Integration in a generating plant

Different specifications are defined by the power system operator in the technical connection conditions depending on the type of power system connection point (PSCP) directly in the UHV or in the MV power system. Before a generating plant can be commissioned, a corresponding certification process must prove suitability [4]. Proper functioning of the protection concept must be demonstrable among other things. Complex individual tests per application have in the past made it expensive to provide proof and in some cases have been omitted.

With the SK/SQ/Q, there is a type-tested system on the market which meets the high demands of the required protective functions. In addition to the Q-V protective functions, four-stage frequency protection and four-stage voltage protection are integrated. When triggered, Q-V protection has a direct effect on the circuit breakers at two points, at the power system connection point (PSCP) and at the generating unit (GU). At different time limits (QV1 and QV2), the phase currents and the phase-to-earth voltages or phase-to-phase voltages must be used as measurement inputs. So that the protection system does not overreact in the case of single-pole faults (earth fault), the phase-to-phase voltages are calculated in the protection system independently of the voltage transformer connection.

In the medium or high voltage network, a directional short circuit protection system and even a six-system, professional 7-stage distance protection system with a fault location on the power system feed-in point can provide comprehensive protective functions without further devices being necessary. The synchron-check checks the switch-on criteria after shutdown and thus prevents asynchronous power up, it being possible to parameterise or terminate for permissible voltage difference, angle difference and frequency difference freely. In addition to the comprehensive protective features, the system can be automated by means of integrated Logic functions soft and controlled via up to 26 binary inputs and 14 outputs. Extensive graphical representations of power system states, measures etc. can be chosen on the high-quality device display with automatic power-off for long lasting operation.

Example application: small power station

A distributed generation plant in the form of a photovoltaic plant, small hydroelectric plant, combined heat and power plant or wind turbine is taken as an example. The plant is connected to the medium voltage system as in the figure below.

In addition to the typical decoupling functions for under/overvoltage and under/overfrequency and short circuit protection, Q-V protections also used. The protection device acts directly on the generator circuit breaker at time stage 1 and in a delayed manner on the circuit breaker at the power system connection point at QV2.

The SK/SQ/Q has two symmetrically arranged generator-side circuit breakers. Depending on the technical connection conditions of the generating unit, a corresponding certification process must prove suitability [4]. Proper functioning of the protection concept must be demonstrable among other things. Complex individual tests per application have in the past been expensive to provide proof and in some cases have been omitted.

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Reactive power undervoltage protection

The increasing number of distributed power suppliers using renewable energy sources from photovoltaics (PV), wind power, biogas or combined heat and power stations (CHP) is resulting in a shift of loads within the power system. With increasing penetration of the generating plants, the connection is being made more and more directly to the medium or high voltage system. Small generating plants, as well as large power stations, are now required to make a contribution towards the power output of the generating plants, the connection is being made more and more often directly to the medium or high voltage system. Small generating plants, as well as large power stations, are now required to make a contribution towards the power output of the generating plants, the connection is being made more and more often directly to the medium or high voltage system. Small generating plants, as well as large power stations, are now required to make a contribution towards the power output of the generating plants, the connection is being made more and more often directly to the medium or high voltage system.

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Q-V relay fully integrated in the SG-/five.lf/zero.lf KOMBISAVE

The Q-V protection system in the SG-/five.lf/zero.lf KOMBISAVE as test equipment for commissioning and regular testing of protective components in the installed plant can likewise be read out and archived in Comtrade format.

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