Static VAr Compensator (SVC)

Transmission & Distribution

OPERATION PRINCIPLE

A Static VAr Compensator (or SVC) is an electrical device for providing fast-acting reactive power on electricity transmission networks. SVCs are part of the Flexible AC transmission system device family (FACTS), regulating voltage and stabilizing the system.

The SVC can also be considered as an automated impedance matching device, designed to bring the system closer to unity power factor.

The regulated reactive power is obtained by paralleling a fixed capacitive load (Capacitor Banks) and an adjustable inductive load (Thyristor Controlled Reactor, or TCR).

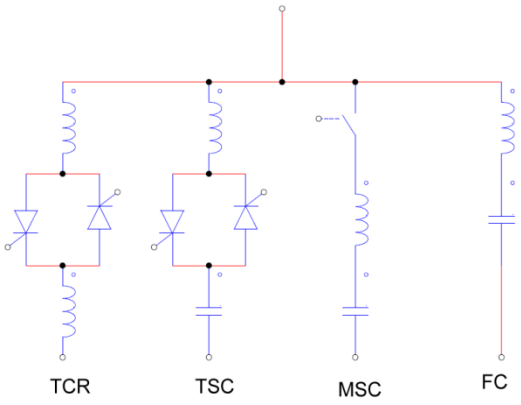
Depending on the firing angle of the Thyristors, injected reactive power can be controlled and the grid voltage can be regulated. The effect of voltage control through capacitance can be understood in terms of a reduction in the line voltage drop as a result of reactive power injection. The SVC provides capacitive reactance, meaning that it injects reactive power into the grid in order to boost the local voltage level.

By adding Mechanical Switched Capacitors (MSC) or Thyristor Switched Capacitor (TSC) for faster response, the SVC can inject reactive inductive power to the grid.

The SVC circuit also contains tuned filters (FC) to suppress the harmonic currents originated by the Thyristors.

The simplicity of the SVC concept and the robustness of the main components (Thyristors, Air Core Reactors, HV Capacitors), allow for outstanding performance and reliability.

The SVC can be connected directly to the grid up to 36kV, for higher voltages a matching transformer is used.



Single Line Diagram of SVC

SVC installed in France

APPLICATIONS & BENEFITS

The SVC is simple, robust, and reliable solution with a good cost/benefit ratio that provides the following benefits:

1. *Voltage Stabilization*

One important issue is voltage stability, reactive power consumption of the connecting lines and loads may lead to voltage collapse in a weak and heavily loaded system. This is quite typical for wind generation or week lines as they are often located in remote areas and connected with long lines to the grid. The SVC compensates the voltage drop due to the reactance in the connection line, the transformer and wind turbines.

2. *Reactive Power Balance*

The SVC can dynamically control the reactive power to improve the transmission capacity.

3. *Voltage Control*

The SVC could acts as a voltage stabilizer by adding/consuming reactive power

4. *Power Oscillation mitigation*

The SVC could acts as a voltage stabilizer by adding/consuming reactive power

Natural air cooled valves in a container

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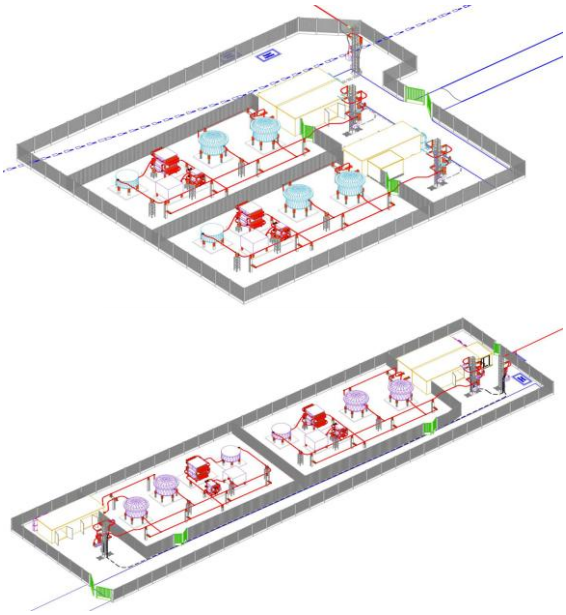
JEMA ENERGY SOLUTION

JEMA ENERGY provides a complete customized turnkey solution.
Our scope includes:

- Engineering
- Simulations dynamic, static
- Harmonic study
- Container solution for indoor equipment
- Customized layout
- Installation
- Commissioning
- Training courses
- After sales services



Two proposed layouts for the same SVC

Outdoor equipment of a SVC

Local control panel PC with SCADA

Outdoor equipment of a SVC

REFERENCES

Eurotunnel	Folkstone	3x110MVAr	Load Balancer
Eurotunnel	Folkstone	2x110MVAr	HVB
SNCF	Longevilles	1x10MVAr	HVB
SNCF	Andelot	1x10MVAr	HVB
SNCF	Le PIEX	2x10MVAr	HVB
SNCF	Ermont	2x10MVAr	HVB

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