**System overview**
The BORDLINE® M6 AC converter is based on thyristor technology.

The system is composed by:
- Full controlled rectifier thyristor bridge
- EMI filter
- Control/Communication unit

**Functionality**
The BORDLINE® M6 AC battery charger feeds from the heating transformer inside the locomotive (210 Vac 1ph 50 Hz, 210 Vac 1ph 16.7 Hz) to generate a 110 Vdc voltage to charge the batteries and supply the DC loads of the vehicle. The battery charger is based on a single-phase full controlled rectifier thyristor bridge without galvanic insulation. The battery charger is made by two modules to guarantee warm redundancy. Each battery charger module provides dead battery start functionality. A battery temperature compensation is implemented. Two separate outputs supply DC loads and charge the batteries.

**Characteristics**
- DSP technology
- Compact and robust design
- Warm redundancy
- Three input voltages (210 Vac 1ph 50 Hz, 210 Vac 1ph 16.7 Hz, 230 Vac 1ph 50 Hz - limit 12 A)
- Workshop supply
- Dead battery start-up
- Air forced cooling
- CANopen interfaces for TCMS; USB interfaces for diagnostic
- 19” Rack mounting
- High reliability thanks to consolidated building blocks

**Technical data**

<table>
<thead>
<tr>
<th>Input voltages</th>
<th>BORDLINE® M6 AC_210V</th>
</tr>
</thead>
<tbody>
<tr>
<td>210 Vac 1ph 50 Hz</td>
<td></td>
</tr>
<tr>
<td>210 Vac 1ph 16.7 Hz</td>
<td></td>
</tr>
<tr>
<td>230 Vac 1ph 50 Hz</td>
<td></td>
</tr>
<tr>
<td>Output voltage</td>
<td>110 Vdc (96 Vdc to 128 Vdc)</td>
</tr>
<tr>
<td>DC output power</td>
<td>6.4 kW</td>
</tr>
<tr>
<td>Protection degree</td>
<td>IP20</td>
</tr>
<tr>
<td>Dimensions (L x W x H)</td>
<td>450 x 483 x 486 mm</td>
</tr>
<tr>
<td>Ambient temperatures</td>
<td>-40°C +55°C (start-up 70°C)</td>
</tr>
<tr>
<td>Weight</td>
<td>44 kg</td>
</tr>
<tr>
<td>DSP Technology</td>
<td></td>
</tr>
</tbody>
</table>
Control and monitoring
Each battery charger module is full digital controlled (DSP technology). The monitoring of the converter is supported by CANopen interface. A free voltage contact output signal (from relay) provides information (battery charger operating) to the train diagnostic system.

Cooling system
The unit is cooled by air forced externally. The battery charger is located inside an electrical cabinet with ventilation of filtered air.

Mechanical design
The converter is suitable to be mounted on board inside a 19 inch rack. All electrical interfaces are located in the back for easy and fast connection.

Diagnostics and service
The service-friendly modular design with highly standardized components ensures high reliability, excellent spare parts availability, and optimized life cycle costs. For maintenance, a diagnostic interface (USB) is available in order to monitor converter status and alarms history.

Application example
BORDLINE® M6 AC is mounted in the power head of X2000 high-speed train revamped by ABB and running in Sweden and Norway.