PCS 100 AVC case study

ABB helps high-tech wafer plant mitigate massive voltage dip with the PCS 100 Active Voltage Conditioner

On May 8, 2010, Singapore experienced a significant voltage sag affecting all three phases of the country's power supply at several locations. ABB's PCS 100 Active Voltage Conditioner (AVC) helped a customer to avoid a wafer plant shutdown, averting downtime and financial impact.

Singapore's electricity network is one of the world's best, with exceptional power reliability. Voltage dips of this magnitude only occur about once every two years Voltage dips are momentary reductions in the electrical supply voltage, sometimes only lasting several milliseconds (ms) because of failure of high-voltage equipment or cable damage.

During the recent voltage sag, several wafer fabs' operations were severely affected by the voltage dip, which had exceeded the permissible limits specified in SEMI F47 standard widely used in wafer fabs.

The PCS 100 AVC is a state-of-the-art power quality solution that protects loads from input voltage magnitude and phase variations from +10% to -40% deviations from the nominal line voltage.

Line	Voltage remaining	Voltage sag magnitude	Sag duration
V_{1-2}	59%	41%	~120 ms
V_{2-3}	56%	44%	
V_{3-1}	86%	14%	

All table and graph values are documented using the AVC.

Table 1: Magnitude of the voltage sags as recorded at the 22kV line during the event.

In one of the wafer fabs, ABB's PCS100 AVC detected the dip and protected critical process loads, allowing the plant to ride through the sag without a costly shutdown.

Line	Before AVC	After AVC
V_{1-2}	42%	88%
V_{2-3}	73%	96%
V_{3-1}	76%	90%

Table 2: Voltage remaining values recorded at the 208 V line before and after the AVC. The difference in sag magnitude as compared to Table 1 is due to the 22kV/208V dry-type transfomer.

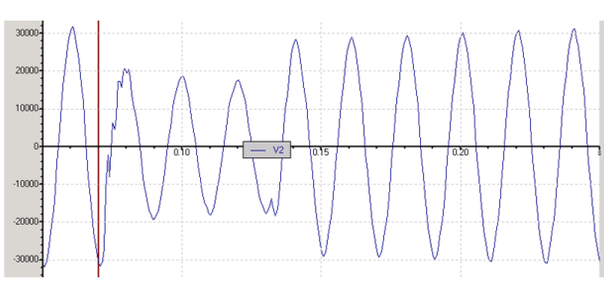

Figure 1: Voltage dip captured at 22kV

Power and productivity for a better world™

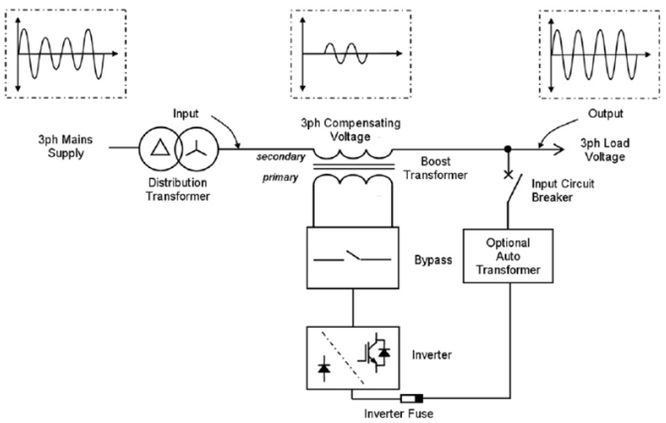

Figure 2: Block diagram of ABB's AVC

Technical specifications	
Date of installation	March 2010
Line voltage	208 kV
Power rating	400 kVA
Sag correction	3-phase 30% /1-phase 40%
Response to sag	< 2 ms
Efficiency	>98% (typically 99%)
Load	>98% (typically 99%)

High-tech industries like wafer fabrication plants and pharmaceutical manufacturing have sophisticated equipment that are extremely sensitive to power fluctuations, and require protection to prevent a shutdown. The cost of getting the plant operating again and the scrapping of damaged products can quickly run into the millions. Power quality and maximum uptime for a plant's operations are ensured with the PCS 100 AVC.

For more information please contact:

ABB Pte. Ltd.
Power Electronics and MV Drives
Sales contact: Kelvin Sim
E-Mail: kelvin.sim@sg.abb.com
Mobile: +65 9295 2082

Sales contact: Richard Yue
E-Mail: richard.yue@sg.abb.com
Mobile: +65 9835 5990

www.abb.com/powerquality