



LiteSava[®] SCRV

Lighting Power Optimisation System

User and Installation Manual

Mark VII – User Programmable System

Single Phase 230V Units

20Amp, 30Amp, 40Amp, 60Amp, 80Amp and 100Amp



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January 2011 – V6.0

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Thank you:

Thank you for purchasing the LiteSava® Single Phase, Lighting Power Optimisation System. We believe it will provide you with many years of service and significant electric power savings.

Please read the following safety instructions and keep this User Manual available so that you can refer back to it at any time.

Description:

The LiteSava Single Phase SCR System is an automated hybrid voltage regulator and stabiliser; which uses solid state switches, transformers, sensors and control systems; managed by a state-of-the-art digital computer system. The LiteSava is connected after the electric meter and site/building Master Breaker Switch and before the Lighting Distribution/Fuse Box. All lighting power to a site/building passes through the LiteSava.

Safety Features:

The LiteSava has a number of standard safety features such as automated and manual By-Pass. By-Pass is the system that can either automatically or manually shut down the regulating operation of the LiteSava with immediate reconnection of input mains to output mains. Automatic By-Pass occurs when the LiteSava identifies incoming voltage or power outside its designed range or if a fault occurs on either the input or output side of the power supply. There are also internal computer systems that constantly monitor the LiteSava operational and maintenance status; and in the event of any fault the LiteSava will automatically sound an alarm and engage By-Pass.

Purpose and Intended Use:

The purpose of the LiteSava is to control incoming mains voltage to any lighting system and maintain the User programmed output voltage value at a regulated and stabilised value. To determine the power requirements of a site/building a minimum period of 1 (one) day of power quality logging is required at the intended site/building.

This power quality logging measures the minimum, maximum and average values of:

- Volts,
- Amps
- Kilowatts

The sites power usage logged during these 7 days is then checked against 12 months of Electric Bills. This 'check' is to ensure that the 7 days chosen as the logging week is an accurate indication of sites yearly power usage. These values of power quality are then analysed to determine which LiteSava Single Phase Systems matches the site/building power output profile. The regulated and stabilised output voltage level is determined by the User and their Installation Engineer at the time of installation. The LiteSava can be manually programmed for +/- 25% of the Input value of Voltage. This and other input and output parameters of operation of the LiteSava can be changed at any time by the User or their Installation Engineer.

Benefits:

Where sites/buildings experience main voltage delivery of over 220V, the electrical equipment is over-powered. Power is wasted and equipment suffers premature failure and reduced life expectancy. Sites/Buildings that have over-voltage supply will:

- Pay more than they need for electricity.
- Experience more electrical equipment breakdowns; higher levels of production loss and higher than normal labour costs for maintenance.
- Replace electrical equipment sooner; increasing the originally projected period for return on investment (ROI) of that equipment, especially in computer systems, lighting and UPS equipment.
- Increase CO₂ emissions and carbon footprint.
- Increase the Users liability for Carbon Taxes.

LiteSava Power Optimisation Systems are used for lighting system in virtually all forms of industry and commerce: telecoms, factories, offices, petrol stations, department stores, residential apartment blocks, leisure - anywhere that needs to maintain constant output voltage, save power, costs & protect equipment from premature failure.

Whatever value of main over-voltage entering the site/building, the LiteSava will always tightly control the User programmed output voltage setting to +/- 1.5 %. It is this powerful and rapid regulation of voltage, coupled with high quality components and build that delivers the significant power and cost savings to our customers.

LiteSava Unique Features:

The LiteSava Power Optimisation system allows the User to change and program:

1. Two levels of Output voltage – V1, to reduce the incoming main level to the first level of voltage reduction; then after the user set time has expired, a gradual reduction of voltage down to V2, the second lower level of voltage.
2. A timer to select the time needed to raise the lighting system to its operating temperature
3. Maximum Over - Voltage Limit
4. Maximum Under – Voltage Limit
5. Maximum Power Output Limit
6. Automated sensing system for additional light activation

Layout Front:

Display & Control Panel – LED Output readout. Open door for programming all input and output parameters.

Mains LED – when illuminated, main power is ON.

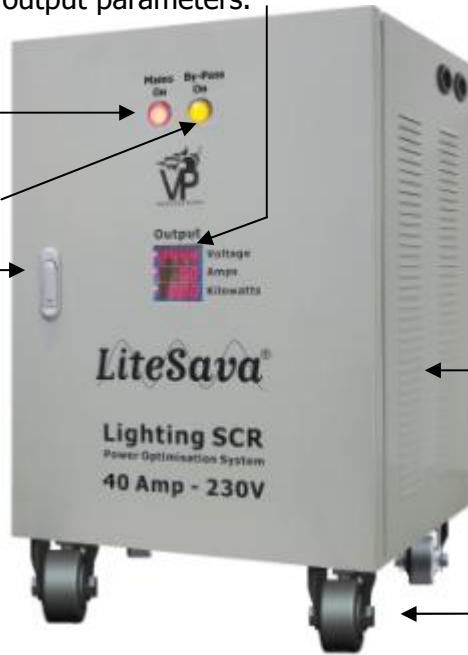
By-Pass LED – when illuminated, By-Pass state exists.

Door Lock Mechanism. Unlock to access Master Protection Switch and program section of the Display and Control Panel

Input & Output Main Cable Grommets. Entry for main incoming and outgoing cables.

Side Air Vents - to facilitate air flow cooling. Do not obstruct.

4 wheels – only fitted to 40 Amp units and above. 2 rear wheels bi-directional and 2 front fully directional with wheel locks.

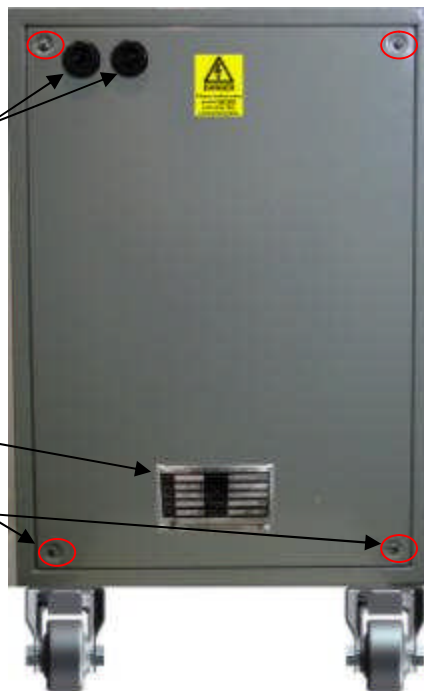


Layout Rear:

Cable Entry Grommets – Input and output cable entry points.

Manufacturers Plate – Identification of model type, power, volts, serial number and date of manufacture.

Rear Panel – Remove the 4 screws holding the Rear Panel to insert the input and output main cables into the front Terminal Connector.



Door Open Layout:

Master Protection Switch – protection circuit breaker for incoming mains power

Mains Power & By-Pass LED Lights

Display and Control Panel with Program buttons

Regulation ON and Manual By-Pass button



Product Package Contents:

- 1 x LiteSava – Available in various Amps sizes. Please see the rear of the unit for the Manufacturers Plate for specific information on power and voltage settings.
- 1 x User Manual

Safety Information:

WARNING:

The LiteSava is designed for use on lighting systems circuits **ONLY** and must **NOT** be used as a Voltage Regulator and Stabiliser for the entire property load. If used as such, the Warranty is void and we accept no responsibility for its use in such an unauthorised manner.

SAFETY WARNING – PLEASE READ:

The LiteSava **MUST** be installed by a **Qualified Electrician who holds nationally recognised qualifications for the installation of electrical high amperage mains equipment**. Failure to use a qualified and competent installer **can result in fatal injuries**. Be sure to turn off the mains power into the LiteSava before installing or servicing any LiteSava. Fire can result from loose electrical connections. Ensure that all connections are secure. **Local and National codes of installation and safety must be adhered to for the installation of the LiteSava**. If you do not know or are not familiar with local and/or national codes for the installation of high amperage mains equipment, please contact your local authority building inspector department for advice and/or guidance.

LIFTING WARNING FOR WALL MOUNTED VERSIONS:

The LiteSava 20Amp and 30Amp system can be floor or wall mounted. Please note that the LiteSava 20Amp weight is **50Kg** and the 30A **55Kg**. **Under no circumstances should a sole person attempt to fit the LiteSava 20A or 30A onto a wall or frame**. A minimum of 2 persons (we recommend 3 persons) will be needed to move and connect the LiteSava 20A or 30A to the wall brackets. **Severe injury** can occur if you attempt to fit the LiteSava 20A or 30A on your own. Please observe all local agency/Government advice on the safe method of lifting and moving heavy objects.

