



# Power Quality Logging PQLM (PQLM)

## User Manual



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V1.5

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## Thank You:

Thank you for purchasing the Vanguard Power, Power Quality Logging PQLM (PQLM). We believe it will provide you with many years of service.

Please read the following safety instructions and keep this User Manual in a safe place so that you can refer back to it at any time. You are permitted to make 3 copies of this User Manual. If you need any further copies please contact Vanguard's Power.

## Description:

The Power Quality Logging PQLM (PQLM) manufactured by Vanguard's Power is used to conduct power quality readings and surveys in single and 3 Phase environments. All data to be measured can be programmed by the user by using a connected laptop/computer. Once programmed the PQLM, connected to the incoming mains power riser using the voltage clips supplied, can be used for any period of time. Data from the site is stored in the PQLM and can be programmed to take readings from 1 minute to 1 day. The data collected from these readings/surveys is then used to identify/measure the following:

1. Volts – per measuring time set plus minimum, maximum and average.
2. Kilowatts and/or Watts - per measuring time set plus minimum, maximum and average.
3. Amps - per measuring time set plus minimum, maximum and average.
4. Harmonics (THD) - per measuring time set plus minimum, maximum and average.
5. Power Factor - per measuring time set plus minimum, maximum and average.

The data collected from any site can then be downloaded to the PC or Laptop using the magnetic optical head with USB lead; and the country specific main plug (to provide PQLM power). The Software of the PQLM provides various formats for showing and printing the data. The data can also be exported to an Excel spreadsheet file for presentation in any other format.

## Purpose and Intended Use:

PQLM is designed for trained personnel and/or qualified electrical engineers to perform accurate logging and retrieval of data to measure a site's power consumption over a period of time. A minimum of seven (7) days power quality data and energy usage is required by Vanguard's Power to determine the build specification of all 3 Phase PropSava and LiteSava Power Optimisation Systems.

The PQLM will measure a variety of parameters for min/max/average conditions including:

- Volts
- Amps
- Watts
- Power Factor
- Harmonics (THD)

## PQLM Case Contents:

1. 1x Logging PQLM Meter System.
2. 1x Voltage Measuring Power Lead with four (4) crocodile clips for site connection.
3. 3x Amp Measuring Clamps.
4. 1x Power Lead with appropriate country plug for retrieving data.
5. 1x Power Quality Management System (PQLM) Software CD.
6. 1x Magnetic Read Head.
7. 1x Aluminium Carrying Case.
8. 1X User Manual.



1



2



3



4



5



6



7

## Before You Start:

### Safety Information:

Use the PQLM only as specified in this User Manual. Otherwise the protection provided by the PQLM might be impaired. Refer to safety information below.

A **Warning** identifies conditions and actions that pose hazards to the user. A **Caution** identifies conditions and actions that may damage the PQLM or equipment under measurement/test.

#### Warning:

To avoid possible electric shock or personal injury, follow these guidelines:

- Always follow the site Health and Safety operating procedures and any other notices provided to you by authorised site personnel.
- Do not use the PQLM if damaged. Before you use the PQLM inspect the case and pay particular attention to the insulation surrounding the connectors.
- Inspect the test leads for damaged installation or exposed metal. Replace damage test leads before you use the PQLM.
- If this product is used in a manner not specified by Vanguard's Power, the protection provided by the equipment might be impaired.
- Do not use the PQLM if it operates abnormally. Protection may be impaired.
- Do not operate the PQLM around areas of exposed gas, vapour or dust.
- Before use verify the PQLM's operation by measuring a known voltage.
- Avoid working alone

#### Caution:

To avoid possible damage to the PQLM or equipment under test follow these guidelines:

- Use the proper terminals, functions and range for you measurements.
- Keep the PQLM clean of dust and any other form of contamination.
- Secure the PQLM in a safe place when unattended.
- Use Notice Boards to advise other persons of the use of the PQLM and that it is not to be disconnected. Ensure that a contact name and number is clearly displayed for further information.

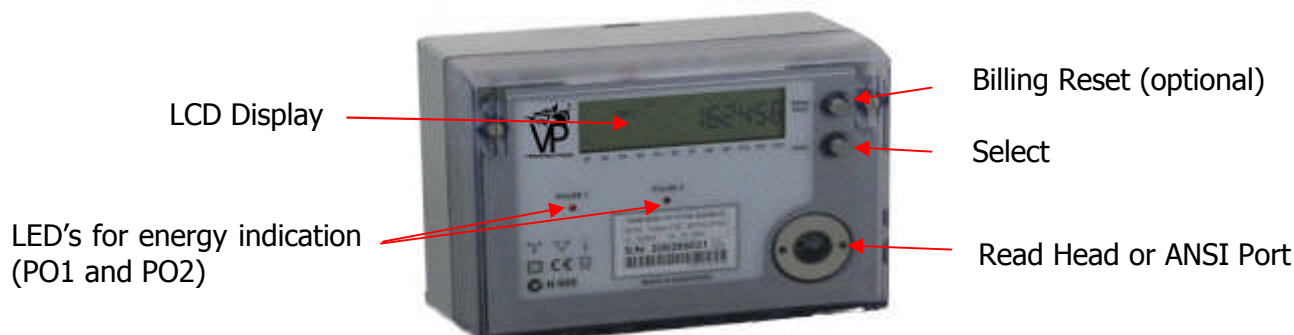


**WARNING**-High Voltage Observe all safety precautions when dealing with Electrical Equipment

All electrical engineers must obey all local and national electric codes, Health and safety laws on all sites.

## External Features:

Figure 2.1 shows the front view of the PQLM PQLM (with protection covers removed from case)



**Figure 2.1**

## Flag/ANSI Port:

Use the standard Magnetic Read Head (supplied) to connect the PQLM to a PC.

**Note** it has occasionally been found that some Read Heads need to be rotated 180 degrees for them to work. If you have problems try this first.

