



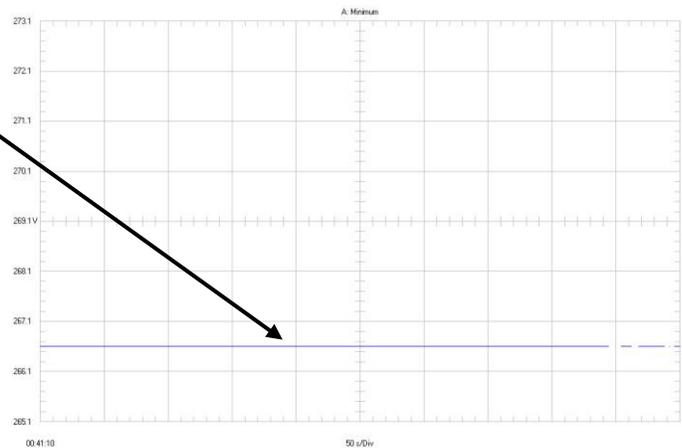
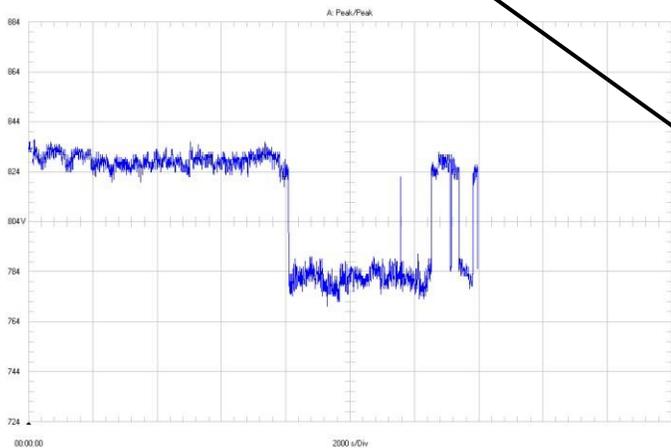
PHASEBACK

Benefits for Ungrounded Power Systems

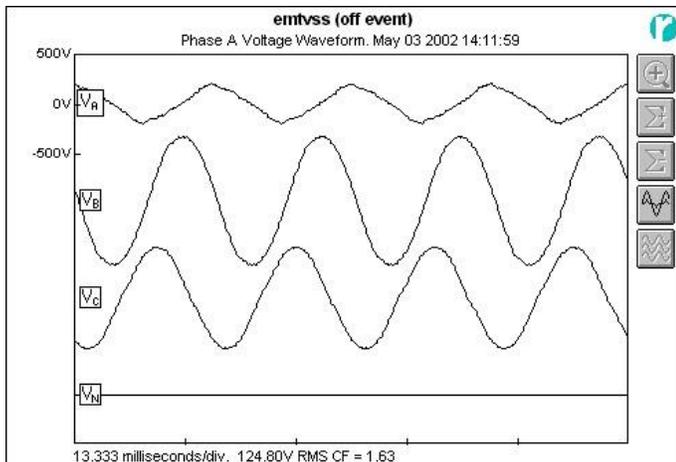
1. Voltage Stabilization and Voltage Balancing

Phaseback balances and stabilizes phase voltages with respect to ground. By this correction drives and control systems to operate reliably. This voltage stabilization also maintains a reference in the event of a power failure or scheduled shutdown preventing damage to sensitive equipment and allowing motors to run cooler extending their life by as much as double.

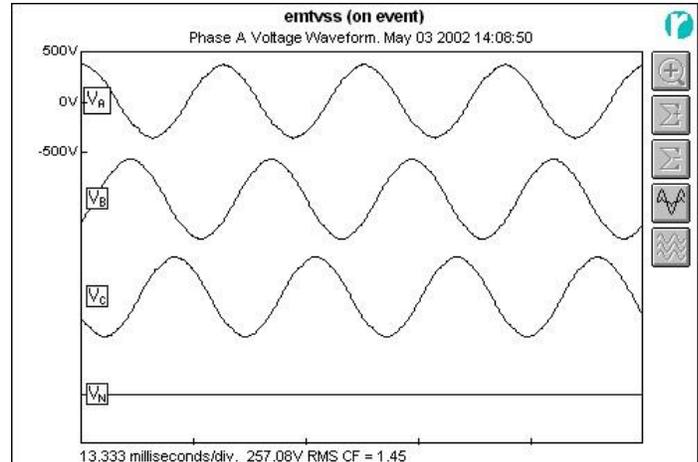
1) Provide Voltage Stabilization



Phase voltage 61% imbalance with Stabilization OFF



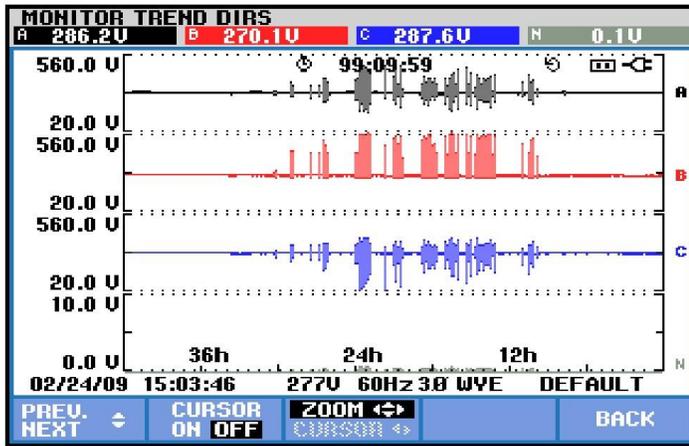
Phase voltage imbalance 6% with Stabilization ON



