



# Choosing a PEL

## YOU KNOW YOU WANT ONE...

If you're looking to cut your energy costs, you definitely should be interested in buying a **PEL** (portable energy logger). But beware, not all **PELs** are the same, says **Julian Grant** of **Chauvin Arnoux**. Follow his advice to choose a **PEL** that's versatile, convenient and easy to use, and that will help you to access the full range of energy saving opportunities.

In any commercial or industrial electrical installation, there are numerous ways in which energy can be saved – or wasted. Just a few of the very common issues that are needlessly inflating business energy bills are unnecessary out-of-hours operation of equipment, inefficient lighting, unbalanced three-phase supplies, poor power factor and high levels of harmonics in the supply system. Action can be taken to address all of these issues, but before you can correct a problem, you need to know you have it!

So how do you go about identifying power supply problems? There's the hard way, which involves taking a lot of measurements with multiple instruments of various kinds and then using a lot of time and expertise to analyse and interpret the results, or there's the easy way, which is to use a portable energy logger (**PEL**).

In a nutshell, a **PEL** is an all-in-one instrument that measures a whole range of electrical parameters, such as voltage, frequency, current, real power, reactive power, harmonic levels and much more. Crucially, the **PEL** doesn't only measure these parameters, it also stores the results over a period of time that can range from a few minutes to months. This is essential, as some key issues, like

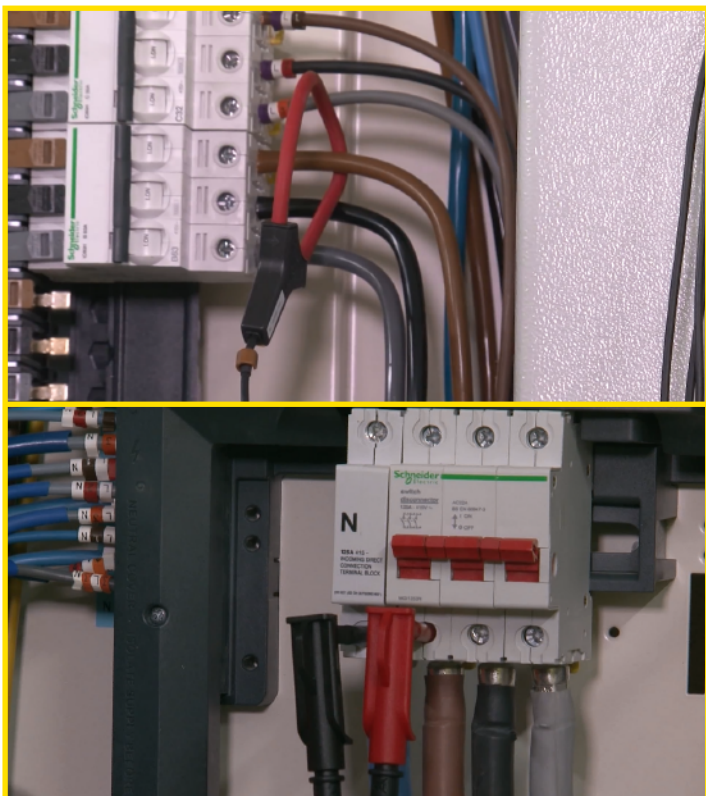
unnecessary out-of-hours operation of equipment, can only be identified by looking at time-stamped energy usage records, while other issues, such as harmonic levels, often change throughout the day and from day to day.

We have therefore already identified the first requirements for a good **PEL**: it must be able to store a large number of results and these results must be easy to retrieve. A convenient solution is for the **PEL** to store results on a standard SD card. These are inexpensive, readily available and, since the cards can be changed when they fill up, they provide virtually unlimited storage capacity. Another benefit is that almost any computer can be used to read data from the cards.

So far so good, but now let's look at some even more basic aspects of a **PEL**: safety, convenience and ease of use. Since the **PEL** is most likely to be used in distribution boards, it is essential that it should have a **CAT III** safety rating in line with **IEC 61010** and, for use on three-phase systems, this rating should ideally be valid at **1000 V**.

Moving on to convenience, it's important to remember that a **PEL** is, by definition, a portable device and, if you're to get the best from it, over time you will undoubtedly want to use it many different locations. This means that versatility is important – it should be suitable for use on single-phase, split-phase and three-phase systems. Ease of installation is equally important. If equipment has to be taken out of service for anything other than a very short time to install the **PEL**, it's quite probable that this will be considered too much trouble and the **PEL** will spend most of its life sitting in a cupboard instead of helping to save you money.

Fortunately, this problem has been solved with the best **PELs**, which use Rogowski coils for current sensing. This may sound very technical, but in fact a Rogowski coil is a flexible device that is simply wrapped around the conductor in which it is required to measure the current flow. No direct electrical connection is needed, so installation is fast, simple and safe. For voltage sensing, magnetic probes are available. These can literally be stuck on **MCB** screw heads, or other suitable connection points, which means that the existing wiring doesn't have to be disturbed.



For convenience, the **PEL** should also be compact, because it will often have to be temporarily mounted in switchboards and control panels where space is limited. A magnetic back is another very useful feature, since it allows the **PEL** to be securely mounted on any convenient steel surface – such as an enclosure door or wall – almost instantly.

