Auxiliary Converters
from Battery Chargers to Head End Power
Dear Rail Expert,

For more than 30 years, ABB has been a leading manufacturer of power electronics for rolling stock. We would like to share with you recent trends in the rail industry related to the supply of Auxiliary Converters for rail vehicles which also go by the names of Static Inverters (SIV), Auxiliary Power Supplies (APS), Head End Power Supplies (HEP), or Battery Chargers (BC):

Importance of global footprint
There is an increasing need for a global footprint to be able to adequately support global vehicle platforms or to provide local content in various countries. ABB is able to support converter projects via local organizations in every major railway region, be it in the Americas, Europe, South Africa, the Middle East, China, India or Southeast Asia.

Recognition of tailor-made solutions
It is more and more recognized among rail customers that Auxiliary Converters need to be highly customized, and not ‘commodity products’. Customers are demanding optimized solutions fitting the overall electrical and mechanical design of the rail vehicle, maximizing power density, and often being integrated with other system components such as propulsion converters or HVAC (heating, ventilation, and air conditioning). ABB can fulfill these requirements through its strong engineering competence and a wide portfolio of field-proven, modularly designed Auxiliary Converters.

Value of a strong and reliable partner
Another trend is an increasing awareness for the benefit of having a strong, financially sound partner for sizeable Auxiliary Converter projects. Some train manufacturers have made bitter experience confiding the on-board power supply for certain fleets simply to the cheapest tenderer. Reliability is key, in ensuring on-board comfort at any time in any climate, but also in keeping the promises made at the award of the contract. ABB, a 40 billion USD company, has made a clear long-term commitment to the rail business. Operators all over the world trust in the ABB brand.

Flexibility
Although ABB is the third largest sub-supplier to the rolling stock industry today, we offer the flexibility of a small entrepreneurial company. There is no ‘one size fits all’ solution, particularly not for Auxiliary Converters. As our direct or indirect customer, you will find this flexibility in all aspects of how we operate, from understanding market needs and creating new solutions, in the direct contact with our converter designers or in developing new collaboration models, for instance in the service area.

We hope that you find some ideas in this brochure that may trigger fruitful discussions with our engineers for the benefit of your rolling stock fleets.

Sincerely Yours,

Edgar Keller
GM Traction Converters, ABB
ABB operates in approximately 100 countries and can provide strong local support to your project. As a truly global organization, we are committed to delivering the highest level of local competence and service.
Offering one of the broadest portfolios
Covering all rail segments

**BORDLINE® Auxiliary Converters for all rail requirements**
- From a few kilowatt to more than a megawatt of on-board power conversion
- Mono, dual or multi voltage input stages (DC/AC lines)
  - DC range: 350 to 4200 V
  - AC range: 224 to 1000 V / 16.7 Hz; 1500 V / 50 Hz
- Strong references in all vehicle segments such as locomotives, high-speed trains, multiple unit trains, rail coaches of all types, metros, tram-trains, light rail vehicles, tramways, monorails, trolley buses, mountain trains and rack railways
- Redundant and synchronized systems
- Auxiliary Converters integrated into propulsion systems
- Liquid, forced air, or natural air cooling system
- Auto-extinguisher system on demand

**Key customer benefits**
+ High total energy efficiency
+ Fast commissioning and homologation
+ High compactness, reliability, robustness
+ Adaptability to customer requirements
+ Easy and fast maintenance (service-friendly solutions)
+ 100% of production undergo functional testing
+ High level of quality management system (IRIS, ISO 9001, ISO 14001, ISO 18001)
# BORDLINE® M – Comprehensive portfolio

**Broadest product and power range**

**Product name definition:** BORDLINE® Mxy has xy kVA output power

- LRV – Light Rail Vehicle
- EMU – Electric Multiple Unit
- DDEMU – Double-Deck Electric Multiple Unit
- IC – Intercity
- HST – High Speed Train
- MD – Medium Distance

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6  Auxiliary Converters from Battery Chargers to Head End Power | ABB
BORDLINE® M – Comprehensive portfolio
Covering a wide range of applications
Research and development par excellence
Your key to competitive advantage

ABB’s success has been driven particularly by a strong focus on research and development. The company maintains seven corporate research centers around the world and has continued to invest in research and development through all market conditions. High level expertise and engineering capabilities derived from decades of experience in the rail field enable us to deliver the most reliable, robust, compact and lightweight solutions for all types of customer applications.

Solving customer challenges and proposing new technical solutions are our core competences, that’s why we are considered a valued partner to vehicle builders, refurbishers, and rail operators worldwide. ABB particularly excels with being able to offer our customers superior engineering capabilities in order to deliver highly customized solutions. Quality, reliability and flexibility characterize our products and daily business.

ABB Auxiliary Converters are compliant with all major railway standards.

