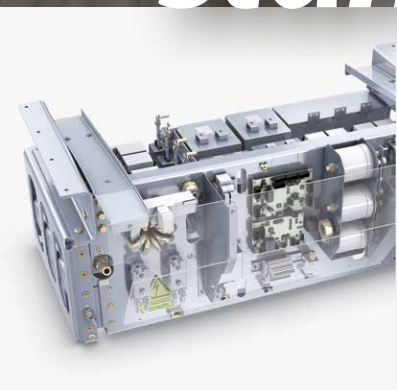




Defining tomorrow's standard



**POWER SUPPLY SYSTEMS FOR RAIL VEHICLES,
INDUSTRY AND ENERGY.**



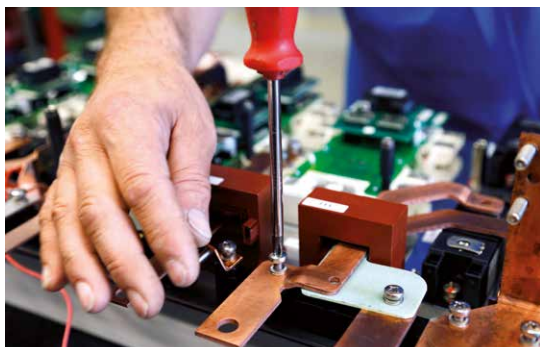
PowerTech

Energy is an essential element for our lives and our prosperity. At Knorr-Bremse PowerTech our mission is to ensure it is available and to use it as effectively as possible. Whether on rail vehicles, in industry or in research and development, our power supply systems operate efficiently and reliably and ensure that optimum use is made of energy.

As part of the Knorr-Bremse Group we aspire to the values that have shaped the company for decades: technological excellence through intensive research and development, and highly reliable and innovative products. Added to this is internal and external responsibility – above all in terms of sustainability, people management and social commitment.



Diverse energy supply.



Greatest product variety

Knorr-Bremse PowerTech provides a wide range of tried-and-tested products for rail vehicles and industrial applications. You can be certain that our power converters will ensure a high degree of reliability.

Global sales & service

Knorr-Bremse PowerTech maintains ongoing, long-term customer relations in all parts of the world. For all projects we train your service staff and provide expert local advice as a matter of course. And following start-up you know you can rely on our efficient aftermarket service network.

Supporting local content

For more than 30 years Knorr-Bremse has consistently focused on local value creation. With the support of the Group, PowerTech helps customers enter new markets where localization is a requirement.

High system integrability

Rail vehicle systems purchased from Knorr-Bremse come with their own power supply if required. Such precisely matched solutions not only benefit rail vehicle builders but also operators when they upgrade their fleets. PowerTech is also a system provider for the industrial and energy sectors, offering comprehensive solutions that are not only reliable but also future-proof.

Trend-setting features

By using the newest technologies, we have created particularly lightweight and compact power converters for rail vehicles. Our power converters for industry, research and renewable energies feature high reliability and a sturdy design. Our specific expertise allows us to make a valuable contribution to the growth of clean and intelligent energy.

Fastest processes

Our consistent use of standardized modules in developing our power converters means we can respond swiftly to demand.

The Knorr-Bremse PowerTech brand stands for electrical power supply systems for rail vehicles and industrial applications, manufactured to proven Knorr-Bremse quality standards. PowerTech was formed through the combination of two medium-sized companies that are leading specialists in auxiliary power converters:

PCS Power Converter Solutions GmbH in Berlin and Transtechnik GmbH & Co. KG in Holzkirchen. Both companies were acquired by Knorr-Bremse in January 2014 and changed their names to Knorr-Bremse Powertech GmbH, Berlin and Knorr-Bremse Powertech GmbH & Co. KG, Holzkirchen in 2016. All over the world our solutions contribute to greater mobility and a more secure energy supply in the 21st century. Together we develop solutions that set new standards for power converter technology and thus open up new opportunities for our customers.