## Battery:

The battery is used to run the clock during loss of power. It also allows the PQLMs LCD screen to be active while main power is not available. It is a 3.0v lithium battery and should last 10 years in normal operation. A low battery indication is displayed on the LCD screen if the battery is not present or depleted. Contact Vanguard Power Customer Support for a replacement battery. Data of all readings is stored in the PQLM on-board memory system.

## Billing Reset:

Pushing the billing reset and select button at the same time will cause the PQLM to be disconnected. **The PQLM will stop recording Data.** The message **Disconnect** will be displayed on the LCD.

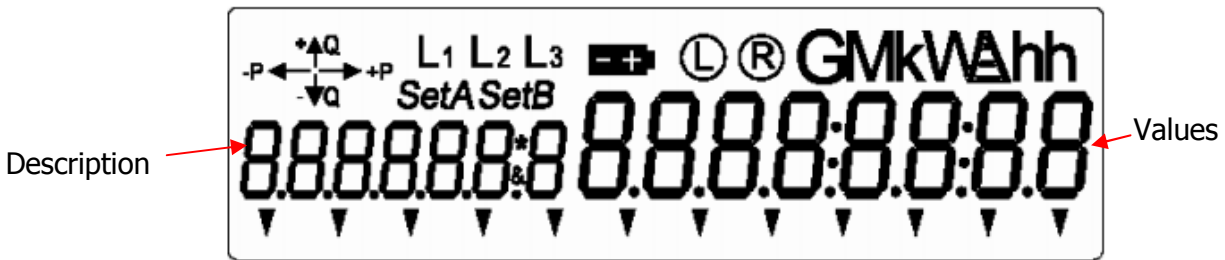
## LCD Display:

The LCD is the primary display for information and also useful during installation, configuration and diagnostic problems. It has 8 (seven segmented) digits to display values and 7 (seven segmented) digits to display description (See Figure 2.2). It has arrows to indicate:

- import and export for active and reactive energies
- indicators for phase voltage
- indicators for display set A and B
- battery indicator
- connection type indicator for connection through local or remote port and units and multiples.

**External Features Continued...**

PQLM also has an optional backlight.



**Figure 2.2 LCD with all segments turned on.**

**Select Button:**

Press and hold the **Select** button for a few seconds to see values. To progress to the next page push the **Select** button once. Each time the button is pressed the display moves to the next page.

**PQLM Case Connections:**

The rear of the case has four (4) connections L1, L2, L3 and Power (Figure 2.3). L1, L2, L3 connections are used to connect Amp clamps. The Power connection is multi use type, for connecting Voltage- via four (4) crocodile clips to the site or with mains single phase plug for data retrieval away from site.



**Main Power & L3 L2 L1 Current Clamps  
Socket Power**

**Figure 2.3 Case Connections.**

**Using the PQLM:**

Before you can use the PQLM you will need to install the PQLM Software onto your PC/Laptop. To install the software you will need the CD supplied with the PQLM and a Software Key. Please ensure that you have both of these items prior to installing the software.

## Installation of PQLM Software:

### System Requirements:

- 486, Pentium, or above based personal computer.
- Microsoft Windows 98/ME or Windows NT4/2000/XP
- Vista is supported – Install PQLM as an Administrator, and run the first time as an Administrator. After that PQLM will operate properly as a standard user.

### Installing PQLM software:

- Close all active applications.
- Insert the PQLM software CD into the CD ROM drive.
- Run the **setup.exe** program from the install package. (In Vista run as Administrator)
- The **PQLM installer** dialog box appears. Follow the instructions on the screen to progress through the installation.

### CD Keys:

PQLM uses a system of 'Keys' to connect the software to the hardware of the PQLM. When PQLM is first run the CD Key **entry dialog** screen will appear (Figure 4.1).

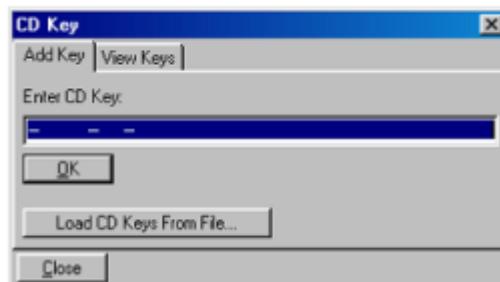


Figure 4.1 PQLM CD Key entry dialog

A CD key will be provided with the CD package. CD keys may either be typed into the **Enter CD Key** field or if they are in a file the **Load CD Keys From File** button may be used. Each key is a series of 26 letters or numbers followed by- Vanguard'sPower.

- Enter CD Key
- Select **OK**

The PQLM **System Code** screen will now appear (Figure 4.2)

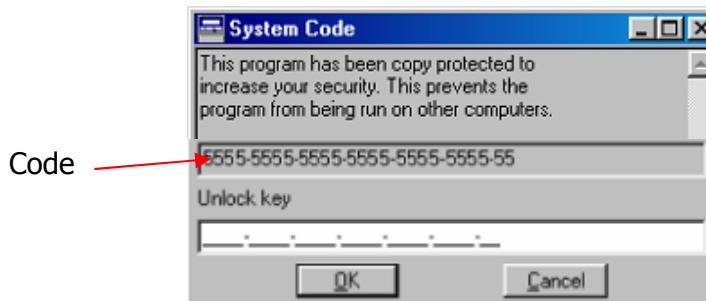


Figure 4.2 PQLM System Code Confirmation

The indicated Code needs to be sent to Vanguard's Power who will then send you the corresponding unlock key. E-Mail is the easiest way to do this- [customersupport@vanguardspower.com](mailto:customersupport@vanguardspower.com) This now locks the software to the hardware so that it only runs on your computer.

