

BORDLINE® designed for LRV

Propulsion and auxiliary converters
or complete traction packages



ABB

ABB IS THE PARTNER OF CHOICE

to power your Light Rail Vehicles

■ THE EXPERT FOR POWER ELECTRONICS

In Switzerland, three ABB sites with approximately 2'000 employees (predominantly in R&D and engineering) work closely together to develop power semiconductors and power electronic applications for many different industries. ABB leverages synergies through standardization of modules, control hardware, and control software. You benefit from ABB's deep experience with components and algorithms, service and life cycles in different environments.

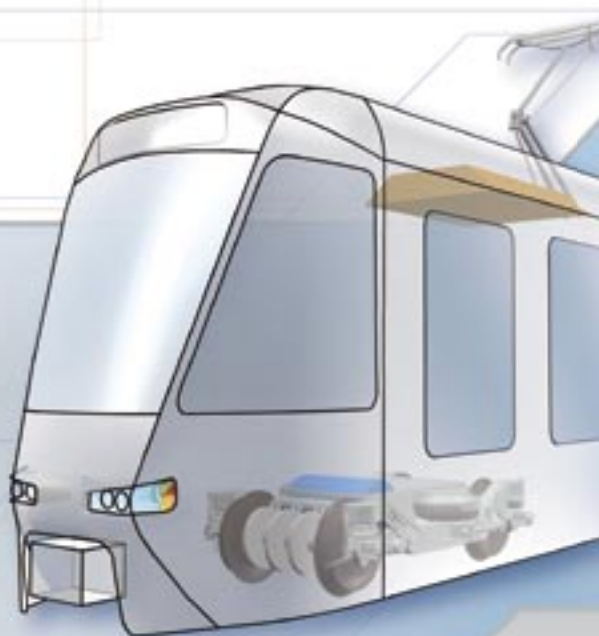


■ Cutting-edge technology at ABB labs in Switzerland

■ STRONG SERVICE OFFER

Our service concept centers on high availability of BORDLINE® converters, spare parts and assistance. Many customers rely on ABB empowering their service personnel to successfully take over all on-site maintenance.

ABB's service offer is modular and includes, for instance, special testing (combined tests), commissioning support, training, spare part logistics, module repair, field operating analysis, product maintenance and upgrades.



■ POWER ELECTRONIC BUILDING BLOCKS

Rail vehicles are highly customized. BORDLINE® converters fit a broad range of vehicle designs because ABB standardizes at the level of the power electronic building blocks. These modules are reliable and well tested in the field. Product maintenance at the module level allows ABB to support your vehicles throughout their entire lifetime and guarantee high availability of spare parts.

PRODUCT OVERVIEW

BORDLINE® M

Auxiliary Converters



BORDLINE® CC400

Compact Converters
Propulsion with
integrated auxiliary
converter



TRACTION PACKAGES

Complete solutions
with converters,
motors, and other
power elements



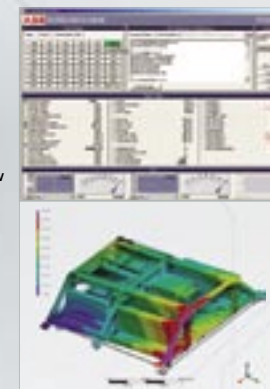
■ POWERFUL CONTROL PLATFORM

BORDLINE® traction converters employ the AC 800PEC control platform, which is used in a wide range of industry applications – from metal mills to wind turbine plants. This fast powerful control is built on industry-grade power PCs. MATLAB®/Simulink®¹⁾ programming ensures quick, reliable coding and easy adaptation of the control software.



■ Versatile ABB control platform AC 800PEC

■ BORDLINE®-View diagnostic tool



■ FEM analysis of mechanical robustness for an LRV Compact Converter

■ THE POWER COMPONENT SUPPLIER TO THE RAIL INDUSTRY

Today, ABB is one of the leading suppliers of power components to the rail industry. ABB stands for reliability, service, and innovative solutions both for new vehicles and fleet refurbishment. As a fully independent component supplier, ABB is uniquely positioned for trustful partnerships with LRV manufacturers and transport operators. For this industry, ABB offers high-quality converters, motors, and other electrical components.

■ QUALITY ASSURANCE

Good project management and quality assurance are the prime concerns of our company. ABB traction converters are IRIS-certified.



