SVC and SVC Light
For improved process economy and enhanced power quality

An electrical arc furnace is a source of severe disturbances to the power grid and requires a stable and steady voltage for optimal performance. An SVC (Static Var Compensator) instantaneously compensates the variations of reactive power so characteristic of an arc furnace to minimize disturbances to the grid and will significantly enhance the performance of your furnace.

**Key benefits**

- Power factor correction for better use of existing power supply and more favorable power rates
- Flicker and harmonics reduction
- Increased available power and reduced tap-to-tap time
- Increased steel production
- Reduced energy losses and reduced electrode consumption

**Features**

- High performance control system
- No need of power transformer
- Water cooled indoor thyristor valves for compactness and efficiency.

The main components (thyristor valve, control system, capacitors, cooling system) are all manufactured by ABB, benefitting from expertise and experience gained during many years of FACTS as well as HVDC installations all over the world.

Since 1972, ABB has been supplying Static Var Compensators to dynamically compensate the complex behavior of electrical arc furnaces. The voltage drops and strong fluctuations caused by the arc furnace reduce the active power to the furnace as well as to other loads on the same feeding busbar.

With a Static Var Compensator (SVC) the reactive power variations are compensated within milliseconds, also individually on each phase, providing a balanced voltage. Thanks to the Thyristor Controlled Reactor in combination with harmonic filters a close to mirror image of the furnace's current is produced on a-cycle-to-cycle basis. The voltage is stabilized and troublesome voltage drops and fluctuations can be avoided.

Single line diagram of an SVC.
With the SVC installed the power factor from the arc furnace is increased to near unity and disturbances on the grid are significantly reduced and utility power factor penalties are avoided. A flicker reduction factor up to 2.5 has been reached with the SVC. In cases where this is not sufficient an SVC Light is the answer.

The stabilized voltage will not only mitigate the arc furnace’s disturbances on the grid, but also have a great positive impact on the furnace power. As the power varies with the square of the voltage, the voltage stabilization will have tremendous impact on the furnace’s productivity.

A typical example of an SVC installation

<table>
<thead>
<tr>
<th>EAF 75 MVA, 100 T</th>
<th>Without SVC</th>
<th>With SVC</th>
<th>Improvement (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVC (Mvar)</td>
<td>0</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>Power factor furnace (p.u.)</td>
<td>0.78</td>
<td>0.78</td>
<td></td>
</tr>
<tr>
<td>Power factor supply (p.u.)</td>
<td>0.78</td>
<td>0.99</td>
<td></td>
</tr>
<tr>
<td>Voltage drop (%)</td>
<td>10</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Melting power (MW)</td>
<td>50</td>
<td>60</td>
<td>20.0</td>
</tr>
<tr>
<td>Energy (kWh/tonne)</td>
<td>430</td>
<td>420</td>
<td>2.4</td>
</tr>
<tr>
<td>Melting time (min)</td>
<td>38.7</td>
<td>31.5</td>
<td>22.8</td>
</tr>
<tr>
<td>Power on time (min)</td>
<td>56.7</td>
<td>49.5</td>
<td>14.5</td>
</tr>
<tr>
<td>Tap-to-tap time (min)</td>
<td>68.7</td>
<td>61.5</td>
<td>11.7</td>
</tr>
<tr>
<td>Electrode consumption (kg/tonnes)</td>
<td>1.6</td>
<td>1.55</td>
<td>3.2</td>
</tr>
</tbody>
</table>

A SVC Light®

Where flicker reduction is critical ABB offers SVC Light which is the ABB trademark of a STATCOM. SVC Light can be connected to the load bus without a converter transformer and has world class flicker reduction ability where a reduction factor greater than 7 has been reached.

A SVC Light is based on a Voltage Source Converter, a fully controlled voltage source matching the system voltage in phase and frequency. It uses IGBTs as semiconductors with a switching ability of thousands of times per second, resulting in a minimal response time and superior flicker mitigation.

Additional benefits of SVC SVC Light
- World leading in flicker reduction
- Small footprint
- Milliseconds voltage control
- Active harmonic filtering

![Flicker generation without and with SVC Light](image)

ABB has been pioneering FACTS technologies since the 1950s, and has over 300 installed industrial SVCs around the world and holds the best reactive power compensation solutions.

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