

# Semiconductor Review

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**POWER  
ELECTRONICS**

E D I T I O N

**Bill Hinton,**  
*Director Of Engineering*

# APPLIED ENERGY

**THE ONE-STOP SOLUTION**  
FOR POWER QUALITY ISSUES

\$15



# Enhance Electronics



The annual listing of 10 companies that are at the forefront of providing Power Electronics solutions and transforming businesses

# APPLIED ENERGY

## THE ONE-STOP SOLUTION FOR POWER QUALITY ISSUES

By Richmond smith

**T**oday, having an uninterrupted power supply alone is not enough for the smooth running of industrial operations. Ensuring the optimum characteristics of supply voltage at all times is essential for continuous operations and longer life of the equipment. With the growing use of power electronic devices in commercial and domestic settings as well as sensitive equipment in automated production, the need for maintaining good power quality has become a necessity. However, ensuring this is often a challenging task for organizations.

“There is a common assumption that power quality issues are circumstantially unique,” says Dan Princinsky, President, Applied Energy. “However, all machines, controls, and drives are powered by the same electricity. Therefore, these problems are a result of the same set of root causes,” he adds.

These root causes can stem from arc flash, arcing ground faults, phase voltage imbalance, and voltage spikes from internal or external sources, among many others. Another key contributor to power quality issues is the “non-linear” loads. The impedance of this specific kind of load changes with instantaneous applied voltage, leading to the lack of the constant relation current vs voltage in the alternating period. This drives current in abrupt short pulses that distort the current waveforms and lead to harmonic distortion and unreliable equipment operation. It brings unexpected resonances, disturbances in electronic equipment, causing logical faults in digital circuits, and malfunctions of motors and generators.



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**Our VSGR is a one-stop solution that can protect everything from five volts DC to grid level equipment**

Headquartered in Saginaw, MI, Applied Energy—a leading solution provider of surge suppressing, voltage stabilizing ground reference devices—is uniquely positioned to address these power quality issues.

Established with a mission to eliminate the problems caused by transient overvoltage events such as ground faults, Applied Energy is widely recognized today as the manufacturer of Phaseback Voltage Stabilizing Ground Reference (VSGR) that solves common power quality issues. It is safe to say that Phaseback VSGR is the world's only energy-saving, energy-efficient, future-proof, harmonic noise eliminating, ground fault/arc flash preventing, lightning arresting, and EMP mitigating voltage stabilizing system. It prevents voltage spikes by balancing the phase voltage with respect to ground in real-time at the speed of the current flow. This prevents the occurrence of adverse events by eliminating causes from the root.

“For years, businesses have been utilizing short-term solutions to eliminate their power-related issues; but the outcomes have remained far from optimum. This is where Phaseback VSGR promises a feasible way forward,” says Bill Hinton, Director Of Engineering, Applied Energy. Clients can install it anywhere in their facilities within 100 feet of the power transformer, and power quality issues will be nothing more than a distant memory.

By using the Phaseback VSGR to control the voltage with respect to ground, there will be up to an 85 percent reduction in phase voltage harmonics, phase voltage imbalance, voltage vector misalignment, and voltage spikes from all sources - internal and external. More importantly, after balancing the voltages and correcting the power issues, there will be tangible, permanent energy savings, which reflects positively and directly on clients' electric bills.

### **In Focus: Phaseback**

In many cases, transient voltages and arcing ground faults cause high-frequency noise, insulation breakdown, control lockups, and premature equipment failure. Phaseback VSGR can prevent arcing ground faults significantly. Also, during a scheduled or

unscheduled power outage, the solution ensures the smooth functioning of a facility by discharging the stored energy from the power distribution. This discharge works like a dynamic braking resistor on a crane.

Phaseback VSGR also protects systems from the high voltage buildup caused by traditional Transient Voltage Surge



Suppressor (TVSS) units. The phase voltage harmonics often cause eddy currents. This leads to heating issues within motors, transformers, and inductive machinery and restricts current flow through the motors causing the motors running DOL to be less energy efficient. Phaseback VSGR addresses this issue as well by balancing and stabilizing phase voltages. Subsequently, the phase voltage harmonics at all frequencies—including zero, even, odd—and inter-harmonics are reduced by at least 85 percent, ultimately leading to the reliable operation of all the equipment connected to the power system. “With Phaseback, the harmonics are reduced and the motors run cooler and use less energy (watts or true power) with reduced volt-amp draw (apparent power), the VAR power (imaginary power) and increased power factor,” adds Hinton.

Another issue that adversely impacts the efficiency of electrical devices is arc flash. The mitigation of this requires achieving fault clearing within ten cycles. Fault currents, even modest ones of 5-10kA, can lead to catastrophic outcomes such as arc flash/blast on live equipment, the rupture of oil-filled gear, or the explosion of faulty switchgear. In worst-case scenarios, major equipment damage and injury or even death can occur before a circuit breaker can clear the fault. Phaseback VSGR equips clients with a current detector that helps identify the first fault and notify concerned personnel accordingly. So, the first fault can be solved at the earliest. It also operates as a dynamic brake when power is



**Dan Princinsky,**  
Major Managing Member


shut off, or a power failure occurs, thus draining the energy to what should be a non-damaging level. “Our VSGR is a one-stop solution that can protect everything from five volts DC to grid level equipment. It reacts at the beginning of an event, simultaneously with the speed of current flow—without the 10 to 100 millisecond delay found in other power products. For example, a delay of just 10 milliseconds would allow a voltage spike to travel 1,860 miles before typical power quality devices can react,” elucidates Princinsky.

While Phaseback VSGR solves all power issues, clients get additional benefits beyond reduced harmonics and voltage spikes. As the equipment operates cooler and with lower voltage stress, it can work longer with higher efficiency. Only one Phaseback VSGR per power transformer or generator ensures one to two-year payback due to increased energy savings.

## Guaranteeing Seamless Operations and Cost Savings

With such a robust power quality solution, Applied Energy has helped a legion of prestigious clients over the years, including US Coast Guard, US Navy, and many automotive companies.

In one instance, a Michigan-based component machining plant with CNC, PLC, VFD spindle, and servo drives, as well as traditional transfer machines, underwent three catastrophic power outages. The outage resulted from lightning and heavy rainfall leaking through the roof onto the bus duct and bus plugs of the 480-volt power distribution system. The 600 volts 1,600 amp substation breaker tripped for a short circuit exceeding 10,000 amps (instantaneous trip set a 6x breaker setting). As such, 20 ft. of the bus was destroyed. On another occasion, lightning struck a transformer in the facility’s main substation, causing a power outage. Typically, these power problems would require control replacement, program reloading, and resetting errors in drives in the facility - leading to many hours of lost production. However, Applied Energy made the entire process frictionless. When the power system components were replaced, and the power turned back on, there was no damage to any control equipment in the facility, and not even one program was scrambled in any PLC, CNC, Servo, or VFD drive. The machinery started back up and was put back into production.

Backed by the prowess of many such success stories, Applied Energy is exploring new avenues of growth. In the future, the company will focus more on enhancing the capability of Phaseback to make it more beneficial for different industry verticals. “We haven’t faced a single failure in the past two decades of being in business. This has only been possible owing to the dedication and passion in what we do,” concludes Princinsky. 

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