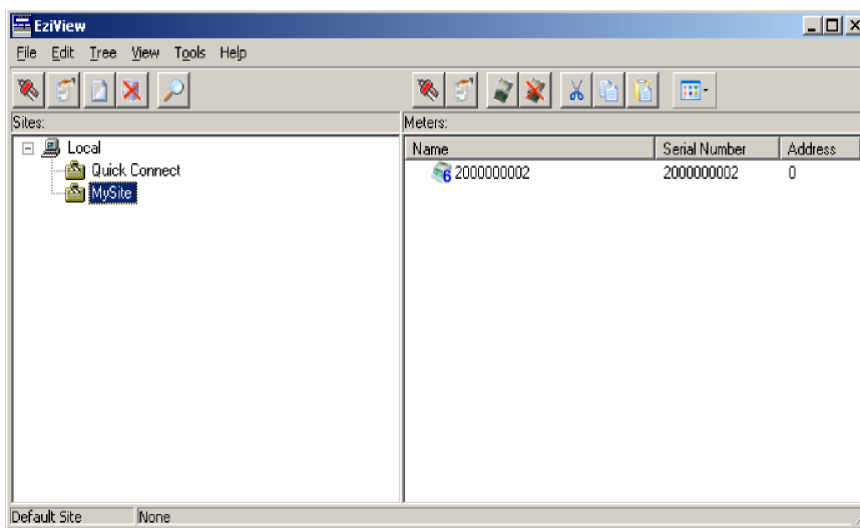
## Running PQLM Software

When starting the PQLM software the User screen is displayed. Enter User name "EDMI" and the password "IMDEIMDE" to log into PQLM. Stars will be displayed instead of the password for security. Ignore the *Link Security* field. Click *OK* after the Username and Password has been entered.



PQLM login

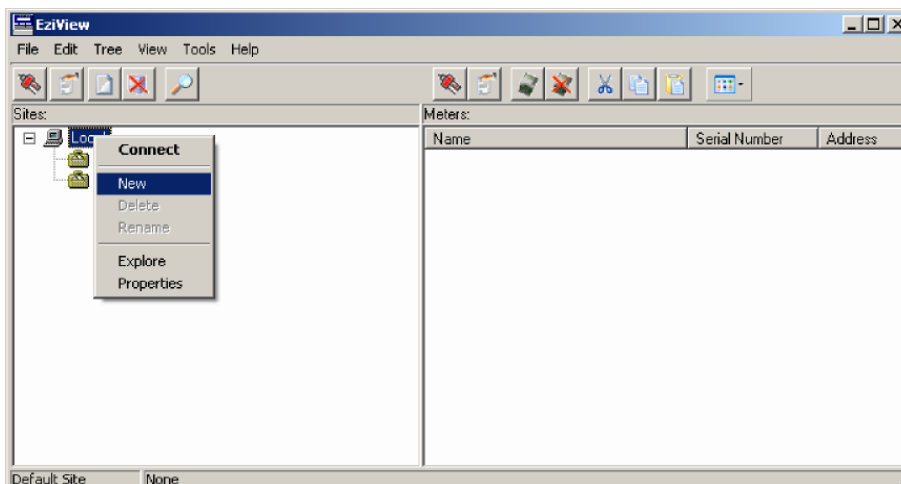
This brings you to the PQLM main screen



PQLM main screen

## Sites

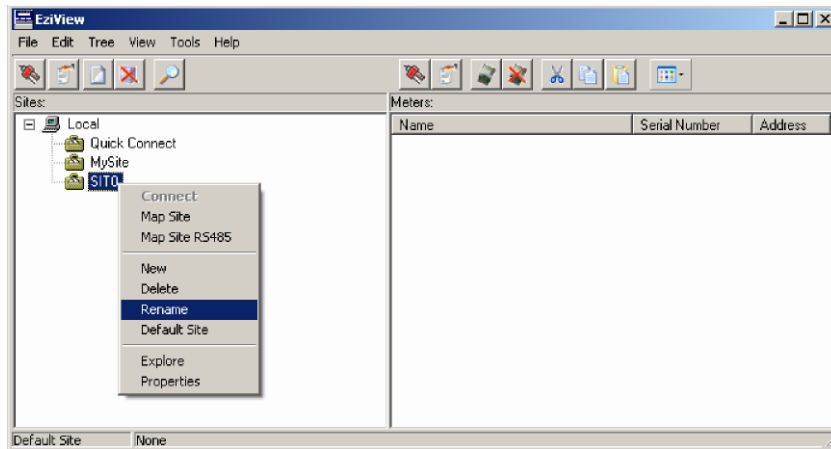
Create a new site. Right click on *MySite* and select "New"- see below.



PQLM tree diagram new site menu option.

## Running PQLM Software Continued...

This will create a site called *SITO*. To change the name either right-click on it and select *Rename*, or click on the name while it is highlighted. A new name can then be entered.



Renaming a site

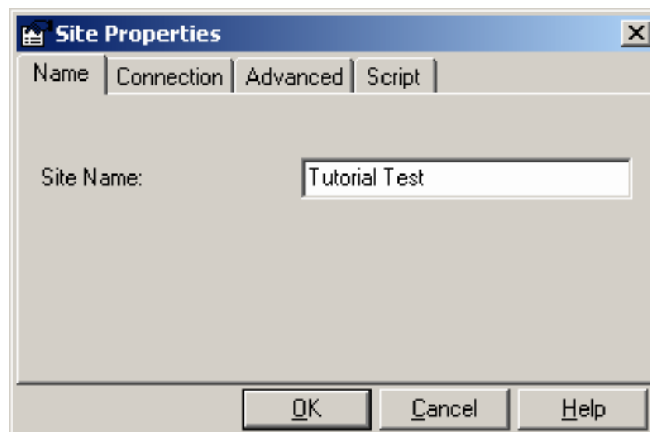
# Sites may be deleted by choosing delete from the right-click menu.

