High-Speed Trains

Realizing System Synergies

Knorr-Bremse
Because we simply find the right answers to complex challenges.
AT SPEEDS OF UP TO 400 KM/H, ENORMOUS FORCES ARE GENERATED. Trains that regularly travel long distances at high speeds require braking systems that can keep these forces under control – both safely and economically. As well as lightweight, compact systems that can be used worldwide, there is a need for intelligent control systems. Knorr-Bremse is recognized as an international pioneer in this field. From a base of proven technologies, we develop innovative solutions offering top levels of safety, reliability, and economy. The systems we have developed are so efficient that they also score top marks in terms of environmental friendliness. Customers enjoy full support from a single source – from the initial planning stage and commissioning through to aftermarket services. Operator and customer audits worldwide regularly single out the consistent quality of our products and services for praise and this is confirmed by our International Railway Industry Standard (IRIS) certification.
KNORR-BREMSE EXPERTISE IN ITS FIELD HAS GONE INTO EVERY SINGLE COMPONENT AND SYSTEM. The highest quality components operate in harmony to guarantee optimum functionality, high reliability and maximum safety. Complex electronic control systems such as blending and brake management reduce wear to a minimum by ensuring priority on regenerative and wear-free systems. The system can be configured either to use the vehicle CAN-bus system or a separate CAN-bus exclusive to the braking system. For each project, customers are closely consulted at the design stage. Knorr-Bremse offers support during the homologation process as well as all the necessary on-site services through the entire product life cycle.
THE PERFECT COMBINATION OF HIGH-QUALITY SYSTEMS AND SERVICES

AIR CONDITIONING  METERING

DOOR SYSTEM  COMORAN SENSOR

BRAKE CONTROL  AIR SUPPLY

» BRAKE CONTROL | ENSURING THE INTELLIGENT INTERACTION OF ALL BRAKE FUNCTIONS
Knorr-Bremse ensures optimum functioning of all systems involved in the braking process facilitating reliable stopping of the train in all operating conditions. The highly flexible and configurable brake control system EP Compact, together with the modular electronic platform ESRA, manages the pressure control, anti-skid, wheel slide monitoring and diagnostics, as well as further highly complex brake control functions.

» ON-BOARD SYSTEMS | DOORS, AIR CONDITIONING UNITS AND MORE
It is not just Knorr-Bremse braking systems that ensure greater safety and comfort in rail vehicles. Our on-board product portfolio covers a wide range of innovative products and solutions including entrance systems and platform screen systems and air conditioning units. We also produce state-of-the-art electronic diagnostic systems and windscreen wiper and wash systems.

» RAIL SERVICES | THE PARTNER OF CHOICE TO SUPPORT KNORR-BREMSÉ SYSTEMS THROUGHOUT THE ENTIRE LIFE CYCLE
Through RailServices, Knorr-Bremse offers a wide range of support services for all of its products and systems. Operating from facilities that are equipped and ready to provide a fast turnaround, RailServices support is structured but flexible. Customers can choose from a range of customized solutions; from the guaranteed supply of genuine Knorr-Bremse parts to a fully managed, maintenance contract for the whole life of the train. The level of support available from RailServices is possible not only because of the superb facilities and equipment but because of the highly skilled, experienced and dedicated staff who really understand Knorr-Bremse products and systems and how to keep them performing as they were originally designed to.

» AIR SUPPLY | COMBINED COMPRESSOR AND AIR TREATMENT SYSTEM
Knorr-Bremse ready-to-install air supply equipment has been adapted in line with the trend towards increasingly compact, lightweight systems. Our product portfolio includes low-vibration and low-noise screw compressors with an output of between 600 and 2,500 l/min., as well as air dryers and condensate collectors. A particularly economic solution is the first ever oil-free compressor, with life-cycle costs that are significantly lower than those of conventional compressors.

» BOGIE EQUIPMENT | INNOVATIVE DESIGN MINIMIZES ASSEMBLY AND MAINTENANCE REQUIREMENTS
Knorr-Bremse offers a wide range of compact, lightweight bogie equipment including low-maintenance compact brake calipers, low-wear brake discs and innovative high-performance brake pads. Sinter pole shoes reduce the life-cycle costs of electromagnetic track brakes by up to 40%. The eddy current brake is completely free of wearing components.

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Knorr-Bremse was the first company in the rail vehicle industry to develop a compressor that operates without any oil. Lubricating oil is negated by the use of a special coating and the unit is cooled by air taken in via the crankcase. This innovative product is a winner in both environmental and economic terms. The expense of oil changes, oil separation and condensate disposal are avoided and energy consumption, weight and installation space are significantly reduced.

The compact brake caliper unit has a completely redesigned mechanism for applying braking force that allows for considerable transverse axle movement and tilt without generating any internal stresses. Requiring only a standard interface, it is easy to install, and sealed joints mean low maintenance. Its weight has also been reduced by up to an impressive 100 kg per bogie.

With EP Compact, Knorr-Bremse has developed a flexible and powerful brake control system with central and distributed control coming from one family. Core functions can be expanded by adding a wide range of options offered by various modules within the EP Compact product family. For high-speed trains, Knorr-Bremse has developed innovative ESRA modules for new functions as defined in the TSI.

