

COMPACT CONVERTER

BORDLINE® CC400 MS

for tram-train with 600/750 Vdc and 25 kVac 50 Hz line voltage



The BORDLINE® CC400 Compact Converter converts 600/750 Vdc and 25 kVac overhead catenary supply into propulsion power required for driving the traction motors. In addition, the Compact Converter also generates auxiliary power for onboard auxiliary loads (AC, DC and battery).

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BORDLINE® CC400 MS
for light rail vehicles

Characteristics

- Multi-system operation (600/750 Vdc and 25 kVac)
- Auxiliary converter and battery charger integrated
- Compact and lightweight solution
- Field-proven state-of-the-art building blocks
- Service-friendly modular building blocks
- Modern and predictive diagnostics for easy maintenance

System overview

BORDLINE® CC400 MS is a compact and rugged IGBT based traction converter designed for use in dual-voltage tram trains, operating either with 600/750 kVdc or 25 kVac supply.

BORDLINE® CC400 MS Compact Converter contains:

- System switch contactor and precharge unit
- Line converter
- DC-link circuit
- Voltage limiting unit/braking chopper
- Motor converter
- Auxiliary converter (fixed frequency)
- Auxiliary converter (variable frequency)
- Battery charger
- AC 800PEC traction control unit

Propulsion converter

The propulsion converter converts the input voltage into a three-phase AC voltage of variable amplitude and frequency to driving the traction motors. The torque and speed of the traction motor are controlled continuously by varying the frequency and amplitude of the stator voltage. The converter generates sinusoidal-like voltages due to high switching frequency and optimized pulse patterns. This reduces the losses, audible noise and insulation stress in the traction motor and traction transformer. During braking operation the energy will be recuperated or, if not possible, dissipated in the resistors.

Auxiliary converter

Two separate auxiliary converters (fixed and variable frequency) are integrated and generate galvanically isolated three-phase sinusoidal AC output. The variable auxiliary converter is used for optimized cooling on demand, provides a low-noise operating mode and energy savings.



01

01 Dual voltage tram-train
Photo: Stadler

02 Simplified main circuit
of BORDLINE® CC400 MS

Battery charger

The battery charger operates at high switching frequency to produce a galvanically isolated DC voltage required for charging the on-board auxiliary battery and to feed auxiliary DC loads.

Heating line

The heating line enables energy efficient heating of the vehicle under all catenary voltages without additional power conversion.

Powerful control platform

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

Cooling system

The converter is efficiently cooled using water-glycol mixtures, allowing a very compact construction. The temperature of the coolant is lowered using an external heat exchanger. The additionally integrated internal heat exchanger circulate the air inside the converter cabinet to remove losses generated by internal components. The captured internal losses are then exchanged to the main water cooling circuit.

Mechanical design

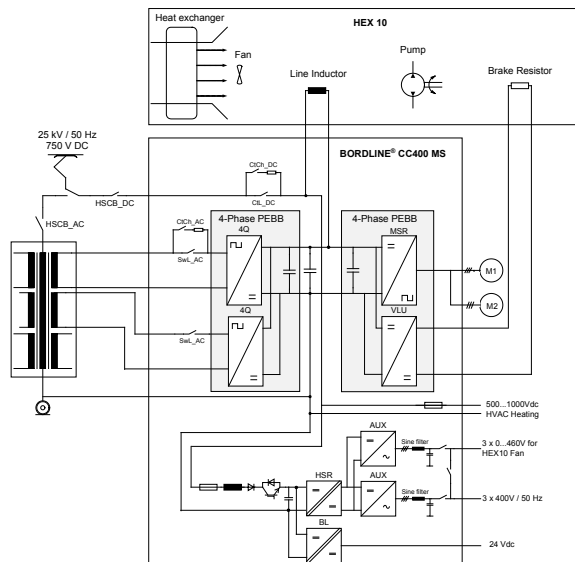
The BORDLINE® CC400 MS is housed in an IP65 aluminum cabinet and has a very low overall weight. The equipment is designed for roof mounting. The modular design offers easy maintenance access.

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Diagnostics and service

The service friendly modular design with standard components ensures high reliability and low life cycle costs for maintaining the system. The BORDLINE® View is the diagnostic application used to visualize signals, parameters and the state of the traction system. It consists of an advanced self-diagnostic function, which gives advice and instructions for service and repair. BORDLINE® View is easy to use and runs on a standard PC.

Application example

BORDLINE® CC 400 MS is used in the dual voltage tram-train by Stadler for South Yorkshire Passenger Transport Executive (SYPT), United Kingdom. The tram-trains will operate between Sheffield's city center through to Rotherham Parkgate, both on the tram network and the rail network. Each vehicle is equipped with one ABB traction transformer and three Compact Converters BORDLINE® CC400 MS.

| Technical data | BORDLINE® CC400 MS_25kV-750V_R_400 |
|-------------------------------|--|
| Input voltage | 600/750 Vdc and 25 kVac / 50 Hz |
| Propulsion output, continuous | 0...500/610/710 Vac, 400/600/980 kW at wheel |
| Braking chopper | 900 kW |
| Auxiliary converter | 3 x 400 V / 50 Hz, 35 kVA |
| Blower control | 3 x 480 V / 0...60 Hz, 5 kVA |
| Battery charger | 24 Vdc, 8 kW |
| Vehicle control interface | CANopen, I/Os |
| Mounting position | roof |
| Dimensionen (LxWxH) | 1600 x 1800 x 618 mm |
| Weight | 560 kg |