# A default filename will be assigned starting from 1000000000 in the right hand window.

**Your PQLM has already been pre-configured to provide you the operation and settings listed below and on the following pages of this User Manual. These settings are given so that you may change them to suit your individual needs.**

## Site Properties

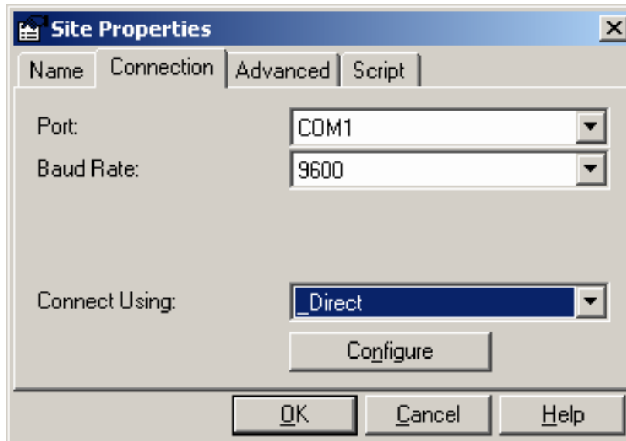
Select Properties:



Name page

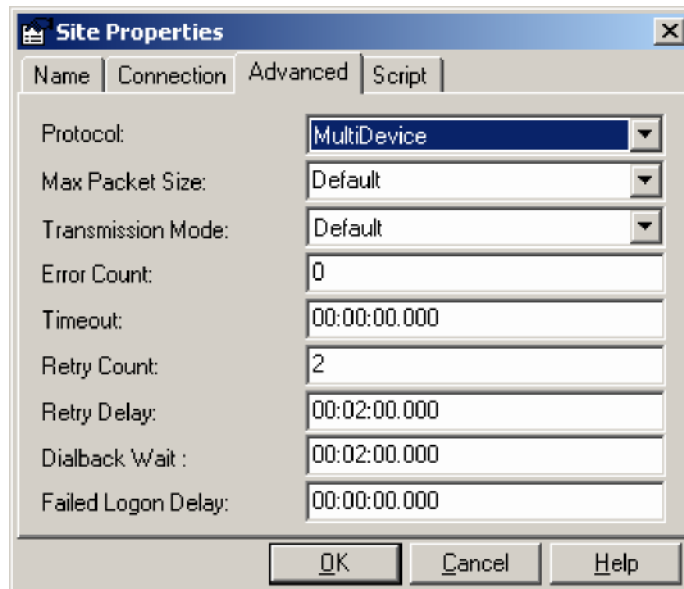
There are four pages to the *Site Properties* dialog. The first page, *Name*, shows the site name. This is yet another way to change the site name.

Site Properties Continued..



PQLM Site Properties, Connection page

The *Connection* page allows the method of connection to the PQLM to be configured. The *Connect* box allows the type of connection to be picked.



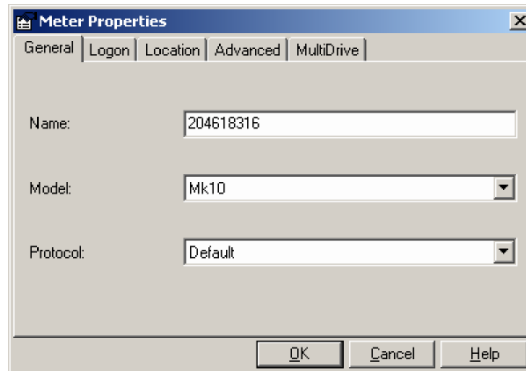
PQLM Site Properties, Advanced page

Click on down arrow on MultiDevice and change to SingleDevice, then change back to MultiDevice and press 'OK'

**Site Properties Continued...**

Go back to Connection page and select *Configure* .

This brings you to the PQLM Properties General screen.

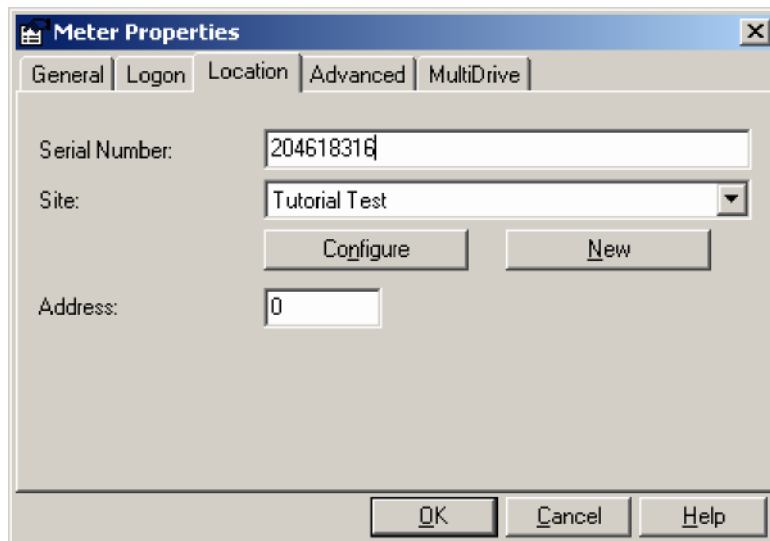


**PQLM Properties**

The first page of this screen allows the PQLM *Name* to be changed, and allows the Model and Protocol to be selected.

- Model should be set to Mk10E
- Protocol set to Default.

