

Made to measure



Hafeez Najumudeen at **Yokogawa Europe** explores how power measurements are an increasingly vital aid to modern day energy efficiency

In the drive to reduce energy consumption and improve the energy efficiency of consumer and industrial equipment, governments and regulatory authorities are establishing new standards for the energy consumption of various types of equipment. Appliance manufacturers, for example, now have to prove that their products comply with certain IEC/EN standards. Equipment has to comply with complex and stringent specifications, and in many cases products have to carry energy efficiency labels to show that they meet these requirements.

An important focus of these regulations is the area of standby power consumption. It is estimated that between 5 percent and 15 percent of residential electricity used in the OECD countries can be attributed to the power consumption of appliances in standby mode: equivalent to about 240 million tonnes of carbon dioxide emissions every year.

Moreover, by 2020 it is expected that approximately 4.6 billion products will be featuring a standby option, contributing around 50TWh of electricity consumption per year. This amount is equal to the total electricity consumption of a country like Greece or Portugal.

The International Energy Agency (IEA) has launched a 1W standby initiative, and it is expected to decrease this threshold to 0.5W in 2013. The scale of the challenge presented by these limits is illustrated by the fact that 18.5 percent of all household appliances in 'off' mode and 31 percent in standby mode recently failed to comply with the 1W initiative. The

proposed reduction to 0.5W will result in 41.5 percent in 'off' mode and 66.4 percent in standby failing to comply.

If an item of equipment has power consumption between 0.5W and 1.0W, it is estimated that electricity consumption in standby/off mode by 2020 will be about 15TWh. This represents a saving of around 35TWh of electricity: equivalent to the total electricity consumption of Denmark.

Meeting user requirements

In order to meet these regulatory requirements, equipment suppliers will need to measure the actual power consumption of their products, often at very low power levels. They obviously require accurate and reliable power measurement over a wide range - from the milliamperes encountered at standby levels to the tens of amperes used in induction hobs, for example. Accuracy and reliability are essential to develop and produce products, which not only comply with standards but also guarantee consistency.

There is also a need to carry out measurements other than the standard electrical parameters of voltage, current and power, because of the increased regulatory emphasis on power quality, which demands measurements in areas such as harmonics and frequency-based parameters.

Equally important, particularly in the production environment, are ease and flexibility of use, to ensure that employees at all skill levels are able to operate the instruments.

Production testing also requires a communications interface so that the measuring instrument can interact with PCs and other instruments to

create an automatic test system for improving productivity and enhancing quality assurance.

These challenges are addressed with instruments such as Yokogawa's latest generation of digital power meters, the WT300 Series (Fig.1), which includes models offering a basic accuracy of 0.1 percent of reading, guaranteed accuracy over the entire measurement range (from 1 percent to 130 percent), a wide measurement range from standby power levels of a few milliamperes up to 40A, and flexibility to enable users to target different applications.

In addition to standard power measurements, these instruments incorporate a wide range of harmonic measurement capabilities, including the ability to carry out simultaneous measurement of normal power parameters such as RMS, mean or DC power along with measurement of harmonics up to the 50th order. As a result, overall measurement times are reduced.

Other features of the new instruments include a bandwidth of DC and 0.5Hz to 100kHz, plus an auto-range function for measurement and integration.

The company advises guaranteed accuracy of these instruments results from the fact that it has its own European standards laboratory at its European headquarters in The Netherlands. This facility is said to be the only industrial (i.e. non-government or national) organisation to offer traceable power calibration, to national and international standards, at frequencies up to 100kHz: a requirement for higher harmonic measurements specified in quality standards such as ISO9000.

Software is also available for testing equipment compliance to industry energy-saving standards such as IEC62301 Ed2.0 and IEC62018 for standby mode equipment or for dealing with waveforms having a crest factor of five or more.

Energy efficiency has become a global concern over the past decade, and evolving national and international standards will help to ensure that power efficiency is incorporated into all the key stages of the design and manufacture of electrical appliances.

Ensuring compliance with these standards requires accurate measurement, and this latest generation of digital power meters are a step towards supporting the industry in developing products that comply with them.

In doing so, they have the potential to not only help manufacturers to achieve energy efficiency but also to benefit the consumers, the economy and - last but not least - the environment.

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Figure1:
The Yokogawa
WT300 Series of
digital power
meters

Hafeez Najumudeen
is Product
Marketing Manager
for Power Analysers
and Meters at
Yokogawa Europe