SELECTRONIC

Instruction Manual for SP LINK Configuration and Monitoring

User | Installation | SP LINK | Service

Contents

SP LINK

Using This Manual

While every attempt has been made to ensure this manual is as self explanatory and clear as possible, there are some technical issues and safety warnings that require thorough understanding. It is extremely important that you and your integrator/installer follow all of the instructions set out in this document; failure to do so may void your warranty and stop you from gaining the full benefits that we know this product can provide.

A PDF copy of this manual may be downloaded from the Selectronic web site www.selectronic.com.au and is also included within the Help menu of the SP LINK software.

You will notice that throughout the manual these symbols will be repeated. These symbols are very important.

This symbol indicates danger. Failure to observe this warning may result in serious injury or death, loss of property or damage to the power system.

This symbol is used to draw attention towards information that will assist you in making full use of your system or gives notice to information which may not seem immediately apparent.

Using SP LINK

Overview

“SP LINK is the pathway to the real power of your SP PRO”

SP PRO is really many products in one. You can simply unpack the unit, mount it on a wall, connect the appropriate cables – and you’ve got power using the following default settings;

- Off Grid
- AC Source size is equal to the power output of the SP PRO model you are using
- Sealed Batteries
- No State of Charge readings, voltage only.

To go further and unlock the true power of the SP PRO unit, you will need to load the SP LINK software (found on the supplied USB stick) onto your PC computer. We strongly suggest these steps are done before heading to the installation site.

System Requirements for SP LINK

The system requirements include:

PERFORMANCE REQUIREMENTS:

- Microsoft Windows XP SP3 / Vista / 7. Other operating systems not supported.
- 30 MB hard disk space
- If Microsoft .NET 4.0 Framework is not already installed then approx. 850 MB of additional disk space will be required.
- Adobe Reader - 100 MB hard disk space
- 1 GHz Pentium or faster processor.
- 512 MB RAM
- USB Port

PERFORMANCE VIEWER REQUIREMENTS

Microsoft Office 2003 or later

Glossary of Terms

Terms used within this manual

DC Coupled system	Refers to when the Solar is connected to the DC side of the inverter system through a Solar Controller.
AC Coupled system	Refers to when the Solar is connected to AC Side of the inverter system via a separate Grid Tie inverter.
Solar Hybrid	Refers to a system which is connected to the electricity grid and also utilises batteries in the system.
AC Source Power.	The primary AC input that is connected to the SP PRO, e.g., Grid, Auto start Generator, Shore
Site File	An SP LINK file which is set up for each and every site that you will need to connect to.
Configuration File	Effectively a subset of a Site File which contains all of the settings that you want to load into the SP PRO
Solar Array	A collection of Solar Panels.
State of Charge	(SoC) Referring to the battery condition. 80% SoC means the battery is 20% from full.
Sealed Battery	A lead acid battery with no access to the electrolyte - either valve regulated or gel. No hydrogen gas discharge during normal operation.
Flooded Battery	A lead acid battery with access caps for maintaining the electrolyte - replacing water lost during recharge operations. Hydrogen gas discharged during normal recharge operation.

Getting Started with SP LINK

You will find SP LINK and other helpful documents contained on the USB stick supplied with your SP PRO, it is good practise to check at www.selectronic.com.au/sppro/splink.htm for the latest version of SP LINK.

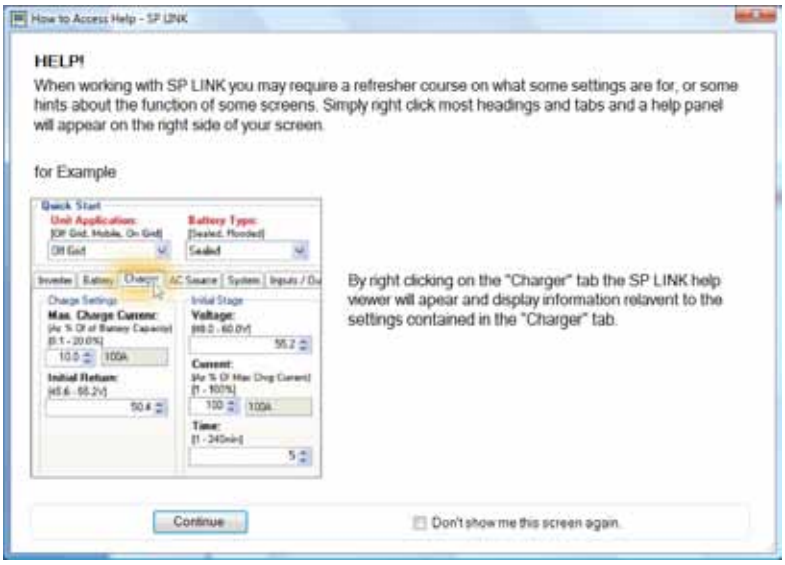
After loading SP LINK onto your computer, you can now begin to use SP LINK. However, we do warn that to achieve the best result out of your system, configuration should be done by an experienced system designer. For maximum warranty in Australia, you will need to employ the services of an SP PRO Accredited Integrator. For full warranty terms and conditions please see the warranty supplied with your SP PRO inverter.

To get started, you do not have to be connected to an SP PRO inverter. Once you have loaded SP LINK onto your computer, you can pre-configure and store on your computer the site information and SP PRO configuration settings. These are then ready to transfer into the SP PRO inverter when you get to site and the SP PRO is installed.

When you first open SP LINK, the Splash screen will appear. Once SP LINK has loaded, the screen will disappear. To permanently disable this screen from being displayed, click on the tick box “Hide this screen on start up”.

HELP!

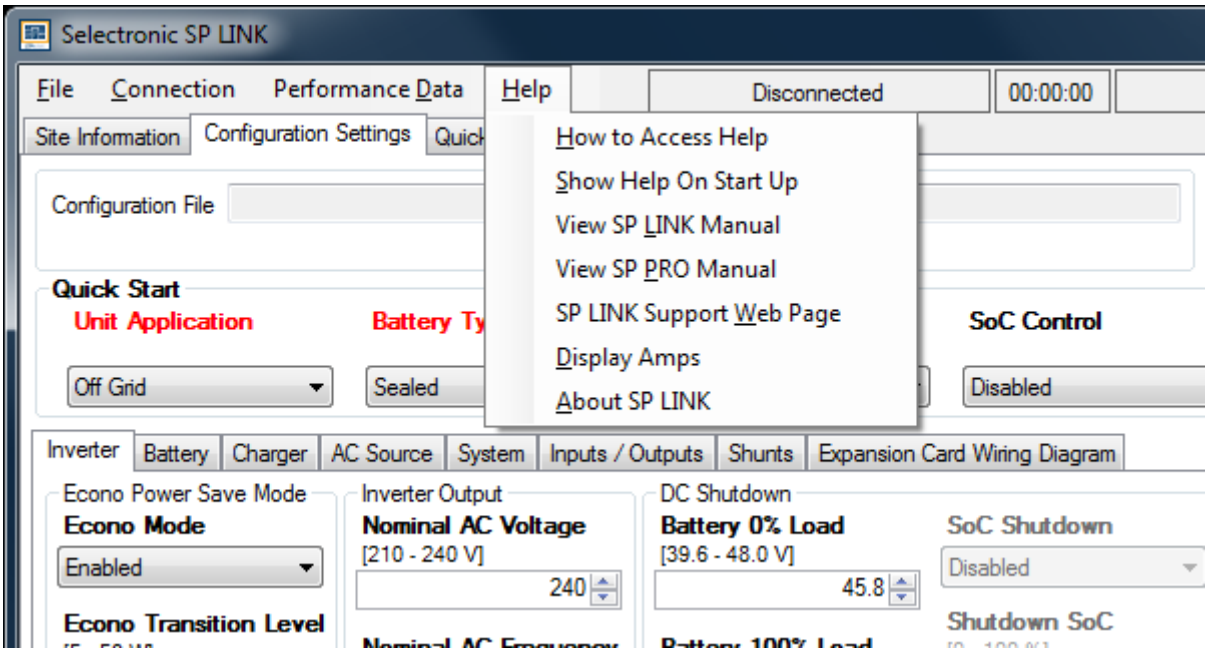
You will see the How to Access Help guide.



By clicking “Continue” SP LINK will start. Again, by clicking the tick box “Don’t show me this screen again” will prevent this from being displayed in the future.

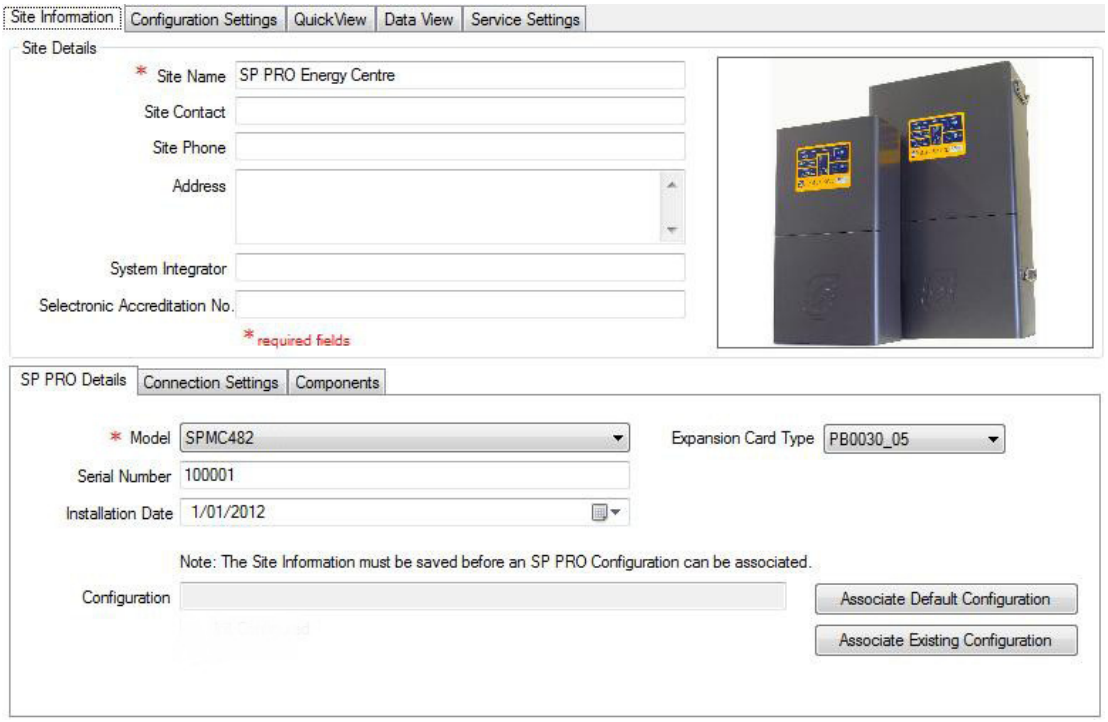
When working with SP LINK you may require a refresher course on what some settings are for, or some hints about the function of some screens. Simply RIGHT CLICK MOST HEADINGS and tabs and a help panel will appear on the right side of your screen.

You can also access both the SP PRO manual and SP LINK manual (this document) from the Help menu at any time.



Preparing a new site

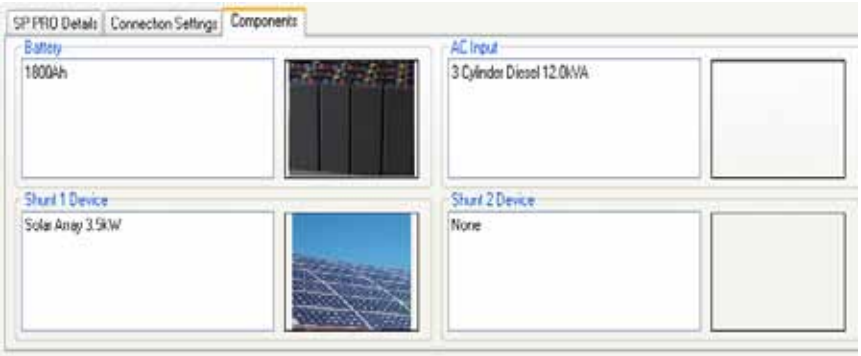
SP LINK will open in the Site Information tab, you will need to enter information in the mandatory fields with the red star, it is not possible to proceed without setting up and saving a site. Information is also required under the lower tabs.



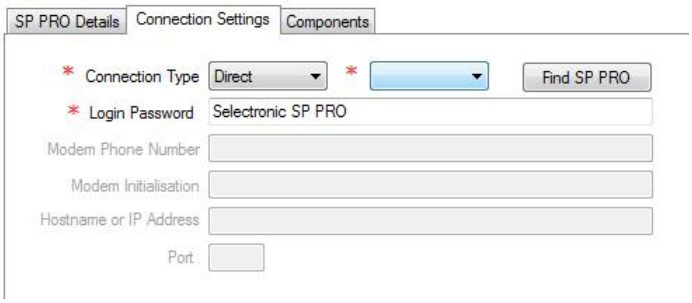
If you require explanation about any of the headings in SP LINK hover your cursor over the heading or right click on the heading to be taken to that section of the instruction booklet.

There is a large window on the right side of the Site Information page, click on this to place a photo of the system that may help the installer recall details at a later date, you may chose to put a picture of the customer here.

It is also helpful to place photos of the various system components under the Components tab, this may assist in the future to determine any new shading issues on a solar array.



Under the Connection settings tab you will need to select the Connection Type method you are going to use when you connect to the SP PRO. If you are simply going to plug your computer into the SP PRO then select Direct.

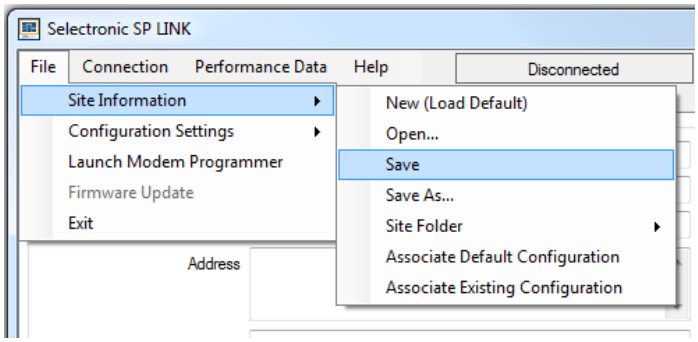


LOGIN PASSWORD
The default LOGIN PASSWORD "Selectronic SP PRO" does not need to be changed in most circumstances. The SP PRO by default is set to "Selectronic SP PRO".

The LOGIN PASSWORD only needs to be changed if you wish to prevent any connection to the SP PRO. This is particularly important to secure the SP PRO against unauthorised monitoring or modification when the SP PRO is remotely accessible via a Modem or Network connection type. Once connected, the default password may be changed under Service Settings

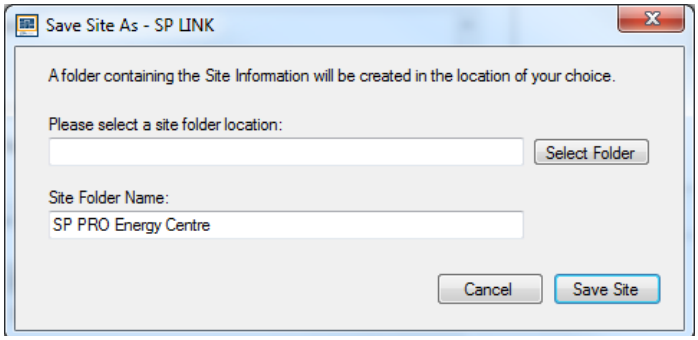
Saving a new site

All site information must now be saved.



To save the SP PRO site information, click on File - Site Information - Save.

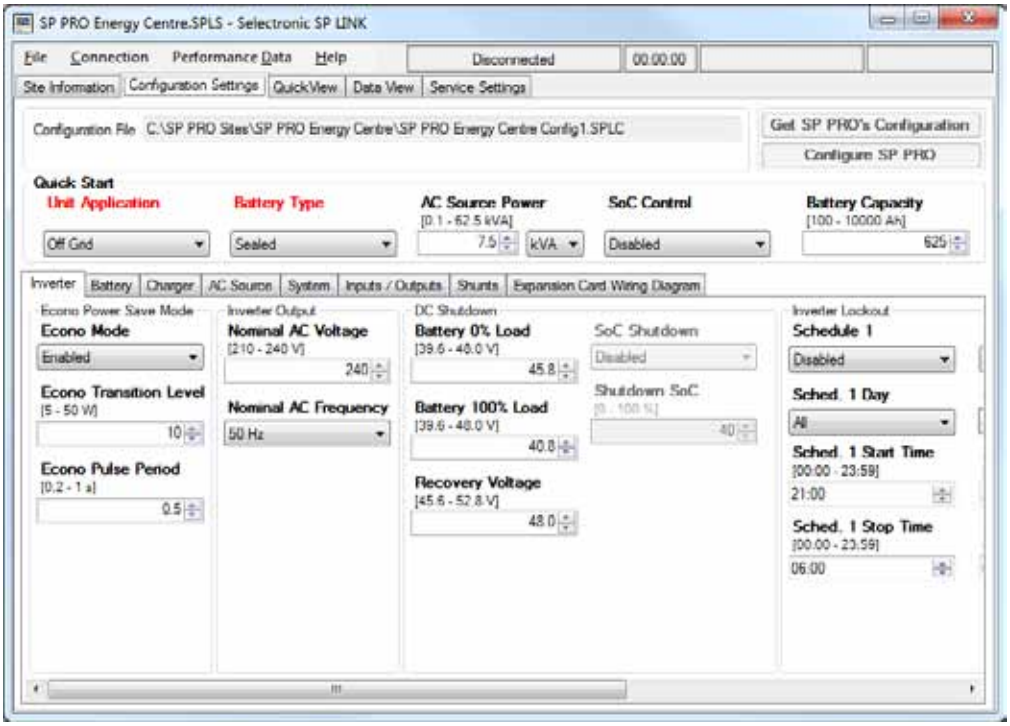
As this is a new site you will need to chose a common place on your computer to store the site folder, other information about this site such as Performance Downloads and Configuration settings will automatically be placed in this folder, the folder will have the same name as the site. Site files will be named with a .SPLS extension.



Preparing a new configuration

You can now start to prepare your Configuration. The SP PRO configuration is stored in a file within the site file and contains all of the SP PRO settings for transferring into the SP PRO when you connect SP LINK to the SP PRO.

Click on the Configuration settings tab.



The SP PRO is a very advanced and intelligent product but don't let the large number of settings concern you.

The default configuration settings have been carefully considered and will be adequate in most circumstances. The Flooded and Sealed lead acid battery defaults provide safe and efficient charging for most common batteries.

There is a Quick Start section near the top of the page which contains the settings that need to be considered for all applications.

The following table indicates the setting needed to be considered for each system.

QUICK START - SETTINGS NEEDED FOR ALL SYSTEMS		
SETTING	CONFIGURATION TAB	COMMENTS
Unit Application	Quick Start	Set to Off Grid, On Grid (Solar Hybrid) or Mobile
Battery Type	Quick Start	Set default battery voltage operating range
AC Source	Quick Start	Maximum capacity of grid supply or AC generator
SoC Control	Quick Start	Enable for battery State of Charge (SoC) management
Battery Capacity	Quick Start	Amount of connected battery storage

The following tables have a minimal list of settings to consider for each particular application.

SOLAR HYBRID (ON GRID) GRID BACKUP SETTINGS

SETTING	CONFIGURATION TAB	COMMENTS
AC Source Disconnect Alarm	System	Enable to alert users that system is running on battery supply
SoC Shutdown	Inverter	The grid backup battery limit point
Periodic Recharge	Battery	Recharge self discharge losses in batteries held in Float for long period of time.

SOLAR HYBRID (ON GRID) GRID BACKUP PLUS SOLAR SETTINGS

SETTING	CONFIGURATION TAB	COMMENTS
AC Source Disconnect Alarm	System	Enable to alert users that system is running on battery supply
SoC Shutdown	Inverter	The grid backup battery limit point
Periodic Recharge	Battery	Recharge self discharge losses in batteries held in Float for long period of time.
Shunt Name and Limits	Shunts	For DC Coupled Solar
KACO Link and Number	AC Source AC Input	For Managed KACO AC Coupled solar

SOLAR HYBRID (ON GRID) TARIFF OPTIMISATION SETTINGS

SETTING	CONFIGURATION TAB	COMMENTS
Shunt Name and Limits	Shunts	For DC Coupled Solar
KACO Link and Number	System	For Managed KACO AC Coupled solar
AC Input Capacity Schedule	AC Source - AC Input	The times and limit of grid supply to restrict if possible
SoC Shutdown	Inverter	The battery limit point to revert to grid supply

OFF GRID SETTINGS

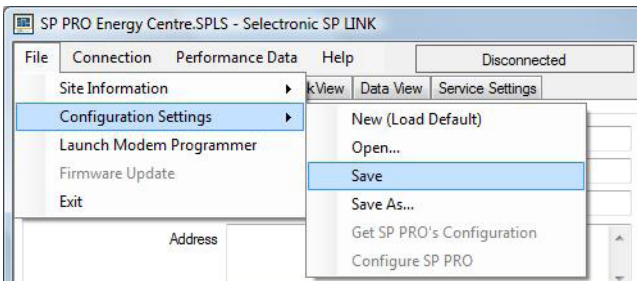
SETTING	CONFIGURATION TAB	COMMENTS
Shunt Name and Limits	Shunts	For DC Coupled Solar
KACO Link and Number	System	For Managed KACO AC Coupled solar
Generator Controller	AC Source - Generator Controller	Disable if manual start generator

See Configuration Settings section for detailed information on all settings.

Saving a new configuration

Your configuration settings should now be saved to file before sending them to the SP PRO.

To save the SP PRO configuration settings, click on File - Configuration Settings - Save.

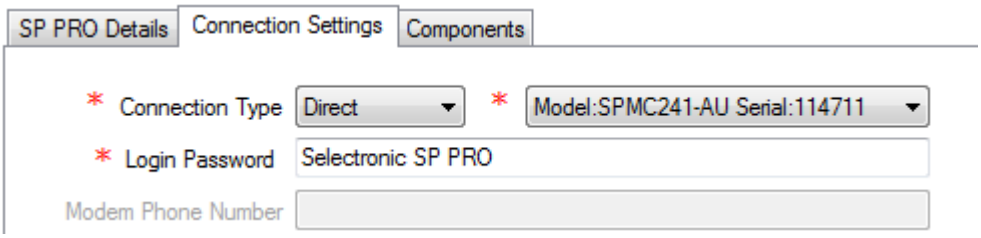


The configuration settings will be saved in the same location with the site information saved in the previous step. SP LINK will automatically use the default file name Config1 prefixed with the site name.

The configuration settings are now stored on your computer. The SP PRO can be configured with these settings at any time once the computer is linked and connected to the SP PRO.

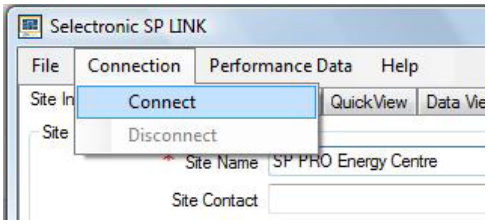
Connecting to your SP PRO

Plug the SP PRO into your computer with the supplied USB cable. The SP PRO will be automatically detected by your computer and SP LINK. Please wait until this has occurred and will be indicated within SP LINK showing both model and serial number under Connection Settings.



Now we can connect to the SP PRO.

In the Connection menu, click Connect.



Now SP LINK is connected through to the SP PRO. SP LINK will notify you if a connection is unable to be established.

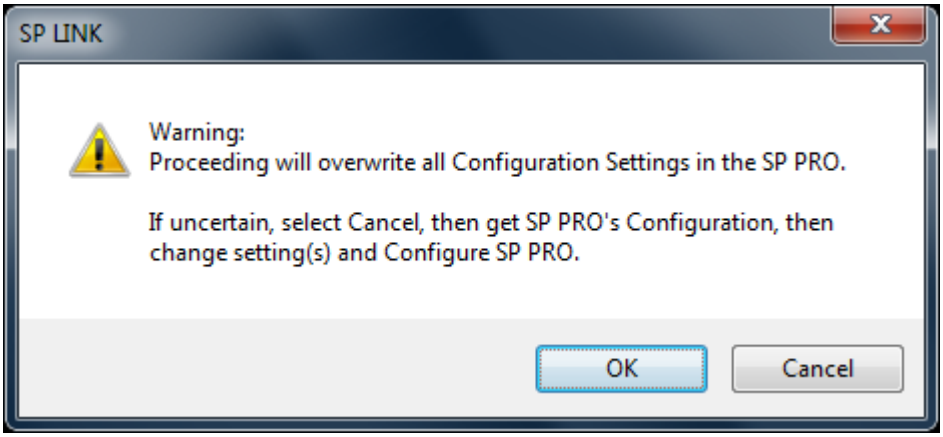
It is important to note that at this stage, the SP PRO has NOT been configured with any setting changes you have made at this time. The settings displayed are only on the computer at this point and have not been copied into the SP PRO. This is performed in the next step.

SP LINK will notify you if the SP PRO you are connected to is NOT as detailed in the SP PRO Details. SP LINK will also, if required, prompt you to update the time within the SP PRO from the computers time.

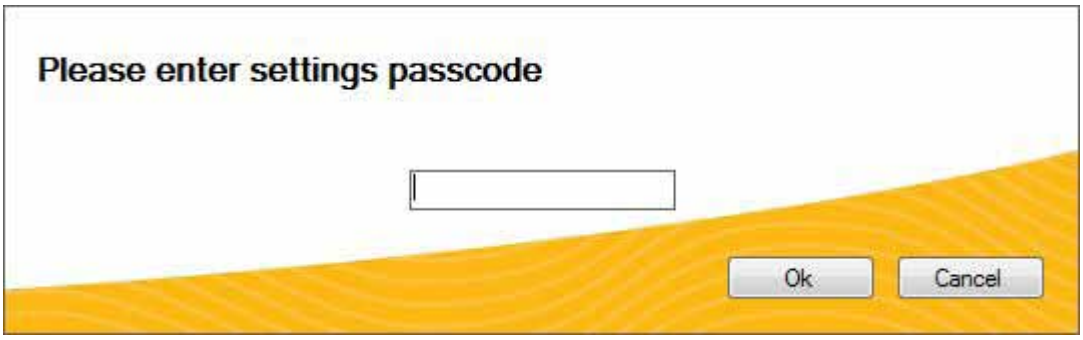
Configuring your SP PRO

With SP LINK connected to the SP PRO, Click Configure SP PRO from the File - Configuration Settings menu or from the Configuration Setting page.

