IMARK SR-SRX100 Solar Regulator Operators Manual

REVISION LIST			
Date	**Details**	**Rev. #**	**Authorised By:**
01/04/2016	Initial Release	0	OS
15/12/2018	Updated, Load Output polarity, Internal battery CB's	1	OS
1/11/2019	24V version of SRX100-48, Electronic Shunt	2	OS
10/4/2020	Minor corrections throughout manual. Battery Connection Pic	3	OS
1/3/2022	Changes to cover various construction updates inc Rack Mtg	4	OS
1/12/2022	Earthing details added	6	OS

INCLUSIONS

The following items are included in the standard package:

1 piece SR100 or SRX100 or SR100R or SRX100R Solar Regulator
1 piece Wall Mounting Bracket (Wall Mtg Models) or Equipment Slide Kit (Rack Mounting Models)
1 piece Battery Temperature Sensor
1 set Mounting Screws
1 Operators Manual (on SD Card) including Parts List and Installation files

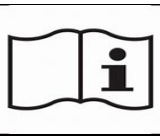
THIS DOCUMENT

This manual has been deliberately written using non-technical terms to provide readers with a simple understanding of how the IMARK SRX Series MPPT Solar Regulators operate. This manual provides sufficient detail to enable technically trained people the ability to install and correctly commission these units.
This manual is supplied in soft copy format on SD Card and includes the following documents as separate files:

DESCRIPTION	File Name	Revision
This Manual	757192.pdf	4
Typical SR Series Installation with multiple PV Strings	80481xCC.pdf	0
Parts Lists	Various	0
Wiring Diagrams	Various	

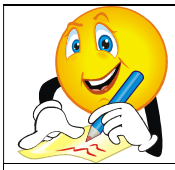
The following graphics are used throughout this manual to alert users and installers to potential safety hazards or to indicate that this manual should be referred to for the correct instructions.

 WARNING	**WARNING** **This symbol is used to indicate that there is the potential risk of electrocution unless the equipment is not fully isolated from all power sources.** **Extreme care should be heeded in these cases.**

 INFORMATION	**REFER TO MANUAL** **This symbol indicates that the user or installer should refer to the specific section in this manual where specific information relating to user operations or settings are required for correct operation.**

 TIP	**TIP** **This TIP symbol indicates that the information provided in this box is only a helpful hint that may assist the user during operation, or the installer during installation.**

 CAUTION	**CAUTION** **The Caution symbol is used where there is no danger to personal safety, BUT, an incorrect setting may cause damage to this equipment, or some other equipment working in conjunction with this equipment.**

 NOTE	**NOTE** **This Note symbol is used to remind installers or users that recording the settings may provide a good record or future reference point should it become necessary to revisit the site.**

WARNINGS

WARNING

WARNING

The voltages used by these Solar Regulators range from 48Vdc up to 500Vdc. These are **LETHAL VOLTAGES**. For your safety, **ALWAYS** isolate this regulator from **ALL** power sources before making any connections or removing any covers. These higher power levels are sufficient to cause electrocution (**DEATH**), and therefore **should only be serviced by competent appropriately qualified technicians.**

- During installation, **ALWAYS** connect the Regulator to the battery bank before connecting the PV solar panels. **ALWAYS** disconnect or open the PV solar panel circuits, before disconnecting the solar regulator from the battery bank.
- If multiple regulators are used to charge a common battery bank, ALWAYS ensure that **ALL** solar regulators are connected to the battery bank BEFORE making any other connections. When disconnecting, ALWAYS disconnect **ALL** solar panels BEFORE disconnecting the battery bank.
- These Solar Regulators are designed for indoor installation, or in fully enclosed cabinets. They must not be installed at locations where they may be exposed to rain or moisture, or in locations exposed to direct sunlight.
- Multiple solar regulators can be used to charge a common battery bank. However, the PV input to each solar regulator MUST be completely independent from all other PV inputs.
- Always use appropriately sized cables for the installation.
- Always ensure that all terminations are tight to avoid temperature hot spots caused by loose connections.
- Always ensure that the regulator is correctly grounded using the ground terminal on the bottom of the unit.
- **ALWAYS** complete the battery settings before connecting the PV Input or Load Output.
- **ALWAYS** set the battery charging parameters in accordance with the battery manufacturer's requirements.
- Blocking diodes MUST be installed whenever multiple PV Input Strings are applied to any one of the regulator's PV Inputs.
- Always use insulated tools when working with electrical circuits, and remove any personal jewelry that may cause a short circuit or injury hazard.
- The PV Input capacitors may store more than 100 Joules of energy. **NEVER** touch any internal component without firstly ensuring that all capacitors are fully discharged.
- The battery bank must comprise of the same make, type, and age batteries.
- Always extinguish any naked flames when working near batteries.
- Special precautions MUST be taken when these regulators are used with INDUCTIVE LOADS. Please refer to the WARNINGS pages under 4.0 Installation.

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1.0 INTRODUCTION

Thank you for choosing an **IMARK SRX100 Series Solar Regulator**. We trust it will perform to your expectations. We, at Imark, value feedback from our customers and would appreciate any feed-back or suggestions that may lead to Imark having a better product. Such input, good or bad, will help us improve and design better products.

The **IMARK SRX100 series of Solar Regulators** have been designed and manufactured in Australia to meet worldwide market needs. They include the following features:

- Deluxe models with LCD Display & Internet Capability
- All models rated for 100 Amperes based on the battery charge voltage
- Maximum 500 Voc PV Input permits connection of up to 3,000 Watts (48V models) or 4,000 (120V models) of PV per PV input.
- Dual independent Maximum Power Point Tracking (MPPT) powerboards satisfy East & West PV Panel orientation requirements
- Interleaved Pulse Width Modulation (PWM) on all models greatly reduces EMI noise
- High Efficiency (~95%)
- Inbuilt Transient Surge Protection on the solar input
- Efficient Convection Cooling with fans that operate at elevated heatsink temperatures
- Over Voltage Protection to protect the battery bank from over charging
- Over Temperature Protection to protect the Solar Regulator from over heating
- Battery Temperature Sensor to protect the Battery Bank from over charging, and to cease or reduce charging based on battery temperature
- Low Battery Voltage Load Disconnect to protect the battery bank from over-discharging
- Generator starting function with second Delayed Output Signal to control transfer switches
- Remote Alarm Output signal on 16 way interface connector
- Remote Signal Output terminal for control of external devices such as generators, lights, or pumps
- Rugged Compact Design (only 420mm x 315mm x 175mm excluding protrusions & model dependent)
- LED's simply indicate operating status or alarm status at all times on all models
- LED's & Illuminated 4x20 alphanumeric LCD to display the current working status of SRX100 models
- High quality PV connectors enable easy PV Connection
- SD Card Slot and USB Port enables product lifetime storage of historical data
- Easy operational monitoring or setting changes using the IMARK Site Explorer on web browsers over the Internet or with direct laptop connection
- 4RU 19" Rack Mounting arrangement or Wall mounting versions
- Remote LCD Display can program or monitor up to 4 SR/SRX100 regulators in the one system
- 10 Amp Load output to operate external fans or other local DC equipment
- Maximum settings flexibility
- Inbuilt 50mV/100A Electronic Shunt Output for connection to 3rd party equipment.
- The SRX100-48 48V model can operate with a 24V battery after setting changes.

The Imark SRX100 regulators are enclosed in a metal housing with a substantial aluminium heatsink at the rear of the unit. A Mounting Plate is provided (with wall mounting units) to enable easy & secure installation of the units in the chosen location. Rack Mounting units are supplied with equipment slides in lieu of a wall mounting bracket. Plug and Socket connectors are provided for the PV Inputs allowing the PV cables to be simply plugged into the appropriate polarised connector. Connections are included for two or four PV input strings (model dependent), but only one string per input is permitted on each of the PV inputs unless blocking diodes are employed.
The battery connections on Wall Mounting units, require the removal of the small cover plate on the front for access to the battery + and – terminals, and require a technically competent tradesman to do this part of the installation. Rack mounting units are supplied with external battery terminals (on the terminal Panel), and require the mating cable connectors to be terminated and inserted into the correct polarised terminal.
The 4RU 19” Rack Mounting models use the same extruded heatsink and electronic circuitry as the wall mounting models, and have the same features and identical electrical performance to the wall mounting models. All SRX100 regulators are supplied with two fans to exhaust internally generated heat thus reducing the internal operating temperature.

Two Power Channels
It should be noted that the regulator has two independent MPPT power channels which is ideal for installations with an east facing roof and a west facing roof.
Accordingly, each power channel has its own CANBus Identity, and thus each channel reports it performance individually. Accordingly, the LCD displays only the performance data for the appropriate power channel. It is necessary to select the appropriate power channel through Screen 0.1 to view the performance data of individual power channels. Please refer to section 2.2 where the construction of the regulator is described in more detail.

Available Models

The following model configurations are available:

Imark Stock #	Model #	Details
804810	SR100-48	Solar Regulator, 100 Amp for 24 or 48Vdc operation, dual Maximum Power Point Tracking, Wall Mounting, and DIP Switch programming.
804811	SR100-48R	Solar Regulator, 100 Amp for 120Vdc operation, dual Maximum Power Point Tracking, 19" Rack Mounting, DIP Switch programming.
804812	SRX100-48	Solar Regulator, 100 Amp for 48Vdc operation, dual-phase PWM & Maximum Power Point Tracking, LCD Display, Wall Mounting
804813	SRX100-48R	Solar Regulator, 100 Amp for 48Vdc operation, dual-phase PWM & Maximum Power Point Tracking, LCD Display, 19" Rack Mounting
804815	SR100-120	Solar Regulator, 100 Amp for 120Vdc operation, dual-phase PWM & Maximum Power Point Tracking, Wall Mounting
804816	SR100-120R	Solar Regulator, 100 Amp for 120Vdc operation, dual-phase PWM & Maximum Power Point Tracking, 19" Rack Mounting
804817	SRX100-120	Solar Regulator, 100 Amp for 120Vdc operation, dual-phase PWM & Maximum Power Point Tracking, LCD Display, Wall Mounting
804818	SRX100-120R	Solar Regulator, 100 Amp for 120Vdc operation, dual-phase PWM & Maximum Power Point Tracking, LCD Display, 19" Rack Mounting

Available Options

The following accessories are available as options at extra cost:

- Remote LCD Display Unit
- SD Cards
- Ambient or Battery Temperature Sensors
- CANBus cables & connectors
- CANBUS Termination Resistors
- Blocking Diodes
- Installation Accessories

Standards

The Imark SRX100 Regulators comply with the following standards:

Title:	Standard #
IT Emission Limits	AS/NZS CISPR11:2004 Group 1 Class B
Electrical Safety	IEC62109 Part 1

AS = Australian, NZS = New Zealand

2.0 SYSTEM OVERVIEW

This section describes a typical installation using Imark SR or SRX series Solar Regulators. It includes a system block diagram and explains how the Imark Solar Regulator interfaces with other equipment to form an off-grid solar system. The purpose of the various parts of the system are described briefly. A more detailed description of the Imark SRX regulators is provided in Section 3 of this manual, while detailed installation instructions and a full description of the user interface are described in following sections.

2.1 Overview

The Imark SR Series Solar Regulators are part of a family of solar regulators based on one design platform and using many common components. The models described in this manual are with 100 Amp charge capability, and for either 24, 48, or 120 battery banks only. These models are available in Wall mounting or 19" Rack mounting configurations. Each model is supplied with six LEDs that provide operational status as well as diagnostic information. A full featured back-lighted LCD display is also included with the SRX models and allows entry of settings via the keypad, as well as providing performance data and diagnostic information. Multiple units in a system can communicate with each other via CANBus while SD Card and USB ports are provided for long term storage of performance data. These regulators have numerous built-in protection features to ensure trouble free operation, and have an electrical efficiency of $\geq$ 95% at full load. These regulators are designed to operate in temperatures from 0° to 50°C with a storage temperature of -30°C up to 70°C and with a non-condensing humidity of up to 95%.

Imark SR Regulators will accept a maximum PV input voltage of up to 500Voc, and require a minimum PV input voltage of approx. twice the battery voltage up to 500Voc maximum. As these regulators have modern sophisticated capabilities, they require programming and installation by suitably qualified tradespeople.

These regulators also have a separate Low Amperage LOAD output, which provides a battery voltage output (up to 10 Amps) to run external equipment, such as fans or other site equipment. Conditions can be applied to this load output based on time, temperature, and/or battery State of Charge (SOC).

All Imark SR/SRX Regulators are provided with a remote battery temperature sense facility to ensure optimum charging of the battery at all temperatures, and to stop charging in the event that the battery bank becomes overheated and/or overcharged. An optional 2nd temperature sensor is available for users wishing to monitor the ambient temperature for control of the Load Output, or remote output control for fans, heaters, or airconditioners.

A Remote Output Signal terminal, which can have conditions enabled, based on Battery State Of Charge, Ambient Temperature, Time, or Cycle Period, allows customisation to control external equipment. A separate Generator Control signal terminal (using similar controls) is provided on the 16 way interface connector.

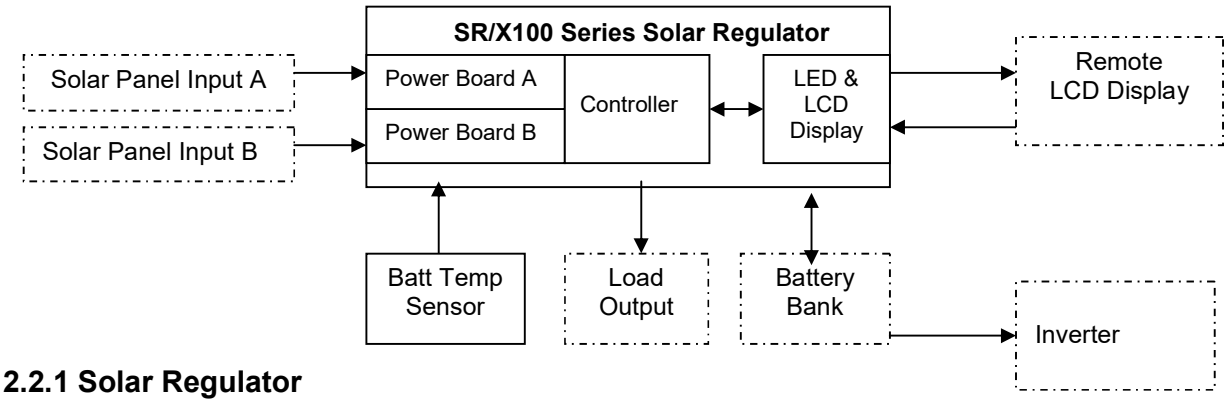
The IMARK Site Explorer is standard with every SRX unit and allows users to monitor the system operation, download historical performance data, or make setting changes easily using their standard web browser. This can be achieved by direct laptop connection or by using the internet.

Various security features are included to prevent unauthorised access, and to prevent malicious or inadvertent tampering with the operational settings.

The optional Remote Control Unit includes the LED's as well as the 4 x 20 LCD module and permits remote display of settings, operating parameters, and for programming the settings or for viewing any alarms, warnings, or shutdown messages.

2.2 Block Diagram

The following diagram shows the general functions of the SRX60, describes the various elements of the system, and the function of each part of the system.



2.2.1 Solar Regulator

The Solar Regulator is the 'heart' of any off-grid solar system. The regulator uses the solar panel input power to charge the battery bank, and controls the provision of power from the battery to the Load Terminals. It employs a Maximum Power Point Tracker to obtain the maximum power from the available sunlight. The Imark SRX regulators will automatically select the most appropriate charging mode (based on the installation settings) to provide optimum battery performance and battery longevity. The LCD display panel is installed on all SRX Regulators. The regulator section of the Solar Regulator operates completely independently from the LCD Display Panel and may be operational with or without the LCD Display Panel being operational.

2.2.2 Solar Panel Input

The solar panels (technically known as Photovoltaic Panels) provide the power, derived from sunlight, to the Solar Regulator. The number of Solar panels can vary and should be arranged in one or more strings of multiple panels provided the PV Voltage is within the PV operating window. Where multiple strings are employed and connected to the one PV Input, each string must be fitted with blocking diodes to avoid circulating currents and to achieve maximum efficiency, even if the panels have by-pass diodes installed (as the bypass diodes perform another function).
Further, the maximum string voltage (V_{oc}), of any string, must NEVER exceed the maximum $500V_{oc}$ rating of the Solar Regulator.

2.2.3 Battery Bank

The Battery Bank provides an energy storage medium and is sized to suit the installation. During the daytime, when there is plenty of solar input, the regulator will charge the battery, while also supplying any load requirement from the LOAD terminals. At night, when there is no sunlight, the regulator will supply the load power needs from the battery. If the site is equipped with an Inverter, the Inverter will also draw power directly from the battery. During this period, the battery will become discharged. The depth of discharge will depend on the battery state of charge at sunset, the amount of power being drawn from the battery, and the size of the battery. It is normal practice with standalone off-grid systems, to size the system for 5 days of cloud cover, and for a maximum allowable battery depth of discharge ('DOD') of 50%. Where Grid-Power, or a generator, is available as the back-up, the battery sizing will most probably be less.
When operating with sunlight, the regulator will charge the battery in accordance with the different battery charge modes, namely; Bulk, Absorption, Equalise, & Float modes.

2.2.4 Load Output

The Load Output supplies DC power to the DC equipment on site, and the voltage supplied to the Load Output terminals is at the nominal battery voltage.
Various conditions can be applied to the Load Output to disconnect the load output and prevent damage to the battery bank, or to activate lights, fans, and electrical equipment. These conditions can be based on Time, Battery State of Charge (SOC), Ambient Temperature, Battery Voltage, or Time Period (days).

2.2.5 Battery Temperature Sensor

A Battery Temperature Sensor is provided with each Regulator to monitor the battery temperature so that temperature compensation can be employed by the Regulator to correctly charge the battery bank. The temperature sensor should be mounted on a battery terminal post using the 'Lug' terminal. It is normal to install this sensor approximately in the centre of the battery bank. The battery temperature sensor is supplied with 5 metres of cable, which can be shortened or extended if required by the location. Please bear in mind that some batteries do not require temperature compensation. In these cases, the temperature compensation should be set to 0mV/^{o}C/Cell.

2.2.6 LED or LCD Display

All SRX models are supplied with 6 LED's and a 4x20 character backlighted LCD display for programming and display of operating parameters, and SD Card and USB ports for data storage. The IMARK Site Explorer app resides in the LCD software and permits direct connection to a laptop or PC, as well as remote system monitoring over the Internet. Full details covering programming and operation of the Internal LCD unit is provided in Section 6 of this manual.
Note: An SD Card or USB device with a storage capacity of 2GB will store the lifetime performance data of one regulator. Larger capacity SD Cards may be installed, but are not necessary. Some larger capacity SD Cards or USB devices may not operate in the regulator.

2.2.7 Remote LCD Display (Optional)

A Remote LCD Display unit is available as an option and can be installed in a system with up to four SR or SRX regulators. The RLCD unit can be mounted up to 100 metres from the regulators, and includes similar features to the Internal LCD unit.

3.0 SOLAR REGULATOR

This section describes in detail the purpose and operating parameters of the IMARK SRX Regulators. This information will help users better understand how and why the regulator operates as it does, and will also provide technical people with background information that may be helpful when installing these regulators.

3.1 Maximum Power Point Tracking (MPPT)

All SR & SRX Series regulators use MPPT algorithms where the MPPT constantly re-calculates the maximum power point over the whole operating range of the input from the solar panels, determines the maximum power point voltage, and operates at the voltage that produces the maximum PV power input from the available Solar Input. The use of two MPPT algorithms permits two PV panel mounting orientations (e.g. East & West) without compromising performance. This arrangement also allows a different PV string arrangement to be used on each powerboard.
MPPT Mode requires the solar input power produced by the Solar Panels to be presented to the Solar Regulator's PV input. The regulator uses the solar input power to charge the battery and to supply the load, with the load receiving first priority and the surplus power being used to charge the battery.

3.2 Battery Management

The battery management function manages the battery charging parameters. It provides a charging regime that includes the various charge modes, namely: bulk, absorption, equalisation, and float, plus the night mode (storage mode). The battery management system also controls the low battery voltage load disconnect function, over current protection, and provides the ability to set different operating parameters for different battery types and sizes.
Over current protection is provided to prevent damage to the battery and/or the regulator in the event that too much battery current is drawn. Further, the battery charge current can be set to prevent charging the battery at a rate higher than the battery manufacturers' recommended maximum charge rate.

3.3 Modes of Operation & Charging

There are several modes of operation which depend on the load, the available source of power, and the battery condition. Mode selection (except standby mode) is made automatically by the regulator based on the settings entered by the technician during installation, and the state of the PV input, Battery, & Load Voltages. Battery Charging occurs in most modes. Brief descriptions of all modes are described as follows:

Night Mode: Night mode occurs when there is no solar input, and therefore the batteries are not being charged. The Load output power requirement is supplied from the battery bank. When the solar panels start producing power and the solar input voltage exceeds approximately twice the battery voltage, the regulator switches to the appropriate Charge mode (normally Bulk Charge mode at the start of the day).

Bulk Charge: During Bulk Charge, the battery voltage level will rise steadily as the battery is being charged. The Bulk charge mode continues until the battery voltage reaches the set Absorption Charge voltage setting (around 57.6Vdc, or 144.0Vdc) at which time the charge mode will change to Absorption mode. The SRX100 operates in MPPT during Bulk Charge mode.

Absorption Charge: Absorption Charge mode commences immediately the battery voltage reaches the Absorption Charge Voltage setting (except when Equalisation Charge occurs). The Absorption Charge mode will maintain charge to the battery bank at the Absorption Charge Voltage setting for the set Absorption Charge Time period, to ensure that the battery is fully charged. When the Absorption Charge period is reached, this charging mode ceases, and the charging mode reverts to Float Charge mode.

Float Charge: Float Charge mode will hold the battery bank voltage at the Float Voltage setting, to maintain full battery capacity, by charging the battery at an appropriate current, further providing there is sufficient solar input power. The charging mode will remain in Float Charge mode for as long as there is uninterrupted solar input power available. Should/when the Solar Input Power ceases, the regulator assumes that the sun has set, and changes to Night mode.

Equalisation Charge: Equalisation Charge mode can be enabled during programming at installation, and will occur automatically after the set time period (# of days) has elapsed. When Equalisation Charge mode is activated (by valid regulator settings), it overrides the normal Absorption Charge cycle and allows the Bulk Charge mode to continue until the Equalisation Voltage is reached. Equalisation Charge mode will then charge the battery at the set Equalisation Voltage for the set Equalisation Time period. After the battery voltage has been held at the Equalisation Voltage for the Equalisation Time, the charge mode will change to Float Charge mode. The Equalisation Charge mode is used to equalise the cell voltages and may be used to prevent stratification of the battery electrolyte.
Note: Equalisation Charge is not required with some battery types.

Standby Mode: The Standby Mode is enabled by pressing the ON/OFF switch on the front panel (for about 5 seconds). In Standby Mode, the regulator is effectively turned OFF, although the microprocessor continues to operate normally (just like switching the TV off at home using the Remote). In these cases, the regulator's LCD display will show 'OFF'.

3.4 Battery Temperature Compensation

Imark SRX regulators include Battery Temperature Compensation which needs to be set (in accordance with the battery manufacturer's requirements) during installation. Battery Temperature Compensation will reduce the battery charging voltage inversely proportional to the battery temperature, to prevent the battery from being overcharged when at elevated temperatures. Battery Temperature Compensation will be disabled at temperatures below 25°C on all models. Battery Temperature Compensation is 0mv/°C/Cell at 25°C. If the battery temperature sensor is NOT fitted, or, if the battery temperature is less than 25°C, the regulator will assume the battery temperature is 25°C, and will operate with the programmed Battery Settings, and NOT reduce the battery charging voltages at higher temperatures.

3.5 Internal Temperature Sensor

The temperature of the regulator heatsink is continuously monitored and if the regulator's heatsink temperature exceeds 60°C, the maximum Regulator output power is reduced progressively. The regulator will cease operating if the heatsink temperature reaches 80°C. The maximum Regulator output will remain limited until the temperature reduces to less than 60°C. These regulators are designed to operate within an ambient temperature range from 0°C up to 50°C. This internal temperature sensor is also used to activate the ventilation fans and switches the fans on when the heatsink temperature exceeds 45°C, and off below 45°C.

3.6 Low Battery Voltage Load Disconnect Function

The load disconnect function is accomplished by disconnecting the Load Output thereby not drawing any DC power from the battery whenever the battery voltage falls below the set voltage. This is set during installation and is to protect the battery bank from over-discharge and damage. The normal battery charging routine continues whenever solar input is present irrespective of whether the Load Output is connected or not.

Hysteresis is required to prevent the load from being reconnected until the battery voltage rises to the re-connect voltage set point i.e. when it is somewhat charged, or has recovered from a heavy discharge. The Load Output will automatically be re-connected when the battery voltage recovers to a suitable level (usually set about 1.0 Vdc above the Low Battery Voltage Load Disconnect voltage.

Even when the load is dis-connected, the regulator will continue charging until the battery voltage reaches the re-connect set point, at which time, the load will be reconnected. The battery management circuit has an automatic reset so that if the battery becomes fully discharged, a fresh battery can be connected and the output will operate correctly without the need to reset the regulator. On SRX models, the Low Battery Voltage Load Release is adjustable from 0.0V-63V on 48V models, or 0.0V-160.0V on 120V models.

