



Comprehensive power protection for mission-critical rail applications

Powering the railways



Trains are such a common sight in many societies that very few people stop to think of the sophisticated infrastructure essential to the smooth running of the service. Even fewer realize how reliant the service is on electrical power. Apart from the obvious ones like the overhead gantries feeding power to electric trains, there is a entire world of other applications on the railway for which electrical power is critical: traffic management systems like control rooms, data centers, computer rooms; automatic train protection systems, such as European Train Control System (ETCS); traffic lights; level crossings; railroad points; video surveillance and communication; ticketing machines, lifts, lights and other station infrastructure; and so on.

Even a minor disturbance in the power supply can have a knock-on effect and result in major disruption to the rail network. More importantly, the reliable functioning of the railway infrastructure is not just a matter of convenience – it is also a serious health and safety issue.

ABB's uninterruptible power supplies (UPSs) help to keep this railway world moving safely and punctually with a new, sustainable approach that assures rail customers that their power supply is supported in a way that not only provides maximum reliability, but that also uses energy efficiently and is available at a low cost of ownership.

ABB has comprehensive knowledge gained from many years of working in the rail industry. In the traction power supply field, ABB's product portfolio includes alternating current (AC) and direct current (DC) traction substations and railway electrification solutions providing reliable power and energy efficiency for mainline trains, metros and mass transit networks.

To keep up with high standards of service and safety in the world's rail infrastructure, ABB takes care of designing, delivering and supporting effective power protection solutions for above-ground and underground locations worldwide. In addition, ABB also produces solutions for associated rail applications such as emergency lighting, PA systems, radio communication, telecommunications and IT networks.

Railway UPS supporting 50 Hz and 16.67 Hz

The rail network poses a particular challenge in that, often, two separate power schemes have to be catered for, eg, 16.67 Hz single-phase and 50 Hz three-phase. ABB dual-frequency UPS systems are designed for this task and they benefit from a simple design derived from standard parts, eliminating the need for expensive customization.

Typically, ETCS power supplies, for instance, are fed from a 400 Vrms, 50 Hz three phase network with a diesel electric generator functioning as a backup supply. The diesel electric generator has a significant impact on the entire system installation cost and, because it takes up considerable space, on the system power density.

ABB's solution not only aims to remove the backup diesel electric generator (and associated greenhouse emissions and

noise), but also to increase the level of redundancy by adding a battery pack.

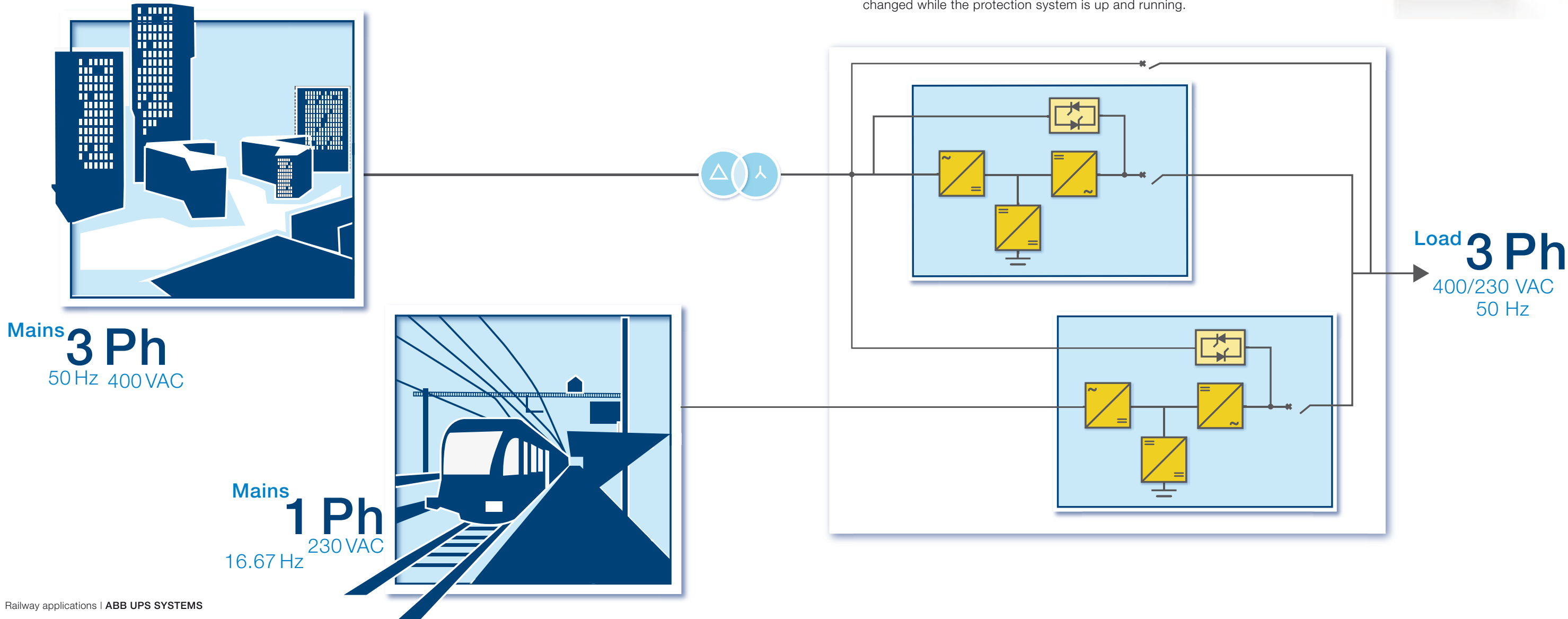
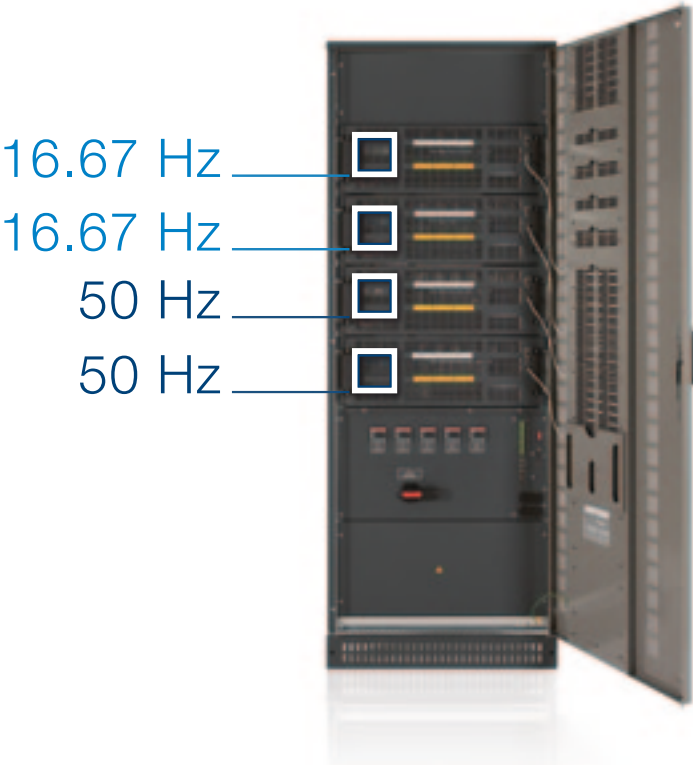
Where an independent second mains network, for example, 230 Vrms/16.67 Hz single-phase, is available, it can also be used in the backup power scheme. An ABB dual-frequency UPS converter makes it possible to harness both networks, so the load can utilize either, or both, as appropriate. For example, if the 50 Hz three-phase line were to develop a fault, the dual-frequency UPS would feed the critical load via the single-phase 16.67 Hz line, and vice versa.

