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TRAKO Report
Tram News Round-Up
1,520 mm Gauge News
FLIRTomania Continues
Spanish Mediterranean Corridor





High-performance traction solutions?

Certainly.



In close partnership with vehicle builders, refurbishers, and rail operators, ABB develops customized complete traction chain solutions for all kind of rail vehicles. For the new locomotives E6ACT 'DRAGON' produced by Newag Gliwice, ABB delivers highly integrated traction systems consisting of DC line filters, propulsion converters with integrated auxiliary converter and battery charger, auxiliary filter packages, and traction motors. As your traction chain partner, we are driven to supply state-of-the-art traction solutions for your fleet's optimum overall performance and highest efficiency. www.abb.com/railway

High Power ABB Traction Equipment For Stadler Rail's Powerful 5 MW Rack And Adhesion Locomotive

The key requirements for this project are intensive use (24 hours a day, 7 days a week), high energy efficiency, high tractive effort, reliability and easy maintenance. The converters employ the ABB three-level topology, resulting in line- and motor-friendly current patterns.

System Overview

The locomotive is equipped with highly redundant traction equipment. One locomotive comprises two identical traction packages located on both sides of the driver's cab, providing excellent accessibility for maintenance. Each traction package consists of three BORDLINE® CC750 Compact Converters of types A01, A02 and A03 that are feeding the two traction motors and the two rack-rail motors of a bogie. The rack-rail motors are connected to compact converter A01 and A02 while the traction motors are connected in parallel to compact converter A03.

The 3 kV DC traction supply voltage is routed via DC high speed circuit breaker (HSCB), line circuit breaker (LCB) and input choke (Ld) to the input terminals and to the DC link of the Compact Converters. The power electronic building blocks (PEBB) connected to the DC link capacitor banks are based on 3.3 kV IGBT devices in a three-level topology. Four PEBBs provide three motor converter (MC) phases, one brake chopper (VLU) phase and one auxiliary link converter phase.

The compact converters of type A01 and A02 supply the auxiliary output (3 x 440 V AC/60Hz, 36 V DC) needed to run fans, pumps, compressors, HVAC and control electronics of the vehicle. To ensure galvanic isolation, energy is transferred from traction to auxiliary circuits through the auxiliary link converter, an isolating transformer and a passive rectifier bridge into the auxiliary link. Compact Converters of type A01 are equipped with auxiliary converter (HBU) and battery charger (BL) while Compact Converters of type A02 feature an auxiliary converter only.

Compact Converter

BORDLINE® CC750 DC 3 kV is housed in a very robust, traction proven IP54 cubicle for mounting in the machine room. The modular design ensures

Since 2008, the converter platform BORDLINE® CC for 3 kV DC line voltage is in successful operation in various EMU fleets of Stadler Rail in Italy, Poland, and the Czech Republic. This field-proven platform is the basis for the new traction equipment of the world largest and most powerful electric rack and adhesion locomotive.



Photo: Michael Burger

fast and easy maintenance. Each module is easily accessible and not heavier than 35 kg.

The control module is arranged on a swing frame in front of the power modules. Each Compact Converter is controlled through a power electronics controller (PEC) that is connected to the vehicle control unit (VeC) through a redundant CANopen network. For service and diagnostic purposes, the PEC provides an Ethernet port to interface to the vehicles TCP/IP based network.