NOTE: These settings have NO control over the power being drawn from the battery by an inverter or other equipment connected directly to the battery.

If the Low Battery Voltage Disconnect setting is the same as the Low Battery Voltage Reconnect setting, this function will be disabled.

3.7 Battery, Load, & Solar Connections

Four polarised MC4 type plugs & sockets (8 on 120V models) are included on the terminal panel for the PV Input. As the Battery Cables are much heavier, these cables are input via the large gland nuts on the Terminal Panel, and are connected directly to the "+" and "-" battery terminals internally on the pcb assembly. A small access panel is provided on the front of the regulator allowing the installer access to the required terminals. A 4 way Plug & Socket connector is provided on the terminal panel for the Load connection. Always ensure that the cables are correctly polarised, fully inserted, and that the cable securing screws are tight when making these connections.

3.8 Load Conditions (SRX Models)

Conditions can be applied to the load terminals which can be used to apply further controls to the load output for use with fans, DC Lights, or similar equipment that only needs to run for defined periods, or at set times. Activation can be based on Time of Day, and/or Battery SOC, and/or Ambient Temperature conditions. A frequency or cycle period (in days) can also be set if required.

3.9 Protection Devices

All SR and SRX Series regulators are fitted with transient protection devices on the Solar Inputs to protect the unit from incidental lightning strikes and/or voltage spikes. TVS diodes are internally fitted on the Battery and Load terminals to reduce the possibility of regulator damage being caused by voltage spikes on the Battery and Load terminals. Numerous software controlled protection features are also included to protect the regulator and/or system against over-current, over-voltage, under-voltage, and over-temperature conditions.

3.10 LED Status Indicators

All Regulators are fitted with six LED's to indicate the Battery State of Charge, the operating status or error status of the regulator. A table describing the status indicated by the LED's is provided in Section 5 of this manual.

3.11 Control & Display

One micro-controller is used by the SRX Solar Regulators to manage the solar input, battery charging, load output, the remote signal output, CANBus communications with other regulators, and the LED's. An additional micro-controller is used to manage the 4x20 LCD display, communicate via CANBus with regulators in the system, and includes the IMARK Site Explorer software to provide the Internet capability.
All LED indications displayed on SRX Regulators will also be displayed on any Remote LCD Control Unit (if installed in the system).

3.12 LCD Display & Control Unit (SRX Models)

The LCD Display & Control Unit is installed on the front panel of the regulator and is provided to monitor and display the performance of the regulator, or to program the Regulator with the user settings. The LCD Display & Control Unit has limited control over the regulator and plays no part in the maximum power point tracking, or the battery, or the load management of the system. The LCD Display Controller will NOT stop the regulator from operating correctly, even if the internal LCD Display section fails for any reason.
The Internal LCD Display unit includes a 4 x 20 alpha-numeric character display to show operating parameters and can be used to program the Regulator. A buzzer is included within the LCD Display Unit to announce keystroke operation when using the LCD Display. The buzzer will also sound to indicate a ground fault on models equipped with Ground Fault Indication (GFI) function.
Whenever a key is pressed, all LED's on the LCD Control Panel are turned off, except the LED above the 'pressed' key. All LED's return to their normal display condition two seconds after the most recent key-press.
Also note that the LCD Display and Remote Controller units get their power through the battery terminals, and are always active when the battery is connected.

3.13 LCD Control Keys.

The Remote LCD Control Unit has six keys for programming, as follows:

UP	▲	For navigating the menu and to exit the programming mode
DOWN	▼	For navigating the menu and to exit the programming mode
LEFT	◄	For navigating the menu and to enter the programming mode
RIGHT	►	For navigating the menu and to enter the programming mode
ENTER	■	To select and store the indicated setting
LEFT & RIGHT	◄ ►	To enter the programming mode (pressed simultaneously)
UP & DOWN	▲ ▼	To Exit the programming mode (pressed simultaneously)
ON/OFF	■	To switch the regulator between Normal & Standby modes.

These keys also operate in the same manner on the Remote LCD Control.

3.14 Remote LCD Control Unit (Optional)

An optional Remote LCD Control Unit can be installed to monitor the performance of the regulator/s remotely, or to program the Regulator/s with the user settings. The Remote LCD Control Unit includes 6 LED's as well as the 4 x 20 alpha-numeric character display to show operating parameters of the connected Regulator/s.
All indicators available on an internal LCD unit are replicated on the Remote LCD Control Unit. A buzzer is also included on the Remote LCD Display Unit to announce keystroke operation when using the LCD Display.
The RCU may be installed up to 100 Metres from the Regulator using a CANBus cable to connect to the installed regulator. However, the Remote Control Unit MUST be connected to a regulator using the CAN 1 connector to obtain voltage from the battery to operate.
Note: The Remote LCD Unit has an extra connector on the terminal board. This connector, however, is not yet functional, as it has only been included to cater for future features.

3.15 Terminal Panel

The Terminal panel is located at the bottom of the wall mounting unit, or at the rear of the unit on 19" Rack Mounting units. The following connectors are located on the terminal panels:

- Two MC4 plugs & Two MC4 sockets for easy connection of the Solar Inputs on 48V units. Four MC4 plugs & Four MC4 sockets for easy connection of the Solar Inputs on 120V units.
- One 4-way 10 Amp connector for the +/- Load Output power.
- One 16-way 1A plug & socket connector for all I/O interface connections. eg. Ambient Temperature Sensor, Battery Temperature Sensor, Remote ON/OFF function, Alarm output, Relay Signal output, Generator Start Signal output, and electronic Shunt Output.
- Two 4-way plug & socket connectors for CANBus interface.
- One RJ45 8-way socket for Ethernet connection.
- One Fuse Holder Socket used for the GFI Link
- Two Gland nuts to accept two $50mm^2$ battery cables. Note: The Battery Cables on wall mounting units MUST be terminated internally as described in clause 3.7 previously. Rack Mounting units use a Plug & Socket arrangement for the battery cables. The plug must be terminated as described in addendum # 5.

Note 1: Battery voltage (for the Remote Control Unit) is only provided on the CAN 1 connector.

3.16 Generator Starting Capability

The 16-way interface connector on the Terminal Panel has two signal terminals for starting generators. One signal output (P13) is used to start the generator, while the second signal output (P14) (with delayed activation) can be used to activate an external device (such as a contactor or change-over switch). This allows generators to be started with no load and then activate an external transfer switch when the delay period elapses. This is a signal terminal only and **cannot** be used to power external equipment.

3.17 Ambient Temperature Sensor Input (Optional) Pin #5 & Pin #6

The 16-way interface connector on the Terminal Panel includes connection terminals to which the external Ambient Temperature Sensor can be connected. This sensor may be used with the Load and/or Remote functions.

3.18 Remote Shutdown (ON/OFF) Pin #9

The 16-way interface connector on the Terminal panel includes a terminal that can be used by external control equipment to Shut-Down the regulator if required. Its signal return path is through Pin #10 (IGND).

3.19 Alarm Output Signal Pin #11

The 16-way interface connector on the Terminal panel includes an Alarm Output Signal terminal that can be used by external control equipment to advise of an Alarm condition if required. Its signal return path is through Pin #10 (IGND).

3.20 Remote Signal Output Pin #12

The 16-way interface connector on the Terminal Panel includes a Remote Signal Output terminal to allow the regulator to activate external devices, such as a generator, air-conditioner, heater, light, etc, if required.
Activation can be based on Time of Day, and/or Battery SOC, and/or Ambient Temperature conditions. A frequency or cycle period (in days) can also be set if required. Its signal return path is through Pin #10 (IGND).

3.21 Ethernet Connector and Cables (SRX Models)

A standard Ethernet cable (usually Blue colour) can be used to connect the Solar Regulator through the RJ45 connector (P2) on the terminal panel to the Internet through an Ethernet Switch or Router.
In cases where the user wants to make a direct connection to a computer, either a standard Ethernet cable (usually blue colour), or an Ethernet Data Crossover cable (usually yellow colour) can be used. These cables are readily available from IT accessory stores.

3.22 SD Card Holder Slot (SRX Models)

The SRX regulators are fitted with a SD Card Holder on the front panel of the regulator. A 2GB SD Card will have sufficient capacity to store the performance data (on a 30-minute basis) for more than the expected lifetime of the product. Data Logging to the SD Card MUST be enabled in Screens 8.1 & 8.2.

All performance data (for about 14 days) is stored in the **regulator's** EEPROM, and is retrieved from the regulator's EEPROM on a 30 minute basis and stored on the SD Card. Therefore, any data retrieved from the SD Card will only be historical data applying to a prior time period, and may be 30 minutes old. It is possible to retrieve the historical data from the SD card at any time via the Ethernet port, or via the Internet.

Note: Users should always bear in mind that the SD Card must be installed into the SD CardHolder, and enabled in screen 8.1 with Data Logging enabled in screen 8.2 if/when users wish to record the historical performance data or events of the regulator. The software used for the LCD panel may not support all SD Cards or SD Cards with more than 2GB of storage capability.

3.23 USB Terminal (SRX Models)

The SRX regulators are fitted with a USB port on the front panel of the regulator. This port operates in the same way as the SD Card port and can be used to store the performance and events data. Only one of the SD port or the USB port can be used per regulator.

Note: Downloading the data via the Internet may take some hours. This depends on the amount of data to be downloaded, and the speed of the connection. (A connection path using 3G may be quite slow).

3.24 Terminal Panel (Remote LCD Display unit ONLY)

The Terminal Panel on the Remote LCD Display unit is fitted with the following connectors:

- Two 4-way plug & socket connectors for the CANBus interface with the Local LCD Display unit on the regulator, and for external provision of V+ & V- to power the Remote LCD Display unit.
- One RJ45 8-way socket for Ethernet connection.
- One DB9 9-way connector for RS232/485 Communications with external devices. (future option).
- One 3-way 1A plug & socket connector for RS485 communications with external devices.

Note: The CAN1 connector on the SRX Regulator MUST be connected to the CAN1 connector on the Remote LCD Unit to be Powered Up.

3.25 CAN2/RS232/485 (Remote LCD Display unit ONLY) (Future Option)

Local access to the regulator using a PC is NOT available via the RS232/485 terminals on the Remote Control Unit ONLY. RS232 data can only be transmitted over short distances, say 5 metres, while RS485 data can be transmitted over distances of up to 1Km.

Note: The CAN2, RS232, & RS485 capability is only available as a special order at extra cost.

3.26 Adjustments

All Regulators are tested and adjusted for correct operation during production at the factory. However, battery manufacturers do specify different charging settings. Accordingly, all installations will require the installer to check all settings to ensure that they match the specific settings specified by the battery manufacturer. This can be done on site using the LCD Display & keys, or by using the remote access using the Imark Site Explorer software. In all cases, this must be done prior to, or during the commissioning the regulator.

3.27 Password Protection (SRX Models only)

Password protection is provided with SRX models, and provides three control levels, two of which may be password protected. The 'Public' control level does not allow any changes, while the 'User' control level allows the user to change settings that are unlikely to damage the regulator or system should inappropriate settings be entered. The 'Technician' control level is provided for use by technically qualified persons who will be responsible for the correct operation of the system. The 'User' level controls are used to display voltages, power consumption, and to change routinely used settings, such as day &/or time, and generator or air-conditioner running conditions. However, the 'User' control level does not allow the user to alter any settings that may affect the correct operation of the Regulator. Any person can view all screens.

3.28 Ground Fault Indicator

All SRX100 models have an inbuilt Ground Fault Indicator (GFI).
This GFI Circuit will detect if a Short Circuit is detected between the Earth and either the PV positive or the PV negative circuit. Should a Ground Fault occur, the SRX100 will immediately cease producing PV power and return to Night mode. The SRX100 will also display a GFI fault via the LED's, in LCD Screen 6.B and Screen 7.C, and simultaneously provide a GFI signal output on pins P10 & P11 on the 16 way Interface connector on the Terminal Panel.
It should be noted that only 1 GFI circuit should be enabled at any particular site.

The GFI Function can be disabled on SRX100 models via Screen 1.7, and by removing the W1 GFI Link (that is located on the LHS powerboard near the terminal board).
On Rack Mounting models, this GFI Link is also available on the external part of the terminal panel. Removing this Green mini-fuse is the same as removing the GFI link on the powerboard and does not any access to the internal parts of the SRX100 regulator.

Further, Radio sites (where the negative circuit is usually earthed) may require special consideration, as will sites that use a Positive Earth wiring arrangement.
Please contact your supplier should you need further information relating to these types of installations.

4.0 INSTALLATION

WARNING

DC Voltages up to 500Vdc may be present in this product.
These voltages can be LETHAL.
If you value YOUR LIFE ……. ALWAYS isolate all input and output connections before removing any covers from the unit.

Read this manual before commencing the installation, as this manual contains important safety, operational, and installation instructions. In particular, ALWAYS heed the safety instructions.

- When the Photovoltaic array is exposed to light, it supplies a dc voltage to the PCE.
- These Solar Regulators are designed for indoor installation, or for installation in enclosed cabinets. They must not be installed at locations where they may be exposed to rain or moisture, or in locations exposed to direct sunlight.
- There are no user serviceable parts inside the Imark SRX series regulators. Internal access is only required at installation by the installation technician. Otherwise, it is not necessary to remove any covers, and all covers should be left installed for safety reasons.
- Any fuses, blocking diodes, or circuit breakers (required to comply with local Electrical Standards) are to be installed externally to the Imark regulator.
- Always ensure that all power sources to the regulator are NOT connected before commencing installation.
- Always use appropriately sized cables for the installation.
- Always ensure that all terminations are tight to avoid temperature hot spots caused by loose connections.
- Always ensure that the regulator is correctly grounded using the ground terminal on the bottom of the unit.
- Blocking diodes SHOULD be installed whenever more than one solar string per input is employed.
- Multiple regulators **CANNOT** be installed using a common PV Input.
- All Negative terminals are COMMON
- Always use insulated tools when working with electrical circuits and remove any conductive jewellery from your person.
- The battery bank must comprise of the same make, type, and age batteries.
- Always extinguish any naked flames when working near batteries.
- **ALWAYS** make the correct battery charge settings before connecting the PV Input.
- Always **CONNECT** the battery supply **FIRST**, and always **DISCONNECT** the battery supply **LAST**.
- When multiple regulators are being installed as a system, always connect ALL battery supply inputs and switch all regulators ON, **before** applying any solar input.
- Reverse polarising the Battery Terminals **WILL DAMAGE** the regulator and is NOT covered by warranty.
- Connecting the PV Input to the battery terminals may damage the regulator and possibly damage the batteries (if connected).
- **NEVER** touch any internal component without firstly ensuring that all capacitors are fully discharged.

CAUTION

WARNING

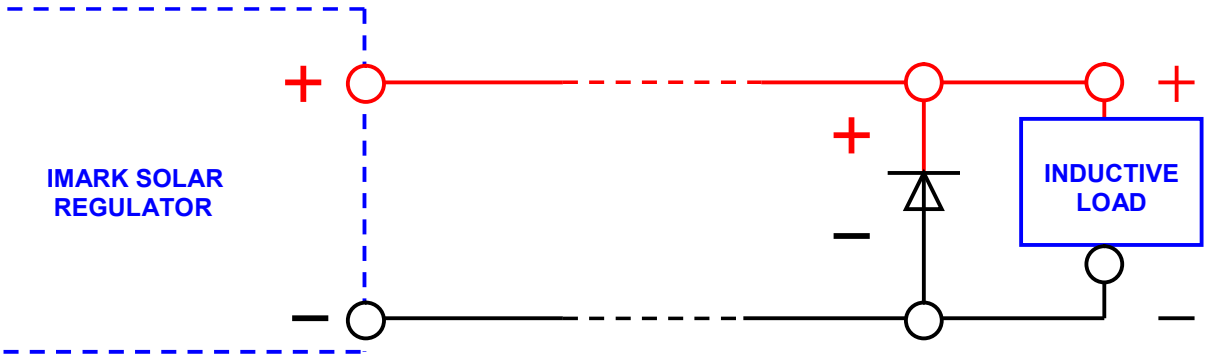
INDUCTIVE LOADS

Inductive Loads can impose transient voltage spikes or disturbances on the DC power source equipment. It is possible for these voltage disturbances to reverse the polarity on the DC supply lines and even damage the supply equipment (such as this regulator).

The IMARK Regulators include some protection on both the battery connections and the Load connections to reduce the possibility of damage to the regulator.

However, this protection is only designed to protect against small voltage disturbances. The magnitude of a voltage disturbance depends on the equipment being connected to the regulator and is something that is beyond the control of IMARK.

Equipment that imposes inductive loads are electric motors, some inverters, some lights, long cable runs, fans etc. If you are connecting any type of inductive load to the IMARK regulators, a diode should be installed near the inductive load, with correct orientation as shown in this diagram.



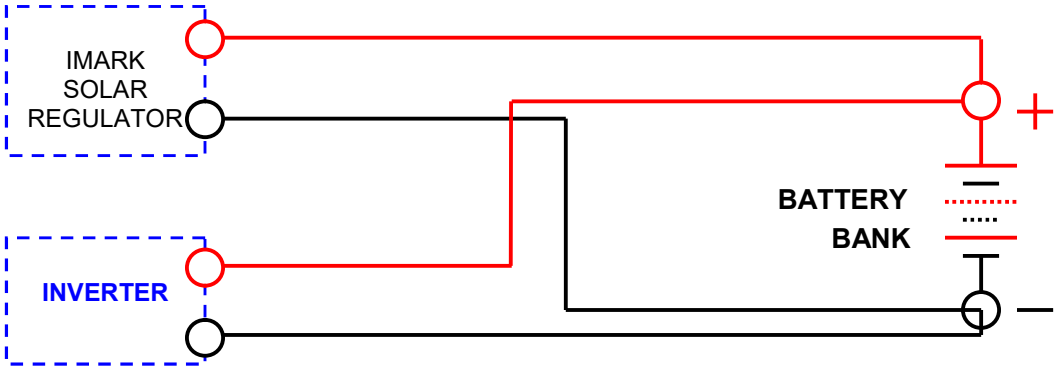
The diode must be:

- A power diode
- Rated at 80Volts (48V units) or 200Volts (120V Units) or greater
- Rated 25% greater than the amperage rating of the regulator.
  e.g. SR100 & SRX100 = greater than 125 Amps min
- Be able to dissipate the heat generated by the load. This may require the diode to be installed on a heatsink.

CONNECTING INVERTERS

Inverters should **NEVER** be connected **directly** to **ANY** terminals of the regulator.
If it is necessary to connect an inverter, it **MUST** be connected **directly** to the battery bank.
Any voltage disturbance created by an inverter should directly travel to the battery before the regulator. (i.e. the regulator and the inverter are separately connected to the battery terminals)

The electrical distance for the voltage disturbance between the inverter and the battery **MUST** be shorter than the distance between the inverter and the regulator.

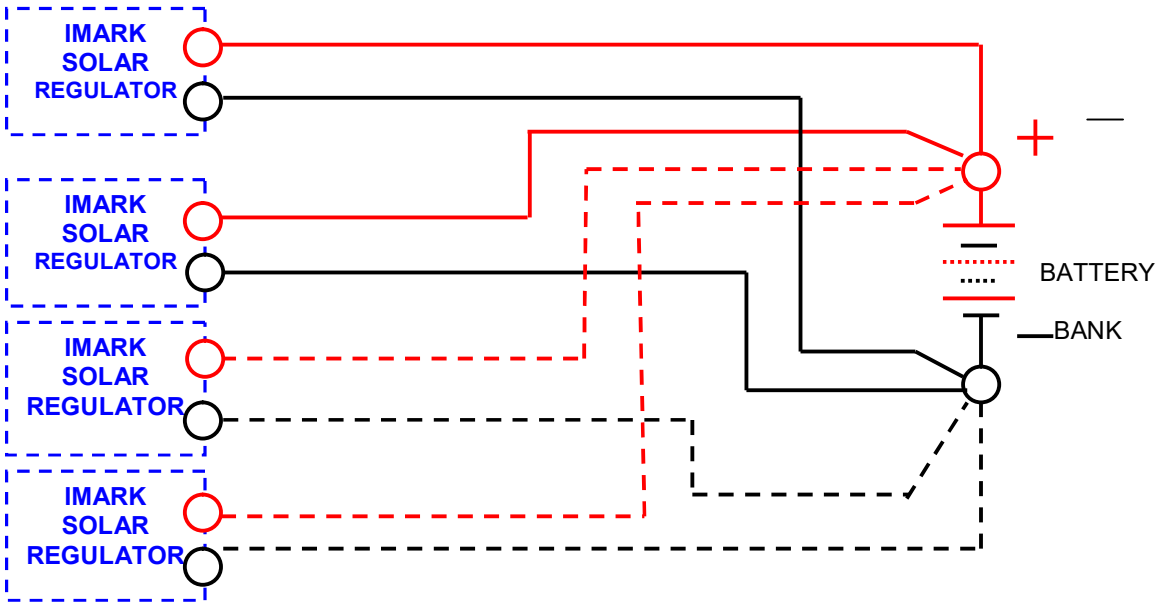


NOTE: *Protection devices not shown.*

PARALLEL REGULATORS

IMARK regulators can be connected in parallel to charge a common battery bank.
HOWEVER, IMARK regulators **CANNOT** be connected in parallel to a common load.
Furthermore, input from PV panels **CANNOT** be connected in parallel to multiple regulators.
IMARK regulators **DO NOT** have any load sharing capability.

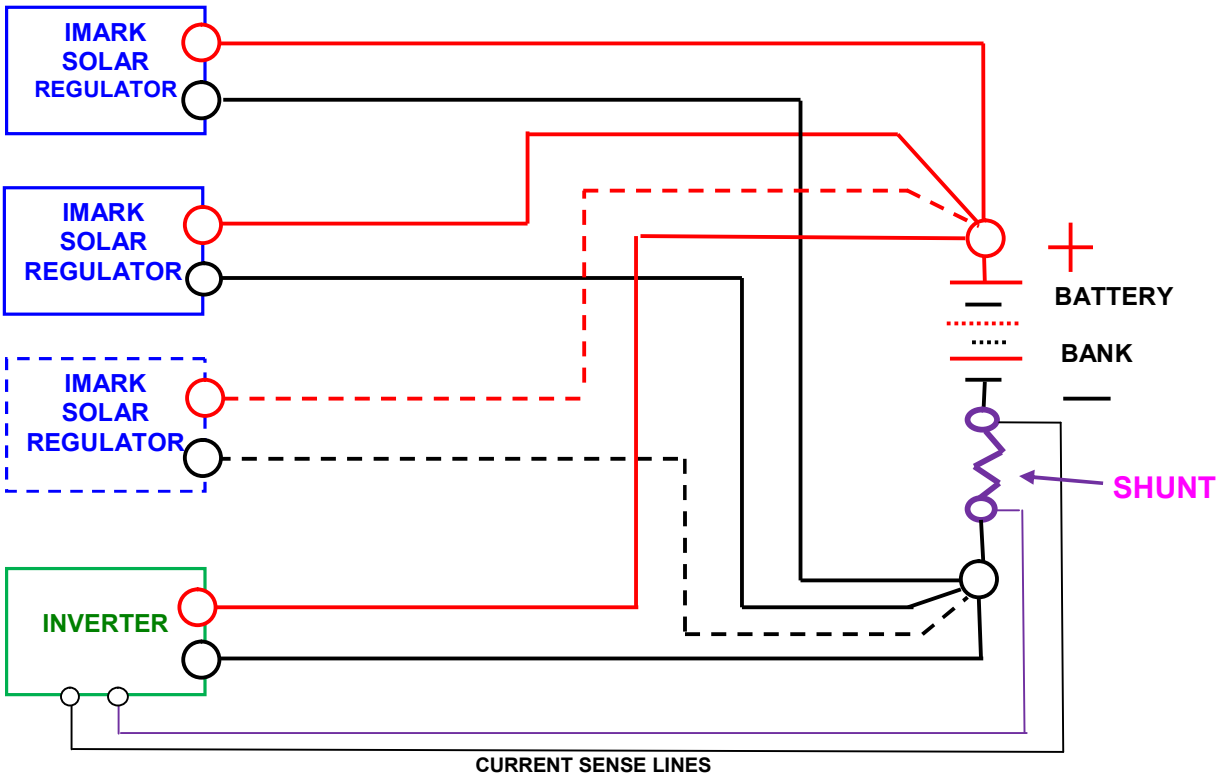
IMARK SR/SRX regulators MUST be connected directly to the battery bank without any intermediate terminations (other than a dedicated Solar Regulator Circuit Breaker).



NOTE: *Protection devices not shown.*

INSTALLATION WITH INVERTERS & CURRENT SHUNTS

Where a **current shunt** is being installed in the battery cable to measure the amount of power being either supplied to, or taken from the battery, the **current shunt** should be installed after the battery cables have been “commoned”, and in a position close to the battery terminal.



