

UST



Energy Efficiency & Power Quality Series

Energy Efficiency and Power Quality in Schools

December, 2008

Phone: 888 403-9084
Fax: 518 377-2207

Email: sales@ustpower.com
Website: www.ustpower.com

P.O. Box 110
Latham, NY 12110

Energy Efficiency and Power Quality in Schools

Addressing energy efficiency in schools, the U.S. Department of Energy says, “For existing schools, implementing energy-efficient operations and maintenance strategies can enable school districts to save as much as 20% in energy costs, extend the life of equipment, and improve the overall physical environment in their school facilities.” DOE further comments about energy efficiency planning, “Addressing O&M considerations at the start of a project can contribute greatly to improved working environments, higher productivity, and reduced energy and resource costs.”

Energy efficiency strategies and plans typically make a major assumption: that the electric power will be clean, stable and the voltages will be at the proper level. Few would imagine that the quality of the incoming electric power (essentially voltage) can diminish or negate the benefits of energy efficiency programs or that improving power quality contributes to energy efficiency.

Many people assume that electricity is always delivered at the proper voltage. The local utility desires this to be the case but many factors are beyond their control. The standard for voltage levels, ANSI C84.1, says that the utility should deliver a voltage within $\pm 5\%$ of nominal. It then goes on to suggest that it is acceptable for the voltage at any piece of equipment to be 5% above or 10% below nominal voltage continuously and 6% above or 13% below for short durations. Not surprisingly, the term “short durations” goes undefined. All of this is simply recognition that the complexity of the electrical delivery system is such that utilities have a limited capability to control voltage levels. It also means that the school, like any end user, is ultimately responsible for the voltage levels delivered to its facilities.

Any school, urban, suburban or rural, can and will experience power quality problems which may be chronic or those that occur without warning. A short power interruption once or twice a year is the most obvious of power problems but it may be far from the most costly. When the voltage level is too high or too low, electrical devices will malfunction or shut down and over the longer term, fail prematurely. Voltage problems reduce productivity, waste energy, damage equipment and increase maintenance and material consumption – many of the same areas that energy efficiency programs are intended to improve.



The electronic voltage regulator (EVR) is a popular choice among schools for power conditioning as it offers the best combination of protection, reliability and low owning cost. Replacing the standard transformer, the EVR automatically provides clean, stable voltages, voltage balancing, surge suppression and noise reduction. Industrial-grade EVRs are 97% to 99% efficient, maintenance-free, fan-free and include an automatic failsafe bypass. The EVR can even save energy by permitting electrical equipment to operate at optimum voltage levels for maximum efficiency or by replacing less energy-efficient power conditioners.

A few of the ways an EVR saves a school's energy, maintenance and equipment budgets are:

Saving Energy	Reducing Maintenance/Service Costs
<ul style="list-style-type: none"> • Replacing inefficient ferroresonant transformers or ferrups UPS • Minimizing UPS operation on battery, • Reducing excess motor energy consumption and overheating due to low voltage, • Reducing excess computer and electronics energy consumption due to low voltage, 	<ul style="list-style-type: none"> • Increasing motor life (air conditioning, boiler, heat pumps, etc.), • Protecting sensitive controls or circuit boards (HVAC, sensors, etc.), • Protecting electronic devices (computers, A/V, printers, UPS, etc.), and • Reducing repair of other electric devices (projectors, monitors, lighting, etc.).

The payback in energy and cost savings typically ranges from 12 to 48 months, depending on the local circumstances. However, the EVR can also help prevent other power-related problems where the actual costs may be much higher but difficult to anticipate, such as the following actual problems:

- Drained UPS batteries due to brownouts causes computer/data center crashes,
- HVAC control failure due to high voltage leads to frozen and burst water pipes,
- Pump motor operation locked-out due to high voltage imbalance, and
- Security and communications equipment malfunctions due to low voltage.



Today's schools have millions of dollars invested in electronic devices and technologies intended to save energy and increase productivity. Power quality problems can put these investments at risk in many ways such as:

- Failure to achieve expected efficiencies,
- Delayed or unreachable payback,
- Inability to achieve desired performance, etc.

Schools can benefit from the lessons learned by business and industry years ago: poor power quality directly impacts the bottom line. Power quality problems occur with warning and all electrical equipment can be vulnerable to their effects. Power conditioning protects a school's investments in electrical equipment and energy saving systems.

Utility Systems Technologies, Inc. manufactures a broad variety of industrial-grade power conditioning products to support the financial, operational, energy saving and environmental goals of its customers. As a leader in the field of "green" power quality, all UST products have the highest performance and efficiencies available while being eco-friendly.