SP LINK will - unless “Get SP PROs Configuration” has just been performed - warn that all settings will be overwritten.



For security purposes, to ensure no-one can tamper with your SP PRO, you will now be asked to enter your passcode.



The default passcode is 74, however you can alter this if you wish. We will cover altering your passcode when we get to “Service Settings”.

Once you have entered your passcode click “OK”

SP LINK will verify passcode and configure the SP PRO with these changes.

SP LINK will indicate with for any reason the Configuration was unsuccessful.

You have now transferred all the Configuration Settings shown in SP LINK into your SP PRO. The settings take immediate effect.

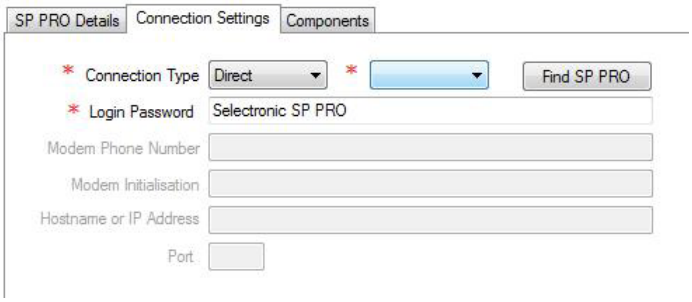
Connection Settings

The connection settings allow other connection types as well as USB Direct. The connection settings need to be set depending on which other communication method is being used. Details for all connection types are stored with the site allowing multiple connection methods to be retained in one site file.

Login Password

A Login Password is required for connecting to the SP PRO. SP LINK can only connect through to the SP PRO with the correct password. The default password is “Selectronic SP PRO”.
This is different to the setting passcode.

Direct and Wireless - Local SP PRO connection.

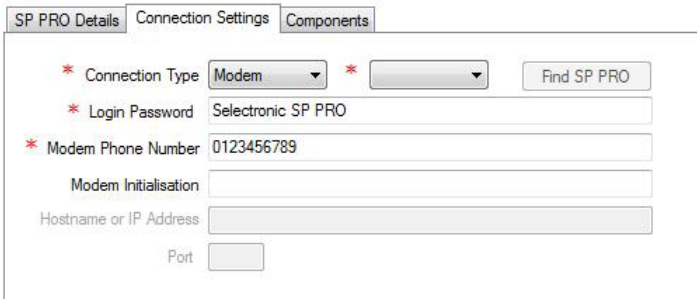


For Direct connections, once the USB cable is connected, SP LINK will automatically detect and set all connection parameters. If using a RS232 serial direct connection, once all cables are connected and in place, press Find SP PRO - this will search through all PC ports and find the connected SP PRO and set connection parameters as required.

For Wireless, once the Selectronic wireless device is installed, SP LINK will automatically detect and set all connection parameters.

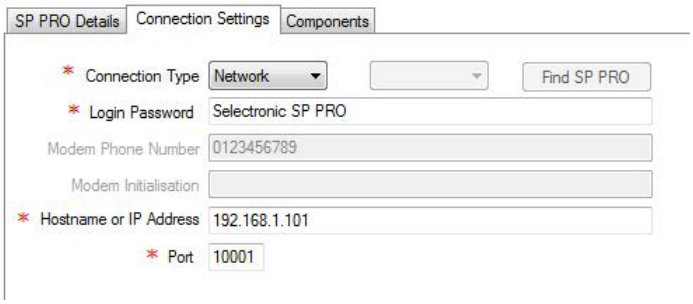
Otherwise, select the PC COM port that is connected to the SP PRO.

Modem - Remote dial-up SP PRO connection.



For Modem connections, select the PC COM port that the modem is connected to. Enter the Modem Phone Number. This is the number that SP LINK will dial when you select Connect. Modem Initialisation can be left blank when using Selectronic supplied modems but may be required for other modem types.
Consult your modem supplier if unsure.

Network - IP connection.

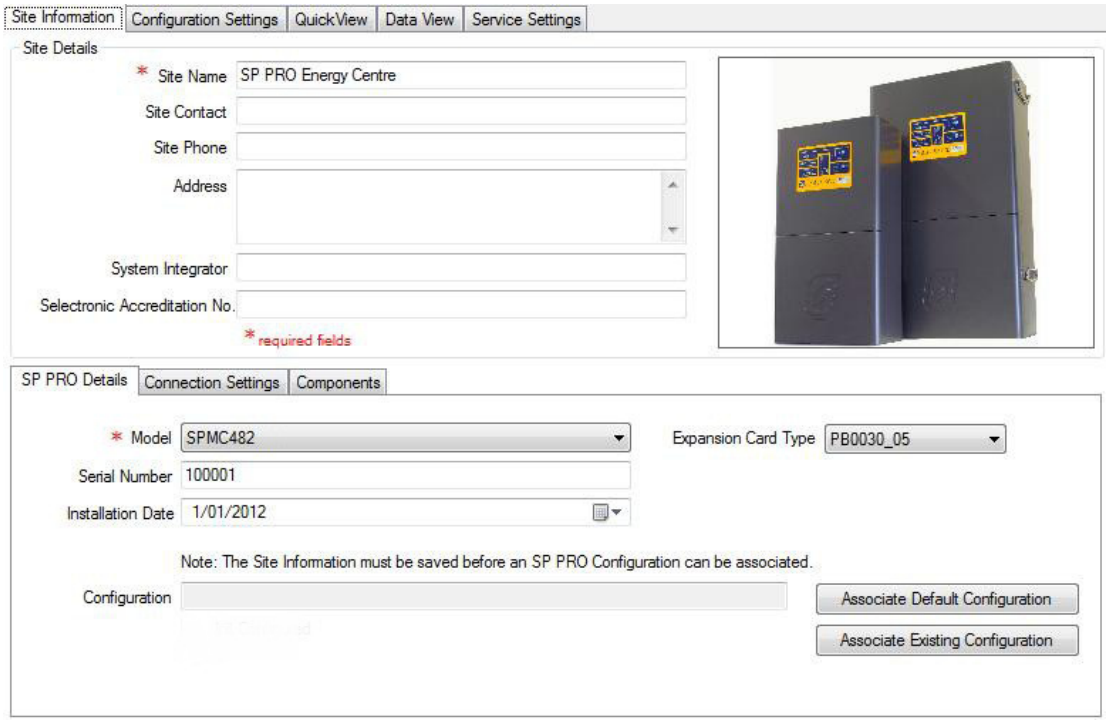


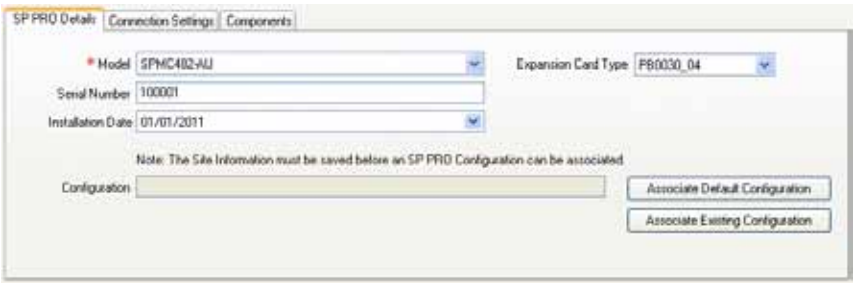
For Network connections, enter the Hostname or IP Address of the serial/ethernet adaptor and the IP Port number of the serial connection to the SP PRO.

Note: Using network connection requires thorough knowledge of IP networks and router configuration and data encapsulation. SP LINK communicates in RAW format to the set IP port via with no embedded serial/ethernet device control. All data sent and received by the serial/ethernet device must be passed through. Serial/Ethernet device must be set to match port speed of SP PRO.
Consult your IT specialist for further information.

Customising SP LINK to suit your site

The SITE INFORMATION screen on SP LINK allows you to record specific site details that are individual to your installation, such as the SITE NAME, the SYSTEM INTEGRATOR, the inverter SERIAL NUMBER as well as including a photo of your site.



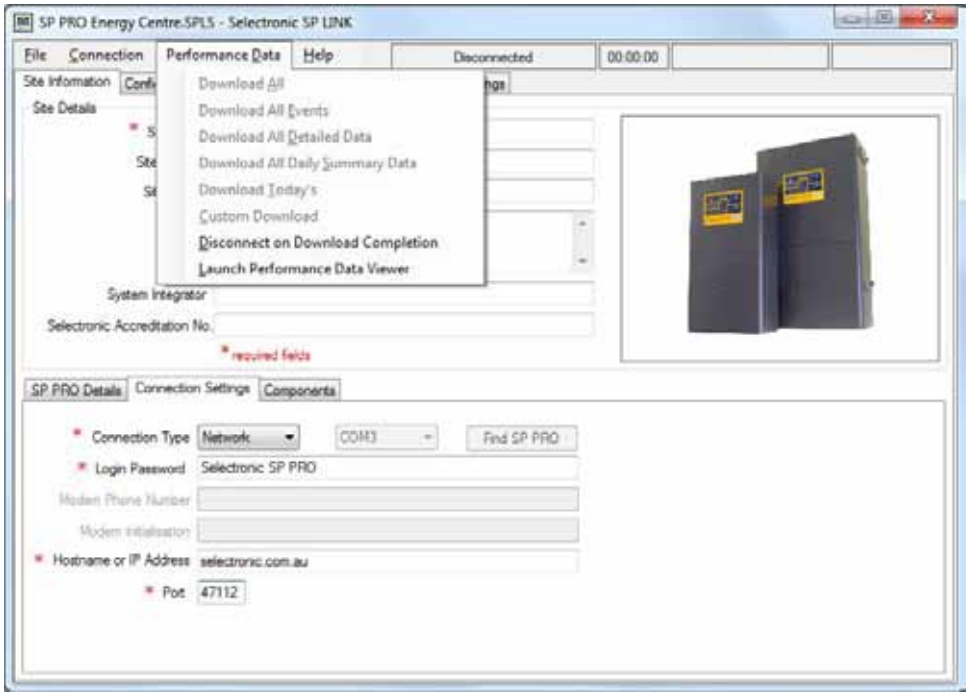


In the SP PRO DETAILS screen you can choose from earlier saved configuration files. As an example, you may have two sets of settings for your inverter saved within SP LINK; one for NORMAL everyday use, and one for HOLIDAY use. In your holiday file you may have included automatic garden watering, switching security lights on and off or even switching off the inverter for periods of time. Changing these settings is as easy as browsing the saved files through the FILE - SITE INFORMATION - ASSOCIATE EXISTING CONFIGURATION menu option or clicking Associate Existing Configuration and selecting the appropriate configuration then clicking on OPEN. This will now load in those settings ready to be Configured into the SP PRO.

Performance Data Retrieval

The SP PRO collects and stores a huge amount of information regarding your complete power system and the SP PRO. This information can be downloaded for reviewing the system performance of the system or assisting to identify any potential areas of concern.

From the drop down menu in “Performance Data” you can choose what, and how much, data you wish to recover from the extensive information stored in your SP PRO.



In the The Performance Data menu give you a number of options, you can either

Download All
: Download all records stored within the SP PRO

Download All Events
: Download just Event records - what happened and when

Download All Detailed Data
: Download just the Detailed data - averages of all parameters like AC Load and Battery Voltage

Download All Daily Summary Data
: Download just the Daily Summary data - total energy usages on a daily basis

Download Today’s
: Download all records for Today

Custom Download
: Choose the date range and what types of data to download.

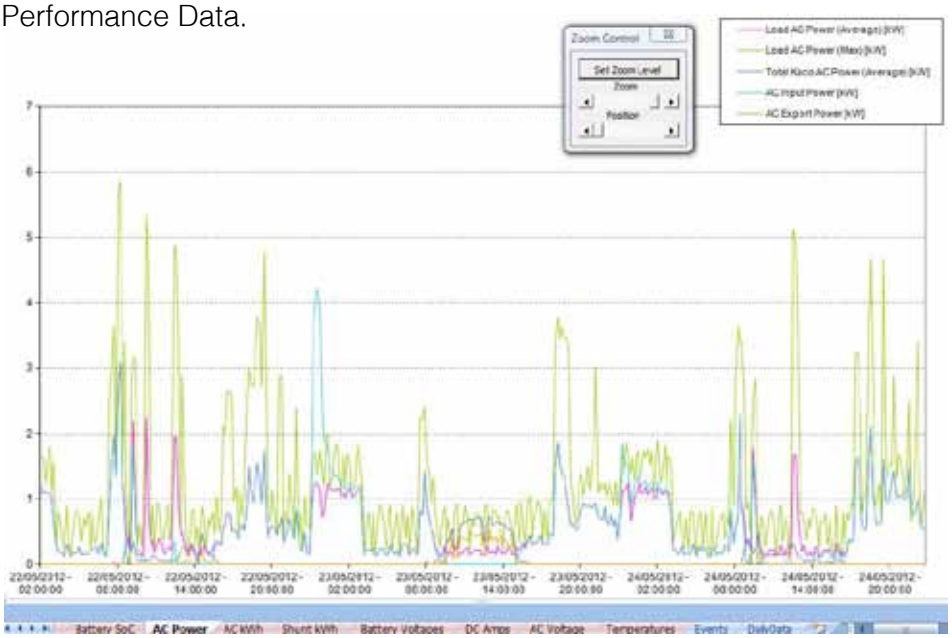
You may also wish to select Disconnect on Download Completion from the menu so to avoid high data costs on Network or Modem connections.

You can also select Launch Performance Data Viewer directly without having to download any data. This will then allow you to choose previously downloaded data from this or other sites.

Performance Data Viewer

Once the Performance Data Download is complete, you can either
click Ok to continue using SP LINK,
click Open Download Folder to see the Performance Data files just downloaded,
click Launch Performance Viewer* to view graphically the Performance Data.
* - Requires Microsoft Excel 2003 or later

The Performance Data Viewer automatically loads and presents the Performance Data graphically and in predefined graphs or a customised graph with any choice of Performance Data plus displays all the Event logging and Daily Performance Data.



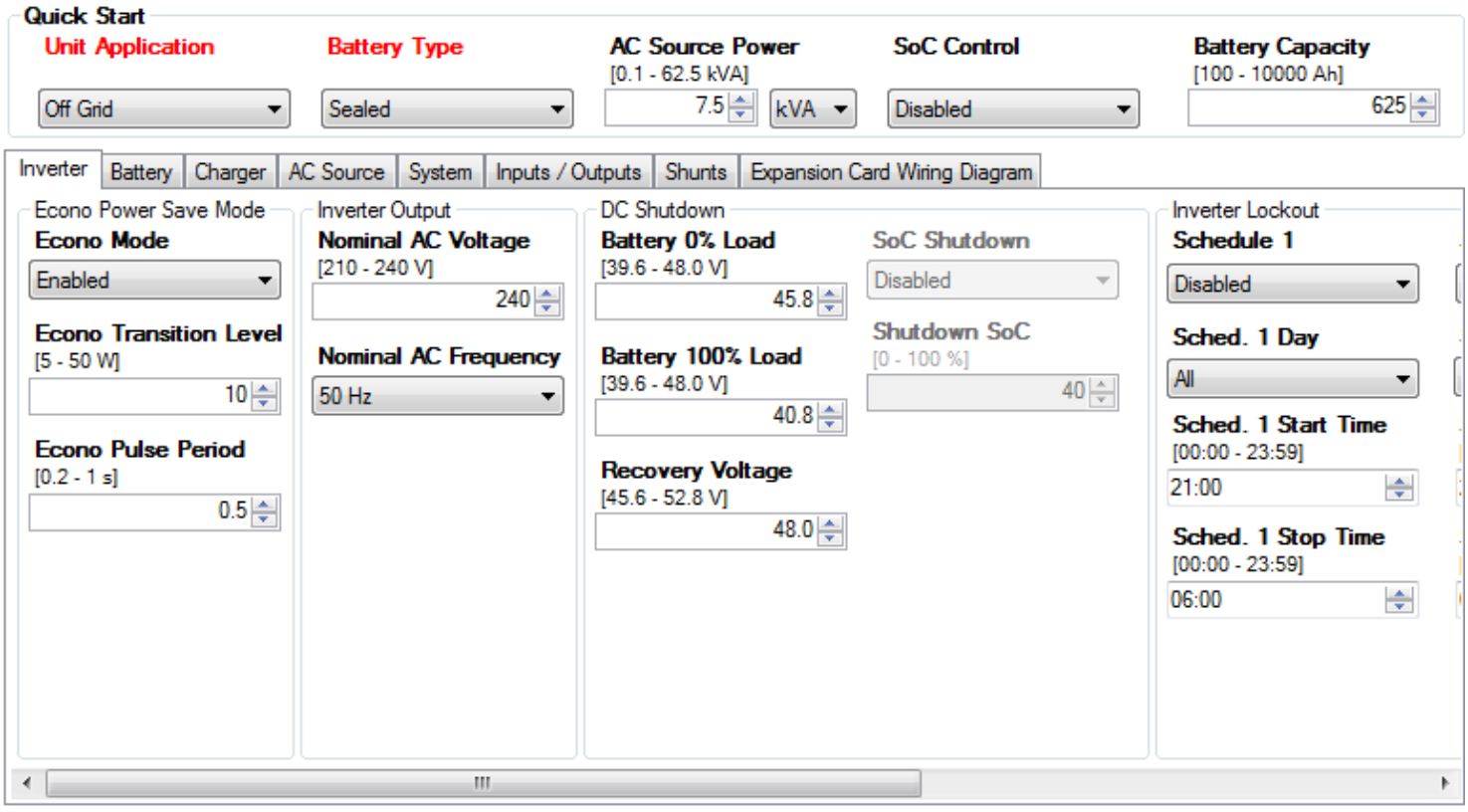
Configuration Settings

Configuration Settings

The SP PRO is a very advanced and intelligent product but don't let the large number of settings concern you. By default, the SP PRO will run as an off-grid inverter charger and through enabling additional features within the SP PRO can many differing system objectives be achieved.

The Configuration Settings are divided with tabs into named sections indicating the types of settings found within. Each Tab highlights a different configuration area within the SP PRO. To access these settings, click on the various section tabs.

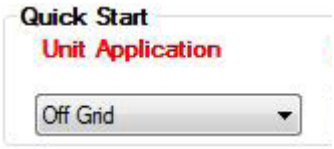
Settings can be changed by either clicking on the drop down list or directly changing the value. Every time you change a setting the title of that setting becomes highlighted in yellow. This is to remind you that you have changed this setting. This highlight disappears when you save or configure the SP PRO.



The following pages detail each tab and individual setting contained within.

Quick Start

The Quick Start section provides the settings needed to be considered for all applications.



The first setting Unit Application determines how you will use your SP PRO.

- Off Grid for remote area homes where a backup motor generator will be used and no grid connection is available.
- Mobile for Motor homes, Caravans & Boats
- On Grid (Solar Hybrid) where you wish to feed Solar, Wind or Hydro power to the electricity grid. Use this setting if back up power required in case of grid failure.

These two battery types require different charging parameters. Picking one type automatically programs the inverter with a number of charge settings.

If you are unsure of the battery type you own it is best to ask your battery supplier. If still unsure, choose Sealed battery but be aware that this may not give optimum battery performance or life.

With AC Source Power you can configure the maximum power drawn from your AC supply either a grid or motor generator supply. With the right hand drop down menu you can choose to set the power level in either kW, kVA or Amps. Ensure that this power level does not exceed your grid or motor generator capacity. If using a motor generator which is not new, it may be necessary to reduce this setting by 10%-20%. If the generator bogs down when the SP PRO starts to charge discharged batteries then keep lowering the AC Source setting until a suitable value is found.

State of Charge (SoC) control gives you the option of controlling your system with either a calculated state of charge or by the battery voltage.

It is important to note, that for State of Charge control to operate correctly, the SP PRO must be able to read and monitor any charge or discharge of the battery, external to the SP PRO. A current shunt will need to be wired in the negative line of these external charge or discharge sources, (Not in the main battery line). Up to 2 current shunts can be read, for example 1 reads your DC Coupled Solar and a second shunt may read a Wind Turbine. Currents shunts must be configured under the “Shunts” tab of SP LINK. The SP PRO does NOT need a shunt for the current that it takes in and out of the battery.

If your Solar is AC Coupled no shunt is required.

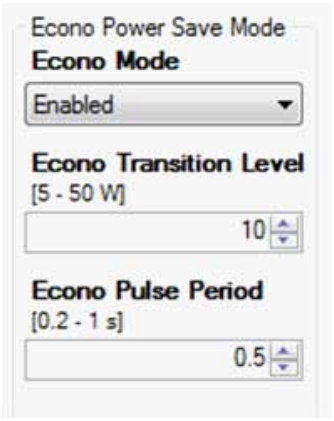
Enabling State of Charge Control provides greater flexibility in system programming and will allow the Fuel gauge on the front of the inverter to display usable battery capacity remaining, like the fuel gauge in your car. If State of Charge is disabled the front inverter display will show battery voltage.

It is important to include battery capacity as it tells the SP PRO how much reserve power you have available – like the size of the fuel tank in your car.
This value should be set at the C rate that the system will be used. For example, if the batteries will slowly discharged then it is likely you would use the C100 or C120 rating, if the batteries will be discharged quickly then likely the C10 rate should be used.

If you are unsure of the capacity of the battery you own it is best to ask your battery supplier.

Inverter Settings

We will start with the “Inverter” tab and progressively work our way through – setting by setting.

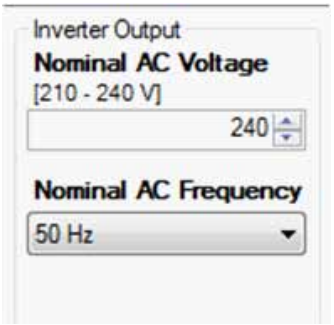


WHEN ECONO Mode is disabled the inverter will run continuously with no AC load. The SP PRO will go to “sleep” when the AC load power is below the Econo Transition Level for more than 30 seconds. It will “wake up” again and run the load once the AC load goes above the Econo Transition level. A short push of the ON button is also required to enable Econo Mode (ON LED slowly flashing Green).

In Econo Mode the inverter puts out pulses of power to sense the load power. The frequency of these pulses is adjusted by setting the Econo Pulse Period.

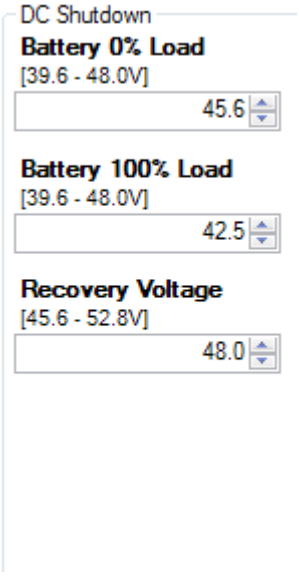
This level is normally chosen to reflect the smallest load you wish to start the inverter, i.e. you may choose 20 watts if you want the inverter to start when you switch on a lamp or you may choose 5 -7 watts if you want it to run a ‘phone charger’.

Econo mode can only be enabled on single 24 V and 48 V models and is can only be enabled for Off Grid systems. This feature should be considered carefully as most modern buildings have loads such as computer networks that require power 24/7, in this case DO NOT enable Econo mode.



INVERTER OUTPUT sets the normal NOMINAL AC Voltage and the NOMINAL AC Frequency from the inverter. For example, in Australia this would is 240 volts and 50 Hz.

When your SP PRO is being used in an “Solar Hybrid” application reference to your local grid supply voltage should be considered as this sometimes varies from the national standard. If you are unsure consult your local power authority.

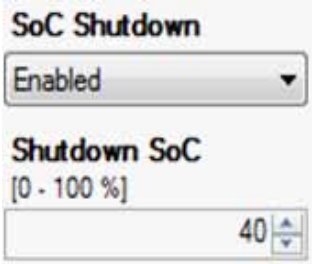


DC SHUTDOWN These figures control how far you will allow your batteries to become discharged before the inverter will switch itself off. These lower limits are important as discharging batteries too far can make them hard to recharge or, in the worst case, damage the batteries. The first setting outlines the voltage at which the inverter will shutdown with no load applied to the battery, this includes any DC loads. The second setting is the shutdown voltage when 100% battery load is applied. 100% battery load is when the battery current is equal to 20% of the battery capacity (C/5). When the battery load is between these two levels your SP PRO will calculate a shutdown voltage based on these two voltages.

Battery load should be understood as only the energy coming from the battery. As an example, in an AC Coupled system there may be 2 kW of AC Load but 2 kW of solar, so there is NO load on the battery.

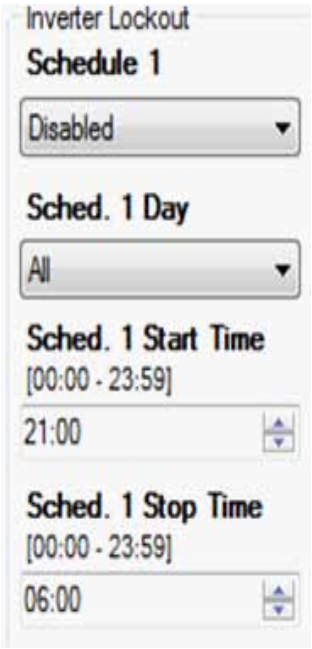
RECOVERY VOLTAGE If the inverter shuts down due to low voltage (as in the last section) this setting allows you to determine at what voltage the inverter will start itself again. It is wise to make this voltage high enough to ensure that significant recharging has occurred before the inverter turns on again.

SoC SHUTDOWN. You can also program the inverter to shutdown in response to the state of charge of the battery. When enabled this figure can be set anywhere between 0 and 100%. For a lead acid battery this will generally be 40-60% but confirm this with your battery supplier.



In a well designed Off Grid system your batteries should never get to the Shutdown State Of Charge. In a Solar Hybrid system this setting can be used as the point that the grid will be reconnected if locked out in a manner to use battery power instead of Grid power.

The SHUTDOWN SoC also defines the lowest point of Usable Charge which is displayed on the front panel battery "Fuel" gauge indicators. It is important to set this correctly regardless of whether SoC SHUTDOWN is used or not as this gives an excellent guide to the remaining usable battery capacity.



