting transmission technologies for high data rate transmission, including all common bus systems up to Gigabit Ethernet and EtherCAT as well as highly efficient non-contacting power transmission. Theoretically, there is no limit to the amount of power that can be transferred.

Advantages of non-contacting technologies are: wear-resistance, high noise immunity combined with excellent EMC performance, high reliability and bit error rates of $<10^{-13}$.

Making of cutting edge slip ring technology

Working closely with the customer as part of the project team ensures the final product meets the complex requirements of the specification.



Professional 3D design engineering



Highly precise machining & manufacturing



Global service & maintenance by skilled and experienced engineers



Assembly lines for prototypes and series production



Packaging & forwarding worldwide acc. to customers demand



100% quality inspection with automated test procedures

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