

Cooling Systems for Railway Vehicle Applications



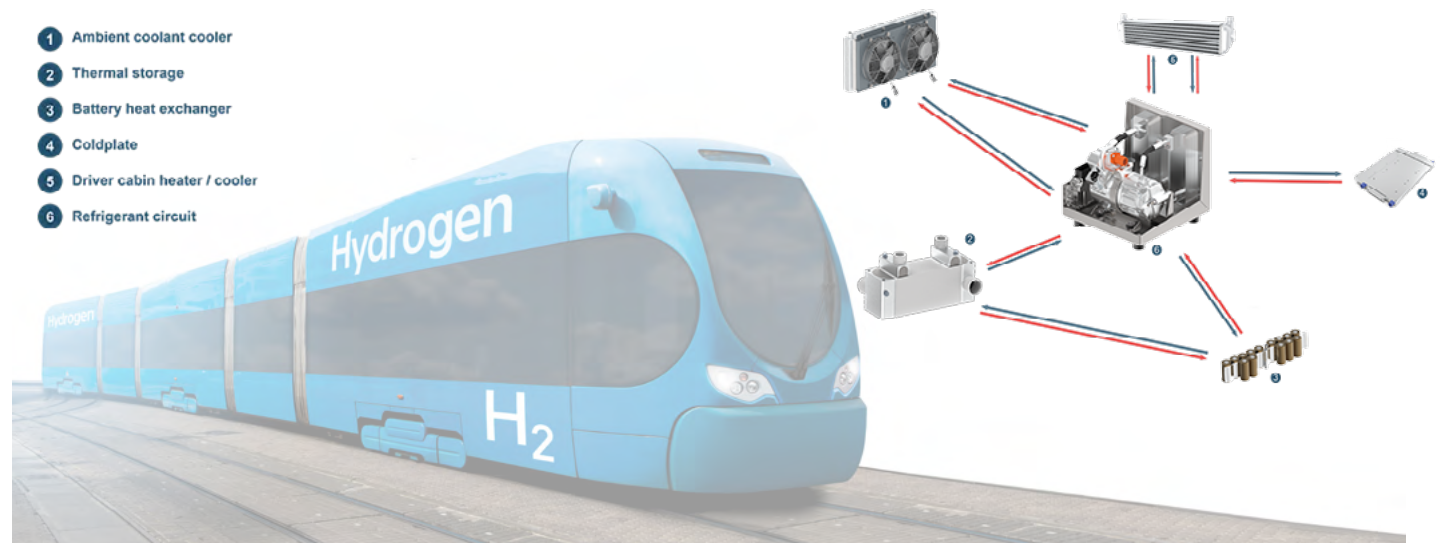
Cooling tower
for combined cooler
for transformer oil and coolant

Thermal Management System

The AKG Thermal Management System for railway is designed to regulate and maintain optimal temperature conditions for batteries, ensuring their efficient operation, long lifetime and reliable power.

With a compact and modular design, our Thermal Management System is easily integrated in many types of equipment. The battery is cooled using a closed refrigerant circuit and can optionally be heated with an electrical high voltage heater. An on-board controller manages the complete thermal system operation.

Our heat exchangers play a crucial role in transferring the absorbed heat through the cooling medium to the refrigerant and the surrounding environment. AKG's design and placement of the heat exchangers within the Thermal Management System are optimized to maximize cooling effectiveness while minimizing energy consumption.

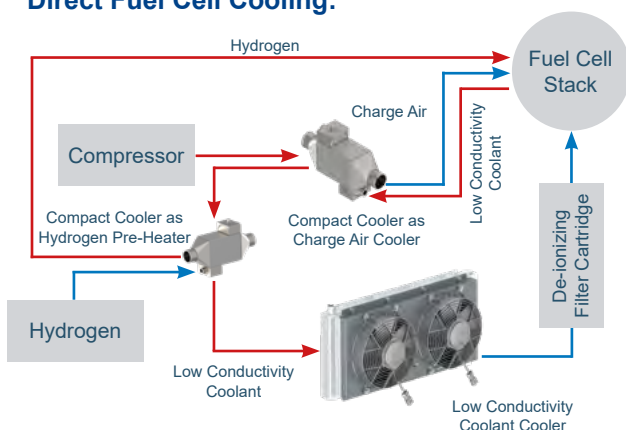


Fuel Cell Cooling System

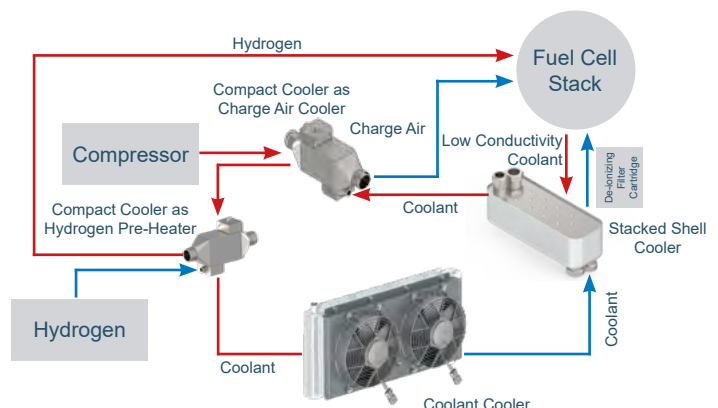
Fuel cells require efficient cooling when converting hydrogen and charge air into electrical energy, with only air and water as byproducts instead of exhaust gases. To avoid short circuits within the fuel cell, the use of an electrically insulating coolant is essential. Our vacuum-brazed aluminum heat exchangers are particularly suitable for these coolants. To keep the required conductivity criteria, deionization processes are used to maintain the low conductivity of the coolant.