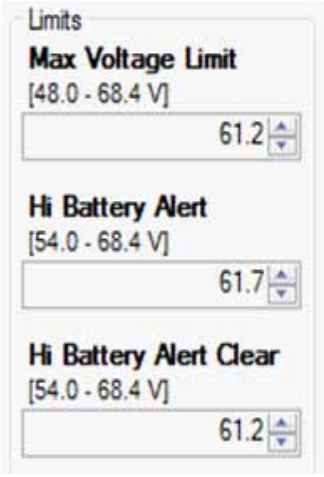
INVERTER LOCKOUT SCHEDULES 1 to 4 is a feature that is normally used when your SP PRO is configured for Solar Hybrid use however it may also be used in Off Grid or Mobile use.

The Inverter Lockout enables you to schedule up to four periods, when your inverter will be switched off to minimise the power you are using when there is no solar power to export to the mains grid.

Of course if the mains grid fails your SP PRO will "wake up" the inverter and take over the loads. In this mode there is a short delay of 1 to 2 seconds before the inverter takes up the load. If it is essential to retain no break power at all times this feature should be left disabled.

Battery Settings

The Battery Tab contains settings intended to protect and maintain your batteries. Please note that you must comply with the requirements of your batteries specifications, failure to do so may void your battery warranty. When in doubt, consult your battery supplier.

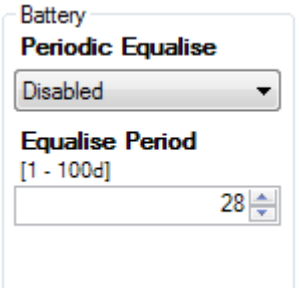


MAX VOLTAGE LIMIT is the absolute maximum voltage produced by the charging section of your inverter in any charge stage.

HI BATTERY ALERT initiates an alarm when your battery voltage exceeds this level. A handy warning if your solar regulator becomes faulty.

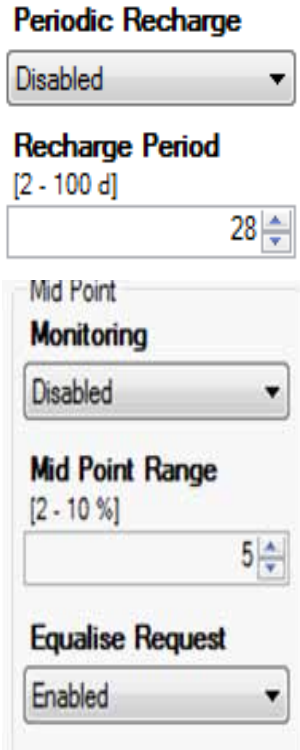
When your battery voltage falls to the value set in HI BATTERY ALERT CLEAR the alarm stops.

Most batteries, in the course of their working life, develop voltage variations between the individual cells. To rectify this problem it is necessary to initiate a charge that exceeds the normal charge levels. How often an equalise occurs is set using EQUALISE PERIOD. The equalise charge voltage, current and duration are set in the CHARGER settings tab. (See “Charger Settings” section)



When an equalise charge is carried out by a charging source that is external to the SP PRO (i.e. DC coupled solar or wind sources) the SP PRO monitors this and reschedules its equalise. For the SP PRO to reschedule, the battery voltage must be taken to or above the EQUALISE STAGE voltage for the EQUALISE TIME settings in the SP PRO therefore it is important to match or slightly exceed these setting in the external renewable controller.

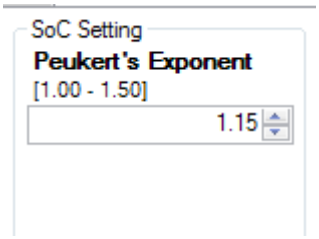
PERIODIC RECHARGE is for systems that remain on Float charge for long periods of time such as Solar Hybrid or Boats in Marinas. Battery banks operating in these conditions benefit from periodically being put through a full charge process. When enabled, after remaining in Float for the number of days set by the Recharge Period, the SP PRO will return to Initial charge stage.



MID POINT MONITORING is a function designed to highlight any significant voltage variation between one half of your battery bank and the other. If one half of the bank is lower than the other it may suggest that the batteries need an equalisation charge or, perhaps, that there is a cell in one half that is not performing correctly. In MID POINT RANGE you determine how much variation between the two halves you will allow before notification. With this function you can help predict battery problems. To make use of this feature you will need to install an additional wire to the battery, see installation section for details. We recommend the use of this handy feature.

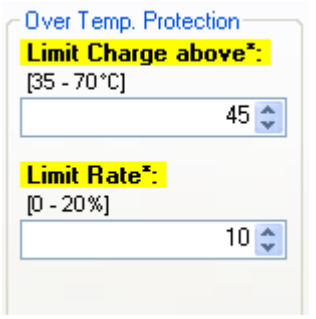
Often these problems can be solved by an equalisation charge so we have included provision for you to request such a charge by enabling the EQUALISE REQUEST setting.

The capacity of your batteries alters depending on how much load you are placing on them. PEUKERT'S EXPONENT is part of a calculation that alters the theoretical battery capacity depending on the load placed on the system. This setting should only be changed by an experienced system designer after analysis of system performance and in consultation with the battery manufacturer.



OVER TEMP. PROTECTION This feature reduces the charge current automatically as the battery temperature rises above the temperature specified in LIMIT CHARGE ABOVE. It reduces the charge current by the LIMIT RATE for every degree Celsius that the temperature is above the temperature specified.

With the default settings the charge rate will drop 10% for every degree over 45°C. e.g. no charging current at 55°C.

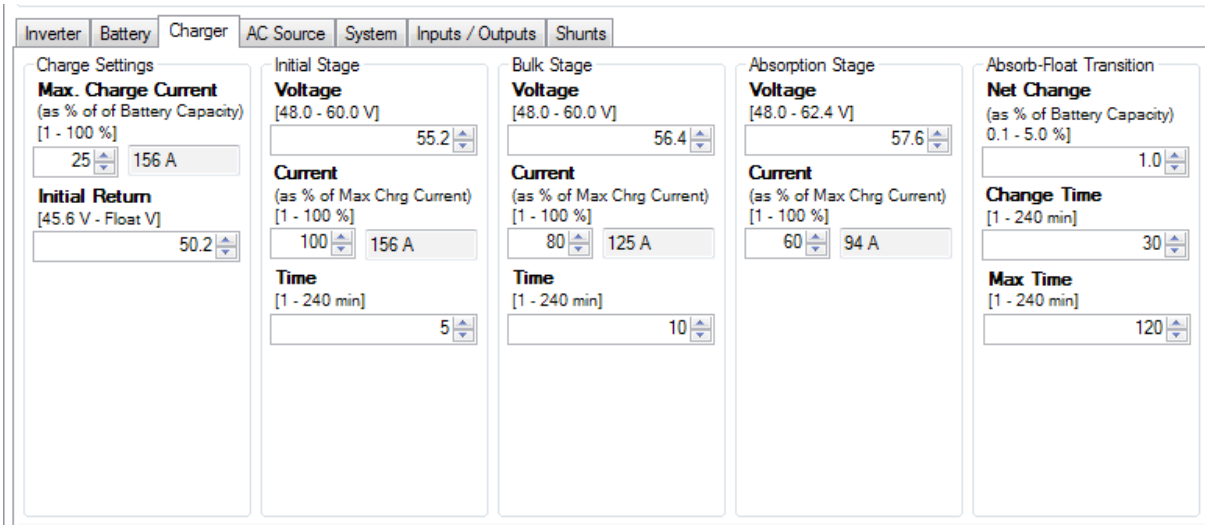


Charger Settings

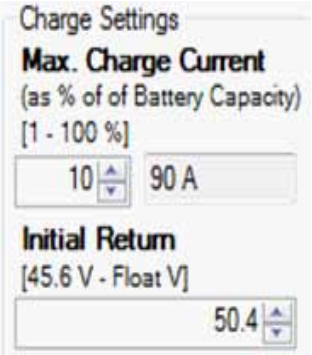
This tab shows all the settings relating to the voltages and currents used in the various charge stages.

The normal charge cycle involves a four stage charge – Initial, Bulk, Absorption and Float– while periodically it is necessary to go one stage further, for the performance and longevity of the battery bank, to the Equalise stage. We will describe each of these stages as we progress. Please note there is a slider at the bottom of this page to move to more settings as this section is quite extensive.

Our default charge settings should be considered as safe for most battery types. Exact charging parameters should be confirmed with your battery supplier



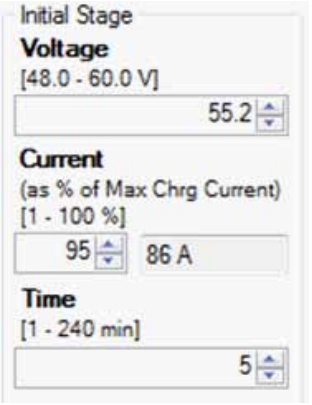
MAX. CHARGE CURRENT is the maximum charge current that the inverter will allow to the batteries under any circumstances (including all external charge currents) at any charge stage. This is expressed as a percentage of your battery capacity. For example if your battery pack is rated at 900 amp hours capacity and your battery manufacturer suggests a maximum charge current of 10% of capacity then you would set this figure at 10% and the maximum charge current limit would be set at 90 amps.
This means that if there is 40 A of solar charge current when the inverter is charging, then the inverter will only put 50 A of charge into the battery.



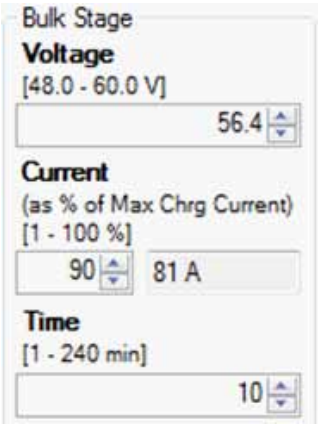
INITIAL RETURN is the voltage level at which the charge cycle will return to the beginning, or Initial, stage of the charge process. The 10 second average battery voltage must remain at or below this level for 2 minutes to switch to Initial. This response time ensures that short term loads do not prematurely cause the charger to reset to Initial. The maximum voltage adjustment is the lowest float voltage (either Float or Long term Float) minus 5%.

The purpose of the INITIAL STAGE of the charging process is to raise the battery voltage quickly with a large charge current. In this section you set the voltage you wish the batteries to reach, the current you wish to charge at and the length of time the batteries will stay at that voltage until the inverter moves to the next stage of the charge cycle.

The current is expressed as a % of the maximum charge current. Using our previous example if the maximum charge current was 90 amps and you wish to charge, in this stage, at ~85 amps you would insert 95 in this area. i.e. 95% of 90 amps = 85.5 amps



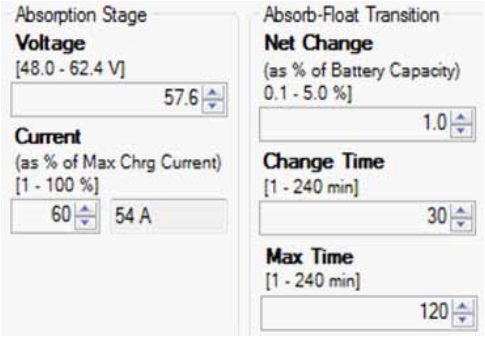
BULK STAGE is the part of the charge cycle where the majority of the charging takes place. This is normally set at a higher voltage than the initial stage but at a lower charge current. The time section determines, once the Bulk voltage is reached, how long the batteries stay at this level until the inverter starts the next stage of the charge process. Once again using our example if you wanted this stage to charge at ~80 amps you would insert 90 as the setting because 90% of 90 amps is 81 amps. The time that the charge stage would remain at this voltage would normally be set longer than in the initial stage.



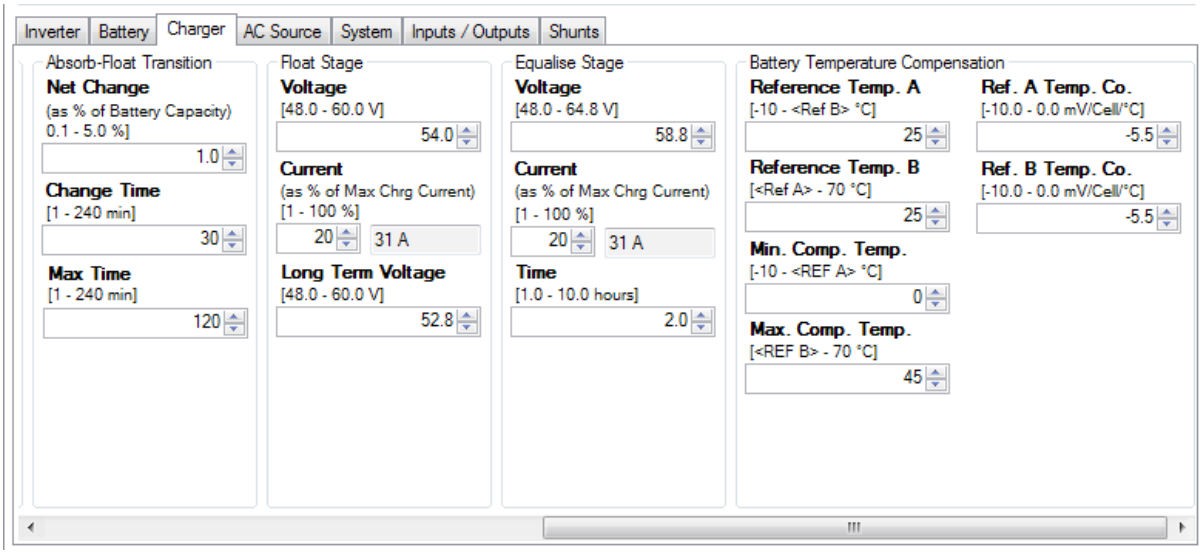
THE ABSORPTION STAGE is the part of the charge process that allows the batteries to maximise the effect of the previous charge stages. This stage is normally set to a higher Voltage than the two previous stages but a lower charge Current. The MAX TIME it would remain in this stage is longer again than the previous stages.

This section has a further level of control in that it will also end this stage if the charge current does not change below the figure set at Net Change for a period of time (Change Time).

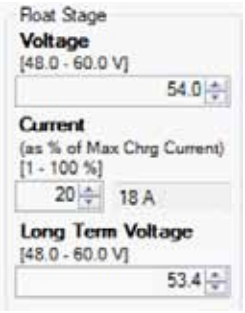
For example if you have set your absorption voltage to 57.6 volts, the current to 60% (54 amps) and the Max Time to 120 minutes, then the battery will be charged at 54 A until the battery voltage reaches 57.6 volts. At this point the battery charging process will change from Absorption into Float based on the rate of change in charge current over a period of time.. If for example you have a battery bank of 900 Ah, Net change is set to 1% and change time set to 30 minutes, then transition to Float will occur when net battery charge current has not changed by more than 9 A in 30 minutes. If transition to Float has not occurred before Max Time expires then absorption stage will be terminated anyway as this may suggest a faulty battery cell.



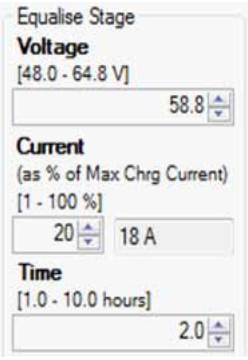
In addition to these stages of charge there are more settings you can access by moving the bottom slider bar.



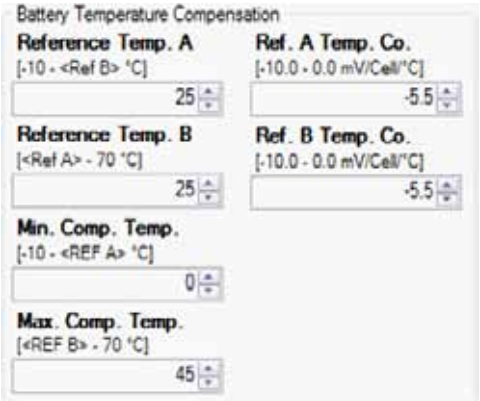
After completion of the charge cycle the inverter will enter the FLOAT STAGE. This setting reflects a voltage that the system will maintain, with a good state of charge, for a long period. If the generator continues to run passed the absorption or equalise stage for any reason, such as maintaining a high load, the inverter will keep the batteries at the float stage voltage – not exceeding the Current set – until the generator is shut off. When the generator or mains voltage is present for longer than 24 hours the charger will drop to the Long Term Voltage to maintain a good state of charge for the lowest charge current. This is particularly useful in boating marinas where shore power may be connected for long periods.



THE EQUALISE STAGE is not employed every time you charge your batteries but is a periodic charge process that raises the battery voltage above the normal voltage settings to a point where the batteries will, essentially be in a state of overcharge. This is necessary to overcome any variations in voltage between individual cells that occur naturally in a battery bank that is cycled between load and charge cycles. These variations can cause a drop in performance in the battery bank and must be “equalised”. In flooded cells this process is sometimes called “gassing”, that is when the batteries sound as if they are lightly boiling. In flooded cells this bubbling helps to circulate the electrolyte fluid within the cells. The Equalise stage will raise battery voltage to the equalise voltage level and maintain this voltage for the equalise time. The equalise current will not be exceeded. If using Sealed batteries, the EQUALISE STAGE may be at the same voltage as Absorption voltage but for a longer period of time. Check with your Battery supplier.



All batteries require different charging voltages when the battery temperature is higher or lower than the battery manufacturer’s specified temperature. Most manufacturers use 25°C as the point on which they base their charge voltages. As the temperature of the batteries falls below or rises above this point the batteries will need to be charged at higher or lower voltages. This is called temperature compensation. If the manufacturer of your batteries specifies different temperature compensation than those used normally by the SP PRO then those parameters can be changed in the BATTERY TEMPERATURE COMPENSATION settings.



AC Source Settings

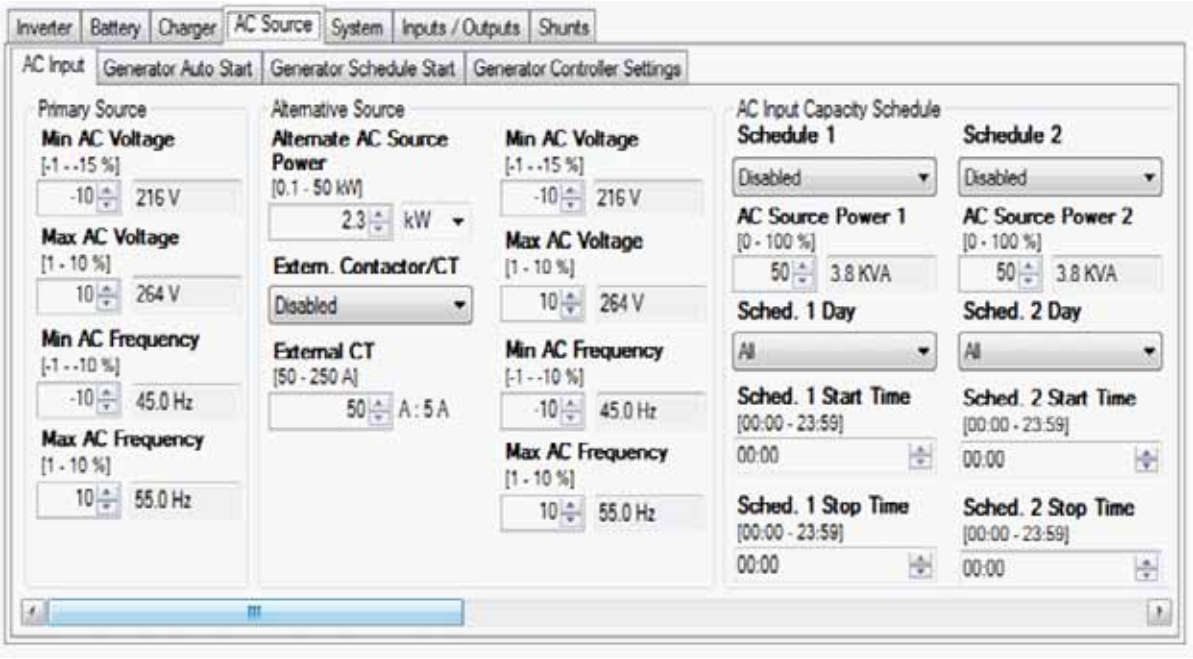
The next tab in our settings menu is the AC Source tab. In this section we are able to change important settings relating to either your generator or the mains voltage. We use the words AC Source rather than Generator, Grid or Shore power as the SP PRO can be used in a variety of applications which may include either of those AC supplies.

There are four sub-tabs within this section:

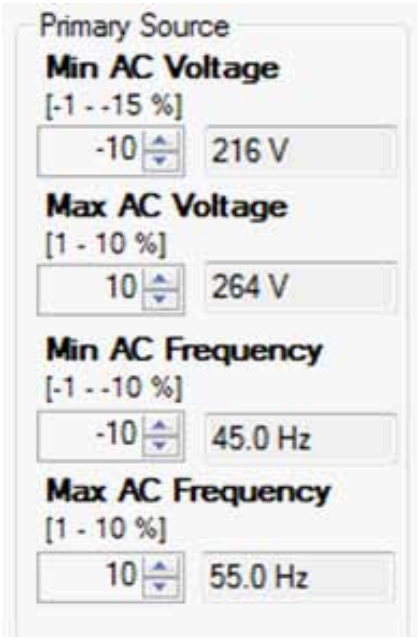
- AC INPUT, relates to general settings that apply if either a generator or the mains grid are used as input power.
- GENERATOR AUTO START relates to conditions that will start your generator automatically.
- GENERATOR SCHEDULE START allows you to program scheduled run times you may choose for your system.
- GENERATOR CONTROLLER SETTINGS is used to set up parameters that relate to your motor generator.

AC Input

This tab allows you to change the conditions under which the AC Input will be utilised by the SP PRO and transferred through to the AC Load.

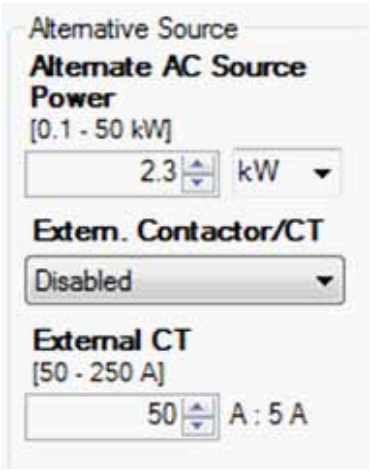


THE PRIMARY SOURCE window reflects the allowable variation to the nominal AC voltage and frequency configured previously in the Inverter section. In that section we used Australia as an example and used 240 volts and 50 Hz as our standard. In this window we can specify the range of voltages and frequency – both higher and lower than the nominal – that we will allow the inverter to work with. Lets assume we insert 10 (10%) into each setting in this window. In that case the input voltage could range between 216 and 264 volts and still be acceptable; while the frequency of the input could be as high as 55 Hz and as low as 45 Hz.



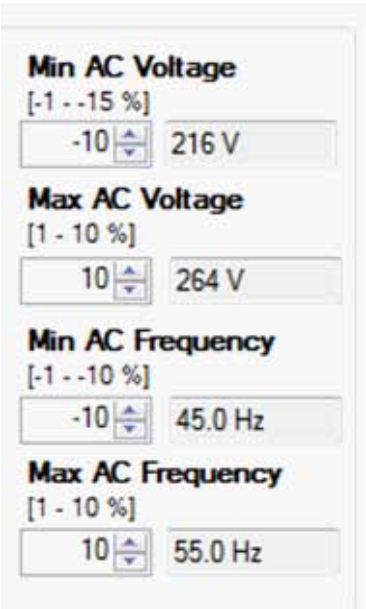
These limits are important as higher voltages may shorten the life of lights and other appliances; while low voltage and frequency may overheat or overstress motors. The quality of supply to the load will be better with tighter settings, however this will also cause the inverter to disconnect from the AC Source and power the load from battery supply under what may be considered as “Normal Conditions”. If using in an Solar Hybrid (ON Grid) system and you observe the inverter disconnecting and then reconnecting, it may be possible that the AC Source is drooping when connected, in this case it can be rectified by lowering Min AC Voltage.
The settings should not be made too tight or they will exclude the normal variation most incoming supplies exhibit - be that grid or motor generator supply.

ALTERNATE AC SOURCE POWER sets an upper limit on how much power the inverter will try to draw from a second or backup generator, the mains grid or shore power, limiting the stress on the generator or the mains wiring. The choice of the Alternate AC Source power level is controlled from a digital input. If a generator is required in a Solar Hybrid (On Grid) system, you will need to install our Grid Fail Generator Backup Module.



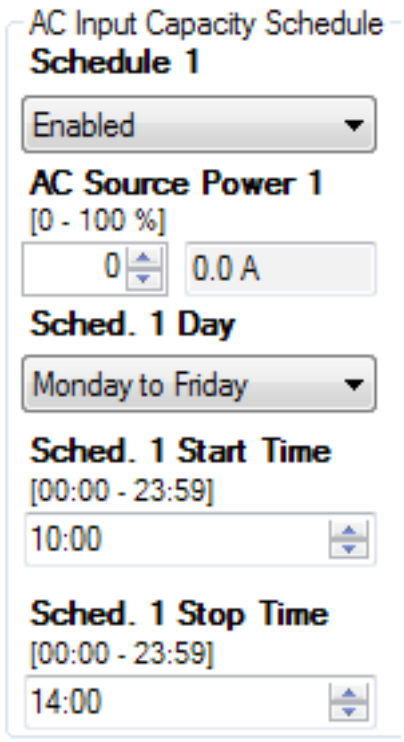
If greater than 63A AC (125A AC SPLC1202) pass through current is required you will need to use an EXTERN. CONTACTOR/CT of up to 250A AC. The current rating of the external current transformer is entered in External CT.

THE ALTERNATE AC SOURCE also provides for a separate allowable variation to the nominal AC voltage and frequency. This allows for different limits to be set for the generator feeding in normally but when connected into the marina on the Grid, different limits can be used.



THE AC INPUT CAPACITY SCHEDULE is a function used in the Solar Hybrid (or On Grid) configuration. Four schedules can be enabled or disabled for which the AC Input Capacity will be reduced by the percentage set. This can be used in times of high electricity prices or peak punitive tariff times to limit the draw from the grid, reducing costs, and drawing any extra required from the battery bank. Any excess solar is still exported to the full extent possible.

Care must be taken to ensure that there will be enough capacity in the battery bank to support the load during the enabled Capacity schedule times. If the battery bank reaches the Low SoC Shutdown or Low Battery Voltage levels, this setting will be bypassed and all of the power will be supplied from the grid until such time that the battery is able to be recharged.