■ TRANSPARENT DIAGNOSTICS

Our converters are shipped with BORDLINE®-View, a diagnostic tool that visualizes signals, parameters and states of the traction system. It includes an advanced Self-Diagnosis Function, which gives advice and instructions for maintenance and repair. BORDLINE®-View is easy to use and runs on a standard laptop.

■ ROBUST AND RUGGED DESIGN

Our products are built for the harsh conditions of public transport. Rigorous testing and simulations ensure that modules and systems perform perfectly in the environments they are designed for. All our roof-mounted or under-floor converters are IP65 protected.

¹⁾ MATLAB®/Simulink® is a trademark of Mathworks™

ABB COMPACT CONVERTERS FOR LRV – PROPULSION AND AUXILIARY CONVERTER

BORDLINE® CC400

ABB presents here the flagship of its BORDLINE® CC400 platform: In terms of its high integration, purpose and compactness, the design of this traction converter may be considered a work of art. Developed for a very wide range of light rail vehicles, it converts 600V_{DC} or 750V_{DC} line voltage into:

- Propulsion power to control and drive the traction motors
- Auxiliary power to supply the onboard loads

■ ADVANTAGE OF HIGH INTEGRATION

All power electronic components needed for an LRV are integrated in one device with one interface to the Train Communication Management System (TCMS):

- Reduced control communication complexity
- Reduced power wiring
- Optimized space and weight
- Simplified maintenance

■ DESIGNED FOR EASY SERVICING

Just 10 minutes are all your service staff need to change a power module of BORDLINE® CC400. The safety scaffold allows simple and safe handling.

The embedded Self-Cleaning Mode facilitates reduced maintenance as well as less cleaning.

■ BORDLINE® CC400 CONTAINS:

- 2 propulsion converters
- 2 main switches
- 2 line filters
- 2 braking choppers
- 1 auxiliary converter (fixed frequency – 50 Hz)
- 1 auxiliary converter (variable frequency – blower control)
- 1 battery charger

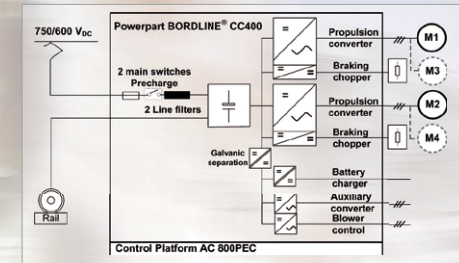
For technical data please refer to product reference sheets.

■ BORDLINE® Compact Converter, under-floor for Tango in Bochum (Germany); ©Stadler

■ BORDLINE® Compact Converter, roof mounted for Variobahn in Bochum (Germany); ©Stadler

■ Configurable connectors

■ Inverter module for LRV motors



■ Single-line diagram of a BORDLINE® Compact Converter

■ ON THE ROOF OR UNDER-FLOOR

BORDLINE® CC400 is designed to be mounted under-floor or on the roof of the vehicle, and is compatible with most light rail vehicles.

The variety of components and spare parts is reduced through this double-purpose design. It also results in economies of scale and more standardized processes:

- High quality and reliability
- Long-term availability of spare parts
- Short delivery times

■ SUPPORT FOR ALL VEHICLE CONCEPTS

Each propulsion converter can either control one or two motors, allowing both vehicle concepts: wheel motor for low-floor or geared axle motors for high-floor vehicles.

In order to provide maximum vehicle availability, each propulsion converter, as well as the auxiliaries can be operated independently and disconnected separately in case of malfunction.

■ CONFIGURABLE CONNECTORS

The Compact Converter has configurable connectors for a customized solution based on the customer's interfaces.

■ FLEXIBLE AND EFFICIENT COOLING

BORDLINE® CC400 achieves its unrivaled power density by means of water cooling, using ordinary service water. This cooling concept, combined with the IP65 protection degree, keeps the electronics free of pollution. Cooling on demand and noise control functions are implemented.

The BORDLINE® CC400 can be flexibly combined with an external heat exchanger. A great variety of cooling set-ups have been realized. As an example, BORDLINE® HEX30 is a combined cooling system for converter, motors and braking resistors.

■ PLATFORM CONCEPT AND OTHER CONFIGURATIONS

Development of ABB traction converter platforms is based on power electronic building blocks and the versatile control system AC 800PEC. Hence, the combination of modules can be adapted to the specifications of different vehicle designs.

