
TRACTION

Retrofit traction solutions

Selected references



Table of contents

- 004–005** **Compact Converter for people mover**
Port Authority of New York and New Jersey,
United States
- Compact Converter for light rail vehicles**
Maryland Transit Automation (MTA), United States
- 006–007** **Traction Converters for electric locomotives**
Indian Railways (IR), India
- Traction Converters for high-speed power heads**
Deutsche Bahn (DB), Germany
- 008–009** **Electrical system for X2 high-speed trains**
Statens Järnvägar (SJ), Sweden
- Compact Converter for locomotives**
Swiss Federal Railways (SBB), Switzerland
- 010–011** **Auxiliary Converters for multiple units and
driving trailers**
Swiss Federal Railways (SBB), Switzerland
- Auxiliary Converters for double-deck coaches**
Swiss Federal Railways (SBB), Switzerland
- 012–013** **Auxiliary Converters for rail coaches**
Swiss Federal Railways (SBB), Switzerland
- Compact Converter for regional trains**
Erzgebirgsbahn Deutsche Bahn (DB), Germany
- 014–015** **Traction converter for electric multiple units**
S-Bahn Berlin, Germany
- Traction system for diesel-electric metro rail cars**
Adelaide Metro, Australia

PORT AUTHORITY OF NEW YORK AND NEW JERSEY | UNITED STATES

Compact Converter for people mover

Compact Converter BORDLINE® CC400

Customer need

- Upgrading the existing propulsion system based on DC motors with a state-of-the-art three-phase AC traction system
- Compact mechanical integration in the available space
- Compatibility with three-phase 600 Vac input supply

ABB solution

- Standard modules and components (retro-)fitted into old system cabinet
- Very compact rack including low voltage distribution and power module



Customer benefits

- Optimized adhesion control results in less tire wear and smooth propulsion for second half of life-time
- Optimized life cycle cost

AirTrain Newark operated by Bombardier Transportation (Photo)

MARYLAND TRANSIT AUTOMATION (MTA) | UNITED STATES

Compact Converter for light rail vehicles

Compact Converter BORDLINE® CC400

Customer need

- Form-Fit-Function; upgrade of the traction converters from GTO to IGBT power semiconductors
- Complete upgrade of the Train Control and Management System (TCMS)
- No replacement of the traction motors

ABB solution

- Forced air-cooled traction converter tailored according to operators' requirements



Customer benefits

- Higher reliability
- Lower total cost of ownership

INDIAN RAILWAYS (IR) | INDIA

Traction and auxiliary converters for electric locomotives

Compact Converter BORDLINE® CC1500 AC and Auxiliary Converter BORDLINE® M260 AC

Customer need

- Replacement of GTO converters without any modification to mechanical design, interfaces, control, transformer and traction motor
- Design suitable for old as well as new locomotives
- Resistant to high temperatures
- Service-friendly solution

ABB solution

- Custom built IGBT-based traction converters
- Conversion from bogie control to single-axle control
- Configurable for six-axle and four-axle variants
- Increased energy efficiency, advanced adhesion control



Customer benefits

- Superior functional replacement to existing GTO-based traction converter
- Significantly improved tractive effort under all conditions
- Better energy-efficiency and less heat generation
- Higher availability due to axle control

DEUTSCHE BAHN (DB) | GERMANY

Traction converters for high-speed power heads

Compact Converter BORDLINE® CC1500 AC

Customer need

- Replacement of old thyristor converters without any modification to mechanical power head design, interfaces, control, transformer and traction motors
- Significant increase in energy efficiency and availability

ABB solution

- Development and production of new IGBT-based propulsion converter for 4.8 megawatt power head within 13 months
- Innovative three-level converter technology
- Service concept for easy maintenance
- Reliable delivery of one power head retrofit kit per week



High-speed train ICE 1
Photo: DB

Customer benefits

- Reliable partnership for quick refurbishment of 38 power heads in the workshop of Deutsche Bahn
- Energy consumption cut by at least 15 percent
- Massive reduction in operating cost
- Massive gain in reliability and availability

STATENS JÄRNVÄGAR (SJ) | SWEDEN

Electrical system for X2 high-speed trains

Compact Converter BORDLINE® CC1500 AC

Customer need

- State-of-the-art reliability and availability for next 15 years
- Lower total cost of ownership
- Minimal reduction of availability during refurbishment

ABB solution

- Retrofit concept highly customized to improve weak points of the current train
- Very flexible response to the customer's requests
- Field-proven solution that optimally fits in the train



Customer benefits

- Lower failure rates, better redundancy concept, lower stress on motors due to three-level converter topology, less maintenance effort
- Significantly lower energy consumption
- Higher comfort for passengers (Heating Ventilation and Air Conditioning, infotainment, WiFi, LED lighting)