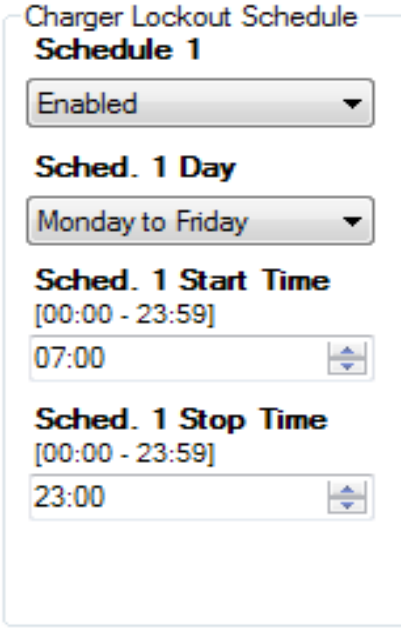
THE CHARGER LOCKOUT SCHEDULE is a function used in the Solar Hybrid (or On Grid) configuration. Four schedules can be enabled or disabled for which charging of the battery bank will be disabled. This can be used to only allow charging of the battery bank during times of low electricity prices or off peak tariff times.

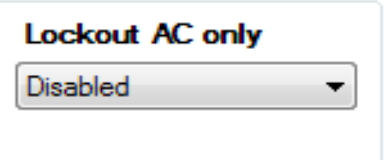
This has no effect on exporting the excess renewable to the grid.

Optionally, by enabling LOCKOUT AC ONLY, only AC Charging will be prevented. This allows for DC coupled renewable charging to continue to charge the battery bank and export any excess export whilst preventing any AC from charging including AC coupled solar..

This has no effect on the renewable input charging or exporting the excess to the grid.

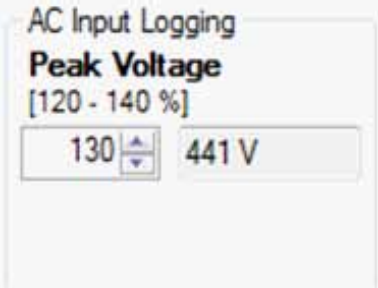
Sufficient time must be allowed in the schedules to be certain that the battery bank can be recharged appropriately in the time given.





The AC IN LOGGING is a Quality of Service monitoring function which sets the peak voltage threshold at which the inverter will record a performance data event. (Peak Voltage of AC rather than RMS - 240V AC has a peak voltage of 340 V)

If you have particularly sensitive loads such as computers and plasma TVs, you may choose to set this to a low value to monitor power quality and record any unexpected high voltages coming from external supply sources.

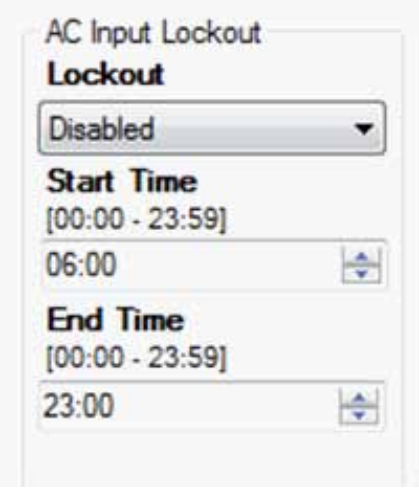


The AC INPUT LOCKOUT is a function used in the Solar Hybrid (or On Grid) configuration. It can be enabled or disabled to allow a period when the mains grid voltage will be prevented from connecting to the inverter. THE START TIME denotes when the lockout period will begin and END TIME when it will finish.

During this period you will be powering your installation directly from an AC Coupled solar and/or from energy stored in your battery. In variable tariff areas this may relate to the most expensive tariff period of the day. This setting overrides any other start command that may be configured into the SP PRO.

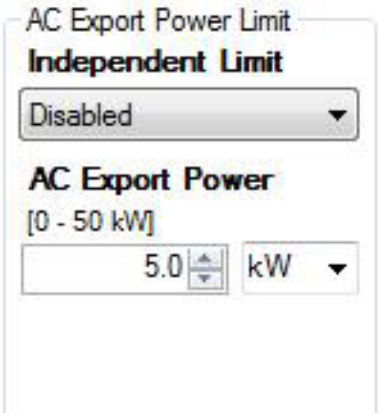
This setting differs from the AC INPUT CAPACITY SCHEDULE in the fact that the inverter has disconnected from the Grid. This means that all loads are powered from the inverter, not just the extra that keeps your input under a limit and no export is possible.

Unless disconnection from the grid is desirable, it is recommended that the AC INPUT CAPACITY SCHEDULE be used in place of AC INPUT LOCKOUT.



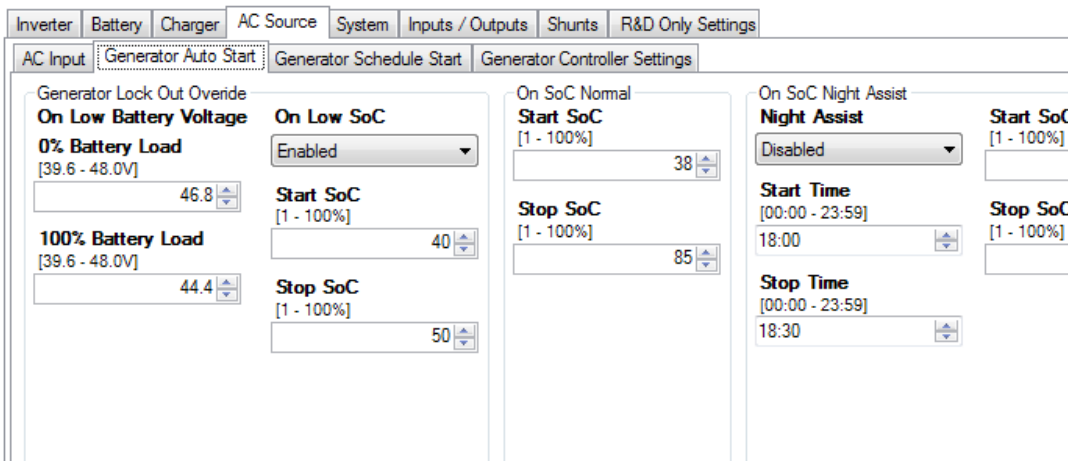
The AC Export Power Limit allows the maximum export power to be set at a different value to the AC Source Power. Enabling this Solar Hybrid (or On Grid) function will, regardless of inverter power or connected renewable, will limit the export power of the system to the power level set instead of being limited to the AC Source Power limit. Like all settings this is prevented from change by the passcode.

This gives maximum flexibility when installing systems into export capacity limited areas that require an inverter of higher power for grid outages yet due to constraints placed on the system by the grid provider are only able to export a lower power. The reverse can also be set, whereby export power is set higher than AC Source Power, in this case minimising the amount of energy drawn from the grid whilst still maintaining maximum grid export power.

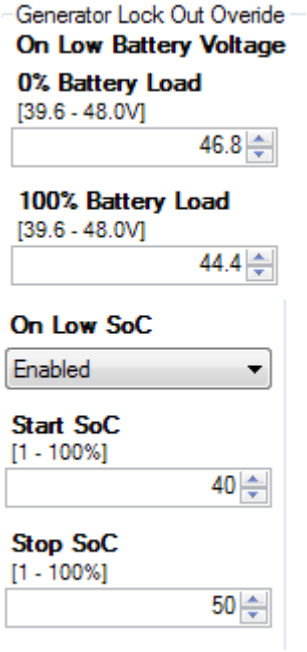


Generator Auto Start

The use of an auto start generator in an Off Grid system is essential as a backup energy source in times of poor Renewable Energy production. In an Solar Hybrid (ON Grid) system the installation of an auto start generator can also provide excellent backup in times of extended outages without the need for oversized battery bank. This section explains how to use the generator to maximise battery life whilst obtaining the lowest operating costs on your system. The Generator Auto Start tab enables you to change the conditions under which the generator will start and stop. When a generator is started it will give first priority to service the AC Loads and any leftover available generator capacity will be used to charge the batteries.



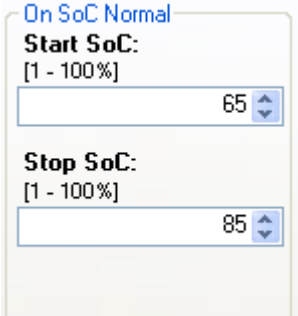
GENERATOR LOCK OUT OVERRIDE During the generator lockout period the SP PRO will override the lockout and start the generator based on battery voltage or when enabled on SoC.



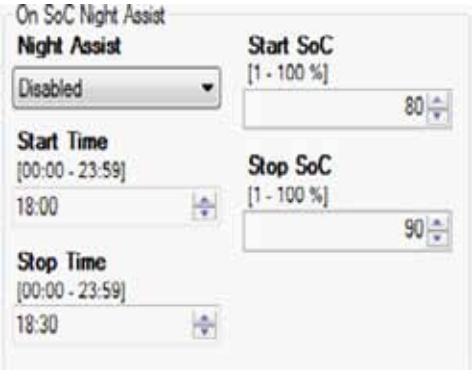
When the battery voltage drops below the ON LOW BATTERY VOLTAGE settings during the GENERATOR LOCK OUT period, the generator will start and run for the Minimum Run Time.

When the ON LOW SoC is enabled and the state of charge falls below Start SoC at any time during the GENERATOR LOCK OUT period the generator will start and run until the SoC reaches Stop SoC or at the least the Generator Minimum Run time.

The ON SoC NORMAL setting applies at times other than when other SoC Start Stop functions are active including during Generator Lock Out times. If SoC falls below Start SoC% the generator will be started and will charge until Stop SoC% or for Generator Minimum Runtime if Stop SoC% is reached before the minimum runtime has elapsed. By not allowing the generator to take the batteries to 100%, this avoids the generator from being too lightly loaded as batteries become full. It is more efficient to allow Renewable sources to fill the batteries to 100%

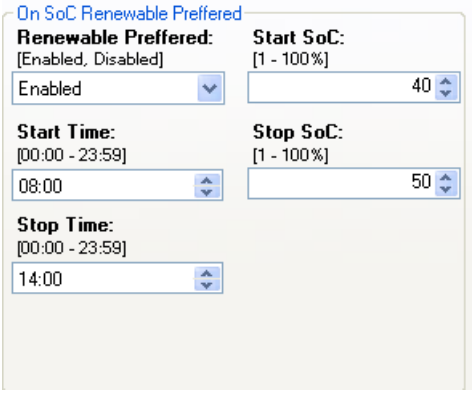


The ON SoC NIGHT ASSIST state of charge control monitors the State of Charge through your highest usage period, usually during the evening. If the battery level has dropped to the Start SoC level at the appointed time your SP PRO will start your generator and raise the state of charge until the batteries reach the Stop SoC level. This prepares your system for the night ahead.



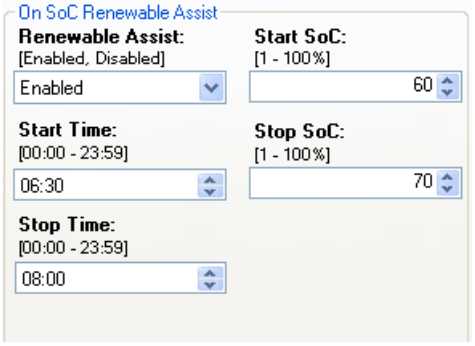
By moving the bottom slider to the right you can access more settings in this field.

ON SoC RENEWABLE PREFERRED is designed to monitor the input from your solar array and, on a day when your renewable sources may be low in output, on a cloudy day or a day with no wind, start the generator at a lower state of charge to ensure your batteries do not get too low. This setting allows you to set a Start SoC percentage and a Stop SoC percentage that will keep your batteries in a “safe” state of charge.

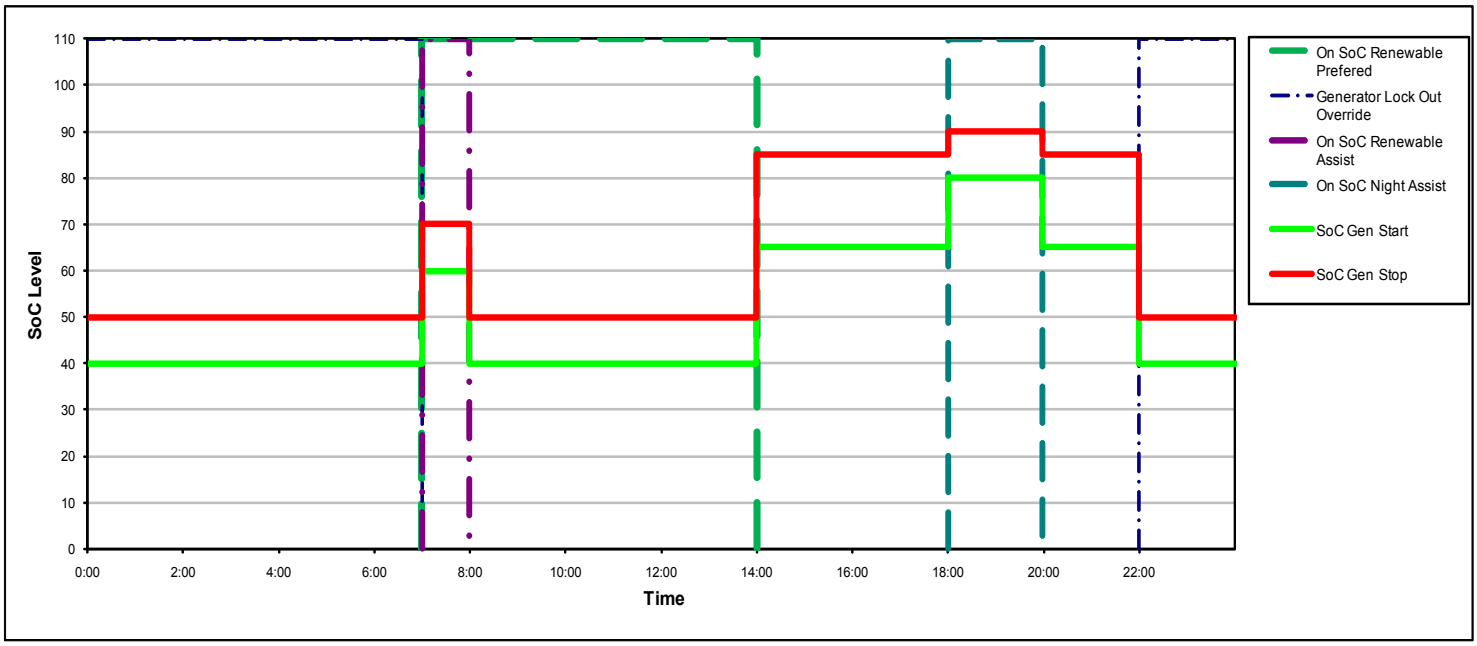


If your solar input does not meet your usual consumption level you can start the day with a compensating charge that will enable your normal solar input to fully charge the batteries.

The necessity for this charge can be worked out in conjunction with your Selectronic Accredited Integrator (Australia Only).



The combination of all these settings should give you a battery protection program that should look something like this…….

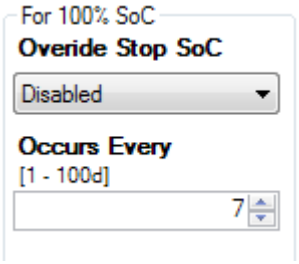


When you get up in the morning, before your solar panels are working at their best, the generator runs for an hour or so while you are cooking, or heating the bathroom for the kids, and starts the day with a support charge (see SoC Renewable Assist).

Then it shuts down during the day when you expect that the solar panels will be carrying the load; then it may start again later that night when your night load is at its highest or if there has been a cloudy day and there hasn't been as much solar input as you would have expected.

Throughout the whole day there is always the lower Generator Lockout Override "safety net" level that will not allow your batteries to get totally flat. Your Selectronic Accredited Installer can help you arrive at the most fuel efficient program to suit your particular needs.

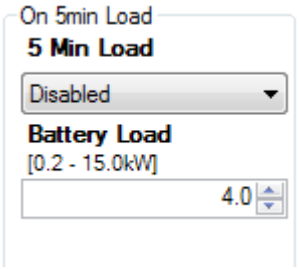
The above system of Generator Auto Start SoC Start and Stop levels prevents the generator from charging the battery bank during the batteries least energy efficient stage; the highest voltage with the least amount of absorbed amp hours. This reduces the generator run time, saving fuel.



This type of system is called Partial SoC control. A battery system will perform well in partial SoC conditions however it is desirable to periodically fully charge a battery bank and bring the SoC to 100% by allowing the charger to complete through to Float stage.

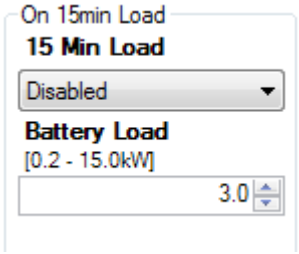
If FOR 100% SoC Override Stop SoC is enabled, in Normal or Night Assist times, it will continue the charge process right through to Float stage as often as you require. In this example it occurs every 7 days.

The generator will also start if there is a persistent load on the batteries. Battery Load sets the level at which the generator will be started if the average load exceeds the preset level for more than 5 minutes.

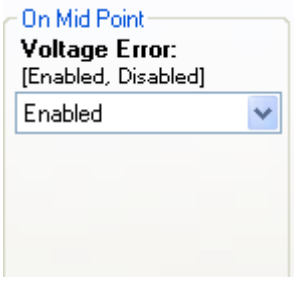


Battery Load is the actual current being drawn from the battery bank. For example, if say solar is providing all the power to the site load, then no current will be coming from the battery bank i.e. Battery Load is 0 kW and the generator won't be started.

On 15 min Load is similar to the previous screen except the settings take effect if the average load exceeds the preset limit for more than 15 minutes.

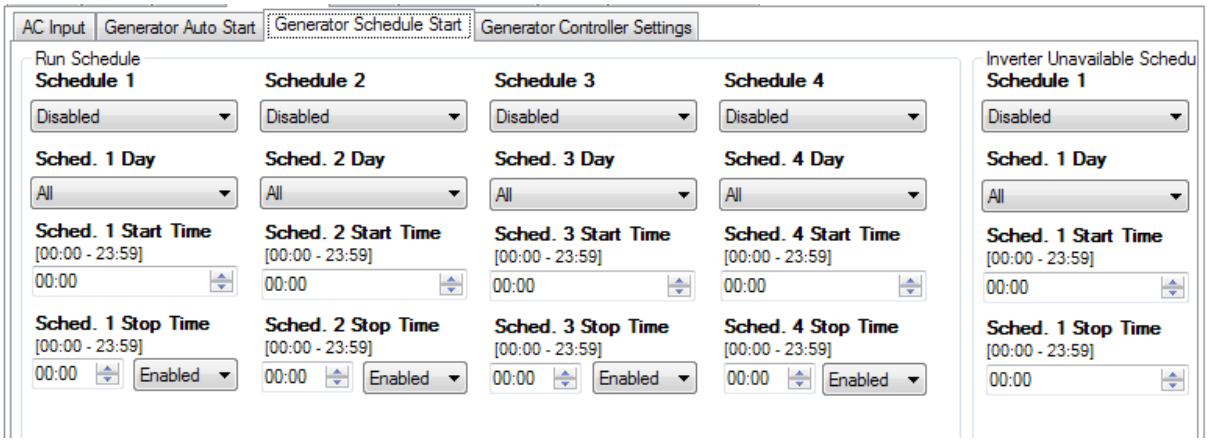


We previously discussed mid point monitoring and its ability to help determine a battery fault. This screen allows you to choose if a mid point Voltage Error should start the generator.

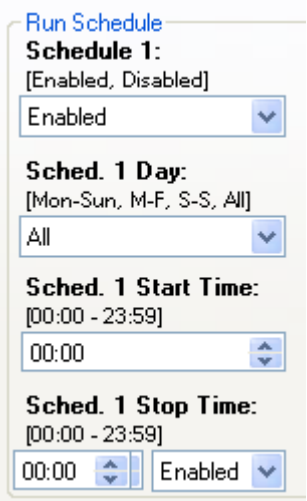


Generator Schedule Start

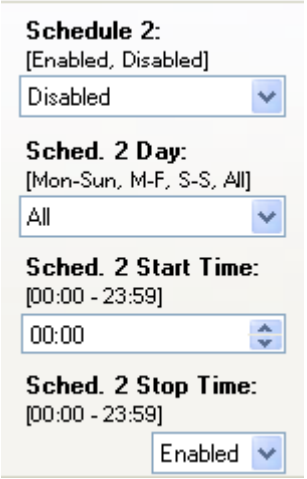
Some people have predictable times when they require a generator to run, such as when a regular plant watering routine requires pumps to run, the program contains the ability to predetermine four different schedules.



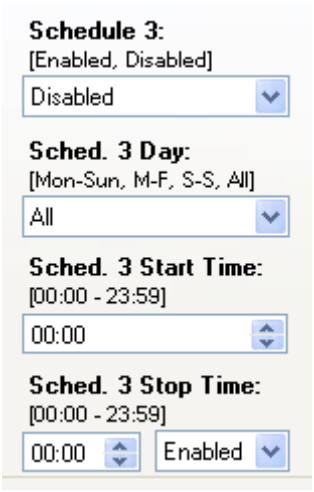
Each of the four Schedules can be enabled or disabled.



Through Schedule x Day you can choose a day of the week, all weekdays, all weekends or everyday (All).

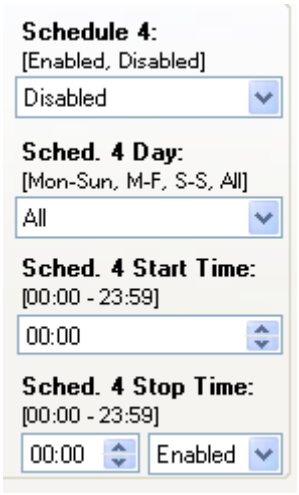


A Schedule x Start Time

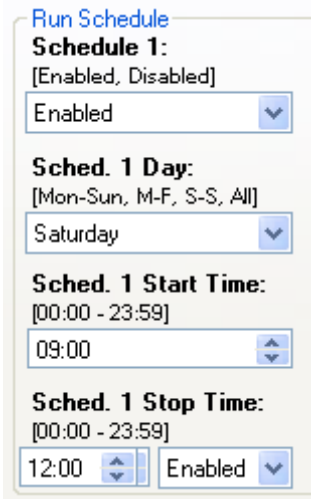


And a Schedule x Stop Time

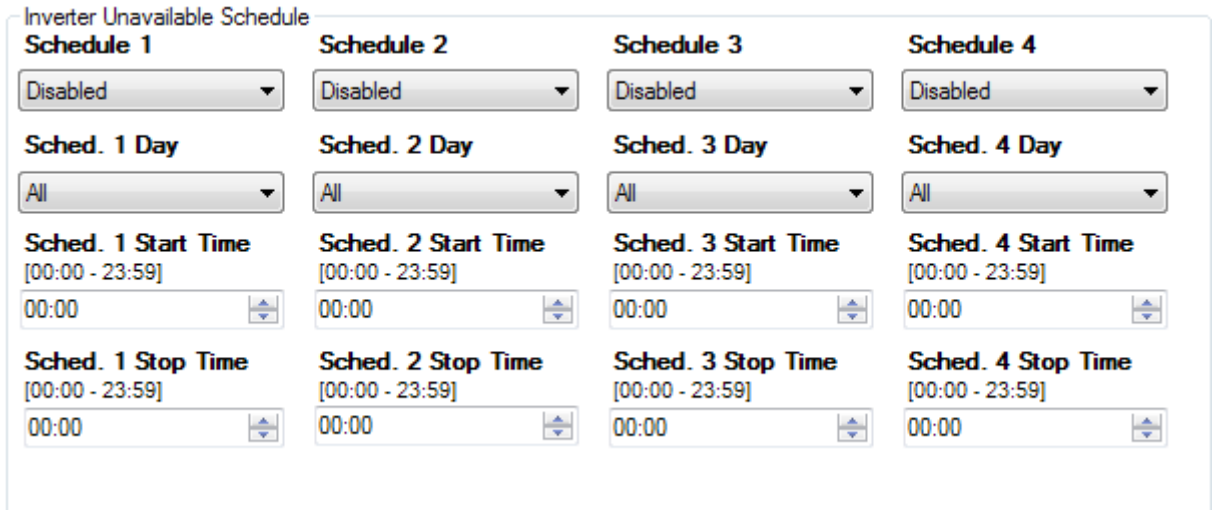
The Schedule x Stop Time can be enabled or disabled. If the stop time is enabled your SP PRO will automatically turn off the generator at the end of the scheduled time or, if disabled, the generator will continue to run if a full charge cycle has not been completed or until all other generator turn off criteria have been met.



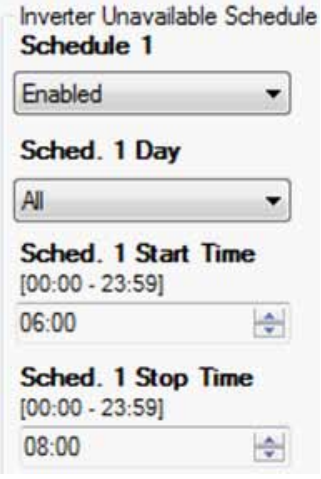
As an example, lets imagine you run a yoga class every Saturday morning and you wish to run a reverse cycle air conditioner for the period of the lesson. You may choose to run your generator during this period to prevent stress on your batteries. In this case your schedule would look like this.



By moving the slider to the right we find a INVERTER UNAVAILABLE SCHEDULE table. In the unlikely event that the SP PRO enters a shutdown condition whereby the inverter is unable to operate, the backup schedule can take effect in to start and stop the generator in addition to the existing Run Schedule. In the cases where the inverter is unable to operate, the AC Loads are powered directly from the generator via the built-in AC powered transfer contactor.

