Special Vehicles

REALIZING SYSTEM SYNERGIES

KNORR-BREMSE
As rail transportation grows, the infrastructure also has to expand – and special vehicles have a crucial role to play in the process. They are also essential for routine maintenance operations. Their special functions mean they also require special subsystems: Only if these are tailored to specific operating scenarios can they offer what their owners need – a high degree of operational and functional safety combined with maximum economy. In this respect, Knorr-Bremse is a reliable partner, thanks to its decades of experience and its development expertise as a globally operating company.
**MICROELETTRICA SCIENTIFICA**

Microelettrica Scientifica, based in Italy, has been developing and producing power switches, transducers and resistors dedicated to the most advanced applications of the rail vehicle industry and industrial applications for more than six decades. The company’s high product quality results from continuous research, realized in close cooperation with its customers in order to precisely and punctually meet their needs.

**POWERTECH**

Knorr-Bremse PowerTech is a specialist in advanced power supply systems for all types of rail vehicle. The brand’s mission is to ensure their availability and to use them as effectively as possible. Whether in rail vehicles, in industry or in research and development, its power supply systems operate efficiently and reliably and ensure that optimum use is made of energy.

**SELECTRON**

State-of-the-art rail vehicles can only be realized with advanced control technology. For many years, Selectron Systems AG has been successfully developing such solutions for the automation, networking, and control of rail vehicles. As Selectron is able to utilize the worldwide Knorr-Bremse sales and service network it can provide its customers with even better support at international level.

**THE PERFECT COMBINATION OF HIGH-QUALITY SYSTEMS AND SERVICES**

**KNORR-BREMSE**

Knorr-Bremse is the world’s leading manufacturer of braking systems for rail vehicles. The product portfolio also includes intelligent entrance systems, HVAC systems, auxiliary power supply systems, control components and windscreen wiper systems, platform screen doors, friction material, driver assistance systems, and control technology. As a technology leader through its products the company has been making a decisive contribution to greater efficiency, cost effectiveness and safety in the international rail business.

**MERAK**

Our mission is to be the most respected partner for rail climate control solutions, through shared values, engineering experience, and global presence. Close customer cooperation, continuous improvement, and innovation have made Knorr-Bremse a world leader for heating, ventilation, and air conditioning (HVAC) systems, with >70,000 units in successful daily service.
BRAKE SYSTEMS

More than 110 years of experience have made Knorr-Bremse the world’s leading manufacturer of rail vehicle braking systems. The company’s skills are evident not just in the individual components it manufactures but also in their perfect interaction – the key to a braking system that meets the highest standards of functionality, reliability and safety. Building on both proven and innovative technologies, Knorr-Bremse works closely with customers to develop project-specific solutions from a single source with a carefully designed combination of electronic, pneumatic, mechanical and hydraulic components. A single, direct interface ensures cost-effective and resource-efficient integration into the overall vehicle system.

CUTTING-EDGE TECHNOLOGIES

AIR SUPPLY | OIL-FREE COMPRESSOR 2.0
- Environmentally friendly design
- Designed for railroad applications
- Continuously improved product based on long-term worldwide experience
- Less complex system with fewer interfaces than conventional compressor systems
- Robust design for underfloor mounting conditions as well as for standing installation, roof-mounted or interior

BOGIE EQUIPMENT | AXLE MOUNTED BRAKE CALIPER UNIT
- Improved protection against water and ice
- Increased robustness
- Higher spring brake performance
- Same interface
- Replaceable
- Less installation space

SYSTEMS SOLUTIONS – BENEFITS FOR THE CUSTOMER

The more closely braking systems are networked with other rail vehicle sub-systems, the greater the benefit for the operator, as this reduces overall complexity by avoiding redundant infrastructure. For example the braking system’s vehicle weight sensors can be used by the HVAC system to adjust output when passenger density drops.
PRODUCTS FOR ALL STANDARDS

Knorr-Bremse is the partner of choice for special vehicle applications – with systems based on more than 110 years of development, production and practical field experience. With innovative, TSI-compliant solutions tailored to local requirements, all current global standards (UIC, AAR, GOST, Chinese Standard, ARA) and individual operating scenarios. And with a worldwide production and service network that meets even the strictest requirements for local content.

