COMPACT CONVERTER

BORDLINE® CC400 DC

For light rail vehicles with energy storage system

The Compact Converter BORDLINE® CC400 DC converts 600 Vdc or 750 Vdc line voltage into propulsion power to control and drive the traction motors and auxiliary power to supply the onboard loads. It is complemented by a modular energy storage system, including batteries, cooling and battery management system.

—
BORDLINE® CC400 DC for light rail vehicles

Characteristics

- All power electronics (traction and auxiliary power) in one roof-mounted housing
- Lightweight and easy maintenance
- Standard ABB modules
- Energy storage system (ESS) as compact additional roof-mounted unit
- ESS purposes: operation in catenary-free sections (distance depending on traction battery capacity); supply for auxiliary loads during short overhead line voltage interruptions; braking energy saving in case of non-receptive overhead line; peak load saving

System overview

The BORDLINE® CC400 DC converters are compact, modular, rugged units based on modern IGBT technology and designed for light rail vehicle applications.

BORDLINE® CC400 DC Compact Converter contains:
– 1 propulsion converter
– 1 main switch
– 1 line filter
– 1 braking chopper
– 1 DC/DC converter with filter for ESS
– Integrated auxiliary converter (50 or 60 Hz)
– Integrated auxiliary converter (variable frequency)
– Integrated battery charger
– AC 800PEC control module

The BORDLINE® CC400 DC can be directly coupled (power, auxiliary power, CAN bus) to an ESS unit which consists of a traction battery unit, a cooling unit, and a battery management system.

Propulsion converter / ESS converter

The propulsion converter controls two motors and the braking chopper. During braking operation the energy can be stored in the ESS, recuperated to the grid or dissipated in the braking resistor.

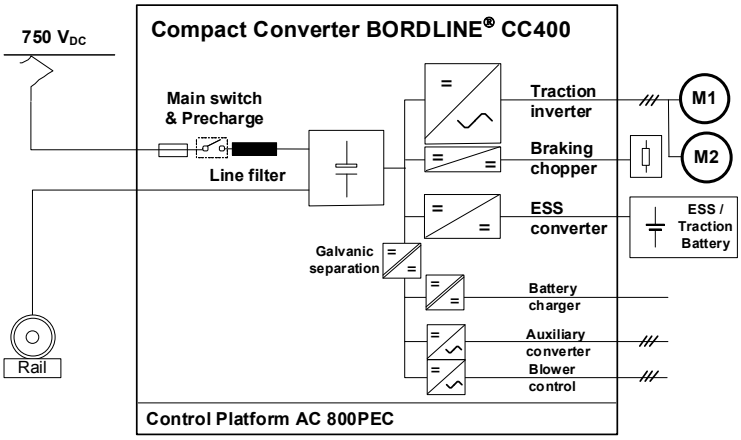
Auxiliary converter

The auxiliary converter provides a three-phase sinusoidal AC voltage output and a DC voltage output for charging the vehicle battery. Both outputs are galvanically insulated from the DC line voltage.

Powerful control platform

ABB traction converters are built on the AC 800PEC control platform, probably the most powerful modular controller for high-speed performance on the market. A wide range of other industrial applications uses this control platform. The AC 800PEC software provides an excellent range of control and communication functionality, in cycle times that extend from the sub-microsecond to the millisecond level. Compared to most other commercially available traction control systems, the modular application software in the AC 800PEC optimizes significantly the train commissioning.

—
01



—
02

—
01 Stadler's Tramlink V4 in the city of Santos, Brasil
Photo: Stadler
—
02 Simplified block diagramm of BORDLINE® CC400 with ESS

Converter cooling system
The Compact Converter is efficiently cooled using liquid coolant. This allows a very compact construction. The temperature of the coolant is lowered using an external heat exchanger.

Energy storage system battery unit
The ESS battery unit is based on lithium cells with lithium titanate oxide (LTO) anode with inherently safe cell chemistry. The battery management system monitors battery temperature, insulation, and cell voltages; it controls battery functions, currents, and the cooling system for the traction battery; and it provides safety and protection functions.

Battery cooling system
The ESS batteries are water-cooled for optimized power rating. The battery temperature is controlled by the BMS to be at around 25 °C to get a long lifetime, therefore a compact temperature management system is mounted next to the battery unit.

Mechanical design
Both BORDLINE® CC400 and energy storage system are housed in IP65 aluminum cabinets, resulting in very low overall weight. The equipment is designed for mounting on the vehicle roof. Due to its modular design, it offers easy maintenance access.

Diagnostics and service
The service-friendly modular design with highly standardized components ensures high reliability, excellent spare parts availability, and optimized life-cycle costs. The Compact Converter is delivered with BORDLINE® View, a diagnostic tool that visualizes signals, various parameters and the state of the traction system. It consists of an advanced self-diagnosis function, which provides advice and instructions for service and repair. BORDLINE® View is easy to use and runs on a standard PC.

Application examples
Stadler's light rail vehciles of the type Tramlink V4 for the São Paulo Metropolitan Urban Transport Company (EMTU) are equipped with Compact Converters BORDLINE® CC400 DC including energy storage system.

Technical data	BORDLINE® CC400 DC_750V
Input voltage	600 / 750 Vdc
Propulsion output	0..550/660 Vac, 320/620 kW at wheel
Braking chopper	650 kW
Auxiliary converter	3 x 400/460 V 50/60 Hz, 35 kVA
Blower control	3 x 400/460 V 0...60 Hz, 5 kVA
Battery charger	24 / 36 / 72 / 110 Vdc, 8 kW
Vehicle control interface	CANopen, I/Os
Dimensions (L x W x H)	1600 x 1800 x 430 mm
Weight	550 kg
	Energy Storage System
Power (peak/continuous)	110/80 kW
Capacity approx.	16 kWh
Battery control interface	CANopen, I/Os
Weight	560 kg
Battery lifetime[1]	> 5 years

Energy storage system is designed according to customer specification; technical data above refers to tramway for EMTU.
[1] Battery lifetime designed according to customer specification.

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

abb.com/railway
abb.com/tractionconverters

3BHS262329 ZAB E07 REV.B 2018-07-03