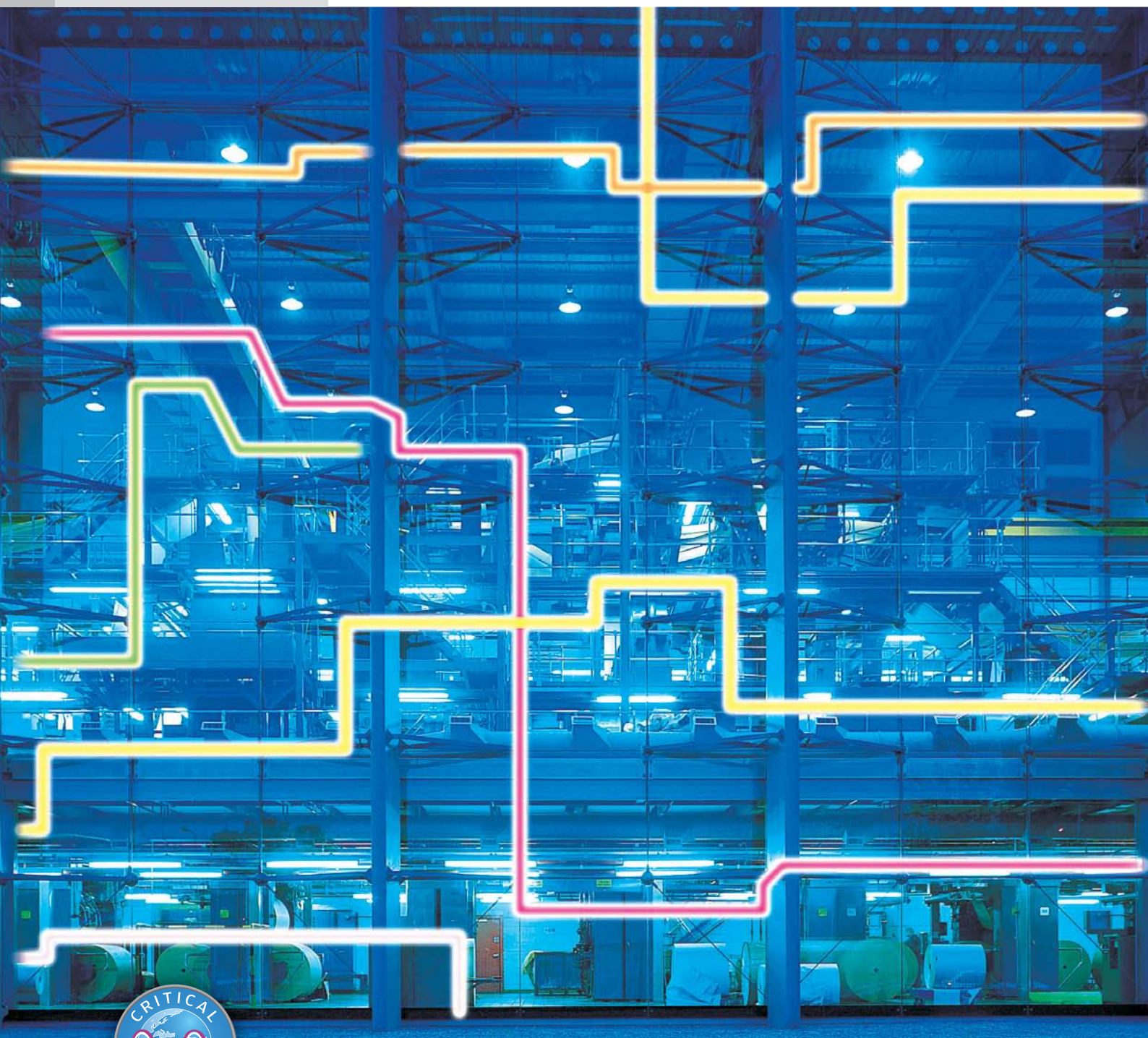


SERVICES

CIM *Power Quality Audit*

Maximise your system power quality



An independent manufacturer

The benefit of a specialist

Founded in 1922, SOCOMEC is an industrial group with a workforce of 3000 people. Our core business - the availability, control and safety of low voltage electrical networks with increased focus on our customers' power performance.



CORPO 308 A

The culture of independence

The SOCOMEC Group's independence ensures control over its own decision-making, respecting the values advocated by its own family shareholders and shared by its employees.