Two fuel cell cooling methods are commonly used: direct and indirect. These are selected depending on the cooling requirements of the fuel cell system. In any case AKG specializes in lightweight, high performance heat exchangers that provide exceptional cooling and heating capabilities for fuel cell applications.

Direct Fuel Cell Cooling:



Indirect Fuel Cell Cooling:



Cooling Systems for Rolling Stock



DE DIESEL-ELECTRIC-LOCOMOTIVES

AKG cooling towers installed in hybrid locomotives.

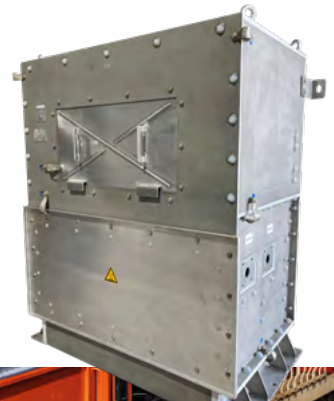
- AKG provides cooling tower solutions for hybrid locomotives which can be operated in all countries in Europe, Asia and North America in all sizes



ELECTRIC-LOCOMOTIVES

AKG offers cooling towers for transformer and converters in a wide power range of locomotives.

- Pure electric locomotives are most friendly to the environment
- Speed controlled fans to ensure low noise



Cooling Systems for Rolling Stock



DMU DIESEL-MULTIPLE-UNITS

AKG high performance light weight cooling systems.

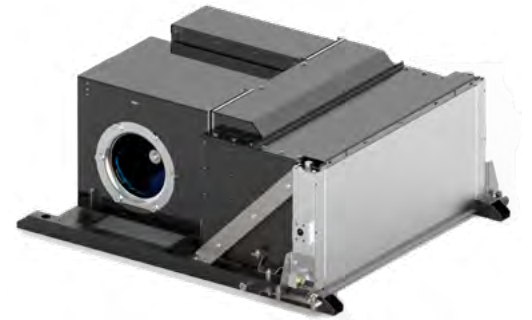
- Single core, side-by-side or multi layer coolers options
- Weight optimized expansion tanks and oil tanks
- Reliable hydraulic pumps and motors for extended life-time
- Speed controlled fans for low energy consumption are environmental friendly



EMU ELECTRICAL-MULTIPLE-UNITS

AKG roof cooling units for transformers and converters.

- Low noise fans
- Due to modular design usable in different locations of the train



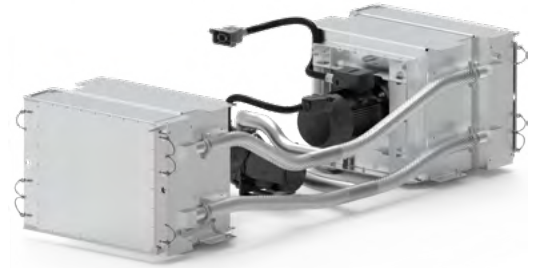
Cooling Systems for Rolling Stock



HST HIGH-SPEED-TRAINS

AKG cooling units for transformers and converters.

- High performance light weight cooling units
- Aerodynamically optimized
- Low sound power level
- Component sets or complete functional units



SPARE PART BUSINESS

AKG provides replacement coolers and cooling systems.

- Performance improvements
- Refurbishments, replacement and repair

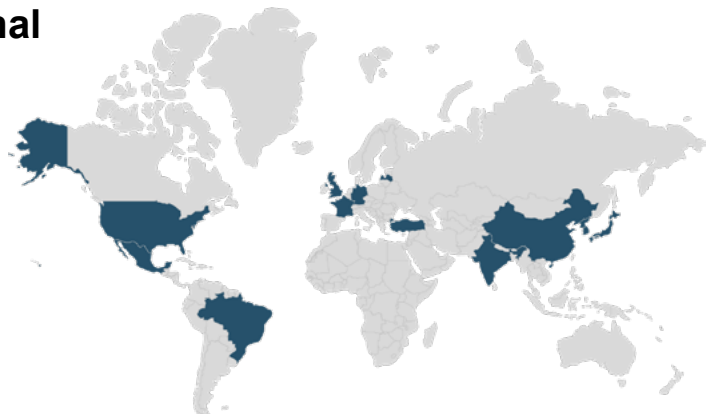




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AKG Service Program

- **Maintenance / Overhaul**
- **Supply of spare part**
- **Repair**
- **Technical Support**
- **Commissioning**
- **Service at Customer Location**
- **Training**

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