

STATCOM

Converter solutions for reliable and stable grids



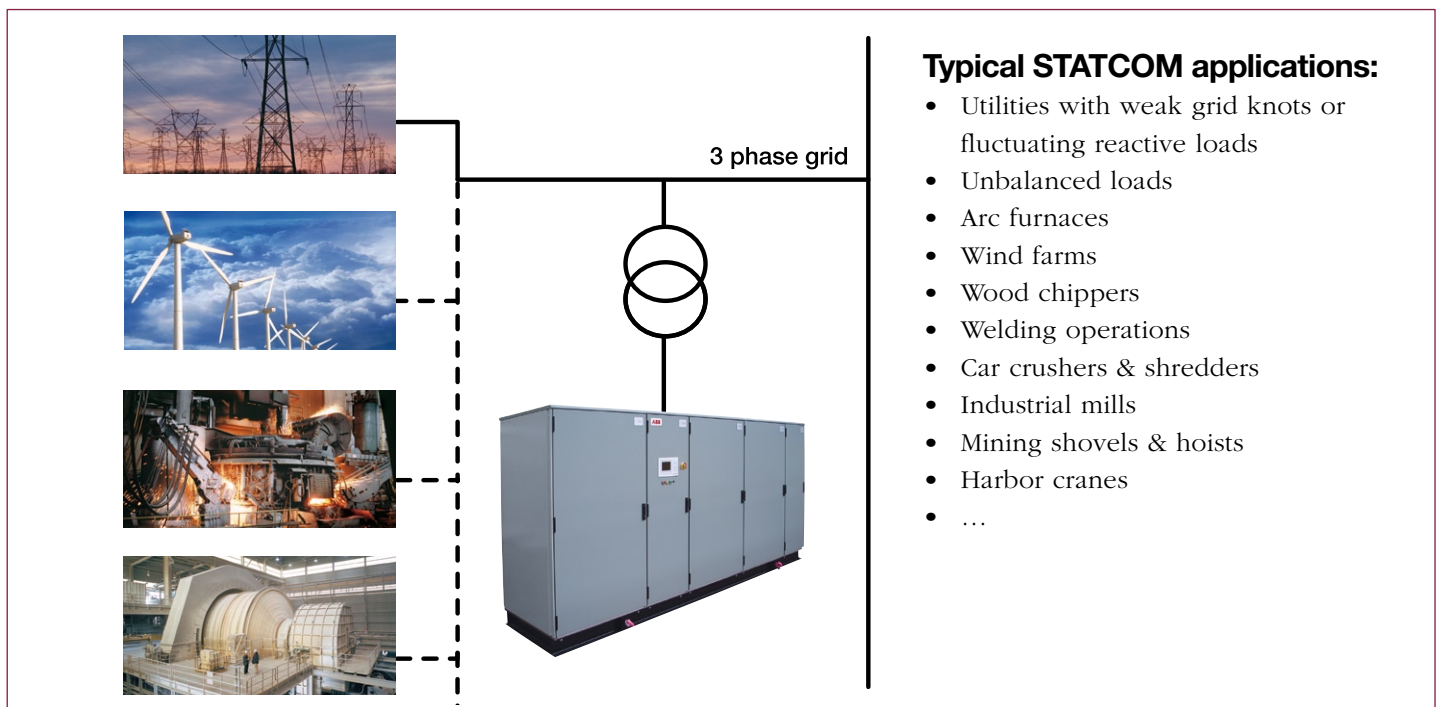
ABB

Static VAR Compensation with a voltage source converter

Electrical utilities and heavy industries face a number of challenges related to reactive power. Heavy industrial applications can cause phenomena like voltage unbalance, distortion or flicker on the electrical grid. Electrical utilities may be confronted with phenomena of voltage sags, poor power factor or even voltage instability. Reactive power control can resolve these issues.

The most advanced solution to compensate reactive power is the use of a Voltage Source Converter (VSC) incorporated as a variable source of reactive power. These systems offer several advantages compared to standard reactive power compensation solutions. Reactive power control generated by generators or capacitor banks alone normally is too slow for sudden load changes and demanding

applications, such as wind farms or arc furnaces. Compared to other solutions a voltage source converter is able to provide continuous control, very dynamic behavior due to fast response times and with single phase control also compensation of unbalanced loads. The ultimate aim is to stabilize the grid voltage and minimize any transient disturbances.



