coldcurve

ELECTRICAL DESIGN

Data and Power Logging Services

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POWER LOGGING

With ever more increasing emphasis put on energy consumption and efficiency, the use of a power data logger can provide invaluable information on an installations power characteristics. The first step in managing energy is understanding 'how much and when' energy is being used. To discover that, you need a power logger. The logger captures voltage, current, power, power factor and energy, displays the measurements, and in logging mode stores them over time. Then, using software, you can graph the measurements and highlight times when extreme or unexpected energy consumption is happening.

Armed with such information you can then take the appropriate steps to correct any shortcomings or to improve their current power network. Once the appropriate steps have been implemented the data logger can then be used to prove the energy efficiency/quality has been improved. This could provide not only a financial benefit, but an ethical benefit, both of which are highly valued by both company and customer.

The types of data attainable varies greatly, from basic voltage, current and power readings to harmonic distortion caused by electronic loads and voltage dips and swells caused by load switching.

Voltage, current and power readings can give the client a detailed picture of the power consumption of various items of equipment or plant and where efficiency could be increased and savings made.

Harmonic distortion readings and event readings such as voltage dips and swells can provide the you with information regarding the effect your various items of equipment or plant, particularly electronic equipment, have on the incoming power supply. The effects of harmonics and events can cause other items of electrical equipment to trip out and cease operation until induced faults have been reset. The analysis of this enables the client to implement appropriate measures to combat such faults, thus improving productivity through reducing faults and equipment downtime.

The initial energy study is conducted at the main utility power supply/service entrance. Once overall power characteristics have been measured, more focused studies are then conducted throughout the facility to profile individual loads and estimate their effect on your energy costs.

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Power Factor

Why does power factor matter?

Large utility customers (typically those with 100 kW+ loads) contract to buy their power based on power factor (the utility requires these big customers to do this to ensure they get paid an amount of money that truly reflects the cost of the infrastructure they need to install to service the customer). Usually the utility requires the customer maintains a power factor of 0.95 or more (this will vary depending on the contract), if the customers power factor goes below the agreed level an additional charge is made to the customer. So power factor has a direct effect on the customer's bill.

What is power factor?

Power factor is the ratio of working power or energy (kilowatts or kW) to apparent or total power (kilovoltamperes or kVA) delivered by the utility. It measures how effectively total delivered power is being used. A high power factor signals effective utilization of electrical power, while a low power factor indicates poor utilization of electrical power. However, this is not to be confused with energy efficiency or conservation which applies only to energy or kW. Improving the efficiency of electrical equipment reduces energy consumption but does not improve the power factor.

What causes a low power factor?

The main contributors to low power factor are inductive loads such as fluorescent lighting and motors with motors being operated at less than full load having the greatest detrimental effect. This often occurs in cycle processes such as saws, conveyors, compressors, grinders, etc.—where a motor must be sized for the heaviest loads. HVAC fans often have a low power factor due to running at reduced load.

What can be done to combat a low power factor?

There are a number of measures available to combat a low power factor with the most common being the installation of capacitor banks. However, this isn't always the best way to reduce energy bills as energy suppliers charges for reactive power (caused by a low power factor) vary dramatically depending on the installations supply network. In this case voltage optimization may be the best alternative, but again, it depends on the energy usage characteristics of the installation. If you are unsure of the best course of action, Coldcurve Ltd. would be happy to assist you in the analysis of power data and the best course of action.

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THE FLUKE 1735 AND ITS USE

As with the majority of our high-spec test equipment we use a Fluke unit, namely the fluke 1735. It has many features and functions not available with other data loggers, and, as with all other fluke test equipment is easy to use and comes with user friendly software.

This unit can either be hired and used by in house engineers or a complete data logging service is available, from setup to analysis and documentation. Prices for either service are available on request.

Use of the fluke 1735:

1. Hook up to the feeders or service. Using proper personal protective equipment, connect the Fluke 1735 to 230 V line power and secure the area so no one will tamper with your setup. For a 3-phase wye system there will be eight connections:

- Three phase voltages
- Neutral voltage
- Three phase currents
- Neutral current

2. Set power system parameters. Set the Network Topology to wye or delta, to match the system you are recording. Verify the nominal voltage (Mains Voltage) and line frequency are correct.

3. Set the recording time. Set the Fluke 1735 to 15-minute averaging intervals and a 30-day recording duration.

4. Record the data. In the W (power) position the Fluke 1735 will record a min, max, and average of these values every 15 minutes:

- Power in Watts for each phase and total
- Reactive Power in VARs for each phase and total
- Apparent Power in VAs for each phase and total
- Power Factor for each phase and average
- Averages of Energy in kWh and Reactive Energy in kVARh

The trend screen will appear and plot a new minimum, maximum and average on the display every fifteen minutes, moving from left to right.

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After 30 days, disconnect the Fluke 1735 from the source, take it to your computer, use the serial cable to connect it, and download the data into the Power Log software included with the unit.

5. Download and review the measurements. For 30 days of recording, with a measurement every 15 minutes, you will have 2880 sets of measurements. Use Power Log to graph this data, find the average current or power on each phase, compare the three phases and report the largest number. Power Log has a built-in report generator that includes graphs of current and real power. Your report can range from a single current or power number to a full-blown document with graphs and tables. But the ultimate goal is still the same: Get an accurate picture of the system load, help design a safe upgraded system and satisfy electrical authorities.

If you are unsure of how to analyze the data you have logged or what the best course of action to take to improve efficiency or quality is, Coldcurve Ltd. would be happy to assist.

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