ABB Advanced Power Electronics

Railway Converter Station
BKW FMB Energie AG, Wimmis, Switzerland

Plant Overview

ABB 20-MW-Converter – 4 Units
3AC 50 kV 50 Hz – 2AC 132 kV 16,7 Hz 84 MVA / 80 MW

Main Technical Features

The railway converter station in Wimmis feeds the 132 kV 16.7 Hz railway supply network of Switzerland and among other things helps to secure the energy supply for the Lötschberg-Base Tunnel of the new alp-crossing railway connection (NEAT). The ABB 20-MW-Converters are built of common components that are easy to operate and transport thus allowing short installation and commissioning times. The selected converter layout results in short servicing times. All components are designed for a long life cycle and are pre-tested by the supplier. Installations have shown that the ABB 20-MW-Converter provides high power availability. The converter station can be deployed for both power directions. The whole installation is remotely controlled from an ABB plant coordination controller.

Transformers

The transformers are designed for outdoor use. The 50 Hz transformer is built with a 12 pulse configuration and supplied by a 3 AC 50 kV 50 Hz network. The 16.7 Hz transformer is a summing transformer and adds the individual converter voltages to provide the railway voltage of 2 AC 132 kV. Both transformer types are oil-filled, naturally cooled and equipped with customary protection and maintenance devices.

Container / Intermediate Circuit

The portable container is designed for outdoor use and links the two transformers to the segregated power converters. A closing system is installed in the monitoring and control circuits for personnel safety. The control system and equipment are installed in a separate, air-conditioned room. Outdoor intermediate circuit components such as chokes and resistors are linked to the container. Stainless water pipes provide the connection to the cooling system.

Cooling System

The cooling system is autonomous and has its own PLC that monitors and controls itself. Redundant pumps convey the processed water-glycol mix to the power converter and the heat exchanger. The power converter losses are dissipated to the ambient air via the heat exchanger by means of variable-speed fans that maintain the cooling circuit at a constant temperature.

Control System / Technology

All open and closed-loop control and protection functions are equipped with the proven, fully digital PSR system. This programmable high-speed controller permits the processing of the precise and fast power converter system control circuits. The in-built Microscada system guarantees the reliable representation, storage and operation of monitoring circuits, sequences and events. The higher-level command centre controls the four ABB 20-MW-Converter via standard interfaces using a plant coordination controller.

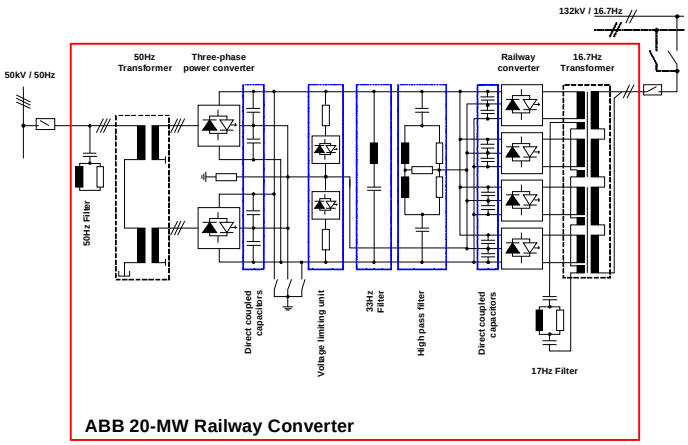

Figure 1: Principal diagram of the ABB converter

Technical Data

Plant:	Railway Converter Station Wimmis - Switzerland
Applications:	Railway power supply, supply networks
Installation:	Outdoors
Ambient conditions:	-22°C - +40°C
Number of units:	4
Frequency:	3AC 50 Hz +/-3% / 2AC 16.7 Hz +/- 3%
PSC 3-phase system 50 Hz:	3AC 50kV +/- 3%
Total / Unit AC apparent power 50 Hz:	83.76 / 20.94 MVA
Cos phi 50 Hz:	1.0
Railway voltage 16.7 Hz:	2AC 132kV +/- 10 %
Total / Unit AC true power 16.7 Hz:	80.0 / 20.0 MW
Total / Unit AC apparent power 16.7 Hz:	84.0 / 21.0 MVA
Cos phi 16,7 Hz:	0.95
Power converter cooling system:	Air / water-glycol
Transformer cooling system:	ONAN /ONAF
Control technology:	ABB PSR-II
Control system:	ABB Microscada

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