



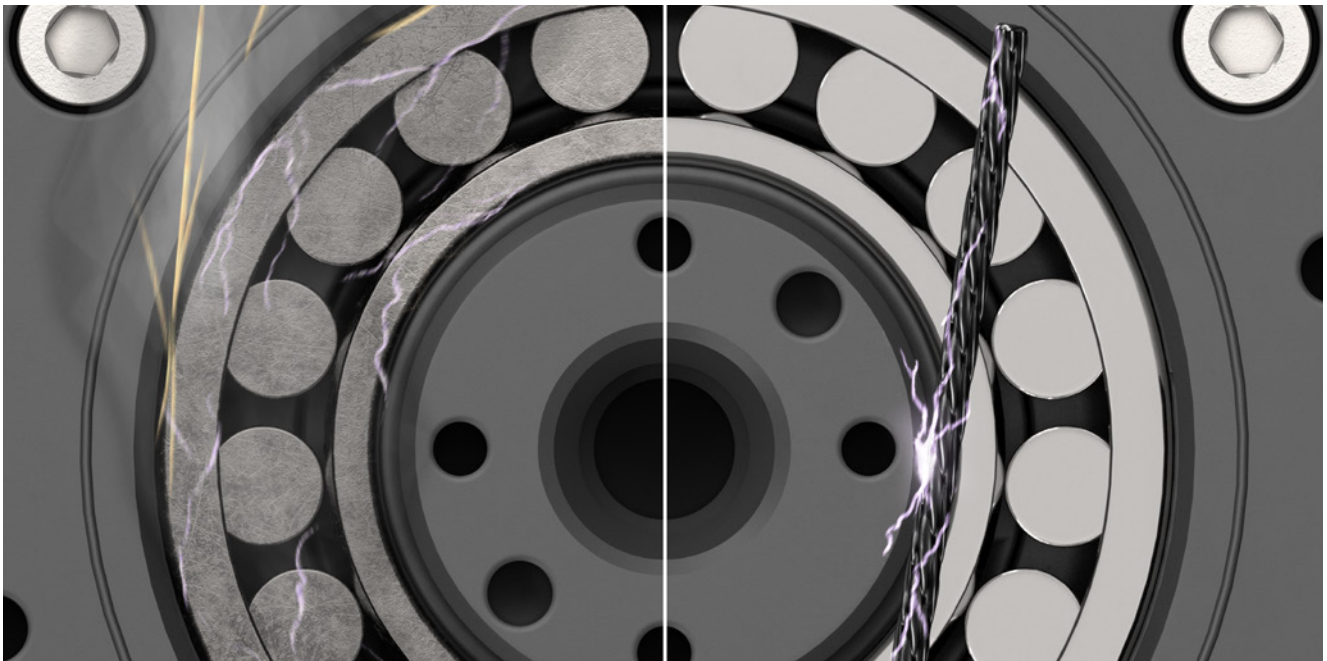
Transit Systems

Perfect Grounding

CFG – Carbon Fiber Grounding

“No unplanned downtime” – shaft grounding systems from Schunk extend the service life of your vehicles

Bearing or transmission damage caused by shaft voltage can result in expensive malfunctions in vehicle fleets. Extend the service life of your trains with patented Carbon Fiber Grounding Systems (CFG) from Schunk: These carbon fiber shaft grounding systems reliably dissipate vagrant currents and provide secure protection against bearing damage in motors or gearboxes/gears.



The problem:

Vagrant currents in inverter-controlled electric motors

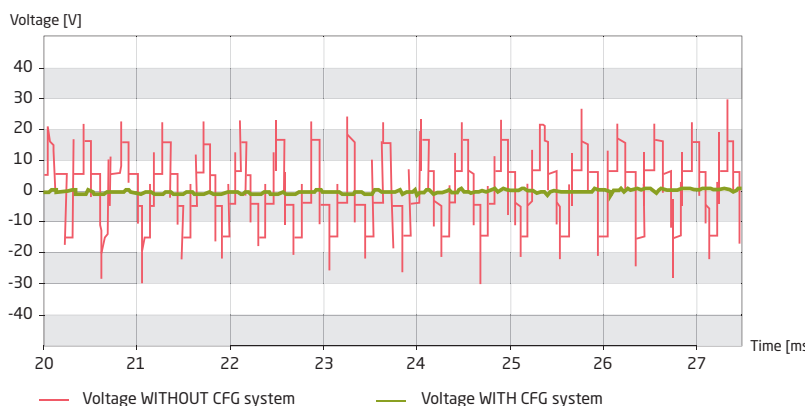
- ▢ cause bearing damage in engines or gearboxes/gears
- ▢ create excessive noises
- ▢ generate added heat within the affected bearings
- ▢ result in expensive (unplanned) train downtimes