NOTE 1: *Protection devices not shown.*

NOTE 2: *Also Note that current SR100 & SRX100 models include an electronic Shunt Output on the 16 way interface terminal.*

CAUTION

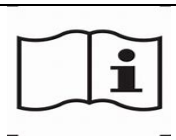
WARNING

BATTERIES or STORAGE DEVICES WITH INTERNAL CIRCUIT BREAKERS

Batteries with internal protection Circuit Breakers (and/or other internal protection systems) may have the internal battery connections to external equipment (such as this solar regulator) opened by the BMS. This event may occur when the PV Input is present, and, (without the battery being connected), may cause the external equipment to become unstable, and could result in damage to the external equipment.
Accordingly, whenever such storage devices are used, the BMS **MUST** close the connection between terminals P9 & P10 on the 16 way connector (P4) on SRX100 models immediately the BMS opens the Internal Battery Circuit Breaker. This action will reduce the risk of damage to the SRX100 Solar Regulator, other attached equipment, and switch the regulator OFF.
The SRX100 will re-start and resume operation when the connection between P9 & P10 (above) is OPENED.
Damage caused to any equipment by failing to follow these instructions is NOT covered by warranty.

Maintainance

The Imark SR and SRX Regulators do NOT require any regular maintenance or periodic replacement of any components.

 **INFORMATION**	**REFER TO MANUAL** The PV Panels and the Battery/s may require periodic maintenance. As these vary from installation to installation, you should refer to the respective manufacturer's instructions.

Cleaning

The Imark SR and SRX Regulators should be kept clean and free of any dust, or grime build-up.
Use a clean soft rag, or soft bristle brush to remove any dust, grime, or moisture from the external parts of the regulator periodically.
And, while you "are at it", check that all covers are correctly located, and that there are no loose or damaged cables present. Remember that high voltage may be present on some cables, so any remedial action should be done by a competent suitably qualified technician.

4.1 Regulator Location

 **CAUTION**	**WARNING** **If this equipment is not installed, or is used in a manner not specified in this manual, the protection provided by the equipment may be impaired, and not covered by any warranty.**

Select a location for the regulator that is NOT exposed to direct sunlight, and NOT exposed to rain or moisture. A flat area of at least 500mm x 400mm is required, with 300mm of air space both above and below the regulator to provide sufficient clearance around the unit to allow free airflow, and entry for the cables.
The regulators are supplied with a panel mounting bracket which allows installers to position the mounting bracket in the desired location, and then when ready, locate the regulator on the mounting plate and secure with the supplied screws. Use at least 4 screws to fix the mounting bracket to the wall, and 4 screws to secure the regulator to the mounting bracket. These screws should be tightened to 2.5nM of torque.
Where more than one regulator is being installed as a system, always allow at least 100mm between units for free air circulation.

PV Installation

The PV array is to be installed as a floating system with the PV frames connected to earth. An external overcurrent or disconnection device MUST be installed on all PV Inputs.

Battery Bank Sizing

The size and voltage of the battery bank is to be determined by the site insolation, site loads, and days of autonomy required. The SRX100-48 model supports 48V battery banks, while the SRX100-120 supports 120V battery banks.
The SRX100 Solar Regulators can be programmed to support the following battery types: Flooded, Gel, AGM, Li-On, LiFePO4, Super Capacitor, and Custom.
It is the installer's responsibility to ensure that the battery charging settings meet the battery manufacturers charging requirements, and that the system is correctly sized.

4.2 Cabling

Always use adequately sized cables. Cable sizes should be increased in high temperature areas. The recommended cable sizes for the various connections are detailed in the cabling table below.
As this product is installed in a PV installation, the battery and PV connections are Over-Voltage Category II.

Designation	Purpose	Cable Colour	Size mm²	Cable Amp Rating
PV1+	Connect the Solar Input positive + to this terminal	Red	4 - 6	25
PV1-	Connect the Solar Input negative – to this terminal	Blue	4 - 6	25
PV2+	Connect the Solar Input positive + to this terminal	Red	4 - 6	25
PV2-	Connect the Solar Input negative – to this terminal	Blue	4 - 6	25
PV3+	Connect the Solar Input positive + to this terminal	Red	4 - 6	25
PV3-	Connect the Solar Input negative – to this terminal	Blue	4 - 6	25
PV4+	Connect the Solar Input positive + to this terminal	Red	4 - 6	25
PV4-	Connect the Solar Input negative – to this terminal	Blue	4 - 6	25
Bat +	Connect to the Battery Positive terminal	Red	35 - 70	150
Bat -	Connect to the Battery Negative terminal	Black	35 - 70	150
Load Out 1 +	Connect the Load Positive + to this terminal	Orange	2.5	15
Load Out 1 -	Connect the Load negative - to this terminal	Blue	2.5	15
Load Out 2 +	Connect the Load Positive + to this terminal	Orange	2.5	15
Load Out 2 -	Connect the Load negative - to this terminal	Blue	2.5	15

Always check that all cables have the correct polarity before applying any power, and that all cable terminations are both secure and tight.

Note #1:
Load Terminals #1 and #3 have positive polarity while Load terminals #2 and #4 are negative polarity. Accordingly, two DC Load outputs are available. One Load Output is supplied on Pins #1 and #2, while the second Load Output is supplied on Pins #3 and #4. These terminals are internally connected in parallel. Each pair of terminals is rated at 10 Amps at the battery voltage. However, ONLY 10 amps of current is available (shared) over the two Load Outputs. Thus, if one Load Output is drawing of 8 Amps, then the second Load Output will ONLY have 2 Amps of current available at the same time.

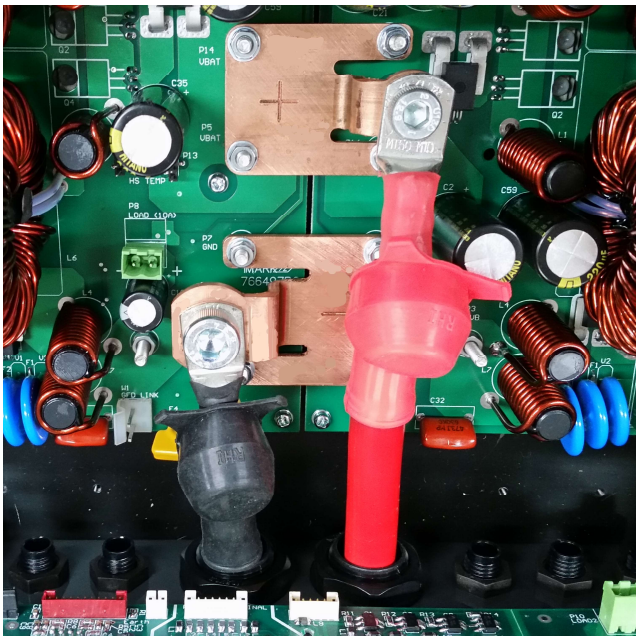
CAUTION: Be very careful!
Always have the battery isolated from the regulator as well as having the PV Input to the regulator isolated when connecting these cables.

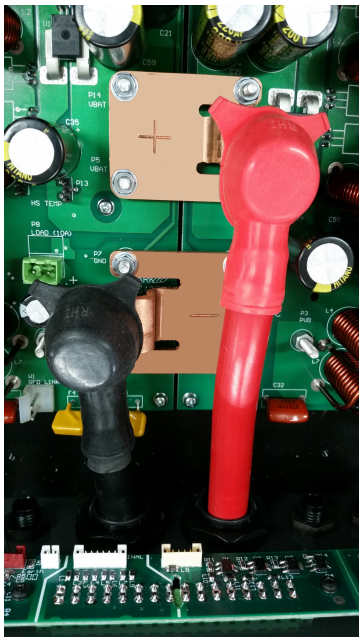
Wall Mounting Regulator

120V Wall Mounting Regulator shown

Battery Connection

Connection of the battery is made through the two large gland nuts on the bottom plate, with the battery cables being internally connected to the Batt + and the Batt – terminals between the two internal power board assemblies as shown in the following graphic.





Note: Cover & some cables removed for clarity.

Use the 8mm cable lug on the + cable (red), and the 10mm cable lug on the – cable (black). Always ensure that the bolts that secure the battery cable lugs to the pcb connection terminals within the regulator are tightened securely to 6Nm of torque.
ALWAYS fit the supplied terminal protector over the terminal connections.
Note: As the current flowing through these connections may be up to 100 Amps, a small resistance, say 100mOhms, will cause these terminals to overheat. In this example, I^2R will produce 1kW of heat at the terminals, which can easily damage the pcb and components.

19” Rack Mounting Regulator

Battery Connection

The Terminal Panel on the Rack Mounting models include a positive (red) and a negative (black) terminal on the external side of the terminal panel with all internal battery connections already made. These connectors are designed to be used with 50mm cable. It is NOT necessary for the installer to make any internal connections.

The SRX100R models are supplied with two mating plugs that require the installer to terminate on the respective battery cables. Instructions on how to terminate these connectors to the cables is shown in Addendum 6 at the end of this manual.

Note: The Positive and the Negative terminals are differently polarized thus making it impossible to reverse polarize the battery connection (unless the connector is terminated to the incorrect cable).

When connecting the terminated cable to the regulator, always ensure that the cables are positioned correctly before pressing the cable plug into the “home” position. A “click” sound will be heard when the plug is pushed fully into the “home” position.

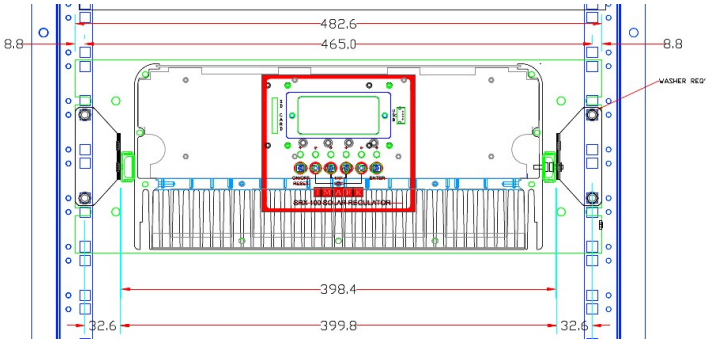
Press the locking tab and wriggle and pull the plug away from the Terminal Plate to remove the cable plug.

ALWAYS remember to check that these cables are correctly terminated and pressed into position. Failure to have the cable plug fully and correctly inserted can create a “Hot Spot” which can create a lot of heat and cause major damage to the regulator. Remember, 100mOhms resistance at 100 Amps of charge current will create 1kW of heat. Power = I^2 x R (or 100 amps x 100 Amps x 0.1 Ohms = 1,000 watts).

Equipment Slides

Rack Mounting models are supplied with equipment slides to permit easy installation into 19” equipment cabinets. The slide rails are designed to be mounted between the front and rear rack rails as shown to the right in the wire frame drawing.

The mating slides are fitted to the sides of the SRX100 before shipping.



P4 16 Way I/O Connector				
Position	**Designation**	**Purpose**	**Colour**	**Size**
1	SHUNT A+	Shunt Output + Regulator side 50mV/100A		0.75mm²
2	SHUNT B-	Shunt Output -, Battery side		0.75mm²
3	TBATF+	Battery Temperature Sensor Input		0.75mm²
4	TBATF-	* Battery Temperature Sensor Input Neg		0.75mm²
5	TAMBF+	Ambient Temperature Sensor Input		0.75mm²
6	TAMBF-	* Ambient Temperature Sensor Input Neg		0.75mm²
7	nSROFF	Full Shut-Down (Hardware Shut-down)		0.75mm²
8	GND	Ground Return		0.75mm²
9	IREM ON	Isolated Remote ON/OFF (wrt IGND)		0.75mm²
10	IGND	Isolated Ground Return		0.75mm²
11	IALARM	Alarm Output Signal Terminal		0.75mm²
12	IREMOTE	Remote Output Signal Terminal		0.75mm²
13	IGENSTR	Generator Start Signal Terminal		0.75mm²
14	IDLYSRT	Delayed Start Signal Terminal		0.75mm²
15		Future Use		0.75mm²
16		Future Use		0.75mm²

*The striped wire on the temperature sensors is the negative wire and should be connected to the TBATF-, or the TAMBF- terminals.

Shunt Connection

The Shunt Outputs on Pins 1 & 2 provide an electronically generated shunt simulation. These Shunt Outputs represent the Current flowing between the SRX100 and the Battery ONLY. The SRX100 has no means of measuring the current being drawn from the battery by other equipment (such as an inverter). It will usually be a positive (charge) reading, but can also be a negative reading, such as when external equipment is connected to the Load Terminal at times when there is NO PV input (night time). This output is calibrated at 50mV/100Amp. Thus, if the current into the battery is 40 Amps, the reading between these two terminals will be 20mV.

Note: If the connection is reversed, the reading will indicate that the regulator is drawing power (Discharging) from the battery (instead of indicating a Charge current).

4 Way DC Output Connector					
Position	**Designation**	**Purpose**	**Cable Colour**	**Cable Size**	**Maximum Current**
1	Load **+**	DC Output Positive	Red	2.5mm²	**10 Amps** shared over the connector at battery voltage
2	Load **-**	DC Output Negative	Blue or Black	2.5mm²	
3	Load **+**	DC Output Positive	Red	2.5mm²	
4	Load **-**	DC Output Negative	Blue or Black	2.5mm²	

Note:
The combined maximum current available from this 4 way connector is 10 Amps.

Load Terminals #1 and #3 have positive polarity while Load terminals #2 and #4 are negative polarity. Accordingly, two DC Load outputs are available. One Load Output is supplied on Pins #1 and #2, while the second Load Output is supplied on Pins #3 and #4. These terminals are internally connected in parallel. Each pair of terminals is rated at 10 Amps at the battery voltage. However, ONLY 10 amps of current is available (shared) over the two Load Outputs. Thus, if one Load Output is drawing of 8 Amps, then the second Load Output will ONLY have 2 Amps of current available at the same time.

4.3 Interface Connections

The SRX regulators provide several interfacing capabilities depending on the particular installation. Access to operational information is available via:

- Remote access (up to 100 metres) using the Remote LCD Control Unit
- Directly connected computer using a standard Ethernet cable and the Ethernet port
- Remote access using Ethernet via a Local Area Network
- Remote access anywhere in the world using Ethernet over the Internet

4.4 Terminal Connector Functions

The purpose or function of the I/O terminals (Connector P4) of the solar regulator is common to all SRX100 models (Refer to para. 4.2) and is described as follows:

Position	Designation	Purpose
1	SHUNT A+	Shunt Output +, Regulator Side, 50mV/100A
2	SHUNT B-	Shunt Output -, Battery Side
3	TBATF+	Battery Temperature Sensor Input *
4	TBATF-	
5	TAMBF+	Ambient Temperature Sensor Input *
6	TAMBF-	
7	nSROFF	Full Shut-Down (Hardware Shutdown) (wrt GND)
8	GND	Ground Return
9	IREM ON	Isolated Remote ON/OFF (wrt IGND)
10	IGND	Isolated Ground Return
11	IALARM	Isolated Alarm Output Signal Terminal (wrt IGND)
12	IREMOTE	Isolated Remote Output Signal Terminal (wrt IGND)
13	IGENSTR	Isolated Generator Start Signal (wrt IGND)
14	IDLYSTR	Isolated Delay Start Signal (wrt IGND)
15		Future Use
16		Future Use

*The temperature sensor Cable has a white outer sheath with two inner Cables. The WHITE inner cable is the Negative and MUST be connected to the TBATF- terminal, while the RED inner cable is the Positive and MUST be connected to the TBATF+ terminal. Likewise for the Ambient Temperature Inputs.

4.5 CAN1 and CAN2 (P6 & P8)

Communications between multiple Solar Regulators installed as a system is achieved using the CANBus Data Protocol. CANBus uses a 'daisy chain' architecture where extra regulators are just added to the last one. This architecture requires that a Termination Resistor be fitted at the 'end of the chain'. All Imark SRX regulators are shipped with this termination resistor and link mounted on the Terminal pcb assembly. Single regulator installations do not require any changes at installation.
However, when multiple regulators are installed as a system, it is ONLY the last regulator in the 'daisy chain' that requires the termination resistor to be in-circuit. Therefore, where multiple Imark SRX Solar Regulators, or if a Remote Control Unit is installed in a system, it is necessary to remove the internal link (W1) from the terminal pcb (above the CAN2 Connector) assembly on all Solar Regulators (EXCEPT the last regulator in the chain).

Where all W1 links are open, a Termination Resistor plug can be fitted externally on the unused CAN2 connector on the last solar regulator. This Termination Resistor plug (Imark stock # 773991) is available as an option from your supplier or from Imark Communications Pty. Ltd.
Further, in cases where the Remote Control Unit is installed, the Remote Control Unit MUST be connected to the CAN1 connector.

4.6 Multiple Regulator Systems

The Regulators have the capability to be 'stacked' using a master and slave configuration to provide higher power outputs when required by larger systems. CANBus is used for communication between multiple regulators.
In a 'stacked' installation, individual regulators can be set to charge different voltage battery banks, and provide that battery voltage to the load terminals. Further, different Solar Inputs can be applied individually to individual solar regulators inputs, even if all regulators are charging a common battery bank.
Note: Each PV Input on every regulator must have a completely independent Solar input, and each regulator MUST be correctly programmed.

IMARK SR/SRX100-48 and SR/SRX100-120 regulators employ two power-boards internally. The SRX100-48 model has two inputs and accordingly, two individual strings can be input without the use of blocking diodes. In the case of the SRX100-120 regulators (which each have 4 PV Inputs), 4 blocking diodes are installed internally. Where multiple Solar input strings are connected to individual regulators, blocking diodes MUST be fitted to each Solar Input string. While it is possible to install blocking diodes at the solar input to each regulator, it is recommended that the blocking diodes be installed on each solar Input string near the solar panels as this will improve the efficiency of the complete installation.

Up to 4 x SR100 or SRX100 regulators can be 'stacked' in a working system with the identities numbered '1' to '8'. As each SRX Unit includes two power-boards (A & B), identities are allocated as follows, and should be programmed according to the following table:

	Regulator #1		Regulator #2		Regulator #3		Regulator #4	
Power Board	1A	1B	2A	2B	3A	3B	4A	4B
CANBus Identity (Board A or B)	1	2	3	4	5	6	7	8
LCD Identity	1		3		5		7	
Remote LCD	-		-		-		-	

The procedure for setting the CANBus identities of multiple regulators is described in section 5 (clause 5.2) for SR100 models and in section 7 (Menu Screen 1.6) for SRX100 models, of this document.
Note: Programming two regulators with the same identity number will confuse the internal microprocessor, and may cause incorrect performance data to be displayed on the LCD Screen, and in the data downloads. Further, the LED Indicator lights may display erroneous information or may not even be illuminated.

4.7 CANBus Cables

CANBus cables can be ordered from your supplier or from Imark pre-assembled to your length (Up to 125 Metres). Alternatively, competent technicians can make cables to suit the installation. The following table shows the required Imark parts and the wiring instructions:

CAN1 Connector	Cable Details	Colour	Signal	CAN2 Connector
#728133.04	#794308			#728133.04
Pin #1		Red	V+	Pin #1
Pin #2		Black	V- or CAN_GND	Pin #2
Pin #3		White	CAN_H	Pin #3
Pin #4		Blue	CAN_L	Pin #4

4.8 Earthing

The Regulator must be earthed to the site ground terminal.
The SRX100 has an EARTH TERMINAL located on the Terminal panel which is fitted with an interlocking washer, and Wing Nut (as shown below). A green (or Green/Yellow) earth cable must be connected to this terminal and run to a common site earth point. This is required for safety purposes, as well as to enable correct operation of the Ground Fault Indicator.

Figure 1

4.9 Ground Fault Indication

The Ground Fault Indicator (GFI) function is inbuilt within the SRX100 regulator. The operation of the GFI function is described in a separate document and is included on the SD Card that is supplied with each SRX100 Solar Regulator.
Activating multiple GFI functions in one system will reduce the sensitivity of the GFI sensing circuit. Therefore, only one SRX100 can have the GFI function active in a system. The GFI alarms can be de-activated via Screen #1.7, while the complete GFI function can be disabled by removing the link W1 on Powerboard A.

The GFI Function can be disabled on SRX100 models via Screen 1.7, and by removing the W1 GFI Link (that is located on the LHS powerboard near the terminal board).
On SRX100R Rack Mounting models, this GFI Link is also available on the external part of the terminal panel. Removing this Green mini-fuse is the same as removing the GFI link on the powerboard and does not require any access to the internal parts of the SRX100 regulator.

5.0 SR100 REGULATOR COMMISSIONING

5.1 Information Display

The user interface information is displayed by LED's on the front panel on the SR series Regulators.

Note: These regulators provide a very substantial range of adjustable settings, and some settings will have an influence on other adjustments. Therefore, installers are STRONGLY ADVISED to read sections 5, 6, & 7 of this manual carefully before making any setting changes. All settings should be recorded (in the IMARK SOLAR REGULATOR PROGRAMMING SHEET (included in the addendum pages of this manual), and independently checked before leaving the site.

WARNING:
ALWAYS remove any PV Input from the regulator when changing the DIP Switch settings.

ALL SR Models are supplied with the LED/Switch Pcb Assembly, as shown in the above graphic, and as described under clause 5.3.

5.2 Regulator Identity for CANBus (for SR models with multiple regulators)

Where more than one regulator is used in a system, it is necessary to set the unique identity of each regulator. Regulators must have numbers between 1 & 8 irrespective of which models are used in a system. As each regulator has two independent powerboards, each regulator requires each powerboard to have its own unique identity, (and uses two identities). If a RLCD Remote LCD Display unit is installed, it MUST also have a different identity number.
There is no need to follow this procedure when there is **ONLY** one regulator in the system, as all regulators have their powerboard identities set to #1 & #2 during production in the factory.

5.2 Regulator Identity for CANBus (Cont).

SR model regulators have their unique identity set by using the DIP Switches as follows:

Step #1.
Open Circuit ALL PV Input circuits. Then remove all power input to the regulator. (Open the Battery Circuit Breaker or Fuse).

Step #2
Set the DIP Switches as follows: where O = Off, and I = ON

	Switch #1 (S1)								Switch #2 (S2)							
Position	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
	O	O	O	O	I	O	O	O	O	O	O	O	O	O	I	O

Step #3
Set the regulator Identity # by setting S2 Positions 3, 4, & 5 according to the following table:

	DIP Switch #2 (S2)		
Identity #	**Position 3**	**Position 4**	**Position 5**
1	O	O	O
2	I	O	O
3	O	I	O
4	I	I	O
5	O	O	I
6	I	O	I
7	O	I	I
8	I	I	I

Step #4
Connect Battery Power to the regulator (48Vdc or 120Vdc) by re-connecting the battery bank or closing the Fuse Disconnect or Circuit Breakers between the regulator and the battery bank.
The LED's will all be OFF, except the 6th LED (RH Side) which will illuminate in yellow colour.

(SRX Models
SRX Models should have their CANBus identity set using the LCD under Screen 1.6 as shown in Section 7 of this document.)

Step #5
Then, switch position 5 on S1 to OFF (to store this regulator's unique identity in memory).
The LED's will all turn OFF, except the 6th LED (RH Side) which will change colour from yellow to green indicating that the regulator's unique identity has been programmed.

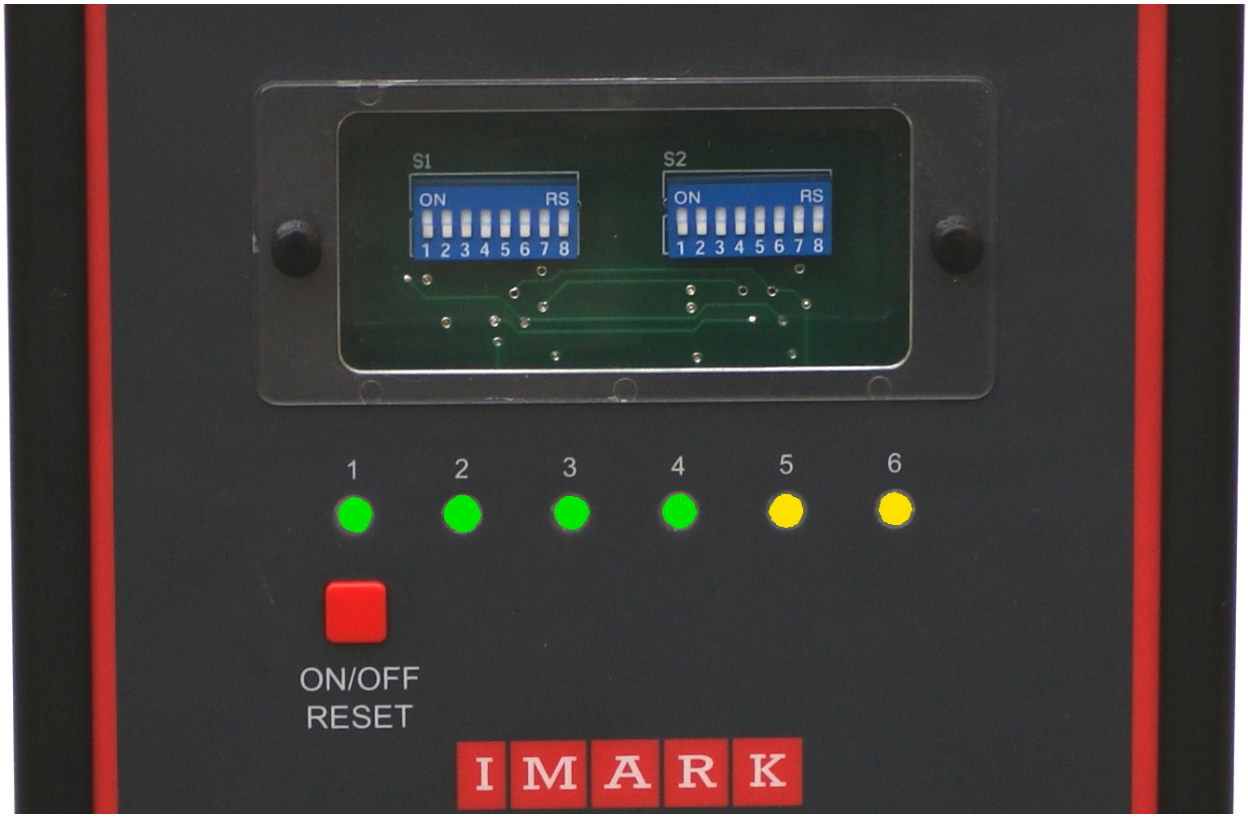
Step #6
On completion of Step #5 above, set all switch positions on S1 to OFF and all S2 switch position to OFF, **EXCEPT S2 p7**. S2 p7 MUST be left in the ON position to enable CANBus access to this regulator from an SRX regulator or from a Remote LCD Display Unit.