ABB's STATCOM converters are designed to mitigate the described phenomena with solutions based on Power Converter System (PCS) platforms providing the following control features:

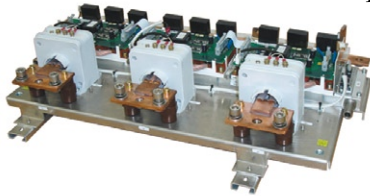
- Power factor correction (cos phi control)
- Voltage control
- Active harmonics cancellation
- Flicker mitigation
- Unsymmetrical load balancing

ABB's STATCOM solutions can be implemented alone or in combination with switched capacitor banks. The final solution depends on the actual system and load conditions determined in a system study, which can be conducted by ABB. Depending on your requirements and the faced challenges customized solutions like active filtering can be realized.

Standardized platforms

The PCS converter series are voltage source converters based on proven building blocks incorporated in ABB products like the PCS 500 or the PCS 6000, which are used in a variety of power conversion applications.

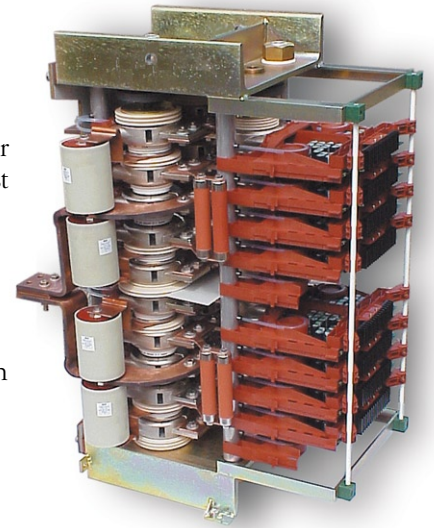
The PCS 500 converters incorporate ABB's IGBT technology configured in an IGBT PEBB (Power Electronic Building Block).



The PCS 6000 converters are based on the IGBT PEBB, mainly used as an

H-bridge module. ABB also offers the SVC Light®, another voltage source converter platform, for the highest power applications.

This standardization allows systems to be realized with lower engineering and design costs and therefore directly affects the customer's end costs.

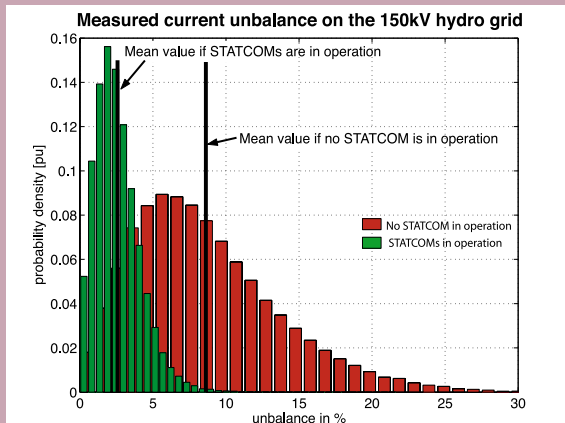


Main advantages of STATCOM solutions with a voltage source converter:

- Continuous and dynamic voltage control
- High dynamic and very fast response time
- Enables grid code compliance
- Maximum reactive current over extended voltage range
- High efficiency
- Single phase control for unbalanced loads
- Small footprint
- Enhanced ride-through capability
- High reliability and availability

Case study: INCO, Indonesia

AC arc furnaces are a major source of grid disturbances. The frequent interruption of the arc leads to strong voltage fluctuations and unbalance between phases. The converters operate as a 64 MVar STATCOM on the grid supplying the furnace. It is possible to



compensate the unbalanced load with the single phase control of the STATCOM and at the same time, supply the required reactive power to stabilize the grid voltage. In normal operation the mean value of current unbalance without operating converter was 8.62%. With the STATCOMs in operation the unbalance is reduced by a factor of nearly four. Due to the better voltage quality the nickel production has been increased significantly.



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