In the event of a fault on both independent networks, the third energy storage option, the UPS battery pack, would provide the energy requested by, say, a control system like ETCS, thus guaranteeing zero downtime for the entire system.

Dual Frequency UPS Systems Solutions – Key Features

Our UPS systems, based on true online double conversion, are fully modular, decentralized and online swappable. They offer the following competitive advantages:

- 99.9999 percent availability
 - Efficiency of up to 96 percent in double-conversion mode
- Furthermore, the fully modular and decentralized approach enhances serviceability:
- 20 min MTTR (mean time to repair).
 - Optimized spare parts management (the interchangeable module approach radically reduces spare part count and simplifies servicing).
 - No downtime: online swap ability allows the modules to be changed while the protection system is up and running.



Doing something special with standard products

ABB offer the best and latest technologies to meet all specific customer requirements. Further, these requirements are met using standard and proven ABB solutions, whenever feasible. This results in a cost-effective project proposal that seeks to ensure reasonable procurement costs, low operating and maintenance costs, minimized inventory and simplicity of operation for railway personnel.

Many customers have adopted ABB's UPS solutions. In a recent typical implementation, for the Swiss state railway, ABB used a standard modular product equipped with two module slots, one compatible with a 16.67 Hz infeed and one with a 50 Hz infeed. The batteries, able to operate autonomously for more than 30 minutes, and the isolating transformer were integrated into the UPS cabinets, thus saving cost and valuable space. The batteries can be configured as one contiguous unit or as two separate units,

one for each module. During normal operation, the load is split evenly between the two supply networks. Should the power supply of one of the modules move out of the tolerance zone, the battery will for the appropriate module will activate. If one module is defective, the other module will take on 100 percent of the load. If the power to both infeeds should fail, the modules switch to battery operation.

This particular project was delivered as an integrated total solution. It included all aspects of consulting and planning, construction and comprehensive testing of prototypes, logistics, service, installation at over 300 locations and supervision of commissioning.

This type of project highlights ABB's ability to provide the power protection solutions needed to supply reliable power and increase power management flexibility in the transportation industry.

Comprehensive power protection solutions for railway applications

ABB's wide range of uninterruptible power supply (UPS) systems are an established part of various rail networks and metro systems around the world, ensuring the reliability, stability and continuity of power for railway applications. ABB's railway power protection solutions include various applications ranging from 10 KW to 5 MW. We are not tied to a single solution or a "one size fits all" approach. We work with you to determine optimum solutions to meet the overall concept of each project and can individually tailor our technologies to meet your operational needs and your budget.

UPS solutions for all applications

ABB power protection solution	Typical rail applications
Low power UPS to 60 kVA	Telecom and IT networks, rail road equipment, way-side emergency & safety systems, Infrastructure & services for customers
Medium power UPS to 200 kW	Traffic management systems, signaling, power subsystems, rail road equipment, Infrastructure & services for customers
Large power standalone UPS to 5 MW	Traffic management systems
Large power modular UPS up to 3 MW	Traffic management systems
Dual frequency converter	Automatic train protection
Rack-independent modular UPS up to 80 kW	Infrastructure & services for customers

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