**BATTERY CHARGER**

**BORDLINE® BC_AC_400/480V_M**

For Diesel-Electric Locomotive

The BORDLINE® BC battery charger is a compact, lightweight unit designed to charge the batteries and supply DC loads.

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**System overview**

The battery charger is based on modern SiC power semiconductor technology.

BORDLINE® BC_AC_400/480V_M battery charger consisting of 2 power modules in order to achieve a high redundancy level. Each battery charger module is composed by:

- Simplified power factor correction (PFC) stage to adjust current and voltage phase
- Resonant DC/DC converter providing galvanic isolation
- Digital control based on microprocessor/DSP
- Customer Interface based on CANOpen
- Speed controlled ultra-long-life fans for cooling (inside BORDLINE® BC power modules)
- Forced aired cooling system including two fans and one air inlet filter
- EMI filter and rectifier for AC inputs

**Functionality**

BORDLINE® BC_AC_400/480V_M battery charger is fed by a three phase AC input and generates a DC voltage to charge the vehicle batteries and/or supply DC loads. Thanks to the internal redundancy, maximum power can be generated also in case of single failure.

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The device is configured to start up as soon as the supply line is present (dead battery start). The converter operates at high switching frequencies allowing for low ripple voltage and compact build size. Charging characteristics can be made battery temperature dependent using the provided temperature sensing input.

**Characteristics**

- High power density and compact design
- Built with silicon carbide (SiC) power semiconductors
- Three phase AC voltage input
- Integrated active output diode
- Customized cabinet
- Efficiency > 93 %
- Full redundancy to increase output power and functionalities availability
- Machine room installation
- Air forced cooling integrated into the modules
Technical data

**Input Voltage**
- 3 x 400 V~ AC 50 Hz
- 3 x 480 V~ AC 60 Hz

**Output Voltages**
- 24 VDC (17...31 VDC)
- 2 x 6.3

**Protection degree**
- IP20

**Operating temperature range**
- -40°...+70°C

**Communication Interface**
- CANOpen

**Dimension**
- 19" rack 3U

**Weight**
- 21 kg
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 of the battery charger is provided by CANOpen interface that is also used as configuration port.

Cooling system
Each BORDLINE® BC module is cooled by forced air. Fan speed is controlled by the needs of the device (depending on load conditions and current ambient temperature).

Mechanical design
The converter is mounted underframe the Electrical Multiple Unit. All electrical interfaces are located outwards and upwards for easy and fast extraction of the mechanical assembly.

Diagnostics and service
For maintenance, a diagnostic information (such as current loading, temperature, errors and warnings) is provided via the CANOpen interface.

Application example
BORDLINE® BC has been installed in Diesel – electric locomotives running in United Kingdom.