Step #7
Reset the Solar Regulator by pressing the RESET Switch on the front panel of the regulator for about 1 second.
The regulator will then run its start-up sequence and be operational.

5.2.1 CANBus Termination Resistor
Whenever multiple regulators are installed in a system and are connected using CANBus, the last regulator in the chain must have a termination resistor installed. This termination resistor is already installed on the terminal pcb assembly in all regulators, and uses a link to **include** or **exclude** the resistor in circuit. Therefore, the link (W1 on the terminal pcb assembly) should be REMOVED on all terminal pcb assemblies EXCEPT the W1 link on the last regulator.

5.3 LED Front Panel

The front panel on the SR regulator is constructed in a way that allows users & technicians to view the switch settings, view the LED's, and use the ON/OFF/RESET switch. The acrylic window can be removed by pulling the two locking grommets towards the front.



5.4 ON/OFF/RESET Switch

A short press (approx 1-second) on the ON/OFF/RESET Switch will restart the micro-controller in the solar regulator, and cause it to clear the memory and restart the software.

A long press (about 5 seconds) will switch the regulator to Standby and the LED's will switch off. A second Long press will restart the regulator and the LED's will again illuminate, (just as the TV remote switches the Television OFF or ON). When switching the regulator ON or OFF, the Left Hand LED will cycle from Orange colour to Red colour, and then to Green colour, with Green indicating that the operation is complete. When turned OFF, all LED's will be 'OFF' (Not illuminated) as long as it is in the "OFF" condition.

A momentary press on the ON/OFF key will cause the LH LED to illuminate GREEN and indicate that the regulator is connected to the battery.

Note: Please note that the LED ON/OFF switch functions differently on the LCD models.

5.5 DIP Switches

Two 8 position DIP Switches are provided behind the clear acrylic window on the front panel of the SR series regulators. These switches are set by the technician during installation and once set, should not need changing.

The following table shows the function and purpose of the two 8 position switches that are visible but located behind the clear acrylic window on SR regulators.

DIP Switch S1	Function	DIP Switch S2	Function
SW1p1	Battery Type selection	SW2p1	Low Voltage Load Disconnect
SW1p2		SW2p2	
SW1p3		SW2p3	Regulation Voltage selection
SW1p4	Enable/Disable Temperature Compensation	SW2p4	
SW1p5	Unit ID programming (See clause 5.2)	SW2p5	Ground Fault Detection
SW1p6	Nominal Battery Voltage Selection	SW2p6	Relay Activation
SW1p7		SW2p7	Dip/Ext
SW1p8	Equalisation	SW2p8	Battery/Regulation mode

The settings for each switch are as follows:

Type *	Switch # S1	Positions 1, 2, & 3		Battery Type Selection & Charge Voltages*						
	Position #1	Position #2	Position #3	Battery Type	Float Volts	Absorb Volts	Absorb Time Hours	Equalise Volts	Equalise Time Hours	Equalise Period Days
0	OFF	OFF	OFF	Gel	54.0	55.2	2.5	0	0	0
1	OFF	OFF	ON	Sealed Gel	54.0	56.0	2.5	56.8	1	28
2	OFF	ON	OFF	Sealed AGM	54.0	56.4	2.5	56.8	1	28
3	OFF	ON	ON	AGM-Flooded	54.0	56.8	3.0	59.6	2	28
4	ON	OFF	OFF	Flooded	53.2	57.6	3.0	60	2	28
5	ON	OFF	ON	Flooded	53.2	57.6	3.0	60.4	3.0	28
6	ON	ON	OFF	NaCl (Salt)	54.0	62.0	3.0	0	0	0
7	ON	ON	ON	Custom	54.0	55.2	2.5	0	0	0

* These are the SR model default settings. These settings can be overridden by the SRX models or by the Remote LCD Unit. Nominal 120V systems will have voltage settings approx. 2.4 times those listed in the above table.

Switch # S1	Position #4	Battery Temperature Compensation
	OFF	Temperature Compensation DISABLED
	ON	Temperature Compensation ENABLED (5mV/°C/Cell)

Note: Temperature Compensation is disabled if the Battery Temperature is less than 25°C.

Switch # S1	Position #5	Switch # S2	Position #7	Not Used

Switch # S1	Position #6	Position #7	Nominal Battery Voltage Selection
	OFF	OFF	Auto Battery Selection
	ON	OFF	120 Volt
	OFF	ON	24 Volt
	ON	ON	48 Volt

Switch # S1	Position #8	Equalisation
	OFF	Auto Activated every 28 days
	ON	Equalisation DISABLED

Switch # S2	Position #1	Position #2	Low Voltage Load Disconnect
	OFF	OFF	NOT Enabled
	OFF	ON	< 25% Battery State of Charge
	ON	OFF	< 50% Battery State of Charge
	ON	ON	< 75% Battery State of Charge

Switch # S2	Positions 3, & 4	Voltage Regulation Selection * Only applicable when Regulation Mode is enabled	
Position #3	Position #4	Voltage	
		48 Volt Models	120 Volt Models
OFF	OFF	48.0 Vdc	120.0 Vdc
OFF	ON	51.0 Vdc	127.5 Vdc
ON	OFF	54.0 Vdc	135.0 Vdc
ON	ON	57.0 Vdc	142.5 Vdc

Switch # S2	Position 5	Not Used

Switch # S2	Position #6	Relay Activation
	OFF	Relay = 'ON' if SOC <25%, Relay = 'OFF' if SOC >50%
	ON	Relay = 'ON' if SOC <50%, Relay = 'OFF' if SOC >75%

Switch # S2	Position #7	Equalisation Setting (Also Refer to SW#1 Pos $5)
	OFF	Settings done by DIP Switches
	ON	Settings programmed externally into EEPROM

Switch # S2	Position #8	Battery Regulation Mode Selection (Also refer to SW#2 Positions 3, 4, & 5)
		Not Used
		Not Used

Use the following table to record the DIP switch settings.

	Switch # S1								Switch # S2							
Date	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Factory	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O

5.6 LED Indicators

LED Status indicators are used to show the operating parameters of the regulator.

The LED's are arranged basically as follows:
The first LED (on the LH side) is used to indicate the operating status, as follows: **Green** means Good, **Yellow** means Warning, and **Red** means Error.
When the first LED is Green, or NOT illuminated, then the second, third, & fourth LED's are used to indicate the battery State of Charge, while the fifth & sixth LED's indicate the battery charging modes.
By referring to the following chart, users are able to determine the exact operating status of the regulator. Please note that the LED's on any regulator only refer to a specific powerboard on the regulator even if several regulators are connected and operating as a system.
Note: The LED's may alternate between two sequences of colours. This only happens if a warning or alarm is present. The upper part of the table on the following page will show the code sequence when there are NO warnings or alarms. The lower part of the table will indicate the fault code in the event of a warning or alarm being present.

1	2	3	4	5	6	LED Status Indicator	Explanation
X/G				Y	X	Bulk Charge Mode	The Regulator is charging the battery with the maximum solar input that is available.
X/G				G	Y	Absorption	The Battery is charged to the Absorption voltage and the regulator is holding the charge at the Absorption voltage for the set time period (assuming there is sufficient Solar Input power available)
X/G				G	G	Float Mode	The battery is fully charged and the regulator is maintaining the battery at this voltage (assuming there is sufficient solar input)
X/G				G	X	Night mode	Night Mode occurs whenever there is NO solar input. The load will be supplied from the battery in this state
X/G				Y	Y	Equalize Mode	Equalize mode is being used to charge the battery at a slightly higher voltage to equalize the cell voltages
X/G				X	G	STOP Mode	The regulator has stopped charging the battery due to some protection feature having been activated
						Timer Enabled	
X	Y					Battery low voltage	The battery State of Charge is less than 10%
X/G	Y	Y				Battery SOC <30%	The battery State of Charge is less than 30%
X/G	Y	Y	Y			Battery SOC > 30% < 50%	The battery State of Charge is between 30% and 50%
X/G	G					Battery SOC > 50% < 80%	The battery State of Charge is between 50% and 80%
X/G	G	G				Battery SOC > 80% < 95%	The battery State of Charge is between 80% and 95%
X/G	G	G	G			Battery SOC > 95%	The battery State of Charge is greater than 95%
							No Solar input for more than the set number of days
							DIP Switches changed
Y				Y		Battery Temperature Warning	The battery temperature is greater than 50°C
R				R		Battery Temperature Stop > Setting	The battery temperature is greater than the maximum battery temperature setting
Y					G	Battery Low SOC	The battery SOC is less than the LOW Battery SOC Alarm setting
Y					R	Battery Level Stop	The Regulator is OFF due to the Battery Voltage exceeding the Battery Low Stop or the Battery High Stop setting
R					G	Battery voltage < 10v	The battery voltage is less than 20 volts DC.
Y					Y	Battery High Voltage	The battery has been charged to 100% of its set capacity, but the battery voltage is below the set maximum voltage
R					R	Battery High Voltage for 2 minutes	The battery voltage has exceed the set maximum voltage for more than 2 minutes
R	Y					Ground Fault Error	A Ground Fault within the installation has activated
Y			Y			Regulator Current Rating Exceeded	The current draw has exceeded the regulator's rating.
Y		Y				Heatsink over 70°C	The regulator's heatsink temperature is more than 70°C but less than 80°C
R		R				Heatsink over 80°C	The regulator's heatsink temperature is more than 80°C
R	R					Regulator Startup Failure	Activates when there is sufficient PV available and the Power Switch is enabled, but there is NO battery Current
R	G					ADC Error	The regulator has an ADC Error
Y						EEPROM Corrupted	The Regulator EEPROM has been corrupted
R			R			Output Peak Current	Output Peak Current Exceeds the Regulator rating
R	R				R	Over Voltage on Solar Input	Activates when the PV Input Voltage exceeds 500 Volts
R	R		R			Power Channel Shut Down	The Power Channel has stopped working
Y	Y					Ground Fault/Surge Fuse Blown	A Ground Fault has been detected, or the Surge Fuse has ruptured
Y	G					PWM Disabled by IREM_ON	The PV Input has been disabled by the IREM-ON input.
Y	Y	Y				PV Present During Start-Up	Will occur if/when PV Input is connected before the Battery is connected

To aid understanding of this chart, readers should regard column 1, and columns 2,3,4 and columns 5,6 independently. An "X" in column 1, indicates the LED is NOT illuminated.

5.6 LED Indicators (continued)

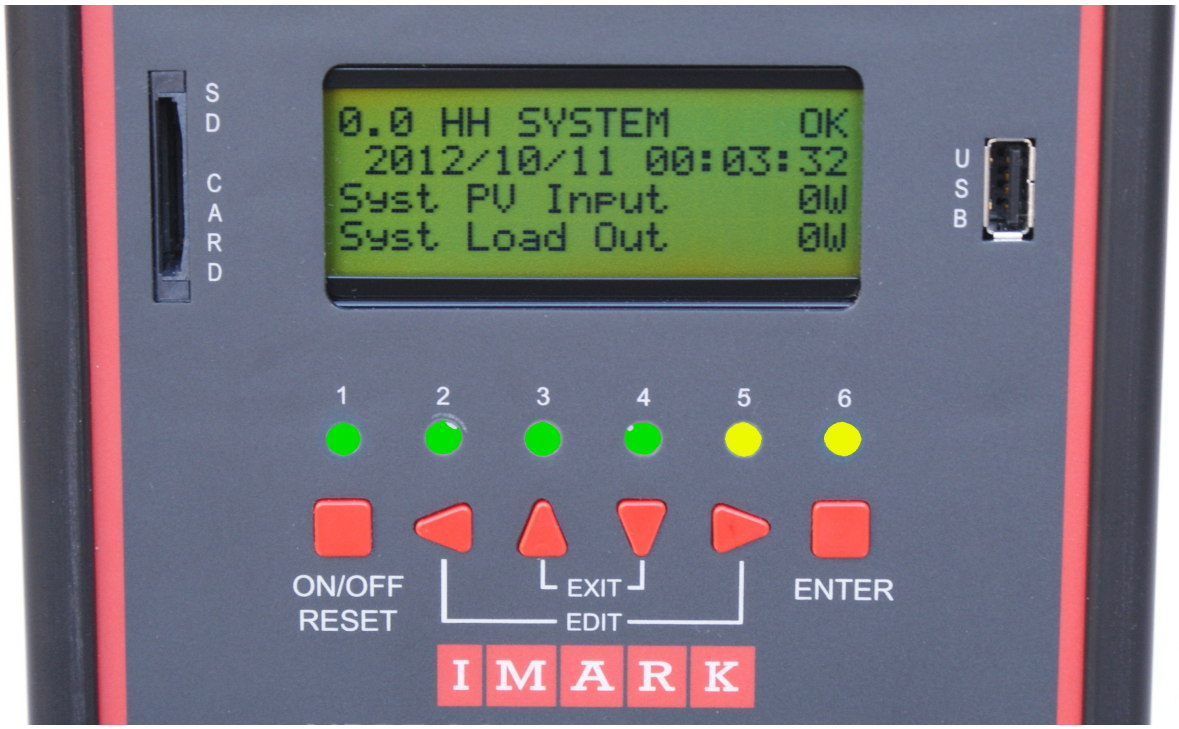
Generally, good operating conditions are indicated by the Column 1 LED being illuminated in a STEADY GREEN state (or NOT illuminated).
Whenever a warning or error is present, the LED indications will alternate between the top section of the chart (Green LED's) and the bottom section of the chart (Red or Yellow LED's).
This alternating state indicates potential problems, with YELLOW being WARNINGS, RED indicating FAULTS, and no illumination indicating that the facility is Not Available or Not Connected.
NOTE: There are a few instances where the Green for Good, and Red for Bad convention has not been followed so users should always refer to the above chart (at least until the user becomes familiar with this chart).

6.0 SRX100 REGULATOR COMMISSIONING

6.1 Front Panel Display

All SRX series regulators are fitted with the LCD display, as well as the LED's to provide operating information. In addition to the interface connections provided on SR models, the SRX series Regulators are supplied with both an SD Card port, and a USB port. The installation of the optional SD Card Memory device allows historic performance data to be stored. This data can be retrieved using the IMARK Site Explorer, or copied to a computer for later analysis.

The LED's on this front panel of SRX models operate in the same manner as the LED's on the SR series front panels and provide the same status information.



The two DIP Switches used on the SR Regulators are NOT installed on the SRX models. Instead, all programming is carried out using the 6 keys and the LCD display. Programming can also be carried out using the IMARK Site Explorer software directly connected to a laptop computer. See Sections 8.0 & 9.0 for details about using the IMARK Site Explorer software.

NOTE: Always have all PV Inputs OFF when switching the SRX100 ON.

When the regulator is switched on, and the fans will activate for 2 or 3 seconds. After completing the start-up checks, the regulator will display the **0.0 SYSTEM** screen (as the default screen), and some LED's will become illuminated. The regulator will return to Screen 0.0 from any other screen, after a period of 5 minutes without any keys being pressed. Further, by pressing the 'UP' & 'DOWN' keys simultaneously from any screen will return the display to the default **0.0 SYSTEM** screen, shown above:

0.0 SH SYSTEM OK
YYYY/MM/DD hh:mm:ss
System PV Input nnnnW
System Load Output nnnnW

6.2 Key Controls

The Control Unit has six keys for programming and for navigating through the screens, as follows:

- UP ▲ — For navigating the menu
- DOWN ▼ — For navigating the menu
- LEFT ◄ — For navigating the menu
- RIGHT ► — For navigating the menu
- ENTER ■ — To save the indicated function
- LEFT ◄ + RIGHT ► — Press simultaneously to enter the 'Edit' mode
- UP ▲ + DOWN ▼ — Press simultaneously to exit the 'Edit' mode*
- ON/OFF ■ — To shutdown the Regulator or to reset the regulator microcontroller.

* When in EDIT mode, pressing the EXIT (UP ▲ + DOWN ▼) keys simultaneously twice will return to the 0.0 SYTEM home screen.

6.3 LED Indications

The LED's operate in a similar manner to that described in Section 5 for the SR100 models. Whenever a key is pressed, all LED indicators switch Off, and the LED above the respective pressed key illuminates. A 'Beep' sound indicates that a key has been pressed.

6.4 LCD Screen Display Layout

The LCD has a 4x20 matrix with 4 rows of 20 alpha-numeric characters, with the Regulator System Screen as the default screen, to provide basic system information, assuming all regulators are operating normally. From this screen, users can 'navigate' to any other screen, or to any regulator in the system.

All Screens are structured in a similar manner, and in many cases have to use abbreviated terms due to the character restrictions imposed by the 4x20 LCD screen.
The top row is used to display the Screen #, heading title, regulator #, and access permission sign, or the status of that part of the system. The second, third & fourth rows are used to show relevant information or the settings. These are described more fully later in this section.

Characters 1 & 3 on the first line: displays the screen #.
The whole digit indicates: 0 = System, 1 = Regulator, 2 = PV Panels, 3 = Battery, 4 = Load, 5 = Remote Output Signal Terminal, 6 = Warnings & Alarms, 7 = Shutdown Messages, & 8 = LCD Setup Information.
The decimal numbers represent sub-screens that are arranged under the heading indicated by the whole number. These numbers can become useful references should the user require remote technical assistance. See Section 6.10 for the menu table.

Characters 5 & 6 on the first line: where X (5th character) indicates the Heading Type as follows: S = Status, H = Header, U = User, T = Technical, A = Alarm, W = Warning, E = Shutdown Message, F = Fixed, and the 6th character indicates the # of the regulator being interrogated (except on System screens).

```
0.0 SH SYSTEM  XXX
YYYY MM DD   hh:mm:ss
Syst PV Input    nnnnnW
Sys Power Out nnnnnW
```

The 1st line shows the System Operating Status. 'ALRM', 'WARN', 'OK', or 'UNKN'.
The 2nd line shows the Date and Time.
The 3rd line shows the System Solar Input. This includes the total solar input to all regulators.
The 4th line shows the System Power Output and includes the Power Output being produced by all regulators in the system.

6.5 Navigating through the LCD display screens.

Whenever a **Heading** screen is displayed, the user can scroll across the headings by pressing the '◄' left and '►' right keys to select the required heading.
Pressing the '▲' or '▼' keys whenever a **Heading** screen is displayed will scroll up or down through the various screens that relate to that selected heading. e.g. All screens under the **Load** Heading **ONLY** display information relating to the Load Output connector.

Pressing the '▲' and '▼' keys simultaneously twice in any menu will return the user to the System Home screen without saving any settings.

6.6 Passwords

No settings can be changed without first entering a valid password. Two passwords are provided as follows:
The **User** password is for use by non-technical persons and allows the user to change settings that are unlikely to cause damage to the regulator and/or attached equipment, or cause incorrect operation of the Regulator, should erroneous settings be made. For example, the user may want to change of starting or stopping times for a generator or Airconditioner, or change the Date or Time Clock, or the generator or Load On/Off times.
The **Technical** password is for use by technically qualified persons who have had suitable training and appropriate knowledge to install this type of equipment. The restricted 'T' settings must not be changed by non-technical persons, as incorrect settings may cause incorrect operation of the Regulator and in some cases may damage equipment.
All screens are viewable by anybody. User changeable screens show a 'U' in the top line of the screen, while Technician changeable screens show a 'T' in the top line of the screen. A '+' sign on the RH side of the top line of any screen indicates that the entered password permits changing the "live" screen.

The LCD display screen will automatically return to the '**System Home**' screen if no keys have been pressed for 15 minutes, and will cancel all access permissions (passwords). All previously **entered** setting changes will remain as changed. Alternatively, pressing the '▲' and '▼' keys **simultaneously** (without pressing the ENTER key), will return the **LCD** display to the **System Home** screen without saving any changes (unless previously saved with the ENTER key).

The regulator is shipped from the factory with basic passwords set simply to prevent inadvertent setting changes (such as may occur with children playing). We suggest that these passwords be changed during the initial installation to more secure passwords at screen # 8.A. Please bear in mind that the Technical password is required to change the User password. Accordingly, the User password should be set during the installation by a person who has technical password access. Always record the new passwords where they can be retrieved if required. Use the following table to record the password changes and the change dates.

Password Change Records					
Date	User Password	Technician Password	Date	User Password	Technician Password
Factory Default	000001	000002			

6.7 Multiple Regulator Systems

The powerboards in all regulators in a system of multiple regulators have to be programmed with a unique identity. This should be done at installation, and the steps to do this are explained under Screen 1.6 as shown in Section 7 of this document.

The HOME screen 0.0 shows the cumulated data for both powerboards. All other screens show the performance data for that one powerboard only. Thus, a system will employ at least two, and up to eight powerboards. Therefore, it is necessary to specify the required powerboard when in **0.1 Select Regulator** screen. Suggested regulator numbering is: 1 & 2, 3 & 4, 5 & 6, and 7 & 8, with Regulator 1 Power Channel A having Identity #1, and Power channel B having Identity #2, Regulator 2 Power Channel A having Identity #3, and Power channel B having Identity #4, and so on until all power channels have been allocated a unique identity.

The number of the Powerboard being interrogated is always displayed in the sixth character space of the first line on the screen. The default regulator number is #1.

To select a different Powerboard, go to the 0.1 screen, and press the 'Edit' keys **simultaneously** to enter 'Edit' mode, and to advance to the field to be edited. Use the UP or Down keys to select the required regulator #, press the 'Enter' key to save the setting, and then press the 'EDIT' keys simultaneously to advance the cursor to the next editable field, **OR**, press the 'Exit' keys simultaneously to leave 'Edit' mode and return to the System Home Screen.

Note: It is **not** necessary to enter a valid password to view details of any powerboard. However, if you intend to change any setting, it is then necessary to enter a valid password at the **# 0.1. SYSTEM** screen. If a password is not entered, the user will be able to view all screens for any regulator, but will NOT be able to make any changes to any settings.

The following table shows what the 0.1 screen will look like.

```
0.1 U SYSTEM      +
Select Regulator #  n
Enter PIN: ******
```

▲ ◄ ► ▼

The 1st line shows the Screen #, and the type of Screen.
The 2nd line requires entry of the relevant regulator/powerboard.
The 3rd line requests the user to enter the PASSWORD. It is not necessary to enter a PASSWORD unless settings are to be changed.

6.8 Regulator Heading Screens

The Regulator Heading screens are used to display the operating parameters relating to the selected Powerboard and to setup the operating parameters for the nominated powerboard.

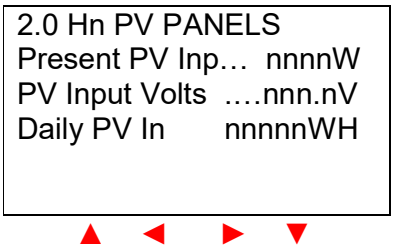
```
1.0 Hn REGULATOR XXX
PV Panel Input     nnnnW
Battery Volts       nn.nV
Reg Power Out    nnnnnW
```

▲ ◄ ► ▼

The 1st line shows the Screen #, the type of Screen, Regulator #, and the current Regulator operating mode: NGT, BLK, ABS, FLT, EQZ, REG, or UNK
The 2nd line indicates the Present Solar Input power in Watts.
The 3rd line shows the Battery Voltage.
The 4th line shows the Regulator Power Output in Watts including both the Battery and the Load Outputs.

PV PANELS Heading Screen

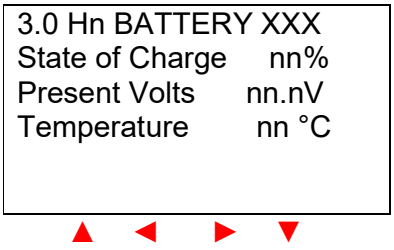
The Photovoltaic screens are used to display the operating parameters relating to the Solar Input and to setup the operating parameters for the Solar Input, for that one Powerboard.



The 1st line shows the screen #, the type of screen, the regulator #, and heading.
The 2nd line shows the present Solar Input power in Watts.
The 3rd line shows the present Solar Input Voltage in DC Volts.
The 4th line shows the cumulative Daily Solar Input Power in Watts since midnight.