WORLDWIDE COMPETENCE IN SPECIAL VEHICLE APPLICATIONS
BRAKE SYSTEMS

PRODUCT RANGE

OIL-FREE COMPRESSOR 2.0
- No oil exchange, no disposal of used oil, no contaminated condensate to collect
- Specially optimized design to minimize noise and vibrations
- Cold starts without preheating, down to -50 °C

SCREW COMPRESSOR
- Special design to cope with tough rail operational conditions
- Low compressor noise level
- Virtually pulsation-free delivery of compressed air

BRAKE PANELS
- For UIC and GOST market
- High availability through in-built back-up
- Optimized maintenance

BP COMPACT
- Modular design
- Lightweight and compact
- Flexible system layout
- Maximum economy thanks to standardized modules
- Straightforward service and maintenance concept
- Innovative use of proven technology

WHEEL-MOUNTED BRAKE DISC
- Standardized interface and mounting on wheel
- Resistant against thermal cracks due to movable friction disc
- Robust design with high safety against external shocks and vibration

AXLE-MOUNTED BRAKE DISC
- Standardized interface and mounting on the axle
- Resistant against thermal cracks due to movable friction disc
- Robust design with high safety against external shock and vibration

SANDING SYSTEMS
- Purely pneumatic sand dosing principle, no abrasion
- Separation of sand dosing and sand conveying functions
- Highest accuracy
- Integrated heating and drying function optionally

WINDSCREEN WIPER AND WASH SYSTEMS
- Maximum lifetime of the driving units
- Optimized availability via optional emergency unit
- Maximum flexibility of functionalities (e.g., middle parking position)
PISTON COMPRESSOR
- Rugged construction and long-life performance
- Self-supporting, flange-mounted motor compressor set

INTELLIGENT AIR DRYER
- Compact, lightweight modular design
- Diagnosis with continuous monitoring of air dryer condition
- Optimized closed-loop regeneration minimizes purge air losses
- Low noise emission

DISTRIBUTOR VALVES
- KE for UIC
- KAB60 for GOST
- DB60 for AAR

MOTION CONTROLLER KIT
- Brake, traction and master controller
- Compatible with UIC standard
- Small, flexible installation space
- Robust modular design, proven application

COMPACT BRAKE CALIPER
- Only one interface to bogie
- Highly modular design
- Optimized design regarding weight, assembly and costs
- Reduced maintenance

TREAD-BRAKE UNIT
- Fixation modular design
- Flexible mounting
- High output forces

iCOM MONITOR
Monitors and analyzes the vehicle system and provides prognosis of servicing requirements.
- Online monitoring of vehicle and component status
- Preventive maintenance to increase vehicle availability and optimize maintenance and utilization costs

WHEEL FLANGE LUBRICATION SYSTEM
- Reduced wheel/rail wear
- Reduced RCF development
- Improved cleanliness
- Increased vehicle availability
- High system reliability
- High efficiency
- Low maintenance
HVAC SYSTEMS

HEATING, VENTILATION AND AIR-CONDITIONING
In the rail sector, ergonomic working conditions are especially important for the drivers. Noise and vibration can be sources of distraction and a properly air-conditioned driver’s cab is an essential part of an efficient, healthy, and safe working environment. Merak’s HVAC systems ensure the right level of comfort, whether operating in mild, tropical, or even arctic conditions. Project-specific application of service-proven technologies means that systems can be flexibly configured for all vehicle types and operating environments, and deliver always the right performance with low weight, noise, and energy consumption. Available as roof-mounted or under-desk units, for newly-built vehicles or upgrades, Merak HVAC systems are in operation in all parts of the world – with local teams ensuring seamless service, every day.

