BORDLINE® M230 DC converts the power from the 1.5kVdc line for onboard consumers (AC, DC and battery).

**Characteristics**
- Latest IGBT technology
- Solid aluminum underfloor construction
- Integrated cooling system
- Integrated auxiliary converter, battery charger
- Flat battery start up function
- Powerful control platform

**System overview**
The BORDLINE® M230 DC static converter is realized with modern IGBT technology and provides a three-phase sinusoidal AC voltage output and a DC voltage output for charging the battery.

BORDLINE® M230 DC consists of:
- Line contactor
- Precharge contactor/resistor
- DC-link capacitor
- Auxiliary converter
- Battery charger
- Voltage limiter unit
- Cooling system including water to air heat exchanger, pump and fan
- AC 800PEC control module
- Flat battery start device

**Auxiliary converter**
The auxiliary converter provides a three-phase sinusoidal AC voltage output for the external 50 Hz auxiliary transformer.

**Battery charger**
The low voltage power supply and battery charger is internally connected to the three-phase AC output of the converter. In the case of a heavily discharged vehicle battery the electronics will be fed from a flat battery start device which is connected directly to the input voltage. Switchover occurs automatically.

**Voltage limiter unit**
The Voltage limiter unit limits the DC-link voltage to a safe value, it is used to suppress transient DC-link voltages and actively discharges the DC-link during converter shutdown.
Control and monitoring

ABB’s control platform AC 800PEC is used in all traction converters, as well as in a wide range of industrial applications. This unit covers control and protection functions, diagnostics and interfacing to the vehicle control unit. The fast and powerful control is based on Power PCs for the industry. The modular programming ensures quick adaptation of the control software, simplicity and reliability.

Cooling system

The power electronics are efficiently cooled using service water, thereby allowing for a very compact construction. The temperature of the coolant is lowered using a heat exchanger, which is integrated into the converter cabinet. An additional internal blower provides forced air circulation inside the cubic, in order to avoid hot spots.

Mechanical design

BORDLINE® M230 DC is housed in a traction proven IP65 housing, designed to be mounted under-floor. Due to its modular design, it allows for easy access for maintenance.

Application example

The auxiliary converter BORDLINE® M230 DC_1.5kV is mounted in the vehicle cars of the Nanjing Metro line 1 extension south, serving the city of Nanjing, China. The six-car metro train is supplied with two BORDLINE® M230 DC_1.5kV and four BORDLINE® CC750 DC_1.5kV Compact Converters.

Technical data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC line voltage (EN 50163)</td>
<td>1500 Vdc</td>
</tr>
<tr>
<td>Auxiliary converter</td>
<td>3 x 400 V/50 Hz, 245 kVA</td>
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<tr>
<td>Battery charger</td>
<td>110 Vdc, 35 kW</td>
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<tr>
<td>Vehicle control interface</td>
<td>CANopen, I/Os</td>
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<tr>
<td>Product option</td>
<td>Flat battery start device</td>
</tr>
<tr>
<td>Dimensions (L x W x H)</td>
<td>2000 x 2100 x 680 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>1270 kg</td>
</tr>
</tbody>
</table>

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.