Energy performance and display energy certificates

Energy performance certification (EPC)

Energy performance certificates (EPC's) provide an energy rating for a domestic home. The energy rating is based on the efficiency of items such as lighting, power and heating and is categorised from A-G, with "A" being the best result. The certificate will not only highlight the energy efficiency and environmental impact rating of a home, but also suggest improvement ideas to enable householders to improve their rating and lessen their impact on the environment. The standard domestic EPC is accompanied by a colour coded bar chart which displays the properties performance against individual elements of energy performance.

Display energy certificates (DEC)

Display Energy Certificates (DEC's) show the actual energy usage of a building, the Operational Rating, and help the public see the energy efficiency of a building. This is based on the energy consumption of the building as recorded by gas, electricity and other meters. The DEC should be clearly displayed at all times and clearly visible to the public. A DEC is always accompanied by an Advisory Report that lists cost effective measures to improve the energy rating of the building. Display Energy Certificates are only required for buildings with a total useful floor area over 1,000m^2 that are occupied by a public authority and institution providing a public service to a large number of persons and therefore visited by those persons. They are valid for one year. The accompanying Advisory Report is valid for seven years.

Excessive supply voltage

The problem – Excessive supply voltage

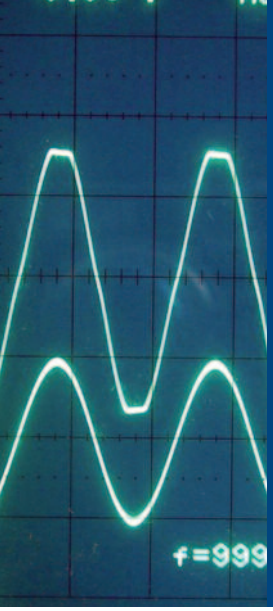
Until recent times, the UK nominal supply voltage has been 240V (ac), this was changed recently to a level of 230V (ac). Due to the acceptable tolerances around these levels, the National suppliers of electricity have been able to satisfy supply voltage regulations, even under the change, without altering their supply voltages. Most UK supplies still stand at around 240V (ac) with tolerances due to be increased further meaning the supply you receive will most likely remain at the original 240V (AC).

A huge amount of electrical equipment in use and for sale today has been designed to operate at voltages much lower than 240V (ac) and in many cases as low as 220V (ac), this means that many of the appliances in use across the UK are supplied with voltage that is higher than necessary. The negative effects of this scenario include appliances operating at a reduced efficiency level, using excessive power, operating at a higher than desirable temperature and having significantly reduced life expectancies. All of these adverse conditions and effects add up to increased costs for consumers and businesses.

The answer…

Quite simply, voltage optimization is the best solution to this problem. Whilst this may sound extremely technical and expensive, it is in fact a simple solution that requires some basic calculations and the installation of purpose built equipment that is likely to pay for itself within a relatively short period.

After some initial monitoring over a short period, our power engineers will be able to assess the voltage being supplied to your installation. Having established that the voltage is not completely satisfactory, our engineers will design and build a piece of equipment that will regulate the voltage continuously, thus ensuring your installation and equipment are operating as efficiently as possible. By reducing the voltage, we can ensure your equipment is not generating power losses which lead to higher bills, or working at excessive temperatures which can reduce the performance and lifetime expectancy, both of which save money and reduce our negative environmental output.



Harmonic distortion

The problem - Harmonic distortion

Harmonic problems are almost always introduced by the consumers' equipment and installation practices. Harmonic distortion is caused by the high use of non-linear load equipment such as computer power supplies, electronic ballasts, compact fluorescent lamps and variable speed drives etc, which create high current flow with harmonic frequency components. The limiting rating for most electrical circuit elements is determined by the amount of heat that can be dissipated to avoid overheating of busbars, circuit breakers, neutral conductors, transformer windings or generator alternators.

Harmonic currents add to the fundamental load current and can affect revenue billing by introducing errors into kilowatt hour metering systems, which will directly increase the net billable kilowatt demand and kilowatt hour consumption charges. The commercial effects of harmonic distortion to power quality are dramatically shorter equipment lifetimes, reduced energy efficiency and a susceptibility to nuisance tripping. The costs of supply interruption are high, however caused, resulting in data corruption, disruption of process manufacturing and failure of telecommunications facilities etc.

The answer…

Simple monitoring over a set period using our state of the equipment will tell us if harmonic distortion exists within your electrical system. The information provided by the survey will also allow our power Engineers to establish what types of harmonics are present, and how they are being produced. Following this diagnostic survey, our Engineers will establish the best possible solution which can include the installation of specially designed harmonic filters (passive or active) to balance the effects of the problem, reducing the level of non-linear equipment within your installation where possible or even carrying out phase balancing exercises within distribution boards.

