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Analysis of System Imbalance Due to Removal of a Failed Capacitor Unit in an Ungrounded Y-connected Capacitor Bank with One Series Group Per Phase

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Abstract

System imbalance due to the removal of a failed capacitor unit in an ungrounded Y-connected capacitor bank with one series group per phase has been analyzed in detail in this paper. The distribution system imbalance as a result of the removal of one failed capacitor unit by its fuse is usually unexpected and unmanageable. Distribution engineers should pay more attention to this situation to lessen its impact on the system and equipment. A sample feeder was used to simulate a practical feeder under normal and abnormal operation conditions and when a failed capacitor unit is removed. In this practical system, the unbalanced situation which arose from the removal of one failed capacitor bank may result in the malfunction of protective relays, interference with the communication system, and deteriorating power quality. The simulation results indicate that the removal of a failed capacitor bank may significantly impact the system operation if the capacitor bank has only one series group. The outcomes are of value to distribution engineers to thoroughly realize the effects of the removal of a failed capacitor bank.