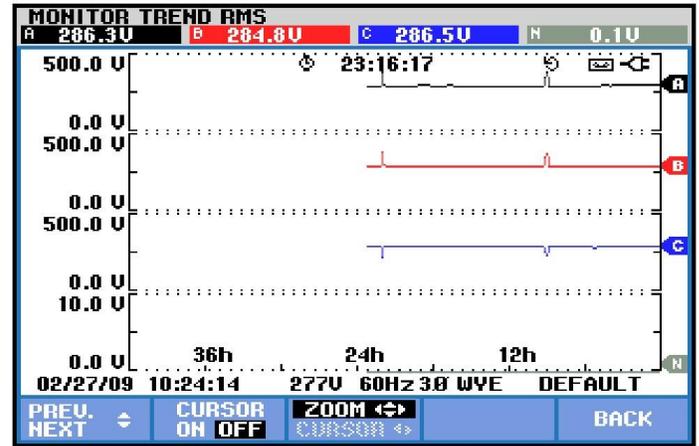
2. Transient and Arc fault damage elimination

Transient Voltages and Arcing ground-faults cause high frequency noise, insulation breakdown, control lockups and premature equipment failure. Most solid grounds, which can cause an arc-flash hazard, start as arcing ground faults, Phaseback prevents arcing ground faults reducing the potential for arc-flash by over 85% and even in a scheduled or unscheduled power outage, Phaseback discharges the stored energy from the power distribution reducing the arc-flash danger. This discharge works like the dynamic breaking resistor on a crane. Power systems with Phaseback are protected from the high voltage buildup allowed by traditional TVSS units. Phaseback limits the voltages to system voltage, 480 in a 480 volt power system.

Voltage spikes and Arcing ground-faults



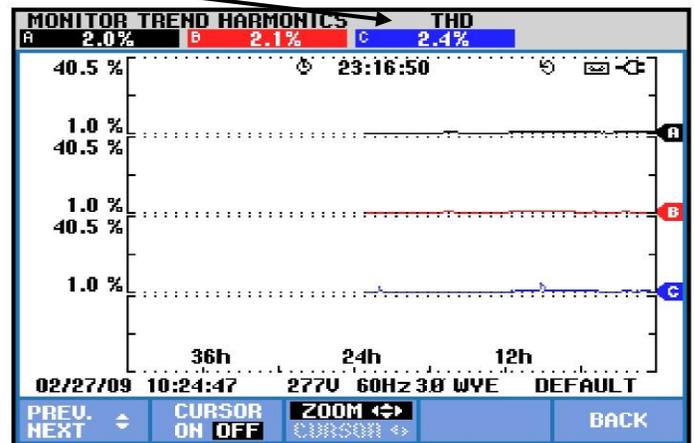
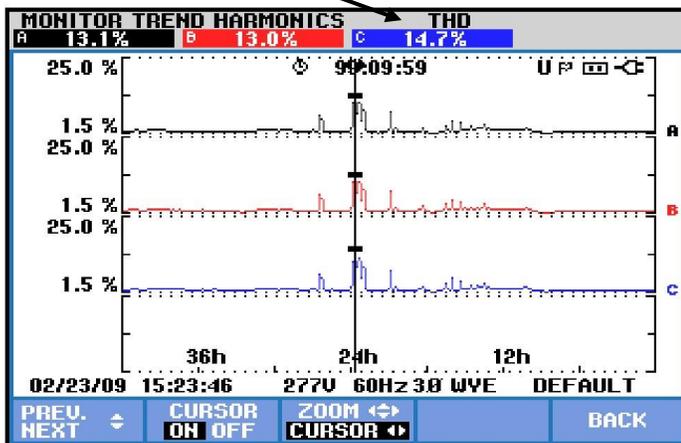
Voltages Stabilized with Phaseback



3. Harmonic reduction

Phase voltage harmonics cause eddy currents which causes heat in motors, transformers and all other inductive devices. They are all reduced with Phaseback. Phase voltages are balanced and stabilized with Phaseback and as a result the phase voltage harmonics at all frequencies, including zero, even, odd and inter-harmonics are reduced by 85% allowing reliable operation of all the equipment connected to the power system.

