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RAILSERVICES

HVAC
ELECTRONIC CONTROL

UNIFIED
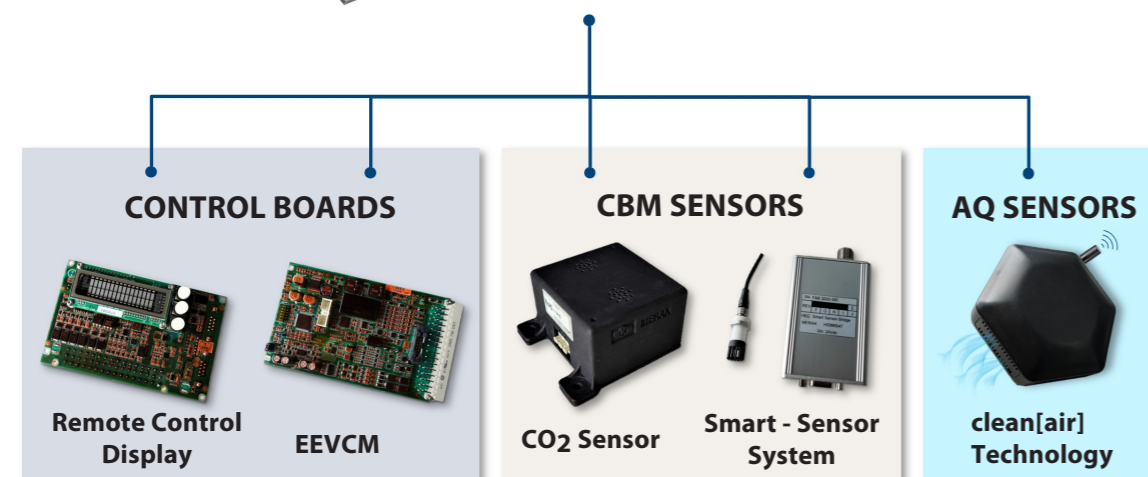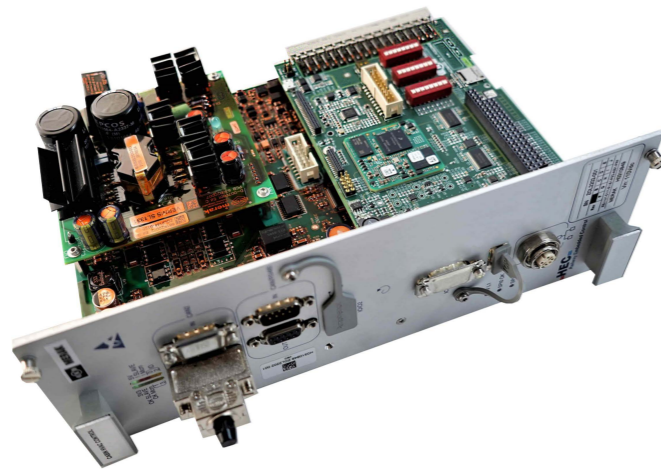## COMMUNICATION
ARCHITECTURE

MERAK

HEC (HVAC Electronic Control)

HEC is a state-of-the-art embedded controller designed for railway HVAC applications.
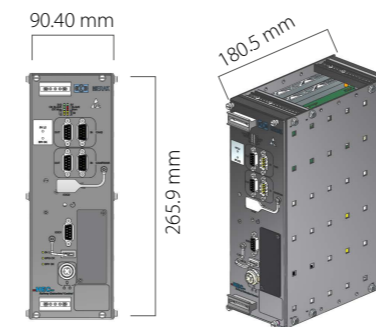
Customer benefits

- State-of-the-art data integrity and protection support for communication networks
- Possibilities for a seamless integration of digital services into our products
- Strong focus on service reliability and robustness
- Comfort improvement by means of specialized peripheral product

CONTROL BOARDS

Remote Control Display   EEVCM

CBM SENSORS

CO_2 Sensor   Smart - Sensor System

AQ SENSORS

clean[air] Technology

HEC Communication Protocols

- Analog Signal: 4-20mA, 0-10V, 0-5V
- Data BUS: MODBUS, CAN, RS485, RS232, ETHERNET

HEC - Main control

90.40 mm   180.5 mm   265.9 mm

- Designed according to international railway standards, incl. EN, GOST and STM
- Compliant with cutting-edge protocols (i.e. TRDP, IPTCOM and CIP)
- Allows implementation of advance monitoring and condition-based maintenance (CBM) solutions
- Compatible with other Knorr-Bremse Group electronic subsystems
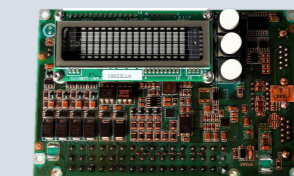
Additional control and sensing technology

EEVCM

- Optimized cooling funtion
- Used with green refrigerants such as CO_2
- Reduced cost compared to COTS

Remote Control Display

- Integrated HMI and control functions
- Reduced cost →Optimum for Sleeper cars

Smart - Sensor System

- Cabling reduction (Onewire)
- Temperature monitoring in the whole vehicle

CO_2 Sensor

- NDIR CO_2 technology sensor
- Power supply: 24VDC
- Accuracy: 30ppm +/- 30%
- Measurement range: 0-10000ppm
- Operation temperature: 0-50ºC

clean[air] - Sensor System

- Innovative sensing technology software
- Connected to clean[air] application
- Allows air quality data visualization, such as: HR, T, PM 2.5, CO_2 and VOC
- Already in service
- Wireless communication: LoRa and GSM 4G