Naturally, the user interface will play a big part in the usefulness of the **PEL**, which should have a large easy-to-read display and a clear logical menu system for selecting the parameters to be measured, stored and displayed. The **PEL** should be supported by powerful yet intuitive software that can be used on a PC to analyse results. Further, in many applications the ability to monitor and analyse results in real time from a local or even a remote PC is valuable.

Where real time monitoring is a requirement, attention needs to be given to the types of connectivity offered by the **PEL**: Bluetooth is very convenient for local connections and, of course, needs no cables; USB connections are reliable and easy to set up, but are again limited to local connections; while Ethernet is an excellent option for remote monitoring. Ideally, you should look for a **PEL** that supports all of these options.



Let's now look at measuring options. Some of these are straightforward: you'll want to be able to measure frequency, voltage and current, and it's probable that every **PEL** can do this, although you should check that the measurements are true **RMS**. Then you'll want to measure power and reactive power along with power factor. Critically, you'll also want to be able to record energy usage. Note that this is not the same as power – energy is power multiplied by time and it is energy, rather than power, you pay for.

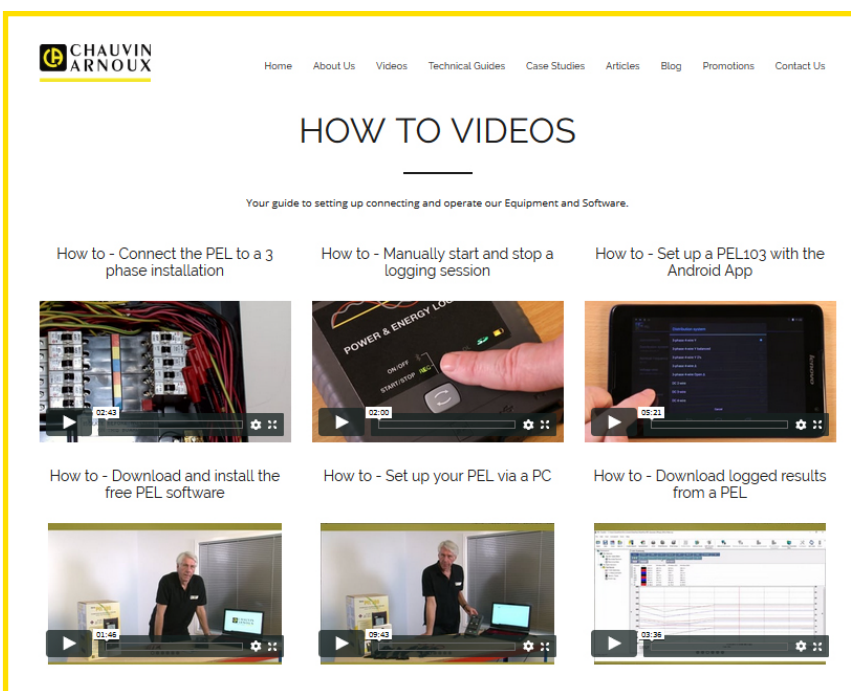
The **PEL** should also be capable of measuring individual harmonics, because modern workspaces are brimming with non-linear loads like variable speed drives, LED lighting systems, IT equipment and UPSs, all of which produce harmonics in the supply system. And harmonics are bad news. Not only do they reduce energy efficiency, they generate heat and can lead to equipment malfunctions. With this in mind, it's worth noting that **PELs** vary considerably in the way they measure and record harmonics.

Some may only provide measurements of total harmonic distortion (**THD**), which is a useful figure but doesn't give you enough information to trace the likely source of the harmonics or to guide appropriate remedial action. Other

**PELs** are limited to measuring only low-order harmonics

but, for the most meaningful results, measurements up to the 50th order are invaluable, so it most definitely pays to choose a **PEL** that can provide such measurements.

If you follow the recommendations contained in this article, you will almost certainly end up with a **PEL** that's safe, convenient to use and that will help you to identify areas where you can make significant energy savings. And don't forget that once you've put energy saving measures in place, your **PEL** is far from redundant as you'll want to use it to confirm the effectiveness of those measures and also to check, from time to time, that there have been no subsequent changes in your plant that might be reducing energy efficiency.



In other words, buy the right **PEL** and it will prove to be a very profitable long-term investment. One final suggestion, however. When you're choosing your **PEL** it pays, as we have seen, to think carefully about the instrument you're buying – but it also pays to give a little thought to the instrument manufacturer.

**PELs** are not hard to use, but there may be times when a little advice and guidance will be welcome, so choose a supplier that not only has a reputation for delivering quality products, but also for providing expert

support should it ever be needed. With all of this in mind, it's time to buy your **PEL**.

**Go on – you know you want one!**



**Chauvin Arnoux Ltd**  
Unit 1 Nelson Ct, Flagship Sq, Shaw Cross Business Park  
Dewsbury, West Yorkshire - WF12 7TH  
Tel: +44 1924 460 494  
Fax: +44 1924 455 328  
[info@chauvin-arnoux.co.uk](mailto:info@chauvin-arnoux.co.uk)