Connecting the LiteSava into Mixed Load Distribution/Fuse Board:

Where lighting systems and other electrical equipment are connected to the same RCB or fuse, a Qualified Electrician must decide if the ultimate lower voltage of the LiteSava will have a detrimental effect on the non-lighting electrical equipment. If so, then either the lighting system or the other electrical equipment circuit(s) – whichever is the most effective – should be moved/installed onto another Distribution/Fuse Board. If in doubt, please contact your local authority building inspector department for advice and/or guidance.

Safety Information Continued...

1. Please check that the voltage and power rating of the LiteSava matches the voltage and plus 20% load (in Amps) of the lighting system to be connected. The information as to the Voltage and Amp rating of the LiteSava can be found on the rear casing on the Manufacturers Plate. **There should always be 20% more Amp power of the LiteSava than the maximum requirement of the connected lighting system.**
2. Check the LiteSava for any obvious signs of damage from transportation. Nominal dents on the metal casing are acceptable but there must not be any damage to the Display and Control Panel and/or terminal plate.
3. Examine the intended site of installation of the LiteSava and ensure that the site has:
 - a) No water leakage, steam, oil-based dust and metal particles.
 - b) No corrosive, flammable, explosive liquid or gas.
 - c) Good ventilation.
 - d) Altitude: ≤ 2000 meters
 - e) Humidity: 0~95% (Not freezing point)
 - f) Ambient temperature: -15 - 50C
 - g) Has a clearance of 100mm above and below with 50mm left and right sides.
 - h) Has sufficient space to carry out a safe installation and maintenance.
4. Be sure to turn off the mains incoming power to the LiteSava before installing or servicing to protect you and the LiteSava.
5. Always isolate incoming mains power to the LiteSava prior to removing the casing.
6. Please ensure that the LiteSava mains breaker switch is in the **OFF** position prior to connection of the Input and Output connections.
7. Please keep connections runs to a minimum length; but allow enough cable to permit the inspection/maintenance of the stand-alone versions of the LiteSava.

Installation:

1. Identify all lighting circuits RCB/Fuses on the Distribution/Fuse Box.
2. Ensure that the LiteSava being used will match the total load in Amps of the lighting system **PLUS** 20%. E.g. if the total load of a lighting system is 32Amps, then the LiteSava must be capable of delivering 38.4Amps; therefore a 40Amp LiteSava should be fitted.
3. Identify what other electrical circuits/equipment (other than lighting) is also connected to that Distribution/Fuse Board.
4. Decide if the other electrical circuits/equipment will be adversely affected by the lower voltage to be used for the lighting system – the LiteSava can be User programmed down to 195V.
5. If any other electrical circuits/equipment may be adversely affected by the lowest voltage setting of the LiteSava, then those circuits (or the lighting circuits) will need to be moved to a separate Distribution/Fuse Box.
6. Decide where to locate the LiteSava.
7. Locations must be dry and free from any contaminants such as oil, fuels of any type, excessive dust, sand etc.
8. The 20Amp and 30Amp version may be wall mounted and are supplied with wall brackets. The other LiteSava versions are floor standing and fitted with lockable wheels.
9. Measure and prepare all cables runs with the correct sized cables.
10. Decide the best position for insertion of the power cables into and out of the LiteSava. The LiteSava has cable entry holes with grommets fitted to the top right and left-side top and right-side top.
11. Unlock the LiteSava door.
12. Remove the top Master Switch safety cover – See Figure 1.



Figure 1: LiteSava door opened revealing the Master Switch safety cover, the Display and Control Panel with the LED for mains power and By-Pass.

Installation Continued.....

13. Gently pull the connector block Plastic Cover away from the block – see **Figure 2**.

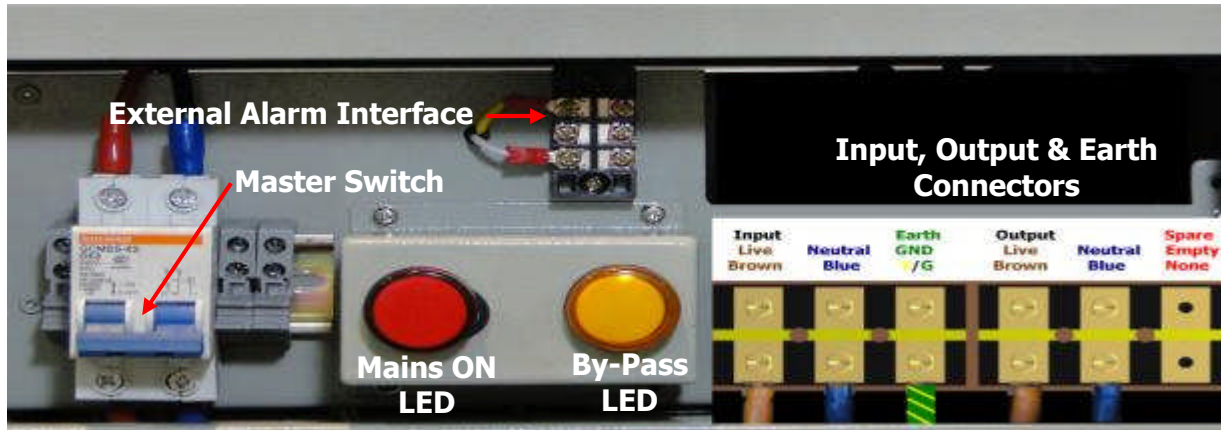


Figure 2: Top Master Switch safety cover removed showing the Master Switch, External Alarm Interface, Input and Output power cable connector block.

14. The LiteSava is equipped with an External Alarm Interface. The connector for your External Alarm System is located behind the Master Switch safety panel – see **Figure 2**.
15. Feed the Input and Output power cables into the selected entry points of the LiteSava.
16. Connect the input and output power cables of the LiteSava onto the correct terminal blocks of the LiteSava. Ensure that the correct size of power and earth cables are used – see **Figure 2**.
17. **Pay attention to the polarity.**
18. Isolate and disconnect all power to the Distribution/Fuse Board. **Follow all site and national safety codes.**
19. Disconnect the incoming power feed to the lighting system distribution/fuse board. Use this power supply as the incoming power feed to the LiteSava Input side. Use appropriate rated size cables which must be earthed in the manner prescribed by local codes. Please see wiring diagram.
20. The LiteSava Output side must be connected to the input power side of the Fuse/Consumer Board using the appropriate rated size cables; and must be earthed in the manner prescribed by local codes. Please see wiring diagram.
21. If you have used the rear entry cable holes for the 20A LiteSava, do not mount the LiteSava onto the wall brackets until you have tested the installation.

Testing the Installation:

IMPORTANT:

22. Prior to connecting power to the LiteSava, please ensure that the Master Switch is in the **OFF** position.
23. Use a multimeter or megohmmeter to check resistance between Input and Output terminals of LiteSava to earth and ensure that it is more than 1Mohm. If not, then check environmental Humidity conditions; check for dirty contacts, dampness around the terminal block and rectify prior to installation.
24. Please follow all local codes on cable sizes, however, we recommend the minimum sizes for the Input/output cable as shown below:

Load (KVA)	Input voltage	Output voltage	Maximum Current	Input/output phase cable	Ground cable
20A	220V \pm 15%	195/250 \pm 1.5%	22A	6mm ²	6mm ²
30A	220V \pm 15%	195/250 \pm 1.5%	33A	10mm ²	10mm ²
40A	220V \pm 15%	195/250 \pm 1.5%	44A	16mm ²	16mm ²
60A	220V \pm 15%	195/250 \pm 1.5%	66A	16mm ²	16mm ²
80A	220V \pm 15%	195/250 \pm 1.5%	88A	25mm ²	25mm ²
100A	220V \pm 15%	195/250 \pm 1.5%	110A	25mm ²	25mm ²

Wiring Diagrams:

Diagram 1: Existing Wiring Connection from Electric Meter to Distribution/Fuse Box.

Diagram 2:

LiteSava installed between the Electric Meter and Distribution/Fuse Box with other circuits that have electrical equipment that **CAN** work with voltage below 220V.