With around 30 subsidiaries located on all five continents, SOCOMEC pursues international development by targeting industrial and service applications where the quality of its expertise makes all the difference.

The spirit of innovation

As undisputed specialists in UPS systems, mains supply changeover, power conversion and measurement, SOCOMEC dedicates nearly 10% of its turnover to R&D. As a result the Group can achieve its ambition of always being one technological step ahead.

The vision of a specialist

As a manufacturer with complete control over its technological processes, SOCOMEC is quite unlike the more general providers. The Group is constantly improving its fields of expertise in order to offer its clients increasingly customised, appropriate solutions.

A flexible manufacturing structure

Backed by two European centres of excellence (France and Italy), the Group also benefits from competitive production sites such as Tunisia and locations in the major emerging markets (India and China). These sites have all implemented a system of continuous improvement based on Lean Management principles, and are therefore in a position to provide high levels of quality, and meet the deadlines and cost requirements expected by customers.

The focus on service

Our manufacturer's expertise naturally extends to a complete range of services designed to facilitate the research, implementation and operation of our solutions. Our service teams have built their reputation on reassuring guidance, flexible skills and reactivity.

Responsible growth

As a Group which is open to all cultures and firmly committed to human values, SOCOMEC promotes employee initiative and commitment. Working relationships are based on the idea of partnerships and respect for shared ethics. Through the company's commitment to achieving harmonious, lasting development, SOCOMEC fully embraces its responsibilities not only towards its shareholders, employees, customers and partners, but also towards society as a whole and its environment.

SOCOMECHAS BEEN A SIGNATORY TO THE GLOBAL COMPACT SINCE 2003.



What is a Power Quality Audit (PQA) ?

The **Power Quality Audit (PQA)**, is a service offered by the Socomec technical support centre that checks the reliability, efficiency and safety of an organisation's 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 organisation. Business and industrial organisations, public authorities, hospitals and laboratories and banking and finance groups are relying more and more on computerised 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.



APPL 300 A

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.

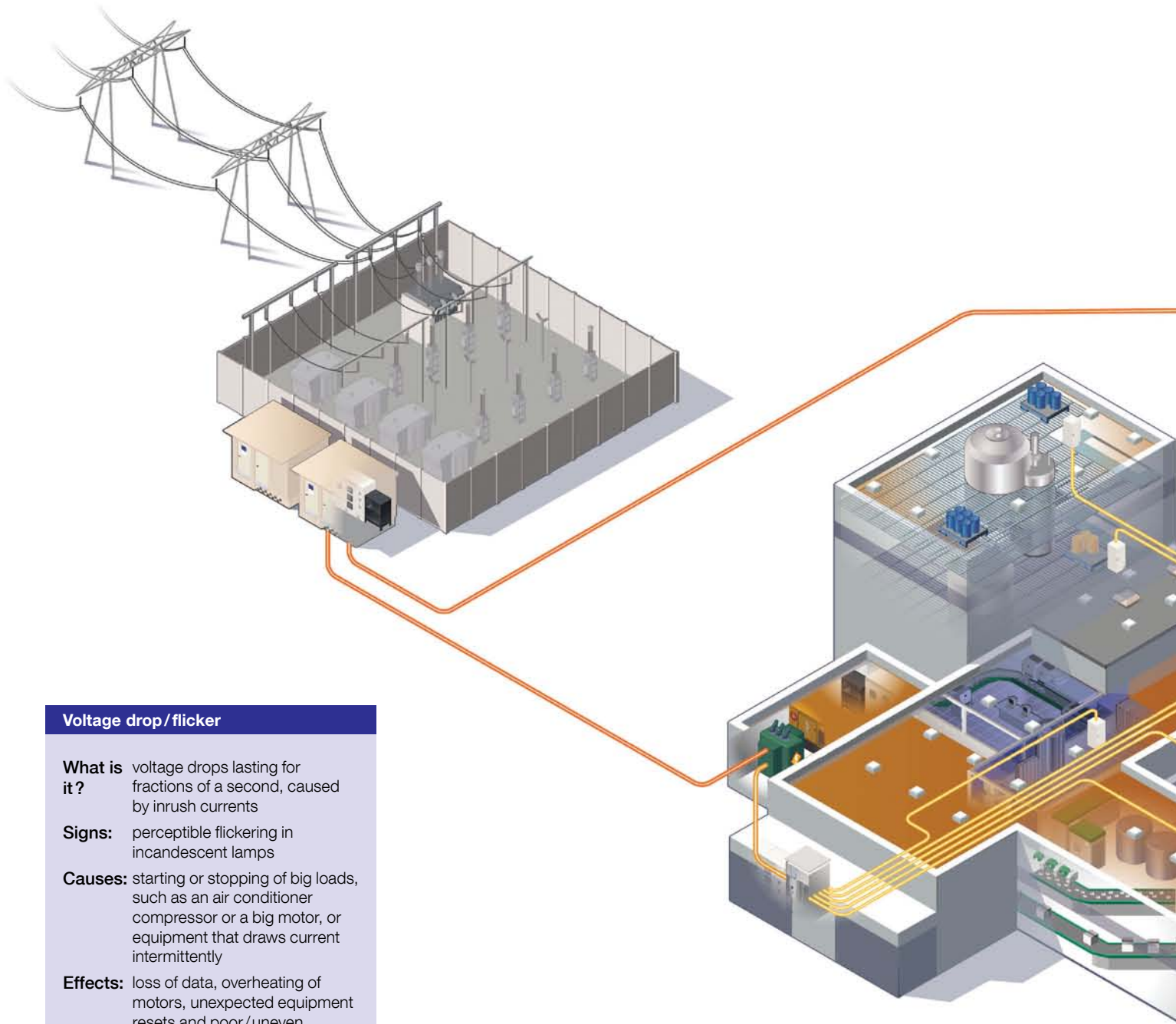
Longer breaks are a problem for all users, but many processes, such as continuous and synchronised production processes or high-value data processing, are sensitive to even the shortest of breaks.

