

# SYSTEM INTEGRATION IN CONTAINER OR FRAME

Customer benefits from project-specific integration of braking equipment: Knorr-Bremse has both the competence and the capacity to design and deliver ready-to-install brake control modules (BCM) that meet customers' precise requirements. The car-specific, maintenance-friendly containers or frames optionally contain all the necessary air supply equipment as well.

## Customer benefits

- Pre-assembled brake control in a frame with pre-tested components
- Optionally contains air-supply components
- Optionally contains electronics unit
- Perfectly matched to project requirements
- Highly integrated design with plug-and-play installation into car
- Reduced complexity in engineering, logistics, assembly and testing

- Maintenance-friendly service concepts reduce operators' TCO
- Good protection against environmental influences

## Applications

- High-speed trains
- Locomotives
- Metros
- Passenger coaches
- Regional & commuter trains



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## Key features

### Design

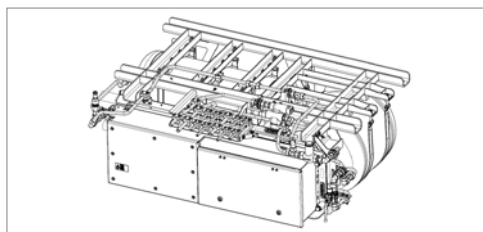
- Compact design in defined installation space according to valid norms and experience from the operating countries (e.g. environmental conditions)
- Wiring according to valid norms for shielding, protection, earth & fire safety

### Testing

- Comprehensive pneumatic & electric tests before shipping → ready to install

### Logistics and Commissioning

- Management from only one supplier, reduced commissioning effort
- Reduced manufacturing lead time and logistic effort compared to non-integrated strategy



## Selected reference projects

### Metro

- Alstom – Barcelona metro
- Stadler – Tyne & Wear
- CSR – New Delhi DLF metro
- Changchun Railway – Mecca metro project

### High-speed trains

- CRRC – CRH5A (see cover picture)
- Siemens – VELARO Eurostar
- Hitachi – First Group/ECO A
- Alstom – TGV 2020

### Assembly and Integration into the Train

- Plug & play with pneumatic & electric interfaces according to customer requirements
- Less design effort for the vehicle builder, supply of 3D-step file if desired
- Faster integration → shorter production process, less warehouse space needed, less testing effort on customer side

### Maintenance and Overhaul

- Central terminal block for interfaces, easy access to all control elements and test points
- Overhaul instructions are created by Knorr-Bremse on module level if desired
- Quick replacement of complete frame for overhaul (can be sent back to Knorr-Bremse for rework)
- Protection against environmental influences (temperature, dust, vibration, shock) leads to longer life cycles and reduced LCCs
- Availability of all components over the contractual lifetime

### Regional & commuter

- Siemens – DESIRO RUS
- CAF – Auckland EMU
- Indian Railway ICF - Train 18 EMU

### Locomotives

- Siemens – Vectron
- Alstom – Madhepura
- Dalian – HXD3
- ZELC – HXD1
- Toshiba – T1-HDB
- Stadler – Eurodual Locos

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