Reduce phase voltage harmonics

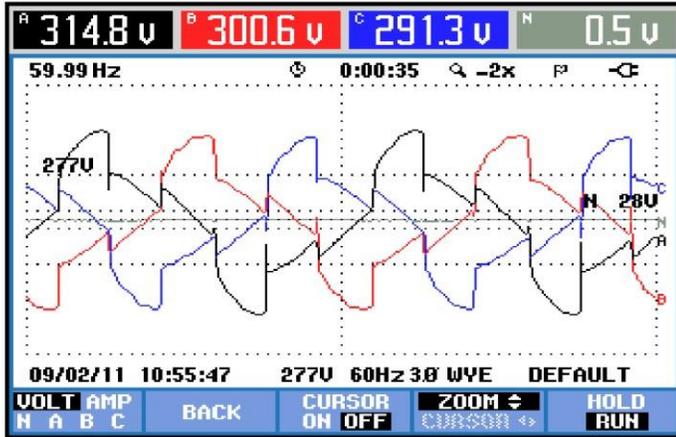


4. Reduction in Energy Consumption

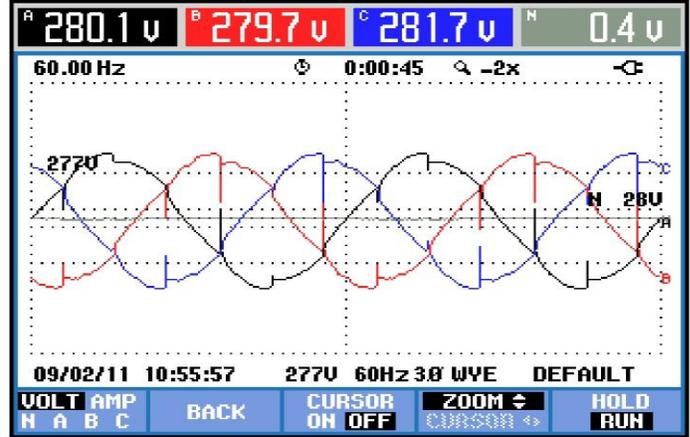
Harmonics cause eddy currents that restrict current flow through the motors causing the motors running DOL (direct on line) to be less energy efficient. With phaseback the harmonics are reduced and the motors run cooler and use less energy (watts or true power), reduce the volt-amp draw (apparent power), reduce the VAR power (imaginary power) increase the power factor. The energy savings will typically cause a payback in one year or less.

Reduce wasted energy and waveform distortion

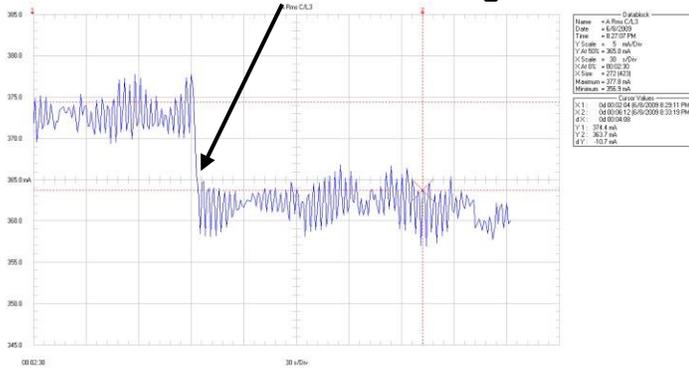
With 350 kVA Wave-Trap filter (over 400 amps)



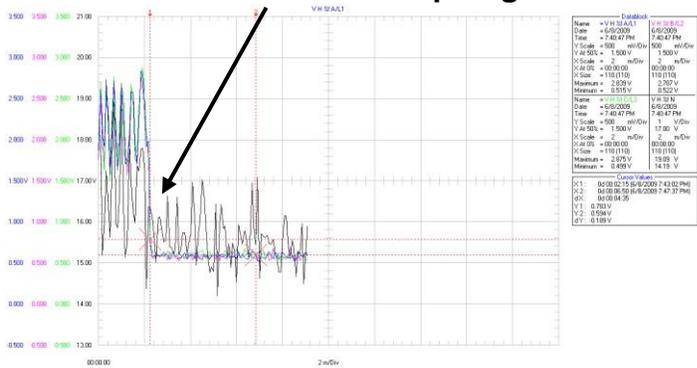
With Phaseback Voltage Stabilization (1 amp)



