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RECOMMENDATIONS AND CONCLUSION

Dynamic Voltage Restorer (DVR) is a very efficient device for protecting the sensitive equipment of customer installations from voltage sags that are very difficult to be compensated from the utility side. Since the compensation of sags is a dynamic process, the control system of DVR plays a very important role in its satisfactory performance. Therefore, in this research project, the main emphasis is on the design of a suitable control system for DVR.

In this study three different control systems are proposed, designed, analyzed and simulated with a view to recommend a suitable control system depending on the external factors such as nature of load, sag depth, sag duration etc.

The open loop control system of the DVR is the first system of study. Sections 4.2 of Chapter 4 and 5.2 of Chapter 5 discuss the design and simulation of the open loop control system. According to the findings, the open loop system is inherently stable and therefore no special care is needed for stabilizing the DVR. Owing to this reason, the DVR control

circuitry is simple and in the implementation, the overall delay in responding can be very low due to use of lesser number of control circuit components.

The major drawback of open loop control systems is its large steady state error. In addition, its output response has a lot of disturbances especially when the load consists of an inductive component.

Due to those drawbacks, open loop controlled DVR is less suitable for loads which require a steady voltage and sensitive to harmonics.

The second system of study is the closed loop control system, which consists of negative feedback of load voltage in the control system. Both, the analysis and simulation show that this system is inferior even to the open loop control system and therefore, it cannot be recommended for any practical use.

The multi-loop feedback Controlled DVR is the last system of study. It has a very robust control, which is less sensitive to the load inductance.

Both the analysis and the simulation show the superb performance in almost all external conditions. Therefore, multi-loop feedback controlled DVR can be recommended for protecting most of the practical loads. The recommended range of loads and load power factors for protection using the DVR designed in this project is from 1 MVA to 5 MVA and power factor from 0.6 to unity.

One of the salient features of DVR is its ability to compensate the voltage sags in three methods; pre-sag compensations, in-phase compensation and optimum-energy compensations (discussed in Section 3 of Chapter 3).

In compensating the voltage sag using the first two methods (pre-sag compensation and in-phase compensation), the control system parameters are fixed where as in the optimum-energy compensations method, control system parameters need to be dynamically varied. Hence, the control system used in the optimum-energy compensation is somewhat complex which needs an appropriate sag detection algorithm.