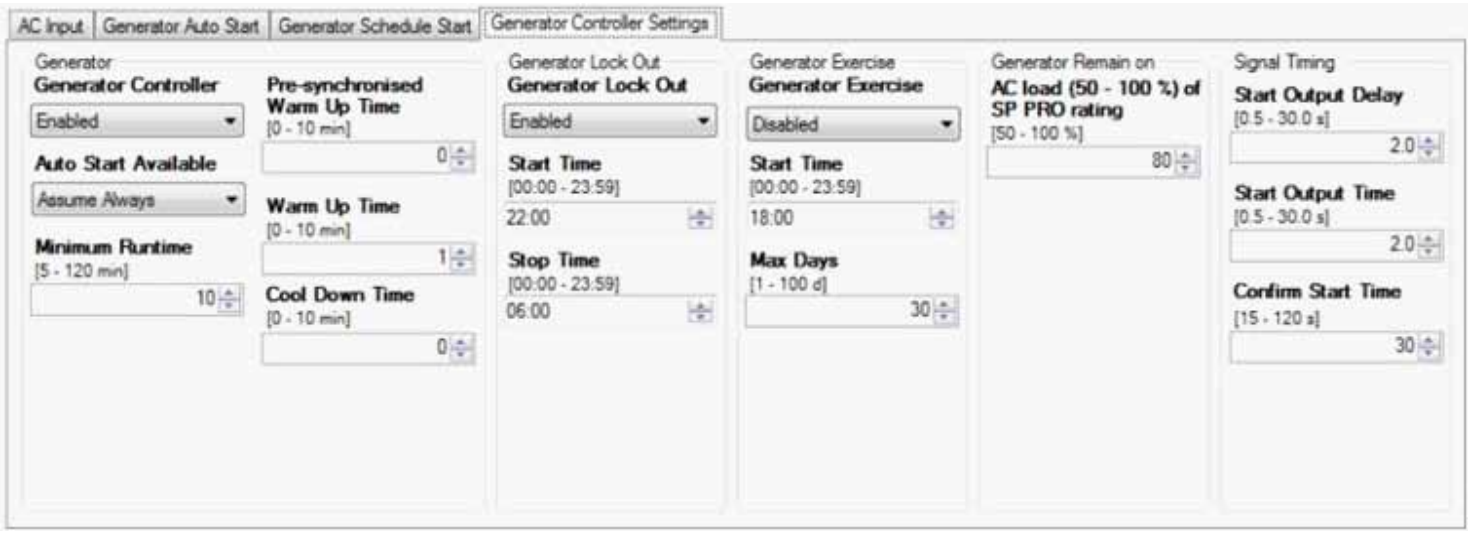


A typical example would be to run a freezer four times a day, for two hours – every day, say with the first as an example from 6 am to 8 am. This function can minimise food loss and provide a safer environment until the inverter shutdown cause is determined. The size of the generator fuel tank should be considered in the design.



Generator Control Settings

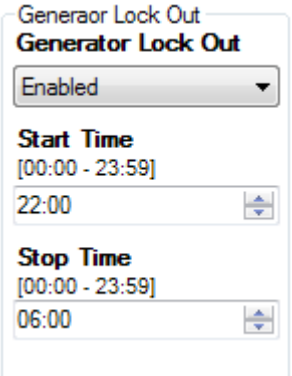
The last tab in the AC Source section is the Generator Controller Settings



If there is an automatic generator permanently connected to the system the Generator Controller setting should be set to Enabled. This is highly recommended for OFF Grid systems If there is no automatic generator connected it should be Disabled.
The Generator Available control allows 2 states. Follow Input allows you to switch the generator availability on and off with an input signal (normally 12 volts from the generator). This ensures that the SP PRO will not try to start the generator if it has become unavailable, e.g. starter battery flat or generator maintenance is being performed. Assume Always allows the inverter to operate as if the generator is always available.
Minimum Runtime determines the shortest time the generator will run. This is to ensure the generator wont start and stop too frequently.

The PRE-SYNCHRONISED WARM UP TIME is the length of time, after the generator starts, before the generator is connected (Transferred) to any load.

This is then followed by the WARM UP TIME, the length of time, after the PRE-SYNCHRONISED WARM UP TIME, before a charging sequence starts. Once synchronised, the AC Load is transferred to the generator during the WARM UP TIME. The staged warm up sequence allows the generator to circulate the oil within the motor thoroughly and to allow the motor to reach operating temperature before being heavily loaded by the charger.

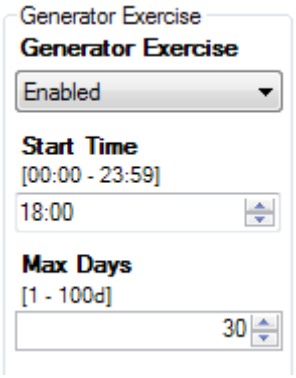


COOL DOWN TIME disconnects the load from a generator for a period of time before shutdown to allow turbochargers to cool down before switching off. The COOL DOWN is overridden if generator is stopped using front panel push button.

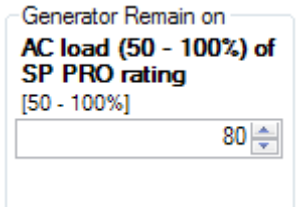
GENERATOR LOCK OUT provides a “quiet time” when the generator will not run unless the batteries get to a dangerously low level ..low level as set in the Generator Lockout Override (“Generator Auto start” tab). This setting is generally used for overnight operation.

If your system design calls for very little, or infrequent generator input it is wise to run the generator sometimes to keep the internal parts of the motor covered with oil and to keep the starting battery charged.

In this screen you can choose whether to have the Exercise feature enabled or disabled, what Start Time you choose. Max Days determines how many days between generator starts. In this example the generator would start 30 days after the last time the generator was called for, would start at 18:00 and would run for the period set in Minimum Runtime.



This feature allows you to determine what size load will keep your generator running rather than shutting down after a stop limit has been achieved, thus avoiding significant battery discharge. This term is expressed as a percentage of your inverter size. In this example the inverter is a 6 kW inverter so 80% of that would mean that if the load on the system exceeded 4.8 kW the generator would continue to run.



The START OUTPUT DELAY setting determines the length of time after the generator run signal is initiated by the SP PRO, either by an external request, load requirement or by a battery charge requirement, before the generator start pulse is initiated.

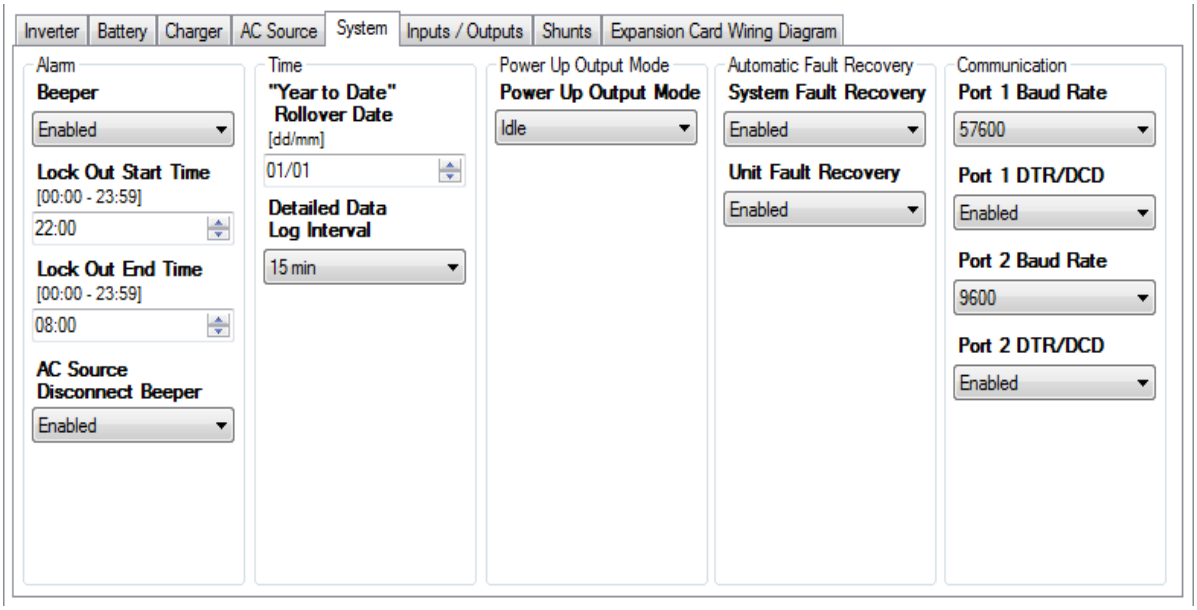
START OUTPUT TIME is the length of time a start pulse is sent. This output can be used in a pulse start/pulse stop type generator control.

CONFIRM START TIME is the time the SP PRO waits before deciding the generator hasn't started. The SP PRO will try a total of three times to get the generator running with a 60 second pause between each attempt.

System Settings

Back to the main tabs and we now look at some system requirements.

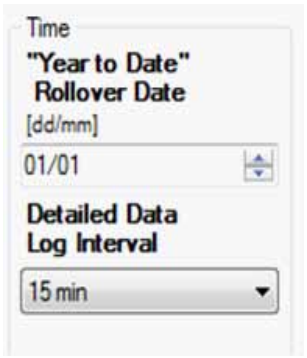
In this section we will look at how the SP PRO works with the whole system. Whether the SP PRO will automatically recover from system faults, how it will alert you of problems and how it links with your computer and other communication devices.



Your SP PRO is configured to recognise, and report, a number of events that can cause damage to your system, such as overloads, low voltage batteries. These events can be announced by a beeper within the SP PRO.

The Alarm - Beeper, may be set to be on, off or only on during a specific period. In this way you may ensure the beeper does not sound during the lockout period. You may set a LOCKOUT START TIME and a LOCKOUT END TIME.

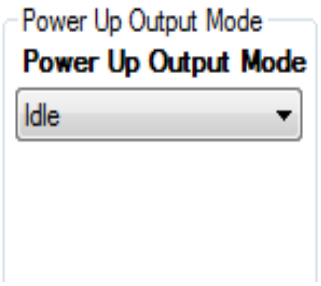
The AC SOURCE DISCONNECT BEEPER provides an alert signal (five short beeps), once per minute, if the SP PRO is not synchronised to the AC Source. This is enabled by default when On Grid is selected and is used to indicate that the system is running on battery supply during grid outages.



The Year to Date feature of the unit is used to monitor the systems performance on an annual basis. You can choose the start date of that year with "YEAR TO DATE" ROLLOVER DATE. This could be the day you installed it, the first day of the year or another date that is relevant to your installation.

Through DETAILED DATA LOG INTERVAL you can choose how often an entry is made. A short interval of 1 minute will give more detailed information, but for only four days. A long interval of 30 minutes will give less detail but 120 days of records. A 15 minute setting records for 60 days and gives a good balance between detail and the number of days recorded.

The ON front panel button is used to choose whether the inverter is
Idle - SP PRO is monitoring but providing no inverter output,
ON - Inverter output is operating normally, or
Econo - Operating normally plus sensing load conditions.
By default, when the battery supply is connected, the SP PRO will power up in Idle mode.
With the POWER UP OUTPUT MODE setting, this can be changed to power up and come On, or power up in Econo mode, without having to press the ON button.
The ON button operation is unaffected by this setting.

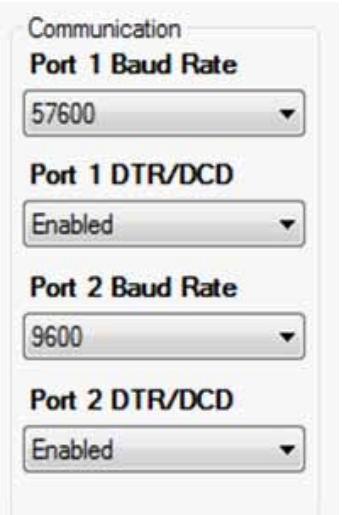


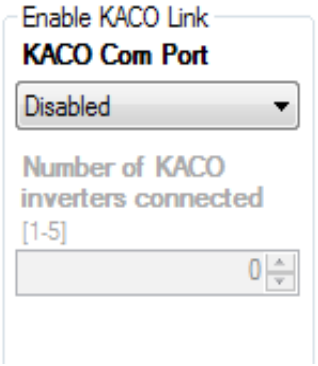
Your SP PRO has the ability to automatically attempt to recover from a fault situation. If SYSTEM FAULT RECOVERY is enabled the SP PRO will monitor the situation that created the fault, such as low battery voltage, and return the inverter to operation if the battery voltage returns to a suitable level. Similarly if Unit Fault Recovery is enabled an internal problem within the SP PRO, such as overheating, is monitored and normal operation continued if the problem is resolved.

Your SP PRO is designed to communicate with an external computer, either directly connected or via a communications device to a distant location.
There are two ports for this data transfer. When connecting through a modem DTR/DCD control signals allow the modem to signal the SP PRO that a modem connection has been established and when that connection has been dropped.

These control signals can be enabled through Port 1 DTR/DCD and Port 2 DTR/DCD while the speed of the data flow can be set with Port 1 Baud Rate and Port 2 Baud Rate. If you are not sure to what speed your modem should be set you should seek the advice of the supplier of the device however, most devices will operate at your SP PROs default setting of 9600 bps. When connecting directly with a computer through the USB port or data cables the rate would normally be set at 57600 bps.

Note: Port 1 DTR/DCD is only provided for backward compatibility with previous SP PRO models and is no longer supported.

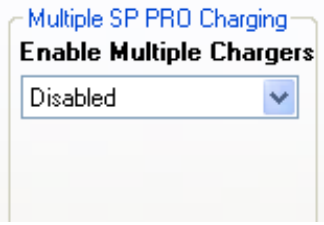




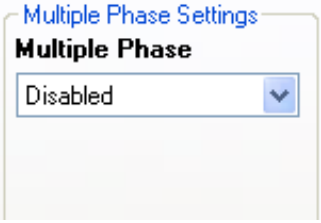
KACO LINK allows the SP PRO to communicate with your KACO Powador 02 series grid feed inverter manufactured after January 2011 which and provide an efficient and convenient method of adding solar to a system through the AC Bus. To enable managed KACO AC Coupling this must be set to RS485 or if listed RS485 on Port 2.

Selections other than RS485 may be listed and are provided for backward compatibility only and are no longer supported.

For managed KACO AC Coupling, the NUMBER OF KACO INVERTERS CONNECTED needs to be set into the SP PRO. Set this to the number of connected KACO units. The maximum number of KACO units that can be installed is 5, the combined AC output of all connected KACO inverters cannot exceed twice the output rating of the SP PRO. The RS485 address must be set in each KACO inverter, sequentially starting from RS485 address 1.



Systems with more than just one SP PRO (two phase or three phase systems), have to be set to accommodate multiple SP PRO charging sources. For each SP PRO connected into the same battery bank, ENABLE MULTIPLE CHARGERS.



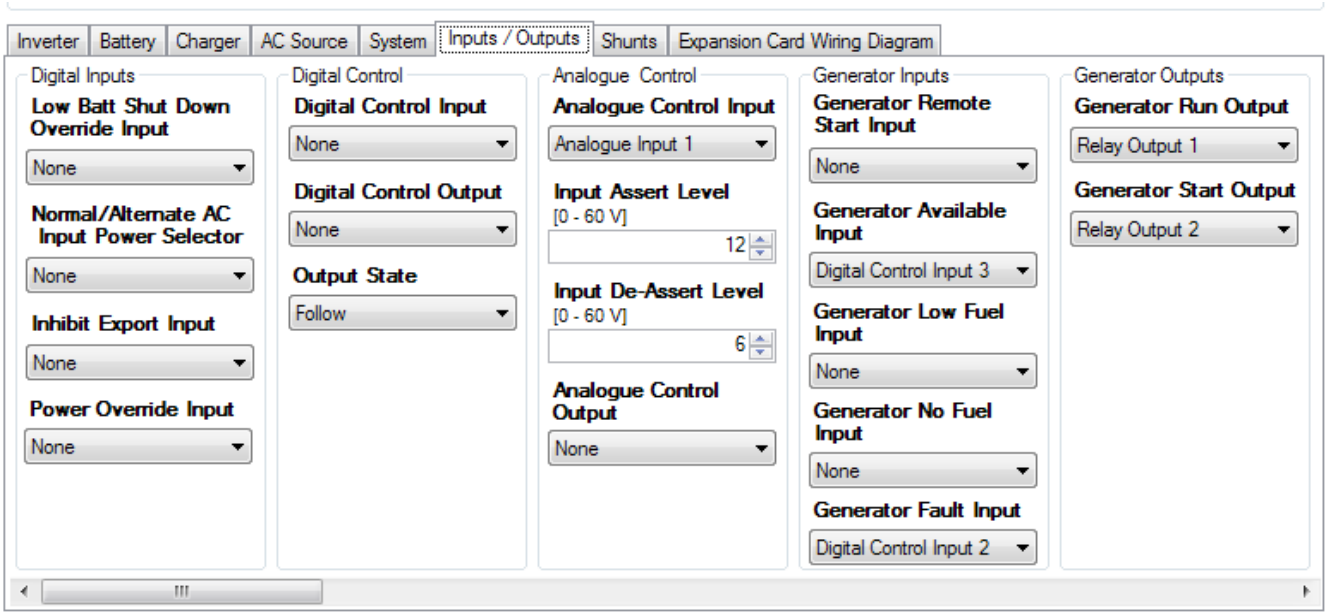
The SP PRO can operate in a Multiple Phase configuration. Each SP PRO in these configurations must be set to either be the L1 - Primary controller or L2, L3 Secondary devices.

Multiple Phase configurations require the use of external SYNC signalling and additional control wiring between each phase unit. Consult specific Three Phase installation instructions for further details and specific configuration requirements.

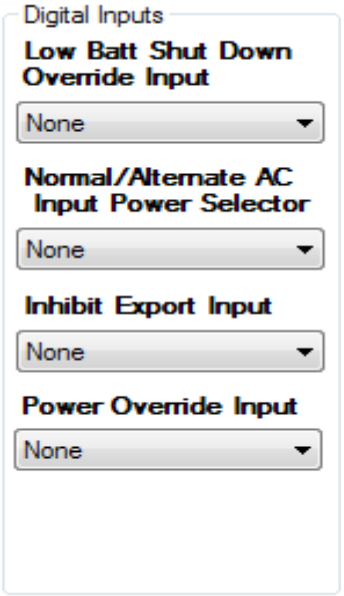
Input and Output Settings

The next main tab is Inputs / Outputs.

Your inverter contains 4 digital inputs, 4 relay outputs, 2 analogue inputs (excluding 120 V models) and 3 digital outputs, and these form the heart of the flexibility and sophistication of your SP PROs interface with the outside world.
With these controls you can monitor when various set points are reached, switch on appliances when certain criteria are met, protect your generator from damage due to low oil pressure, schedule a watering system to switch on and off and many other functions.
We will give you a few examples of how to use these functions later in the manual, however your individual needs will vary and, if necessary, your local Selectronic Accredited Integrator will be able to assist you with advanced system design.



The LOW BATT SHUTDOWN OVERRIDE INPUT function is known here at Selectronic as the “Just Go” control. In case of emergency, even if the batteries would normally be considered too flat to safely run the inverter, activating this input will force the inverter to run, until there is insufficient battery power left to maintain the load. This is considered essential if, say, phones or a fire pump MUST be operated.



When a second AC Source with a different capacity to the primary AC Source, is available to the system, use the NORMAL/ALTERNATE AC INPUT POWER SELECTOR setting to set the input that you wish to use to select the secondary power level. The secondary source power level is selected in Alternative AC Source Power back in the AC Input section. When Alternate is selected, AC Input Charger and Capacity plus Inverter Lockout Schedules no longer apply.

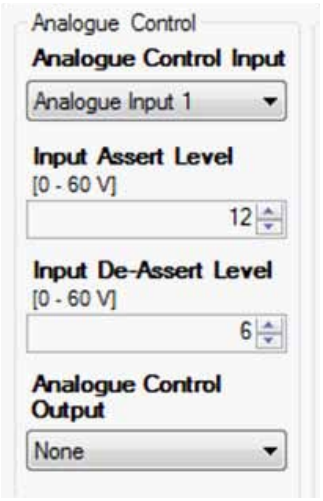
In some circumstances you may wish to prevent the SP PRO from exporting excess energy to the grid such as when the grid has failed and you have connected a diesel generator into the system. Using INHIBIT EXPORT INPUT in conjunction with the Normal/Alternate AC Input you can switch to a different power level and know that the SP PRO will not try to export power to your motor generator.

POWER OVERRIDE INPUT. No function within standard SP PRO units. Contact Selectronic for details.

The Digital Control section is used to switch an output on or off with a digital input. For example, if a positive input, from a level switch in a water tank, was received by DIGITAL INPUT 2 RELAY OUTPUT 4 would be activated to switch on a water pump. This output can be reversed in the Output State section. In the given example a positive input from an upper float switch could switch off a water pump.

In short you can control many different types of appliances or warning devices from digital inputs.
The switching of a digital input is recorded as events on the event log and can be monitored by downloading data.

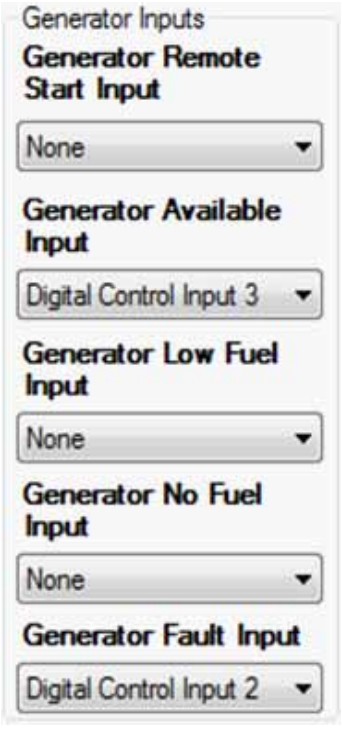
Your SP PRO has two analogue inputs that can control the full range of output options. An analogue input differs from a digital input in that instead of reacting to an on/off type signal as a digital input does, an analogue input reacts to a preprogrammed upper and lower voltage level.



As an example if a suitable moisture sensor was connected to Analog Input 1 the output from Relay Output 3 could be used to switch a watering system on and off depending on the moisture content of the soil.

Your Selectronic Accredited Integrator can help you with specific applications that you may require.

Sometimes it is convenient to be able to remotely start your generator when you are away from the power area. With this function you can program one of your digital inputs to perform this function.

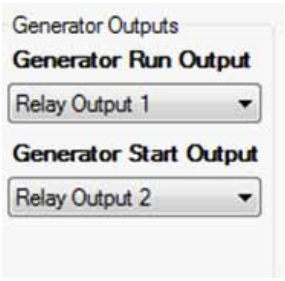


Your digital inputs can be used to protect your motor generator. One or more of the digital inputs can be configured to activate actions, warnings and shut down protection. In the Available control you can determine wether your generator is available for automatic control. This is particularly useful to prevent the generator from starting during maintenance or refuelling.

The LOW FUEL input will initiate an alarm when a suitably positioned sensor provides a warning that the fuel level within the fuel tank is low. The NO FUEL input will either stop the generator or prevent your SP PRO from attempting to start the generator when there is no fuel.

The FAULT input can detect signals from your generator control system to either stop the generator or prevent your SP PRO from attempting to start the generator when a fault is present in the generator.

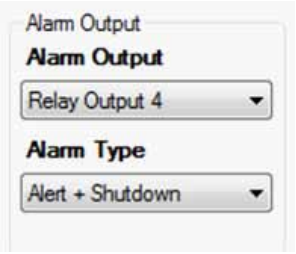
In Generator Outputs you can configure the Run and Start outputs to suit the starting requirements of your motor generator. The Run output will provides a start and run signal for a two wire generator controller. The Start output provides a start and stop pulse signal for three wire generator controllers. See Signal Timing under the Generator Controller settings.



Your SP PRO can recognise and alert you to many potential situations that may prejudice the smooth operation of your power system.

You can configure one of the outputs in your SP PRO to activate an external alarm, visual or audible, to alert you there may be a problem.

The OUTPUT field allows you to choose which output will be activated while the ALARM TYPE field lets you choose if you will be advised of Alerts (warnings of potential problems), Shutdowns (events that have caused the inverter to shut down) or both.

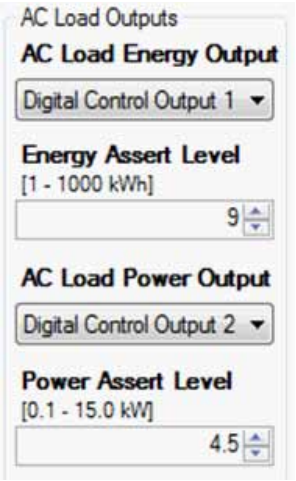


Your SP PRO can help you to manage your system by advising you when certain output levels have been exceeded.

For the purposes of demonstration let's assume your system has been designed to provide 10 kilowatt hours a day and you consider any load exceeding 5 kilowatts is considered excessive.

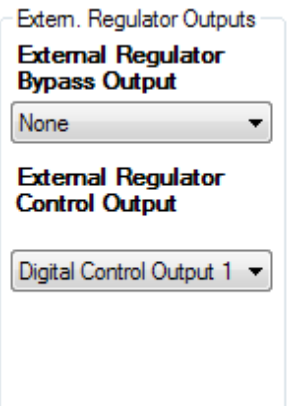
In the example given AC LOAD ENERGY OUTPUT has been set to Digital Control Output 1 and this output will be activated when your daily usage reaches 9 kilowatt hours, as programmed into ENERGY ASSERT LEVEL.

Set at this level your inverter will advise you when you are approaching the design limit of your system and allow you to choose if you wish to modify your power consumption for the remainder of the day. Similarly AC LOAD POWER OUTPUT has been allocated to Digital Control Output 2 and this output will be activated if the AC load on your system reaches the POWER ASSERT LEVEL of 4.5 kilowatts

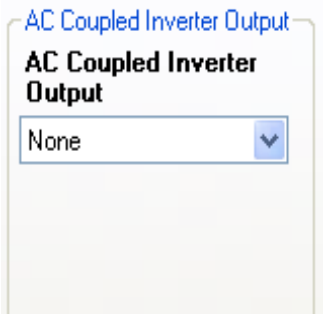


External Regulator Bypass Output can be used to control a relay that will bypass your solar or wind generator regulator to allow the full renewable output to be forwarded to the battery or exported to the grid.

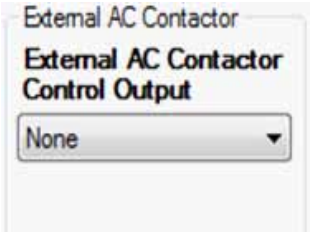
The External Regulator Control Output provides a PWM signal to drive an external solar regulator



The AC Coupled Inverter Output drives an external solid state relay to control when the AC Coupled inverter feeds to the grid, local AC Load and battery bank. This is suitable for switching any Grid feed inverter.