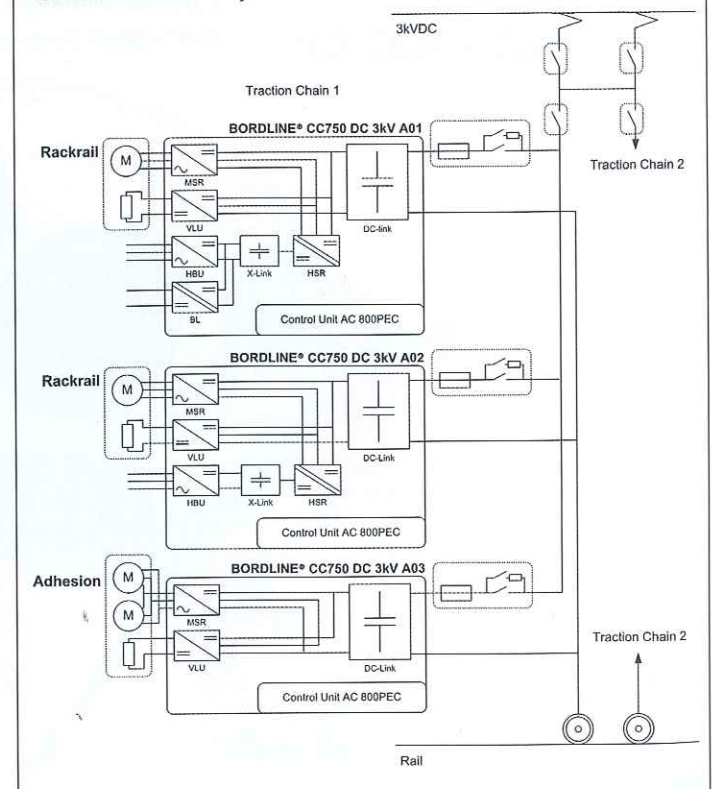
ABBs standardised IGBT based power electronic building blocks for three-level applications are liquid cooled. A combined air/water heat exchanger and fan module provides a circulating air flow that cools all other components of the Compact Converter, including the control module. The heat exchanger for cooling the service water is external to the compact converter.

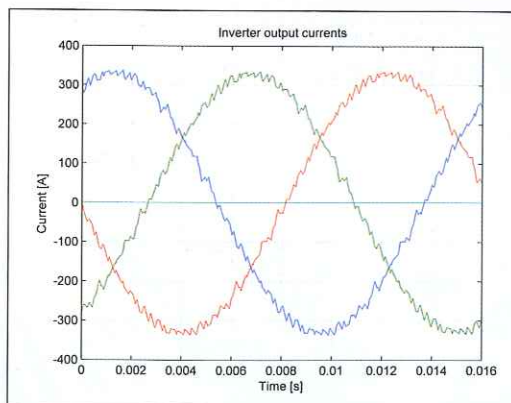
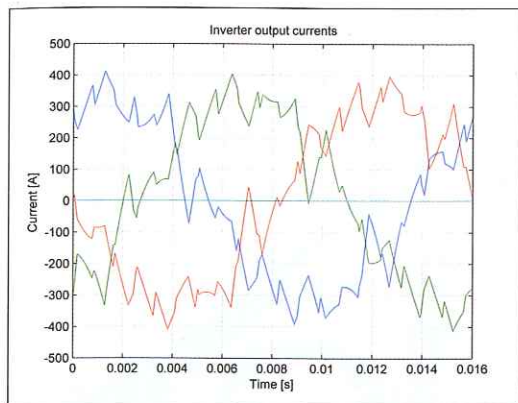
The photo shows MRS Logística's 901502 near Raiz da Serra, at the lower end of the rack on 23 October 2012.

Principal Technical Data Of The Traction Converters For The MRS Logística's Class He 4/4 Locomotive

Propulsion Output	971 kW (at wheel) per converter
Tractive Power	760 kN
Braking Chopper Cont./Peak Power	650 kW/850 kW per converter
Auxiliary Converter	3 x 440 V/60 Hz, 4 x 70 kVA
Vehicle Control Interface	CANopen, I/Os
Dimensions Compact Converter	907 x 850 x 1,897mm (L x W x H)
Converter Weight	895 kg without battery charger 910 kg with battery charger

Single line diagram of the Class He 4/4 locomotive traction system.





Three-Level Topology

ABB's well-proven three-level topology has several advantages compared to conventional two-level solutions: it is better for the motor, better for the grid, and it saves energy! The three-level topology has generally the same semiconductor cost as the two-level approach. Since it allows reducing the bulky line filter, it is the most economical solution for 3 kV DC applications. Furthermore, it saves cost in terms of lower motor wear, lower energy cost, and faster homologation.