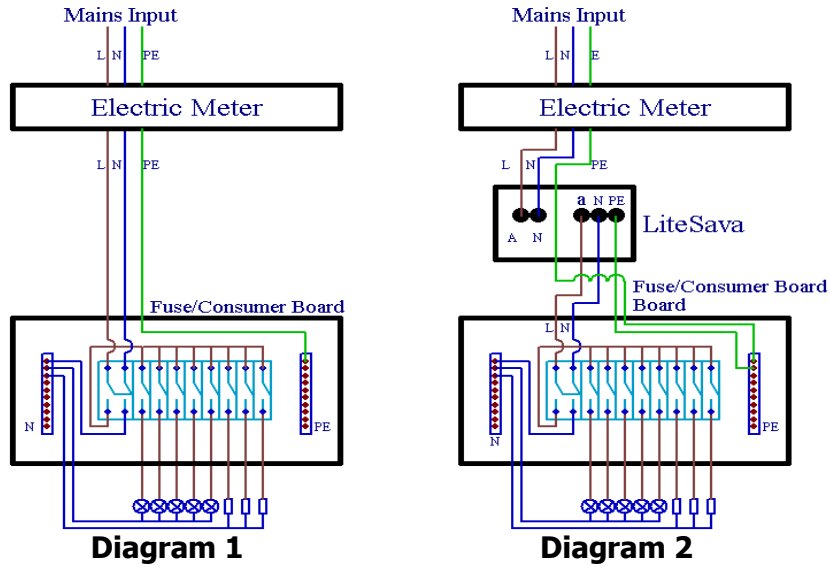
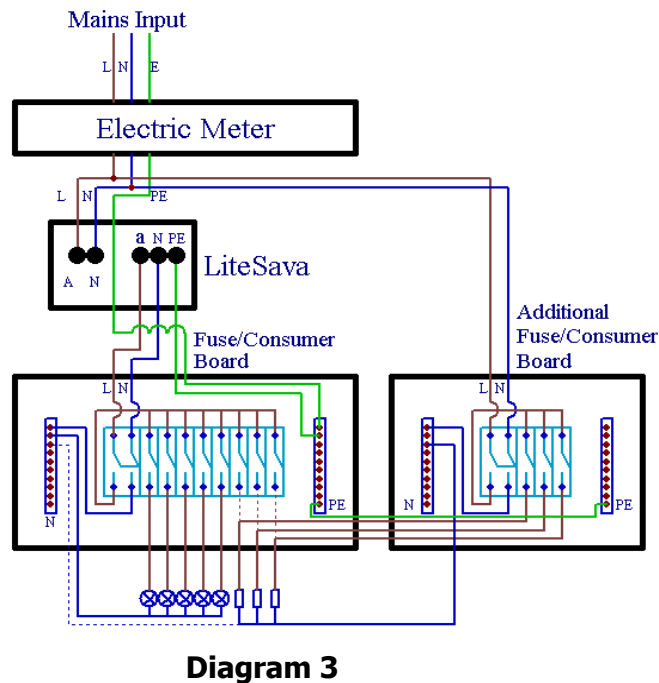


Diagram 3: LiteSava installed between the Electric Meter and Distribution/Fuse Box with other circuits that have electrical equipment that **CANNOT** work with voltage below 220V.



1st Post Installation Test – No Load:

1. Switch **OFF** the Master Switch of Distribution/Fuse Box and each sub-circuit RCB then switch **ON** the Master Switch of LiteSava. The LiteSava will default to **Regulation ON**
2. Check the LiteSava display panel to see that the **Regulation** LED indicator is illuminated. You should now see the regulated Output voltage of 220V +/- 1.5% (if still at the factory default setting).
3. Press the **R/B** button and check that the LiteSava switches to **By-Pass** mode. The red coloured LED next to the **By-Pass** button should illuminate. The Output Voltage LED display should now show the existing value of incoming mains voltage.
4. To re-start the LiteSava either:
 - a) Press **R/B** button on the Display/Control Panel again to place the LiteSava back to **Regulation** mode or,
 - b) Switch off the LiteSava Master Switch; wait 5 seconds and then turn ON the Master Switch again.
5. The Display/control panel output voltage should now be showing the regulated voltage of 220V (factory setting) or the value you have programmed +/- 1.5%.
6. Now switch **OFF** the Master Switch of the LiteSava to prepare for the 2nd Post Installation Test below.

2nd Post Installation Test – with Load:

1. Ensure that the Distribution/Fuse Box Master Switch is still **OFF**.
2. Switch **ON** the Master Switch of LiteSava. The LiteSava will default to **Regulation ON**.
3. Switch **ON** the Master Switch of the Distribution/Fuse Box and Switch **ON** the sub-circuit RCB's one at a time.
4. Ensure that the LiteSava does not show any faults or go to By-Pass.
5. If there is/are any faults shown on the LiteSava, please identify which LED's faults are indicated and contact Customer Support.

Service and Maintenance:

The LiteSava has no parts that need regular servicing and/or maintenance. However we recommend that annual checks for safety and performance are carried out by a qualified electrician. As an absolute minimum, we recommend that every 10 (ten) years of service the Control Board be inspected and tested for safety and/or performance.

Display & Control Panel – Description of Function and Controls:

LED Indicators

showing that the Output Screen is being displayed

Power Display Default Screen

Output Voltage

Output Amps

Output Kilowatts

LED Indicators

Manual By-Pass ON

Regulation ON

Event/Alarm LED Indicators

- ▶ OLP–Overload Protection-Event
- ▶ OVP–Over Voltage Protection-Event
- ▶ UVP–Under Voltage Protection-Event
- ▶ Message – An Event Has Occurred

1. Regulation ON OR Manual By-Pass ON
2. Enter
3. Up Arrow
4. Right Arrow
5. Display



Description of Function and Controls:

1. The **"R/B"** button has two functions; to switch on the regulation function of the LiteSava and also to manually turn off the regulation and place the LiteSava in **'By-Pass'**. **By-Pass** is the system of by-passing the LiteSava regulation system by directly connecting the incoming mains power to the outgoing mains without interrupt output. In the **By-Pass** state the LiteSava is live but it is not regulating the power (reducing or increasing the voltage). The **By-Pass** system also operates automatically when the Control System identifies either voltage or power above the safe settings of the LiteSava or if an internal fault is detected. This ensures that the LiteSava always supplies power to the property or site under any condition.

2. The **"Enter"** button has three functions:

- a) to enable the computer programming system when you want to start programming on a Display screen;
- b) to save the changes made to any settings in the various display screens into the computers program memory and;
- c) to open a special Display page that cannot be accessed by the **"Display"** button.

Description of Function and Controls Continued....

3. The "**Up Arrow**" button is used to scroll the number or value to your newly selected value on each of the LED screens. Repeated pressing of the **Up-Arrow** button will increase the value displayed in increments of 1. Stop pressing when you reach the value you require and then press **Enter** to store the new value.

4. The "**Right Arrow**" button is used to move the cursor to the next LED character to the right. Repeated pressing of the **Right Arrow** will move the cursor through each of the LED characters of each row of the LED screens. When you have moved the cursor to the desired character to change, use the **Up Arrow** to change the value and press **Enter** to memorise the changes.

5. The "**Display**" button changes the display panel. By changing the **Display** panel you can access the LED screens and make changes to the settings of the **LiteSava**. There are 3 display screens. Each press of the **Display** button will change to a different screen. After 60 seconds of non activity on that screen, the display will default to the **Power Display** screen.

How to Change LiteSava Settings:

1. All change of LiteSava settings must be made in **By-Pass** mode – Push **R/B** button and ensure that the **By-Pass** LED is illuminated.
2. Press the **Display** button to change the **Display** to either **Power**, **Protection** or **Output Setting** screens.
3. On the selected screen, press the **Enter** button. The first character on the top set of LED will now flash.
4. Use the **Up-Arrow** to change the character up. Keep pressing until you have arrived at the number you want. If you pass the character you wanted, keep pressing the **Up-Arrow** until you arrive at the number required.
5. If this is the only change you wish to make then press the **Enter** button to save the entry. If you wish to change further settings, use the **Right-Arrow** to move to the next character or next row of LED's.
6. When you have completed all your setting changes, please make sure to press the **Enter** button to save your new settings. If the **Display** screen changes to the Default screen (Power) and you have not pressed the **Enter** button your changes will not have been saved. You will then need to start again.

Power Display Screen:

Default Screen: Shows the Output Voltage, Output Amps and Output Kilowatts. You cannot change the values of the Power Display as these are the measured output values of your lighting system.

