Taking Wind Energy to New Heights

Innovative carbon solutions for onshore and offshore use
Schunk is a worldwide leader in the development, production and application of carbon and ceramic solutions. Like no other company, Schunk combines innovation and technological expertise with exceptional service orientation into a service portfolio that is unique on the market.

Schunk is a partner who offers you all the technological possibilities of a globally operating company and pragmatically puts your ideas into practice. And always precisely tailored to meet your requirements—for industrial volume markets as well as for highly specialized niche markets. Our technology portfolio, including mechanical carbon, electrical carbon, high temperature applications and technical ceramics, offers you perfect solutions for a diversity of industrial applications.

The Schunk Group
Empowering, idea-driven, collaborative – this is how the Schunk Group has made a name for itself as a global technology group since 1913. Empowering, because we build bridges for our customers to enable them to use innovative technologies to develop better products and conquer new markets. Idea-driven, because innovations are an essential part of our corporate culture. Collaborative, because customer orientation is practiced on a daily basis by each and every Schunk Group employee.

With around 9,100 employees in 29 countries, it is on this basis that the Schunk Group develops tailored high-tech products and systems in a wide variety of areas: We are active in carbon technology and ceramics, environmental simulation and air conditioning technology, sintered metal, ultrasonic welding and optical machines. And this is the case for many key industries: from automotive, train, aircraft and ship technology to solar and wind energy through to medical and electrical engineering as well as in the semiconductor industry.
Know-how is the Driving Force

Schunk is one of the most advanced technology providers in the field of current transmission. Our no-compromise commitment to quality management and our highly efficient development and manufacturing processes are the common denominators behind high performance, economic efficiency, and reliability.

We have been producing cutting-edge products in the fields of actuators and contacting for more than 100 years. Our carbon-based materials provide the perfect technological foundation for high-efficiency current transmission solutions, even under the most extreme conditions. Our carbon brushes, contact strips, grounding systems, mounting systems, conductor lines as well as other products keep millions of electric motors, industrial, and railway applications running around the world. Our development efforts focus on ensuring a high degree of robustness, functional safety, and cost efficiency during operation.

In the wind industry, our optimal current transmission solutions ensure that everything runs smoothly. Anytime, anywhere. Thanks to our unique expertise of materials, we can develop tailor-made solutions in very short order and cover the entire breadth of customer-specific requirements, both for offshore and onshore installations as well as high-altitude plants.

Tailwind for Efficiency and Profitability

As a long-standing development partner of the wind power industry, we are setting technological benchmarks worldwide. Our carbon brushes and brush holder systems for generators and pitch installations, our reliable lightning protection and grounding systems as well as our newly developed solutions for low-noise and abrasion-resistant azimuth brake pads, help manufacturers and constructors of installations and generators achieve their goals.

Modern wind power plants are highly efficient power generators in terms of output and efficiency. In order to continuously optimize energy yield and profitability, energy losses and maintenance efforts must be minimized, the reliability of systems increased, and new locations in urban areas as well as under difficult climatic conditions need to be developed. Schunk offers customer-specific solutions to satisfy all of these requirements today. We also plan for tomorrow: Our experts monitor industry trends very carefully and derive development processes from this. For example, for the new performance classes up to 8 megawatt or to comply with more stringent noise emission regulations.
The generator is the core element of every wind power installation. You have to be able to absolutely rely on the quality, performance and reliability of the components used. Our carbon-based solutions provide efficient current transmission and the safe dissipation of interfering currents.

**CURRENT TRANSMISSION**

**Higher Performance with Outstanding Reliability**

The materials of our carbon brushes are adapted precisely to the on-site conditions. This perfects the transmission of power, guarantees a high thermal and electrical load capacity as well as low-wear operating behavior and long maintenance intervals.

**Carbon brushes**

for the most demanding requirements

**Grounding brushes**

for reliable protection

High-frequency interference currents can severely damage transmission components and bearings. Our grounding brushes reliably conduct capacitive currents away from the shaft, thus minimizing repair costs and downtime of the wind turbine.

**Grounding brush holders**

for exact orientation

These brush holders are the perfect supplement for our grounding brushes. They are custom designed for the grounding brushes you require, always position these correctly, and allow for capacitive interference currents to be reliably deflected even under extreme conditions.

**Slip rings**

for smooth operation

Perfectly matched materials set standards in terms of reliability and efficiency, even under the toughest conditions. Our slip rings are used up to an electrical output of 6 MW, for amperages of up to 2,500 A and speeds of up to 3,000 rpm.

**Brush rockers**

for minimal effort

Our brush rockers form a perfect unit with our slip rings and can be individually matched to your generator type. Whether fully or partially assembled, our brush rockers reduce your installation effort significantly.

