

INTEGRATION OF DISTRIBUTED GENERATION IN MEDIUM VOLTAGE GRIDS - PROTECTION ISSUES

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Keywords: Distributed Generation; Medium Voltage-grid; Protection;

ABSTRACT

At this moment climate change and CO₂ reduction are hot topics in relation to energy production. Efforts are made to stimulate development of sustainable energy sources, such as wind turbines and PV-systems. Also the combined heat and power production is encouraged. This has lead to an increasing penetration of small generating units in medium voltage (MV) grids. Small generation units, also distributed generation (DG), can have a significant impact on power flow, voltage profile, power quality and grid protection. In this article the effect of DG on grid protection is studied in detail. The paper gives an overview of current protection practices in MV-grids and shows how these practices are influenced by DG. A procedure is derived to determine the impact on protection systems in advance which can be helpful in the planning stage. To illustrate the effects a 3-bus test grid and an existing 20 kV cable grid including high penetration of DG-units is modelled in professional software. In the models the grid protection and the protection of the DG-units are modelled as well. The simulations show that protection problems in compact cables grids are not likely. In weak grids DG can cause a delay of fault clearing which can lead to serious selectivity problems. In the paper it is demonstrated that the effect of DG on grid protection is minimized by immediate disconnection of the DG-units.