BORDLINE®-CC500

Converters for rail vehicles

500 kW compact converter
Compact Converter BORDLINE®-CC500

System overview
The generator converter converts the incoming power from the diesel generator to a DC voltage before it is transformed into traction power of 450 kW by the traction converter. The system supplies the energy to the onboard network and the vehicle battery directly from the same DC link. Energy recuperated during braking is fed back into the DC link, where it may be consumed by the auxiliary converters, or if needed the energy will be dissolced into heat by the braking chopper.

The overall BORDLINE® CC500 system consists of:
• Generator converter
• Traction converter
• Integrated auxiliary power converter
• Integrated battery charger
• Common DC link
• AC 800 PEC control system

A key feature of the system is the vibration-proof mounting of each converter in its own cabinet. The coupling of the auxiliaries to the common DC link allows the unit to utilize braking energy often lost in diesel electric vehicles.

Generator & Traction - Converter
The compact BORDLINE®-CC750 series converters are rugged units incorporating modern IGBT technology, and are designed especially for use in traction vehicles. Each individual unit is built on PowerPak 3 power electronics building blocks (PEBB).

Fig. 1 shows the individual modules of the BORDLINE®-CC500 converter and how it is integrated into the overall system.

Control system
Using ABB’s own hardware and software platform (AC 800 PEC), the software code was generated directly from system simulation. This made it easier to develop and implement the software, while also limiting the engineering required.

Mechanical design
The compact converters of the BORDLINE® CC500 series are available for indoor mounting as well as IP65 protected cabinets for roof or under-floor mounting.

Technical Data
- Generator Power: 430 kW
- Generator converter: 480 V / 60 Hz / 600 A
- DC link voltage: 750 V
- Traction converter: 0..480 Vac / 850 Aac / 0..172 Hz
- Aux. power supply converter: 3 x 400 V / 50 Hz / 50 kVA
- Battery charger: 24 V / 200 A

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Figure 1: Principle diagram of BORDLINE®-CC500

Cooling system
The efficient cooling system uses service water to cool the modules – a feature contributing to the converter’s very compact design. In each unit an air-to-water heat exchanger is included, which cools the internal cabinet and is connected to the same cooling circuit as the power parts. The water itself is cooled by an external heat exchanger.

Auxiliary power supply converter
An auxiliary power supply converter produces a current-limited 3-phase output voltage directly from the DC link voltage. A sine wave filter smooths the output voltage and produces an almost pure sinusoidal voltage at the output terminals of the converter.

Battery charger
The supply of DC loads and the battery charger power is sourced through a DC-DC converter connected to the main DC link. This converter operates at a switching frequency 20kHz and provides galvanically isolated power via a decoupling diode to the vehicle DC loads. A separate current limited output is provided for battery charging.