

RELION®

Power system protection and automation reference

Hanover water supply to rely on IEC 61850



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Secured power supply for Fuhrberg waterworks with ABB switchgear and Relion® protection

enercity is the commercial umbrella denomination under which Stadtwerke Hannover AG, Hanover's municipal utility, supplies energy, water and other services to the citizens. The company operates three waterworks providing drinking water to a total of 650,000 people in the metropolitan area of Hanover. Fuhrberg waterworks is the second largest of the three waterworks and it satisfying approx. 40 per cent of the water demand of the area. The ground water is pumped from five horizontal filter wells some 30 meters below the surface. The iron is removed from the water in a complex process before the water is pumped

into Hanover's drinking water network with a length of 2,100 km. To ensure that a constant water supply is maintained, dependable processes and a reliable supply of electricity are required.

Investment decision and operational design criteria

enercity therefore took the decision to replace the, already some 50 years old, air-insulated BBC switchgear at the Fuhrberg waterworks with a new system, to ensure maximum availability and reliability of the power supply. The switchgear system was to be designed in such a way that any system group required for the operation of the waterworks could be supplied re-energized within half an hour after a total 6 kV outage due to system malfunction.

Modern switchgear and IEC 61850 compliant protection equipment

After customary technical and commercial evaluations, enercity chose the factory-built and type-tested air-insulated single busbar ZS8.4 switchgear system provided with vacuum circuit breakers, and ABB's genuine IEC 61850 compliant REF615 feeder protection and control IEDs.

Modern and reliable switchgear solution

The 6 kV switchgear system comprises two feeder panels, two coupler panels, 13 outgoing panels, two riser panels and a busbar measurement panel and it was installed in three implementation phases. The old system was replaced with the Fuhrberg works continuously in service. The control panels are of metal-clad type and thus comply with partition class PM and loss of service continuity category LSC 2A.



Technically challenging interlocking scheme

The interlocking of the downstream transformers of the low voltage supply presented a challenge. The transformers' earthing switches do not have interlocking magnets. However, in order to ensure maximum operator safety, ABB developed an electric locking concept, which triggers the circuit breaker of the associated control panel if the earthing switch is actuated while live.

Genuine IEC 61850 protection and communication

In choosing the REF615 feeder protection and control IEDs of the Relion® product family, enercity is opting for the very latest technology. The horizontal communication between the IEDs and the company's process control system uses a standard Ethernet/TCP/IP link in accordance with IEC 61850 and interlocking functions are implemented using GOOSE (Generic Object Oriented Substation Events) messaging. The feeder panels are fitted with multiple-stage overcurrent and earth-fault protection also including phase failure protection. In the outgoing panels, inrush current monitoring, overcurrent protection, thermal overload protection and directional earth-fault protection are implemented.

High-speed arc fault protection for maximum personnel safety

The three-channel arc protection system ensures high personnel safety, for instance when the system is undergoing on site service at the Fuhrberg waterworks. The arc sensors in the busbar, circuit breaker and cable connection compartments detect an emerging arc fault already in its early stage and initiating a trip command to the circuit breaker of the panel affected in less than 15 milliseconds. As a result of the high-speed arc protection personnel safety is improved, major damage to the entire switchgear can be avoided, thus reducing downtimes and improving system availability.

ABB's switchgear and protection system the most suitable solution

On the whole, the combination of ABB type ZS8.4 switchgear and IEC 61850 compliant protection of the Relion® 615 series provided the most suitable solution for enercity in terms of quality and value for money, in order to meet the high demands regarding system availability, personnel safety and asset management.





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