Saving Energy Consumption

Through Power Quality Improvement

Corrects up to 12 electrical power problems found in industrial, commercial and institutional facilities.

- ☑ Voltage Balancing
- ☑ Current Balancing
- ☑ Mitigating In-Rush Currents
- ☑ Stabilizing Over-voltage & Under-voltage
- ☑ Minimizing Voltage Flicker
- ☑ Swell & Sag Mitigation
- ☑ Transient Suppression
- ☑ Impulse & Spike Protection
- ☑ Broadband Harmonics Filtration
- ☑ Power Factor Correction
- ☑ Brownout Protection
- ☑ Momentary Supply Interruption Protection

Captures and re-cycle losses across all 3 phases using LRC tank circuits and zigzag reactors

Outperforms traditional capacitor banks

Not SCR or choke of any kind

Designed in parallel with multiple impedances

PowerKure is the culmination of 10 years of power quality experience and was developed by a team of highly qualified electrical engineers. Each PowerKure system is custom built to correct and "re-cycle" losses from up to twelve different problematic conditions found in industrial, commercial and institutional facilities. PowerKure is a modular system engineered to effectively and economically optimize power quality and provide **guaranteed** energy savings, through reductions in power demand and power consumption. (KVA/KW and KWH) .

Guaranteed Savings from 3% to 6% on Electrical Consumption and Demand Charges

Saving 3% to 6% is typical for a North American facility and some save up to 18%. A detailed electrical audit of your facility is examined by our engineering staff to identify your savings potential via a written proposal containing both guaranteed savings and system costs.

Power Quality Problems

Lost Production, Plant Downtime, Damaged Equipment, Higher Maintenance Costs, Shorter Equipment Life, Damaged Product, Lost Revenue, KW & KWH Losses, Power Factor Penalties, Increased Motor Heat

Voltage Fluctuations

Voltage may fluctuate within a single phase. Voltage fluctuations include over-voltage, under-voltage (greater then 1 minute), swells and sags (duration of 1 cycle to one minute) and flicker (rapid changes in voltage). Motors and equipment are designed to be most efficient at a set voltage and any minor fluctuations, up or down, will decrease the motor's efficiency. Significant voltage fluctuations can cause equipment to shut down or fail.

Unbalanced Voltage

Most industrial electrical loads are designed for 3 phases of current at either 480 volts or 600 volts. A 600 volt motor is optimized when it receives 3 phases of current at 600 volts. Often, electrical systems can become destabilized and each phase will deliver current at a different voltage such as 585, 600 and 615 respectively. Even minor imbalances can generate heat and electrical losses.

Unbalanced Current

Imbalanced loads can cause phase current imbalances, thus creating negative sequences and circulating currents. This can result in higher equipment failures and maintenance costs. Additionally, imbalanced loads may generate higher demand charges from the utility if the utility is billing demand on the highest phase.

Harmonics

Most AC electrical equipment in North America is designed for AC electricity at 60Hz and any electrical current above the fundamental 60Hz is called a harmonic. Harmonics are not only wasted power but can also damage equipment and nuisance tripping of protective devices.

Low Power Factor

In alternating current (AC) systems with inductive loads, (i.e. motors) the current wave form often lags the voltage wave form. The greater the variance, the lower the power factor, the more energy wasted. Additionally, many utilities apply a power factor penalty to electric bills if power factor drops below a pre-determined efficiency.

Transients & Impulses

A transient is a very short increase or decrease over nominal voltage and an impulse is significant increase. Electrical transients and impulses can significantly damage plant equipment and trip protective devices.

Brownouts

A brownout is a temporary voltage decrease from the supply. Brownouts can damage equipment and can also shut down operations.

Momentary Supply Failure

An intermittent supply failure is a temporary loss of voltage. These types of failures can shut down entire facilities and cause production malfunctions.

Traditional Solution Side Effects

Traditional Solutions to solve these power quality problems often use a silo approach. They may correct one problem but their side effect may generate other problems. Treating multiple problems with multiple solutions is also expensive which may leave some problems uncorrected.

Voltage Balancing: Minor imbalances are generally left un-corrected and major imbalances are fixed by by expensive projects such as re-wiring equipment to balance loads, replacing motors and adding transformers or switchgear.

Voltage Stabilization: Minor fluctuations are generally left un-corrected. If significant fluctuations occur additional capacitor banks can be added. However, traditional capacitor banks can increase resonance harmonics, destabilize voltage and increase the susceptibility for surges and transients. Traditional capacitor banks do not have the ability to regulate voltage to preset levels. Additionally, UPS boxes can be installed to protect critical equipment from voltage sags.

Unbalanced Current: Minor fluctuations are generally left un-corrected. Significant unbalanced loads can be rewired to equalize the load between phases.

Harmonics: Traditional methods of correcting harmonics include capturing the harmonic and sending it to ground or using power to generate the inverse harmonic to cancel out the original harmonic. Other solutions block the original harmonic.

Power Factor: The traditional method to improve power factor is to add traditional capacitor banks. However, capacitor banks often increase resonance, surges, transients, harmonics, and increase KW and KWH as a result of increased motor torque and in-rush currents. Some newer capacitor banks do eliminate harmonics and transients but do not correct all twelve problems or come with guaranteed power savings.

Surges and Transients: Traditional surge protectors clip larger voltage spikes at a preset level and send them to ground.