Knorr-Bremse PowerTech in brief

- part of the Knorr-Bremse Group since 2014
- more than 500 employees
- Five sites on four continents
- turnover in three-digit millions
- more than 100 years' experience in rail technology
- more than 60,000 power converters for rail vehicles and industry
- some 60,000 electrical equipments for passenger rail cars
- reference projects on all continents

What we offer

- a wide range of tried-and-tested power converters world-wide
- a global sales network
- support over meeting localization requirements
- integration of our power converters into other rail vehicle systems
- compact, weight-optimized units
- flexible installation options
- various cooling systems
- large range of options
- efficiency, thanks to extreme effectiveness

...and last but not least: a level of service that leaves nothing to be desired. We support you during the entire product lifecycle and are always ready to help with problems, wherever you are in the world.



Knorr-Bremse PowerTech not only complies with the standards of the **ISO 9001** quality management system but also the specific requirements of the **International Railway Industry Standard (IRIS)**.

All forms of energy.

Rail vehicles – energy for trains



As a global systems supplier we work with all the rail vehicle manufacturers and operators. Knorr-Bremse PowerTech supplies customized technologies for rail applications all over the world.

Test benches – flexible energy



Motors and gears have to be subjected to intensive testing if they are to be reliable. Scalable PowerTech power converters enable entire processes to be simulated, reducing development costs and shortening lead times.

Research facilities – full energy supply



Unlocking the secrets of nature calls for large amounts of energy – and not just on the part of the researchers. High-performance equipment from Knorr-Bremse PowerTech provides the power needed to research the energy sources of the future.

Energy generation systems – limitless energy



Clean energy for tomorrow's world. From scalable power converters to complete energy generation systems with energy storage, we use cutting-edge technologies to ensure maximum efficiency.

Power grids – energy in full flow



We develop solutions for the efficient use of power use by electricity generators as well as consumers. Smart, technologically outstanding and reliable.

The future lies with urban mass transit systems. In many countries of the world, urbanization is driving demand for high-performance systems. For light rail vehicles and metros, Knorr-Bremse PowerTech offers a wide range of tried-and-tested products distinguished by their reliability, compact design and efficiency.

We work with our customers to develop optimum auxiliary power supply and distribution systems for rail vehicles, incorporating their particular requirements into the design and construction of our products. For us, standardization and individuality are not a contradiction in terms. Whether you want an auxiliary power converter, battery charging equipment or a complete power supply system – we will not rest until you are satisfied.



Reliable all-rounders.

In recent years we have moved ahead with standardization of our auxiliary power converter solutions for mass transit vehicles. This enables us to offer our customers tried-and-tested equipment with short delivery times.

Reliable and safe

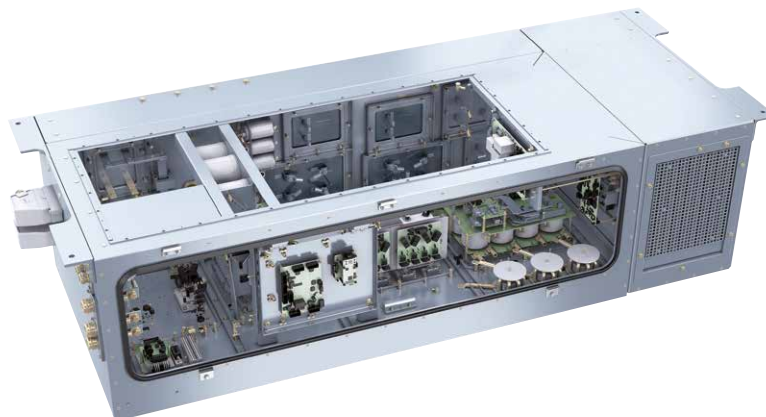
Safety is a priority for Knorr-Bremse. PowerTech products are therefore designed to cope with all eventualities. For us, galvanic isolation of inputs and outputs is standard. And their internal energy storage capability means our power converters can easily cope with interruptions in the catenary supply.

Ease of maintenance

Our units are designed for maximum reliability and durability. If problems do occur, however, the unit involved can easily be replaced, thanks to the compact, modular design of all our electronic components.

