BORDLINE® CC1500 DC converts power from the 3kVdc line into propulsion power for the traction motors, auxiliary power and DC power for onboard consumers (AC, DC and battery).

Characteristics
• Designed for passenger and heavy haul cargo applications
• Configurable for six and four axle locomotives
• High energy efficiency
• Light and compact design
• Single axle control for redundancy and adhesion performance
• Optimized pulse pattern to minimize motor losses and enhance motor life
• Easy maintenance

System overview
BORDLINE® CC1500 DC Compact Converter is connected to the 3 kVdc catenary via an external line inductor and the main circuit breaker. BORDLINE® CC1500 DC converts the 3 kVdc voltage into drive power for the traction motors, three-phase auxiliary power and 110 Vdc power.

BORDLINE® CC1500 DC consists of:
• 3 propulsion converters
• 1 braking chopper
• 1 auxiliary converter for onboard supply
• 1 battery charger
• DC-link capacitors
• Control
• Line contactor and precharge unit
• Cooling system

Propulsion converter
BORDLINE® CC1500 DC is a robust and solid unit incorporating modern IGBT technology, with the ability to control each traction motor individually. With optimized switching patterns, BORDLINE® CC1500 DC generates a quasi-sinusoidal current waveform, which reduces the harmonic losses, the audible noise and the mechanical stress on the traction motor.

Auxiliary converter
The auxiliary converter module supplies the electricity requirements for the locomotive (blowers, compressor and pumps). It generates a three-phase 50 Hz output supply directly from the DC-link voltage, which is filtered via an external sine filter and galvanically separated via an external auxiliary transformer.

Battery charger
The battery charger is integrated inside the traction converter and is fed by the auxiliary power while charging the DC battery and the locomotive DC load.
Powerful control platform

ABB traction converters are built on the AC 800PEC control platform, one of the most powerful modular controllers for high-speed performance on the market. This control platform is also used in a wide range of industrial applications. The AC 800PEC software is implemented on three performance levels, thus providing an excellent range of control and communication functionality, in cycle times that extend from the sub-microsecond to the millisecond level. Compared to most other commercially available traction control systems, the modular application software in the AC 800PEC reduces train commissioning time significantly.

Cooling system

The equipment is efficiently liquid cooled, allowing a very compact construction. The temperature of the coolant is lowered using an external heat exchanger. An additional internal blower provides forced air circulation inside the cubicle in order to avoid hot spots, passing the losses via an internal air/liquid heat exchanger to the main cooling circuit.

Mechanical design

BORDLINE® CC1500 DC is housed in an IP54 cabinet, designed for mounting within the machine room. Due to its modular design, it allows for easy access for maintenance.

Diagnostics and service

The service-friendly modular design with highly standardized components ensures high reliability, excellent spare parts availability, and optimized life-cycle costs. The Compact Converter is delivered with BORDLINE® View, a diagnostic tool that visualizes signals, various parameters and the state of the traction system. It consists of an advanced self-diagnosis function, which provides advice and instructions for service and repair. BORDLINE® View is easy to use and runs on a standard PC.

Application example

BORDLINE® CC1500 DC is mounted in Newag’s new cargo locomotives E6ACT Dragon, operating in Poland by freight operators STK and LOTOS Kolej. The locomotives are one of the most powerful cargo locomotives serving the Polish market. ABB delivered a highly integrated traction system consisting of DC line filters, traction converters with integrated auxiliary converters and battery chargers, auxiliary filter packages and traction motors.

Technical data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>BORDLINE® CC1500 DC 3kV M 2500</th>
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<tbody>
<tr>
<td>Propulsion output</td>
<td>3 x 0...2340 Vrms, 833 kW at wheel</td>
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<tr>
<td>Braking chopper</td>
<td>1200 kW</td>
</tr>
<tr>
<td>Auxiliary converter</td>
<td>3 x 400 V, 175 kVA</td>
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<tr>
<td>Auxiliary frequency</td>
<td>50 Hz</td>
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<tr>
<td>Vehicle control interface</td>
<td>CANopen</td>
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<tr>
<td>Mounting position</td>
<td>machine room</td>
</tr>
<tr>
<td>Dimensions (L x W x H)</td>
<td>1800 x 875 x 2030 mm</td>
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<tr>
<td>Weight</td>
<td>1380 kg</td>
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</tbody>
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