**BORDLINE® M1 DC_24V**

DC/AC converter for rolling stock applications

The BORDLINE® M1 converter is a compact, rugged unit developed for coaches and locomotives.

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**System overview**

The BORDLINE® M1 DC is a DC/AC converter, with voltage/frequency control, to supply single-phase loads in railway applications. It’s based on modern MOSFET technology.

BORDLINE® M1 DC contains:
- Input fuse and LC filter
- Buck and push-pull converter
- Insulation transformer: insulates the mains to the load for safety requirements satisfaction
- AC ground fault detector
- DSP control unit
- Diagnostic and communication port

**Functionality**

The BORDLINE® M1 DC converter turns an input nominal DC voltage of 24V from batteries to an output sinusoidal voltage to supply 1 phase AC loads. The converters operate at high switching frequencies allowing for low ripple voltage and compact build size.

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**Characteristics**

- DSP technology
- Compact and rugged design
- On board installation
- High reliability thanks to consolidated building blocks

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**Technical data**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>BORDLINE® M1 DC_24V</th>
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<tbody>
<tr>
<td>DC voltage input</td>
<td>24 V&lt;sub&gt;dc&lt;/sub&gt; (16.8 V&lt;sub&gt;dc&lt;/sub&gt; - 36 V&lt;sub&gt;dc&lt;/sub&gt;)</td>
</tr>
<tr>
<td>AC voltage output, nominal</td>
<td>220 V&lt;sub&gt;ac&lt;/sub&gt; 50 Hz</td>
</tr>
<tr>
<td>AC output power</td>
<td>1.4 kVA</td>
</tr>
<tr>
<td>Protection degree (rack-mounted)</td>
<td>IP20</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>-25°C ... +70°C</td>
</tr>
<tr>
<td>Diagnostic interface</td>
<td>USB</td>
</tr>
<tr>
<td>Dimensionen (L x W x H)</td>
<td>330 x 300 x 445 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>19 kg</td>
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</tbody>
</table>
Control and monitoring
The converter is fully digital controlled by using a digital signal processor (DSP). The control unit monitors voltages, currents and internal temperatures to protect the device. External overload conditions such as short circuit, excessive ambient temperature, overvoltage are handled safely. The driver electronics supply the trigger signals for the power semiconductors and are also responsible for the protection of the power semiconductors. All outputs are short-circuit proof.

Control interface
Monitoring and configuration of the converter is provided by means of a USB interface.

Cooling system
The unit is cooled by natural convection.

Mechanical design
The equipment has a light and compact structure; it can be mounted on board of coaches or in the machine room in vertical position.

Diagnostics and service
The converter has been designed with highly standardized components, high reliability, excellent spare parts availability, and optimized life-cycle costs. For maintenance, an USB communication interface is available.

Application example
BORDLINE® M1 DC is used in Trenitalia MD coaches. Each coach train is equipped with one converter. It’s installed to feed the electrical fans on coach heating system.