Phaseback DVS ON Peak Voltage Reduction



Phaseback DVS ON Amperage Reduction

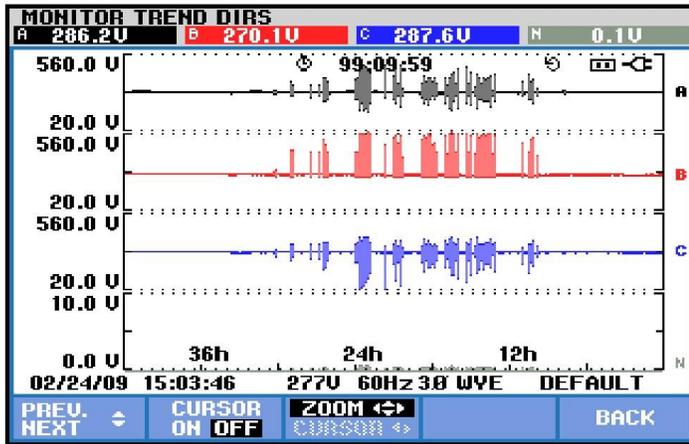


5. Arc Flash Mitigation

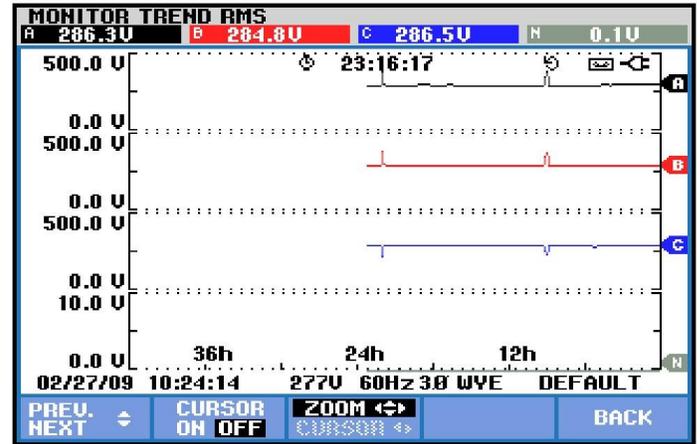
For the mitigation of arc flash hazards the goal is to achieve fault clearing within 10 cycles. Fault currents, even modest ones of 5-10kA, can yield catastrophic results - arc flash/blast on live equipment, the rupture of oil-filled gear or explosion of faulty switchgear. Major equipment damage, injury or death to personnel can occur well before a circuit breaker can clear the fault. And Personal Protective Equipment, the flame suits, only protect against heat and small particles.

With phaseback there is a current detector to identify and notify personnel when the first fault occurs early enough to correct the problem before a second fault occurs. Phaseback also operates like a dynamic brake when power is shut off or a power failure occurs thus draining the energy to what should be a non-damaging level.

Voltage spikes and Arcing ground-faults



Voltages Stabilized with Phaseback



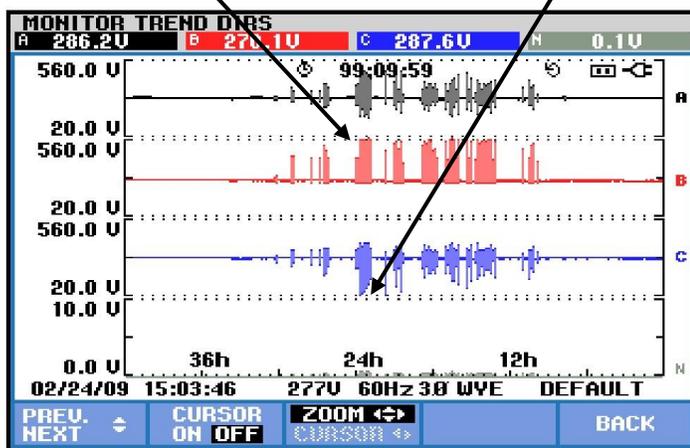
Benefits for Grounded Power Systems

1. Transient voltage Damage elimination

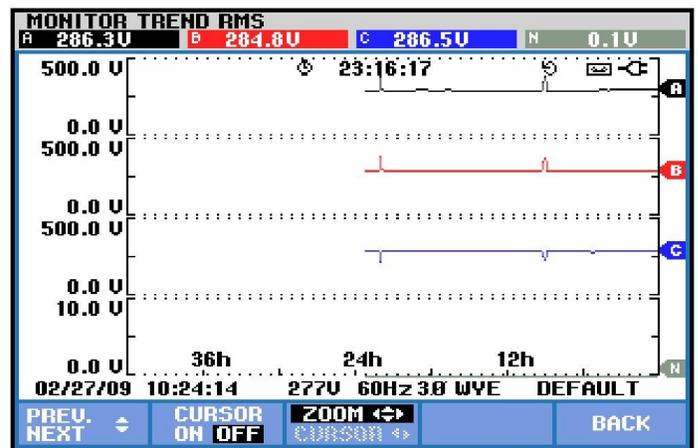
Transient Voltages and Arcing ground-faults cause insulation breakdown, high frequency noise, control lockups and premature equipment failure. Most solid grounds, which can cause an arc-flash hazard, start as arcing ground faults, Phaseback prevents arcing ground faults reducing the potential of an arc-flash by over 85% and even in a scheduled or unscheduled power outage, Phaseback discharges the stored energy from the power distribution reducing the arc-flash danger. This discharge works like the dynamic breaking resistor on a crane.

Power systems with Phaseback are protected from the high voltage buildup allowed by traditional TVSS units. Phaseback clamps the voltages from exceeding system voltage, 480 in a 480 volt power system.

Voltage spikes and Arcing ground-faults



Voltages Stabilized with Phaseback



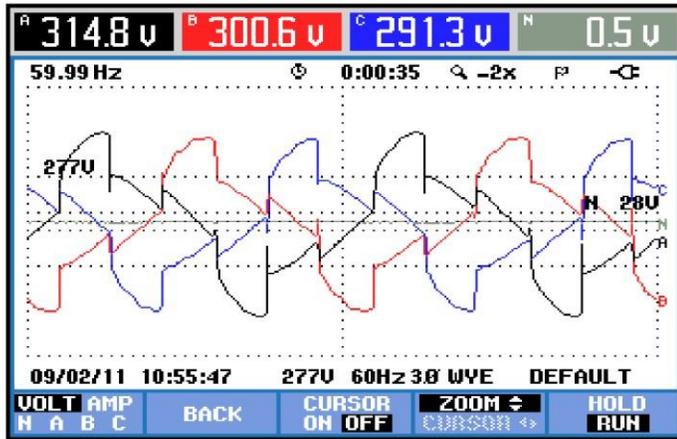
2. Reduction in Energy Consumption

The harmonics cause eddy currents that restrict current flow through the motors the motors running DOL (direct on line) to be less energy efficient. With phaseback the harmonics are reduced and the motors run cooler and use less energy