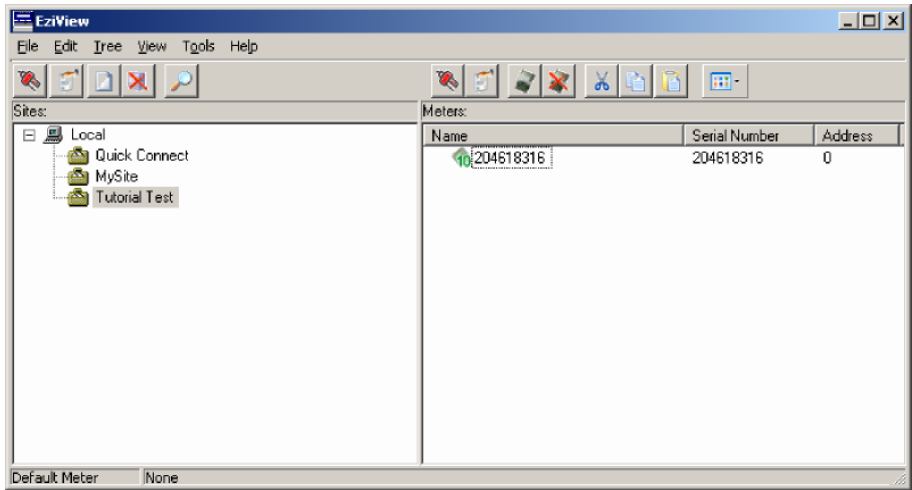
**Select PQLM Location:**



**PQLM location**

- Serial Number = Copy Serial Number of PQLM.
- Site is the name of your site.
- Click "OK"

Select PQLM Location Continued...



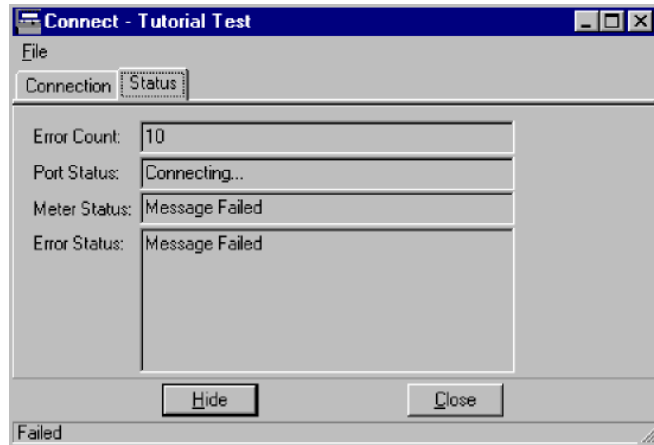
A newly created PQLM in PQLM.

The PQLM will now appear on the screen with the correct Name (Site) and Serial number.

Connecting to the PQLM

To connect to the PQLM, double click on the PQLM or its site. Alternatively the right-click menus have a *Connect* option .

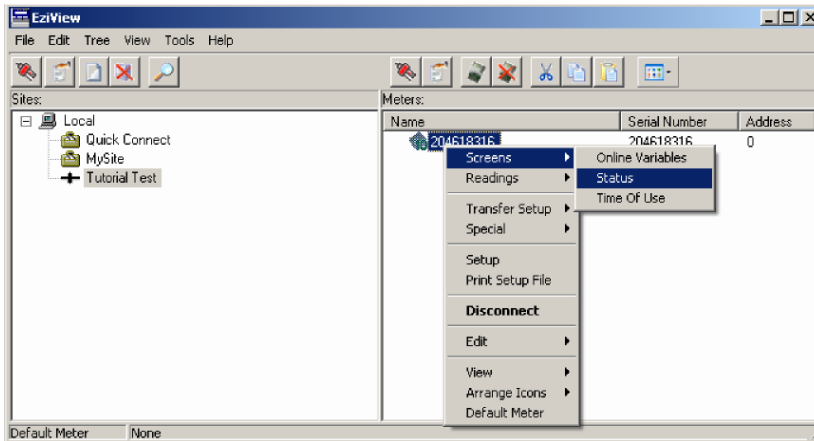
A screen similar to below is shown while PQLM is attempting to connect. The *Hide* button hides this screen, but has no effect on operation.



PQLM connection *Status* page

## Online Functionality

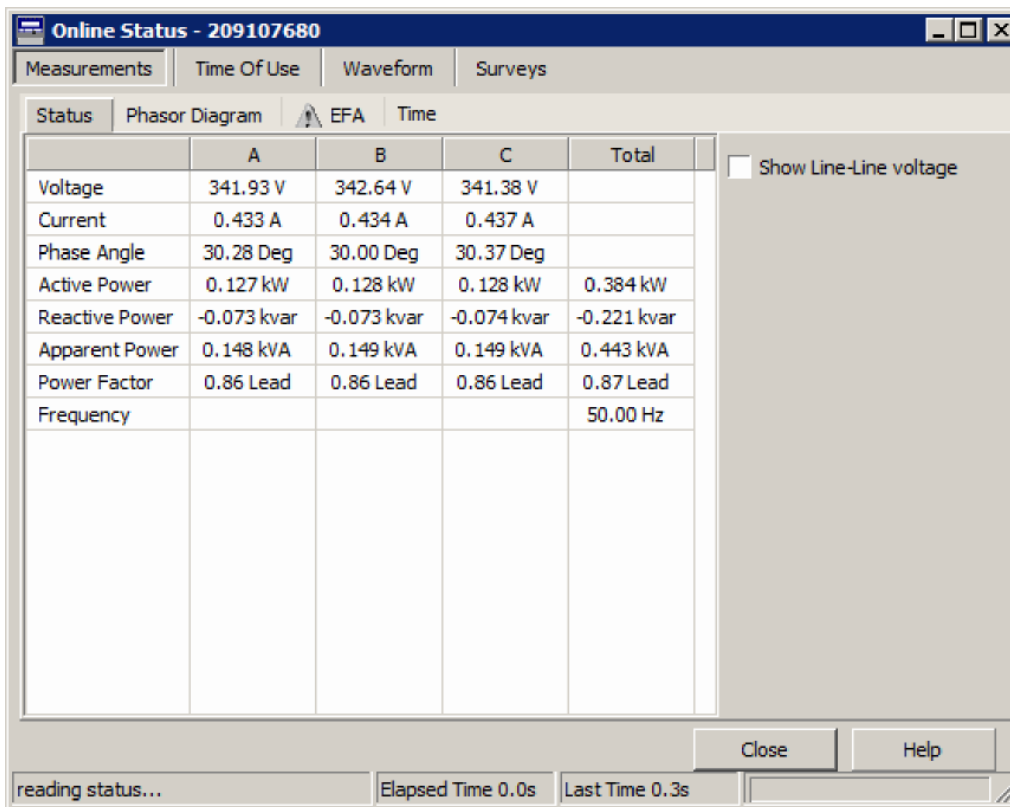
Once the PQLM is connected and online, extra options become available on the PQLM's menu. Most obvious is the *Disconnect* button, which terminates the connection with the PQLM.



