SVC to increase transmission capacity and stability of the Indian 400 kV AC system

Two static var compensators (SVC), each rated at 140 Mvar inductive to 140 Mvar capacitive supplied by ABB were commissioned in 1992 in the Kanpur 400 kV substation of the Power Grid Corporation of India in the state of Uttar Pradesh. The compensators were installed on a turn-key basis.

The main purpose of the Kanpur SVCs is to maintain a stable voltage in this part of the system under various operating conditions.

Also, large active power oscillations can appear in the power transmission system in question. The SVCs are equipped to counteract such oscillations by means of Power Oscillation Damping regulators which automatically go into action if the oscillations exceed a certain preset level.

Furthermore, in case of undervoltage caused for example by short circuits in the surrounding system the SVCs are controlled to zero output and then automatically go back to normal voltage control upon the return of the voltage. This function will effectively reduce system disturbances on such occasions.

To ensure optimum dynamic response of the SVCs for various network conditions, automatic gain supervision is included in the regulator of each compensator.

The effectiveness of the SVCs was demonstrated during an incident where the grid voltage dropped by close to 10% due to a faulty line which was not tripped fast enough. The SVCs very quickly went fully capacitive, thereby supporting the voltage and saving the system from a cascade tripping.

The two SVCs have enabled a considerable increase of the active power transmission capability of the Northern Regional grid and help to maintain a stable 400 kV voltage in the Kanpur area especially under peak load conditions, which used to be a difficult problem.
**Technical data**

- **Controlled voltage**: 400 kV
- **SVC rating**: 140 Mvar inductive to 140 Mvar capacitive (per compensator)
- **Control system**: Three-phase voltage control by means of a voltage regulator. Regulator functions include strategy selection and gain supervision/optimization.
- **Thyristor valves**: Water cooled three-phase valves with magnetic firing.

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