



ELECTRIC INTEGRATED INC.

Power Quality Audit

*Maximize your
system power quality*



www.saitechelectric.com

An independent manufacturer

The benefit of a specialist



SAI-TECH Electric Integrated Inc.,

Our core business - the availability, control and safety of low voltage electrical networks with increased focus on our customers' power performance.

What is a Power Quality Audit (PQA) ?

The **Power Quality Audit (PQA)**, is a service offered by **SAI-TECH** support center that checks the reliability, efficiency and safety of an organization electrical system.

It verifies the following aspects:

- the **continuity of the power supply**: i.e., that the power in the network is available on a regular basis and is able to ensure the efficient operation of the equipment;
- the **quality of the voltage**: i.e., that there are no low or high frequency disturbances in the network capable of damaging the system components.

The PQA uses **network analyzers**, instruments specially designed to detect faults and deteriorations and record parameters and information that may be of use in locating the causes of disturbances. The data is collected and analyzed by our engineers, who can then diagnose the problems and suggest the most appropriate solutions.

What does the 'quality' of energy' mean?

A quality electrical power supply must be available at all times, always within the frequency and magnitude tolerance limits, and always with a perfectly sinusoidal waveform.

A reliable, efficient and safe power supply is essential for guaranteeing productivity and precision in any organization. Business and industrial organizations, public authorities, hospitals and laboratories and banking and finance groups are relying more and more on computerized and electronic equipment for their daily work activities.

These important electrical loads are subject to a range of disturbances that adversely affect the quality of the power supply and the reliability of the electrical system.

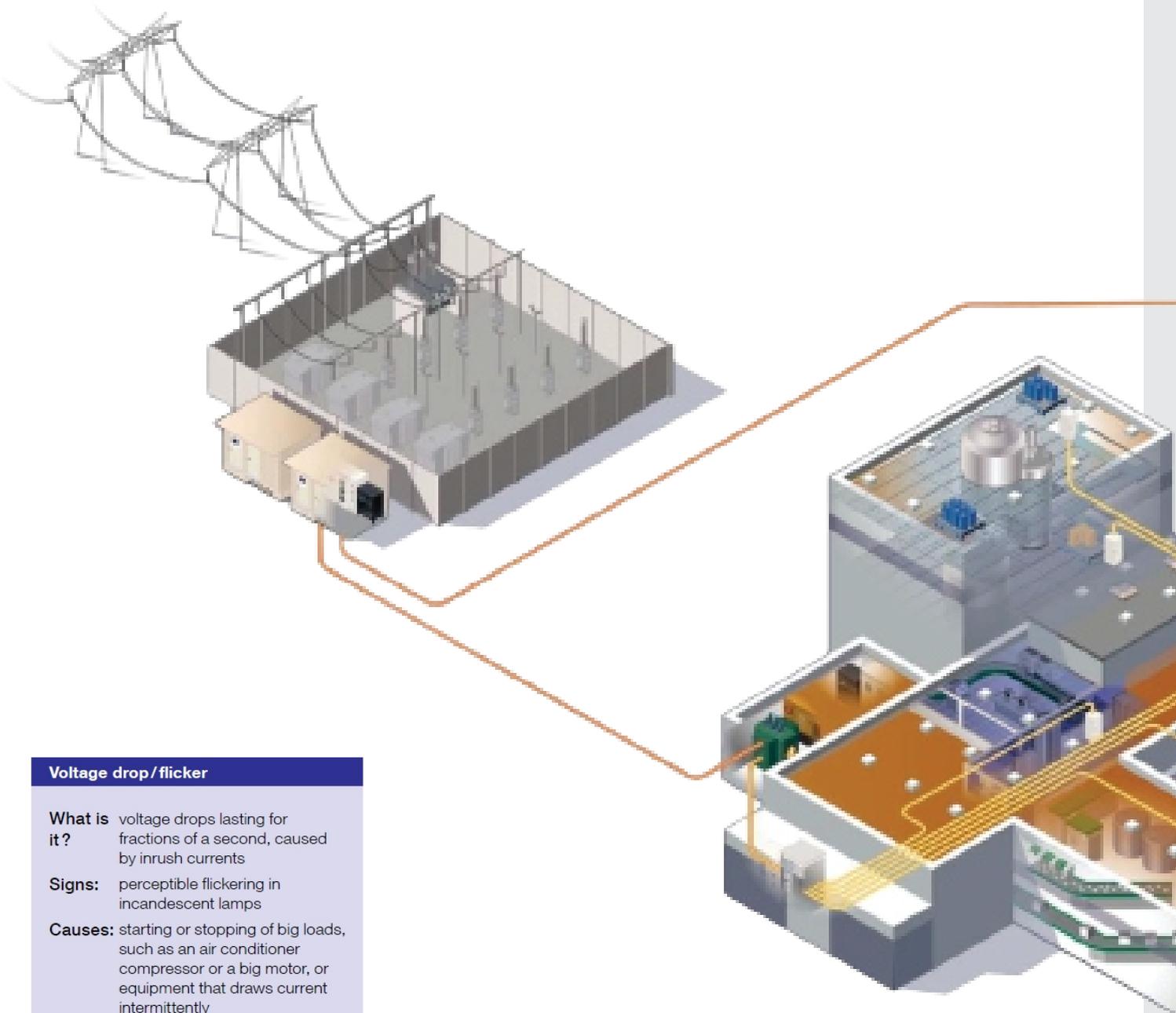


The problems that may arise

The most common disservice of a not fully reliable electrical system is a break in the power supply: either complete breaks, lasting from a few seconds to several hours, or voltage sags / drops, when the voltage falls to below the rated level for short times. Longer breaks are a problem for all users, but many processes, such as continuous and synchronized production processes or high-value data processing, are sensitive to even the shortest of breaks. Other disturbances that may occur are: over voltages, harmonic distortions, imbalances, reduction of power factor etc.