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."

LE - Leonardo Energy
(www.leonardo-energy.org)

Are you sure your system is **reliable**, **efficient** and



Voltage drop / flicker

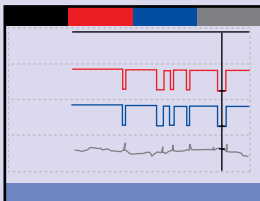
What is it? voltage drops lasting for fractions of a second, caused by inrush currents

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

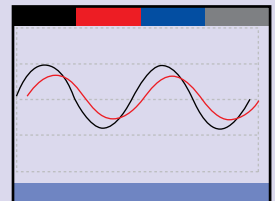
What is it? increase in the reactive power (VAR) of the load in relation to its active power (W)

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

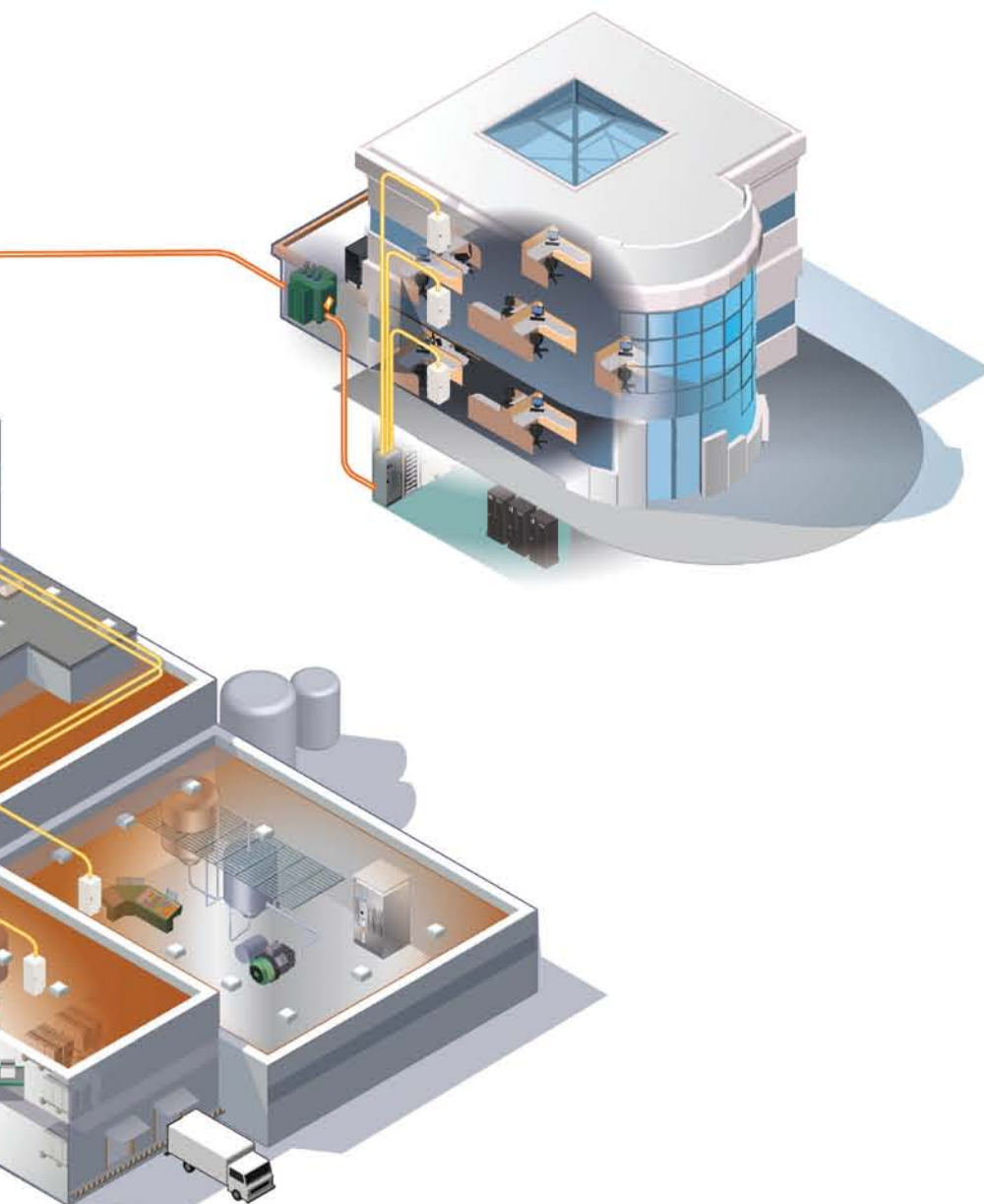
Causes: addition of excessive capacitive / inductive loads, fault in capacitor filters or compensation system