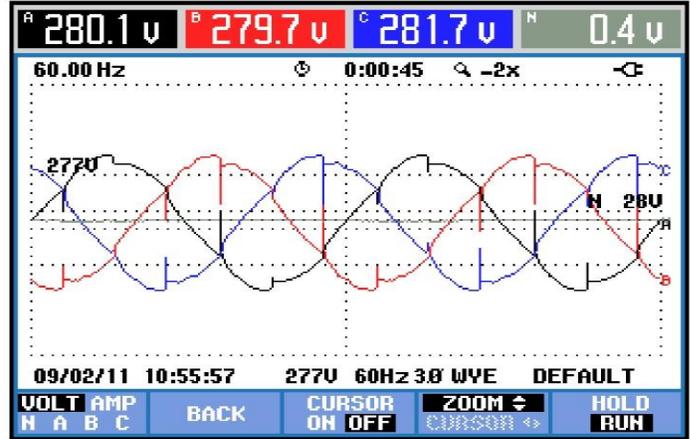
(watts or true power), reduce the volt-amp draw (apparent power), reduce the VAR power (imaginary power) increase the power factor. The energy savings will typically cause a payback in one year or less.

Reduce wasted energy and waveform distortion

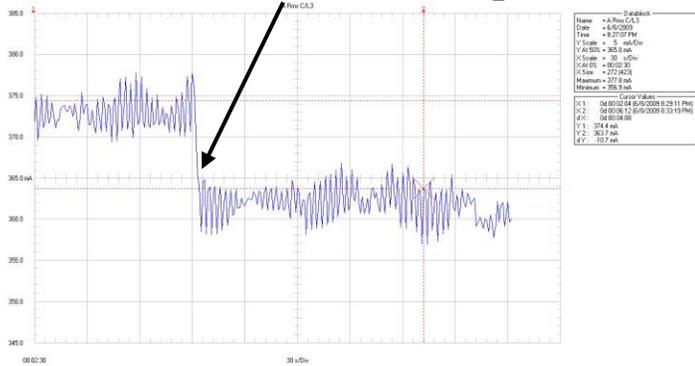
With 350 kVA Wave-Trap filter (over 400 amps)



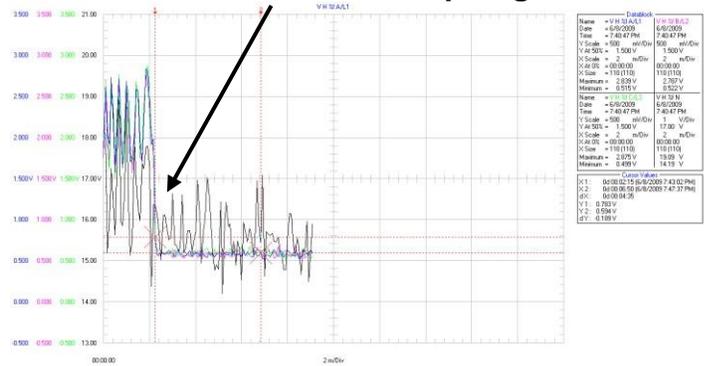
With Phaseback Voltage Stabilization (1 amp)



