

AUXILIARY CONVERTER

BORDLINE® M80 DC_750V

For metro cars



The BORDLINE® M80 DC static converter is a compact, rugged unit developed to feed auxiliary services of the metro.

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System overview

The BORDLINE® M80 DC converter is based on modern IGBT technology.

The system is composed by:

- N° 1 DC/DC chopper converter with pre-charge circuit (750 Vdc/580 Vdc) to supply DC/AC inverter and LVPS1
- N° 1 DC/AC inverter (580 Vdc/400 Vac 50 Hz 3ph - 65 kVA) to supply AC loads
- N° 1 LVPS1 bi-directional DC/DC converter (580 Vdc/110 Vdc - 25 kW forward mode, 19 kW reverse mode), to supply DC loads and LVPS2
- N° 1 LVPS2 DC/DC converter (110 Vdc/24 Vdc - 10 kW), to supply DC loads @24 Vdc

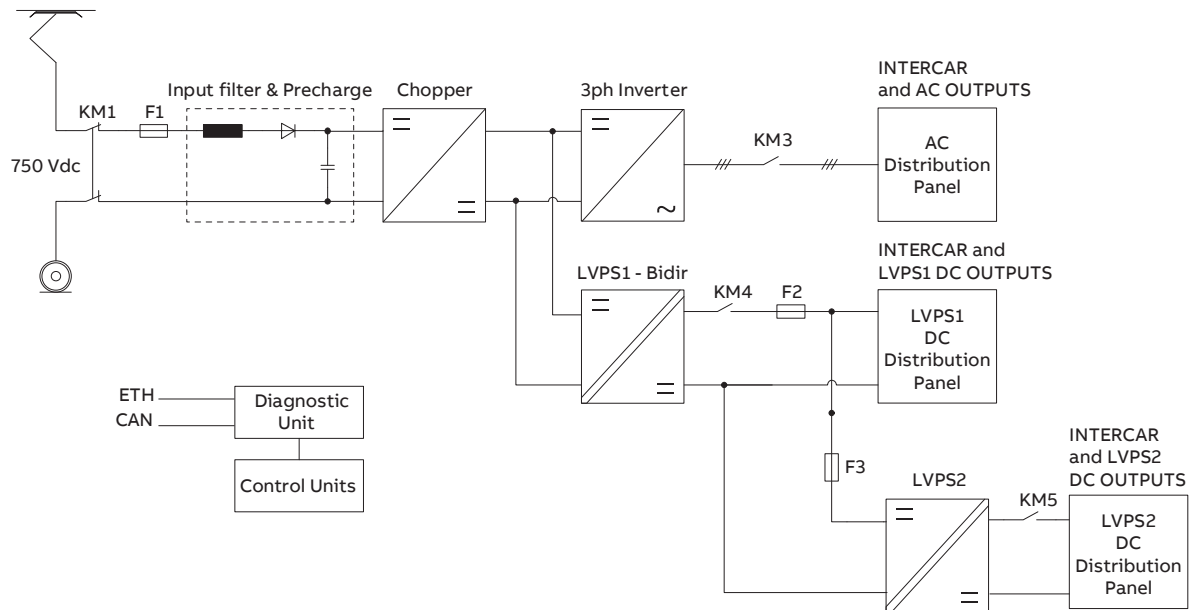
Functionality

The chopper is a DC/DC converter used to generate a 580 Vdc internal DC bus from the input voltage to supply 3ph inverter and LVPS1. Chopper stage works in forward mode, while is OFF in reverse mode. A pre-charge circuit is used to limit inrush current. A not isolated three-phase inverter, due to the installed sinefilter, generates a sine wave three-phase voltage at the converter output. A V/F control is implemented to limit the inrush current when a heavy load is powered (e.g. compressor). The bidirectional galvanically isolated DC/DC converter is based on SiC components. It can operate in two modes: Forward Mode to generate

an 110 Vdc voltage available at the output to supply DC loads. The total power is 25 kW without overload capability (15 kW as LVPS1 + 10 kW to supply LVPS2). Reverse Mode when batteries supply LVPS1 module to converter battery voltage to a suitable DC voltage to feed 3ph Inverter Module (total power is 19 kW). An isolated DC/DC converter is available to supply DC electronic loads of the metro @24 Vdc. The LVPS2 is fed by LVPS1 or batteries.

Characteristics

- IGBT and SiC technology
- Compact and robust design
- Designed for heavy sand and dust environment
- Integrated sine filter
- Fed by 750 Vdc catenary (500 Vdc - 1000 Vdc)
- Integrated bi-directional low voltage power supply
- Change-over contactor: HV input or shop power
- Ethernet diagnostic and CAN Open communication bus
- Full digital control
- Underfloor installation



01 Block diagram of
BORDLINE® M80 DC_750V

Technical data	BORDLINE® M80 DC_750V
Input voltages	750 Vdc (500 Vdc - 1000 Vdc)
Outputs	400 Vac 50 Hz 3ph - 65 kVA 110 Vdc - 15 kW forward mode, 19 kW reverse mode 24 Vdc - 10 kW
Protection degree	IP65
Dimensions (L x W x H)	1980 x 1190 x 500 mm
Ambient temperatures	-25°C +50°C
Weight	< 710 kg
Communication interface	Ethernet, CANopen

Control and monitoring

The converter is full digital controlled (DSP technology) and it is structured so that each power section (AC or DC) can work independent of each other. All outputs are short-circuit proof. The control electronics also monitor voltages, currents and internal temperatures. The interface to the Train Control and Management System is managed by CANopen bus.

Cooling system

The converter is cooled by forced air. The internally mounted fan and the air duct are integral parts of the onboard converter. A thermal monitoring device protects the converter from becoming overheated.

Mechanical design

The metal structure, based on painted steel material (dielectric white internally and black externally), has been designed for IP65 protection and to be mounted on metro cars (underfloor). It is equipped with anti-sand inertial filters located at the air intakes and in the outlet in order to be compliant to heavy sand and dust environment use. The heatsinks are partitioned so that the individual modules can be easily removed and replaced.

Diagnostics and service

The service-friendly modular design with highly standardized components ensures high reliability, excellent spare parts availability, and optimized life-cycle costs. For maintenance a diagnostic interface (Ethernet) is available. Further data can be obtained using a standard PC and the BORDLINE®-View, a diagnostic tool that includes an advanced self diagnosis function, which provides advice and instructions for service and repair.

Application example

BORDLINE® M80 DC_750V is mounted on metro cars running in Saudi Arabia.