CUTTING-EDGE TECHNOLOGIES

COMPACT ROOF-MOUNTED HVAC UNIT
- Designed for operation in some of the harshest conditions, in order to assure driver’s comfort
- Remote control panel located in the crew cabin for easy access
- High reliability to support vehicle availability
- Capable of operating at extreme ambient temperatures (above 60 °C)

SYSTEMS SOLUTIONS – BENEFITS FOR THE CUSTOMER
The more closely an HVAC system is networked with other rail vehicle sub-systems, the greater the benefit for the vehicle builder and operator, as this enables intelligent response to the other systems’ current operating status. For example the HVAC unit can be immediately shut down if a fire alarm is triggered, instead of continuing to blow air inside the vehicle.
POWER SUPPLY

Resistors enable safe, controlled braking to take place, contactors connect and disconnect circuits under load, and disconnectors change the configuration of the traction circuit when the catenary voltage changes. High-voltage metering transducers provide reliable data for the vehicle logic, drive control and many other measuring devices. Systems like these are often invisible to the outside world but are essential for the proper functioning of a modern vehicle. And however diverse their tasks, such control components have one thing in common: There can be no compromises in terms of safety. Microelettrica Scientifica’s cutting-edge solutions have met this requirement for more than 50 years, and today the company is a global market leader in electrical and electromechanical control components for rail applications.

CUTTING-EDGE TECHNOLOGIES

COMETER AC/DC VOLTAGE AND CURRENT TRANSDUCER
- Single transducer for current and voltage in AC/DC
- High precision, for detailed measurements
- Catenary voltage recognition function
- Possibility to integrate extra functions, such as harmonic content

LTHM AND LTMP SYSTEM CHANGE-OVER DISCONNECTORS
- Suitable for connecting the traction converter alternatively to pantograph or to diesel power generator
- Available in 1-, 2-, 3-, 4-pole versions
- Very high reliability over time and compact design
- Bistable, for very low power consumption

SYSTEMS SOLUTIONS – BENEFITS FOR THE CUSTOMER
The more closely power supply systems are networked with other rail vehicle sub-systems, the greater the benefit for the vehicle operator. For example a smart air supply unit could adjust compressor performance when the train enters a station, thereby reducing noise emissions.
PRODUCT RANGE

LINE CONTACTORS
- For AC and DC voltage systems
- Up to 4 kV voltage rating
- Available in 1-, 2-, 3-pole versions
- Different power terminal positions

PRE-CHARGING SYSTEM
- AC/DC pre-charge contactor
- Pre-charge resistor, with customizable resistance level, 1 to 100 ohm
- Up to 4 kV voltage rating

AUXILIARY CONVERTER OUTPUT CONTACTOR
- 3-phase contactor range for 400 V, 50 Hz power supply
- High breaking capacity
- Compact design

BATTERY SWITCH
- 2 poles
- 2 stable positions, for saving energy when closed
- Suitable for low voltages, but high currents
- Compact design

BRAKING RESITOR
- Naturally or ventilator-cooled
- Custom-designed resistance value and cooling pattern
- Custom-designed interfaces

TRACTION MOTOR BLOWER
- Centrifugal or centaxial design
- Very high pressure
- Highly customizable
- High resistance to corrosion

TRACTION CONVERTER COOLING FAN
- Centrifugal, centaxial or axial design
- Very wide range of fans, with flexible design
- High resistance to corrosion
CONNECTED SYSTEMS

Modern rail vehicles are highly complex systems incorporating braking, door and HVAC systems as well as traction, lighting and power supply components. They also carry a wide range of display units for vehicle diagnostics, passenger information and safety alerts. The train control management system (TCMS) links all these functions into a single, intelligent system that offers maximum precision, safety and reliability. This is where Selectron Systems AG comes in – the market leader in rail vehicle control technology and automation. Selectron’s comprehensive product portfolio includes freely programmable control units, central and distributed remote I/O systems and train setup components. At the heart of the systems is an EN 50155-compliant family of control systems.

