

COMPACT CONVERTER

BORDLINE® CC1500 AC_15-25kV

For double-deck electric multiple units



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BORDLINE® CC1500 AC
for double-deck EMU

Characteristics

- High power density of 1.5 MW/t
- Innovative low voltage IGBT technology
- Solid aluminum construction and consequent lightweight design
- Optimized reliability and life cycle due to dimensioning and component reduction
- Powerful control platform
- «Best Efficiency Control»
- Auxiliary converter integrated

System overview

Incoming power from the overhead line (15/25 kV) is stepped down by the transformer to feed the Compact Converter BORDLINE® CC1500 AC which supplies the motive power for the traction motors. BORDLINE® CC1500 AC consists of two separate converter elements (part 1 and 2), controlled by one common control system and integrated in one cabinet. Converter parts 1 and 2 supply each individual traction motor.

The Compact Converter

BORDLINE® CC1500 AC converts the power from 15 kV/16.7 Hz or 25 kV/50 Hz line into propulsion power for the traction motors and auxiliary power for onboard consumers.

Part 1 consists of line contactor/precharge unit, line converter, propulsion converter, DC-link circuit, high voltage limiter, auxiliary converter (sine filter 50Hz), and auxiliary inverter (variable performance-related frequency for the fan of the cooling tower). Converter part 2 is identical to converter part 1 but has no auxiliary converter and auxiliary inverter. Apart from the common control system of the overall converter, converter parts 1 and 2 work independent of each other in case of failure, thereby completing the well-engineered redundancy concept of the double-deck EMU.

Propulsion converter

BORDLINE® CC1500 AC Compact Converter is a compact and solid unit incorporating modern low voltage IGBT technology. With a high switching frequency of 2 kHz, BORDLINE® CC1500 AC generates sinusoidal-like output current, which dramatically reduces the losses, the audible noise and the mechanical stress on the traction motor. To maximize the energy efficiency, a «Best Efficiency Control» algorithm is implemented. This algorithm finds the optimal setpoint under any operation condition.



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01 Electric double-deck train, S-Bahn Zurich
Photo: SBB

02 Block diagram of BORDLINE® CC1500 AC

Auxiliary converter

The auxiliary converter generates directly from the DC-link circuit voltage, a current limited 3-phase-voltage. A sine filter smoothes this pulse width modulated voltage to provide a quasi-sinusoidal voltage waveform at the output terminals of the auxiliary converter.

Powerful control platform

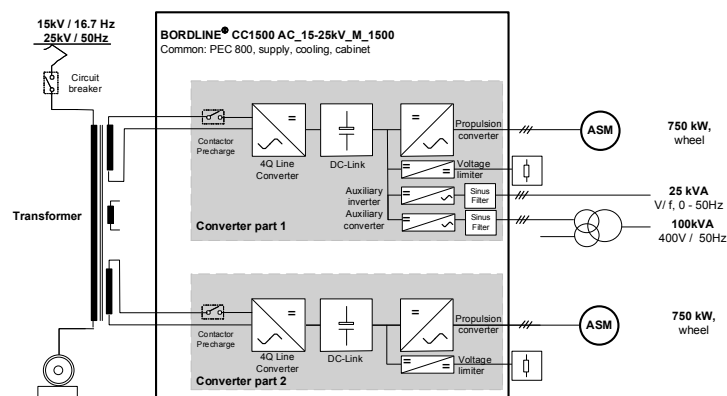
ABB Compact Converters are based on the AC800 PEC control platform which is a modular and flexible high-speed traction control unit designed for harsh environmental and operating conditions in rolling stock.

Cooling system

The equipment is efficiently cooled using service water, thereby allowing for a very compact construction. The internal fan ensures forced air circulation inside the power parts and dissipates the heat with an internal air-to-water heat exchanger, to the main cooling circuit. An additional, external ventilation of the power parts can therefore be omitted.

Mechanical design

The propulsion and auxiliary converter are each housed in a vibration resistant cabinet. BORDLINE® CC1500 AC is machine room mounted, solid and resistant (IP54) and sets new standards in lightweight construction. The modular design is easy to service. Power parts can easily be exchanged through drawer insets by a single person.



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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

BORDLINE® CC1500 AC is used in the new electric double-deck KISS trains for the S-Bahn Zurich. The six-car trains from Stadler have two power heads, each equipped with two ABB traction transformers LOT 1100 and two BORDLINE® CC1500 AC_15-25kV.

Technical data	BORDLINE® CC1500 AC_15-25kV_M_1500
AC voltage input	400 Vac / 16.7 Hz and 50 Hz
Propulsion output	0...520 Vac, 750 kW at wheel
Auxiliary converter	3 x 400 V / 50 Hz, 100 kVA
Auxiliary inverter	0...50 Hz, 25 kVA
Battery charger	optionally integrated
Vehicle control interface	CANopen
Mounting position	Machine room
Dimensionen (LxWxH)	1808 x 793 x 2230 mm
Weight	1005 kg

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