The BORDLINE® M75 DC static converter is a compact, rugged unit developed to feed auxiliary services of the metro.

**System overview**
The BORDLINE® M75 DC converter is based on modern IGBT technology.

The system is composed by:
- N° 1 DC/AC inverter (750 Vdc/415 Vac 50 Hz 3ph -55 kVA) to supply AC loads
- N° 1 AC/AC insulation transformer (415 Vac 3ph to 240 Vac 1ph - 5 kVA)
- N° 1 LVPS1 DC/DC converter (750 Vdc/48 Vdc - 20 kW), that turns catenary voltage (750 Vdc) into 48 Vdc to supply DC loads and charge the batteries
- N° 1 LVPS2 DC/DC converter (48 Vdc/24 Vdc - 5 kW), to supply DC loads @24 Vdc

**Functionality**
A not isolated three-phase inverter, due to the installed sine-filter, generates a sine wave three phase voltage at the converter output. Three-phase output also feeds 3ph to 1ph transformer. A V/F control is implemented to limit the inrush current when a heavy load is powered (e.g. compressor). An isolated DC/DC converter (LVPS1) is available to convert the 750 Vdc catenary voltage in a 48 Vdc to supply the electronic loads of the metro and charge the batteries. A control for compensation in temperature of batteries charging voltage is integrated.

An isolated DC/DC converter (LVPS2), fed by batteries, is available to supply DC electronic loads of the metro @24 Vdc

**Characteristics**
- IGBT technology
- Compact and robust design
- Integrated sine filter
- Fed by 750 Vdc catenary
- Integrated battery charger and DC/DC
- Ethernet diagnostic port
- CANopen communication interface to TCMS
- Full digital control
- Underfloor installation
- Air forced cooled

**Technical data**

<table>
<thead>
<tr>
<th>Input Voltages</th>
<th>750 Vdc (500 Vdc - 1000 Vdc)</th>
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<tbody>
<tr>
<td>Output Voltages</td>
<td>415 Vac 50Hz 3ph - 55 kWh</td>
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<tr>
<td></td>
<td>240 Vac 50 Hz 1ph - 5 kW</td>
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<td></td>
<td>48 Vdc - 20 kW</td>
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<td></td>
<td>24 Vdc - 5 kW</td>
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<tr>
<td>Protection degree</td>
<td>IP65 - IP54 for fans</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>-20°C...+40°C</td>
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<tr>
<td>Communication Interface</td>
<td>Ethernet, CANBUS</td>
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<tr>
<td>Dimensions</td>
<td>1483 x 1176 x 486 mm</td>
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<tr>
<td>Weight</td>
<td>475 kg</td>
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</tbody>
</table>
Control and monitoring
The converter is fully digital controlled (DSP technology) and it is structured so that each power section (AC or DC) can work independent of each other. All outputs are short-circuited proof. The control electronics also monitor voltages, currents and internal temperatures. The interface to the Train Control and Management System is managed by CANopen bus.

Cooling system
The converter is cooled by forced air. The internally mounted fan and the air duct are integral parts of the onboard converter. A thermal monitoring device protects the converter from becoming overheated.

Mechanical design
The metal structure, based on painted steel material (dielectric white internally and black externally), has been designed for IP65 protection and to be mounted on metro cars (underfloor). The heatsinks are partitioned so that the individual modules can be easily removed and replaced.

Diagnostics and service
The service-friendly modular design with highly standardized components ensure high reliability, excellent spare parts availability, and optimized lifecycle costs. For maintenance a diagnostic interface (Ethernet) is available. Further data can be obtained using a standard PC and the BORDLINE®-View, a diagnostic tool that includes an advanced self-diagnosis function, which provides advice and instructions for service and repair.

Application example
BORDLINE M75 DC_750V is mounted on metro cars running in Kuala Lumpur, Malaysia.