SWISS FEDERAL RAILWAYS (SBB) | SWITZERLAND

Compact Converter for locomotives Re460

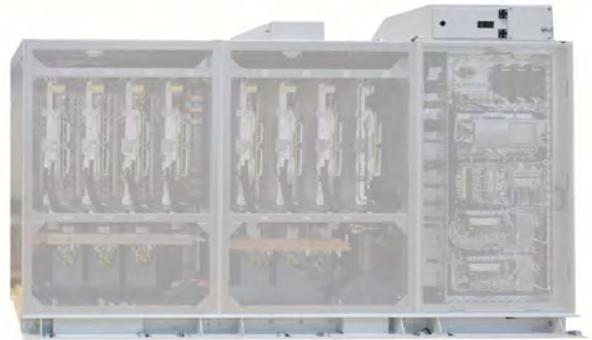
Compact Converter BORDLINE® CC1500 AC

Customer need

- Replacement of GTO converters
- State-of-the-art IGBT technical solution
- Improved reliability and availability for next 25 years

ABB solution

- IGBT based 3-level propulsion converter
- Improved energy efficiency
- Existing transformer and motors retained
- Compatible with legacy vehicle control unit



Customer benefits

- Significantly lower energy consumption
- Easy maintenance
- Lower total cost of ownership

SWISS FEDERAL RAILWAYS (SBB) | SWITZERLAND

Auxiliary converters for multiple units and driving trailers

Auxiliary Converter BORDLINE® M25/M45

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

Multiple unit train 'Domino'

SWISS FEDERAL RAILWAYS (SBB) | SWITZERLAND

Auxiliary converters for double-deck coaches

Auxiliary Converter BORDLINE® M80

● **Customer need**

- New auxiliary converter for HVAC upgrade
- High power density and compactness
- Demanding interface to HVAC installation

● **ABB solution**

- Solution with very high level of custom engineering



● **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

SWISS FEDERAL RAILWAYS (SBB) | SWITZERLAND

Auxiliary converters for rail coaches

Auxiliary Converter BORDLINE® M50

Customer need

- Powerful onboard converters to improve passenger comfort such as passenger information systems, video surveillance

ABB solution

- Short engineering time for customizing the solution (i.e. dimensioning, low noise emission, lightweight)
- Optimum auxiliary converter solution with respect to electrical and mechanical interfaces
- Robust and highly integrated underfloor design



Customer benefits

- Very flexible and cooperative engineering partnership with customer's project management, consultants, and HVAC (heating, ventilation, and air conditioning) supplier
- Customized underfloor fit
- More powerful and energy-efficient auxiliary converters

ERZGEBIRGSBAHN DEUTSCHE BAHN (DB) | GERMANY

Compact Converter for light rail vehicles

Compact Converter BORDLINE® CC400

Customer need

- Lower emission and fuel savings by
 - replacing existing diesel-hydraulic propulsion through diesel-electric propulsion
 - braking energy recuperation
 - adding traction battery
- Fast charging of traction battery at stations
- Integration of new components without change of existing train control unit

ABB solution

- Multi-mode series hybrid propulsion
 - Diesel engine/permanent magnet generator
 - Li-Ion traction battery
 - Charging from 1 kV 16.7 Hz
- Energy management system
- Integration of new equipment on existing train



Customer benefits

- Lower emissions
- Significantly lower energy consumption and life cycle costs

S-BAHN BERLIN | GERMANY

Traction converter for electric multiple units

Compact Converter BORDLINE® CC400 DC

Customer need

- Replacement of obsolete thyristor technology
- No modifications on vehicle side
- Integration with ongoing vehicle overhaul

ABB solution

- Compact IGBT converter module and cooling unit for installation in existing traction container
- Identical interfaces to vehicle side



Customer benefits

- High reliability and low life-cycle cost (LCC)
- Prototype delivery six months from order
- Efficient vehicle installation thanks to pre-tested modules
- Environmentally friendly refit thanks to high portion of re-used material

ADELAIDE METRO | AUSTRALIA

Traction system for diesel-electric metro rail cars

Compact Converter BORDLINE® CC400 DE

Customer need

- Form-Fit-Function; replacement of existing GTO converter by state-of-the-art IGBT converter
- Complete upgrade of the Train Control and Management System (TCMS)
- Replacement of GenSet (Diesel Engine-Generator)
- No modifications to existing traction motors

ABB solution

- Retrofit of traction system highly customized to operators' requirements
- State-of-the-art traction converters with integrated auxiliary converters
- Low emission/high efficiency GenSet



Customer benefits

- Higher energy efficiency
- Higher reliability and availability
- Noise reduction during standstill at stations and lower emission
- Lower total cost of ownership

ABB Switzerland Ltd
Traction

Austrasse
5300 Turgi, Switzerland
+41 58 585 00 00
sales.traction@ch.abb.com

ABB Automation Products GmbH
Transportation

Kallstadter Straße 1
68309 Mannheim, Germany
+49 621 4381-0
transportation.deabb@de.abb.com

abb.com/railway
abb.com/tractionconverters