Output Voltage – as LiteSava is in By-Pass mode, this value shown on the image is the value of incoming main voltage. When NOT in By-Pass Mode, this value of voltage will show the output voltage set by the User +/- 1.5%.

Output Amps – The current used by the lighting system.

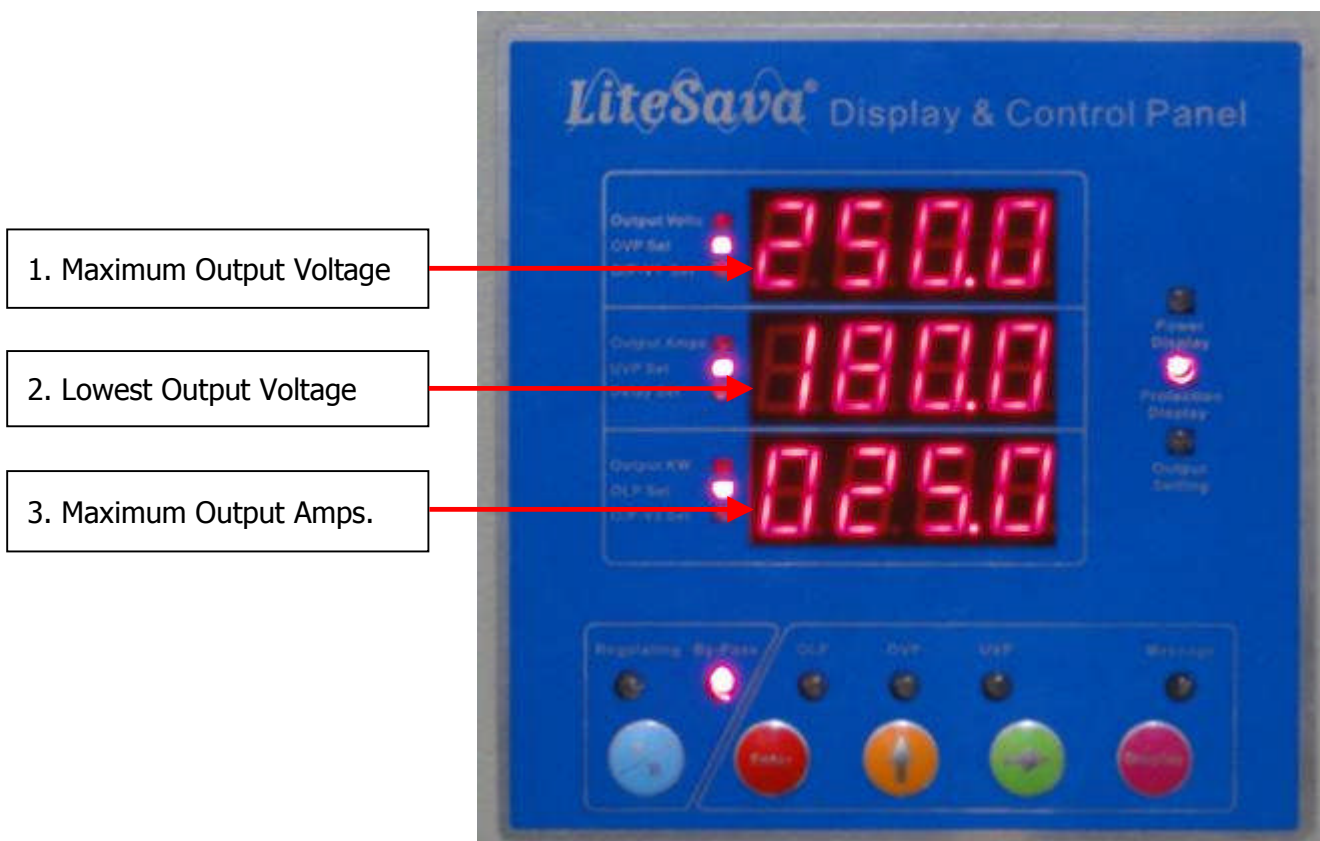
Output Kilowatts – The kilowatts used by the lighting system.



Protection Display Screen:

The Protection Display Screen shows the User settings of Maximum Output Voltage, Minimum Output Volts and Maximum Output Amps.

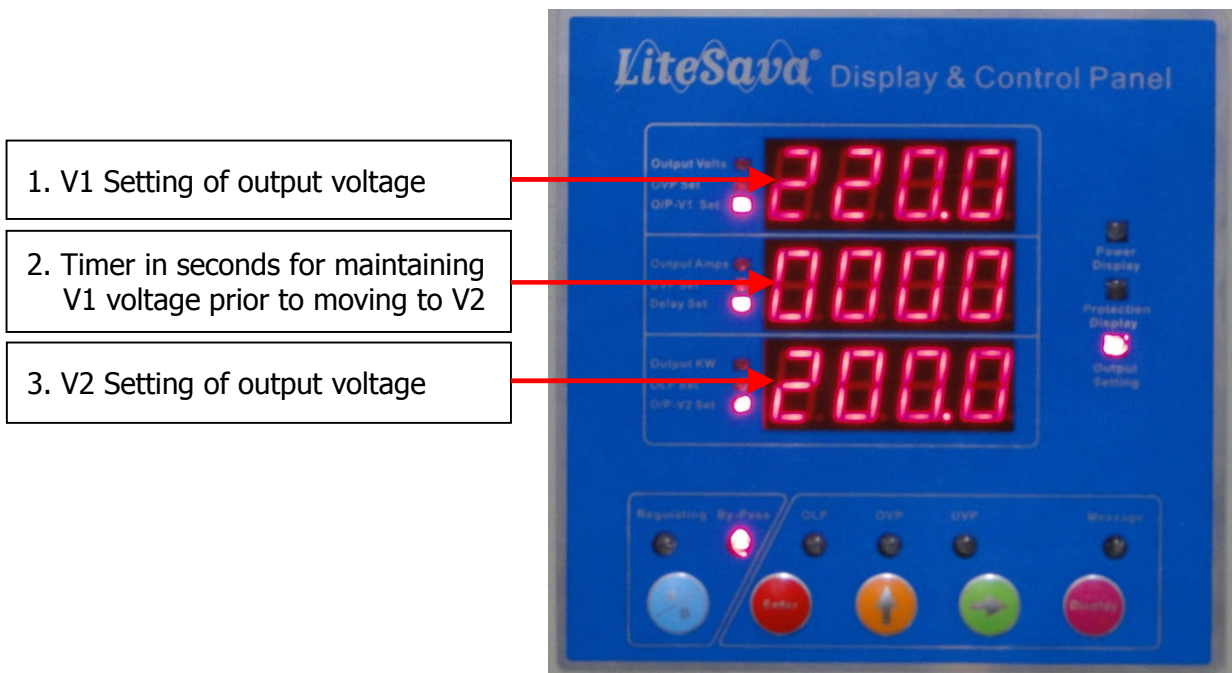
1. **Maximum Output Voltage – OVP Set:** Here you can change the Maximum Voltage level that you will allow for incoming mains voltage. Maximum voltage value is 253V. Factory default is 250V. Should the incoming mains voltage exceed the setting, the LiteSava will automatically go into **By-Pass** mode.
2. **Lowest Output Volts – UVP Set:** Here you can change the Minimum Voltage level that you will allow for incoming mains voltage. Minimum voltage value is 190V. Factory default is 190V. Should the incoming mains voltage fall below this setting, the LiteSava will automatically go into **By-Pass** mode.
3. **Maximum Output Amps – OLP Set:** Here you can change the Maximum output Amps of the LiteSava. The Maximum level is 10% more than the rated output power of the LiteSava. Factory default is +10% of the rated output Amps of the LiteSava. Should the site lighting system draw more than the setting, the LiteSava will automatically go to **By-Pass** mode.



Output Setting Display Screen:

The Output Setting Display Screen shows the User setting of the V1 Output Voltage, Timer for setting the lighting system warm-up time in seconds and the V2 Output Voltage setting.

1. **V1 Setting – O/P-V1 Set:** Here you can change the voltage value that the LiteSava will immediately regulate voltage to when powered on known as V1. Maximum voltage value is 250V but we recommend 230V as the higher normal limit. Factory default is 220V.
2. **Timer – Delay Set:** Here you can change the time needed to allow the lighting system to reach its manufacturers recommended operating temperature before the voltage is reduced to V2. The timer is in seconds up to 9,999 seconds. Factory default value is 60 seconds.
3. **V2 Setting – OLP Set:** Here you can change second level of voltage reduction. When the timing has expired to allow the lighting system to reach its correct operating temperature, the voltage reduction to V2 is enabled by the computer system at 1.5% of V1 setting every 15 seconds. Factory default is 200V.



