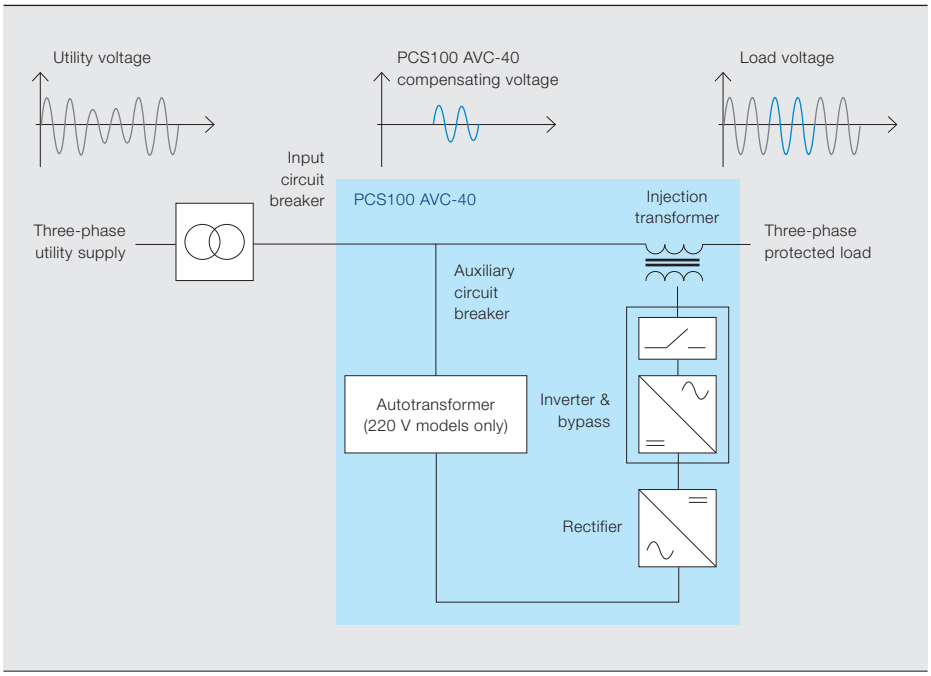
Steady as a rock

Two PCS100 AVC products now designed for different applications

DARIO ROZMAN – Even developed countries equipped with modern power networks are not immune to voltage problems. While outages may be rare, the voltage problems caused by weather, network faults or “digger-through-the-power-cable” type events are ever-present. With modern industry employing more and more automation, the sensitivity of processes to such power quality events is increasing. Even an event lasting less than a few cycles can cause processes to unexpectedly stop – potentially resulting in product damage, wastage and production shortages. In developing countries, or regions with a weak power supply, the main problem is poorly regulated voltage. Without the correct voltage, the reliable process operation may not be possible. If the voltage is low or imbalanced then the overheating of motors is a particular concern. ABB’s PCS100 AVC products are designed to protect industry from voltage events, allowing companies to get on with what they do best.

1 PCS100 AVC-40 schematic



Often, industrial sites are located close together – for example, in an industrial park or in a particular area of a city. If one user in this cluster disrupts the utility voltage – by starting a large motor, for example – the others can be affected by power supply sag or fluctuation. Weather events or faults in other parts of the utility network can also cause the voltage to sag well below its nominal value and stay there for many cycles.

Such voltage variations can cause sensitive production equipment to stop. If a production line stops, it has to be restarted and this can be a complicated and very expensive exercise. Equipment damage caused by power quality events can be even more costly. Further, equipment can be very dependent on a stable power supply to deliver a good-quality end product.

It is best, then, for companies exposed to the risk of an uncertain power supply to invest in equipment that ensures a constant supply of clean, high-quality power – ABB's PCS100 Active Voltage Conditioner (AVC).

Title picture
ABB's PCS100 AVC corrects voltage sags or fluctuations and ensures a supply of high-quality power to critical loads.

The PCS100 AVC product

ABB has a variety of power protection products and the PCS100 AVC is unique among these. Specifically designed for industrial and large commercial applications, the PCS100 AVC is able to respond instantly to voltage sags and surges, correct for voltage imbalances and remove voltage flicker.

> The PCS100 AVC-40 responds to voltage sags or swells within several milliseconds and can inject up to 40 percent voltage correction.

The PCS100 AVC consists of two converters that are not in the current path between the load and the utility. Instead, the corrective voltage injection is achieved by means of a transformer winding placed between the utility and the sensitive load ➔ 1–2. This configuration delivers a very efficient and effective voltage correction.

The PCS100 AVC does not require battery storage as it draws the additional current required to make up the correction voltage from the utility supply. Without the ongoing maintenance costs typically associated with batteries, the cost of ownership of PCS100 AVC systems is very low.

Furthermore, the PCS100 AVC contains a bypass system that, in the event of a fault within the PCS100 AVC, ensures that the load continues to be supplied from the utility.

The PCS100 AVC is available with ratings from 150 kVA to 3.6 MVA and is realized in a low-voltage switchgear cabinet ➔ 3. It offers precise online voltage control, a proven and dependable converter platform, sophisticated control software and an efficiency of 99 percent. The PCS100 AVC product portfolio now has two products designed for different applications:

- The PCS100 AVC-40 – designed for customers who have a stable network, but one which may be susceptible to voltage sags caused by external factors such as weather, etc.
- The PCS100 AVC-20 for continuous voltage regulation. This product is ideal for customers whose network is weak and unstable.

The PCS100 AVC does not need batteries as it draws the additional current required to make up the correction voltage from the utility supply.