Powerful Control Platform

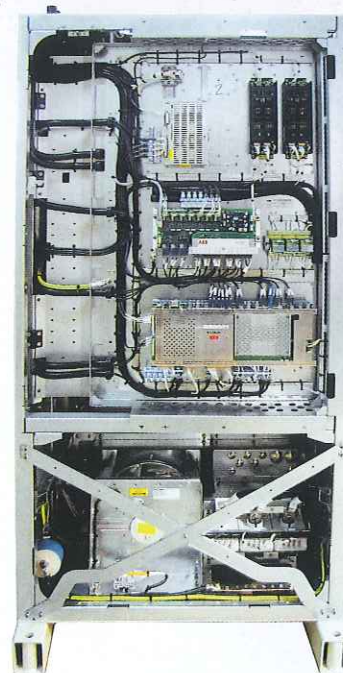
All ABB traction converters are built on the AC 800PEC control platform, the most powerful modular controller for high-speed performance on the market. This control platform is also used in a wide range of other industrial applications. The AC 800PEC software provides an excellent range of control and communication functionality in cycle times that extend from the sub-microsecond to the millisecond level. The modular application software in the AC 800PEC speeds up train commission-

The upper diagrams show comparison of current wave forms in two- and in three-level topology.

ing significantly, compared to most other commercially available traction control systems. In order to increase the availability of the vehicles, the vehicle bus (CANopen) has a redundant design.

Harald Hepp

Photo on the right and diagrams: ABB



BORDLINE® CC750 DC 3 kV compact converter.

First Himmelstreppe Panoramic Car

On 19 December 2013 the first of NÖVOG's four Stadler-built panorama cars was delivered to the Mariazellerbahn. It was moved by low loader to Ober Grafendorf and railed there using cranes. A Class 5090 diesel railcar was used to shunt the new vehicle. Following initial testing, that same day two Himmelstreppe EMUs, ET 2 and ET 5, hauled the P 1 car to Laubenbachmühle, as shown in the upper photo, taken near Kirchberg a. d. Pielach. The test train carried the reporting code nP 34355.

The air conditioned panorama cars are 16,700 mm long over couplings, weigh 30 t, and are designed for a ma-

Photo: Kurt Feuerfeil



Photo: NÖVOG/Bollwein

imum speed of 80 km/h. The new vehicles, designed for hauling by the otherwise second class only Himmelstreppe EMUs, offer **first class accommodation**. Three of the cars have 36 seats, while the last of them, with only 33 seats, is equipped with catering facilities including a kitchen

for preparing drinks, and cold and warm meals. A company for running this catering, together with running the Bistro Shop at Laubenbachmühle station, is being sought. The closing date for submission of bids was 3 January 2014.

The new vehicles are fitted with inter-car gangways, and it is planned to create self-contained formations using up to four panoramic cars to be hauled by a single Class ET EMU (as shown in the upper photo). The Him-

melstreppe EMUs are designed to cope with this additional weight, even on the steep gradients of the sinuous mountain line to Mariazell. The remaining three panoramic cars, P 2 to P 4, are to be delivered by March 2014 (while the ninth ET EMU will arrive in January). The panoramic cars will be used mainly on Saturdays, Sundays and public Holidays, or can be hired for charter.

Kurt Feuerfeil

On 13 December 2013 the EBA granted authorisation of the new **MERIDIAN** FLIRT EMUs (see R 4/13, p. 6), thus enabling them to be used on local services forming the E-Netz Rosenheim, involving München - Rosenheim - Salzburg/Kufstein and München - Holzkirchen - Rosenheim services. These are operated by Bayerische Oberlandbahn, a subsidiary of Veolia Transport GmbH. However with the 15 December 2013 timetable change only eight of 35 MERIDIANS on order were available, various replacement trains being necessary. This caused problems with delays and train breakdowns, however operation punctuality gradually rose from initially 55 % to 95 % by the end of December. With more MERIDIANS becoming available, the situation will be stabilised.

Jaromír Pernička