BATTERY Heading Screen

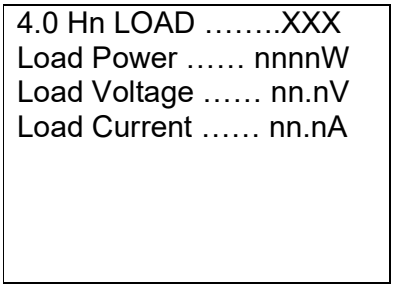
The Battery screens are used to display the operating parameters relating to the battery and charging and to setup the operating parameters for the battery and charging. The displayed parameters for Battery Screen relate to the Regulator, (i.e. the two powerboards combined) irrespective of the displayed powerboard identity.



The 1st line shows the screen #, type of screen, the regulator #, and the current charging status for the battery. NGT, BLK, ABS, FLT, EQZ, REG, or UNK.
The 2nd line shows the Battery State of Charge (SOC) in %.
The 3rd line shows the Battery Voltage in Volts.
The 4th line shows the Battery Temperature in degrees (°C).

LOAD Heading Screen

The Load screens are used to display the operating parameters relating to the Load Output terminals and to setup the operating parameters. The displayed parameters for LOAD Screens relate to the Regulator, (i.e. the two powerboards combined) irrespective of the displayed powerboard identity.



The 1st line shows the screen #, type of screen, the regulator #, and the current Load Status: OK, NONE, WARNG, ERROR.
The 2nd line shows the amount of power being drawn by the load in Watts.
The 3rd line shows the Voltage being supplied to the load equipment.
The 4th line shows the load equipment current draw in Amps.

REMOTE OUTPUT SIGNAL Heading Screen

The Remote Output Signal screens are used to set-up and display the operating parameters for the Remote Output Signal Terminal. The Remote Output Signals relate to the complete regulator, irrespective of the displayed powerboard identity.

5.0 Hn REMOTE OUTPUT	
Timer Condition	XXX
Battery SOC Cond	XXX
Temperature Cond	XXX

▲ ◄ ► ▼

The 1st line shows the screen #, type of screen, regulator #, and heading.
The 2nd line shows if the Time Control Condition is invoked.
The 3rd line shows if the Battery State of Charge condition is invoked.
The 4th line shows if the Temperature Condition has been invoked.

Messages Heading Screen

The Messages screens are used to display Warnings and Errors, and to assist with diagnostics should problems occur. Warnings and/or Alarms shown on these screens do not cause the regulator to cease operating. Where a WARNING is displayed, and if it relates to a powerboard issue, then it WILL relate to the displayed powerboard identity.

6.0 Hn WARN & ALARM	
PV Panels & Load	nn
Regulator	nn
Battery	nn

▲ ◄ ► ▼

The 1st line indicates whether there are any current Alarms.
The 2nd line indicates the number of current PhotoVoltaic or Load Alarms.
The 3rd line indicates the number of current Regulator Alarms.
The 4th line indicates the number of current Battery Alarms.
Please Note: Warning or Alarm Messages automatically clear whenever the cause of the alarm is removed.

Shutdown

The Shutdown screens become active whenever a fault that stops the regulator from operating occurs. These error codes are useful diagnostics tools. Where an ERROR or SHUTDOWN message is displayed, and if it relates to a powerboard issue, then it WILL relate to the displayed powerboard identity.

7.0 Hn SHUTDOWN MSGS	
PV Panels & Load	nn
Regulator	nn
Battery	nn

▲ ◄ ► ▼

The 1st line indicates whether there are any current Errors.
The 2nd line indicates the current PhotoVoltaic or Load Errors.
The 3rd line indicates any current Regulator Errors.
The 4th line indicates any current Battery Errors.
Please Note: Shutdown Messages automatically clear whenever the cause of the alarm is removed.

LCD Setup Screens

The LCD Setup screens display operational settings that must be correctly entered to enable correct LCD operation and interfacing to external equipment. The REGULATOR part of the solar regulator may still operate correctly even with Incorrect LCD Setup settings. Some of these settings may have been factory installed and cannot be changed.
The displayed LCD Screen parameters relate to the Regulator, (i.e. the two powerboards combined) irrespective of the displayed powerboard identity.

8.0 Hn LCD SETUP
CAN Address n
SW Version 1.0.4.R
Web Page: 27/03/2013

▲ ◄ ► ▼

The 1st Line indicates that the information under this heading relates to installation setup.
The 2nd line shows the CANBus number of the relevant regulator.
The 3rd line shows the version of LCD software.
The 4th line shows the Web Page installation date.

6.9 Editing Screen Settings

Follow these steps to change settings.

1. Enter a valid Password via Screen 0.1. You will need to enter a Technical Password to be able to change any **critical** settings. (Any incorrect setting that may cause damage is regarded as a **critical setting**).
2. When in 'Navigation' mode, use the '◄' or '►' keys to go to the appropriate header: e.g. for battery settings, go to the Battery Header screen (3.0).
3. Still in 'Navigation' mode, use the '▲' or '▼' keys to go to the required sub-menu screen. **Note:** The screen will show a '+' sign in the upper RH character to indicate that you have valid permission to change this screen. If the '+' sign is not present, the fields are either NOT changeable, or, you will need to enter the appropriate password in screen # 0.1.
4. Press the 'Edit' keys simultaneously to enter 'Edit' mode. The cursor will be automatically placed in the first editable field, and the selected character space will 'blink'. Where there is more that one editable fields in the same screen, you must press the 'Edit' keys simultaneously to cycle to the next editable field.
5. When in the desired field, use the '▲' or '▼' keys to increment or decrement the highlighted number until the desired settings are displayed.
6. Save the setting by pressing the '**Enter**' key. Pressing the 'Enter' key only saves the setting for that particular field. It does NOT save the other settings displayed on that screen. If the ENTER key is NOT pressed, the setting will not be saved when exiting that field or screen.
7. Press the 'Edit' keys to cycle to the next editable field, within that screen, to be changed OR press the 'Exit' keys to leave/cancel 'Edit' mode and return to 'Navigate' mode.

Note 1: You cannot move to any other screen when in 'Edit' mode. You MUST press the 'Exit' keys to Exit the 'Edit' mode to be able to navigate to other screens.

Note 2: Settings cannot be changed without having entered a valid password in screen # 0.1.

6.9 Editing Screen Settings (cont)

Note 3: A valid password is cancelled 15 minutes after the last key press, the LCD display returns to the System Home screen (0.0), and the LCD backlight returns to OFF.

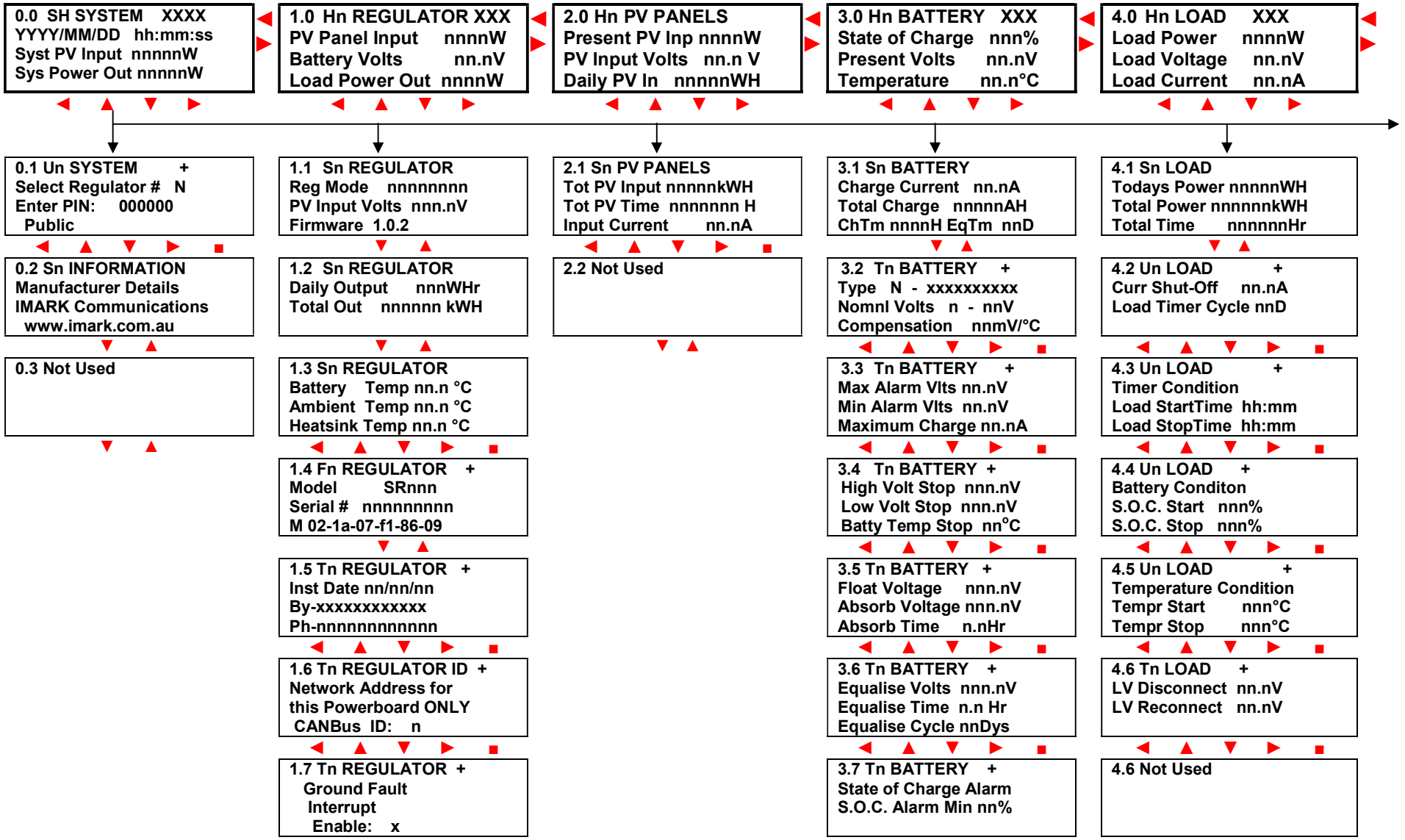
If the user wishes to exit from a particular screen **without** saving the settings, the '▲' and '▼' EXIT keys should be pressed **simultaneously**. Alternatively, by waiting for 30 seconds, the menu display will return to the 'Standby Menu' without saving any setting changes **for this particular menu field only**.

Note 4: If the **Enter** key is pressed when in any setting field, those settings will be saved to memory.

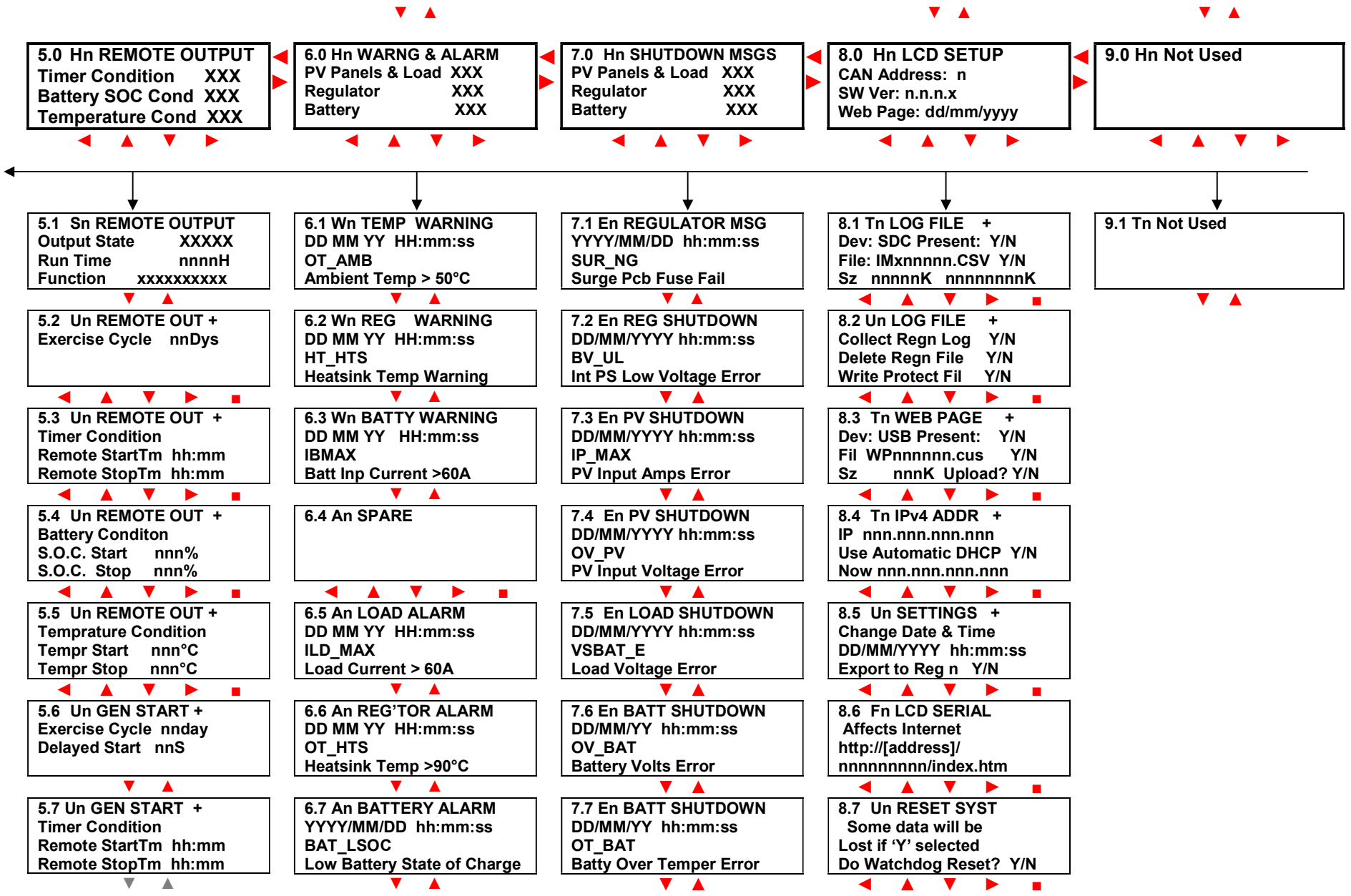
Please Note: It may take up to 30 seconds for setting changes to be written to the regulator control pcb assembly. The LED's will illuminate in their normal colours to indicate that the settings are now saved and valid.

6.10 MENU TABLE

This table shows the menu structure only. Specific details relating to the individual screens are provided in Section 7 of this document.



IMARK SR/SRX 100 SOLAR REGULATORS



5.8 Un GEN START + Battery Condition S.O.C. Start nnn% S.O.C. Stop nnn%	6.8 An BATTERY ALARM DD MM YY HH:mm:ss VBAT_LO Low Battery Volts Warning	7.8 En BATT SHUTDOWN DD MM YY HH:mm:ss IBPK Battery Over Current Error	8.8 Un SPARE	
5.9 Un GEN START + Temprature Condition Tempr Start nnn°C Tempr Stop nnn°C	6.9 An BATTERY ALARM DD MM YY hh:mm:ss VBAT_VO Out of Range Warning	7.9 En REG SHUTDOWN DD/MM/YYYY hh:mm:ss ADC_NG ADC Failure Error	8.9 Un SPARE	
5.A An Not Used	6.A An BATTY WARNING YYYY/MM/DD hh:mm:ss VBLW Low Battery Voltage	7.A En REG SHUTDOWN DD/MM/YYYY hh:mm:ss PSD_D Internal Reg Failure	8.A Tn P.I.N's User 6 digts ****** Technical ****** Reveal? Y/N	
5.B An Not Used	6.B An REG'TOR ALARM YYYY/MM/DD hh:mm:ss GFI Ground Fault Warning	7.B En REG SHUTDOWN DD MM YY HH:mm:ss EE_NG EEPROM Read Failure	8.B Fn SPARE	
5.C An Not Used	6.C An BATTY WARNING YYYY/MM/DD hh:mm:ss BLO Low Battery S.O.C.	7.C En REG SHUTDOWN DD/MM/YYYY hh:mm:ss GND_FLT Ground Fault Error	8.C Tn IPv4 GATE + GATE nnn.nnn.nnn.nnn Use Automatic DHCP Y Now nnn.nnn.nnn.nnn	
5.D An Not Used	6.D An BATTERY STOP YYYY/MM/DD hh:mm:ss VBHS Battery Volts HiStop	7.D En REG SHUTDOWN DD/MM/YYYY hh:mm:ss START_FAIL Int Diagnostics Error	8.D Tn Not Used	
5.E An Not Used	6.E An BATTERY STOP YYYY/MM/DD hh:mm:ss VBLS Battery Volts LoStop	7.E En REG SHUTDOWN DD/MM/YYYY hh:mm:ss PC_NG Power Channel Error	8.E Tn Not Used	
5.F An Not Used	6.F An BATTERY STOP YYYY/MM/DD hh:mm:ss TBHS Battery Temp HiStop	7.F En REG SHUTDOWN YYYY/MM/DD hh:mm:ss HW_FAIL Hardware Failure Err	8.F Tn Not Used	

7.0 MENU DETAILS

7.1 About the menu's.

This section describes all menu items, their purpose, and the setting ranges. These menu items are in logical groups under their respective heading. Some of these menus are 'status' menus and are only used to convey information. Other menu items are used to change the settings. All menu items are displayed 'for all to see', but, the critical menu items require the 'Technical' password to make any setting changes.

The LCD screens can be in one of two modes, namely, 'Navigate' mode where the keys are used to 'navigate' to other screens for viewing purposes only, and 'Edit' mode where settings can be changed.
Whenever a setting is changed, the "ENTER" key **MUST** be pressed to save the setting.

Always bear in mind that only some screens can be edited, based on a valid password. A '+' sign will be shown in the upper RH part of the screen if your password allows you to edit that particular screen.

7.2 Menu Details

The following pages describe the various screens including the purpose of the setting and any limits on the setting range.

```
0.0 SH SYSTEM      XXXX
DD/MM/YYYY  hh:mm:ss
Syst PV Input    nnnnnW
Sys Power Out    nnnnnW
```

■ ◄ ▼ ▲ ► ■

The top line indicates that this is the system screen as well as showing the System Status from 'ALRM', WARN', 'OK', or '- - - -'.
The 2nd line indicates the date and time in 24 hour format.
The 3rd line shows the System Solar Input. This includes the total solar input of all regulators.
The 4th line shows the System Power Output and includes the power being produced by all regulators in the system.

```
0.1 Un SYSTEM          +
Select Regulator:      n
Enter PIN #    nnnnnn
     Public
```

◄ ▼ ▲ ► ■

Pressing the ▲ or ▼ key opens the **Select Regulator** screen. If users wish to access a regulator other than the indicated regulator, then they must enter the 'Edit' mode, select the required regulator, press 'Enter', and 'Exit' the edit mode as described previously. Only information relating to the indicated regulator will be shown. When the desired regulator has been selected, use the ◄ ▼ ▲ ► keys to navigate through the various screens. The default regulator is regulator #1. The selected regulator # will be displayed in the 6th character on the 1st line until this screen has been refreshed.
Users must enter the appropriate password if they intend to make any setting changes. If there is NO intention to change any setting, then simply press the enter key and the LCD screen will display 'Public', and will allow the user to view all screens. Enter a valid User password and 'User' will be displayed indicating that the user can change settings in screens displaying 'U' in the 5th character position of the first line. Then go to the Regulator Home screen from where the user can navigate to the various screens.
When a selected regulator is a SR model, Switch SW2pin7 must be set to 'ON' in order to make setting changes.
The regulator setting range is 1 – 8.
The password setting range is 000000 – 999999.

```
0.2 Sn INFORMATION
Manufacturer Details
IMARK Communications
www.imark.com.au
```

▼ ▲

The **Manufacturer Details** screen displays the name and contact details of the manufacturer (or distributor). These details are loaded when the software is loaded and cannot be changed. They may be useful should the user or reseller require further information at any future time.

```
Return to System Header
Screen
```

1.0 Hn REGULATOR XXX
PV Panel Input nnnnW
Battery Volts nn.nV
Reg Power Out nnnnW

◄ ▼ ▲ ►

The 1st line displays the Screen #, Type of Display, the Regulator #, and the Operating Mode of the Regulator chosen from 'REG', 'NGT', 'FLT', 'EQZ', & 'UNK', 'BLK', "ABS".
The 2nd line displays the current PV input in Watts for the indicated regulator.
The 3rd line displays the Battery Voltage.
The 4th line displays the Load Power Output being produced by **this one** indicated powerboard. ("n" in the top line of the LCD Display)

1.1 Sn REGULATOR
Reg Mode nnnnnn
PV Input Volts nnn.nV
Firmware: 1.0.2

▼ ▲

The 1st line displays the Screen #, Type of Screen, the Regulator #, and REGULATOR.
The 2nd line indicates the Operating Mode of the Regulator, and will display 'Night', 'Bulk', 'Absorptn', 'Float', 'Equalize', or 'UNK' modes. ('UNK' = Unknown)
The 3rd line displays the solar Input Voltage.
The 4th line displays the Firmware version of the indicated regulator.

1.2 Sn REGULATOR
Daily Output nnnWHr
Total Out nnnnnkWH

▼ ▲ ■

The 1st line displays the Screen #, Type of Screen, the Regulator #, and REGULATOR.
The 2nd line shows the cumulative power output from the regulator since midnight in WH.
The 3rd line shows the total cumulative power output from the regulator since installation in kWH.

1.3 Sn REGULATOR
Battery Temp nnn°C
Ambient Temp nnn°C
Heatsink Temp nnn°C

▼ ▲ ■

The 1st line displays the Screen #, Type of Screen, the Regulator #, and REGULATOR.
The 2nd line shows the battery temperature in °C.
The 3rd line shows the ambient temperature in °C (assuming the optional ambient temperature sensor has been installed).
The 4th line shows the actual regulator Heatsink temperature in °C.

1.4 Fn REGULATOR +
Model # xxxnnn
Serial # nnnnnnnnn
M 02-1a-09-c2-42-b1

▼ ▲

The 1st line displays the Screen #, Type of Screen, the Regulator #, and REGULATOR.
The 2nd line shows the Regulator Model #.
The 3rd line shows the Regulator Serial #.
Both the Model # and Serial # are factory set.
The 4th line shows the MAC address for the nominated Regulator. This is an automatic calculation.

1.5 Tn REGULATOR +
Inst'n Date DD/MM/YY
By xxxxxxxxxxxxxxx
Ph nnnnnnnnnnnnnnn

◄ ▼ ▲ ► ■

The 1st line displays the Screen #, Type of Screen, the Regulator #, and REGULATOR.
Installed Date should be installed by the installer when the system is commissioned. Once installed, this date cannot be changed.
The lower two rows show information entered by the Reseller or Installer. Information for these two fields can only be entered by using the IMARK Site Explorer software via a web browser.

1.6 Tn REGULATOR ID+
Network Address for
This Powerboard ONLY
CANBus ID: n

◄ ▼ ▲ ► ■

Every regulator installed into an integrated system MUST have its own CANBUS identity. Up to 4 SRX100 regulators can be installed as one system, and each SRX100 regulator has two MPPT Power Boards, with each Power Board requiring it's own unique CANBus identity, numbered from #1 to #8. Thus, it may be necessary to allocate up to 8 CANBus Identities. Addresses are entered through this screen as follows: SRX Regulator #1 uses CANBUS Identities 1 & 2, SRX Regulator #2 again uses two Identities, say #3 & #4, and so on for all four SRX100 Regulators. ALWAYS ensure that each Powerboard has its correct CANBus identity. This final step **MUST** be done **WITHOUT** any CANBus cables installed.

TIP

An easy way to program all regulators in a system is to set **ALL** CANbus Identities to CanBus ID # 1 before making any program settings. Then select Regulator #1 (in screen 0.1). Assuming all Powerboards in the system have been set to CANBus ID # 1, then programming Powerboard # 1, will program all powerboards in the system identically.
When all programming has been completed, Powerboards 2, 3, 4, etc MUST have their CANBus ID # set to the correct CANBus Identity.

1.7 Tn REGULATOR +
Ground Fault Interpt
Enable Y/N? x

◄ ▼ ▲ ► ■

All SRX Regulators (Unless otherwise ordered) are fitted with Ground Fault Indication circuitry. Under some circumstances (e.g. where two regulators are installed in the same system, or where installed in a radio system), the Ground Fault Circuitry may need to be disabled to permit correct operation. Selecting "N" in this screen will disable the GFI function and alarm function. It is also necessary to remove the GFI link on the Powerboard A Pcb Assembly.

Return to Regulator Header Screen

```
2.0  Hn PV PANELS
Present PV Inp    nnnnW
PV Input Volts    nn.nV
Daily PV In     nnnnnWH
```

The 1st line display
s the Screen #, Type of Screen, the Regulator #, and PV PANELS.
Present PV Input shows the amount of solar power being supplied at that time in watts.
PV Input Volts shows the voltage of the solar input in Volts dc at that time.
Daily PV Input Power shows the amount of power (in WattHours) produced by the Solar Panels (connected to that regulator) since midnight, and is reset at midnight each day.