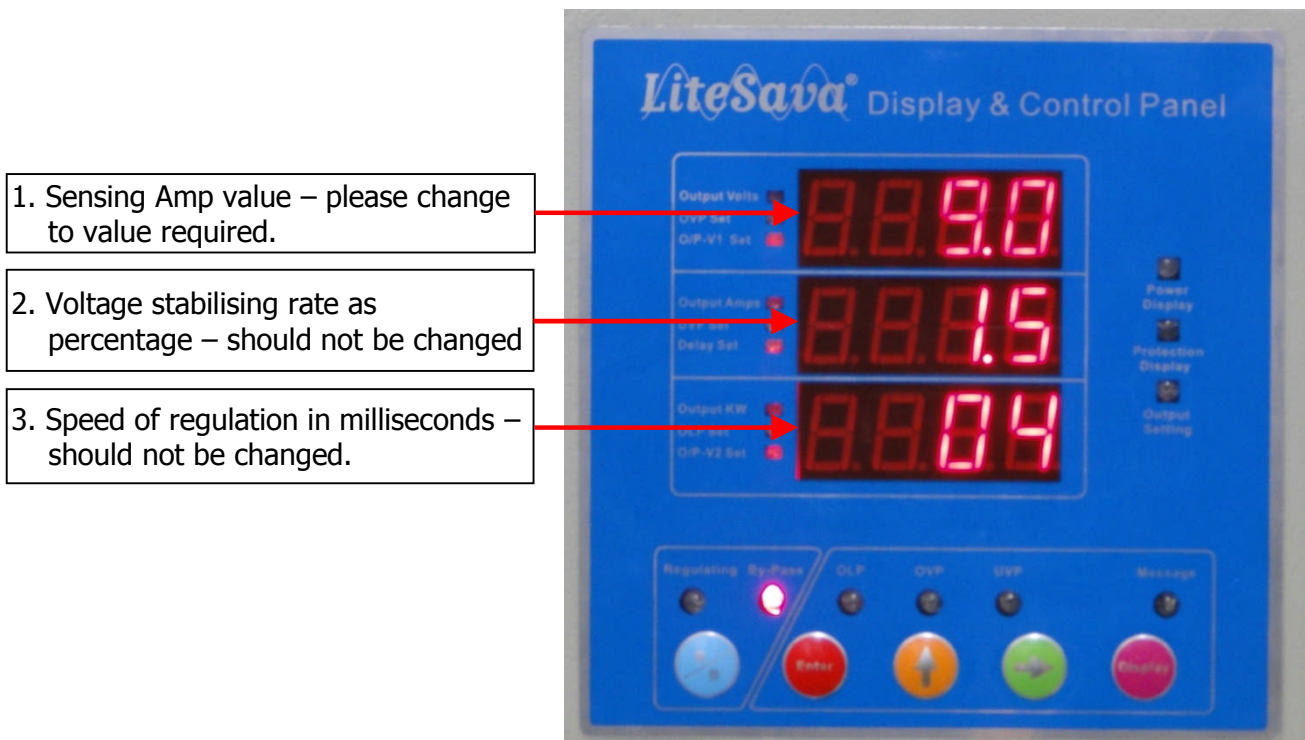
Sensing Amp Screen:

Sensing Amp Screen shows the User setting of the Sensing Amps, the voltage stabilising rate (cannot be changed, reference only) and the speed of the switching system in milliseconds (cannot be changed, reference only).

The Sensing Amp screen is accessed by holding down the **Enter** button at the default **Power Display screen**. When the Sensing Amp Screen is activated all other Display Screen LED will extinguish.

The LiteSava is equipped with an intelligent sensing system for additional lighting activation after V2 setting has been achieved. Should the newly activated lighting need the V1 voltage setting to either power-up or to reach optimum temperature setting, then the LiteSava will immediately switch to V1 voltage levels; then after the set timing has expired, the LiteSava will gradually reduce the voltage back to V2 set voltage levels.

This feature can be disabled by setting the Amp setting of the Sensing System to the highest setting (LiteSava models vary). The Factory default setting for this feature is 1Amp.



Events and Alarm Buzzer:

1. In the event of any of the settings being breached, the **By-Pass** will automatically be engaged,
2. The breached setting will be identified by one of the **Event/Alarm** LED being illuminated.
3. If the LiteSava **By-Pass** is automatically engaged an audible Alarm will activate.
4. If any internal fault occurs in the LiteSava including main control board failure, SCR, Transformer etc., the audible Alarm will sound.
5. **PLEASE NOTE:** The Alarm Buzzer will **NOT** activate if **By-Pass** has been activated manually.

Muting the Alarm Buzzer:

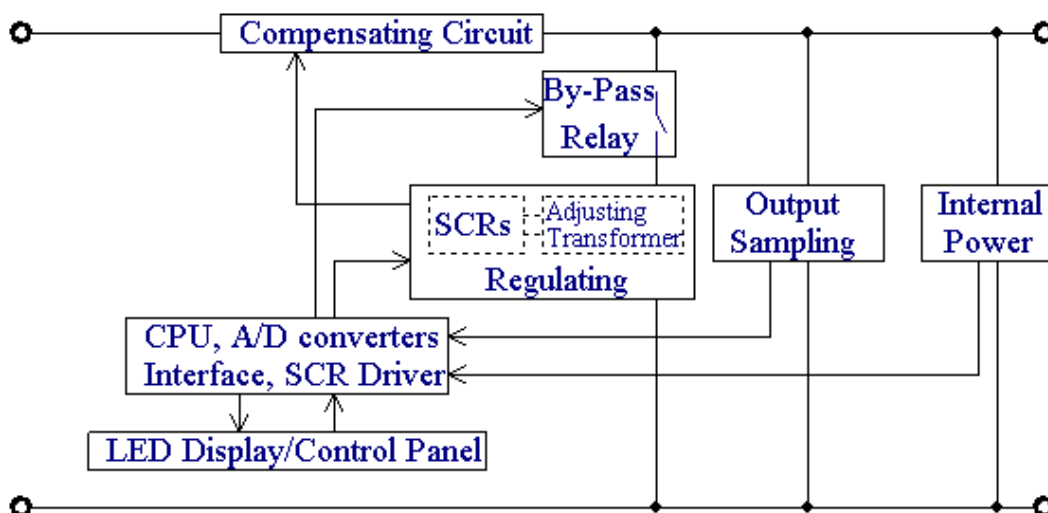
To access the Mute button for the alarm system you must first unlock the door of the LiteSava cabinet. Once open, to mute the Alarm Buzzer press the **Mute** button located between the Mains-ON LED indicator and By-Pass LED indicator near the Master Switch.

Resetting the LiteSava after an Alarm:

Providing that the reason for the engagement of the automated **By-Pass** state has been corrected, press the **By-Pass** button on the Display and Control Panel once to reset the LiteSava to Regulation mode. Normal regulation will restart if the fault has been rectified; if not the system will activate the Alarm Buzzer again and return to the By-Pass state. If this occurs, mute the Alarm Buzzer again and contact your installers/Distributor.

Working Principle:

1. Compensation unit consists of a compensating and regulation transformer with contactless switches (SCR's).
2. Sampling circuit consists of output voltage/current sampling with Voltage and Current sensors
3. Master control board consists of CPU, interface, SCR drive circuits, internal Power Regulation etc.
4. Display/control panel consists of LED display, buttons and interface ICs.



Power Quality Management System (PQMS):

This optional system is available on Vanguards Power single and 3 Phase PropSava and LiteSava products.

PQMS consists of a smart metering system with management software.

PQMS software is a Windows-based application primarily used to configure and retrieve data from the metering system. This software allows Users to see current and past power quality readings with customisable displays, presented as tables or as graphs.

PQMS provides multi-users with seven access levels. Wizards enable easy set up of common operational functions like adding and changing sites/VPHK Systems, reading files, task files, schedules and system information.

PQMS displays instantaneous power quality readings which are stored in the database for analysis at any time.

