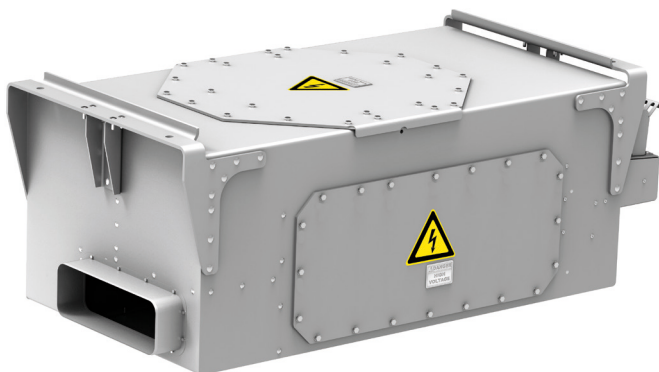


## BATTERY CHARGER

# BORDLINE® BC\_110V

## Battery charger for High Speed Trains



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

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BORDLINE® BC\_110V  
for High Speed Trains

### System overview

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

BORDLINE® BC\_110V contains:

- N°2 BORDLINE BC power modules
- EMI filter and rectifier for AC inputs
- 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 Ethernet/CIP
- Speed controlled ultra-long-life fans for cooling (inside BORDLINE BC power modules)
- Air cooling system composed by two fans and one air-to-air heat exchanger

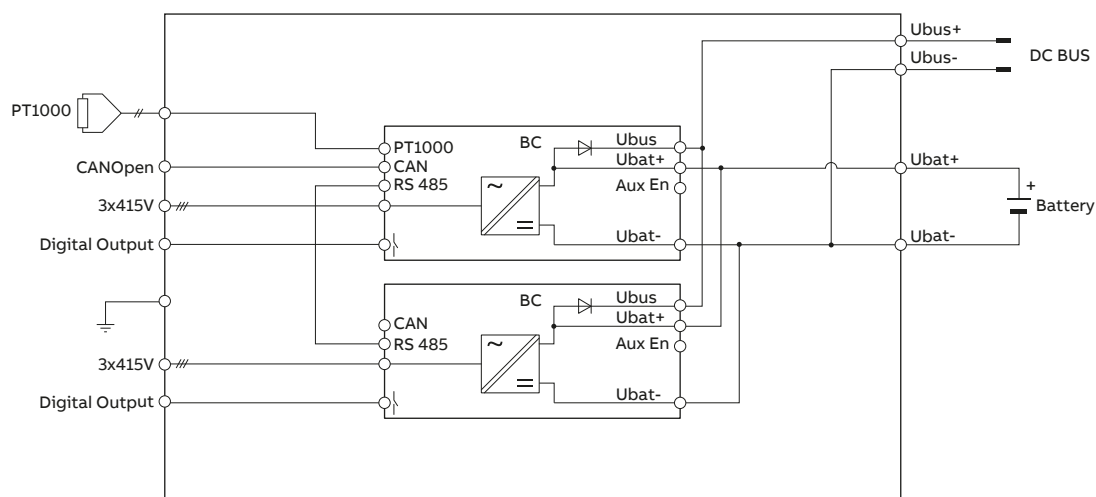
### Functionality

The BORDLINE® BC 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. 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 with IP65 protection degree
- Efficiency > 95 %
- Redundancy to increase output power availability

Technical data	BORDLINE® BC_110V
AC Voltage Input	3 x 480 Vac, 60 Hz
DC Voltage Output	110 Vdc (77...137,5 Vdc)
Max DC Output Power	19 kW
Protection degree	IP65
Operating temperature range	-25°...+48°C
TCMS interface	Ethernet CIP
Diagnostic Interface	Ethernet, CANOpen
Dimension	1100 x 547 x 435 mm
Weight	80 kg



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01 Block diagram of  
BORDLINE® BC\_110V

### 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 means of Ethernet CIP interface; configuration is based on CANOpen protocol.

### Cooling system

Each BORDLINE BC module is cooled by forced air. An air-to-air heat exchanger and two additional fans ensure a good cooling of the IP65 area. Fans speed is controlled by the needs of the device (depending on load conditions and current ambient temperature).

### Mechanical design

The converter is mounted underframe of passenger cars. (Four units for each train). All electrical interfaces are located on one side for easy and fast connection.

### Diagnostics and service

For maintenance, a diagnostic information (such as current loading, temperature, errors and warnings) is provided via Ethernet CIP and Web Browser interface. Additional diagnostic interface for each BORDLINE BC module, via CANOpen interface.

### Application example

BORDLINE BC\_110V has been installed in new high speed trains running in USA.