◄ ▼ ▲ ►

```
2.1  Sn PV PANELS
Tot PV Input nnnnnkWH
Tot PV Time  nnnnnnnHr
Input Current     nn.n A
```

The 1st line displays the Screen #, Type of Screen, the Regulator #, and PV PANELS.
Total PV Input shows the cumulative amount of power that has been produced by the Photovoltaic Panels since installation, and will update at midnight to add the daily solar Input power production.
Total PV Time indicates the total number of hours that the regulator has been receiving more than 1 Ampere of power from the solar panels since installation.
Input Current shows the input current at the present time from the nominated PV String input.

▼ ▲

```
Returns to PV Panels
Header
```

```
3.0  Hn BATTERY    XXX
State of Charge    nn%
Present Volts     nn.nV
Temperature      nn.n°C
```

The 1st line indicates the Screen #, Type of Screen, Regulator #, BATTERY, and the battery charge mode. e.g. 'NGT', 'BLK', 'ABS', 'FLT', 'EQZ', or ' UNK '.
State of Charge indicates the battery State of Charge in 10% increments. E.g. 70% means that the energy in the battery is 70% of its stated capacity based on battery voltage.
Present Volts indicates the Battery Voltage in Volts at this point in time.
Temperature indicates the present battery temperature in °C.

◄ ▼ ▲ ►

```
3.1 Sn BATTERY
Charge Current    nn.nA
Total Charge     nnnAH
ChTm  nnnnH EqTm nnD
```

The 1st line displays the Screen #, Type of Screen, the Regulator #, and BATTERY.
Charge Current indicates the present Charge Current in Amperes.
Total Charge indicates the Total Charge input since installation in AmpHours.
ChTm indicates the **total battery charge time** since installation and **EqTm** indicates the number of days before the regulator does an **Equalise Charge**.

▼ ▲

```
3.2 Tn BATTERY          +
Type  n  -  xxxxxxxxxxx
Nomnl Volts  n  –  nnV
Compensation nnmV/°C
```

The 1st line displays the Screen #, Type of Screen, the Regulator #, and BATTERY.
The **Type** indicates the type of battery with **n** indicating 0 = Gel, 1 = Sealed Gel, 2 = Sealed AGM, 3 = AGM/Flooded, 4 = Flooded, 5 = Flooded, 6 = NaCl (Sodium), 7 = Custom.
Nomnl Volts indicates the nominal battery voltage with "**n"** indicating 2 = 24V, 3 = 48V, & 4 = 120V. It is only necessary to enter the one digit represented by "n" when entering **Type & Nomnl Volts.**
Battery Temperature Compensation is used to reduce the battery charging voltage at elevated temperatures to protect the battery from damage, and is settable from 0mV to 19mv in 1mV increments and revolves around the nominal 25°C used by battery manufacturers. This **should** be the value specified by the battery manufacturer.
Notes: The effects of this operation MUST be considered when setting any Overvoltage or Undervoltage Alarm, and the Low Voltage Load Release settings.
If the battery temperature sensor is NOT fitted, the regulator will assume the battery temperature is 0°C and increase the charge voltage accordingly, irrespective of the actual battery temperature. Thus, when the battery temperature sensor is NOT fitted, the Temperature Compensation should be set at 0mV/°C/Cell. A 0mV/°C/Cell setting disables this function.

◄ ▼ ▲ ►

```
3.3  Tn BATTERY         +
Max Alarm Vlts    nn.nV
Min Alarm Vlts    nn.nV
Max Charge        nn.nA
```

The 1st line displays the Screen #, Type of Screen, the Powerboard #, and BATTERY.
Max Alarm Voltage sets the Maximum Battery Voltage at which the Battery Alarm message is triggered. The setting range is 21.0 to 32.0 Vdc in 0.1V increments (for 24V systems), 42.0 – 60.0 Vdc in 0.1V increments (for 48V systems), and 105.0 to 150.0Vdc in 0.1V increments (for 120V systems).
Min Alarm Voltage sets the Minimum Battery Voltage at which the Battery Alarm message is triggered. The setting range is 42.0 – 60.0 Vdc in 0.1V increments (for 48V systems), and 50.0 to 150Vdc in 0.1V increments (for 120V systems).
Maximum Charge sets the maximum charge rate (in Amperes) at which the battery will be charged assuming there is sufficient PV input. **Note:** It is NOT possible to enter a Max Charge rate greater than the regulator's rated maximum charge rate. The setting range is 0.1A to 50A for all SRX100 models. (Note: 50Amps x two Powerboards = 100 Amps total)

◄ ▼ ▲ ► ■

3.4 Tn BATTERY +
High Volt Stop nn.nV
Low Volts Stop nn.nV
Batty Temp Stop nn°C
(OT_BAT)

◄ ▼ ▲ ► ■

The 1st line displays the Screen #, Type of Screen, the Regulator #, and BATTERY.
The High Volt Stop function is based on the battery voltage, and provided to prevent the battery from being damaged due to over-charging. Whenever the battery voltage exceeds this setting, the regulator PV Input Circuit will cease charging the battery, and Screen 6.D will indicate a High Voltage STOP error. The Max Battery Voltage setting range must be greater than the Equalise Voltage setting and less than 63V. (150Vdc on 120V Models). The factory default setting is 00.0V **.
The **Low Charge Stop function** is based on the battery voltage, and provided to prevent the battery from being damaged due to over-discharging. Whenever the battery voltage is below this setting, the regulator will cease charging the battery.
The Low Volts Stop setting must be less than 42.0 Vdc on 48V systems and 110Vdc on 120V systems. The factory default setting is approximately half of the nominal battery voltage **.
The regulator will resume charging the battery whenever the battery voltage falls between the High and Low Voltage Stop settings (assuming PV Input is available to charge the battery).
** A 00.0V setting will disable this function.
The **Battery Temp Stop** should be set no greater than the maximum battery temperature specified by the battery manufacturer. Whenever the battery temperature exceeds this setting, the regulator will cease charging the battery. The factory default setting is 50°C.
When **the High Volts Stop, Low Volts Stop**, or the **Battery Temp Stop** settings are set at 00.0 Volts/degrees, the particular function is disabled.

3.5 Tn BATTERY +
Float Voltage nn.nV
Absorb Voltage nn.nV
Absorb Time nn.nHr

◄ ▼ ▲ ► ■

The 1st line displays the Screen #, Type of Screen, the Regulator #, and BATTERY.
Float Voltage sets the battery voltage level that the regulator will allow the battery voltage (after an Absorb or Equalise charge) to drop to. The regulator will then charge the battery at a rate that maintains this voltage whenever the regulator is in FLOAT charge mode, and sufficient PV Input power is available. The setting range is 21.0 Vdc to 32.0 Vdc on 24V systems, 42.0 Vdc to 60.0 Vdc on 48V Systems, systems, and 105.0V to 150V on 120V systems, in 0.1 Vdc increments.
Absorb Voltage sets the voltage level at which BULK charge mode ceases and the ABSORB charge mode commences. The range is settable between 21.0 Vdc to 33.5 Vdc on 24V systems, 42.0V to 60.0V on 48V systems , & 105.0V to 150V on 120V systems in 0.1 Vdc increments.
Absorb Time is the time the battery will be charged at the Absorb voltage level to become fully charged. The setting range is 0.0 hours to 4.0 hours in six minute increments. A 0.0 Hours setting will prevent the **ABSORBTION** charge from occurring.

3.6 Tn BATTERY +
Equalise Volts nn.nV
Equalise Time n.nHr
Equalise Cycle nnDys

◄ ▼ ▲ ► ■

The 1st line displays the Screen #, Type of Screen, the Regulator #, and BATTERY.
Equalisation is activated on a cyclic basis and is used equalise cell voltages and to prevent stratification of the battery electrolyte. It is only necessary with certain types of batteries. Always refer to the battery manufacturers instructions before enabling this function.
Equalise Volts sets the voltage level that the charger uses during an EQUALISATION charge. The range is settable between 21.0 to 32.0 Vdc for 24 Volt systems, 42.0 to 60.0Vdc on 48V systems , & 105.0V to 150Vdc on 120V systems in 0.1 Vdc increments.
Equalise Time sets the maximum time limit for the EQUALISATION charge. The range is settable between 0 Hours and 4.0 Hours in 0.1 Hour increments. A 0.0 Hours setting will prevent the EQUALISATION charge from occurring.
Equalise Cycle sets the number of days before another Equalisation Charge is allowed. The range is settable between 0 Days and 60 days in 1 Day increments. A 0 days setting will prevent the EQUALISATION Charge from occurring.

3.7 Tn BATTERY +
State Of Charge Alarm
S.O.C. Alarm Min nn %

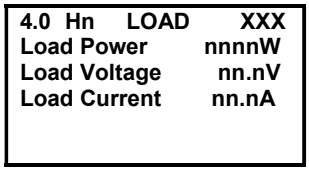
◄ ▼ ▲ ►

The 1st line displays the Screen #, Type of Screen, the Regulator #, and BATTERY.
The **S.O.C. Alarm Min** is the setting below which the **Low Battery State of Charge Alarm** will activate. If there is no PV Input, the regulator will enter “Night Mode”. However, the regulator will switch ON when/if the PV input voltage is/becomes approx. twice the battery voltage and will commence charging the battery, even if the battery voltage is below the S.O.C. Alarm Min setting. The operation of this function is not affected by the mode of operation.
Note: Settings made in Screen 3.4 **WILL** affect the battery charging function, while settings made in Screen 3.7 **ONLY** affect the Alarm function.

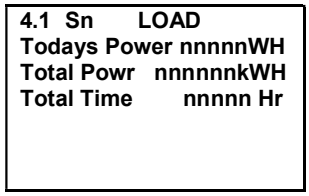
3.8 Not Used

▼ ▲

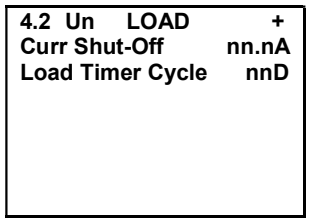
Return to Battery Header Screen



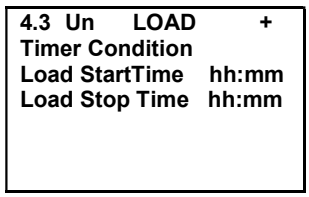
The 1st line displays the Screen #, Type of Screen, the Regulator #, LOAD, and the State.
The **Load State** indicates the status of the load and can be OK, NIL, WRN, or ERR.
The **Load Power** indicates the power being drawn from the Load Terminals in Watts.
The **Load Voltage** indicates the Voltage at the load terminals. This will be close to the battery voltage when the LOAD switch is closed.
The **Load Current** shows the power being drawn by the load in Amperes to 10 Amps Max.
NOTE: Any load being drawn from the battery by other equipment (such as an inverter) is not known by the regulator, and is not recorded.



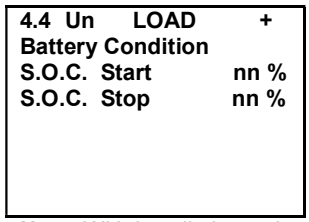
The 1st line displays the Screen #, Type of Screen, the Regulator #, and LOAD.
Todays Power shows the amount of power that has been used by the load since midnight, and is reset at midnight each day.
Total Power displays the Total Load Power in kWattHours that has been consumed by the Load since installation.
Total Load Time shows the length of time that power has been supplied through the Load Output terminals since installation. Loads less than 1.0 Amperes are disregarded.



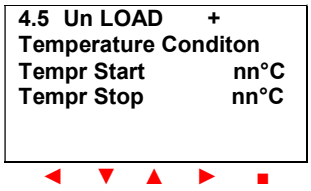
The 1st line displays the Screen #, Type of Screen, the Regulator #, and LOAD.
Load Current Shut-Off sets the maximum amount of DC current that can be drawn from the Load Terminals. This setting range can be set between 2.1 – 10.0 Amps in 0.1 Amp increments. This is the total of all load outputs on this regulator.
Load Timer Cycle is used in conjunction with the Load Timer Condition (next screen).
The **Load Timer Cycle** Sets the number of days before the Load Timer will be activated again. E.g If weekly, then set to 7 days. The setting range is 0 – 99 days. A 0 days setting disables this function.



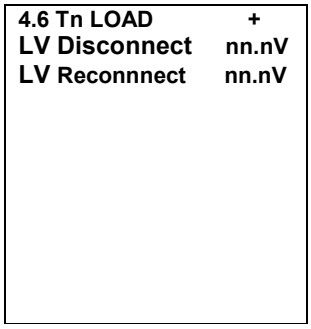
The 1st line displays the Screen #, Type of Screen, the Regulator #, and LOAD.
The **Timer Condition** can be enabled by users who only require the load output to be powered periodically. e.g. for running water pumps or lights.
Load StartTime sets the Start time at which the load output will be activated.
Load StopTime sets the Stop time at which the load output will be disconnected.
The setting range is 00:00 – 23:59 (HH:MM) using a 24 hour clock system.
This function is disabled when both times are set 00:00 or to the same time.



The 1st line displays the Screen #, Type of Screen, the Regulator #, and LOAD.
Load Battery Condition sets the battery State of Charge condition that will cause the Regulator to close the Load terminals (and apply power to the Load equipment). The output condition will be met whenever the battery S.O.C. is between these settings. This condition will be ignored when both S.O.C. settings are set at 00%, or are set to the same S.O.C. The setting range is 00% - 100% in 10% increments.
Note: Calculation of the battery S.O.C. is based on both voltage and current.
These settings may conflict with the settings made in screen 3.4.
Note: With installations where the battery is small (<200Ahr)(or in poor condition), with an intermittent load current greater than 5 Amps, the battery S.O.C. settings should be separated by 30%



The 1st line displays the Screen #, Type of Screen, the Regulator #, and LOAD.
The **Load Temp. Condition** sets the required temperature conditions that must be met before the regulator will close the Load Output terminals, and would be used when the load is powering some temperature dependant equipment. The setting range is 0 °C to +60 °C in 1°C increments. This condition will be ignored when both temperatures are set to 00°C, or if they are set to the same temperature. **Note:** This condition is based on Ambient Temperature.



The 1st line displays the Screen #, Type of Screen, the Regulator #, and LOAD.
Low Voltage Load Release is based on the battery voltage, and provided to prevent the battery from being damaged due to over-discharge. When this condition is active, the Load Output terminals are disconnected. However, all other functions still remain active, including charging and the Remote Signal Output.
LV Disconnect is the voltage setting at which the Load terminals are disconnected.
LV Reconnect is the voltage setting at which the Load terminals are re-connected.
The setting range is 0.0Vdc to 60.0) Vdc for 24V and 48V systems, and 0.0Vdc to 150Vdc in 120V systems, in 0.1Vdc increments. The difference between the Disconnect and the Reconnect voltages must be greater than 1.0 Vdc. Actuation is based on actual battery voltage only.

Note: When using the LV Disconnect/Reconnect function, Imark recommend that the S.O.C. Load conditions in screen 4.4 be set at '00'% and '00'% to disable the SOC condition.

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Return to Load Status Menu

5.0 Hn REMOTE OUTPUT
Timer Condition XXX
Battery SOC Cond XXX
Temperature Cond XXX

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The 1st line displays the Screen #, Type of Screen, the Regulator #, and REMOTE OUTPUT. This screen displays the status of each condition and displays the operating state for each condition applied to the Remote Output Signal terminal. This signal terminal may be used to activate external devices such as a Generator, Air Conditioner, Heater, Water Pump, lights, etc. The Output Signal is an Open/Closed 100mA drain signal.
The conditions can be individually invoked and their invoked status is displayed as ACT(IVE) or NON (Off).

5.1 Sn REMOTE OUTPUT
Output State XXXXX
Run Time nnnnnH
Function xxxxxxxxxx

▼ ▲

The 1st line displays the Screen #, Type of Screen, the Regulator #, and REMOTE OUTPUT. **Output State** shows the current status of the signal output terminal. It will show OFF, ON, ACTIVE, or ERROR. ACTIVE indicates that the function has activated, but some conditions are not valid. E.g. A Light is to be activated, but the time conditions are not yet met.
Remote Time shows the total time that the output has been active since installation in hours.
Function a command field, and can be used to enable different functions on the 16 way connector. Entering "LCDRST" into this field will perform a Power Reset of the LCD module only at midnight. Other functions can be activated here but can only be activated using the Imark Site Explorer. More information on this is provided under Settings in section 9.2 and in Addendum #5.

5.2 Un REMOTE OUT +
Exercise Cycle nnDys

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The 1st line displays the Screen #, Type of Screen, the Regulator #, and REMOTE OUTPUT. **Remote Output Exercise** sets the number of days between activation of the Remote Signal Output. This function is usually used to run a generator if it has not run for the set number of days (to circulate the engine oil and to charge the generator battery), or to run a pump. The setting range is 00 days to 99 days in 1 day increments. This condition will be ignored if the days are set at 00 days.

5.3 Un REMOTE OUT +
Timer Condition
Remote StartTm hh:mm
Remote StopTm hh:mm

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The 1st line displays the Screen #, Type of Screen, the Regulator #, and REMOTE OUTPUT. **Remote Output Time Condition** sets the preferred running time for the external equipment. The Remote Output signal terminal will only be activated when all invoked conditions are met, such as Time, Battery SOC, Exercise period, and/or Temperature conditions. Manually starting the external equipment will have no bearing on these settings. The Time setting range is 00:00 Hours to 23:59 hours in 1 minute increments. This condition will be ignored if both time settings are the same.

5.4 Un REMOTE OUT +
Battery Condition
S.O.C. Start nnn %
S.O.C. Stop nnn %

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The 1st line displays the Screen #, Type of Screen, the Regulator #, and REMOTE OUTPUT. The **Remote Output Battery Condition** sets the battery State of Charge condition that will cause the Regulator to activate the Remote Output signal (and start the external equipment). The setting range of 00% - 100% in 10% increments. The output condition will be met whenever the battery S.O.C. is between these settings. This condition will be ignored when both S.O.C. settings are the same. Note: Any other conditions that have been set must also be met.
IMPORTANT NOTE:
When using this condition to start an external generator (that is being used to charge the battery bank), the generator will be directly charging the battery bank. In this circumstance, the charging current is **NOT** being "seen" by the solar regulator, and depending various site conditions, will stop the generator and battery charging prematurely. In this case, the **S.O.C. Stop** should be set to 100%. This will cause the Remote Output Signal to remain active, and the generator to continue charging until the battery Bank Voltage reaches the **Absorb Voltage** setting.

5.5 Un REMOTE OUT +
Temperature Condition
Tempr Start nnn°C
Tempr Stop nnn°C

◄ ▼ ▲ ► ■

The 1st line displays the Screen #, Type of Screen, the Regulator #, and REMOTE OUTPUT.
The **Remote Output Temperature Condition** sets the required temperature conditions that must be met before the regulator will activate the Remote Output Signal, and would be used when running an airconditioner, fan, or heater. The setting range is 0 °C to +60 °C in 1°C increments. This condition will be ignored when both temperatures are set the same.
Note: This condition is based on Ambient Temperature. **Note also:** Any other conditions that have been set must also be met.

5.6 Un GEN START +
Exercise Cycle nnday
Delayed Start nnS

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The 1st line displays the Screen #, Type of Screen, the Regulator #, and GEN START.
Exercise Cycle sets the number of days between starting of the Generator Gen Start Signal Output. This function is provided to run a generator if it has not run for the set number of days (to circulate the engine oil and to charge the generator battery), or to run a pump, but can be used for other purposes. The setting range is 00 days to 99 days in 1 day increments. This function will be disabled if the days are set at 00 days.
Delayed Start (in seconds) is provided to activate a second device (such as a contactor) a short time after the generator has started and warmed up.

5.7 Un GEN START +
Timer Condition
Gen Start Time hh:mm
Gen Stop Time hh:mm

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The 1st line displays the Screen #, Type of Screen, the Regulator #, and GEN START.
The **Timer Condition** sets the preferred running time for the generator. The Gen Start Output signal terminal will only be activated when all invoked conditions are met, such as Time, Battery SOC, Exercise period, and/or Temperature conditions. Manually starting the external equipment will have no bearing on these settings. The Time setting range is 00:00 Hours to 23:59 hours in 1 minute increments. This condition will be ignored if both time settings are the same.

5.8 Un GEN START +
Battery Condition
S.O.C. Start nnn%
S.O.C. Stop nnn%

◄ ▼ ▲ ► ■

The 1st line displays the Screen #, Type of Screen, the Regulator #, and GEN START.
The **Gen Start Battery Condition** sets the battery State of Charge condition that will cause the Regulator to activate the Gen Start Output signal (and start the generator). The setting range of 00% - 100% in 10% increments. The output condition will be met whenever the battery S.O.C. is between these settings. This condition will be ignored when both S.O.C. settings are the same. Note: Any other conditions that have been set must also be met.
IMPORTANT NOTE:
When using this condition to start an external generator (that is being used to charge the battery bank), the generator will be directly charging the battery bank. In this circumstance, the charging current is **NOT** being "seen" by the solar regulator, and depending various site conditions, will stop the generator and battery charging prematurely. In this case, the **S.O.C. Stop** should be set to 100%. This will cause the Remote Output Signal to remain active, and the generator to continue charging until the battery Bank Voltage reaches the **Absorb Voltage** setting.

5.9 Un GEN START +
Temperature Condition
Tempr Start nnn°C
Tempr Stop nnn°C

◄ ▼ ▲ ► ■

The 1st line displays the Screen #, Type of Screen, the Regulator #, and GEN START.
The **Gen Start Temperature Condition** sets the required temperature conditions that must be met before the regulator will activate the Gen Start Output Signal, and could be used when running an airconditioner, fan, or heater. The setting range is 0 °C to +60 °C in 1°C increments. This condition will be ignored when both temperatures are set the same.
Note: This condition is based on Ambient Temperature. **Note also:** Any other conditions that have been set must also be met.

5.10 Spare

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Return to Remote Output Header Screen

6.0 Hn WARNG & ALARM	
PV Panels & Load	xxx
Regulator	xxx
Battery	xxx

6.n screens ONLY display current **WARNING** or **ALARM** messages. Whenever a WARNING or ALARM message is present, this screen will flash. The 50 most recent **active** messages will be displayed in the following sub-screens. Any WARNING or ALARM message that has cleared will not be displayed. Only currently **active** messages will be displayed.
In cases where there are NO errors/warnings, the screen will show the heading only, and rows 2, 3, & 4 will NOT display anything.
This screen will show what messages are present and the relative message code.
Note: (SHUTDOWN messages are shown under 7.n Screens).

NOTE: The following screens will always show the first line, **BUT,** lines 2, 3, & 4 will **ONLY** be shown when/if the relevant alarm has occurred.

6.1 Wn TEMP WARNING
DD/MM/YYYY hh:mm:ss
OT_AMB
Ambient Temp > 50°C

OT_AMB indicates that the Ambient Temperature has exceeded 50°C. This has no effect on the regulator operation as the regulator has its own protection measures. Ambient temperature information is only used by the Remote Output signal terminal or the Load terminals to control a heater or airconditioner. This is a WARNING message only.

6.2 Wn REG WARNING
DD/MM/YYYY hh:mm:ss
HT_HTS
Heatsink Temp Warning

HT_HTS indicates that the Temperature of the internal heatsink has exceeded 60°C but is less that 80°C. In this condition, the regulator will be operating at de-rated current capacity. This is a WARNING message only and will clear and the regulator will operate normally as soon as the heatsink temperature cools to less than 60°C.

6.3 Wn BATTY WARNING
DD/MM/YYYY hh:mm:ss
IBMAX
Max Input Cur Warning

IBMAX indicates that the Regulator Output Current has exceeded the Maximum Regulator Output (50.1 Amps, (or the setting as set in screen 3.3). This may occur when a high load current is required and the battery is somewhat discharged. This is a WARNING only and will clear as soon as the operating conditions become normal again.

6.4 Wn BATTY WARNING
DD/MM/YYYY hh:mm:ss
Future Option

Spare for future option

6.5 An LOAD ALARM
DD/MM/YYYY hh:mm:ss
ILDMAX
Max Load Currt Alarm

ILDMAX indicates that the Load Output Current has exceeded the internal Maximum Load Output Current setting and that the Load Output terminals have been disconnected. This is an ALARM message and can only be cleared by switching the regulator OFF, & then ON again by pressing the ON/OFF key for several seconds.

6.6 An REG'TOR ALARM
DD/MM/YYYY hh:mm:ss
OT_HTS
Heatsink Temp Alarm

OT_HTS indicates that the Temperature of the internal heatsink has exceeded 80°C and that the regulator has shut down to protect itself. The regulator will re-commence operating when the heatsink temperature cools to 60°C. This is an ALARM screen only. However, if this condition occurs regularly, the cause of the overheating should be investigated and rectified.

6.7 An BATTERY ALARM
DD/MM/YYYY hh:mm:ss
BAT_LSOC
Low Batt'y SOC Alarm

BAT_LSOC indicates that the battery is in a Low State of Charge and below the minimum battery SOC of 20V for 48 Volt systems, and 50 Volts for 120 Volt systems. This setting is a WARNING message, and is based on the Battery SOC Stop setting in Screen 4.4. The Load Terminals will be opened to protect the regulator. The regulator will re-commence operation when/if the battery voltage rises above this setting.

