

Optimal allocation of soft open point devices in renewable energy integrated distribution systems

ABSTRACT

Renewable Energy Sources (RESs) are increasingly integrated into distribution networks due to their undeniable technical and environmental advantages. Despite all the economical and environmental benefits of RESs, they can negatively affect the distribution network. For instance, their output generations are not predictable, and these uncertainties will lead to some operational challenges. Also, RESs are affected by the climate situation, and there are high correlations between them, generally. The correlations between RESs intensify the operational challenges of energy systems. Soft open points (SOPs) are flexible power electronic devices that can effectively increase the efficiency of energy systems. They realize accurate active power control and reactive power compensation to reduce power losses and adjust three-phase voltages. This paper focused on the optimal determination of the location and setting points of SOPs in unbalanced distribution networks in the presence of correlated uncertain sources. The genetic algorithm (GA) was used to solve the main optimization problem, and the correlation between uncertain sources was managed by the Nataf transformation technique. The IEEE 37 bus test system was utilized to illustrate the effectiveness of the proposed method.