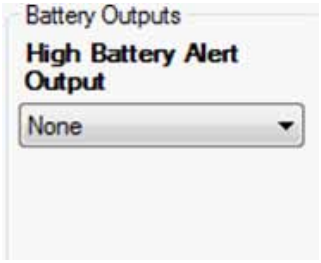


If you are using an external contactor this output provides a control signal for actuating the contactor coil.
This control is also used to provide a grid failure alarm. The output is active during a grid outage.

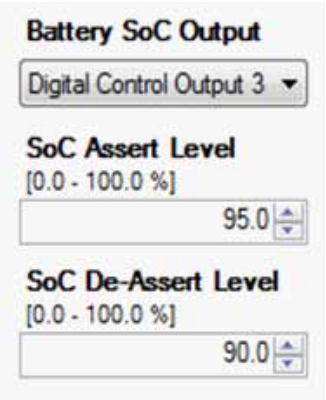


The next section within Inputs/Outputs covers output activation relating to the condition of the battery.

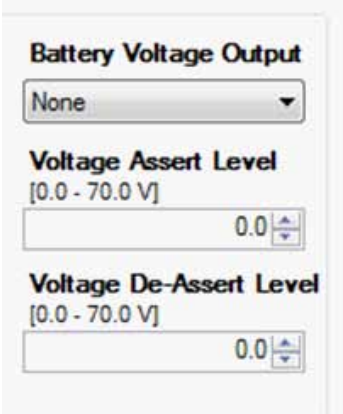
HI BATTERY ALERT initiates the chosen output when the battery voltage reaches the point set at Hi Battery Alert in the Limits section in the Battery Settings Limits section.



BATTERY SOC OUTPUT initiates the chosen output when the SoC Assert Level reaches the programmed level then switches off the output when the SoC De-Assert Level is reached.
An example of this would be if you wanted to provide a “Computer games allowed” light for the kids. The light could be switched on when the state of charge reached, say, 95% and switched off when a lower level was reached.



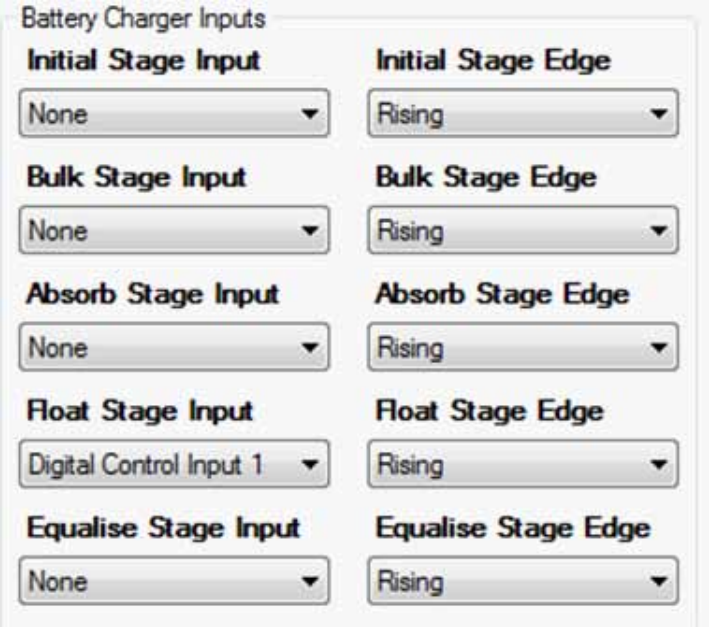
This setting is similar to the prior setting but is based on battery voltage instead of state of charge.



BATTERY CHARGER INPUTS are used in a variety of ways to help integrate the SP PRO with other renewable chargers. All work in a similar way but just move the charger to a different charging mode.

Care must be taken when using these inputs as improper use can prevent the charger working correctly. Consult your Selectronic Authorised Integrator for assistance.

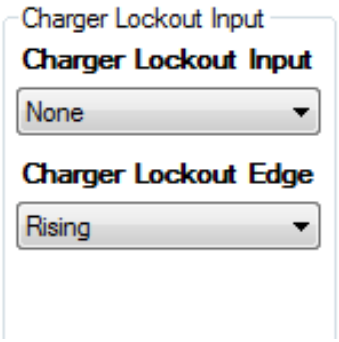
The most commonly used would be the Float Stage Input.



FLOAT STAGE INPUT. Using the drop down menus you can choose which Digital Input you wish to use to control a function. Making this input high or active (> 6 V DC) will force the inverter charge controller into the “Float” stage of the charging process.

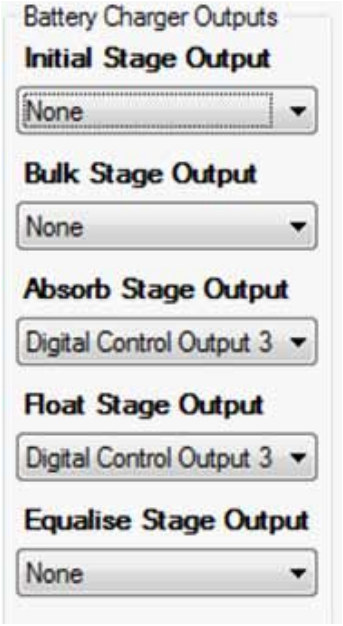
FLOAT STAGE EDGE Consult your regulator manufacturer to determine the output signal your chosen regulator provides. The most common is the default of Rising edge.

CHARGER LOCKOUT INPUT. This input is used to signal the SP PRO to stop allowing or performing any battery charging. This can be useful in controlling when the grid supply is allowed to perform any battery recharge.



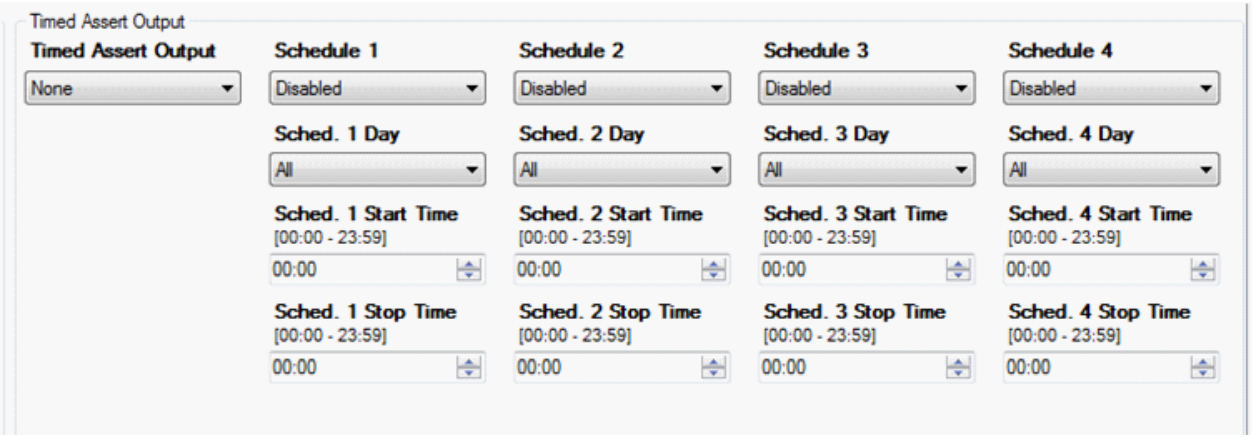
CHARGER LOCKOUT EDGE. The edge type determines what the SP PRO recognises as a change in the signal. The most common setting is BOTH. When set to BOTH, when the signal is turned on, no charging is allowed and when the signal is removed, charging is once again allowed.

Battery Charger Outputs also help with integration of external chargers but also be used to turn on or off various loads depending on what charge stage the charger is in. All outputs work in the same way, when the charger is in that charging phase, the corresponding output will turn on and subsequently turn off when no longer in that charging phase.



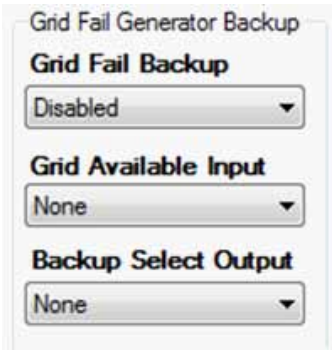
For example, you may wish to only turn on any pumping equipment when the charging process is nearing competition and whilst the charger remains in Float. By selecting the same output "Digital Control Output 3" for both Absorb Stage and Float Stage and the output will remain on during both of those charging stages.

A timed schedule similar to the generator run schedule is also provided for a digital output. This facility allows you to control the regular operation of appliances around your home. A typical example would be to turn on a watering system every night for a fixed period.



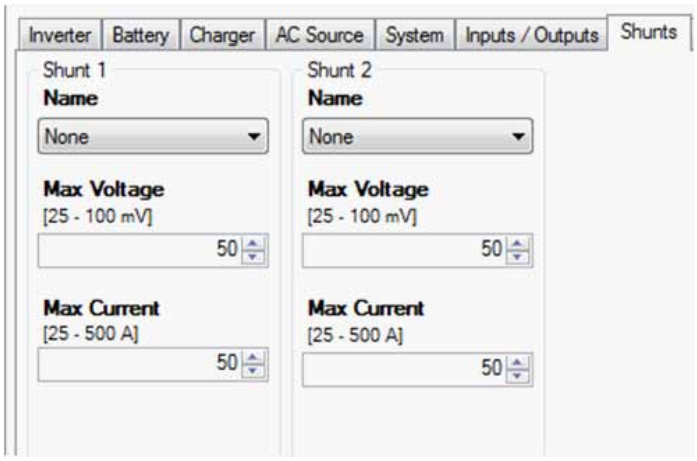
The final section controls the Solar Hybrid function allowing for a Backup Generator to be automatically controlled during times of Grid failure.

These setting must be used in conjunction with an optional external controller supplied by Selectronic. Full details of correct settings will be supplied with the optional controller.



Shunts Settings

The Shunts tab contains settings required to configure any connected current shunts that measure other DC currents coming into and going out of your system. The readings obtained from these shunts are essential to accurately calculate the state of charge of your batteries. These shunts can be configured to read inputs, such as Solar or wind generator input or DC loads such as a low voltage pump or lighting.



A shunt is NOT required to measure the inverter current. This is measured internally.

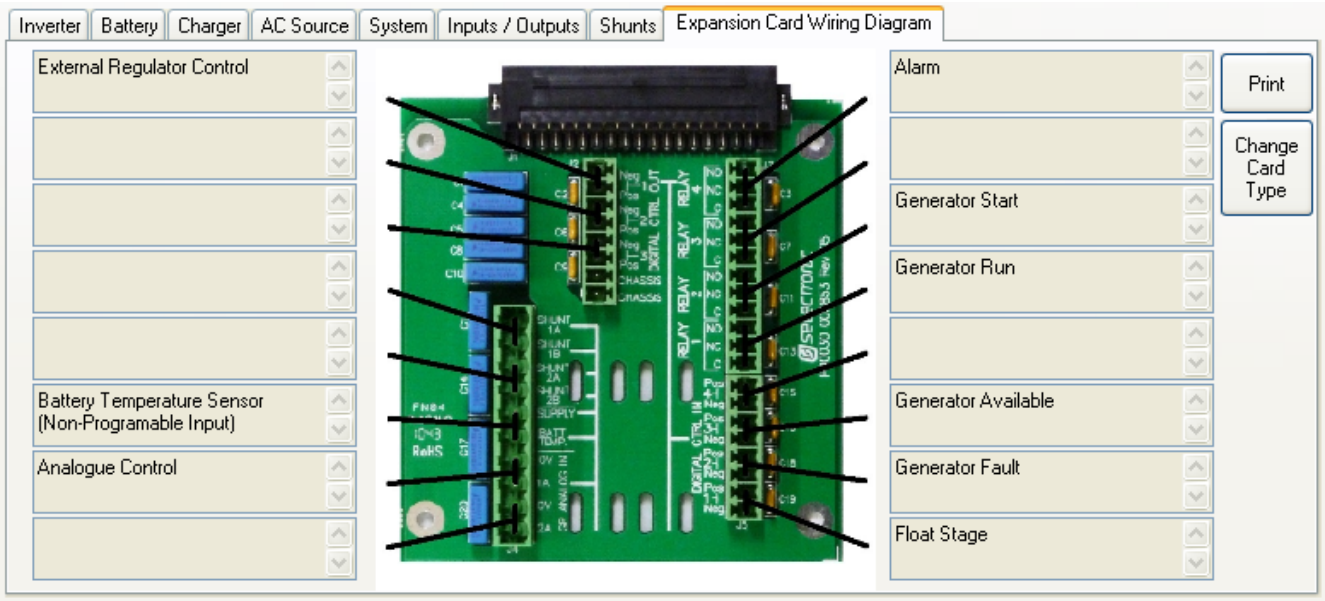
All shunts are calibrated for the maximum current they will carry and the number of millivolts that can be measured across them at that maximum current. If you are unsure of these figures please seek the advice of the supplier of the equipment.

Configuration Setting Expansion Card Wiring Diagram

The Configuration Setting Expansion Card Wiring Diagram shows how you have allocated the input and output functions. It can be used as a guide to placement of control wiring. This diagram is a display of the Configuration Settings on the PC, not the actual settings in the SP PRO.

This guide can be printed for reference during installation and will also include the Site Information.

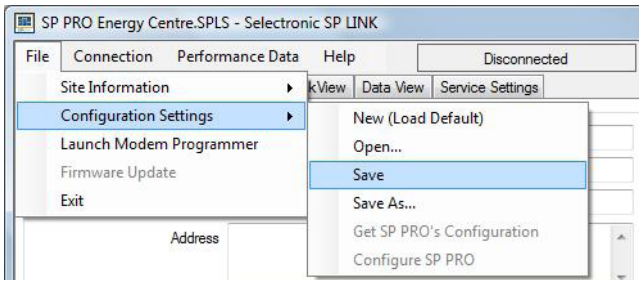
Expansion card picture may vary depending on SP PRO model. Click Change Card Type to change display to suit your model.



Default Off Grid configuration shown.

Save and Configure SP PRO Settings

Your configuration settings may now be saved to file or sent to the SP PRO using the Configure SP PRO button.



To save the SP PRO configuration settings, click on File - Configuration Settings - Save.

To configure the SP PRO, ensure SP LINK is connected (via connection menu) to the SP PRO and then click Configure SP PRO either on the Configuration Screen or in the File - Configuration Settings menu.

Remember that all settings are sent to the SP PRO, not just the ones you have changed. The default passcode is 74. It can be changed in Service Settings.

Performance Monitoring

Performance Monitoring

SP LINK provides a number of options to monitor in real time or review the history of all modes of operation of the power system. These options are -

- Customer Interface
  - Quick View - real time summary of SP PRO system
- Integrator / User Interface
  - Data View - real time detailed information of what is occurring
    - Now,
    - Today and what has occurred
    - Historically
- Integrator / User information
  - Performance Data
    - Historical records for displaying graphically

Customer Interface

The customer interface is called Quick View. Quick View presents you with a screen that mimics the front panel of your SP PRO along with a real time overview of the condition of your system.

SP LINK Auto QuickView

QuickView can easily be accessed directly from the computers desktop. Click the SP LINK Auto QuickView icon (installed automatically with SP LINK) and the last site will automatically be loaded and a connection (if possible) established.

Integrator / User Interface

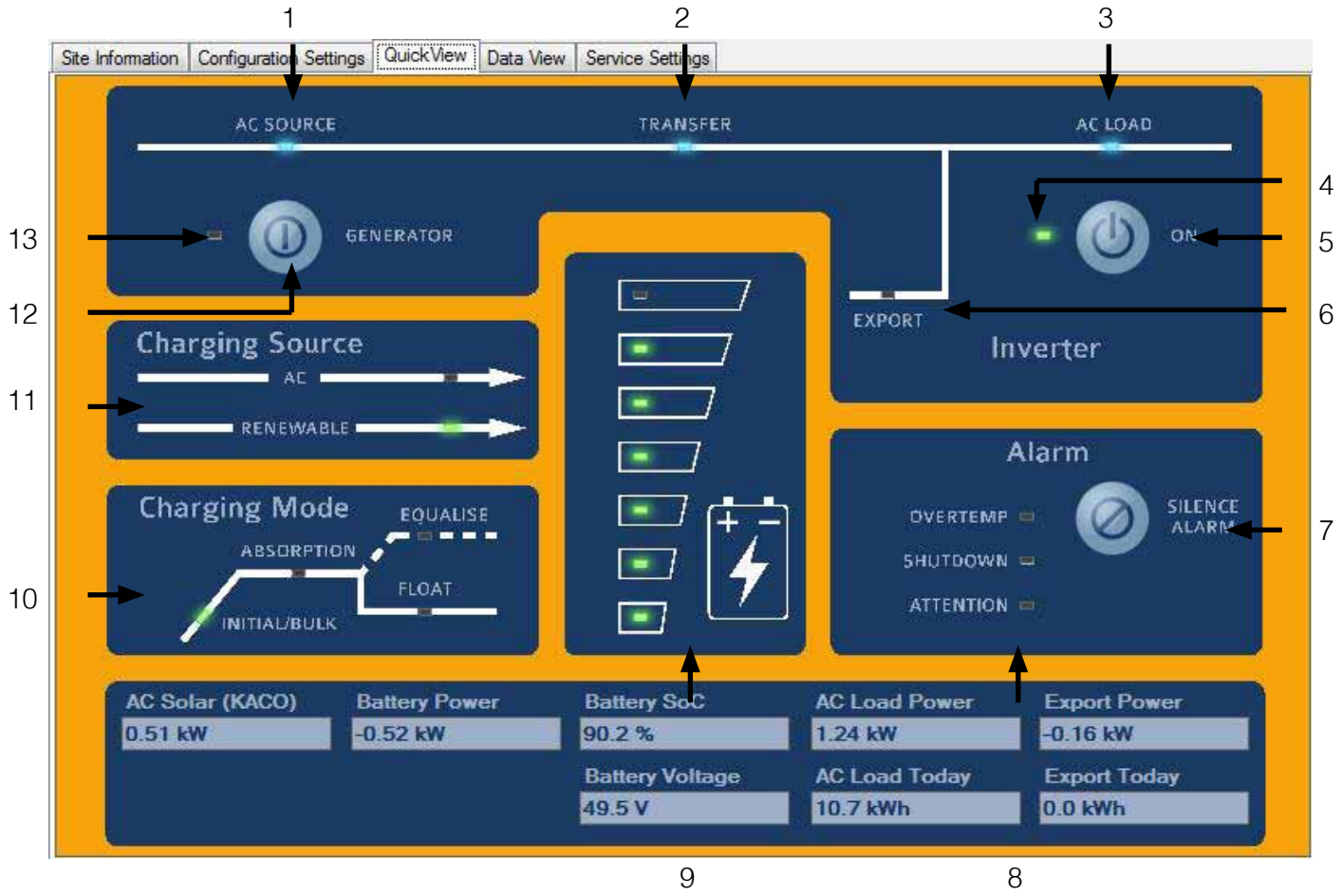
The Integrator and User interface is called Data View. Data view contains a number of sections which provide numerical details on the systems operation and status of the SP PRO.

Each section contains details for

- Now
- Today
- DC History
- AC History
- Technical Data
- Expansion Card Wiring

Quick View

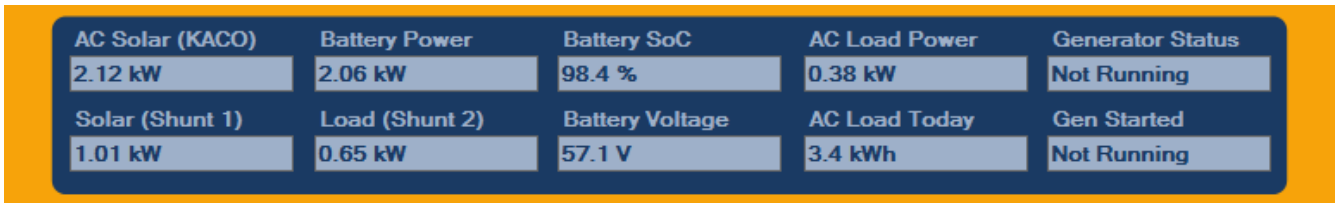
Quick View presents you with a screen that mimics the front panel of your SP PRO along with a real time overview of the condition of your system.



The following page lists the SP PRO control and indicators which correspond to the labelled image above.

The overview shown is for a Solar Hybrid (On Grid) system. The real time overview values shows how much power is being produced (AC Solar) and exported (Export Power and Export Today) as well as the present consumption (AC Load Power and AC Load Today). The battery condition (Battery SoC and Battery Voltage) is also indicated.

The overview for a Off Grid system varies slightly such that the Export Power and Export Today are replaced by the Generator Status and Gen Started.



DC shunts are enabled in this example and their real time values are shown as Solar (Shunt 1) and Load (Shunt 2).

1 AC SOURCE *

When illuminated,this shows the presence of AC supply voltage from either a motor generator or the mains grid, whichever is applicable. This is powered directly from the incoming AC supply.

2 TRANSFER *

Illuminated when an external AC supply is connected through to the AC LOAD output. If AC SOURCE is illuminated but not TRANSFER, it would generally indicate that the AC supply is out of sync tolerance – either the voltage or the frequency is beyond the set limits. If the AC supply is a motor generator, check if it needs servicing; if the mains grid, check with your supplier for a problem, or for either, that the set limits are suitable. It is normal operation for this to flicker slightly.

3 AC LOAD *

When illuminated, this shows the presence of AC voltage ready to supply loads. This is powered directly from the inverter AC output or AC supply.

* These indicators will operate without any DC connection to the SP PRO. An external AC supply will activate the AC bypass and illuminate these indicators.

4 OUTPUT MODE STATUS

Off	SP PRO is Idle - Monitoring and logging but no inverter AC output.
Steady Green	The SP PRO is On.
Slow Flashing Green	SP PRO Econo mode is active and is sensing load conditions.
Fast Flashing Green	SP PRO is preparing to start.
Steady Red	Indicates that a Fault has been detected and no inverter output is possible.
Flashing Red	Indicates an open circuit or poor battery connection and no inverter output is possible.

5 ON BUTTON

A LONG PRESS (>1 second) - turns the SP PRO On, another long press SP PRO reverts to Idle.
A SHORT PRESS (<1 second) - activates Econo mode.

6 EXPORT

In grid connected systems, indicates that the SP PRO is feeding power: On, renewable exporting to the grid and supply AC Load; Flashing, supplying the AC Load.

7 SILENCE ALARM BUTTON

The Silence Alarm button cancels any audible alarm. This does not remove the alarm, just the audible component.

8 ALARM INDICATORS

OVERTEMP

Yellow	SP PRO is approaching an over temperature situation
Red	SP PRO has shutdown due to an over temperature situation

SHUTDOWN

Yellow	SP PRO is approaching a shutdown situation
Red	SP PRO has shutdown

ATTENTION

Off	Normal
Yellow	Attention Required Fan Service Request
Flashing Yellow	Clean Fan or Fan Fault Capacitor Service Request
Red	Immediate Attention required
Flashing RED	Unit Fault

See Attention Required in SP LINK Data View - Now section to determine specific reason for the attention indicator.

9 BATTERY "FUEL" GAUGE

These represent either the battery voltage or State of Charge (SoC). By default, battery voltage is indicated. All indicators on green indicate Float or higher voltage. If just the bottom indicator is on red, battery voltage is approaching the SP PRO Shutdown voltage.

If your SP PRO has SoC Control enabled, these will represent the percentage of usable charge remaining in the batteries. Usable charge is defined from 100% SoC down to the Shutdown SoC parameter.

Top Indicator	
Flashing RED	Instant Hi DC Voltage Shutdown
Bottom Indicator	
Yellow	Low Battery
Red	Low Battery Shutdown
Flashing RED	Instant Low DC Voltage Shutdown

When all are flashing RED, inverter is in Low DC Shutdown Override. In emergency situations, this override enables the SP PRO to be forced to work beyond the battery shutdown limits. The SP PRO will continue to operate at reduced capacity until the battery can no longer supply enough to keep the inverter and loads running. We remind you, this emergency feature may damage your batteries or connected equipment.

10 CHARGING MODE

The Charging Mode panel indicates the present charging mode being performed by either connected Charging Source, or the stage that will be started when Renewable or external AC supply becomes available.

11 CHARGING SOURCE

AC - On	External AC supply charging battery bank
Renewable - On	Monitored renewable supply is charging battery bank

DC Coupled renewable supplies must be monitored via an external current shunt(s) to activate this indicator.

12 GENERATOR START/STOP BUTTON

A brief press of this button (<1 second) will start or stop the generator. Two long presses (>2 seconds) will request an equalising charge on the batteries after a full battery charge.