6.8 An BATTERY ALARM
DD/MM/YY hh:mm:ss
VBAT_LO
Low Battery Voltage Warning

VBAT_LO indicates that the battery is in a Low State of Charge and is below the minimum battery SOC setting of 20V for 48V systems, and 50 Volts for 120V systems. The regulator will disconnect the load output terminals whenever the battery falls below the Minimum Battery Alarm Voltage setting (to protect the batteries from damage). This Alarm will clear itself, and reconnect the load output terminals when the Battery Voltage rises above the Minimum Battery Alarm Votage setting in Screen 3.3.

6.9 An BATTERY ALARM **DD/MM/YY hh:mm:ss** **VBHW** **High Battery Voltage**	**VBHW** indicates that Battery Voltage is higher than the voltage setting shown in screen 3.3. This is a WARNING only to alert users that the Battery Voltage is high, but does not stop the regulator from operating normally.
6.A An BATTERY ALARM **DD/MM/YY hh:mm:ss** **VBLW** **Low Battery Voltage**	**VBLW** indicates that Battery Voltage is lower than the voltage setting shown in screen 3.3. This is a WARNING only to alert users that the Battery Voltage is low, but does not stop the regulator from operating normally.
6.B An GROUND FAULT **DD/MM/YY hh:mm:ss** **GFW** **Ground Fault Error**	**GFW** indicates that a Ground Fault exists in the system, and that the internal GFI Fuse has ruptured. The cause of the Ground Fault should be investigated and rectified. The regulator will continue normal operation. However the alarm will continue operating until the fault is rectified and the fuse is replaced. It is possible to stop the alarm by changing the GFI setting to “N” in screen 1.7.
6.C An BATTERY ALARM **DD/MM/YY hh:mm:ss** **BLO_SOC** **Low Battery S.O.C.**	**BLO_SOC** indicates that Battery State of Charge (SOC) is lower than the voltage setting shown in screen 3.7. This is a WARNING only to alert users that the Battery S.O.C. is low, but does not stop the regulator from operating normally. In this condition, the internal buzzer will be activated.
6.D An BATTERY ALARM **DD/MM/YY hh:mm:ss** **VBHS** **High Batty Volt Stop**	**VBHS** indicates that Battery Voltage is higher than the voltage setting shown in screen 3.4. This is an ALARM to alert users that the Regulator has stopped charging the battery. However, power will still be supplied to the Load Terminals. The regulator will return to normal operation when/if the batter voltage becomes less than the setting in Screen 3.4.
6.E An BATTERY ALARM **DD/MM/YY hh:mm:ss** **VBLS** **Low Batty Volt Stop**	**VBLS** indicates that Battery Voltage is lower than the voltage setting shown in screen 3.4. This is an ALARM to alert users that the Regulator has stopped charging the battery, and stopped supplying power to the Load Terminals. The regulator will return to normal operation when/if the battery voltage exceeds the setting in Screen 3.4.
6.F An BATTY WARNING **DD/MM/YY hh:mm:ss** **OT_BATW** **Battery Over Temp.**	OT_BATW indicates that the Battery Temperature has exceeded the 50°C internal Battery Temperature setting. This is a WARNING only and the regulator will continue operating normally.
Returns to Warnings & Alarms Messages Menu	

7.0 Hn SHUTDOWN MSGS **PV Panels & Load xxx** **Regulator xxx** **Battery xxx**	**SHUTDOWN** messages indicate that the regulator has ceased working either to protect itself or due to some failure. The regulator will re-check the conditions every minute, and will re-start if the error has been corrected. Most SHUTDOWN messages will require human intervention to restore the regulator or system to a working condition. This header screen indicates the number & type of SHUTDOWN Messages.

NOTE: The following screens will always show the first line, **BUT,** lines 2, 3, & 4 will **ONLY** be shown when/if the relevant alarm has occurred.

7.1 En REGULATOR MSG **DD/MM/YYYY hh:mm:ss** **SUR_NG** **Surge Pcb Fuse Fail**	**SUR_NG** indicates that the fuse on the Surge pcb has ruptured and that the surge protection is no longer operating. This is probably caused by a lightning strike. In this case, a suitably qualified technician should rectify the problem to restore the surge protection capability of the solar regulator. In this condition, the regulator may be operating correctly in all other regards.

7.2 En REG SHUTDOWN **DD/MM/YYYY hh:mm:ss** **BV_UL** **Int PS Low Voltage Error**	**BV_UL** indicates that that the supply voltage to the regulator's internal power supply voltage is excessively low and that the regulator has ceased operating. This may be caused by both a low solar input voltage, and/or low battery voltage. This is a SHUTDOWN message and requires technical attention.
7.3 En PV SHUTDOWN **DD/MM/YYYY hh:mm:ss** **IP_MAX** **PV Input Amps Error**	**IP_MAX** indicates that the input current from the solar panels has exceeded the rated input power setting, and that the regulator has shut down to protect the regulator. This is a SHUTDOWN message and requires attention.
7.4 En PV SHUTDOWN **DD/MM/YYYY hh:mm:ss** **OV_PV** **PV Input Voltage Error**	**OV_PV** indicates that that the solar panel input voltage has exceed 500Vdc, and that the regulator has ceased operating to protect the regulator. This is a SHUTDOWN message and requires attention.
7.5 En LOAD SHUTDOWN **DD/MM/YYYY hh:mm:ss** **VPVHIGH** **Load Current Error**	**VPVHIGH** indicates that a High PV Voltage is present during Start-UP. This can be caused by the PV Input being connected without having the battery correctly connected. This is a SHUTDOWN message and the regulator can only be started by removing the PV Input immediately, and connecting the Battery Terminals firstly before applying any PV Input whatsoever.
7.6 En BATT SHUTDOWN **DD/MM/YYYY hh:mm:ss** **OV_BAT** **Battery Volts Error**	**OV_BAT** indicates that that the battery bank voltage has exceed the internal Battery Voltage setting. In this condition, the regulator ceases operating to protect the battery. This is a SHUTDOWN message and requires attention. The internal settings are 33.5Vdc for 24V systems, 67.0VDC for 48V systems, and 168Vdc for 120V systems.
7.7 En BATT SHUTDOWN **DD/MM/YYYY hh:mm:ss** **OT_BAT** **Batty Over Temper Error**	**OT_BAT** indicates that that the battery bank temperature has exceeded the temperature setting (set through screen 3.4), and that the regulator has ceased charging to protect the battery. The regulator will re-start operating when/if the battery temperature falls to 5°C below the temperature set in Screen 3.4). This is a SHUTDOWN message and requires attention.
7.8 En BATT SHUTDOWN **DD/MM/YYYY hh:mm:ss** **IBPK** **Bat Peak Current Error**	**IBPK** indicates that that the peak current into the battery bank has exceeded the rated charge current setting and that the regulator has ceased operating (to protect the battery bank). This is a SHUTDOWN message and requires attention.
7.9 En REG SHUTDOWN **DD/MM/YYYY hh:mm:ss** **ADC_NG** **ADC Failure Error**	**ADC_NG** indicates that the internal ADC has malfunctioned, that the regulator has ceased operating. This is a SHUTDOWN message and requires technical attention.
7.A En REG SHUTDOWN **DD/MM/YYYY hh:mm:ss** **PSD_D** **Internal Reg Failure**	**PSD_D** indicates that an internal hardware overcurrent or internal overvoltage event has occurred, and that the regulator has ceased operating. This is a SHUTDOWN event and requires technical attention.
7.B En REG SHUTDOWN **DD/MM/YY hh:mm:ss** **EE_NG** **EEPROM Read Error**	**EE_NG** indicates that there has been an EEPROM read error. In some cases, the regulator may be operating from the back-up EEPROM data, or it may have been unable to read the back-up data, and ceased operating. In any case, the regulator requires technical attention.

```
7.C En REG SHUTDOWN
DD/MM/YYYY  hh:mm:ss
GFSH
Ground Fault Error
```

GFSH indicates that a GROUND FAULT error has occurred. A Ground Fault normally implies a fault with the installation wiring, but may be due to a lightning strike. A Ground Fault error will cause the internal fuse to open and the regulator will activate an alarm and issue this message. Restarting the regulator may rectify this condition, but the alarm will continue to sound. The alarm may be de-activated by changing the GFI setting to "N" in Screen 1.7.

```
7.D En REG SHUTDOWN
DD/MM/YYYY  hh:mm:ss
START_FAIL
Int Diagnostics Error
```

START_FAIL indicates that the regulator has failed to verify all initial diagnostics, and has shut down. This is a SHUTDOWN message and requires technical attention.

```
7.E En REG SHUTDOWN
DD/MM/YYYY  hh:mm:ss
PC_NG
Power Channel Error
```

PC_NG indicates that there is a problem with an internal power channel and that the regulator has shut down. This is a SHUTDOWN message and requires technical attention.

```
7.F En REG SHUTDOWN
DD/MM/YYYY  hh:mm:ss
HW_FAIL
Hardware Fail. Error
```

HW_FAIL indicates that an unknown internal hardware failure has occurred. The regulator has ceased operating, and requires attention from a suitably qualified technician.

```
Returns to Shutdown
Header Screen
```

```
8.0  Hn  LCD SETUP
CAN Address  n
SW Version:  1.4.0.R
Web Page: 27/03/2013
```

This screen shows the CANBUS address of the **displayed** regulator, the version of the software installed in the LCD controller. Note: This LCD Software is different to the software used by the Regulator's power section.
Web Page indicates the date the web page was loaded into the LCD microcontroller.

```
8.1  Tn LOG FILE      +
Dev: SDC Present:YES
File  IMD10000.csv NO
Sz          KB        0K
```

This LOG FILE specifies where to save the logged data. It can be saved onto a USB memory device in the USB port, or saved onto a 2Gb SD Card in the SD Card port, with the storage medium being set in line #2. Select 'USB' or 'SDC'.
Then, 'YES' or 'NO' indicates if the device is installed (or that it is seen by the computer).
Separate files are saved for each regulator in the system with the 4th character of the filename indicating the number of the regulator. Only the last 4 characters of the file name can be changed.
The 4th line shows the file size. Users must log onto the appropriate regulator at screen 0.1 to view or set the file names for other regulators.
(Two files are saved – IMDr0000.csv is logged data & IMEr0000.csv is the logged events file.)

```
8.2  Un LOG FILE    +
Collect Regn Log    Y/N
Delete Regn File    Y/N
Write Protect Fil   Y/N
```

This screen enables the collection of the regulator's performance data. No data is stored when 'N' is selected.
The data file for the indicated regulator can be deleted by entering 'Y' at the end of the 3rd line.
The data for the specified regulator can be Write Protected by entering 'Y' in the 4th line.
Note: Write Protecting the file prevents the collection of any further performance data. This screen may not show if the USB stick is not installed.

```
8.3 Tn WEB PAGE     +
Dev: USB: Present: NO
Fil WP000000.cus    NO
Sz   nnnnK  Upload? N
```

This screen is used to load the appropriate WEB Page Logo. The WEB page logo is pre-installed at the factory during production and should not require refreshing. However, the WEB page file is supplied on the SD Card with the regulator and can be restored to the micro-controller using this screen should the original ever become corrupted. It can also be restored from a USB memory device if necessary.
Line 4 indicates the size of the WEB page file, and provides the means to upload the web page file. This line is only displayed when the storage media is inserted.

```
8.4  Tn Ipv4 ADDR     +
IP     192.168.001.001
Use Automatic DHCP N
Now  192.168.003.001
```

◄ ▼ ▲ ► ■

The **Ipv4 Address** displays the TCP IP Address of the LCD Module. This address may vary depending on your Internet Service Provider and may require an IT specialist to enter the correct information here. Please read the Section 8.0 in this manual for more details on interfacing to the Internet.

```
8.5 Un SETTINGS
Change Date / Time
  dd/mm/yyyy hh:mm:ss
  Export to Reg n  N
```

◄ ▼ ▲ ► ■

Change Date / Time is used to change the date and time, in the shown format, with the starting year set at 2000. The Time uses the 24 Hour format.
Export to Reg n is used to set the **Regulator Real Time Clock** (as distinct from the LCD clock). This allows one LCD Display unit to set the time on the entry level regulators. However, it is necessary to log onto the correct regulator at the 0.1 screen to change other regulators.
Note: 'Export to Reg n' **MUST** be set to 'Y' to save these settings.

```
8.6 Fn LCD SERIAL     +
  Affects Internet
http://[IP address]/
nnnnnnnnn/index.htm
```

◄ ▼ ▲ ► ■

This serial # of the LCD unit should be the same as the regulator and is derived from the standard Imark serial # procedure. The serial # is fixed at the factory and cannot be changed. The serial # is also shown on the terminal panel of the regulator. When supplying replacement LCD modules, Imark MUST factory set this # to be the same as the # shown on the bottom of the regulator.

```
8.7 Un RESET SYST   +
   Some Data may be
Lost if 'Y' selected
Do WatchDog Reset? N
```

◄ ▼ ▲ ► ■

In the event of the regulator 'locking up' it may be necessary to reset the LCD processor by pressing the 'RESET' key. Under normal circumstances, no data should be lost. However, it is wise to ensure that any read/write to the storage device actions have completed before doing this 'Watch Dog' Reset.

```
8.8 Un   SPARE   +
```

▼ ▲ ► ■

Not Used. Spare for future options.

```
8.9 Un   SPARE   +
```

▼ ▲ ► ■

Not Used. Spare for future options.

```
8.A Tn P.I.N's      +
User 6 digits    nnnnnn
Technical        nnnnnn
Reveal?  N
```

◄ ▼ ▲ ► ■

Passwords can be changed using this screen. The Technical password is required to set both the User and the Technical passwords. The Technical password is required to Reveal the set passwords. Regulators are shipped from the factory with default passwords of 000001 for User, & 000002 for Technical. These low level PIN's should be changed at installation to more secure passwords if required.

```
8.B Fn SPARE
```

◄ ▼ ▲ ► ■

Not Used. Spare for future options.

```
8.C Tn Ipv4 GATE      +
GATE   192.168.001.001
Use Automatic DHCP N
Now  192.168.003.001
```

◄ ▼ ▲ ► ■

The **Ipv4 GATE** displays the TCP IP Gateway Address of the LCD Module. Selecting DHCP Yes in either this screen or in screen 8.4 will automatically allocate both the IP Address and the matching Gateway Address. Please read the Section 8.0 in this manual for more details on interfacing to the Internet.

```
8.D Fn  Not Used
```

◄ ▼ ▲ ► ■

Not Used. Spare for future options

▼ ▲

```
Returns to Settings
Header Menu
```

8.0 EXTERNAL INTERFACING TO IMARK SOLAR REGULATORS

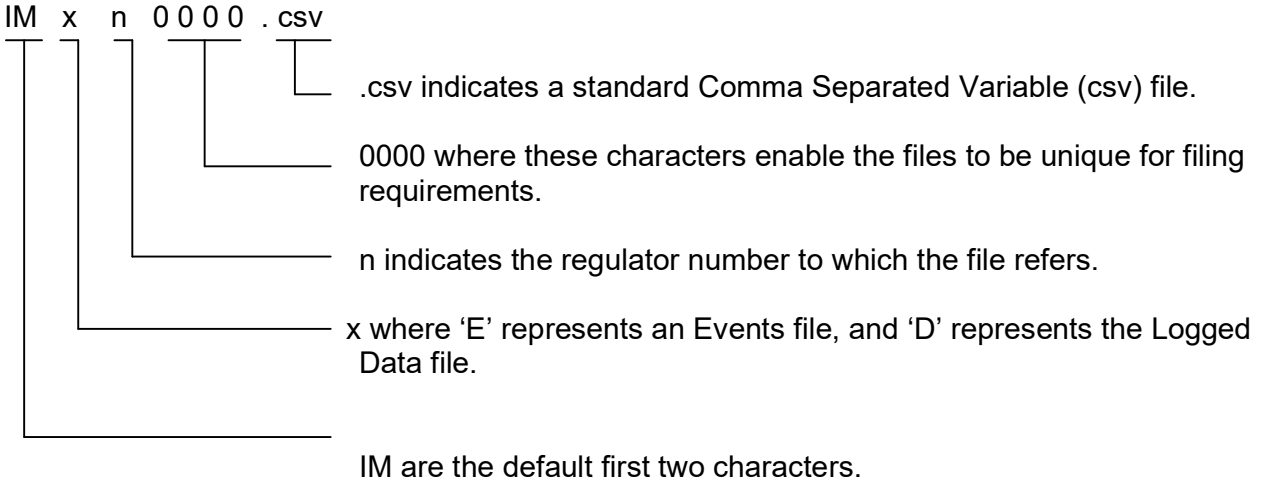
External Interfacing with the IMARK SR Series regulators can be achieved in several ways, as follows:

8.1 SD Card

The simplest means of reading performance data is to simply remove the optional SD Card from the regulator, and insert it into the SD Card reader on a PC or Laptop and read the data. In this case, the data is stored as a .CSV file, and can be opened using Microsoft Excel or similar products. Users should always remember that the historical data is stored on the SD Card approximately every 30 minutes. Accordingly, the stored data may not include the last 30 minutes.
Please bear in mind that the Memory Storage Device must be inserted in the appropriate port on the front of the regulator. Then, the required Memory Device must be selected in the regulator 8.1 screen, and the 'Collect Regn Log' **must** be set to 'Y' in the regulator 8.2 screen. 'Write Protect Fil' in regulator screen 8.2 **must** be set at 'N'.
The data will be stored to EEPROM at 30 minute intervals, so it may be necessary to wait for at least 30 minutes before the logged data is written to a fresh Memory Storage Device. In such cases, it is only possible to write the data that is currently stored in the regulator's EEPROM (which is about 15 days of data). Therefore, even though it is possible to store the data for the lifetime of the regulator on the Memory device, the Memory device should be installed at installation, and should remain installed for the life of the regulator.

Note: The Memory Storage device can be removed for up to several days and then re-inserted, at which time the new Performance Data (from the Regulators EEPROM) will be appended to the existing stored data, thus not loosing any stored data.

Two .csv files are automatically saved for each regulator in the system, and use the following naming convention:



It is also possible to use a USB Memory Stick to retrieve performance data from the regulator in the same manner as described above. However, in this case, the USB memory device must have been installed in the regulator for the data period. (days, weeks, months, etc.)

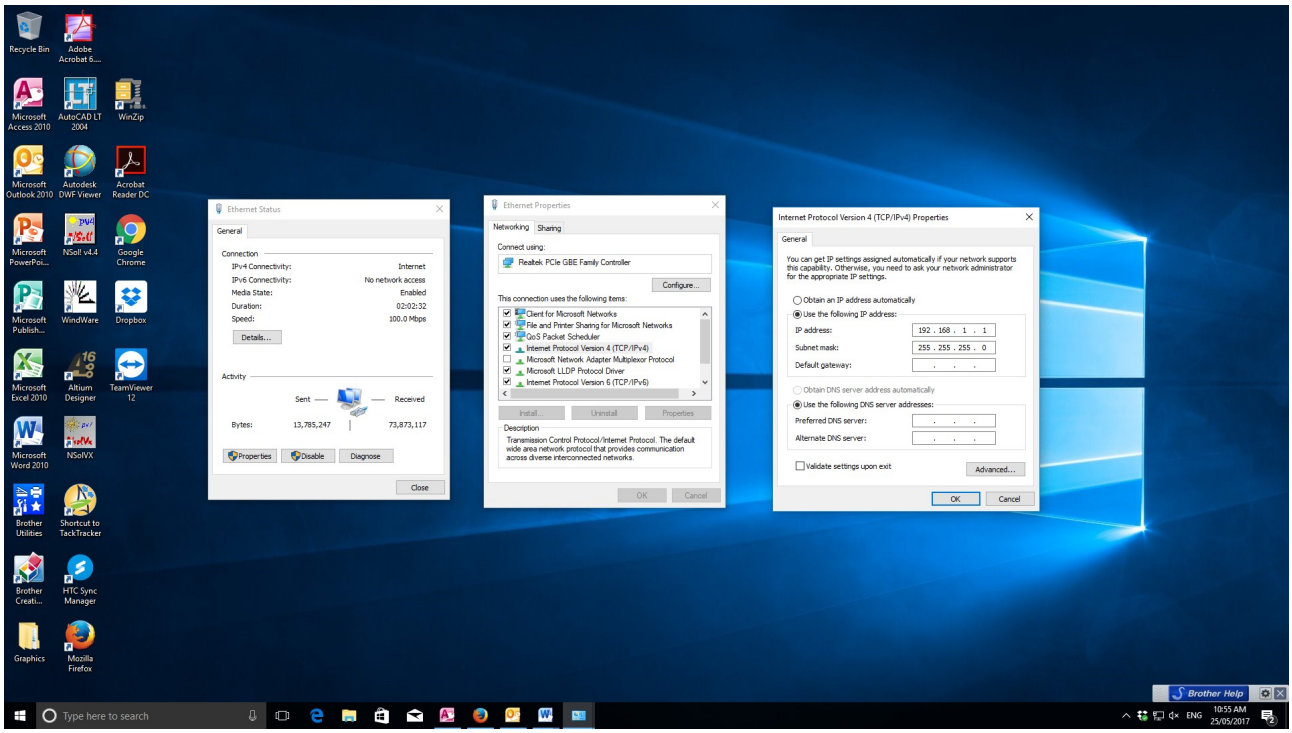
8.2 Network Connections

When connecting either directly, or using a LAN, the Network Connections on your computer must be setup correctly.

Users will need to go to ‘Network Connections’ in the Control Panel, then right-click on the ‘Local Area Connection’ icon, select ‘Properties’, then click ‘Internet Protocol (TCP/IP)’ to highlight it, then click on the ‘Properties’ tab, then press the ‘Alternate Configuration’ tab. It will then be necessary to click on the ‘User Configured’ button and enter the TCP/IP parameters.

Enter the ‘IP Address’ fields. The first 3 octets (fields) should be exactly the same as the first 3 fields shown on the bottom line of regulator screen # 8.4. for example, ‘010.010.010 ‘ or ‘ 10.10.10 ‘. Enter ‘001’ (1) in the fourth field. Any number from ‘ 0 ‘ to ‘ 255’ can be entered in the fourth ‘IP Address’ field. However, this number MUST be unique and CANNOT have the same number as any other device on the LAN. As an example, if you had 8 regulators installed at various locations, they would all need to have a different number in the fourth field (as shown in the bottom line of the regulator screen #8.4). You may wish to number the sites consecutively from 1 – 8, or 101 to 108, for example.

It is also the necessary to ‘mask’ the fields by entering the required information into the ‘Subnet Mask’ fields. Enter 255.255.255.0. The ‘Subnet Mask’ acts as a filter and (in this example) means that the first three fields of the ‘IP Address’ MUST match the first 3 fields in the regulators’ IP Address, (as shown in the bottom line of the regulator screen #8.4). The ‘ 0 ‘ in the fourth field, of the ‘Subnet mask’ allows any number (less than 255) to be entered in the fourth field of the regulators ‘IP Address’. This allows users to have up to 254 individual regulators with their IP Addresses starting with ‘10.10.10 ‘, without having to change their computer settings to log onto different regulators.



8.3 Direct Connection with a PC or Laptop Computer

Step #1.
Connect a standard Ethernet cable (yellow or blue) between the Ethernet port on the Solar Regulator and the Ethernet port on your computer. (NOTE: The LCD Module will automatically recognise whether you are using the standard Ethernet cable (blue), or the Ethernet data transfer cable (yellow) and act appropriately).

Step #2.
Go to regulator screen 8.4 and note the TCP/IPv4 address shown in the 2nd line. Then set the DHCP to 'N' in line #3. Line #4 should show the 'NOW' address and this should be identical to that shown in line #2.

Step #3.
Open your web browser (Internet Explorer, Firefox, etc)
Enter the required web-site address details, as follows:

http://xxx.xxx.xxx.xxx/nnnnnnnnn/index.htm and press return

Where

Takes you directly to the IMARK Site Explorer Index page on the solar regulator

These nine numbers MUST be the actual solar regulators unique serial number and must be entered correctly. Access is NOT possible without the correct serial # being entered. This is both a security feature, and a means of uniquely identifying the exact regulator with which you wish to communicate.

These 4 octets (fields) are the unique IP Address shown on line 4 of the LCD on the solar regulator and MUST be entered exactly as shown. You can obtain the regulators IP Address on the LCD screen by going to Menu Screen #8.4
DHCP must be disabled as 'N' on screen 8.4.

The Web browser should now display the Index page of the IMARK Site Explorer. If not, you may need to go to the Settings or Tools part of your browser & select Internet Options/Connections/LAN settings, etc. Go to Internet Protocol (TCP/IP) and click on properties, then click the Alternate tab, and set the User Configured IP Address and the Subnet Mask as described in clause 8.2 of this document. You may also need to go to the 'Settings' or 'Tools" part of your web browser and select 'Internet Options/Connections/LAN Settings, etc' and verify that the settings are correct.
If that fails, then, it may be necessary to have your IT person change your network and/or security settings to allow access to such addresses on your network.

8.4.1 Connecting using a LAN

Due to the remote locations of most solar regulator installations, extreme care MUST be taken to ensure that all IP based settings are correct before leaving site. Further, we urge all installers to have the settings checked by an independent person who is Off-Site. This independent off-site person should log onto the site using the required IP settings and confirm that the IP connections are operating correctly and confirm with the on-site installer before the on-site installer leaves the site. An incorrect setting may mean that the site is NOT accessible using the Imark Site Explorer, and may require a costly return trip to site to make the correct setting.