- Configuration of a single or multiple VPHK Systems.
- Real time display of voltage, current, Kilowatts, power factor, waveform, harmonics, alarms etc.
- User access levels: Read Only Access (RO), Read & Write Access & Read, Write & Modify.
- Data retrieval (event logs, alarm logs, sag/swell logs, tamper logs) to generate reports.
- Schedule downloads of historical data on a daily, weekly, fortnightly, and monthly basis.
- Data export to OLEDB/ODBC databases for storage and management.
- Customisable features and menus.
- Device/meter communication options such as TCP/IP, UDP/IP, RS485/232, PLC, GSM/GPRS.
- Supports multiple languages

Benefits for Users:

- Management in 'real-time' of entire site(s) energy usage.
- Comparison of energy usage to calculate where savings can be maximised.
- Equipment Failure Alarms- Instant knowledge of problems site(s) wide.
- Time of Use – Identify where energy is used at different times of the day, week or year.
- Multi Metered Sites- To compare which sites perform the best in energy savings and use.
- Use collected data to construct a full energy saving plan to cut costs.
- Accurately show energy savings for Carbon tax credits.

Power Quality Management System (PQMS) – Continued...

Meter Positioning:

The meter is positioned/mounted in various positions in the single and 3 Phase PropSava and LiteSava. Below we show the position in a 3 Phase PropSava SCR series, mounted in the lower part of the case.



PQMS meter mounted inside 3 Phase SCR PropSava



LAN/P.C - External connection – lower rear left case on a 3 Phase PropSava.

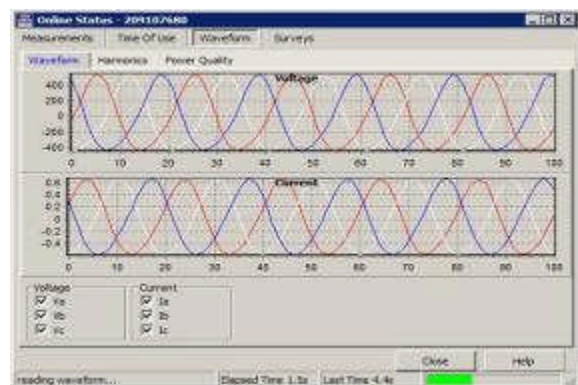
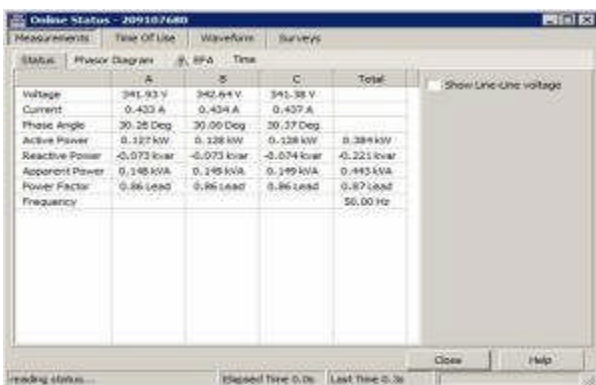
Connectivity:

Connectivity comes in the form of a J45 connection allowing for direct connection to a LAN network. Alternatively a USB connection can be fitted for use with a Laptop.

An optional Dynamic or Permanent GPRS system can be used for a full wireless network. This will require a GPRS enabled modem with a GPRS connection that uses a fixed IP based system.

Software Application:

PQMS software is a 32 bit Windows-based application primarily used to configure and retrieve data in a user-friendly manner from the metering system. It can keep track of single or multiple meters spread across multiple sites. This software allows Users to see current and past power quality readings with customisable displays, presented as tables, waveforms or as graphs.



Example Screens, showing on line readings in a table and waveform format.

The PQMS software is provided with a Tutorial section enabling the user to familiarise themselves with all applications; from setting up the meter to customising the relevant data required for live applications and historical records.

Power Quality Management System (PQMS) – Continued...

Security:

Security is controlled by PQMS using usernames and passwords on a meter by meter basis. When PQMS loads it prompts for a username and password.

The meter allows for up to six (6) users, before any operations can be performed a user must log on. Each user has a user name and password, each up to 7 and 15 characters long respectively. The user remains logged on until logged out.

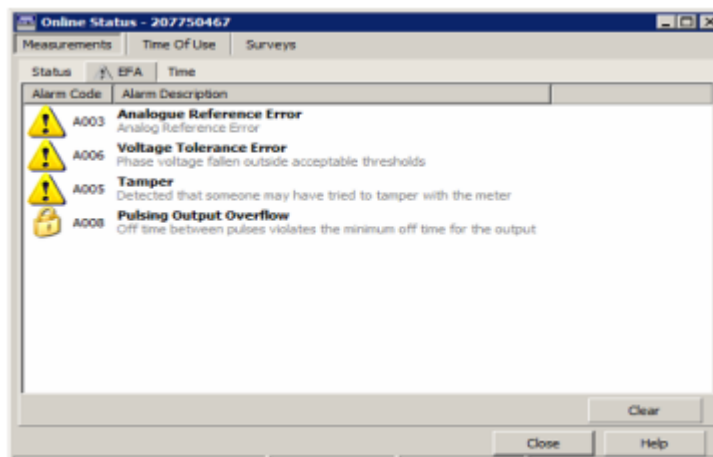
Each user has a user level security access to the system subject to Administrator given rights. There are 7 user levels of security numbered 0-6 as outlined below with 6 being the highest level of access.

Number	Access	Description
0	Read only	Only allows values to be read
1	Read All/ Limited Timeset	Also allows the time to be set by a limited amount, as per the shift limit setting.
2	Read All/Billing Reset	Also allows a billing reset to be performed.
3	Read All/Clear	Clear EFA alarms, surveys and other systems. Control user programmable pulsing outputs. Unlimited timeset ability.
4	Read All/+Setup/ Write User	Allows the setup to be read, and allows limited setup change. Added in firmware version 1.27
5	Read All/+Setup	Allows the setup to be read, but not written.
6	Read/Write All	Allows the setup of the meter to be changed.

The seven levels of User Security Rights which are set by the Administrator

Alarms:

During operation the metering system monitors a variety of external and internal conditions. If a problem is detected an alarm is raised called an 'Equipment Failure Alarm' or EFA. These tests are designed to detect measurement failure, tampering attempts and hardware failure.



Power Quality Management System (PQMS) – Continued...

There are 17 alarms each representing a different fault. Each alarm has a corresponding flag letter that represents it.

Flag Letter	Alarm Name	Alarms Page Code
E	Analog Reference Failure	A003
S	Asymmetric Power on Mk10 Neutral current Mismatch on Mk7	A000
V	Voltage Tolerance Error.	A006
F	VT Failure.	A007
R	Incorrect Phase Rotation. (not on Mk7)	A002
T	Lid Tamper	A005
C	Clock Failure.	A017
M	Reverse Power.	A004
L	Calibration Data Lost.	A001
H	Modem Failure.	A012
X	RAM Failure or LCD Failure.	A015
Y	Program Flash Failure.	A015
Z	Data Flash Failure.	A015
N	Pulsing Output Overflow.	A008
D	Battery Failure	A016
U	Tamper	A005
O	Overcurrent (Extra EFAs group)	

Alarm names and Flag letters

An Alarm Flag can have one of 3 states. The Active state means that the alarm has been detected and is still occurring. The latched state means the alarm was active but is not active now. The inactive state means the alarm is not active and has not been in the past.

Event Logs:

The PQMS keeps a record of a variety of events that occurs to the Meter. The size of these logs may be configured.

Log Name	Description
System Log	Used for system events like power on and off.
Access Log	Used to track user accesses to the meter.
Tamper Log	Records when tamper events occur. (Also used as LCD Alarm LOG for UPS meters, and previously was used as a billing reset log)
Sag/Swell Log	Records Sag and Swell events.
Debug Log	Only used for diagnostics. Also used as the Push Alarm log for UPS meters and meters with Push alarming enabled.

Event Log Types

Power Quality Management System (PQMS) – Continued...

Event logs can be downloaded as a text file. Each file has a unique number starting from when the meter was started, which is only reset if a survey is cleared. Each Log can be cleared individually.