Whatever the solution, by reducing the level of Total Harmonic Distortion (THD) within your installation, you will be contributing to the improvement of the performance of equipment, reducing the negative effects of heat within the system and ultimately saving money by prolonging the life expectancy of expensive plant and equipment.

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Imbalanced phase voltage

The problem - Imbalanced phase voltage

Electrical equipment, especially motors and their controllers, will not operate reliably on unbalanced voltages in a 3-phase system. Generally, the difference between the highest and the lowest voltages should not exceed 4% of the lowest voltage. Greater imbalances may cause overheating of components, especially motors and intermittent shutdown of motor controllers. Motors operated on unbalanced voltages will overheat, and many overload relays can't sense the overheating. In addition, many solid-state motor controllers and inverters include components that are especially sensitive to voltage imbalances.

The potential impact of this scenario for many commercial and industrial companies is often related to financial losses. For instance, a production or manufacturing business might lose the operation of a critical piece of equipment for a short period. Often in these cases the equipment forms part of a production line and repairs can take time with labour and parts difficult to source quickly.

The answer...

Carrying out simple load tests as part of a power quality survey will establish the extent of any imbalances within a 3-phase supply network. If any significant imbalances are detected, these can be rectified by carrying out load sharing exercises whereby circuits are terminated equally across all 3-phases of the supply distribution boards ensuring the demand placed on each is more equally distributed.

Carrying out this work ensures that 3 phase equipment works more efficiently and accurately reducing the level of energy used and reducing heat generation in critical equipment such as motor drives and bearings. Evenly distributed loads within a 3-phase system can also reduce the presence of total harmonic distortion (THD) subsequently reducing the threat of dangerous neutral currents which can lead to damaged cables, equipment and unplanned outages.

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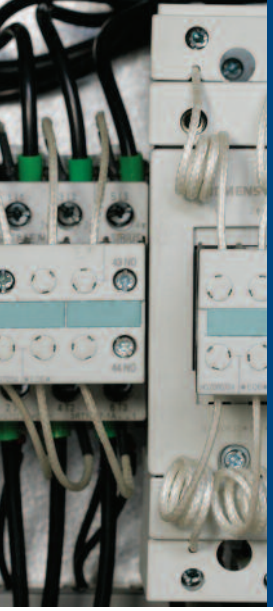

Power quality and energy solutions

Introduction

At PHS Compliance, we aim to offer our customers advice and support which they can understand. We do not expect all of our clients to understand the technical processes and mathematical formulas that surround electricity, energy and power. With this in mind, we have developed our basic guide to power quality and energy solutions that describes the key issues and offers answers, thus allowing you to make your own decisions.

PHS Compliance has specialised in the test and inspection of electrical systems and equipment for over 2 decades. During this time, we have witnessed incredible changes in the way such equipment is designed, installed and used.

The introduction of large volumes of non-linear loads including variable speed drives, high frequency lighting, air-conditioning systems, computer equipment and modern motors has led to new problems in the way in which we use and affect power. Poor power quality is now responsible for higher energy bills, degradation of equipment, electrical system failure and higher carbon emissions – all of these problems generate higher costs and contribute to the negative effect we have on the environment.

PHS Compliance has developed a number of new services aimed at identifying and remedying power quality issues. Through controlled monitoring, testing and inspecting existing installations, we can identify the causes of negative influences and help customers take steps to reducing energy bills and prolonging the life of their systems and equipment.

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KVAr (Apparent power) and poor power factor

The problem - KVAr (Apparent power) and poor power factor

All systems that require electricity to work consume power, but not all consume this power efficiently. Our energy providers generate and supply us with electricity and bill us for the number of units we use. All being well, our electrical systems operate correctly and we pay for the Watts (unit of power) that we use. However, in many cases the systems we use do not work efficiently due to the high levels of Non-linear load such as capacitors, motors and inductors.

Circuits containing excessive amounts of non-linear equipment directly affect the power factor rating of an installation. In order to use the power fed into a system efficiently, a power factor of 1.0 (Unity) must be achieved. If a power factor of less than 1.0 is achieved, more energy is required to power equipment in an installation. The adverse of affect of this is that the electrical system in question will only use the required amount of power to function normally and the excess power generated will be wasted in the form of KVAr's. As the supply authority has to generate more energy than necessary to power inefficient systems, it will not only charge for the wasted energy (KVAr's) – it will often charge a premium.

The answer...

By simply having visibility of a recent energy bill, PHS power engineers can devise the best possible course of action to improve your power quality and consumption. This course of action may include a short period of monitoring of your electricity supply to establish critical power readings and ultimately lead to the installation of Power Factor Correction equipment where necessary. Regardless of the course of action chosen, the aim remains the same, to achieve a power factor reading of as close to 1.0 (Unity) as possible.

Once an improved power factor reading is achieved, you will begin to benefit from a more efficient system, prolonged life expectancy of equipment, reduced energy bills and significant cost savings.

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