Phaseback DVS ON Peak Voltage Reduction



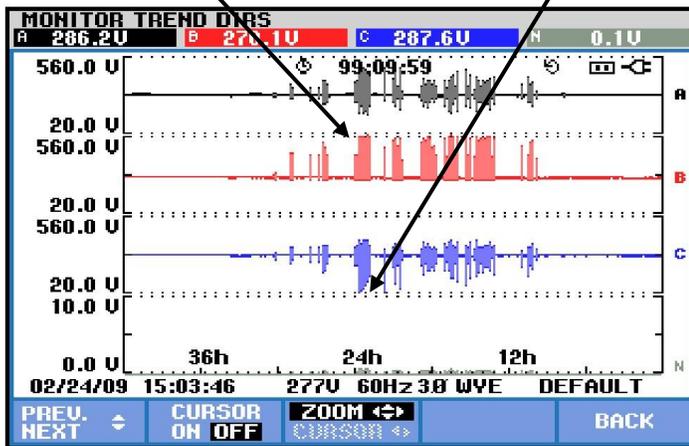
Phaseback DVS ON Amperage Reduction



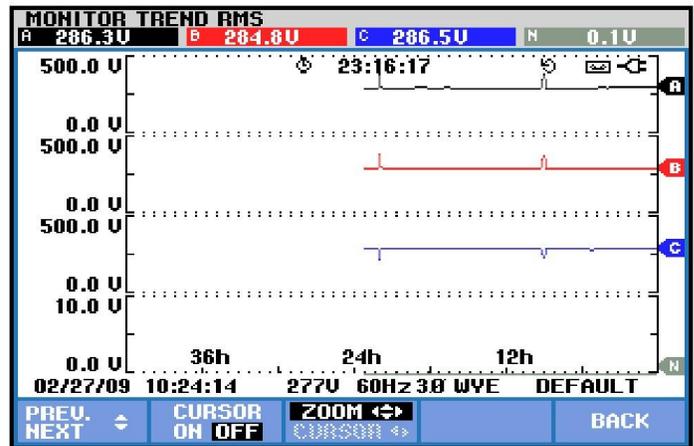
3. Arc Flash Mitigation

Transient Voltages and arcing ground-faults cause high frequency noise, insulation breakdown, control lockups and premature equipment failure. Most solid grounds, which can cause an arc-flash hazard, start as arcing ground faults, Phaseback prevents arcing ground faults reducing the potential of an arc-flash by over 85% and even in a scheduled or unscheduled power outage, Phaseback discharges the stored energy from the power distribution reducing the arc-flash danger. This discharge works like the dynamic breaking resistor on a crane. Power systems with Phaseback are protected from the high voltage buildup allowed by traditional tvss units. Phaseback clamps the voltages from exceeding system voltage, 480 in a 480 volt power system.

Voltage spikes and Arcing ground-faults



Voltages Stabilized with Phaseback



Phaseback reduces the occurrence and severity of an arc to ground preventing an arc-flash event in a power system without the need for photocells, upgrading the trip units or replacing the main circuit breakers.

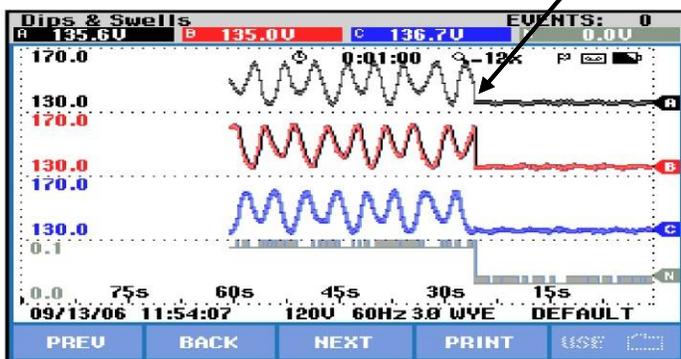
Phaseback Drive Voltage Stabilizer

Benefit

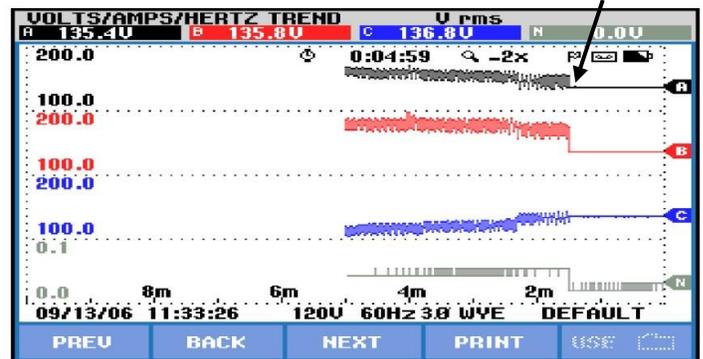
1. Voltage Stabilization

Phaseback balances and stabilizes phase voltages with respect to ground. By this correction drives and control systems to operate reliably. This voltage stabilization also maintains a reference in the event of a power failure or scheduled shutdown preventing damage to sensitive equipment and allowing motors to run cooler extending their life by as much as double.

