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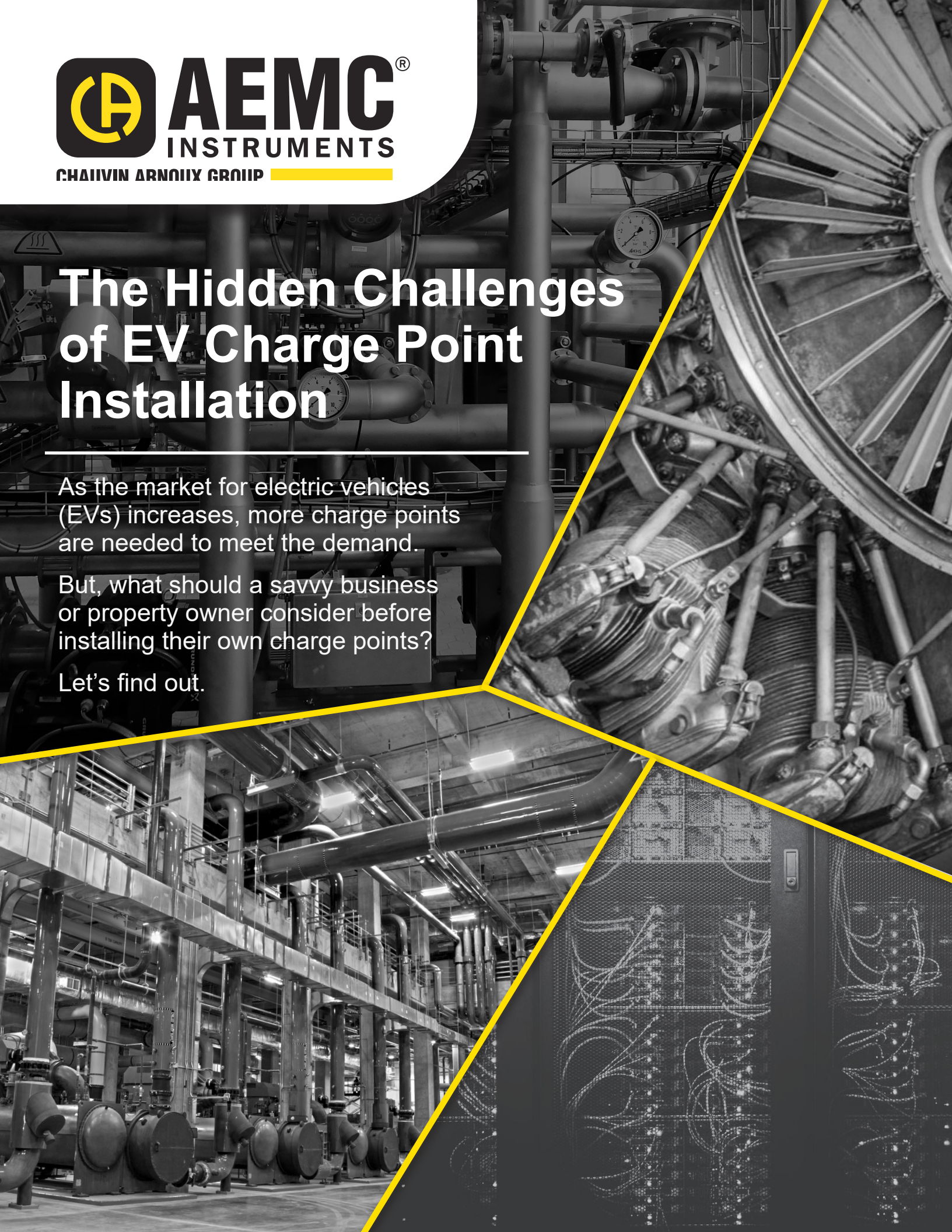
The Hidden Challenges of EV Charge Point Installation

As the market for electric vehicles (EVs) increases, more charge points are needed to meet the demand.

But, what should a savvy business or property owner consider before installing their own charge points?

Let's find out.



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The Hidden Challenges of EV Charge Point Installation

Many businesses are actively considering the installation of electric vehicle (EV) charge points, which is undoubtedly an excellent move from an environmental perspective. But, according to Julian Grant of Chauvin Arnoux, if EV charging facilities are to be implemented smoothly, accurate data is essential for planning.

Installing an EV charge point is not quite as easy as, say, installing a new electric heater. For a start, EV charge points will probably have special grounding requirements, but you can expect a competent installer to take care of these. However, if you are the owner or manager of an area where a charge point is being installed, you will need to be aware of the hidden aspects that will affect the charge point's installation. Most of these hidden aspects relate to the charge point's effect on your electricity supply system.

Before looking at these in more detail, it's important to realize that EV charge points come in many types and sizes that must be considered when planning an installation.