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

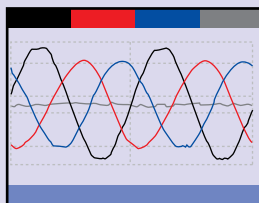


safe ?



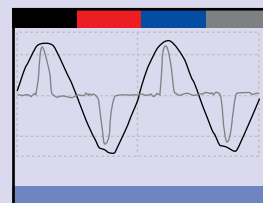
Imbalance on three-phase load

- 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



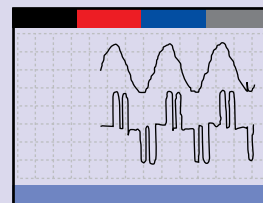
Harmonic distortion

- 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 1968, SOCOMEC 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.



COPO 185 A

Expert on-site maintenance

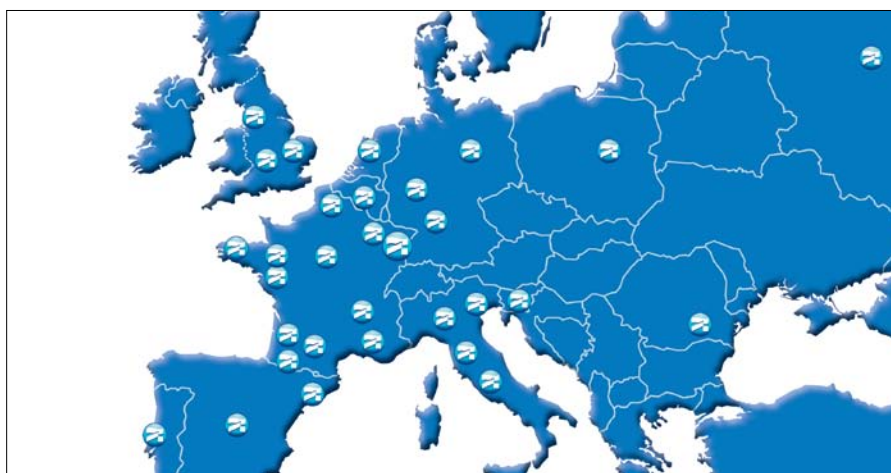
The technicians and engineers we dispatch to service your equipment are specialists in high-quality energy sources (UPS and rectifiers). The technological know-how which enables them to repair the latest and most advanced equipment is regularly updated.



SITE 099 A

Rapid intervention wherever you are

Our European and worldwide presence ensures that you will always have SOCOMEC specialists close to your site, for a fast and efficient response.



CARTE 022 C

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