Our solution:

Patented Carbon Fiber Grounding Systems from Schunk

- ▢ reliably dissipate vagrant currents
- ▢ provide effective protection against expensive bearing damage
- ▢ are resistant to average ambient conditions in railway applications, e.g. shocks and vibrations
- ▢ are generally simple to retrofit

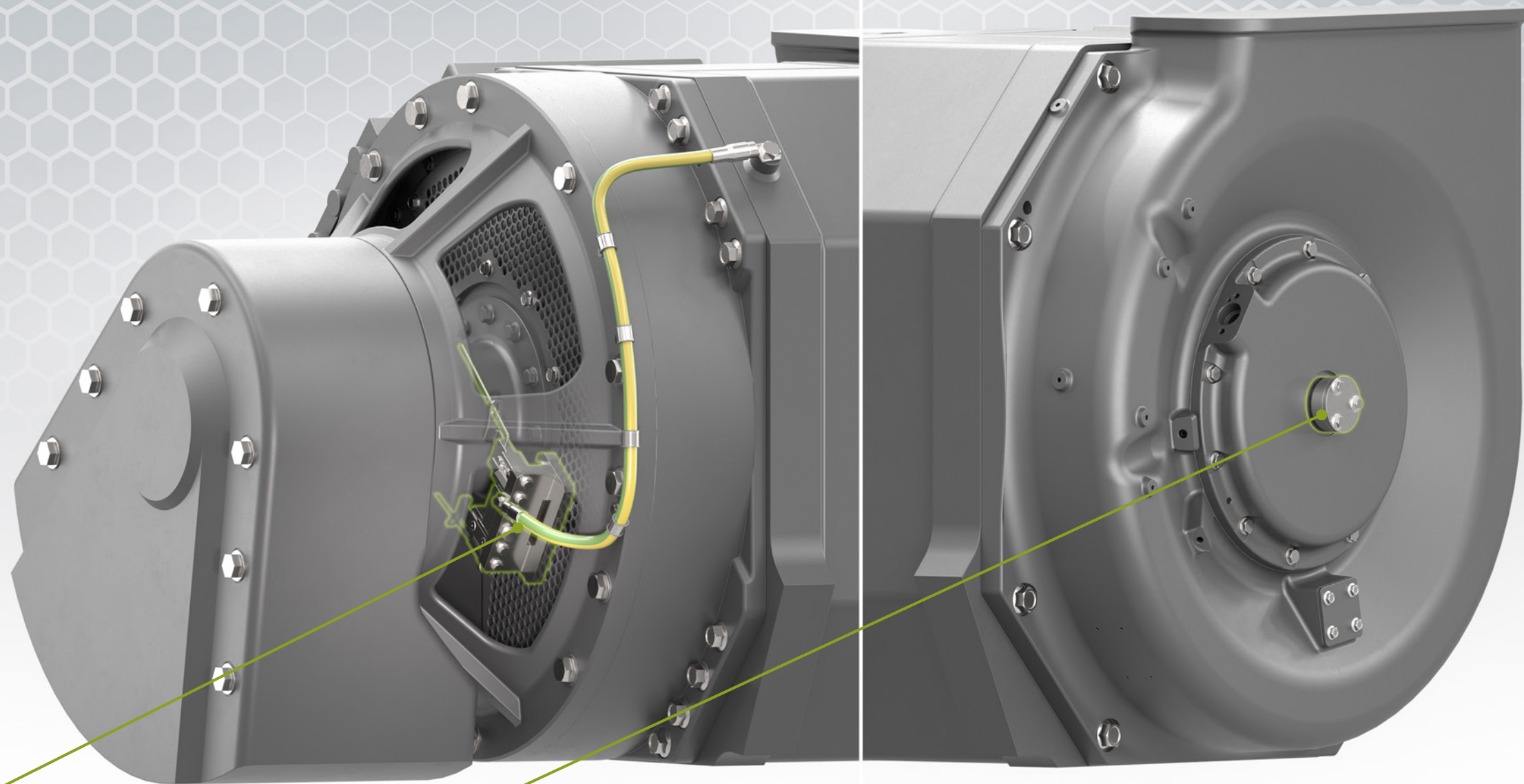
CFG systems from Schunk reliably reduce shaft voltage