For instance, in a retrofit an auxiliary converter or battery charger integrated in the main propulsion converter may not be needed. Furthermore, output power ranges can be adapted.

ABB AUXILIARY CONVERTERS FOR LRV

BORDLINE® M

ABB's BORDLINE® M series is a product platform for static converters with a wide application range on light rail vehicles. They are designed for use with nominal grid voltages of 600V_{DC} and 750V_{DC}. The units are housed in dust and waterproof casings (IP65) and are suitable for either roof or under-floor mounting.

■ POWER ELECTRONIC BUILDING BLOCKS

The compact and flexible BORDLINE® M product platform for LRVs is realized with standard modular units (power electronic building blocks). Using these proven modules, it is possible to realize cost-effective, tailor-made solutions that fit perfectly in your vehicle design.



■ BORDLINE® M product platform at a glance – modular, flexible and service friendly



■ BORDLINE® M30 for tramway Citadis in Tenerife (Spain); ©ALSTOM Transport/R. Santonja

■ COMPREHENSIVE REFERENCE LIST OF SATISFIED CUSTOMERS

ABB's experts have created a flexible platform that allows products to be realized for the whole power range of LRVs, from tramways to metros.

For references and technical data, please refer to the corresponding documentation.

■ REDUCED COST OF AUXILIARIES

Both AC and DC outputs are galvanically insulated from the input for improved safety and EMC behavior. The 3-phase AC output also has a sine filter. The sinusoidal voltage waveform allows the use of standard 3-phase motors for lower investment costs. Reduced motor insulation stress and motor losses result in a higher lifetime for the auxiliary motors.

■ SOFT STARTING

High overload capability and a soft-start function permit trouble-free starting of the converter even under heavy loads. The frequency and the voltage are reduced so that the output current is reduced to an appropriate value. The motors are then brought up to nominal power with a soft start.



■ BORDLINE® M55 for tramway Cobra in Zurich (Switzerland); ©Bombardier Transportation

■ LONG LIFETIME

The robust and rugged design of BORDLINE® M converters ensures long lifetime and high availability. ABB invests continuously in life cycle management and offers interesting upgrade and retrofit solutions.

■ SERVICE FRIENDLY

Service teams will appreciate the ABB design. Almost no maintenance is required, and the mean time to repair is short thanks to the powerful diagnostics tool and the modular construction.

ABB TRACTION PACKAGES FOR LRV

BORDLINE® CC400, motors, and additional power components

ABB traction packages for LRVs consist of propulsion converters (incl. drive control unit AC 800PEC), traction motors and auxiliary converters. Other power components, such as switchgear, brake resistors, line inductors, heat exchangers and surge arrestors can be included in our scope of supply.

■ EXPERT SUPPORT THROUGH ALL PROJECT PHASES

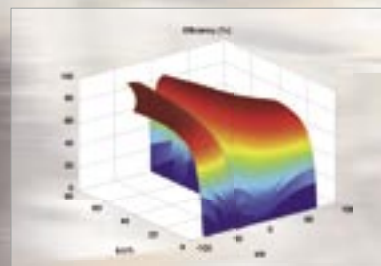
We provide mounting and wiring instructions, facilitate commissioning on the first vehicle and support our customers with homologation tests and required documentation.

Further, we offer service and maintenance contracts throughout the product life cycle.

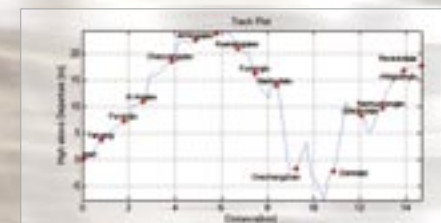
■ ABB motor for tramways



■ BORDLINE® HEX30 cooling unit with integrated brake resistor



■ Traction chain simulation



■ Track profile and vehicle energy consumption calculation

■ SYSTEM DESIGN AND SIMULATION COMPETENCY

After analyzing the customer's needs, ABB performs all relevant vehicle simulations. Mission profile, energy consumption and line interference simulations allow configuration of the optimum system solution.

System performance will usually be tested and approved by a full-scale combined test and digital real time simulation in our power laboratories.



ABB Switzerland Ltd.

Traction Converters
Austrasse
5300 Turgi
Switzerland
Tel: +41 58 585 00 00
e-mail: traction.converters@ch.abb.com
www.abb.com/railway