[LoadSurvey]

LastRecord=0000000061

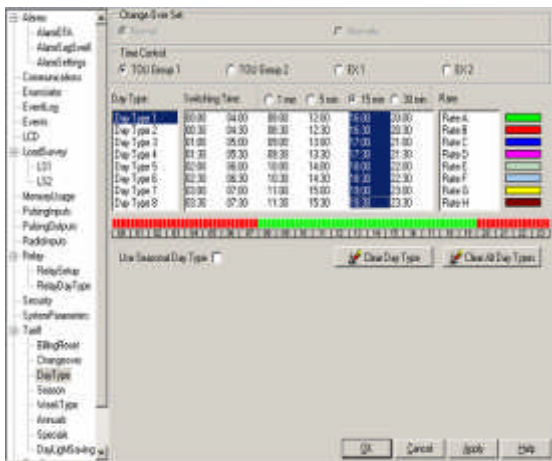
StartTime=01/01/1996 00:20:50

Record No	DateTime (0x0000F03D)	Event (0x0000FFFF)
34	01/01/1996 21:39:50	User: 1 changed database stage: Misc=>2041
35	01/01/1996 21:39:55	User: 2 changed database stage: Pulse=>2042
36	01/01/1996 21:39:57	Log off port: Optical=>2081
37	03/01/1996 07:56:58	User: 0 logged in on port: Optical=>2000
38	03/01/1996 07:56:58	Bad password on port: Optical=>2080
39	03/01/1996 07:56:58	User: 0 logged in on port: Optical=>2000
40	03/01/1996 07:57:28	Inactivity timeout on port: Optical=>2082

Downloaded Event Log

Time of Use (TOU) Channels:

An energy quantity such as KW/h is recorded in a TOU channel. Each TOU channel records both accumulated energy; the maximum demand; and the time maximum demand occurred. It can record these quantities separately for different times of the day, week, seasons, special periods, and year. Hence the term 'Time of Use'. The calendar allows different rate structures for different days of the week and for different special days during the year. It can take account of seasons or complete customised rate conditions.



Day type TOU set up



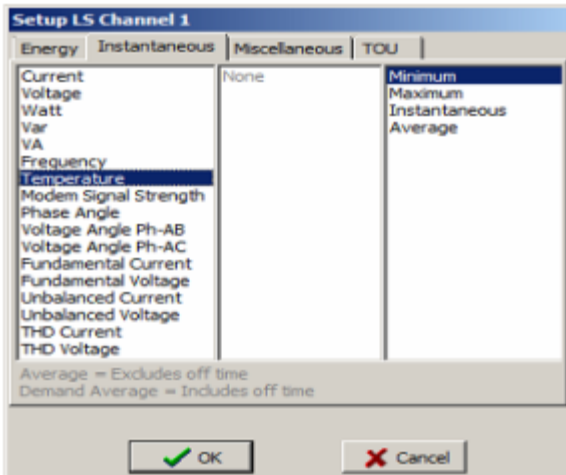
Week type TOU set up

Power Quality Management System (PQMS) – Continued...

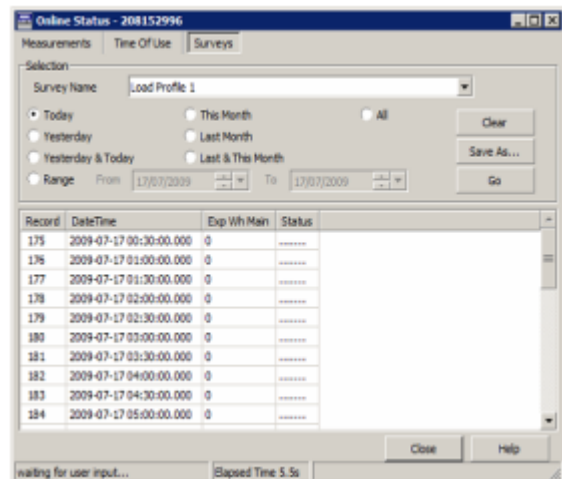
Load Survey:

A load survey is designed to give a detailed record of energy usage. PQMS has two load surveys available each independently programmable and each can record up to 32 channels. The load surveys in PQMS also have the ability to record instantaneous figures such as voltage and current. Load Surveys can be downloaded as text files, similar to Event Logs.

The Load Survey on line status screen allows periods of time to be downloaded or entire surveys.



Instantaneous Channel selection



Load Survey On-Line Status

LiteSava Specifications:

Regulation:	Digital control contactless (SCR) compensation regulation
Max. Output Amps:	20A, 30A, 40A, 60A, 80A, 100A
Phase:	Single Phase
Mounting:	20A and 30A type are designed for wall mounting, 40A to 100A type are floor standing with four wheels.
Input Mains switch:	Air - break switch for input control and short load protection.
Input voltage:	150V to 265V AC 50Hz/60Hz. Total input voltage range is +/-25% of output voltage.
Output Voltage:	195V to 230V, 50Hz /60Hz. Adjustable by 1.5% per step.
Output Voltage Stabilisation:	$\leq \pm 1.5\%$
Efficiency:	$\geq 98\%$
Wave distortion:	$\leq 0.4\%$
Response time:	$\leq 40\text{ms}$
Output voltage control:	<p>Output Voltage is set by the User. There are two setting for Output Voltage – V1 and V2. V1 is the immediate regulated voltage level achieved after switching on the LiteSava. V2 is a User voltage setting below V1 level which is achieved after the time (also set by the User) has elapsed. The timing set by the User at V1 is to allow for the site connected lighting system to achieve operating temperature prior to being reduced to V2. The reduction in voltage from V1 to V2 occurs at the rate of 1.5% of V1 value every 15 seconds.</p> <p>The default factory setting for V1 is 220V and V2 is 200V. Timer default factory setting is 30 seconds.</p> <p>Other User settings for the control of Maximum and Minimum Output Voltage. If these settings are exceeded the LiteSava will automatically engage By-Pass.</p>
Display and Control Panel:	There are 3 Displays accessed by using the Display button; Power Display (default screen), Protection Display and Output setting. Each of these displays has an LED screen of which the User can change the values using the Control Panel Keys. There is an additional screen accessed by using the "Enter" key to access the Sensing System of the LiteSava.
LED indicator:	1. Mains power ON - Red LED
	2. BY-pass On - Yellow LED - illuminated when LiteSava is in either manual or automatic By-Pass mode.
Cooling:	Natural Ventilation and fan cooling of SCR and Heat sink.
Working temperature:	$\leq 65\text{C}$

LiteSava Specifications Continued.....

<p>By-Pass Alarm/Mute (optional):</p>	<p>There are two alarm systems and mute switch. Both alarm systems are activated when the LiteSava enters By-Pass mode.1. Internal alarm and mute switch: When the LiteSava is in By-Pass mode, the By-pass LED indicator illuminates and the alarm is activated. The mute switch will silence the alarm although the By-Pass LED will still remain illuminated until the By-Pass status has been corrected. 2. External alarm and mute switch. All LiteSava’s are fitted with a terminal for the wiring of an external alarm and light. You may purchase the optional flashing light and alarm with mute switch if required.</p>					
<p>Output Voltage Protection functions:</p>	<p>1. Surge Protection Device – (optional) 2. OLP (Over Load Protection): If output current exceeds 120% (or below by User Setting) of maximum rated current for 20 seconds, then system will automatically enter By-Pass state and activate the alarm. 3. OVP (Over Voltage Protection): If output voltage is above 250V (or below by User Setting) maximum for 10 seconds the system will activate automatically By-Pass and activates the alarm. 4. UVP (Under voltage Protection): If output voltage is under 190V (or under by User Setting) for 10 seconds the system will automatically enter by-pass state and activate the alarm. 5. Manual By-Pass button – no alarm activated 6. Automatically engagement of By-Pass due to internal or external fault with alarm activation.</p>					
<p>Ambient temperature:</p>	<p>-15 - 40C</p>					
<p>Humidity:</p>	<p>0~95% (Not freezing point)</p>					
<p>Case:</p>	<p>IP22 Type. Lockable front cabinet door with inspection windows.</p>					
<p>Casing colour:</p>	<p>Light grey with LiteSava Logo and VP Logo</p>					
<p>Cable location:</p>	<p>Incoming and outgoing cable connections to be from top and top rear and top of side of casing. 32MM holes with rubber grommets. Connections by cable eye terminal.</p>					
<p>Life:</p>	<p>Minimum of 10 years up to 20+ years subject to 10 year service intervals</p>					
<p>Cabinet Size (HxWxD cm include wheels) CM:</p>	<p>20A</p>	<p>30A</p>	<p>40A</p>	<p>60A</p>	<p>80A</p>	<p>100A</p>
<p>Approximate Weight KG:</p>	<p>62x45x26</p>	<p>62x45x26</p>	<p>75x40x36</p>	<p>75x40x36</p>	<p>85x40x36</p>	<p>85x40x36</p>
<p>Approximate Weight KG:</p>	<p>50</p>	<p>55</p>	<p>60</p>	<p>70</p>	<p>80</p>	<p>100</p>

Surge Protection System – Optional extra requested at time of order:

Overview:

Surge arrestors protect site/properties electrical equipment. Surges are short-duration peak voltages – i.e. transient voltages – existing for only milliseconds; but can measure thousands of volts.