SYSTEMS SOLUTIONS – BENEFITS FOR THE CUSTOMER

The more closely a rail vehicle’s sub-systems are networked with each other, the greater the benefit for the vehicle builder and operator. For example cross-system diagnostics can make individual service tools superfluous. Cutting-edge control technology from Selectron Systems AG provides the perfect basis for this.
CUTTING-EDGE TECHNOLOGIES

SMARTIO
The smart remote I/O system (“Smartio®”) simplifies the complexity of the wiring in the body of the vehicle, in the cabinet, and in the driver’s desk allowing a lean design, savings on installation and service time, and is extremely space-saving and easy to install. It can be flexibly expanded for all applications and is, therefore, a “just enough” solution.

PRODUCT RANGE

ROUTER/SWITCH
The new switches and routers provide flexible network architectures and meet the new TCN standard IEC 61375. Configuration of individual devices within the network is carried out across the trains from one data access point. Application development, commissioning, and service are simplified.

MAS 835
The MAS 83x family of controllers has been generically designed and can be used, for example, as a safe vehicle control unit or as a safe monitoring unit. The processing unit has high performance, is flexibly expandable, and easy to program. Variations from SIL0 up to SIL2 are available. The generic certificate for safe applications simplifies vehicle registration.

HMI
The HMI portfolio includes display sizes from 8.4” up to 12.1”. The units are available as both SIL0 and SIL2 versions. The high processing power allows, among other things, multichannel video streaming over Ethernet; the display is particularly bright. The simple and intuitive graphical programming interface reduces development and commissioning times.
SERVICE

A reliable service partner – over the entire life cycle. All train operators are unique – and their servicing requirements for braking and on-board systems are also highly specific. But they have one thing in common: They depend on their vehicles remaining operational at all times and in all places. The mission of our RailServices brand is to ensure that this happens – for all Knorr-Bremse subsystems and over the vehicle’s entire life cycle.

The extended RailServices portfolio includes comprehensive service and support for all our products and systems, including vehicle maintenance.

- Worldwide Service Center close to the customer
- Highest quality of maintenance via standardized production system
- RailServices standards for services and maintenance for on-train and off-train operations
- Field service and training
- Innovative component upgrades and systems modernization for existing fleets
- Service life extended and its life-cycle costs reduced
- Maintenance of rail vehicles ranging from commissioning to overhaul as well as light maintenance and repair campaigns.

- Original quality parts over the entire life cycle
- Parts management
- Supply chain premium services
- iCOM serving as a platform for applications that require a connection to the wayside to enable digital solutions
- Upgrade of trains with Knorr-Bremse components from the one source
Products and services creating genuine added value in line with ongoing changes in the rail sector – RailServices is further developing its range of services.

**Service Centers – always close to the customer**  
Excellent service calls for rapid reaction times. With 30 service centers in all continents, our RailServices specialists are close at hand when local customers need them. The first European Rail Services sites already fulfill the requirements of European Regulation (EU) no. 445/2011 for freight wagons.

**Modernization – customer-specific solutions breathe new life into existing vehicles**  
RailServices provides innovative component upgrades and systems modernization for existing fleets. We offer attractive system solutions worldwide for rail vehicles of all ages. Modernization is delivered by RailServices specialists with expertise and above all, passion. It is our ongoing commitment to your operational needs and to continued product innovation that makes modernization projects a realistic and affordable option for our customers.

**iCOM – digitalization on board**  
iCOM ushers in a new era in vehicle servicing. This retrofittable system extends rail vehicle diagnostics to cover not just specific systems but whole vehicles. By introducing tablets, smartphones and apps to the railroad sector, it offers unique access to data on the condition of the entire vehicle fleet. Sophisticated measurement and analysis processes combine with automatic diagnostics to enable iCOM to predict maintenance requirements in advance – allowing operators to take measures pro-actively. This powerful and flexible system already supports additional applications such as driver advisory systems and energy metering as well as third-party products due to the open architecture.