13 GENERATOR STATUS

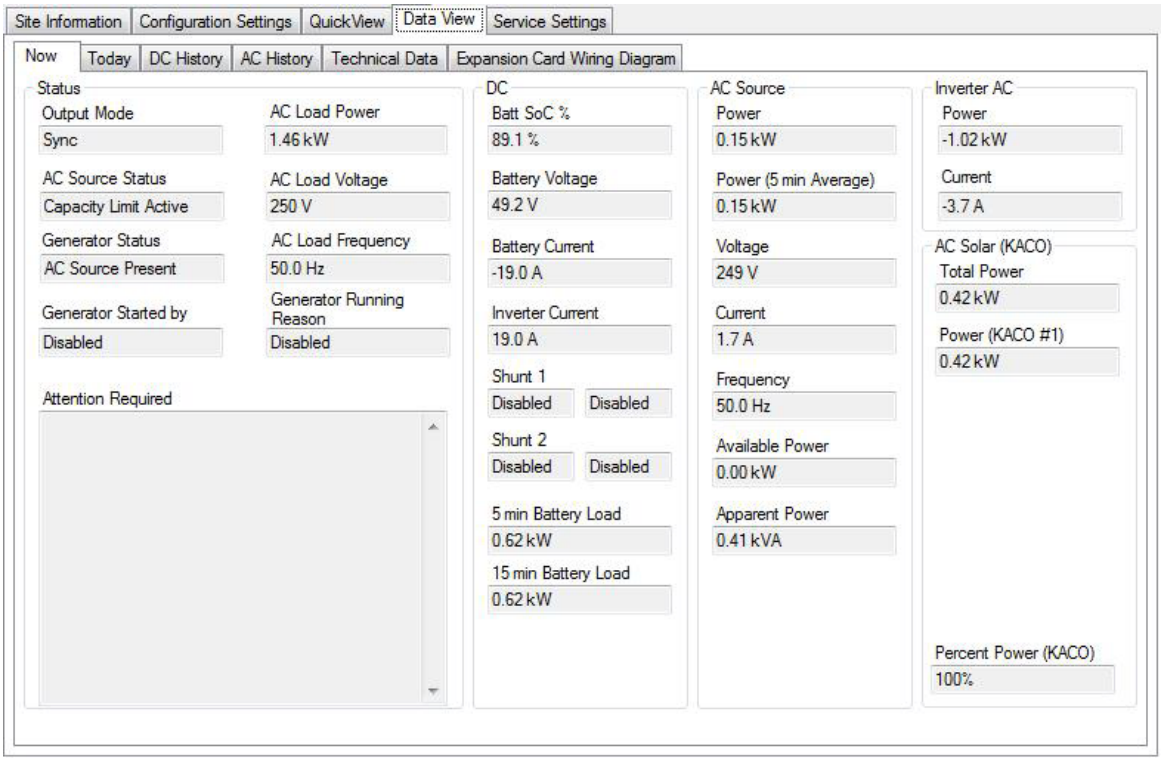
Off	No generator activity
Flashing Green	Generator is in the process of starting
Steady Green	Generator has started and is running
Flashing Yellow	Generator is not available for auto start
Flashing Red	There is a generator fault

Data View

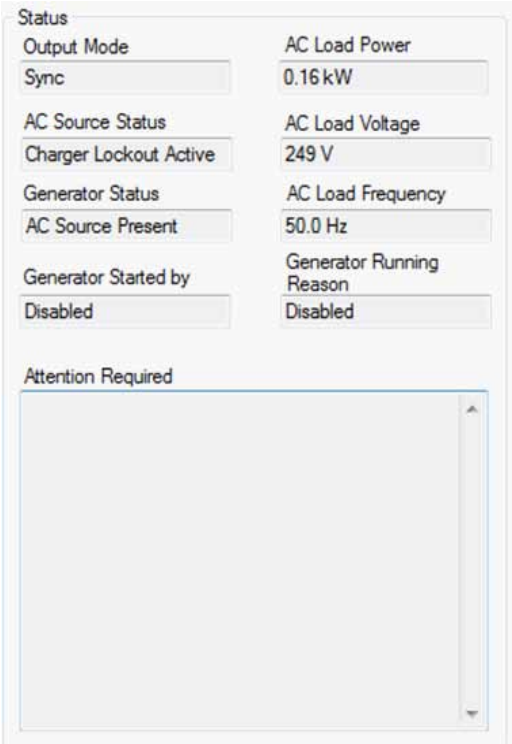
If you require more detailed data about your system clicking on Data View opens a screen containing comprehensive data about your SP PRO and your system

Now Tab

The Now tab gives you live information about what is happening to your system now.



STATUS

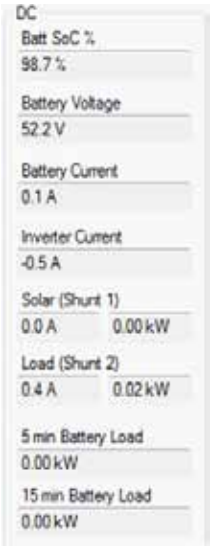


The first panel shows the Output Mode in which your SP PRO is running, such as Idle, On or Synchronised, the Generator Status – Available, Not Available or AC Present. The reason the generator has started such as high load is displayed in Generator Started By: then the reason that it is still running in Generator Running Reason. If you feel that your generator has been running too long this is the area to check first.

If the Attention indicator is flashing on the front panel you can check in this area to find out what Attention is required.

In addition this panel shows AC Load Power, Voltage and Frequency. The AC Load power allows you to differentiate between the total Inverter Power which may include a battery charging or grid exporting component. That is if Inverter Power is greater than AC Load Power the difference will be the charge or export power.

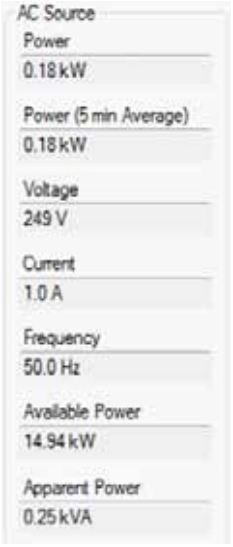
DC



This screen gives you vital information about the state of your batteries at the time of viewing.
The BATT SoC% indicates the actual capacity left in the batteries, just like a fuel gauge in your car, and will help you make decisions about your power consumption for the rest of the day. Similarly your Battery Voltage gives a rough guide to battery condition.

The next four readings give you an overview of what's going into and coming out of your batteries. Inverter Current shows the amperage being used by your SP PRO to run AC loads or the amperage being contributed to battery charging if the generator is running.
DC Battery Current is the nett amount going into or out of the battery pack. If your Solar Current is greater than your loads a positive figure will be shown while if your loads are greater than the combination of charging sources a negative figure will appear. Load Current is the measurement of DC loads monitored by your Load shunt.

AC SOURCE

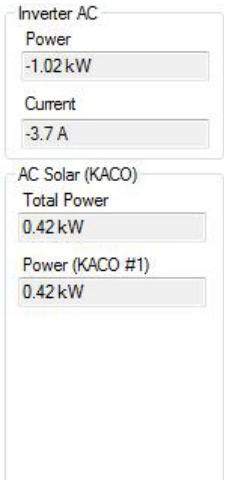


This panel reports on the contribution and condition of your motor generator or the mains grid (where applicable).
The POWER reading records the input from your external power source in kilowatts.

The Power (Average) calculates, as the name suggests, the average power in kW over the last 5 minutes.

Voltage is the RMS AC voltage provided by your external power source.
The actual AC Current, in Amps, is recorded in the fourth window.
The AVAILABLE POWER reading is calculated by deducting the load power from the AC Source Power you recorded in AC Input Power. Your SP PRO will automatically reduce the charge current to the batteries to ensure the system doesn't draw any more than set from the AC Source.

INVERTER AC

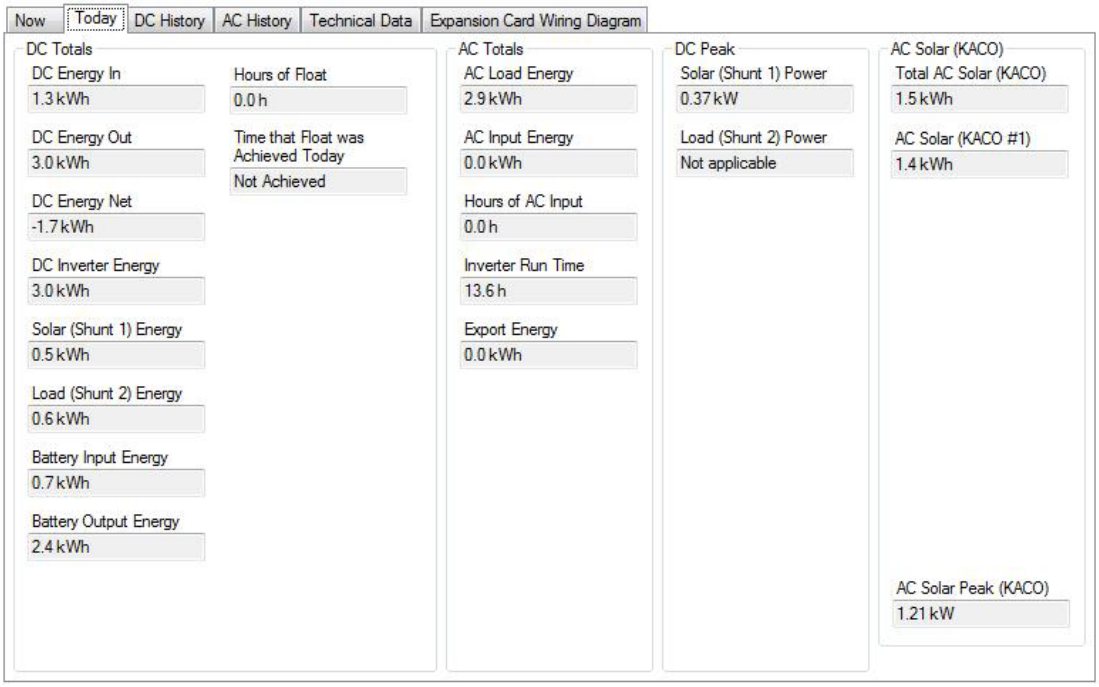


This panel is similar to the preceding panel except that it shows the Inverter Power and Current from the inverter.

The panel also shows the AC Solar(KACO) Total Power and individual output powers from each of the connected KACO Inverters. These are listed as KACO #1 through to KACO #5 (when connected).

Today Tab

The TODAY tab gives you data about your system for the current day.

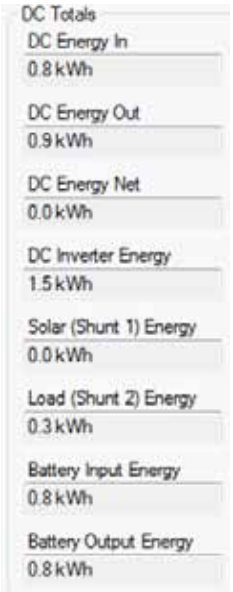


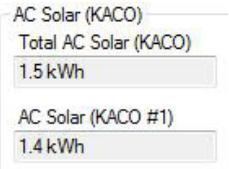
DC TOTALS

This panel is a summary of today's totals of inputs and outputs through your battery pack. DC Energy In is compared to DC Energy Out to arrive at DC Energy Net and the results are recorded in kW hours.

DC Inverter Energy is a total of the work the inverter has done, whether that is supplying a load or charging.

If you wish to monitor the day to day performance of your system Time That Float Was Achieved Today can be compared with yesterdays in the DC HISTORY tab. This can be a handy comparative reading. You can record daily how long it takes your system to replenish the previous days usage.





AC TOTALS

This is also a summary page, but this time of the AC kW hours through the system.

AC Load Energy records the total power consumption by your site during that day.

AC Input Energy shows the total contribution by your generator or the mains grid, while Hours of AC Input records the running time of your generator or the length of time the mains grid was connected to your SP PRO.

Inverter Run Time is the length of time the inverter has run today – this should be all the time unless you have programmed in an Inverter Lockout period.

In grid connected systems Export Energy is the total power your system has contributed to the mains grid in that day.

DC PEAK

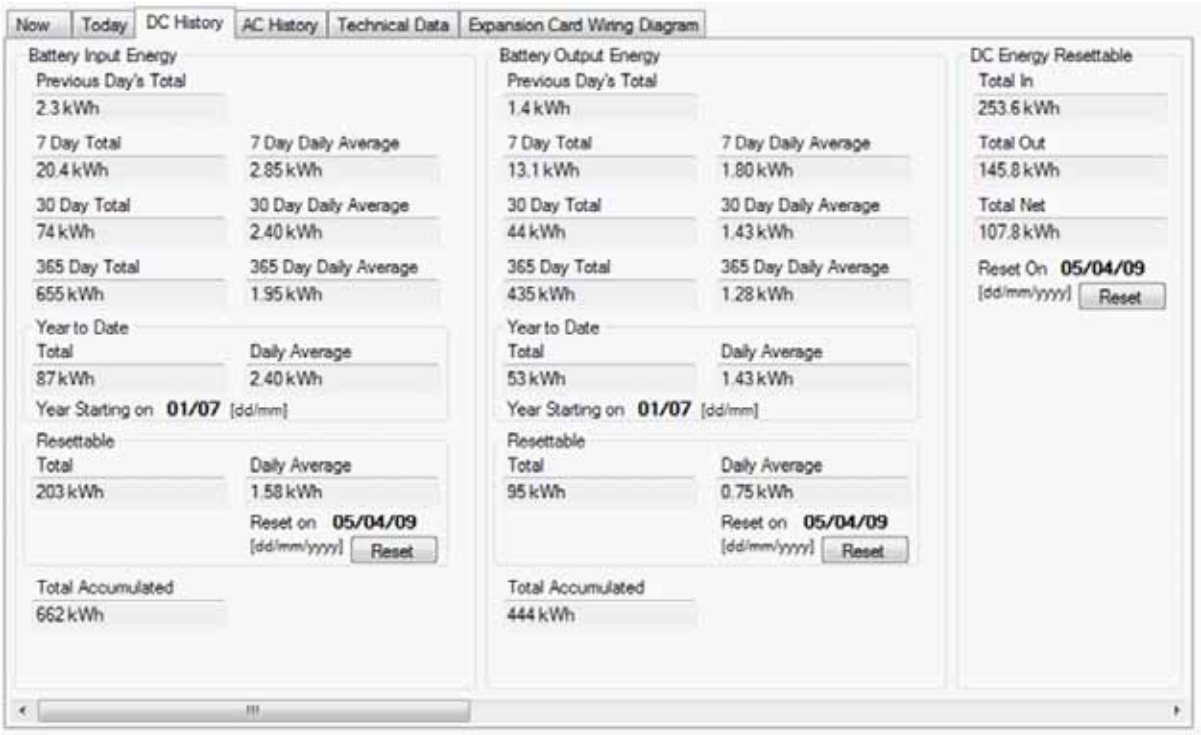
This screen records the peak power level that has passed through the shunt(s) that day. Not Applicable means the shunt isn't configured for measuring renewable.

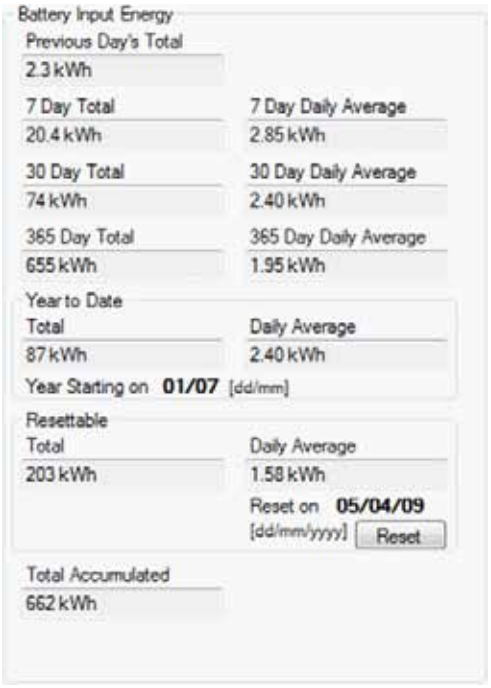
AC SOLAR (KACO)

AC Energy (kWh) generated by the total KACO system plus individual inverters.

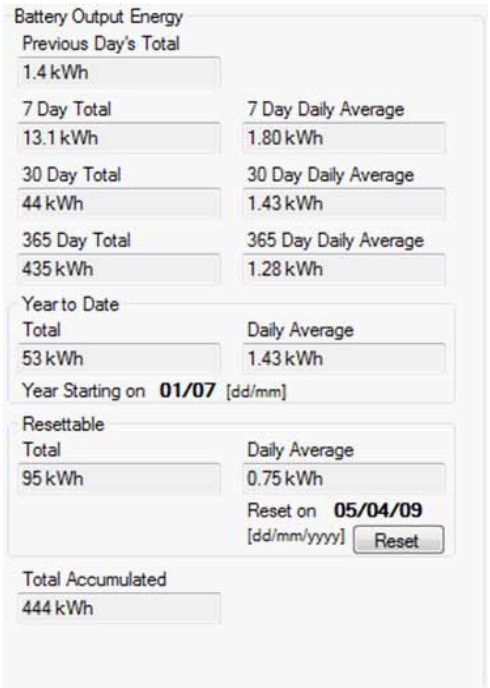
DC History Tab

The next tab is the DC HISTORY screen. As the name implies this screen gives you data from the previous day, the last seven days, the last 30 days, the last year and the whole period since installation.





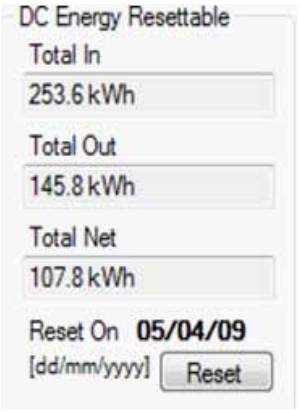
All the input to your battery pack



All the output.

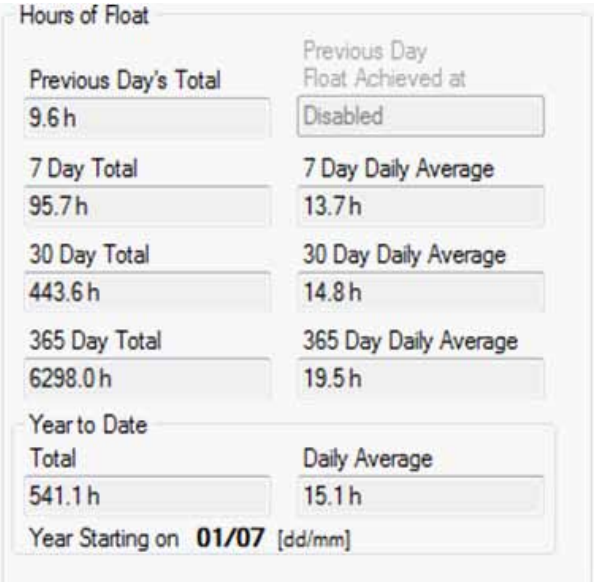
DC ENERGY RESETTABLE is like a trip meter in your car. When reset this records DC energy in and out of the system and gives a net total.

RESET ON: shows the date when last reset so you can calculate how many days have elapsed. By clicking the Reset tab all totals in this reading are zeroed and accumulation of data starts again on the date of the reset.



HOURS OF FLOAT records what time float was achieved on the previous day and how much time has been spent in float since installation.

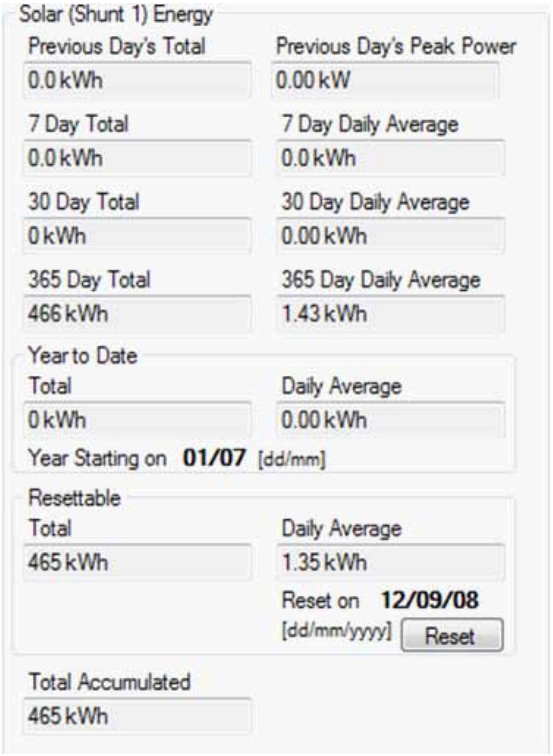
This data can be used for future system improvement design. If your system never reaches float, you may need to increase your solar array size, if your system regularly enters float before lunch you may be able to consider adding extra "luxury" loads to the system.



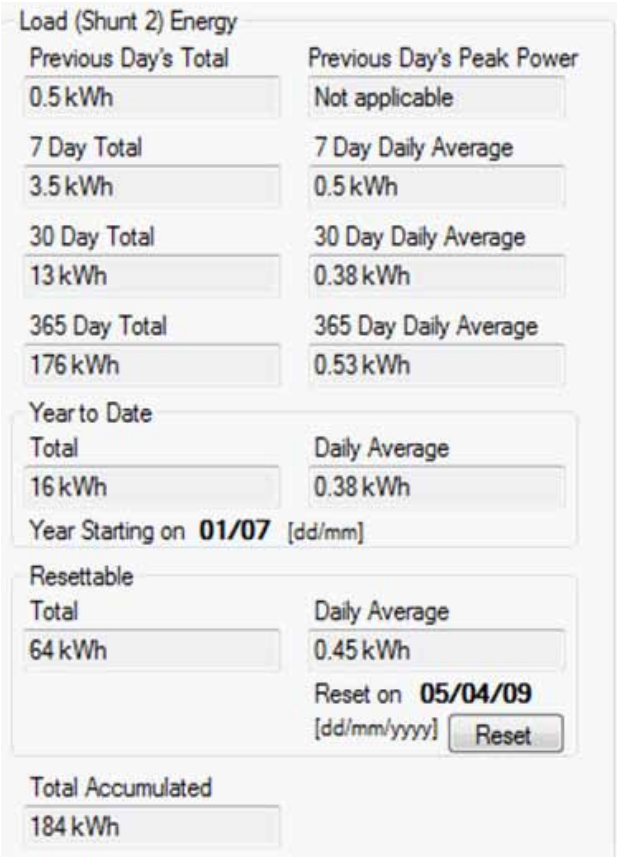
This panel gives a picture of the effect that Shunt 1 has had on your system. For the sake of clarity we will assume that Shunt 1 measures your solar input. This, then, records the solar contribution to your system since the system was installed. Once again you can compare today's solar input with other averages to see if you've had a good or a bad solar day.

As with the previous screen you can collect data over a period you determine with the use of the RESETTABLE feature.

The TOTAL ACCUMULATED is all the solar input to the system since installation.



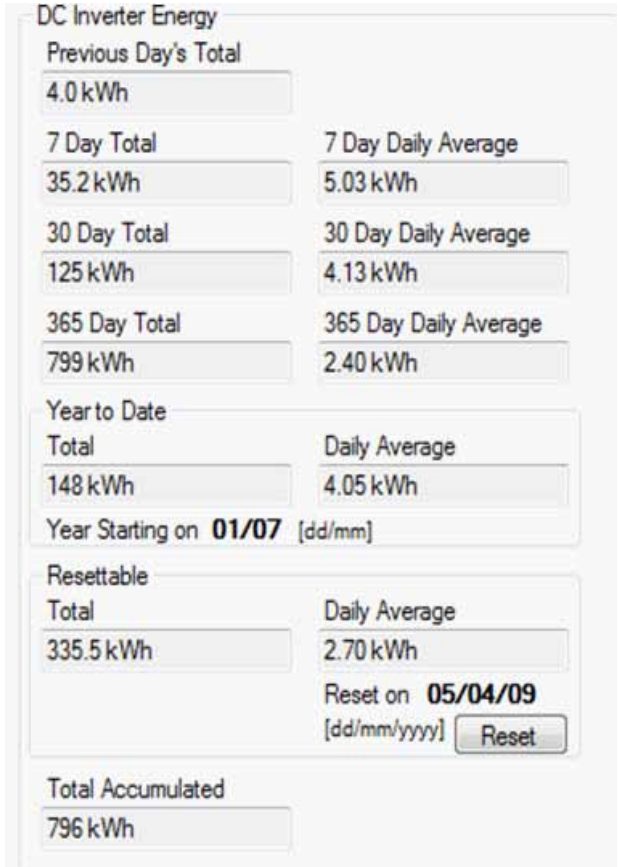
This panel is the historical record of the Shunt 2 and its effect on your system, either through a renewable contribution, if it is measuring input through a wind turbine or micro hydro, or as a deduction through DC loads. In the case shown, DC Loads.



This panel shows historical data of all of the DC energy that has passed into or out of the inverter.

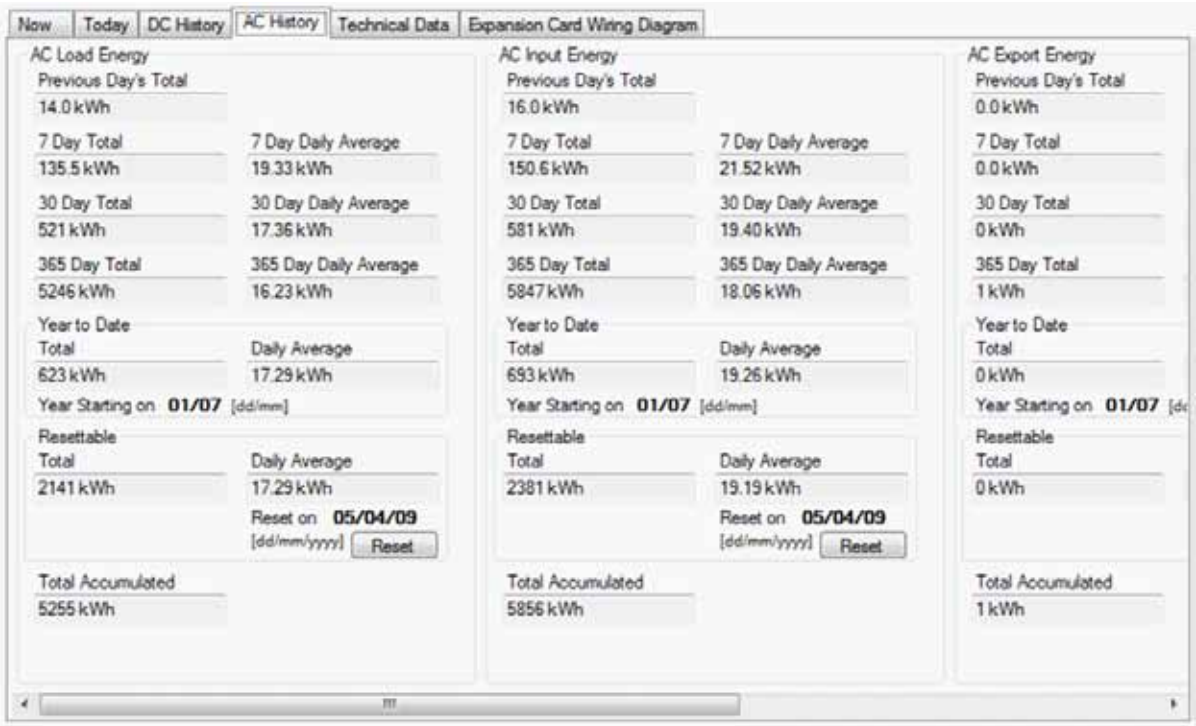
This panel also gives you the ability to accumulate this data from a date you determine. By pressing the Reset tab all totals in this reading are zeroed and accumulation of data starts again on the date of the reset.

A particular feature of this panel is the ability to compare your previous days total with the averages over a week, a month or a year.