Product features

- suitable for input voltages of 600/750 V DC and 1,500 V DC
- output range AC: 15 kVA to 200 kVA
- output range DC: 7 kW to 40 kW
- available for roof-mounted or underfloor installation
- compact and lightweight design thanks to use of medium-frequency technology
- forced air, convection or water cooling
- emergency start device
- if required, integration of switching and circuit-breaker components
- parallel switching of AC as well as DC outlets possible
- communication interfaces with vehicle: CAN-Bus, MVB, Ethernet
- extensive service software



Long-distance and regional trains are a symbol of mobility worldwide – and an important alternative to air and road travel. Rail is just one of the most environmentally-friendly transport modes but also the most comfortable.

Auxiliary power converters play a crucial role here – delivering electricity for the air conditioning, restaurant and customer power points. They also make it possible to provide on-board digital infotainment. Solutions from Knorr-Bremse PowerTech help make long-distance and regional trains more efficient, more comfortable and less prone to faults.



Customized for all needs .

Multiple units, mainline trains, passenger cars or high-speed trains – auxiliary power converters from Knorr-Bremse PowerTech are individually customized to the needs of each type of rail vehicle. We work with customers to design individualized solutions that best meet their specific requirements.

Standalone battery chargers

Particularly on high-speed trains, high-output standalone battery charger units are required. With temperature-controlled charging characteristics, Knorr-Bremse PowerTech high-performance units protect the vehicle battery.

Specialist for double-deck rail cars

PowerTech has been equipping double-deck rail cars with power converters since 1997. And the company's success story with long-distance trains goes back even further: for more than half a century it has been producing on-board power supply equipment for this segment – including upgrade projects.

Product features

- suitable for UIC-standard input voltages
- several individual AC- and DC outlets
- AC power range 15 kVA to 120 kVA in total
- DC power range 5 kW to 25 kW in total
- available for installation under floor, on roof or as a cabinet
- compact and light-weight design thanks to medium-frequency technology
- forced-air cooling
- parallelswitching of AC as well as DC outlets possible
- communication interfaces to vehicle: CAN-Bus, MVB, Ethernet
- extensive service software
- addition of pre-assembled electrical components

Pre-assembled electrical components

- high and low-voltage switching systems
- switch and control cabinets
- driver consoles



Energy supply systems are crucial for performance, efficiency and comfort – and not just in rail vehicles. Our expertise in the field enables us to also offer products for industrial applications – for example wind turbines and aircraft, research facilities and test benches. Further areas of application include mining, grid compensation and industrial automation.

Whatever the field, our focus is on producing technologically sophisticated products that are reliable, flexible and help conserve resources. Together with our customers we develop solutions that offer genuine added value through their combination of high performance and sustainability.



Scalable performance.

Our customers also benefit from our long experience of rail technology when it comes to other fields of application. High levels of reliability and a robust design are features of our power converters for industrial and research use – to ensure that your equipment keeps running.

Energy generation and storage

Our specific expertise in the field of grid codes means we can ensure optimum grid integration and maximum yield. PowerTech power converters convert electrical energy from any energy source into the exact form that must be fed into the grid. The combination of energy generation systems and storage systems ensures efficient supply and high grid stability.

Efficiency for grids

Products from Knorr-Bremse PowerTech support industrial consumers of electricity as well as grid operators with smart solutions for active grid compensation, saving money for our customers. For off-grid systems and the connection of renewable energy sources and storage systems to the public grid, our Knorr-Bremse PowerTech converters make a

valuable contribution towards clean, smart energy for tomorrow's world.

Energy for highly dynamic test benches

Grid and drive converters from Knorr-Bremse PowerTech enable the creation of high-end test benches for a range of high-performance applications. To maximize performance we use intelligent modules, forced air and water cooling and a compact design with a minimum number of components. The result is power converters that combine high dynamic qualities with precise regulation and minimum interference emissions.

