Locomotives

REALIZING SYSTEM SYNERGIES
They are used to pull regional expresses and high-speed trains – or as workhorses for heavy freight haulage. Without the sheer versatility of locomotives, world-wide rail transportation would be unthinkable. Manufacturers develop individual solutions tailored to customers’ specific requirements – often using modular concepts. Whatever segment is involved, Knorr-Bremse has proven technologies for all conceivable scenarios, ensuring the highest safety standards with innovative, cost-effective solutions and service concepts offering operators long-term value-added.
EcoMeter

Compressor

BRAKE CALIPERS

BRAKE DISCS

SMARTIO®

iCOM

Locomotives

rail

vehicle

systems

Microeletrtica 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 over 7,000 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 | AAR-AIR DRYER LD1000
- 10-year main overhaul interval
- Suitable for OE projects and upgrade of existing fleet
- Low LCC
- Suitable for robust environment, underfloor installation possible, rated IP69K
- State-of-the-art solution for heavy haul freight locomotives
- Efficient variable purge control
- Superior pre-filtration for removal of oil vapour and bulk water

BOegie EQUIPMENT | COMPACT BRAKE CALIPER RZT
- Improved protection against water and ice
- Increased robustness
- Higher spring brake performance
- Same interface
- Replaceable
- Less installation space
- RZT and WZT are further developments of the service-proven K8 standard products RZS(S) and WZK, with optimized robustness and overhaul period.

CCB-3
- Improved mission reliability
- Life-cycle cost reduction
- Standardization of interfaces for global markets
- Improved diagnostics
- Safety certification for global use
- Improved configurability
- Shorter lead times

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 locomotive 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 LOCOMOTIVE 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

MODULAR BRAKE SYSTEM
- For UIC and GOST market
- High availability through in-built back-up
- Reduced overhaul time by automatic self-diagnostics
- Functionalities combined into line replaceable units
- Optimized maintenance

CCB II
- Modular design
- For AAR market

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

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

SANDING SYSTEMS
- Pure pneumatic sand dosing principle, no abrasion
- Separation of sand dosing and sand conveying functions
- Highest accuracy
- Optionally integrated heating and drying functions

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

Motion Controller Kit
- Brake, traction and master controller
- Compatible with UIC standard
- Small, flexible installation space
- Robust modular design, proven application

Tread-Break Unit
- Fixation modular design
- Flexible mounting
- High output forces

Conditioning Unit
- Wheel surface conditioning to improve friction
- Flexible mounting in bogie
- Robust and service-proven design

iCOM
iCOM transfers the mobile device philosophy to the railway industry:
- Condition Based Maintenance (iCOM Monitor)
- Driver Advisory System (iCOM Assist)
- Energy Metering (iCOM Meter)
  - One common back office
  - Addition of functions via apps
  - Open system platform and architecture

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 always deliver 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 UNDER-DESK MOUNTED HVAC SYSTEM
- Designed for operation in desert conditions, while maintaining the driver’s comfort
- The control panel and controller are installed outside of the HVAC for easy access
- Dual refrigerant circuits for redundancy, capacity control, and energy optimization
- Suitable for high-speed train operation
- Capable of operating at extreme ambient temperatures of up to 55 ºC

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 into the locomotive.
PRODUCT RANGE

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)
POWER SUPPLY

As the number of different energy consumers on rail vehicles increases in line with growing comfort and safety expectations, the power supply system is assuming an increasingly central role. The PowerTech brand brings together Knorr-Bremse’s full range of expertise in power converters and electrical equipment for rail vehicles. We cover today’s professional energy conversion requirements for all performance categories and train types – including a service network on every continent.
PRODUCT RANGE

BATTERY CHARGER
- Battery protection by special charging characteristic and temperature compensation
- Compact and rugged design, IP65 degree of protection
- High efficiency rate up to 92%
- Temperature range –25 °C to +45 °C
- 19” enclosure, free positioning in car possible
- Advanced technology, service-proven in many projects all over the world
- Lightweight and compact design

HVAC INVERTER
- Inverter for HVAC compressor supply
- Compact design
- Optimized mechanical concept
- Cooled by natural convection
- VVVF operation for motor management

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.
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

INTEGRATED COOLING TOWER
- Integrates the braking resistor and the traction converter cooling radiator
- Cooled by a centrifugal fan
- Braking resistor sections designed upon specification
- Complete with internal piping and circulation pump

LTX – HIGH PERFORMANCE LINE CONTACTOR
- Thermal current up to 1800 A
- Rated voltage up to 4000 V
- Very high breaking capacity in a small space
- Electronic control and power saving system

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 traction circuits
- 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

DC HIGH-SPEED CIRCUIT BREAKER
- Up to 4 kV voltage rating
- Thermal current up to 4 kA
- Vertical and horizontal mounting position
- IP65 enclosures for underframe or on-the-roof installation
- Extremely compact design

SYSTEM CHANGE-OVER DISCONNECTOR
- For multi-voltage platforms
- Bistable, for very low power consumption
- Up to 4 kV voltage rating
- 1- to 4-pole versions, with different power terminal positions

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

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

MACHINE ROOM BLOWER
- Centrifugal, centrifugal or axial design
- Very wide range of fans, with flexible design
- High resistance to corrosion

ENERGY METERING
- System compliant with ENS0463 standard for energy billing
- Single transducer for measurement of voltage and current in AC/DC, for outdoor installation
- On-board data transmission system, with Ethernet interfaces
- Software for energy data analysis available
- Suitable for new vehicles, or for overhaul projects
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.

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.
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.