**Brush holders**

for perfect positioning

Schunk brush holders ensure exact positioning of the carbon brush on the slip ring at all times and thus make the transmission of power highly efficient. The integrated wear indicator also ensures increased efficiency in terms of maintenance and replacement.
Maximizing Safety and Energy Yield

Wind turbines are often subjected to extreme weather conditions. Storms and lightning strikes can inflict heavy damage on your installations. Our technologically advanced components provide adequate protection under such conditions. Under normal weather conditions, they ensure that your installations deliver maximum yield through precisely pitched rotor blades.

- **Carbon brushes**
  - customer-specific, efficient, and reliable
  - In pitch systems, our carbon brushes impress with excellent data transmission properties, high resistance to wear, and high efficiency. Perfectly matched materials in accordance with the desired output and climatic conditions ensure a high degree of operational safety.

- **Grounding rollers**
  - abrasion-free, flexible, and proven
  - The grounding roller we have developed is a tried and tested alternative to our grounding brushes. The system can be used both as lightning protection and as shaft grounding and is particularly useful when abrasive dust is to be avoided.

- **Lightning protection systems**
  - certified, secure, and high performance
  - Our lightning protection systems meet the highest lightning protection class and the most stringent standards in use today. Confirmed by independent institutes. This excellent lightning protection solution minimizes damage, repair expenses, and downtimes of your wind turbines.

Lightning protection systems are crucial for the safe operation of wind turbines. They protect against the damaging effects of lightning strikes and ensure that your installations can operate efficiently and safely.
The ambitions to expand wind power are running high. Don’t get slowed down by criticism and regulations concerning noise emissions, particularly in the vicinity of inhabited areas. Our quiet and almost abrasion-free azimuth braking pads provide a convincing solution that will keep you moving ahead.

Minimizing Noise and Downtimes

Inorganic brake pads
Immediate noise reduction, lasting increase in efficiency

Our carbon-based brake pads differ from conventional organic pads by their extremely quiet operation. Carbon-based pads cannot glaze, which means that squeaking noises during braking are effectively prevented. Additionally, Schunk brake pads produce virtually no stick-slip effects, which can lead to destructive vibrations.

Our brake pads work nearly abrasion-free, which keeps the inside of the nacelle clean and ensures that important components are not contaminated by dust. Thanks to this wear resistance, maintenance intervals can be significantly optimized, which can lead to considerable cost savings, particularly in the offshore sector.

Noise Level—Brake Pads

You can rely on:

- Low-noise operation—less vitrification of the brake pads
- Reduction in the stick-slip effect—approximately the same static and dynamic friction coefficient
- Wear resistance—less abrasion, less pollution
- Resistance to lubricants
- Universal application—for both onshore and offshore
- Longer service intervals—reduced downtime, positive cost-benefit analysis

Inorganic brake pads by Schunk reduce brake noise significantly, which means that wind turbines can now be installed in previously infeasible locations and be more readily accepted by the public.
Sicherheit und Leistungsfähigkeit erhöhen


Universeller und zuverlässiger Lagerschutz


### Werkstoffempfehlungen

#### Generatoren

<table>
<thead>
<tr>
<th>Werkstoff</th>
<th>Metallgehalt %</th>
<th>Opt. Dauerdichtstromdichte A/cm²</th>
<th>Max. Umfangsgeschwindigkeit m/s</th>
<th>Bemerkungen</th>
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<tbody>
<tr>
<td>C72</td>
<td>29</td>
<td>92</td>
<td>131</td>
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<td>A24X</td>
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<td>S80</td>
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<td>Geringste elektrische Verluste</td>
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<td>S80/2K</td>
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#### Wellenerdung

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<thead>
<tr>
<th>Werkstoff</th>
<th>Metallgehalt %</th>
<th>Opt. Dauerdichtstromdichte A/cm²</th>
<th>Max. Umfangsgeschwindigkeit m/s</th>
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<tr>
<td>A15</td>
<td>40</td>
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<tr>
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<tr>
<td>C70</td>
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<td>Schichtausführung, Standard Kombination</td>
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<td>sichere Erdung bei hohen Frequenzen</td>
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</table>

#### Blitzschutz – unsere Ausführungen sind bis zu 150 kA (10/350) µs geprüft – mit zusätzlichen, speziellen Funkenstrecken bis zu 200 kA

<table>
<thead>
<tr>
<th>Werkstoff</th>
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Blattposition

- nur auf spiralformig genuteten Schleifringen

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Blattposition

- nur auf spiralformig genuteten Schleifringen