



# Large Site Power Factor Correction Systems

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## The Problem with Large Sites

Large industrial sites in Australasia are characterised typically by a site that is metered at the 11kV incomer(s), with a number of 11kV/400V transformers and associated switchrooms in various places over the site. Specifically, the Lines Company behind the electricity retailer that supplies the particular site will meter the usage at the 11kV incomers. These meters measure the Amps used and the power factor. This means that the electricity bill and power factor penalty tariffs are determined at the 11kV incomers. From the 11kV switchroom(s), a number of 11kV/400V transformers are connected and it is usually at the 400V side of these transformers that power factor correction is installed. To summarise, these sites incur financial penalties at one place and try and correct it at several other places. Examples of this type of site include (but are most definitely not limited to): freezing works, dairy factories, pulp & paper mills, steel mills, and so on.

The individual low voltage (LV) systems will normally have a target power factor of 0.96 (tariffs are often only invoked below 0.95, so this provides a control band). However, this will not usually bring the 11kV power factor up over 0.95, meaning it is very common to have all the LV systems working perfectly, and yet a monthly power factor penalty is still being charged. These penalties can be substantial – kVArCorrect knows of several sites that still incur monthly penalties in the thousands of dollars although all LV systems are working correctly.

## The Solution

kVArCorrect Ltd. has been involved with many large sites that have this distributed network of transformers and yet is invoiced by the readings taken from the meters installed at the 11kV incomer(s). The company has developed a suite of capabilities to solve these issues on a case by case situation. Sometimes the solution is to install 11kV power factor correction, but more often, it is to install a co-ordinated network of 400V power factor systems that work together, driven from the 11kV metering data. It is not about the particular technology of the power factor control system, it is about understanding the whole site and working to eliminate **any and all** penalty tariffs accrued at the metering point. This takes experience, knowledge and a system that is capable of achieving it.

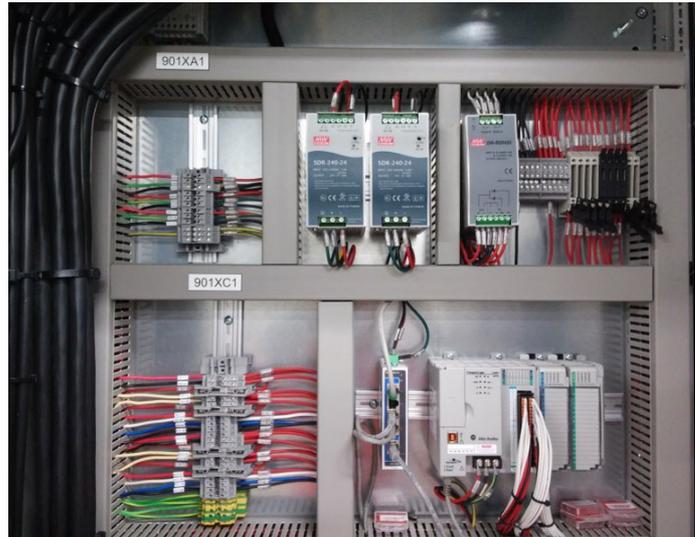
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At the heart of kVArCorrect's Large Site System is the intelligent 11kV metering controller, *MetaVAr*. This is a product that has its own CT's installed in the 11kV incomer(s) and therefore 'knows' the same power factor and kVA loading that the retailer uses to create the invoice that has the power factor penalty tariffs and demand charges. The *MetaVAr* controller is programmed to communicate with any number of kVArCorrect 400/415V power factor control systems installed around the site. A variety of communication methods can be used to send information around the site, including Wi-Fi, Ethernet, hard wiring, GSM, etc – whatever is best for a particular site can be accommodated. Each controller of the low voltage (400/415V) is therefore able to be commanded from the *MetaVAr*. Because *MetaVAr* can see data from all over the site, it recognizes there is a problem and increases the target power factor on selected LV systems to try and control the 11kV power factor – which is being metered. Depending on the set up and size of the site, there may be enough capacity in the LV systems to maintain the 11kV power factor at a level where penalties are minimised, but in the event there is insufficient correction available at the LV level, kVArCorrect has proven experience with high speed 11kV correction of up to 750kVAr. This takes the form of a separate installed system that is controlled directly by *MetaVAr*.



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## Photos:

- Top Right: Close up of internals
- Bottom Left: Outside of *MetaVAr* Cabinet
- Bottom Right: Inside of *MetaVAr* Cabinet



## About the Author

The opinions expressed here are the researched views of Allan Ramson, General Manager, kVArCorrect Ltd. All claims have been substantiated by testing and observations from the Australasian market between 2007 and 2018. Having been associated with the design, manufacture and supply of many thousands of power factor capacitors and over 500 power factor systems, kVArCorrect confidently states that we have the experience, the knowledge, the suite of products and the desire to eliminate power factor penalty tariffs, even those applied from 11kV metering.

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