Phaseback Drive Voltage Stabilizer ON

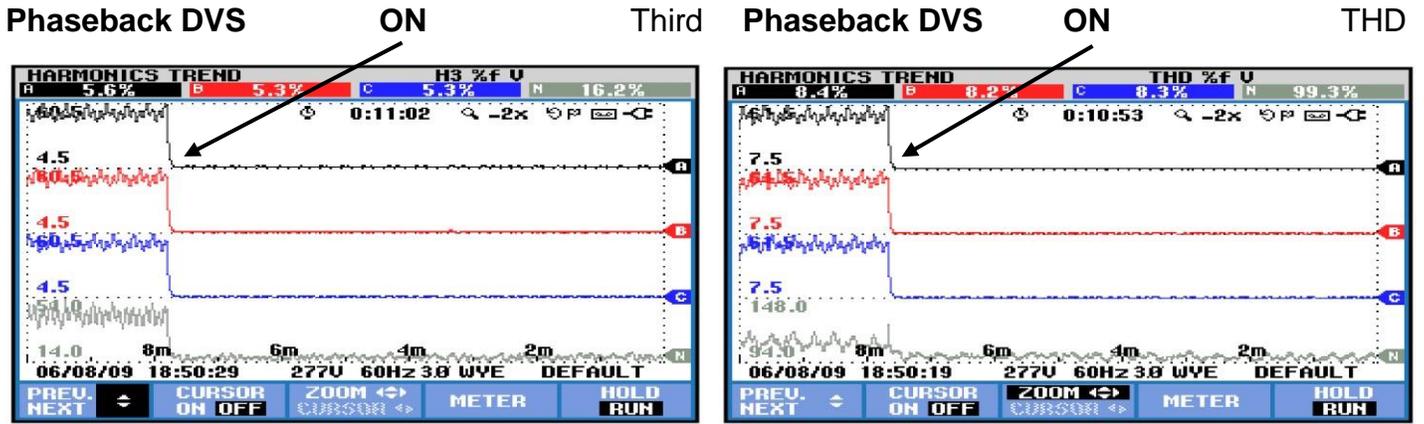


Phaseback Drive Voltage Stabilizer ON



2. Harmonic reduction

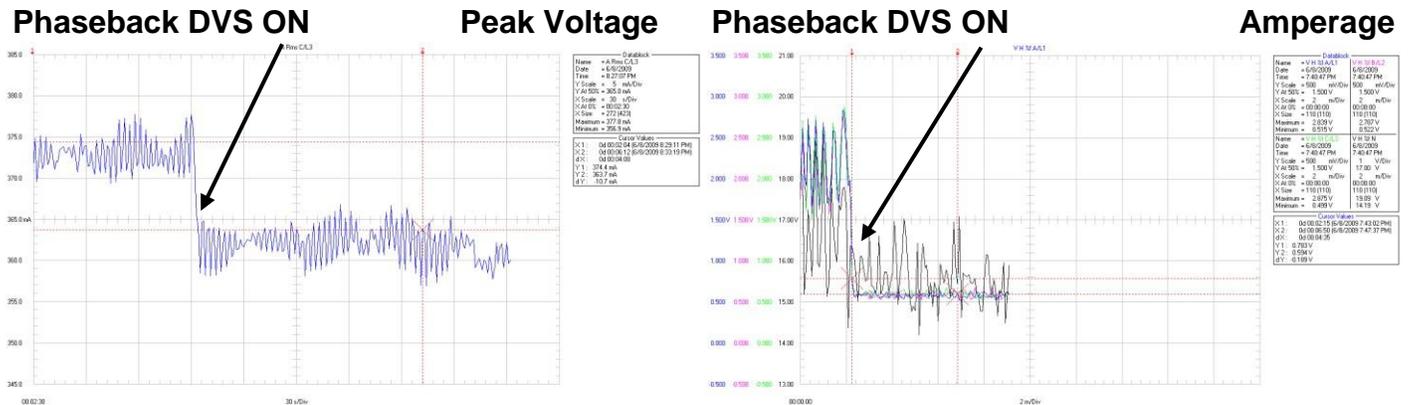
Phase voltage harmonics cause eddy currents which causes heat in motors, transformers and all other inductive devices are reduced with Phaseback. Phase voltages are balanced and stabilized with Phaseback and as a result the phase voltage harmonics at all frequencies, including zero, even, odd and inter-harmonics are reduced by 85% allowing reliable operation of all the equipment connected to the power system.



3. Energy Consumption Reduction

Energy Reduction with Phaseback

Phaseback balances the voltages, reduces the harmonics that cause eddy currents which in turn causes heat in motors and prevent transient voltage spikes and this makes it easier for all the motors running DOL (direct on line) to run cooler and use less energy (watts or true power), reduce the volt-amp draw (apparent power), reduce the VAR power (imaginary power) increase the power factor. The energy savings will typically cause a payback in one year or less. Typically the energy reduction is 8%

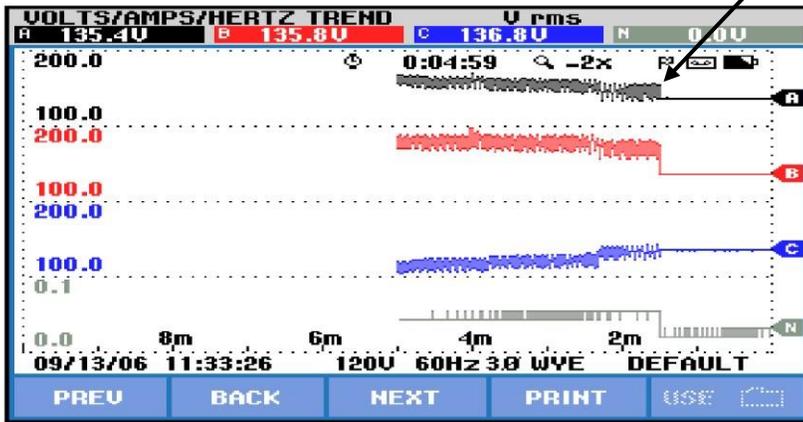


4. Transient elimination from the Drive

Arcing ground-faults cause high frequency noise, insulation breakdown, control lockups and premature equipment failure. Most solid grounds, which can cause an arc-flash hazard, start as arcing ground faults, Phaseback DVS prevents arcing ground faults reducing the potential of an arc-flash by over 85% and even in a scheduled or unscheduled power outage, Phaseback DVS discharges the stored energy from the power distribution reducing the arc-flash danger. This discharge works like the dynamic braking resistor on a crane.