PQLM online options

## Live Measurement Display

If you have a PC/Laptop connected, PQLM can display live readings from a connected PQLM.



PQLM *Status* screen example

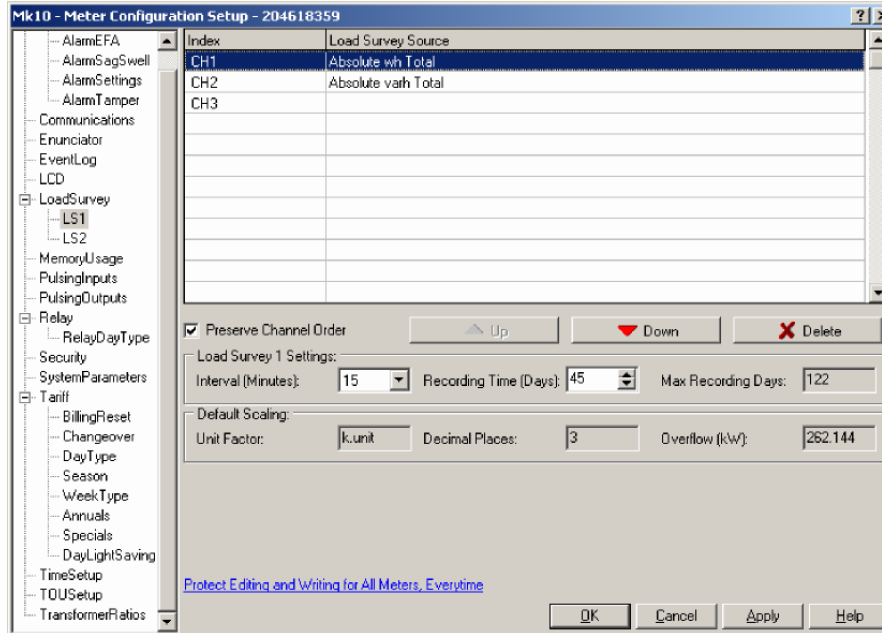
- Selecting *Screens*→ *Status* gives a real time display of the PQLM's basic measurements.

## Load Survey

**NOTE: The PQLM hardware is pre-set with the basic parameters for a survey. (LS1)**

## Survey Setup

If you want to change the Survey program data, please read the following:

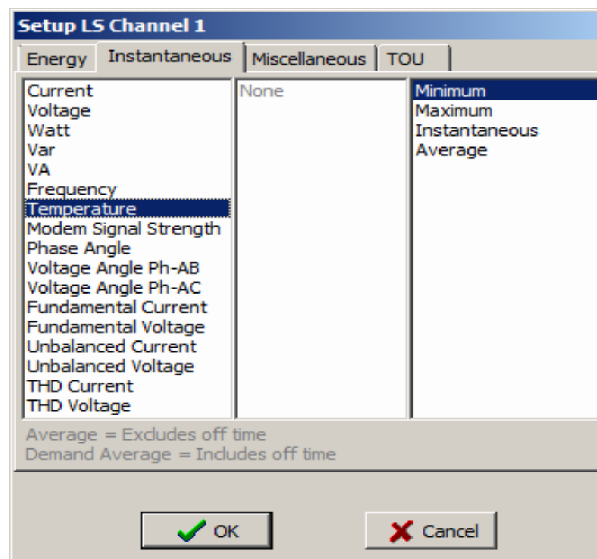


Load Survey Configuration page.

- Selecting *LoadSurvey* → *LS1* or *LoadSurvey* → *LS2* will bring up the configuration page.

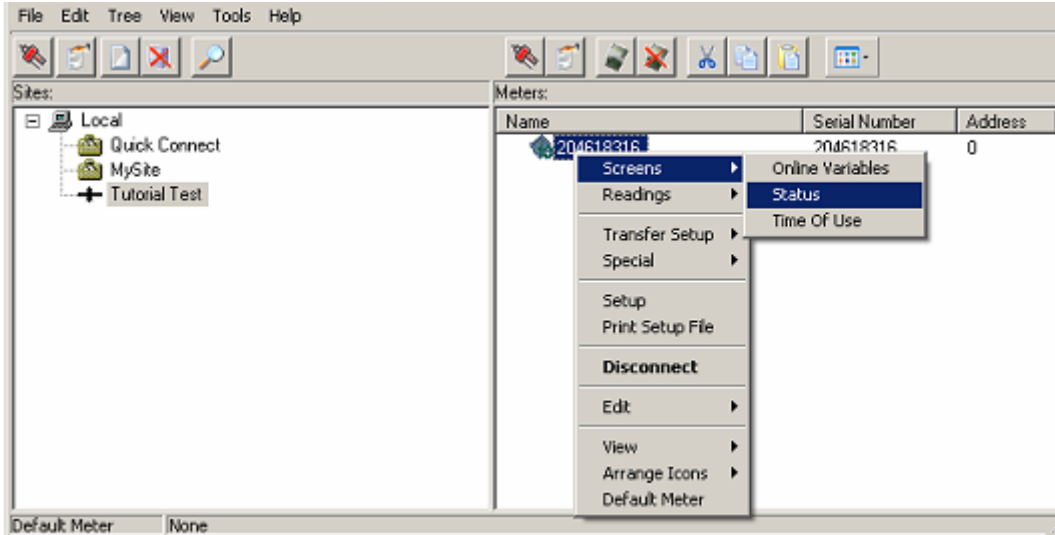
To add a channel, double click on the last “blank” entry. To change a channel, double click on it. Both these actions will bring up the source selection page. To delete a channel, select it then click the delete button.