The least powerful types, which are often described as "standard" or "slow" chargers, have a rating of 3 kW or even less. Meanwhile, one of the latest "superchargers" may be rated at 130 kW or more. While adding an extra 3 kW load to an existing installation will probably not cause many supply capacity problems, adding a 130-kW load will certainly be more of a headache.

A standard charger can be expected to take between 8 and 12 hours to deliver a full charge. This may be fine if you're charging your car at home overnight, but it is not ideal for workplace charging, especially if visitors are going to expect access to charging facilities. On the other hand, a supercharger can deliver a useful amount of charge in as little as 10 to 20 minutes. This is perfect for an interstate service area but not necessary in most business environments.

It's most likely, therefore, that most businesses will choose mid-range chargers rated at up to 7 kW single phase or up to 22 kW three phase. A mid-range charger rated up to 7 kW single phase will charge a car in 3 to 4 hours, while a charger rated up to 22 kW three phase has a charging time of 1 to 2 hours.

The next question is how many charge points you are going to install. Most businesses will

probably need several, especially if they're looking to the future.

When you've chosen your charge point rating and decided how many you need, it's time to consider the capacity of your electricity supply system. If you have a three-phase supply, you're probably on a maximum demand tariff, and you'll incur stiff financial penalties if you exceed the maximum demand agreed with your energy supplier. But how close are you to your limit, and will your new EV charge points push you over?

It's possible to estimate your current maximum demand using previous energy bills and your knowledge of the existing electrical loads. However, you can obtain a much more accurate and reliable depiction of your current maximum demand by monitoring your energy usage. This is easily achieved with a modern portable energy logger (PEL) such as the PEL 103 from Chauvin Arnoux.

The PEL 103 can be installed quickly in a distribution board, in many cases without even having to turn off the supply. It will log meaningful measurement data over any period you choose (hours, days, or weeks) so that you can get a detailed picture of your energy usage. This is useful because your peak load may not necessarily occur at the time you would expect. With the results from the PEL, you will immediately know if you have the spare supply capacity, often called headroom, that you will need for your charge points or if you will need to budget for an upgraded service from your energy supplier.

But that's not all your PEL will tell you.

Another important concern with EV charge points is harmonics. The supply system is AC, but you will need a DC supply to charge a vehicle. So, at some point in the charging system, either in the charger itself or in the vehicle, there is going to be a rectifier. Rectifiers are inherently non-linear loads that generate harmonics. If the harmonics in your supply system are outside the limits prescribed by your energy supplier, you may be required to disconnect the load(s) that are causing the problem, possibly including your much needed EV charge point.

However, with your PEL, you will have accurate information about the harmonics in your supply system by logging this information over a period of time. This is useful before you install the charge point so that you will know whether you're already approaching the prescribed harmonics limit and to ensure that you are still meeting your supply company's requirements after the charge point is installed.

This is not, by the way, just the supply company being picky. Excess harmonics in your supply system can cause heating and vibration in motors, heating in neutral conductors, poor performance of electronic devices, and other problems that will end up costing you money. Therefore, you will have a vested interest in making sure that your harmonic levels are low and stay that way.

Finally, let's consider load balancing. If you have a three-phase supply and you're installing three-phase charge points, this shouldn't be an issue. But what if you have a three-phase supply and you're installing single-phase charge points? This can be problematic.

Even if you're installing them in multiples of three and distributing them across the phases, there's no guarantee that they will all be in use at the same time. With single-phase chargers, there's always a risk that they will unbalance your supply.

An unbalanced supply is a definite problem if your business uses three-phase motors because it will cause them to run poorly, vibrate excessively, and operate inefficiently by using more energy than they should, which will cost you money. In tackling this issue, the PEL is indispensable once again. It will let you see how well your phases are balanced—and don't forget you'll need to check this when the chargers are in use and when they're not. It will also help you see the effects of redistributing your existing loads for the best possible balance.

As we've seen, a PEL is an essential asset when planning EV charge point installation and after the installation is complete to verify that the loading, the harmonics, and the supply balance are within the expected limits. Is it worth buying a PEL for this? Only you can decide. But, it could easily save you much more than its purchase price, especially when you consider its ongoing usefulness. Apart from any consideration of the EV charge points, regularly monitoring your supply system to check for balance, level of harmonics, unexpected out-of-hours usage, and power factor can save you a small fortune.

We've tried to present the information in this white paper as clearly as possible, but there's no doubt that power quality and charge point installation can be daunting topics! So, if you'd like further information about the ideas we've put forward or if you'd like help with starting your own power quality investigations, please get in touch with us.

It costs nothing to talk to the experts at AEMC® Instruments, but it can make a big difference to helping you reduce costs and improve profitability!

Content has been edited from the original.

About the author:

Julian Grant is the General Manager of Chauvin Arnoux® UK. He has over 38 years of experience in the electrical and communication test and measurement industry with specialized knowledge in the areas of Building Wiring, Energy Efficiency, Power Quality, Renewable Energy, and products.

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