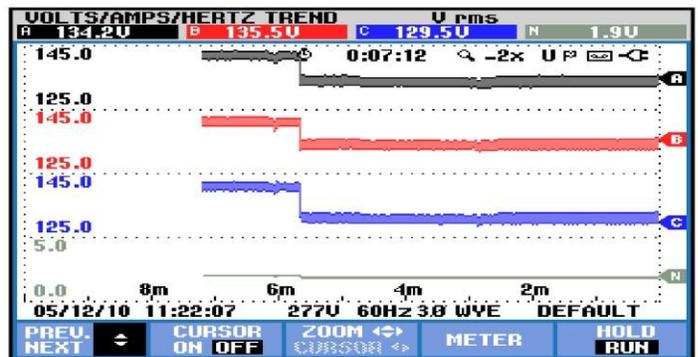
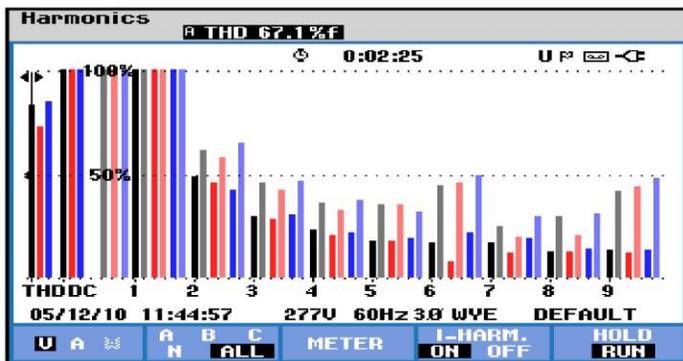
Motor power systems with Phaseback are protected from the high voltage buildup allowed by traditional tvss units. Phaseback clamps the voltages from exceeding system voltage, 480 in a 480 volt power system.

Voltages Balanced and stabilized with Phaseback ON



5. Extended Distance between Drive and Motor (Tested at 1000 Ft.)

The motor power cable can not typically exceed 100 ft due to harmonics and transient voltage spikes from the drive causing noise between the variable speed drive and motor. With the Phaseback DVS this requirement is no longer an issue. Motor power systems have been tested to 1000 ft with a Phaseback Drive voltage stabilizer reduces the harmonics and spikes



6. Extended Motor Life

Phaseback balances and stabilizes phase voltages with respect to ground causing the voltages to be brought back into balance which corrects the voltages to allow drives and control systems to operate reliably.

Electric motors with a 4% voltage imbalance run 25% hotter and every 7 ½ degrees a motor runs in excess of its rating cuts the motor life in half. With the Phaseback DVS electric motor life will more than double.

Phaseback balances the voltages, reduces the harmonics that cause heat in motors and prevent transient voltage spikes and this makes it easier for all the motors running DOL (direct on line) to run cooler and use less energy (watts or true power), reduce the volt-amp draw (apparent power), reduce the VAR power (imaginary power) increase the power factor. The energy savings will typically cause a payback in one year or less. Typically the energy reduction is 8%

Harmonic Silencer

Benefits

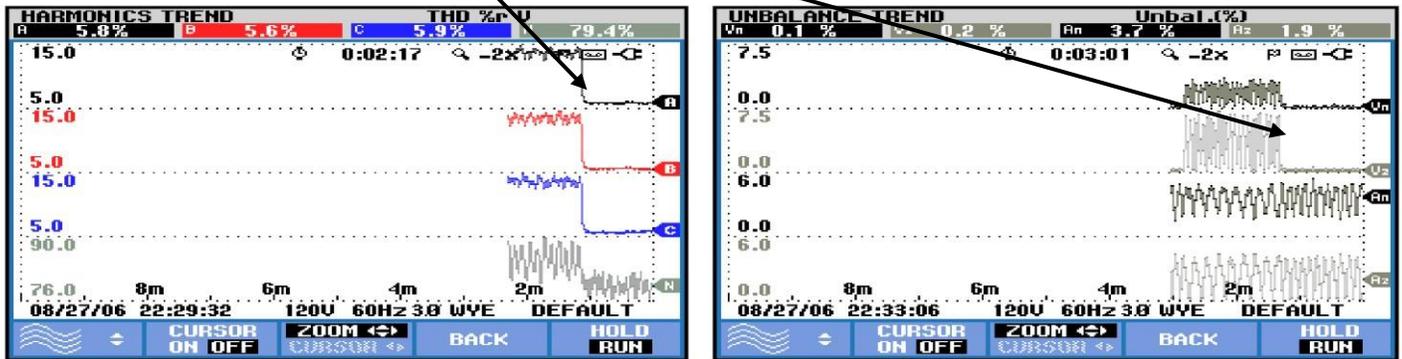
1. Harmonic Cancellation Every Harmonic (even and odd including Triplens)

The Harmonic Silencer reduces line harmonics by beating the noise against itself causing a total harmonic reduction typically of 85%. The design of the Silencer uses the fact of Delta power transformers cancelling harmonics at the square of the harmonic. Both the input and secondary filters of the Silencer reduce harmonics causing a reduction in harmonics of 9 times for the third harmonic, 25 times for the fifth harmonic and 49 times the reduction of the fundamental. Typical harmonic mitigation systems use series connected line reactors and chokes (inductors) to smooth the flow of current.

These types of devices only are partially effective, require power down to install and do nothing for harmonics from other drives or devices.

The Harmonic Silencer is a parallel connected power filter that does not require equipment to stop for installation and it will reduce harmonics from a drive, a group of drives and it will also reduce the harmonics from fluorescent lighting computers and harmonics from other facilities that may affect the operation of your equipment.

Harmonics Reduced and Voltages Stabilized with the Harmonic Silencer



Bounce Back Form

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