The *Instantaneous* tab allows the recording of measured quantities such as voltage and current.



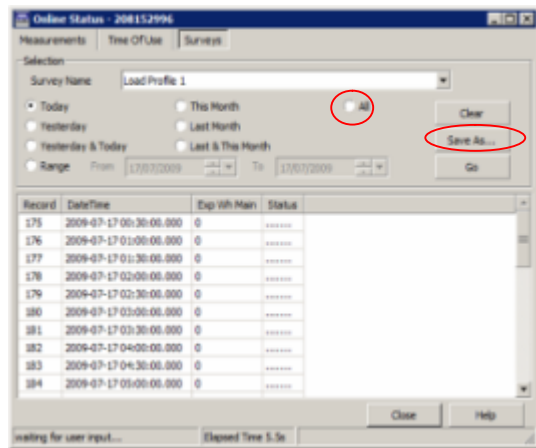
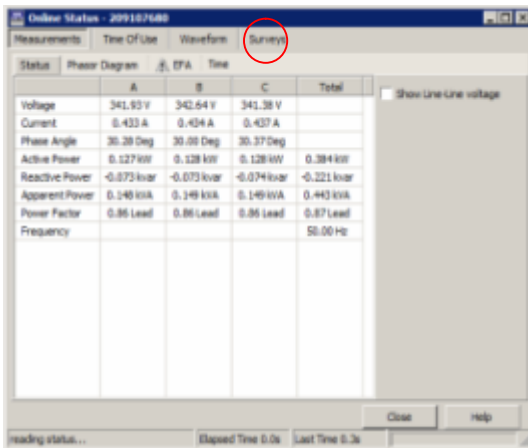
## Survey Retrieval

- **On-line options** Menu - Right click on the PQLM icon in the right hand window and a drop down menu appears. Select **Screens** and then select **Status** in the next drop down menu.



On-line options menu.

- **Status** Screen



Status Screen

- Select the **Survey's** Tab on the On- line Status screen and the Survey screen appears.
- Select **All**.
- Select **Save As**. Then select where you want to save your Survey Data as a CSV Text file.
- **Warning: Do not click on the Clear button as this will erase the survey.**
- The CSV text file can now be opened with any spreadsheet program to be manipulated into graphs, charts and any other form or report

## Connecting the PQLM to Mains Power Cables

Gain access to the sites main input power supply.



**WARNING** - High Voltage Observe all safety precautions when dealing with Electrical Equipment

**WARNING:** This Product should only be connected to the main supply of a premise by a suitably qualified person. If you have not been trained to connect this Product to live main incoming power cables or you are **not** a qualified electrical engineer/electrician, please do **NOT** connect this Product. Seek expert advice if you are not qualified. **Any activity on live incoming main cables is potentially dangerous and can result in fatal injuries.**

If you are qualified to connect this Product to live main incoming power cables, connect the PQLM leads as identified below:

1. Connect the Power lead with four (4) crocodile clips (Figure 3.1) to the PQLM case's power connector.
2. Each crocodile clip is numbered. Clip each crocodile clip in turn to the main Phases L1, L2 and L3.
3. Connect the neutral clip to neutral mains.



Figure 3.1 Power lead with crocodile clips.

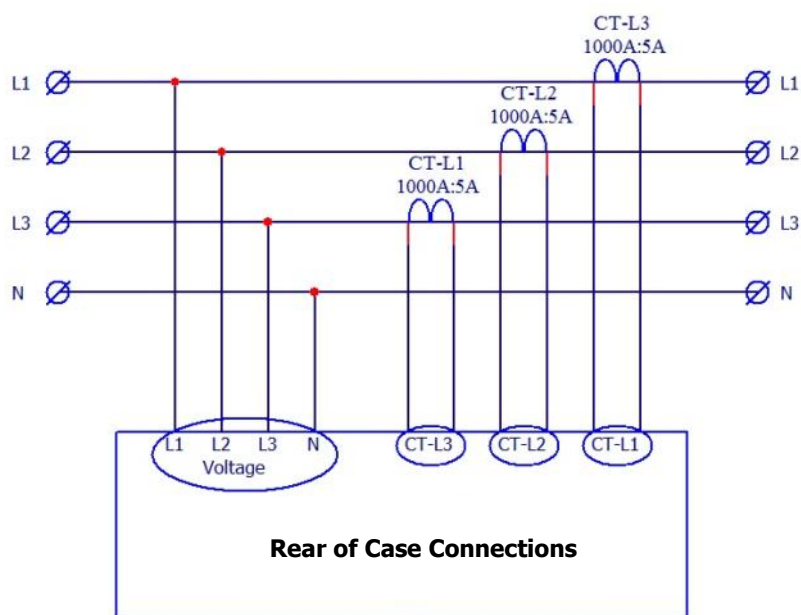
4. Connect L1 Amp clamp lead (Figure 3.2) to L1 case connector.
5. Clamp Amp clamp over L1 main feed on site.



Figure 3.2 Amp Clamp Lead.

6. Carry out the same procedure for L2 and L3 Amp clamp leads.

### PQLM Connection Diagram:



### Confirming Correct Connection and Operation:

1. Once you have connected the PQLM as stated above the PQLM is live and ready to start a Survey.
2. To confirm correct connection and operation hold the **Select** button for a few seconds to see values.
3. Cycle the **Select** button to see first Frequency (should be 50Hz), Volts and Amps.
4. The PQLM is now storing all data programmed into the Survey File for collection at a later date.