"A perfect power supply must guarantee an uninterruptible service within voltage and frequency tolerance limits with a distortion-free sinusoidal waveform. The acceptability of deviations from specified power ratings depends on the kind of use, the systems installed and their requirements."

Are you sure your system is reliable, efficient



Voltage drop / flicker

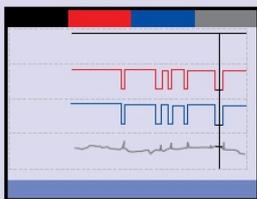
What is it? voltage drops lasting for fractions of a second, caused by inrush currents

Signs: perceptible flickering in incandescent lamps

Causes: starting or stopping of big loads, such as an air conditioner compressor or a big motor, or equipment that draws current intermittently

Effects: loss of data, overheating of motors, unexpected equipment resets and poor / uneven visibility (flicker)

Note: voltage drop / flicker constitute almost 90 % of electrical disturbances



Reduction of power factor

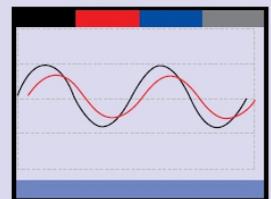
What is it? increase in the reactive power (VAR) of the load in relation to its active power (W)

Signs: $\cos \varphi$ is lower than agreed with manufacturer

Causes: addition of excessive capacitive/inductive loads, fault in capacitor filters or compensation system

Effects: greater operating costs, penalty charges in electricity bills

Note: the cost of remedying the reduced power factor problem is much less than the payment of a penalty charge

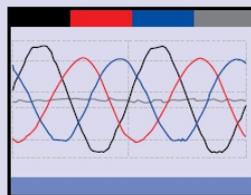


and safe?



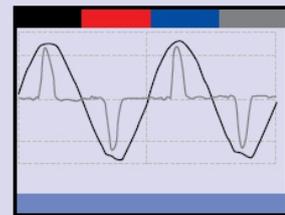
Imbalance on three-phase load

- What is it?** imbalance in the voltage value of a phase (> 2%)
- Signs:** not visible without instrumentation
- Causes:** connected single-phase loads with different powers, three-phase load faults
- Effects:** inefficiencies, overheating, motor and transformer faults
- Note:** imbalances are typical in organisations that keep adding new loads to their systems



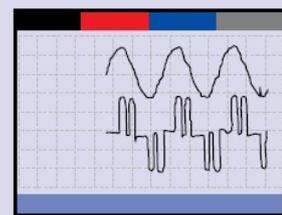
Harmonic distortion

- What is it?** alterations to voltage and current waveforms due to absorption by the loads at frequencies differing by 50Hz from the basic one
- Signs:** not visible without instrumentation
- Causes:** non-linear loads (in almost all electronic equipment or drives)
- Effects:** overheating of electrical equipment, wiring and motors, automatic switch malfunctions, tripping of relays, opening of fuses and a general reduction in the efficiency of the system
- Note:** most distortion is attributable to the third harmonic, typical of IT equipment



Transitory current/over voltage

- What is it?** peak of short duration up to 1ms
- Signs:** not visible without instrumentation
- Causes:** switching of filter condensers, switching large equipment on and off, short circuit in wires or a lightning discharge
- Effects:** shorter lamp life, equipment stopping/damage, PC crashes with memory loss, data processing errors, printed circuit card burnouts and motor and transformer insulation damage
- Note:** transitory currents are harder to detect without a specific instrument



The Risks

Ignoring the symptoms of possible disturbances in the electrical system could lead to damaged equipment, consequently reducing its working efficiency and shortening the life span. The resulting break in critical processes (i.e. machine downtime) could lead to a loss of earnings that could far outweigh the mere cost of the actual operation.

In addition, there is also the likely risk of having to bear increased energy costs and pay penalty charges in electricity bills, with the possibility of legal disputes with energy providers.



The improvement measures

The quality of the energy can be improved by taking action on 3 levels:

- 1) user's electrical system
- 2) equipment connected to system
- 3) mains

If the problem is in the electrical system, the PQA could advise the user to install active or passive filters, harmonic compensators, emergency generators or UPS systems, or to intervene directly on the system structure (transformers, new distribution lines, etc.).

Although the advance of technology has led to the introduction of standards that tend to reduce the creation of disturbances and make equipment less disturbance prone, problems can however arise with the mismatching of non-homogeneous equipment in the same system. The PQA makes it possible to find the right arrangement within the system.

If the problem lies in the source, or electricity mains, the PQA may encourage the customer to contact the provider in order to improve the supply contract parameters.

The advantages of the PQA

The PQA final report provides a complete picture of the electrical system's correct state of operation. The report is a tool of primary importance for preventive maintenance, in that it lists all the measures to be taken promptly when disturbances are detected, before the negative impact on production and the running of the equipment is felt.



The expertise of a design manufacturer

Since 2009, SAI-TECH has been developing quality products which aim to provide you with a high quality, secure supply of electrical energy. Our teams know what your business needs and will make full use of their expertise in fields such as electronic components, integrated circuits, operating logics and industrial software engineering.



Expert on-site maintenance

The technicians and engineers we dispatch to service your equipment are specialists in high-quality energy sources. The technological know-how which enables them to repair the latest and most advanced equipment is regularly updated.

Rapid intervention wherever you are

Our on-site availability ensures that you will always have SAI-TECH specialists close to your site, for a fast and efficient response.





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