Applications

High-Speed Trains | Light Rail Vehicles | Locomotives | Metros | Passenger Coaches | Regional and Commuter Trains | Special Vehicles
MERAK designs, manufactures, installs and provides support for high quality HVAC systems for all rail applications. Service-proven throughout the world for over 50 years, some 100,000 units guarantee passenger comfort every day, even in the toughest climatic conditions.

Our presence on all five continents and our wide experience in project management and system integration allow us to offer our customers a unique combination of global knowledge and outstanding local support. This also enables Merak to customize standardized modules to systems that respond to almost any specific requirement.

Merak’s leadership in the field of HVAC systems is based on a solid product portfolio and close cooperation with operators and carbuilders:

- Local value-added powered by a global team
- High performance technology for all technical challenges
- Worldwide service network

**CUSTOMER BENEFITS**

**Local value-added**
- Customized solutions to exactly fit our customers’ needs
- Technical support provided locally
- Major facilities located in Australia, China, India, Europe and the Americas

**High-performance technology**
- Operation under extreme conditions: temperatures from +55 °C down to -45 °C, dust and sand, ice and snow, etc.
- Specific standards and norms: NFE, GOST, EN, ASHRAE, AS, DIN, VDV, etc.
- Efficient energy consumption
- Enhanced technology and upgrades available
- Environmentally friendly design

**Worldwide service network**
- Close to our customers
- Support available throughout the entire life cycle of the product
- Experenced and highly-skilled after sales teams including field technicians
- Overhaul, refurbishment and upgrade services

**SCOPE OF SUPPLY**

We supply the complete HVAC system for all railway applications. When required, additional elements can be supplied such as:

- Energy-saving solutions
- Sand filtration systems
- Pressure wave detection and protection systems
- Air sterilization systems
- Auxiliary power inverters, etc.

As well as a full range of validation test and analysis, e.g.:

- Dust network design
- Computational Fluid Dynamics (CFD) for HVAC system, ducting or complete car
- Finite Element Modeling (FEM) calculations
- HVAC noise and vibration analysis, etc.
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. Knorr-Bremse’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, Knorr-Bremse 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 unit 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 °C

COMPACT ROOF-INTEGRATED HVAC CABIN UNIT
- Two separate and independent refrigerant circuits (supply for driver’s cabin and for the vestibule)
- With active pressure protection and specific housing tightness
- Integrated side channel blowers for fresh air support
- High-quality stainless steel housing, suitable for aggressive environments
- Maintenance access from inside the driver’s cabin

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 in support vehicle availability
- Capable of operating at extreme ambient temperatures (above 60 °C)
HEATING, VENTILATION AND AIR CONDITIONING

Passengers expect the rail sector to steadily improve levels of comfort. Noise and vibration are increasingly regarded as sources of irritation, and a properly air-conditioned interior is taken for granted. Knorr-Bremse HVAC systems ensure the right level of comfort for all passengers, whether they are commuters on urban metro trains operating in tropical conditions, or long-distance travelers in the arctic winter. Project-specific application of service-proven technologies means that systems can be flexibly configured for all rail vehicle types and operating environments, and always deliver the right performance with low weight, noise, and energy consumption. Available as roof-mounted, floor-level, or under-floor units, for driver’s cabs or passenger cars, for newly-built vehicles or modernizations, Knorr-Bremse HVAC systems are in operation in all parts of the world – with local teams ensuring seamless service, every day.

CUTTING-EDGE TECHNOLOGIES

HVAC SYSTEM FOR DESERT APPLICATIONS
- Roof-embedded HVAC system
- Extreme temperature operation (full cooling capacity is maintained at temperatures exceeding 50 °C)
- High-redundancy design - no single point of failure
- Lightweight design
- Suitable for hot and dry climates where climate control is mission-critical

HVAC SYSTEM WITH ALTERNATIVE REFRIGERANTS
- CO₂ (R744) with GWP=1 (Global Warming Potential)
- High energy efficiency thanks to frequency-controlled compressor and new electric expansion valve control
- Heat pump & energy recovery available

SYSTEMS SOLUTIONS – BENEFITS FOR THE CUSTOMER

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PRODUCT RANGE

ROOF-MOUNTED SALOON UNIT
- On-roof mounted HVAC unit
- Special functions include emergency ventilation when power out, automatic shutdown in case of internal car fire and full recirculation airflow in case of external smoke, amongst others
- Dual refrigerant circuits for redundancy, capacity control and energy optimization

ROOF-EMBEDDED SALOON UNIT
- Roof-embedded HVAC unit plus underfloor HV unit with brake energy-to-heat recovery
- Dual refrigerant circuits for redundancy, capacity control and energy optimization
- Quick maintenance access through quarter-turn locks in all covers
- Ideal for applications with low profile tunnels, lightweight requirements and units located in the center of the roof

ROOF-INTEGRATED HVAC SYSTEM
- Compact unit with low height and weight
- Extremely silent unit based on internal silencer
- Variable fresh air and capacity control

SALOON
- Compact unit with low height and weight
- Extremely silent unit based on internal silencer
- Variable fresh air and capacity control

CABIN
- Compact unit with low height and weight
- Extremely silent unit based on internal silencer
- Variable fresh air and capacity control

HVAC PLATFORM FOR LOW-PROFILE APPLICATIONS
- Roof-mounted or fully embedded HVAC system
- Catalog of different frame and coil materials
- Wide power range (up to 41 kW) and flexible interfaces
- Ideal for metros with low profile, due to its low height (< 300 mm) and weight

HVAC SYSTEMS
RAIL VEHICLE SYSTEMS
METROS
HEATING, VENTILATION AND AIR CONDITIONING
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CUTTING-EDGE TECHNOLOGIES

ADAPTIVE LIGHT RAIL SALOON HVAC SYSTEM
- Roof-mounted
- Very compact and low weight with an excellent ratio of size vs. cooling capacity (45 kW in 500 kg)
- Adaptive temperature control
- Fresh air input control according to occupation and exterior conditions

HVAC SYSTEM WITH ALTERNATIVE REFRIGERANTS
- CO₂ (R744) with GWP=1 (global warming potential)
- High energy efficiency thanks to frequency-controlled compressor and new electric expansion valve control
- Heat pump and energy recovery available

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 vehicle.

In combination with heat pump and motor cooling units, the HVAC system can significantly reduce the power consumption, which is a major benefit for the vehicle operator.
HEATING, VENTILATION AND AIR-CONDITIONING

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PRODUCT RANGE

CUTTING-EDGE TECHNOLOGIES

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