### Servicing:

The system is not designed for field servicing and has no user serviceable parts. The PQLM PQLM has no internal fuses. In the event of failure contact Vanguard's Power Customer Support.

### Trouble Shooting:

The PQLM is pre-configured up for Logging purposes and is mapped to the PQLM software for ease of use. **Do Not** attempt to alter any settings as this can affect the equipment.

No connection of PQLM PQLM to PC

- Rotate Flag Reed head 180 degrees.
- Ensure PQLM icon has same serial number as the PQLM.
- Record any failure messages.

If you still have problems contact Vanguard's Power Customer Support.

### Training:

Training on the PQLM and PQLM systems are available from Vanguard's Power. Contact Customer Support: e-mail [customersupport@vanguardspower.com](mailto:customersupport@vanguardspower.com)

**Specifications:**

**Measured Quantities and Methods:**

The PQLM can measure the following Quantities:

Quantity	Units	Description
Watt hours	Wh	The total Wh.
var hours	Varh	The fundamental varh. In 2 element mode calculated from $\sqrt{VAh^2 - Wh^2}$
VA hours	VAh	The total VAh, calculated from $V_{rms} \times I_{rms}$ . In 2 element mode calculated from $\sqrt{Wh^2 + varh^2}$
Watts	W	The total W.
vars	Var	The fundamental vars. In 2 element mode calculated from $\sqrt{VA^2 - W^2}$
VA	VA	The total VA, calculated from $V_{rms} \times I_{rms}$ . In 2 element mode calculated from $\sqrt{W^2 + var^2}$
Voltage	V	True RMS voltage.
Current	A	True RMS current.
Frequency	Hz	Fundamental system frequency.
Phase Angle	Degrees	Angle between Fundamental Voltage and Fundamental Current.
Phase to Phase Angle	Degrees	Angle between Fundamental Voltages.
Power Factor	Ratio	Watts divided by VA. Lead or lag determines the sign.

**Specifications Conditions:**

**Safety Certification and Operating Conditions:**

<b>Safety Standards</b>	<b>The PQLM complies with the following standards</b>
IEC	IEC 62052-11 (2003), IEC 62053-21 (2003), IEC 62053-23 (2003), IEC 62052-21 (2004), IEC 62054-21 (2004), IEC 62053-22 (2003), IEC 61038 (1990), IEC 61036 (1996).
Australia/New Zealand.	AS 62052-11 (2005), AS 62053-21 (2005), AS 62053-23 (2006), AS 62054-21 (2006), AS 1284.11 (1995), AS62053-22 (2005), AS 1284.12 (1995)
Europe	EN 50470-1, EN 50470-3
<b>Voltage</b>	
Nominal (Un)	220VAC to 240VAC.
Operating Rang	0.8 Un to 1.2 Un (Extended IEC is 1.15 Un)
Limit Range	0 Un to 1.2 Un (IEC is 1.15 Un)
Start Up	Time for PQLM to be fully functional after Un applied is <3s
<b>Over current</b>	Whole Current: 7000A for 3 cycles, 30 I <sub>max</sub> for 0.5 cycles
	CT: 20 I <sub>max</sub> for 0.5 seconds
<b>Frequency</b>	Active 45Hz to 65Hz
	/- 2% variation for accuracy (per IEC)
<b>Temperature</b>	
Operating	minus 25c to plus 60c
Limit Range	minus 40c to plus 80c
	Operation at extremes should be limited to <6h
Dry Heat Test	plus 80c (IEC is 70c)
Damp Heat Cycle Test	plus 60c (IEC IS 40C)
Relative Humidity	Non-condensing: Annual mean <75%, 30 days 95% (in a natural spread), occasionally 85%)

## Warranty Terms & Conditions

1. Please check the Power Quality Logging Meter (PQLM) and contents as soon as possible. If the PQLM or any other item included in the package is damaged or faulty you must inform your supplier immediately or at the latest within 14 (fourteen) days of the date of purchase. If you and/or your supplier does not inform us within 14 (fourteen) days of purchase of the PQLM of any missing items, damage or fault we shall have no further liability for items missing, damaged or faulty.
2. Vanguards Power (Hong Kong) Limited, hereafter referred to as "VPHK", warrants that the PQLM will be free from component defects for 1 (one) year from the date of purchase; and free from labour charges to rectify any faulty workmanship or component for 1 (one) year from the date of purchase. This Warranty is subject to completion and filing with VPHK of the Warranty Card attached.
3. Any repairs or parts supplied or other work carried out which are found to be outside the Terms of this Warranty will be charged to the purchaser, and will be payable at the point of service. If no fault is found or the fault is outside the scope of the warranty then a possible charge for labour, parts and/or transportation may also be made.
4. The purchaser must ensure the environmental and power supply conditions are suitable for the PQLM and that the PQLM is cared for and maintained in accordance with the recommendations stated in this User manual.

### Exclusions to the Warranty:

1. Breakdowns or failures arising from any external influences such as misuse, neglect, accidental damage, inadequate ventilation/temperature control of the area of installation, transients of any kind above, short circuits, loading to the PQLM above the original specification of build, any unauthorised tampering with the system and/or its software, and other external influences such as, but not limited to poor environmental conditions.
2. Purchaser's consequential loss or liability of any kind.
3. We do not accept liability for returns damaged in transit or not received by us.
4. Every care has been taken in the preparation of all and any details or statement made in this User Manual and the PQLM packaging. However, as far as is permitted by applicable law, we disclaim all warranties, express or implied as to the accuracy of information contained herein.

# Vanguards Power, Power Optimisation Systems – Single & 3 Phase:



**PropSava 3 Phase SCR V User Programmable**



**PropSava 3 Phase SCR V User Programmable & TDS**



**LiteSava Single Phase SCR V User Programmable**



**PropSava Single Phase SCR V User Programmable**