Field measurements show:

CFG systems from Schunk reliably dissipate vagrant.

Shaft voltage, generally at levels of $> \pm 20$ V, can be reduced to a non-critical level of 4 V by using a CFG system on the affected shaft.



Gear/gearbox-mounted CFG systems

Shaft grounding can be tailored to any transmission or motor. It can be installed on an available interface with just a few steps.

Take advantage of these benefits:

- Customer-specific design
- Simple installation and removal
- Tolerance compensation for axle clearance



Motor-mounted CFG systems

Our adaptable standard solution can be attached to any front shield in just a few steps. The rotation center of the motor shaft serves as the counter surface.

Take advantage of these benefits:

- Compact design
- Easy to use
- Long service life



Customer-specific CFG systems

Years of development expertise and thousands of systems in operation make us a reliable partner if you need to design a custom shaft grounding system to meet your individual interface.

Take advantage of these benefits:

- Fast reaction times
- Highly functional design
- Simple installation and removal

Technical data

Operating conditions

Frequency range	0 – 100 kHz
Dissipation properties	The typical voltage level for vagrant shaft currents in traction applications is between 20 and 40 VAC. Under normal conditions*, Schunk CFG systems are capable of continuously reducing the voltage in the affected shaft to <4 VAC.
Current	<10 A (applies to standard fibers with an approx. 4 mm diameter)
Rotational speed	Up to 120 m/s
Contact resistance	A contact resistance of <150mOhm at 1 A can be used as a reference value.
Contact options	Radial or axial shaft contacting possible (gearbox/motor side)
Typical maintenance interval for railway applications	300,000 to 500,000 km vehicle driving distance, depending on the system
Environmental conditions	Slight contamination from moisture or oil will not significantly influence the function of the fibers.
Standard	S&V: IEC61373:2010 CAT3 Fire&Smoke: DIN EN 45545-2:2013 Contact Resistance: DIN EN 50153:2014

* Normal conditions: the operating range specified on the data sheet, in terms of electrical and mechanical operating parameters. This value refers to a reduction in voltage measured in the field. This may vary from vehicle to vehicle.

Usage parameters

Shaft diameter	Radial and axial: unlimited
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Material

Fibers	Patented carbon fibers (high temperature treated)
Housing / mount	Aluminum or stainless steel

Interface requirements

Mounting interface	Electrically conductive shaft – such as steel or stainless steel, peak to valley height Ra0.8 Rz4 Dissipation of shaft voltage through the electrically conductive surface of the surrounding interface or a nearby grounding spot housing or the grounding cable.
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Benefit from these advantages:

- Available as original equipment or a customer-specific retrofit solution
- Not sensitive to changes in direction
- Reliable even following contamination by water or oil
- Tested in accordance with DIN EN 61373

Schunk – A worldwide success. Always at your side.

Schunk is the world leader in the development, production, and application of carbon, ceramic, quartz and sinter metals solutions. Like no other, Schunk combines innovative strength and technological know-how with an extraordinary service orientation to supply a range of performances unique to the market. Schunk is a partner who offers you all the technological possibilities of a globally active company and can implement your ideas pragmatically and tailor-made to your requirements – whether these are for industrial large-volume markets or highly specialized niche markets.

The Schunk Group

The Schunk Group is a globally operating technology company. The company is a leading supplier of products made of high-tech materials – such as carbon, technical ceramics and sintered metal – as well as machines and systems – from environmental simulation and air conditioning to ultrasonic welding and optical machines. The Schunk Group has more than 9,000 employees in 29 countries and achieved sales of €1.2 billion in 2020.



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