These surges are caused by:

1. Direct lightning strikes
2. Indirect lightning strikes within a distance of some kilometres
3. Switching operations in the power supply system
4. Faults due to switching operations within the installation

LiteSava-Single Phase Standard Surge Arrestor installed V 20-C/1+NPE-280 technical data:

Note: alternatives such as ABB, DEHN, PHOENIX, Schneider maybe used without notice.

Surge Controller surge arrester Description	V 20-C/1+NPE-280
Maximum continuous operating voltage U_c	280 V \sim
LPZ	1 \rightarrow 2
Requirement class to VDE 0675, Part 6 (Draft 11.89) A1, A2 to IEC 61643-1	C Class II
Tested to:	IEC 61643-1, pr EN 61643-1, E DIN VDE 0675-6:1989-11 and Part 6/A1
Nominal discharge current of the upper part I_n (8/20)	20KA
Maximum discharge current of the upper part I_{max} (8/20)	50 kA
Voltage protection level at 1 kA (8/20) U_p at 5 kA (8/20) U_p at I_n U_p	≤ 1.2 kV ≤ 1.5 kV ≤ 1.8 kV
Response time T_a	<25 ns
Short-circuit withstand strength 25 kA with max. upstream fuse	125 A gL/gG
Connection cross-section	2.5-35 mm ² (single and multi stranded); 2.5-25 mm ² (fine-stranded with core end sleeves)
Mounting	Snap-fitting on 35 mm top-hat rail to DIN EN 50 022
IP Code	IP20
Temperature range ϑ	-40 °C to +80 °C

LiteSava Fault Finding and Recommendations for Electricians ONLY:

NOTE: In the unlikely event of any fault developing on the LiteSava, the automated **By-Pass** system will be engaged and the electrical power from the mains supply will be diverted **DIRECTLY** to the Fuse/Consumer Board. The User of the LiteSava may be able to restart the LiteSava by turning the Master Switch of the LiteSava Off then On. If this does not restart the LiteSava –please call your service centre and/or the installing Electrician.

WARNING:

DO NOT ATTEMPT, UNDER ANY CIRCUMSTANCES, TO REMOVE ANY WIRES AND/OR PANELS OF THE LITESAVA. ALL THE CONTROLS OF THE LITESAVA ARE EXTERNAL THAT CAN BE OPERATED BY THE USER. ALL OTHER EXAMINATION OR WORK MUST BE CARRIED OUT BY A QUALIFIED ELECTRICIAN. FAILURE TO OBSERVE THIS WARNING MY RESULT IN SERIOUS INJURY FROM ELECTROCUTION AND MAY BE FATAL.

Fault Description:	Reason:	Recommendations:
No operation	1. No power 2. Master Switch not in on position 3. Shut down	1. Check the input cable connection and input voltage 2. Switch on Master Switch. 3. Intermittent high load or short circuit event. The LiteSava has shut-down. Reset the Master Switch.
By-Pass LED On.	4. Over load 5. Fuse blown 6. Over Voltage/Under voltage output limit exceeded.	4. Check lighting system load for short circuit or over load. 5. Contact Customer Support to arrange for replacment fuse. 6. Check the User setting of input and output voltage.
No Display	7. Loose connection from main control board 8. Main board power failure	7. Check connection. 8. Check power supply.
Relay Noise	9. Incoming voltage too low	9. Check User setting for input voltage

Declaration of Conformity:

The Manufacturer of the Products covered by this Declaration is:

Vanguards Power (Hong Kong) Limited
1508 Eastern Tower, Yihai Square,
Commercial Building
North Chuang Ye Road, Nanshan, Shenzhen.518054, China

Company Registered in Hong Kong Number: 1125122

The Directives covered by this Declaration:

Council Directive 89/336/EEC and LVD Directive 73/23/EEC, including amendment 2004/108/EC and 2006/95/EC-Council Directive Amending Directives.

The Products Covered by this Declaration is the LiteSava® 20A, 30A, 40A, 60A, 80A and 100A Lighting Power Optimisation System.

The Basis on which Conformity is being declared:

EMC Test Standards:	EN61000-6-1:2007 and IEC 61000-6-1:2005
	EN61000-6-3:2007 and IEC 61000-6-3:2006
	EN61000-3-2:2006 and IEC 61000-3-2:2009
	EN61000-3-3:1995+A1:2001+A2:2005 and IEC 61000-3-3:2008
LVD Test Standards:	EN61558-2-12:2002 and IEC 61558-1:2005/A1:200
	IEC 61558-2-12:2001

The manufacturer hereby declares under his sole responsibility that the products identified above comply with the protection requirements of the EMC directive and with the principal elements of the safety objectives, and that the standards have been applied.

The technical documentation required to demonstrate that the products meet the above requirements has been compiled and is available for inspection by the relevant enforcement authorities. The CE mark was first applied in July 2010.

Warranty Terms & Conditions

1. These Terms and Conditions do not affect your statutory rights.
2. Please check the LiteSava package and contents as soon as possible. If the LiteSava or any other item included in the package is damaged or faulty, you must inform your supplier immediately or at the latest within 7 (seven) days of the date of purchase. If the supplier you purchased it from does not offer an exchange and/or replacement service, we will arrange collection and replacement at our cost. If you do not inform us within 7 days we shall have no liability for the LiteSava said to be damaged and/or items missing at time of purchase.
3. Vanguards Power (Hong Kong) Limited, hereafter referred to as "VPHK" guarantee that the LiteSava will be free from defects for 10 (ten) years from the date of purchase, subject to completion, supplier stamping and the registering with VPHK of the attached Warranty Card. If no Warranty Card is registered with VPHK within 3 months of the date of installation, the LiteSava will be warranted for 1 year from date of installation. If LiteSava does not conform to this Warranty then we will at our option either remedy the defect in question or replace the LiteSava, or refund the price paid, subject to sight of the original receipt from the supplier where it was purchased.
4. Subject to registration of the completed and supplier stamped Warranty Card, the first 10 (ten) years of Warranty covers parts and labour. The warranty period commences on the day of successful installation by a qualified electrical Engineer. 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 and transportation may also be made.
5. The purchaser must ensure the environmental and power supply conditions are suitable for the LiteSava and that the LiteSava is cared for and maintained in accordance with the recommendations stated in this User manual.

Exclusions to the Warranty:

6. Breakdowns or failures arising from any external influences such as misuse, neglect, accidental damage, inadequate ventilation/temperature control of the area of installation, harmonic wave distortion, power factor below 0.8, short circuits, loading to the LiteSava 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.
7. Purchaser's consequential loss or liability of any kind.
8. We do not accept liability for returns damaged in transit or not received by us.
9. Every care has been taken in the preparation of all and any details or statement made in this User Manual and the LiteSava 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.

The Range of LiteSava Single Phase Power Optimisation System:



Warranty Card: Please complete all sections.

Amp Size: _____ Voltage Rating: _____ Serial Number:

Date of Installation: _____ Installer/Engineer Name: _____

Installer/Engineer Company Name: _____

Installer/Engineer address: _____
_____ Country: _____

Installer/Engineer Statement: I confirm that the above stated LiteSava has been installed in accordance with current building and electrical code(s) of safety and conditions specified in the User Manual for such products. Signed: _____ Dated: _____

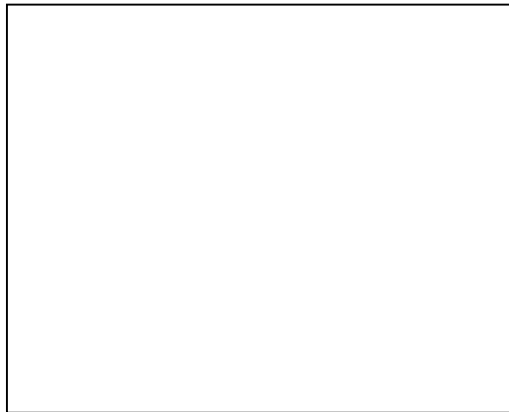
Name of Customer or Company: _____

Name of Contact: _____ Telephone (Incl. Country code): _____

Address of installation: _____
_____ Country: _____

Distributor Name: _____

Distributor Stamp:



Dated: _____ Signed on behalf of authorised Distributor: _____