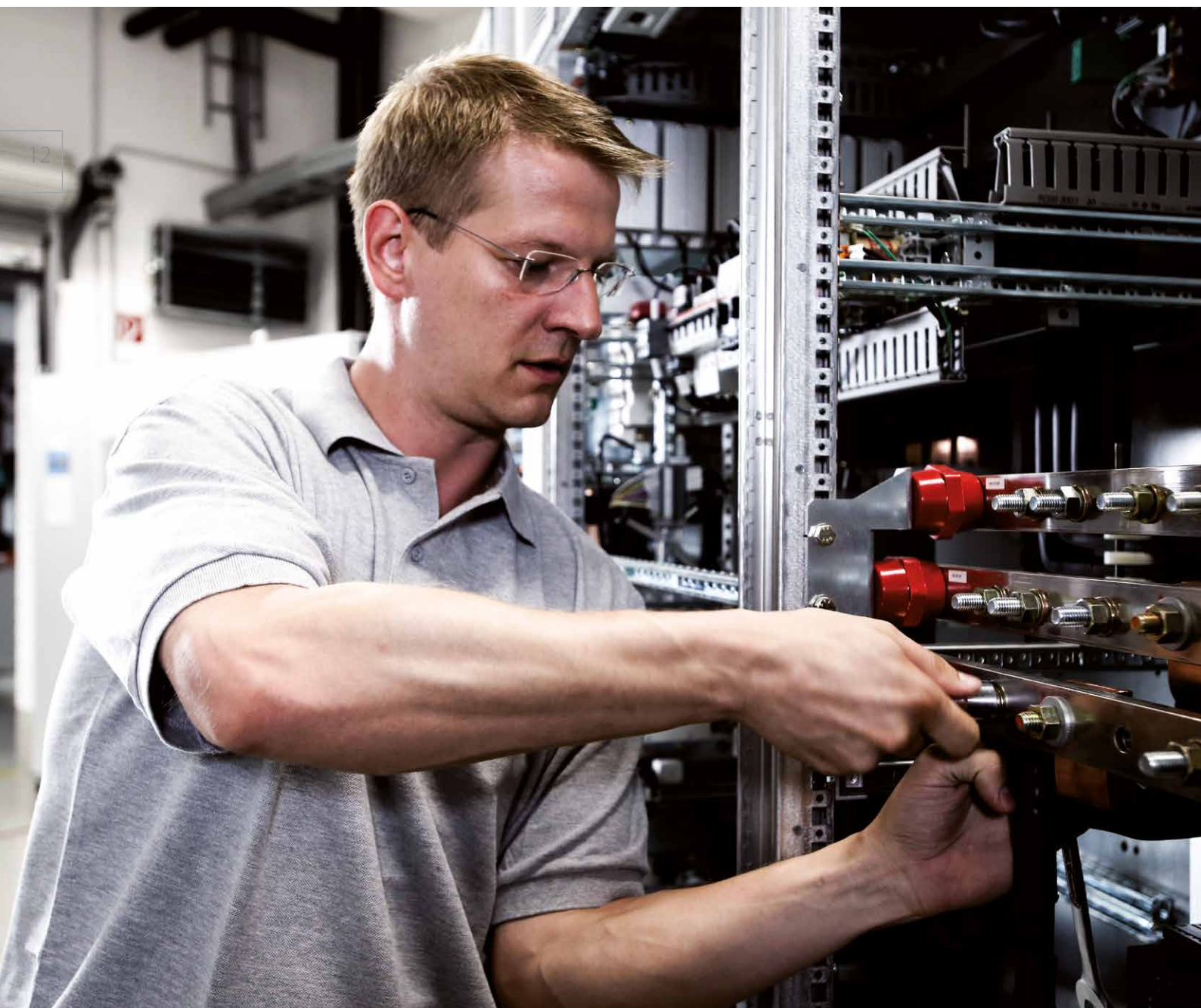
Top performance for research facilities

Knorr-Bremse PowerTech develops and manufactures high-precision power and voltage sources that meet the most rigorous standards. They are used within particle accelerators all over the world, for example to operate superconducting electromagnets and detectors. Our products supply the voltage required to generate radio-frequency radiation as well as high current of more than 20,000 amperes at low voltage.



