

## BATTERY CHARGER

# BORDLINE® BC

## Compact battery charger module for all rolling stock applications



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

01 BORDLINE® BC for rolling stock applications

### Characteristics

- Compact and lightweight design
- Eco-friendly due to minimal material use
- Very high efficiency up to 96 %
- Proven maintenance free long-life fans
- Three-phase AC or onboard DC voltage input
- 19-inch rack mount, switchgear cabinet or dedicated roof or underfloor housing installation
- Scalable power through parallel operation
- Very high availability of large power systems through implementation of redundancy concepts
- Bidirectional DC voltage model

### System overview

The BORDLINE® BC battery charger module is based on a state-of-the-art high efficiency converter topology using silicon carbide (SiC) power semiconductors.

BORDLINE® BC contains:

- EMI filters at input and output
- Input rectifier if AC voltage input is used
- Simple power factor correction stage to align input current and voltage (power factor  $\approx 0.95$ )
- DC/DC converter providing galvanic isolation (bidirectional)
- Lossless output ORing diode
- Digital control and protection based on DSP
- CAN or ethernet communication interfaces

### Functionality

The BORDLINE® BC battery charger module is fed by a three-phase AC or onboard DC grid and generates a DC voltage output to charge the vehicle backup batteries and/or supply DC loads. The charging characteristics can be made battery temperature dependent using the provided temperature sensing input. An integrated lossless output ORing diode decouples the battery from the DC bus. Control, monitoring, and configuration are provided by means of a CANopen, SAE J1939, or ethernet TRDP interface. Configurable digital inputs and outputs allow for control and monitoring without using a communication bus. The device can be configured to operate autonomously as soon as the supply line is present (dead battery start). Sense voltage inputs enable battery cell voltage monitoring. The provided PC-tool "BC-Launcher" allows easy configuration and monitoring of current operating conditions.



01

01 High-speed train  
"Giruno" of Swiss  
Federal Railways  
Photo: Stadler

02 Block diagram of  
BORDLINE® BC

### Control and monitoring

The converter is fully digital controlled using a digital signal processor (DSP). The control unit monitors internal and external voltages, currents, and temperatures to protect the device and charge the battery according the predefined charging characteristics. External overload conditions such as short circuit, excessive ambient or battery temperature, and overvoltages are handled safely. All outputs are short circuit proof.

### Communication interface

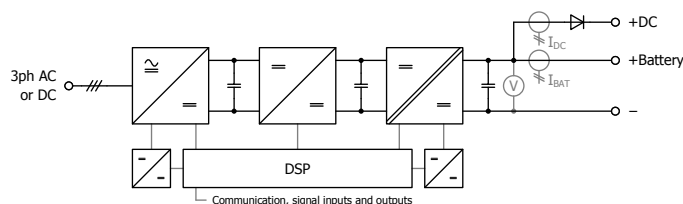
Monitoring and configuration of the battery charger is provided by means of a CANopen, SAE J1939, or an ethernet TRDP interface.

### Cooling system

The unit is cooled by forced air. Fan speed is controlled and monitored by the device (depending on load conditions and current ambient temperature). Proven long-life fans enable maintenance free operation.

### Mechanical design

The recommended installation is inside a switchgear/control cabinet. Two units fit side by side inside a standard 19-inch rack. All electrical interfaces are located in the front for easy and fast access. MTTR can be as low as a few minutes in this way. Engineered IP67 housings for one up to four modules are available upon request.



02

### Diagnostics and service

For maintenance, diagnostic information (such as current operating conditions, pending or past errors and warnings) is provided via the communication interface.

### Application example

BORDLINE® BC is used in the new high-speed trains of Swiss Federal Railways (SBB) traveling on the transalpine routes, connecting Zurich with Milan. Each of the 11-car electric multi-system multiple-unit trains are equipped with two traction transformers LOT3000, four Compact Converter BORDLINE® CC1500 MS and nine battery charger modules BORDLINE® BC.

Technical data	BORDLINE® BC
AC voltage input	3 x 400 - 480 V <sub>AC</sub> 50/60 Hz
DC voltage input	450 - 750 V <sub>DC</sub>
DC voltage output, nominal	24/36/72/110 V <sub>DC</sub>
DC output power, maximum	8/10/7/10 kW
Protection degree (rack-mounted)	IP20
Operating temperature range	-40 °C .... +70 °C (+85 °C)
Charging characteristics	IUoU
Communication interfaces	CANopen, SAE J1939, TRDP
Dimensions (L x W x H)	400 x 220 x 125 mm
Weight	10 kg

ABB Switzerland Ltd  
Traction  
Austrasse  
5300 Turgi, Switzerland  
sales.traction@ch.abb.com

[abb.com/railway](http://abb.com/railway)  
[abb.com/tractionconverters](http://abb.com/tractionconverters)

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