One Product, correcting up to 12 power quality problems

Balance Voltage Across All Three Phases

PowerKure can help stabilize voltage across all three phases using a combination of LRC tank circuits and phase shifting reactors. Balancing voltage across all three phases reduces heat and electrical losses. NEMA has a 5% limit on imbalanced phase voltages but even a 3% voltage imbalance will generate 18% more heat and heat will generate electrical losses.

Decrease Voltage Swells, Sags, Flicker, Over-voltage & Under-voltage

PowerKure can improve voltage within each phase and minimize fluctuations and allow motors to run more efficiently. Additionally, PowerKure has the ability to raise voltage by using LRC tank circuits and zigzag reactors to capture and recycle losses as needed. During installation, a 600v transformer is generally “tapped down” and the PowerKure system then re-cycles losses as needed to keep the load closer to 600v.

Balance Current Across All Three Phases

PowerKure helps balance the load over three phases and mitigates phase currents, thus reducing negative sequences and circulating currents. It uses reactive passive components to help reduce three phase imbalances. Current balancing can often reduce utility bills with reductions in KW, KVA, KVAR and KWH.

Mitigate Harmonics

PowerKure mitigates broadband harmonics or electrical frequencies above 60Hz. PowerKure does this by first tuning and then detuning the harmonic. It uses multiple filters to capture the harmonics and then re-cycle the losses through the tank circuit. If harmonics are found to be extremely high, additional components will be used to reduce distortion at the targeted spectrum. This reduces electrical losses and improves equipment longevity and performance.

Correct Power Factor

PowerKure can optimize power factor between 93% and 99% without traditional capacitor banks and their associated side effects. By correcting the above problems such as voltage imbalances, current imbalances and harmonics, a significant amount of the power factor problems can be eliminated. Additionally, PowerKure will monitor power factor with a regulator and then add capacitance, as needed, to maintain power factor at a pre-defined level.

Impulse & Transients Suppression

PowerKure captures minor surges and transients, and then recycles the losses through the tank circuit. Impulses are clipped and sent to ground reducing the chance of equipment damage.

Protect Equipment from Brownouts

PowerKure maintains and increases voltage during temporary brownouts, reducing equipment shut downs. This is an optional feature that can be incorporated into the PowerKure system.

Protect Equipment from Intermittent Supply Failures

PowerKure supplies continuous voltage during intermittent supply failure of short durations, generally 0.5 seconds or less. This is an optional feature that can be incorporated into the PowerKure system.

The PowerKure Approach to Power Quality

PowerKure is a custom engineered solution designed to minimize and / or eliminate all the unique power quality problems. Our approach to power quality is based on the following activities:

Audit: During the electrical systems audit, we collect electrical power quality information from the customer's facility. We will gather the following information: voltage, current, power factor, harmonics, most recent 12 months of utility bills, transformer nameplate data, etc.

Proposal: The initial electrical survey will provide us with enough information to determine an approximated system size, the equipment cost with an estimated installation cost. The proposal will also include our guaranteed electrical savings once the equipment is installed.

Design Analysis: This survey is a more detailed version of the original survey. At this stage we will check the original measurements and any possible variations thereof; identify a more economical or effective method to address the problem(s) and savings; determine the location at the site where the PowerKure system will be connected and determine breakers/disconnects, cables, and conduit sizes required for installation.

System Design: The actual design of the PowerKure system can only begin after a design analysis has been performed. Since measurements are taken on the secondary load side of the main transformer on the common buss as well as each subsequent feeder downstream of the main distribution, this will allow us to design the optimal placement of the required components, placing some components closer to the individual problem load(s).

Installation: PowerKure's authorized licensed electrician, or the customer's electrician, will install the required switchgear, breakers, disconnects, cables, etc. PowerKure will then assist the electrician with the placement of the actual PowerKure unit. Once installed, PowerKure will then measure the load and tune the PowerKure system for optimal performance.

The PowerKure Audit

The initial audit tests and measures the electrical load (s) and the distribution (s). From this information, both the impedance or z factor of the system and the X/R ratio are determined. (X being the reactance of the system and R being the resistance of the system.) From that, we are able to point out the areas in your plant where energy is being wasted. To obtain an accurate report of savings and payback, the following criteria/data are required:

- At the time of measurement, plant operations must be at 70% or a greater level.
- Copies of the most recent 12 month electric bills with KWH consumption and charges, and demand charges.
- A list of any of known power quality problems in the electrical system, such as, surges, harmonics, power factor, unusual equipment failures, etc.
- An explanation for any abnormal changes in the electric bills due to temporary operational changes.
- Relevant information about any future changes to normal plant operations that would affect electrical consumption or demand.
- Access to the main distribution panel (s).
- The estimated percent of DC loads and AC loads.
- List and location of any variable frequency drives & SCR controls.
- Number of transformers/total transformers on each electric bill.
- Meter location, i.e. primary side or the secondary side.
- If available, a site plan of electrical system.
- A list of any existing power factor correction capacitors with location, model, age and size (KVAR).
- Access to the main transformer in order to obtain the size (KVA), impedance, primary and secondary transformer voltage ratings, delta or wye configurations, and if it is dry or liquid cooled.
- Typical hours of operation. More specifically, for each location and electrical load, the "adjusted hours" of continuous normal operation measured in hours per week.

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