2 The PCS100 AVC

Each product is specifically engineered to fix different types of common utility power supply problems.

PCS100 AVC-40 Active Voltage Conditioner for sag correction

The PCS100 AVC-40 responds to voltage sags or swells within several milliseconds and can inject a voltage correction of up to 40 percent. For example, if a facility was faced with a voltage that sagged to 60 percent of its nominal value, the PCS100 AVC-40 would boost the voltage back to 100 percent. No lights would dim and no equipment would trip – business would go on as usual. This example applies to three-phase power; performance is even better for single-phase sags (the most common type): voltage sags down to 45 percent of the nominal voltage are fully corrected.

The PCS100 AVC contains an internal bypass system that, in the event of a fault with the AVC, ensures that the load is continually supplied from the utility.

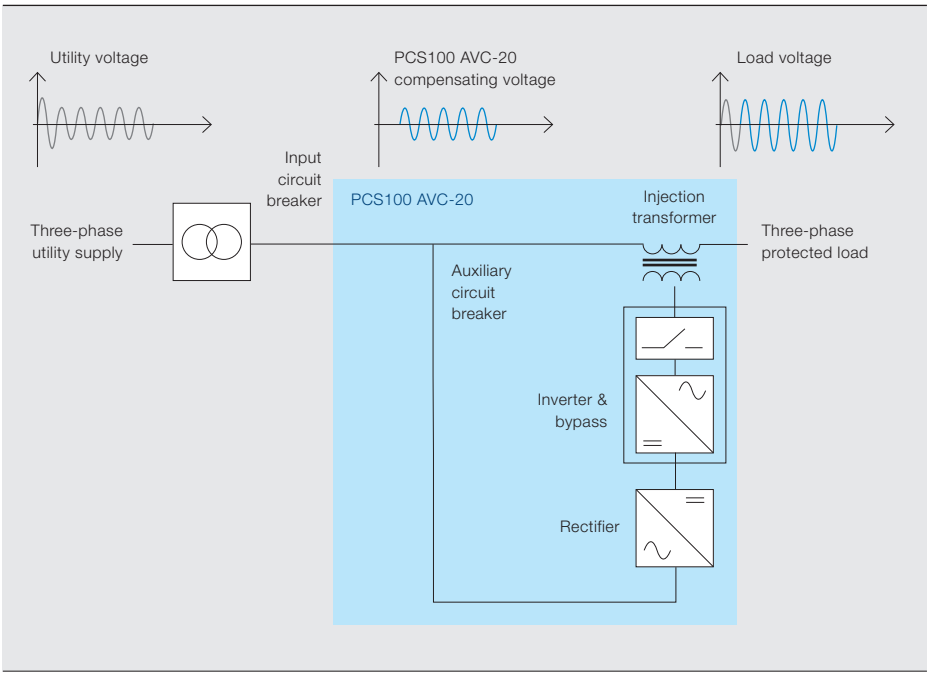
For three-phase sag events, the PCS100 AVC-40 can restore voltage that has sagged to 50 percent back to the 90 percent level, thus guaranteeing continued plant operation. The AVC can sustain this correction for 10 seconds. This performance amply covers the sag durations experienced by customers. Thus, plant operation is well protected against the two main aspects of voltage sags – depth and duration.

For single phase, the PCS100 AVC-40 can correct sags of up to 30 percent remaining voltage back to 90 percent, guaranteeing continued plant operation. The AVC can perform this correction for 10 seconds at this voltage level. Again this is more than covering the sag durations experienced by customers.

In addition, the PCS100 AVC-40 is able to continuously correct voltage fluctuations of ±10 percent in the mains voltage and even remove imbalances from the supply voltage.

The product is rated from 150 kVA to 3.6 MVA and is available for 220 V, 400 V and 480 V. Special voltages and powers up to several MVA are available as customized designs.

3 PCS100 AVC-20 schematic



Rated at up to 3 MVA, the PCS100 AVC-20 ensures continuous voltage regulation to 100 percent for voltage fluctuations of ±20 percent of the mains voltage. It also removes any imbalances from the supply voltage.

PCS100 AVC-20 Active Voltage Conditioner for voltage regulation

Rated at up to 3 MVA, the PCS100 AVC-20 ensures continuous voltage regulation to 100 percent for voltage fluctuations of ±20 percent of the mains voltage. The PCS100 AVC-20 also removes any imbalances from the supply voltage ➔ 3.

If the voltage fluctuations are even higher, the PCS100 AVC-20 will undertake a partial correction, with a voltage injection of up to 20 percent. For example, with mains voltage drops of 30 percent, it corrects to 90 percent of the nominal voltage – keeping voltage levels inside standard specifications of most electrical equipment.

Common features

The PCS100 AVC has several advantages over competitors' devices:

– Small dimensions: Space is often an issue in industrial environments and the compact dimensions of the PCS100 AVC allow it to be installed in small spaces.
– High reliability: An integrated bypass, and industrial-grade overload and fault capacity contribute to the high reliability.
– Lowest total cost of ownership: The absence of energy storage (batteries), low maintenance and high efficiency mean running costs are low.

The PCS100 AVC-40 and AVC-20 products both feature a large touch-screen LCD, through which the device can be operated and detailed event logs accessed. An integrated Web server allows remote access and emails can be sent to those concerned when a power quality event occurs.

Modern factories with sophisticated equipment face continuous threats from power utility network events such as sags and surges. By installing ABB's PCS100 AVC they are equipping themselves with a sophisticated layer of protection that improves their bottom line by dramatically reducing downtime, scrap material, poor product quality, lost production time and reduced plant maintenance.

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