Technological highlights:

- Simple and reliable topologies
- Modular concept for fast project delivery, economies of scale, maintainability and optimized life-cycle cost and line replacement units
- Latest control hardware and software technologies
- Monitoring and diagnostics via Ethernet, CAN and MVB interfaces
- Service-friendly modular design with highly standardized components
- High power density thanks to efficient cooling system and resonant low loss topologies
- Patented high voltage input stage / active input filter

Research and innovation is a core part of ABB’s culture.
Smooth operations
Focus on service and availability

Empowering the customer
- Pragmatic maintenance concept for efficient adoption of on-site maintenance by customer’s service personnel:
  - Customized trainings
  - Strong diagnostic tools
  - Modular repair
  - Commissioning support
  - Product maintenance
  - Upgrades
- Commitment to customer support with flexible ABB service contracts spanning multi-year periods:
  - Clever spare part logistics
  - Repairs, on-site service
  - Field operating statistics and analysis
  - Support line and expert support
- The BORDLINE® Service philosophy:
  - Deep partnership with the customer’s service organization, providing focused services within the areas of the industrial partner’s expertise
  - Smooth commissioning and early operation phase
  - Guaranteeing high converter availability after the warranty period and through the entire life cycle

Service and availability on-site
- BORDLINE® Service concept: The right spare parts — at the right site — at the required time
- No more stocking of obsolete spare parts, no more waiting for spares
- Containerized consignment stocks with automatic replenishment, optimized to suit the fleet requirements
- Unique global network of skilled experience and service

1 BORDLINE® Service Concept | 2 Container consignment stock
Success stories – BORDLINE® M
Locomotives

**Electric Locomotives, Indian Railways**

**Customer need**
- Replacement for legacy GTO (Gate Turn-Off thyristor) based static converters without any modification to locomotive mechanical layout, cooling, communication and electrical interfaces
- Power upgrade from 3 x 100 kVA to 3 x 130 kVA
- Design suitable for old as well as new locomotives and operation with high ambient temperature

**ABB solution**
- IGBT based static converter with integrated Battery Charger
- Output sine filter with common mode voltage filtering
- Modular service-friendly design suitable for all locomotive variants
- Innovative internal cooling concept to reduce converter’s internal ambient temperature
- Compatible with MICAS S2 MVB and prepared for operation with open communication protocols

**Customer benefits**
- State-of-the-art IGBT based static converter with advanced diagnostic capabilities
- Higher power density in the same footprint
- No component obsolesce problems

**Electric Locomotives E464, Trenitalia**

**Customer need**
- Replacement of old GTO technology with IGBT for new locomotive production, maintaining the same volumes with the same mechanical and electrical interfaces
- Full redundancy
- Increased reliability
- Reduced assembly costs
- Service-friendly solution

**ABB solution**
- Tailor-made IGBT-based (Insulated Gate Bipolar Transistor) converter to replace the old one in the same available room
- Fully redundant system
- Add all magnetic components and battery chargers in one enclosure
- Modular technology with independent power modules

**Customer benefits**
- Full interchangeability with old converter
- Excellent ratio between dimensions, weight and power output thanks to modular technology and liquid cooled system
- Quick release system for higher availability and shorter maintenance intervention
Success stories – BORDLINE® M
Regional trains

Double-Deck EMU ‘KISS’, SBB and EMU ‘FLIRT’, TILO

Customer need
- Reliable Battery Charger in various types of trains and electric multiple unit extension with additional cars

ABB solution
- One 10 kilowatt Battery Charger design for vertical or horizontal mounting that fits well in different locations on KISS double-deck electric multiple units as well as in additional cars for FLIRT trains, both made by Stadler Rail

Customer benefits
- Homogeneous fleet of more than 560 Battery Chargers
- Reduced set of spare parts
- Option to integrate these Battery Chargers with an innovative long-term service contract

EMU ‘DOMINO’ retrofit, SBB

Customer need
- New state-of-the-art Auxiliary Converters for refurbishment of electric multiple unit
- 25 kVA supply for motor and driving trailer HVAC system, 45 kVA for coach HVAC system including battery charger

ABB solution
- Two tailor-made Auxiliary Converters with common modules and spares for easy maintenance
- Quick module exchange

Customer benefits
- Customized fit
- Reduced spare part inventory due to common auxiliary converter platform and common spare part stock
- Optional integrated battery charger
Success stories – BORDLINE® M
Urban mass transit

Double-Deck EMU retrofit, SBB

Customer need
– New Auxiliary Converter for refurbishment and climatization
– High power density and compactness
– Demanding interface to HVAC installation

ABB solution
– Tailor-made solution with very high engineering effort

Customer benefits
– State-of-the-art solution with very high power density
– Very flexible and cooperative engineering partnership with customer’s project management, consultants, and HVAC supplier

Light Rail Vehicles, various operators

Customer need
– Competitive Auxiliary Converter solution
– Mechanical converter design customized to vehicle concept

ABB solution
– Auxiliary Converter with galvanic insulation
– Electrically customized solution for an extensive fleet

Customer benefits
– Highly reliable and robust auxiliary power supply
– Easy mounting and maintenance
– Well proven solution with large numbers already in operation worldwide
Partnering with ABB

Major benefits

– High flexibility and innovation to realize your project vision

– Large global corporation and technology leader with a long-term strategic commitment to the rail industry

– ABB as a component and electrical partner for train builders and operators

– Competent local service and support wherever your project is
Notes