Safety-critical products are worth much less if they are not backed up by first-class service. Knorr-Bremse is aware of this, and under the title of RailServices offers support throughout the entire life-cycle of rail vehicles from initial commissioning to spare parts procurement and repair – and even upgrades.

It goes without saying that the same applies to products and applications from Knorr-Bremse PowerTech, whether these take the form of vehicle systems, converters for wind turbines or test bench technology. We sign an individual agreement with you to cover your requirements – including training, on-site service and 24/7 availability.



On the safe side.

You can rely on our support when you use our highly sophisticated products. Providing rapid and specific back-up across the entire technology life-cycle is a priority for us – also for our former brands Transtechnik, PCS, and FAGA.

Training

We train your staff in using our products, helping with installation and commissioning – and of course are happy to pass on our knowledge to your own customers as well. All training is carried out by highly experienced, skilled trainers. Afterwards you are provided with individualized documentation.

Spare parts

We hold spare parts for Knorr-Bremse PowerTech products according to our customers' requirements – for as long as you like, and wherever you like. We also keep you informed of any plans to discontinue spare parts and develop new components for your existing power converter as required.

Repairs

Even Knorr-Bremse PowerTech power converters can occasionally develop a fault – for whatever reason. If this does happen, it is important to prevent you suffering any losses, which is why many of our modules are completely exchangeable, minimizing downtimes for the vehicle or facility concerned. Meanwhile we repair the faulty components either on-site or at one of our own facilities.

Upgrades

Rail vehicles can continue in operation for 30 years or longer, and Knorr-Bremse has a reputation for providing aftermarket service throughout their entire life cycle. Whether you are extending or upgrading existing systems, PowerTech provides proven technology that guarantees many years of operation.



Extensive experience.

LRV Citadis

Customer: Alstom

Product: On-board auxiliary power converter 30 kVA as well as 70 kVA incl. battery charger unit 13 kW

Volume: More than 1,000 units since 2008

Countries: France, Morocco, Algeria, Spain, Netherlands, Brazil, UK, Turkey, China, United Arab Emirates

LRV Flexity

Customer: Bombardier

Product: On-board 15-75 kVA auxiliary power converter incl. 8-12 kW battery charger unit

Volume: More than 3,200 units since 2001

Countries: Australia, Austria, Belgium, Canada, China, France, Germany, Italy, Netherlands, Poland, Spain, Switzerland, Turkey, UK

LRV Combino

Customer: Siemens

Product: On-board 15 and 52 kVA auxiliary power converters incl. 8 kW battery charger unit

Volume: More than 1,300 units since 1997

Countries: Germany, Australia, China, Hungary, Japan, Netherlands, Portugal, Switzerland, Ukraine

Double-deck cars

Customer: Bombardier

Product: On-board auxiliary power converter up to 150 kVA incl. 6-15 kW battery charger unit

Volume: More than 2,500 units since 1996

Countries: Germany, Israel, Denmark, Poland, Luxembourg

Electrical Multiple Unit ICE 4

Customer: Siemens

Product: Battery charger unit 2 x 25 kW incl. battery inverter 15 kVA

Volume: More than 400 units since 2014

Country: Germany





Particle Accelerators

Customer: CERN, STFC Rutherford, FERMI

Product: Precise high-voltage power source for magnets of HEDS (High Energy Drift Space)

Volume: More than 30 worldwide

Countries: Switzerland, Italy, UK

Wind turbines

Customer: Suzlon, eno energy

Product: RCS (Reactive Current Source)
2,500 kVA

Volume: More than 200 units since 2009

Countries: Germany, Spain, Portugal, South Africa, China

Automotive test benches

Customer: AVL

Product: Power converters for 50 to 1,500 kVA motor and gear test benches

Volume: More than 500 benches since 2000

Countries: Japan, China, Brazil, India, Germany, Russia, USA, Turkey, Canada, Korea, France, Italy, UK, Sweden, Spain, Austria, Hungary, Poland, Mexico, Taiwan, Vietnam, Singapore, Iran, Thailand

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