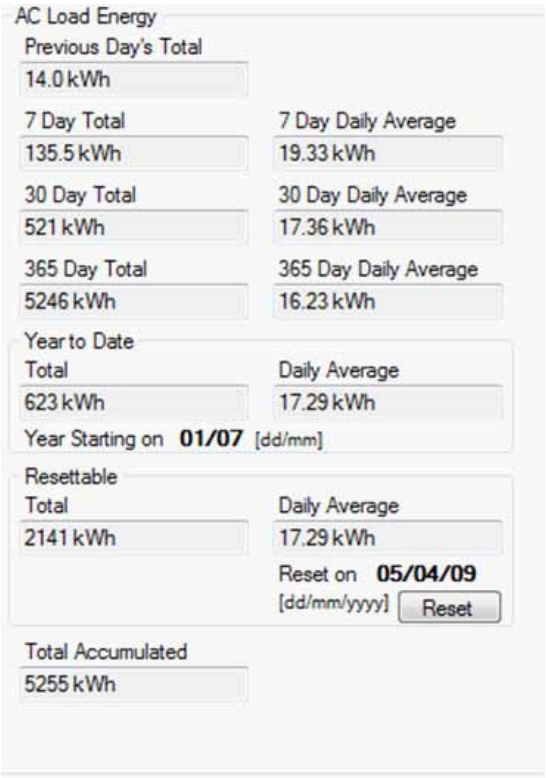


AC History Tab

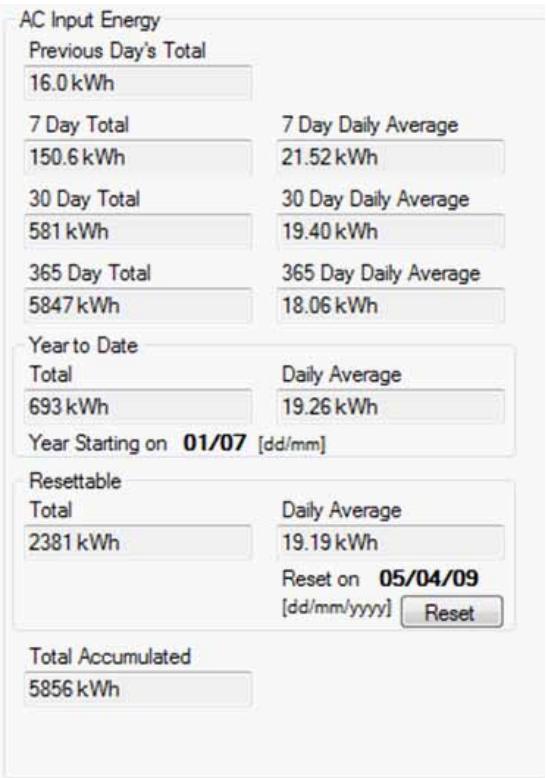
The AC HISTORY SCREEN, as with the DC History screen gives you data from the previous day, the last seven days, the last 30 days, the last year and the whole period since installation



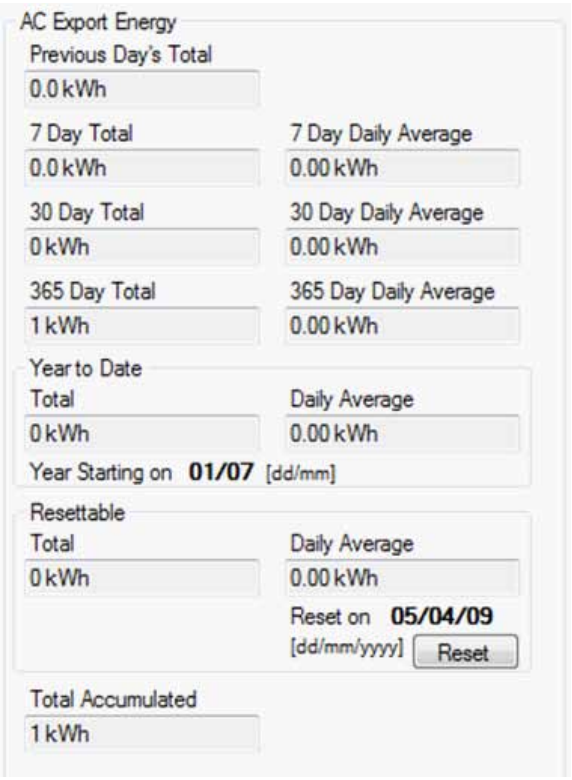
This is a record of the total AC loads presented by your home to your power system.



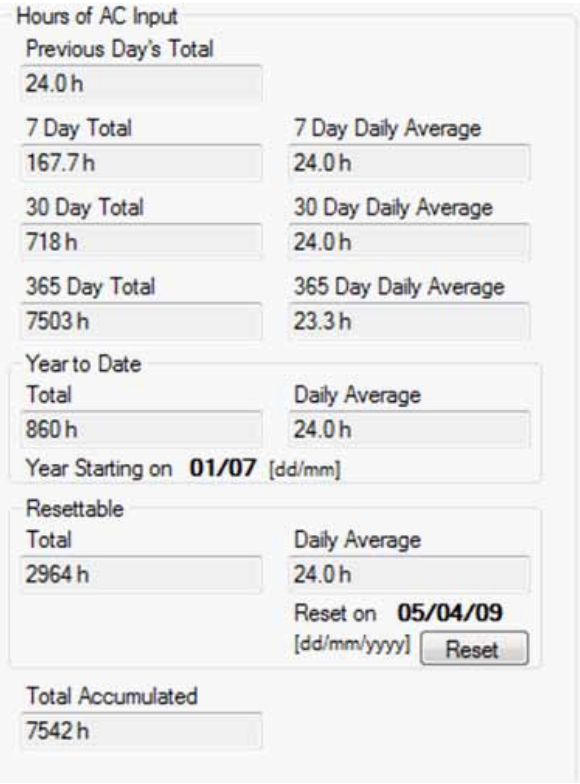
This is the total AC input contributed by your motor generator or by the mains grid.



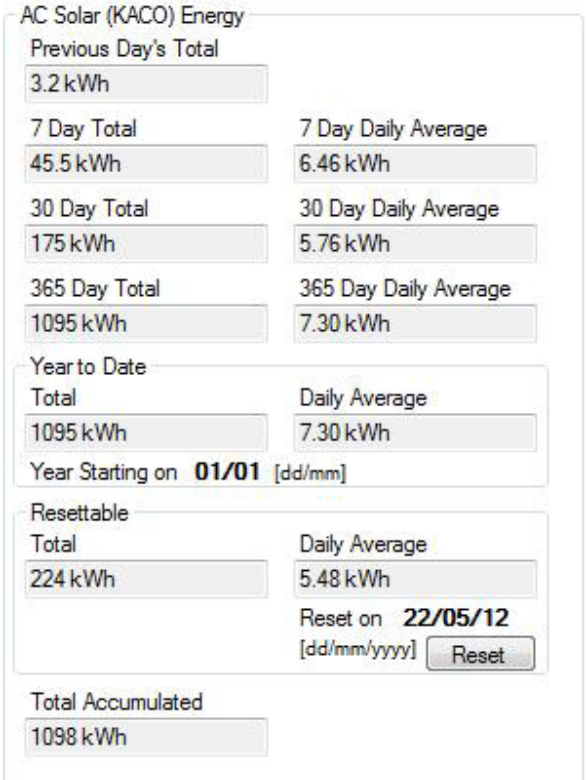
In grid connected systems you can monitor the amount of energy you are exporting to the mains grid. You can compare today's total with the last week, the last month or the whole year.



A record of how many hours your generator has run or for how long the mains grid was connected.



Total AC Solar(KACO) input to your system.

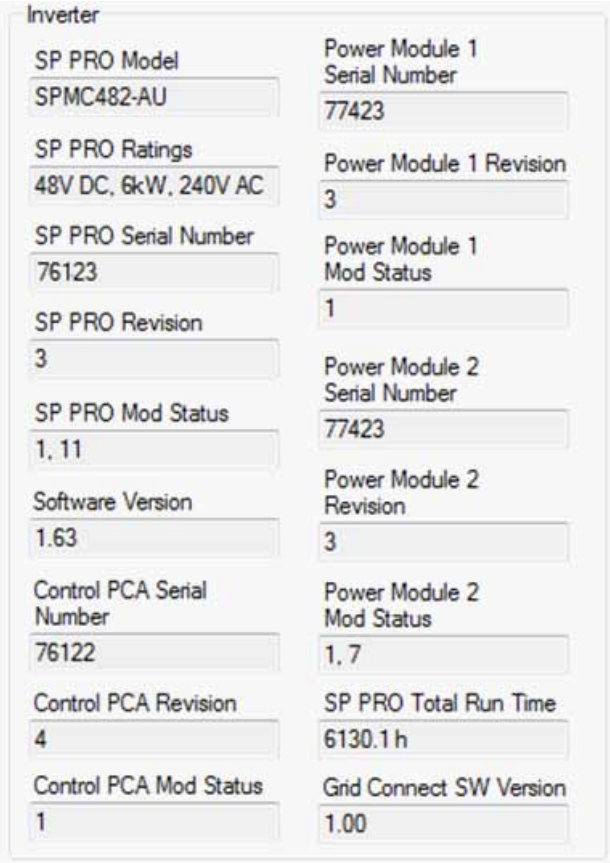


Technical Data Tab

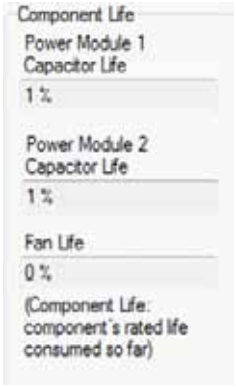
The TECHNICAL DATA tab provides you with information relating to maintenance and updating your SP PRO.

In the INVERTER section we show you the SOFTWARE VERSION and hardware that is currently installed in your inverter. From time to time, as Selectronic designs new features for your SP PRO, new revisions of software may become available from our web site. By comparing your current version you can tell if you need to update your inverter over the net.

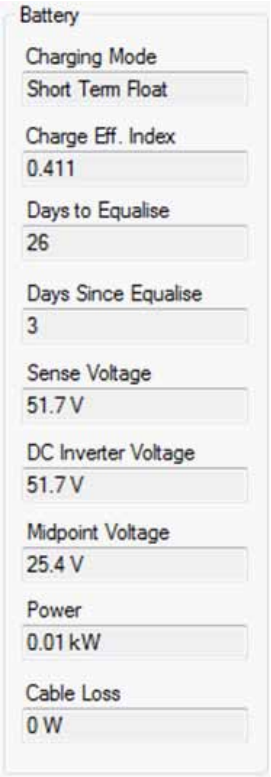
TOTAL RUN TIME tells you the total number of hours the inverter has run.



Your SP PRO monitors the life-span of certain components within your inverter. By advising you of the amount of Capacitor Life and Fan Life that have been consumed SP LINK allows you to plan for long term maintenance at a time that will not inconvenience you.

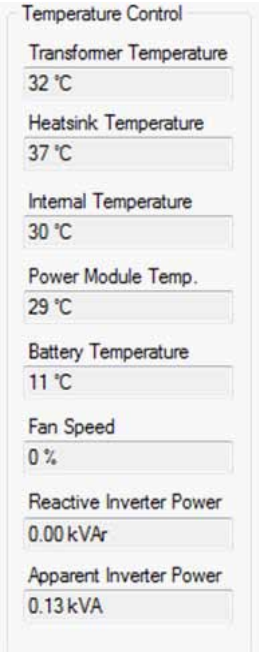


The technical data stored in the BATTERY panel is essential for analysing system problems.
The Charging Mode window advises what stage of charge your SP PRO is at, or will start from next time the generator starts.
We have previously discussed how battery problems can be isolated using Battery Midpoint Voltage.
SP LINK records how long it has been since your batteries received an equalising charge and how long before such a charge is due.
The Charge Efficiency Index describes how well your batteries are receiving the charge current presented; another factor in determining your battery maintenance / replacement program.
The DC Inverter Voltage is compared to the Sense Voltage (a measurement taken right at the battery bank) and calculates how much Cable Loss is present.
If this loss figure is too high it may indicate the loads placed on the inverter are higher than the design criteria and the cable size may need to be increased.
Power is the actual load on the batteries, expressed in kW. This figure should be used in comparison with the battery cable loss figure to determine the relevance of the loss figure.



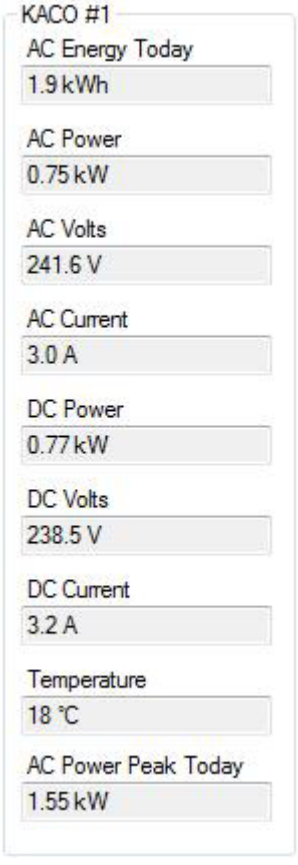
The Days to Recharge and Days Since Recharge tracks, if Periodic Recharge is enabled, how many days between switching to Initial stage and how long before the SP PRO will switch to initial.

The TEMPERATURE CONTROL panel records the power the inverter is dissipating and allows your Selectronic Authorised Installer to compare this reading with the temperature of various hardware items within your SP PRO, in conjunction with the ambient temperature around the inverter and refer this data to the internal fan speed to analyse system performance.



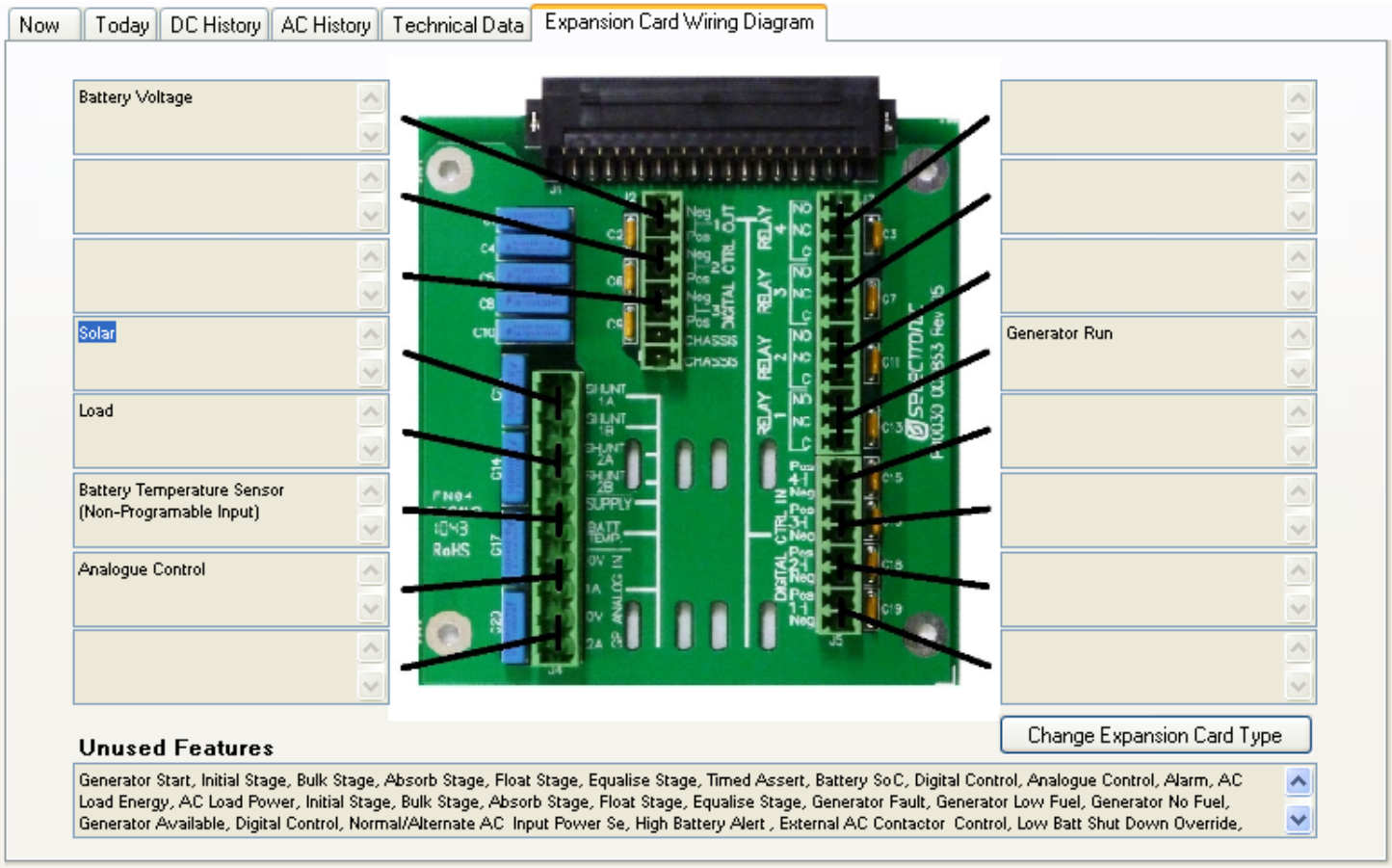
The INPUTS AND OUTPUTS panels monitors which of your digital and analogue inputs are on (Active) and which are off (Inactive) and, similarly, which output is on (Active) and which is off (Inactive).

The KACO panels (#1 through to #5 when connected) display all of the data fed back to the SP PRO from each KACO unit.



Expansion Card Wiring Diagram Tab

The Expansion Card Wiring Diagram shows you how the input and output functions are programmed and allocated in your SP PRO. This display is only active when your are connected to the SP PRO.



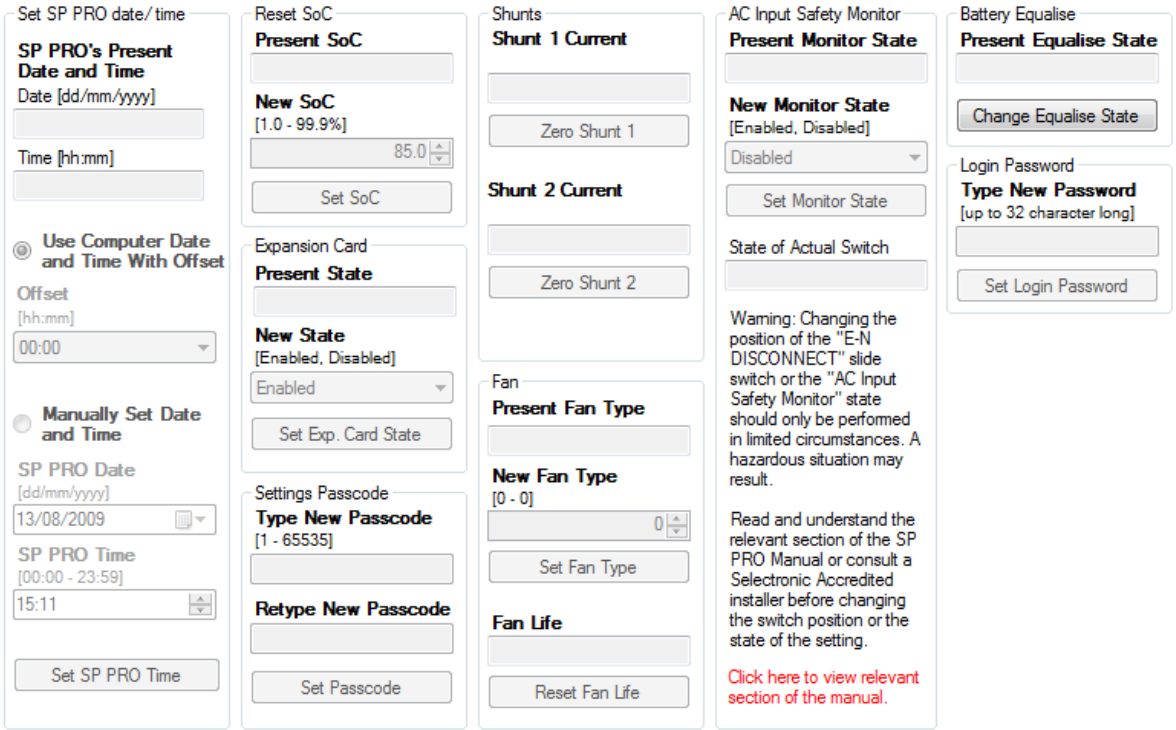
The Unused Features display lists all input and output functions that have not been allocated to an input or output.

Expansion card picture may vary depending on SP PRO model. Click Change Expansion Card Type to suit your model.

Service Settings

Service Settings

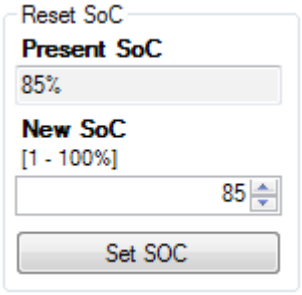
Certain readings within your SP PRO must be correctly configured at the time of the original setup. These include the time and date, an approximation of the state of charge and that the current shunts are zeroed.



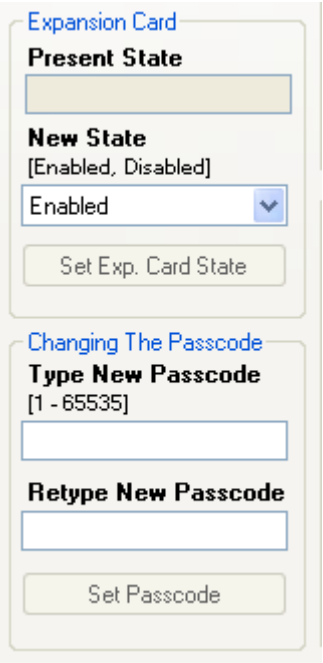
To ensure that various timed functions within the SP PRO, such as generator run schedules, perform as expected it is important to have the correct date and time recorded in your SP PRO. You have the option of automatically uploading the time and date from your computer – including the facility to allow for an offset if your computer is set to a different time zone to the area of installation – or to manually set the time and date.
If you are adjusting the date manually click on the circle adjacent to MANUALLY SET DATE / TIME and use the drop down menu to select the correct date. The time can be set by clicking on the hour or minute section and use the up/down arrows to adjust.

When you have completed adjustment click on SET SP PRO TIME to record the change.

When first setting up your SP PRO an initial estimation of the state of charge must be programmed to enable the SP PRO to facilitate all the functions that are determined by the state of charge measurement from the first day. As the period of operation increases any small error from the original estimation will be corrected.



The current status of the EXPANSION CARD is displayed. The SP PRO can be set to use (Enabled) all the connected functions from the expansion card like shunts and battery temperature sensor or to ignore (Disabled) them. By default the Expansion Card is enabled.



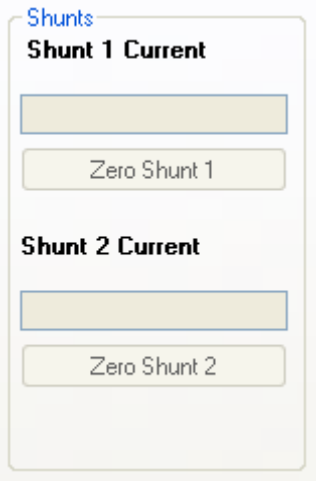
If you are concerned that the standard passcode does not provide the level of security you desire for changing settings, you can change the passcode in your SP PRO to one that is uniquely yours.

Please note that if this passcode is lost or forgotten it can only be reset by a procedure that requires someone to be on site.

If you require assistance resetting your passcode please consult your Selectronic Accredited Integrator.

To accurately measure and calculate inputs and outputs to and from the batteries your SP PRO needs to start its measurements knowing what is Zero. To set this parameter you must ensure all inputs and outputs are switched off – that is no solar, wind or other inputs coming into the system and all DC loads are switched off – then the ZERO SHUNT 1 and ZERO SHUNT 2 buttons should be pressed.

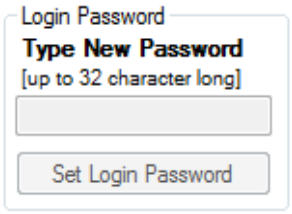
The figures above the buttons indicate what the on board computer in your SP PRO perceives the relative current to be before zeroing.



If you are concerned that the default login password does not provide the level of security for any access to the SP PRO, you can change the Login Password in your SP PRO to one that is uniquely yours.

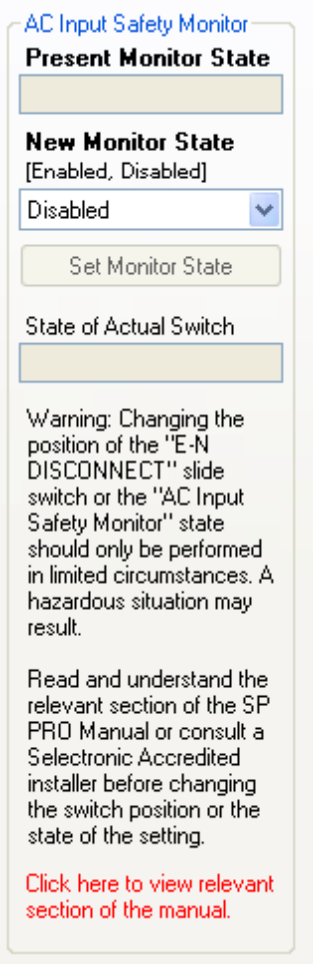
Like the passcode, if the Login Password is lost or forgotten it can only be reset by a procedure that requires someone to be on site.

SP LINK will automatically update the Connection settings in Site Information when you set your new Login Password.

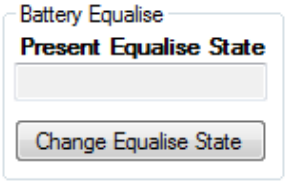


The cooling fan within your SP PRO is a long life, high quality component. As the control section of your SP PRO calculates the hours of life left in the fan (along with other components) it is important that the fan – when it is eventually necessary – is replaced by an authorised spare part. However we are aware that components become obsolete and other fans may need to be used, so we have allowed settings for 4 different fan types. These settings are based around all the fan types available at this time and we will clearly mark any replacement fans with their fan type as they become available.

The AC INPUT SAFETY MONITOR assesses the presence of an earth/ neutral link in your generator or the mains grid connected to your SP PRO and will prevent this source of power connecting to your system if it is not present. This important safety feature is included for your protection and should never be ignored. This being said there are certain marinas around the world that have isolation transformers in their shore power connection that will trigger this feature. If you have your SP PRO installed on a boat and encounter this situation it is possible to disable this function temporarily to allow you to use the shore power connection. An alert will periodically sound to remind you that this safety feature is disabled.



The BATTERY EQUALISE display shows whether the SP PRO will perform an equalise charge when it next achieves Float (Equalise Pending). Pressing the button will toggle between Equalise Pending and No Equalise Pending. Pressing the button will also stop a current Equalise process.



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