Brake Management is all about reducing the stress on wear components to a minimum. Knorr-Bremse ensures that friction brakes only come into operation when wear-free dynamic brakes are not enough. A brake management system for the entire train calculates brake force distribution based on different data: available brake effort of the individual brake systems, vehicle weights and adhesion limits and thermal limits of the friction brake are all taken into account to blend the different systems and achieve a balanced braking effort.
INNOVATIONS THAT REDUCE LIFE-CYCLE COSTS

“...We produce reliable and robust systems that withstand the most demanding operational use and conditions. Our products combine uncompromising levels of safety with ease of handling and economy through the life cycle.”

REDUCING UNNECESSARY WEAR AND MAINTENANCE IS A GOOD WAY OF REDUCING LIFE-CYCLE COSTS. More than any other manufacturer, Knorr-Bremse has succeeded in finely coordinating the complex interplay of different braking systems. Brake components that are prone to wear are only used when the wear-free electro-dynamic braking cannot cope on its own. Even then, patented brake pads have proven longevity against conventional materials. Brake pads and discs require replacement less frequently and their design enables them to be serviced rapidly. The brake calipers themselves are low maintenance. These examples demonstrate that if all the relevant factors are included in the calculation, the bottom line is savings for the customer.

Customized service packages ensure that all Knorr-Bremse systems function smoothly for up to 30 years – anywhere in the world. The secret is our combination of OEM expertise and a highly efficient service infrastructure.
PRODUC T RANGE

AIR SUPPLY

OIL-FREE COMPRESSOR
- Oil-free air (environmentally friendly, no downstream contamination)
- Less complex system/fewer interfaces (no oil filter, no condensate collector)
- Virtually maintenance-free, very low life-cycle costs

SCREW COMPRESSOR
- Special design to cope with tough rail operational conditions
- Low compressor noise level
- Low vibration

EP COMPACT
- Flexible brake control platform
- Central and distributed control
- Compact design
- Continuous pneumatic load correction
- Full set of auxiliary functions
- CENELEC and TSI compliant

MODULAR BRAKE CONTROL
- Intelligent combination of pneumatic and electronic control
- Intelligent blending and brake management
- Modular and suitable for various customer requirements
- CENELEC and TSI compliant

BOGIE EQUIPMENT

WHEEL- AND AXLE-MOUNTED BRAKE DISC
- Standardized interface and mounting on wheel
- Resistant against thermal cracks due to movable friction disc
- Robust design with high protection against external shock 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 function
- Highest accuracy
- Integrated heating and drying function optionally

WINDSCREEN WIPER AND WASH SYSTEMS
- Pneumatic system with electric control and diagnosis
- Highest system availability through emergency operating unit
- Based on more than 20 years experience in high speed/very high speed trains wiper systems

AUXILIARIES
COMPACT UNITS
- Compact, light, highly reliable
- Developed especially for installation beneath the frame
- All components to be maintained can be accessed through a maintenance port

AIR DRYER
- Dual-chamber regeneration dryer
- Lightweight aluminum design
- Integrated pre-filtration elements

COMORAN® — CONDITION MONITORING FOR RAILWAY APPLICATIONS
- Condition monitoring and diagnosis
- Reducing life-cycle costs
- Derailment detection
- Fulfills TSI requirements

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

ISOBAR SINTER BRAKE PAD
- Flexible sinter brake pad with high level brake performance
- Temperature resistant with constant friction behavior
- Long disc and pad life due to even temperature distribution on brake disc
- For overhaul, only replacement of friction elements necessary

EDDY CURRENT BRAKE
- No mechanical contact between brake and rail
- No wear and low maintenance
- Noiseless braking
- Brake force does not depend on friction coefficient
- Constant brake force even for high-speed applications
- Significant wear reduction on brake discs and brake pads

LEADER DRIVER ADVISORY SYSTEM
- Saves traction energy
- Increases punctuality
- Reduces wear of the brake system
- Improves driver skills
- Increases customer satisfaction
WHEREVER TOP QUALITY IS CRUCIAL FOR COMPETITIVENESS, KNORR-BREMSE RAIL VEHICLE SYSTEMS OFFER CUTTING-EDGE TECHNOLOGY
THE EXTREME STRESSES TO WHICH MODERN HIGH-SPEED TRAINS ARE SUBJECTED DEMAND TECHNOLOGICALLY ADVANCED, RELIABLE AND SAFE BRAKING SYSTEMS. Knorr-Bremse designs every system to address specific operating conditions, minimizing wear and achieving high levels of economy and vehicle availability. As a manufacturer of braking systems with more than 100 years experience, Knorr-Bremse has the necessary expertise to achieve this. High levels of research and development investment ensure that our systems remain cutting-edge. With RailServices, Knorr-Bremse offers a high-quality portfolio of maintenance and aftermarket services ranging from original spare parts and maintenance agreements right down to responsibility for complete systems during the entire life cycle. Customers also benefit from a comprehensive network of service centers for all braking and on-board systems.