Step #1.
Open a web browser on your computer.

Step #2.
Go to regulator screen 8.4 and set the DHCP to 'Y' in line #3. Line #4 on the LCD screen should now show the local IP Address allocated to the solar regulator by your system router. Note: The TCP/IPv4 address shown in the 2nd line will be **different** to the IP Address shown as the 'NOW' IP Address in line #4 of the regulator screen.
Note the number shown as the 'NOW' IP Address.

Step #3.
Enter the required web-site address details, as follows:

http://xxx.xxx.xxx.xxx/nnnnnnnnn/index.htm and press return

Where

- Takes you directly to the IMARK Site Explorer Index page on the solar regulator
- These nine numbers MUST be the actual solar regulators unique serial number and must be entered correctly. Access is NOT possible without the correct serial # being entered. This is both a security feature, and a means of uniquely identifying the exact regulator with which you wish to communicate.
- These 4 octets (fields) are the unique IP Address shown on the 4 line of the LCD on the solar regulator and MUST be entered exactly as shown. You can obtain the regulators IP Address on the LCD screen by going to Menu Screen #8.4
  DHCP must be enabled as 'Y' on screen 8.4.

The Web browser should now display the Index page of the IMARK Site Explorer. If not, you may need to change your network settings as described in clause 8.2 of this document. If that fails, then, it may be necessary to have your IT person change your network and/or security settings to allow access to such addresses on your network. If you use a router, then a unique port must be allocated to the solar regulator

8.4.2 Using a Gateway

When using a Gateway with the Imark Site Explorer, certain procedures MUST be followed, and all settings that MUST be correct.
The following settings MUST be entered or confirmed on the regulator that is connected to the LAN or Internet.

Step #1
Enter a valid technician password at Screen 0.1 to enable setting changes.

Step #2
Go to Screen 1.6 and enter (or confirm) that the correct (Regulator network) CANBus identity has been entered. This MUST be correct on the regulator that is connected to the LAN. This network address will probably be #1 on simple systems, but can be up to #8 on larger systems.

Step #3
Go to Screen 0.1 and ensure that the same CANBus identity has been selected on the second line.

Step #4
Go to Screen 1.4 and ensure that the displayed serial # matches the serial # of the regulator as shown on the terminal plate of the regulator.

Step #5
Go to Screen 8.6 and ensure that the serial # of the LCD is correct, and should be the same as that shown in Screen 1.4. This exact serial number is required to access the regulator over the internet and should be recorded and kept in a convenient location.

Step #6
Go to Screen 8.4 and set the DHCP to “Y” and press enter. This will cause the regulator to “negotiate” an IP address with your router or IP network switch, and place the “negotiated” IP address into the “now” line on Screen 8.4. You should now enter the “now” IP address into line 2 “IP” of this screen. Press Enter. Then change DHCP to “N”.

Step #7
Go to Screen 8.C. You will note that this screen has been set to DHCP = “Y” (if DHCP in Screen 8.4 is set to “Y”) and that the Gateway Address is shown in the “now” line. You should now enter the “now” Gateway address into line 2 “GATE” of this screen. Press Enter. Then Change DHCP to “N”.

NOTE:
Setting DHCP to “Y” or “N” in either Screen 8.4 or Screen 8.C will automatically change the other screen to the same DHCP setting where Screen 8.4 will display the IP Address and Screen 8.C will display the Gateway Address.
Imark suggest that the “now” addresses be entered into the IP Address field and the Gateway Address fields, as the regulator will use whatever addresses are in the IP Address field and the Gateway Address field (not the “now” field) in the event that DHCP **cannot** negotiate new addresses when the lease expires after 24 hours.

Step #8
Go to your computer, open your Web browser, and enter the regulator’s IP address into the URL field in the same format as shown in the regulator’s Screen 8.6. You MUST replace [IP Address] with the “now” IP Address shown in screen 8.4. Do NOT include the “[ ]” brackets.

Step #9
Let's assume all is OK so far.
It is now necessary to do "Address Reservation" on your network router or network switch. This will "Lock" an IP Address to a MAC Address, and is done so that your IP Address cannot be changed on a daily basis when the "lease" gets "re-negotiated" between the Regulator and router on a daily basis. When done correctly, the system should always use the set IP Address, even after a power failure.
You will need to go to Regulator Screen 1.4 and record the MAC Address shown on line 4 "M". It will look something like: 02-1a-07-f1-86-09
You will also need to go to Regulator Screen 8.4 and record the shown "now" IP Address.
You will now need to log onto your network router or switch and follow the procedure described in the manual that is provided with the network router or network switch.

Step #10
Have an Off-site colleague log onto the site using their Web Browser and confirm that the settings provide reliable site connection.

Step #11
Assuming all is working fine, and that your network router or switch is reliably allocating the correct IP Address from Screen 8.4, go to screen 8.4 or 8.C and set DHCP to "Y".
Wait until the regulator beeps (maybe as long as 1 minute) before switching anything OFF. The beep indicates that the new parameters are safely stored in the regulators flash memory.

NOTE:
If you wish to use a different GATE address in Screen 8.C, the new Gateway Address can be entered into the GATE field. When using a fixed Gateway Address, the DHCP setting must be "N".

Network Routers & Network Switches
Further information relating to Network Routers and Address Reservation is included in Section 8.6 of this document. However, the manual supplied with the actual router may better describe the router's (or switch's) set-up procedure, and should be used as the reference.

Section 8.6 also describes how to calculate the regulators MAC Address.

8.5 Connecting over the Internet

Open your Internet Browser (Internet Explorer, Firefox, etc)
Enter the necessary Public IP Address of the site where the regulator that you wish to view is installed. You will need to know the site's Public IP Address. This address will be different to the Local (internal) IP Address (described above) and different to the IP Address of your computer. You can obtain this address by opening a web browser on a computer attached to the remote system browser and using the search function. Type in 'What is my IP Address' and you will get several responses, most of which will show the IP Address of the remote site. Where the remote site uses a router, the 'Port Forwarding Rules' must be set up as described in clause 8.6 of this document. You may need your IT specialist to do this for you. (This may not be easy if the regulator is at some remote location).
Depending on the browser, the IP Address will be like this:

http://nnn.nnn.nnn.nnn:ppp/nnnnnnnnn/index.htm and press return

Where

Takes you directly to the Solar Regulators HOME page

These nine numbers MUST be the actual solar regulators unique serial number and must be entered correctly. Access is NOT possible without the correct serial # being entered. This is both a security feature, and a means of uniquely identifying the exact regulator with which you wish to communicate.

This is the router port through which the solar regulator communicates with the internet. You may need your IT specialist to set this up on your router or read clause 8.6.

These numbers are the unique Public IP Address allocated to the customer's site (to which the solar regulator is attached) and MUST be entered exactly as shown. You can obtain the site Public IP Address by opening a web browser on the site and searching for 'What is my IP Address'. This will inform you of the site's Public IP Address. This IP Address may change on a daily basis depending on the way your ISP manages your network IP Address. The solar regulator's LCD Screen (8.4) will only show the Local IP Address. NOT the Public IP Address.

This may or may not be required depending on the browser you are using.

8.6 Setting the Solar Regulator for use with a Modem/Router

When logging on to a remote Imark Regulator from your web browser over the Internet, your 'request' to the remote site's IP Address will find its way to the router attached to the remote site. So that the router knows what to do with your 'request', or which device your 'call' should be directed to, you need to setup the 'Port Forwarding Rules' (for the remote router).
The method of doing this will vary depending on the make and model of the router, and the manufacturer's manual should be followed to setup these rules. Depending on the remote computer setup, and the competence of the person doing the installation, it may be necessary to have your IT Specialist setup these rules.

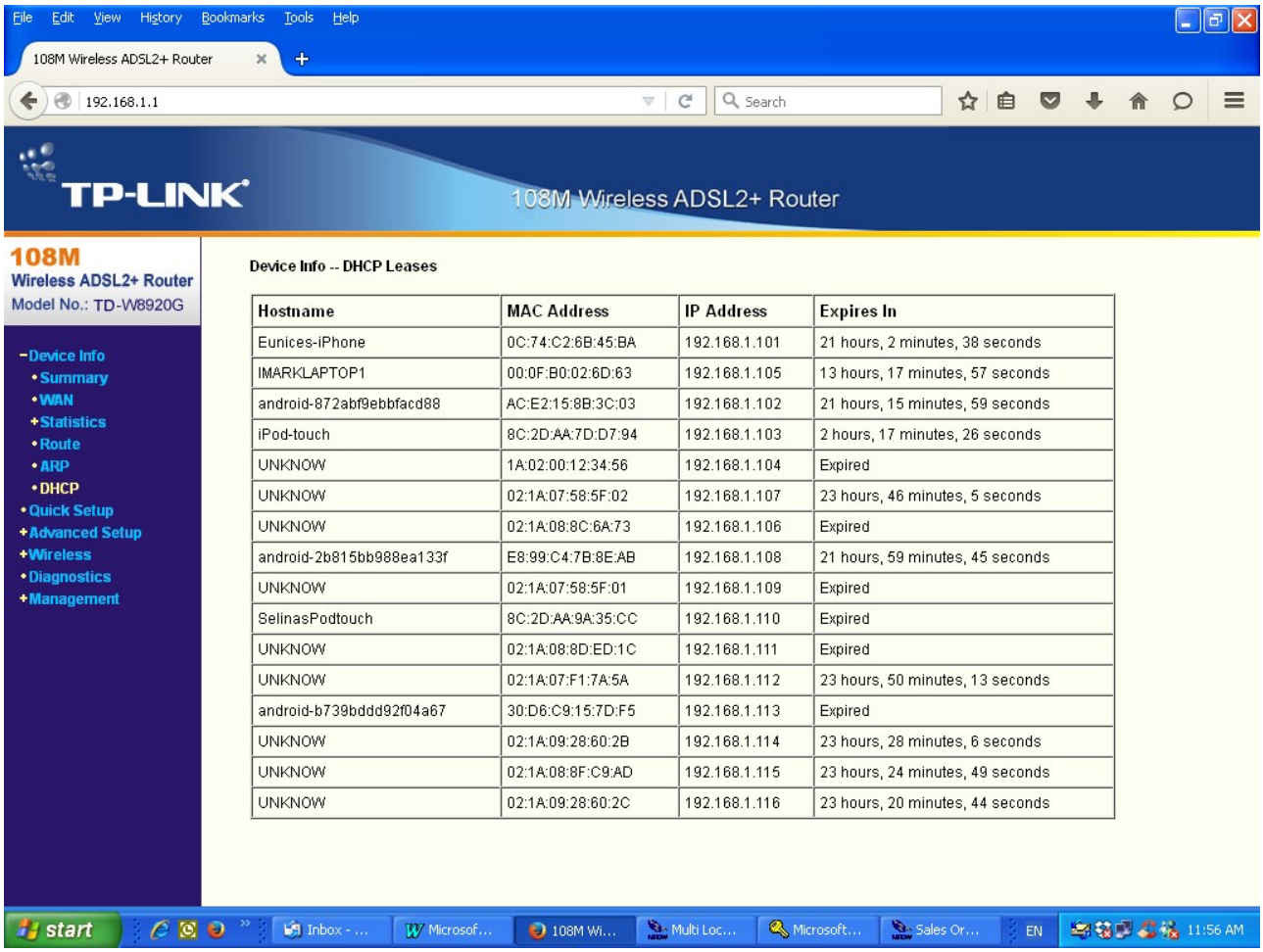
The Ethernet port on the Imark SRX series regulators supports the http protocol and the DHCP protocols ONLY. Whenever DHCP is enabled, the Router and the Regulator will "negotiate" (daily) leases and automatically allocate the IP Address and the Gateway Address. The allocated IP Address will be shown in screen 8.4 and the Gateway Address will be shown in Screen 8.C.
If desired, fixed IP Addresses and fixed Gateway addresses can be assigned through Screens 8.4 and 8.C on the regulator.

In simple terms, it is necessary to tell the router that any calls coming in (to the **Public** IP Address) on a given port, should be directed to the Imark solar regulator (which would have been allocated a unique **Local** IP Address by the router). Do NOT use just any port, as it may be being used by some other device on the remote router. Certain ports are set-aside for specific purposes, so we suggest using an unused 'public' port from within the remote system that is available for free use. Where more than one Imark solar regulator is connected to the one router, you will need to setup the Port Forwarding (also referred to as "NAT") rules for each solar regulator, and each regulator will need to be assigned a specific port. When assigning ports, you will need to specify the IP Address for each regulator when setting the Port Forwarding Rules. This exact IP Address (specified when setting up the Port Forwarding Rules), MUST be identical to the IP Address shown on line 4 of regulator screen # 8.4 with DHCP enabled 'Y'.

Note: Internal IP Addresses (Local IP Addresses) are only known to the router, and are NOT seen by the Internet. Simply, the Public IP Address will be different to the Local IP Address.

There is a lot of information on setting up 'Port Forwarding Rules' available on the Internet, and the information there describes this process better than we can. Therefore, if necessary, we suggest you spend a few minutes researching this subject before starting.
It is important to understand that most routers only issue a 24 hour "lease" on all IP Addresses and then will re-allocate the IP Address when the "lease" expires. Thus equipment connected to routers may have a different IP address after every 24 hours.
Accordingly, Imark suggest that the desired IP Address be allocated to the solar regulator's MAC Address. This is known as "Address Reservation" and the way to do this will be explained in the router's manual. For ease of setup, the regulator's MAC Address is shown on the 4th line of the regulator's Screen 1.4.

You can see the various IP Addresses and allocations on your router by logging onto the router using your web browser. Commonly, the router address is 192.168.1.1. You will have to enter the required administrator name and password. Often the default details are printed on the router, and commonly "admin" & "admin" is used. The go to - Device Info/DHCP where the list of allocations will be displayed, as shown below.



Hostname	MAC Address	IP Address	Expires In
Eunices-iPhone	0C:74:C2:6B:45:BA	192.168.1.101	21 hours, 2 minutes, 38 seconds
IMARKLAPTOP1	00:0F:B0:02:6D:63	192.168.1.105	13 hours, 17 minutes, 57 seconds
android-872abf9ebbfacd88	AC:E2:15:8B:3C:03	192.168.1.102	21 hours, 15 minutes, 59 seconds
iPod-touch	8C:2D:AA:7D:D7:94	192.168.1.103	2 hours, 17 minutes, 26 seconds
UNKNOW	1A:02:00:12:34:56	192.168.1.104	Expired
UNKNOW	02:1A:07:58:5F:02	192.168.1.107	23 hours, 46 minutes, 5 seconds
UNKNOW	02:1A:08:8C:6A:73	192.168.1.106	Expired
android-2b815bb988ea133f	E8:99:C4:7B:8E:AB	192.168.1.108	21 hours, 59 minutes, 45 seconds
UNKNOW	02:1A:07:58:5F:01	192.168.1.109	Expired
SelinasPodtouch	8C:2D:AA:9A:35:CC	192.168.1.110	Expired
UNKNOW	02:1A:08:8D:ED:1C	192.168.1.111	Expired
UNKNOW	02:1A:07:F1:7A:5A	192.168.1.112	23 hours, 50 minutes, 13 seconds
android-b739bddd92f04a67	30:D6:C9:15:7D:F5	192.168.1.113	Expired
UNKNOW	02:1A:09:28:60:2B	192.168.1.114	23 hours, 28 minutes, 6 seconds
UNKNOW	02:1A:08:8F:C9:AD	192.168.1.115	23 hours, 24 minutes, 49 seconds
UNKNOW	02:1A:09:28:60:2C	192.168.1.116	23 hours, 20 minutes, 44 seconds

You will note that the MAC Addresses are linked to the IP Addresses, and that the “leases” will all expire on a daily basis.

Imark suggest that the router should have the desired IP Address reserved to the MAC Address, and that Port Forwarding rules be used to allocate a specific regulator to a specific port. The Port Allocations can be seen on the router by going to: Advanced Setup/NAT/Virtual Servers/Add as shown on the next page.

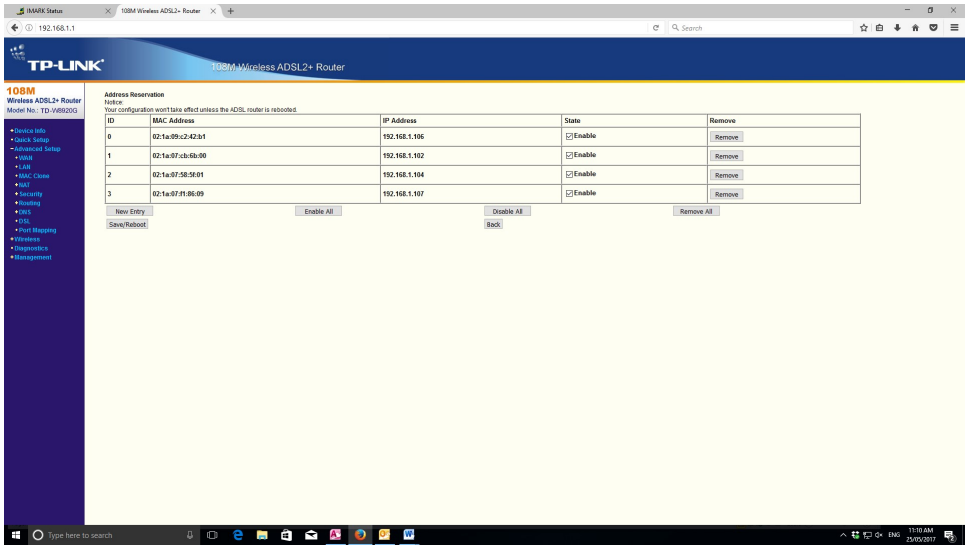
When the Solar Regulator is set to “DHCP = Y” (Screen # 8.4), the regulator and the modem/router will automatically arrange the IP Address which is shown in the “NOW” field in Screen # 8.4, as well as the Gateway Address shown in the “now” field in Screen 8.C.

If the Solar Regulator and the modem/router (for any reason) are unable to arrange the IP Address automatically, then the Solar Regulator will set the DHCP flag field to “N”, and enter the default IP Address into the “NOW” IP Address field.

As the Solar Regulator may be installed at a remote site where the user cannot easily read the “NOW” IP Address, Imark suggest allocating a reserved IP Address in the Router. This is achieved by linking a specific IP Address to the Solar Regulator’s MAC address by programming the router accordingly. Some routers refer to this as “Address Reservation”

To do this, you will need to log onto the router. You will also need to know the Solar Regulator's MAC Address, as well as the login details for the router. This is usually done using your web browser and entering the router's IP Address instead of entering the web address. The IP Address, the User Name, and the Password are usually printed on the router. For example: IP Address = 192.168.1.001, User Name = admin, and Password = admin.

The MAC Address for the Solar Regulator uses part of the serial number, and is constructed using 6 fields, as follows: xx : xx : xx : xx : xx : xx
The first two fields will be Hexadecimal number: 02 : 1A : ……
Secondly, you need to convert the solar Regulator's serial number to a hexadecimal number. Thus, a decimal serial number of 143420025 will become Hexadecimal number: 08 : 8C : 6a : 79 and these characters are inserted into the last four fields. Thus, in this example, the MAC Address will be Hexadecimal number 02 : 1a : 08 : 8C : 6a : 79
Log onto the router, using the router's IP Address, User Name, and Password. Then go to "Advanced Setup", then "LAN", then "Set Address Reservation", and finally "New Entry".
Enter the required MAC Address for the Solar Regulator, as well as the desired IP Address in the respective fields. Then, set the state to "Enable", and finally press "SAVE".



If you enter an address that clashes with an existing setting, the router will probably give you an alert prompt, and it will be necessary to re-enter the corrected details possibly with an UNUSED IP Address.
Note: The IP Address will also have to be within a set range.
This process will ensure that in the event of the Solar Regulator and the router/modem being unable to allocate an IP Address with DHCP enabled "Y", the router will then use the default IP Address that has been set in the second row of the Solar Regulator Screen # 8.4.

As a final back-up, the regulator can be programmed as shown at screen #5.1 to display "LCDRST"). This can only be done from a laptop or PC using Imark Explorer/settings/Remote Output Function text).
This will cause the regulator to do a "Watchdog Reset" at midnight on a daily basis.

8.7 Connecting using Microsoft Excel

It is possible to connect to the regulator using Microsoft Excel, provided you have the Internet enabled and connected.
Open Excel, then go to File, Open, My Network places and specify 'Entire Network), Filename, and enter the name as follows:

http://nnn.nnn.nnn.nnn/nnnnnnnnn/index.htm and press Enter

where, nnn.nnn.nnn.nnn means the IP Address octets,
and, nnnnnnnnn must be the serial number of the regulator attached to the LCD display.

If you wish to download the performance data, you may do so by going directly to the download page, by exchanging: _ _ _ _ /index.htm with _ _ _ _ /download.csv?p=d&r=1&c=l

Where the period p= 'l' = live, or 'd' = day, or 'w' = week, or 'm' = month, or 'a' = all, and r='1' is the regulator number (1 to 8), and (category) c= 'l' = log data file, or 'e' = events file

When downloading data using this method, the data will come directly from the regulator as one packet, as a .csv file. You will be prompted to specify several parameters as follows:
Do **NOT** check 'Treat consecutive delimiters as one'.
Make sure that the 'Delimited' box is checked, and that the 'File Origin' type matches your computer. (Macintosh, Windows (ANSI), DOS or OS/2 (PC-8)) .
Click the 'Next' box.
The next screen will ask you what the delimiter is. Tick the 'Comma' box (as implied by .csv = comma separated variable).
Click the 'Next' box.
Select the Date format (DMY = day, month, year --- or whatever suits you best).
Click the 'Finish' box.
Excel will now open with the data entered into a table. From here, it is possible to manipulate the data as required. Users may wish to open new worksheets to make their own graphs. Go to Insert, then Worksheet, and name the worksheet appropriately.

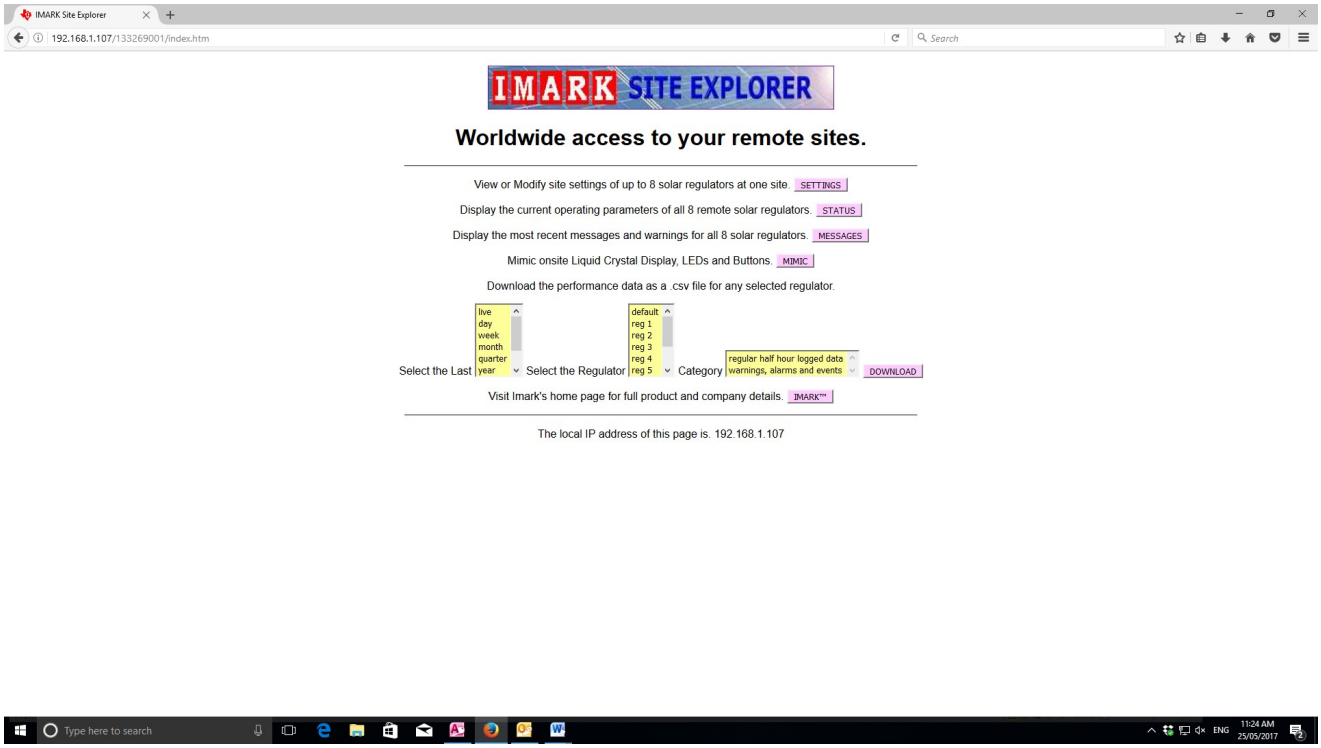
9.0 IMARK SITE EXPLORER

This section provides information about the IMARK SITE EXPLORER and its operation.

9.1 INDEX PAGE

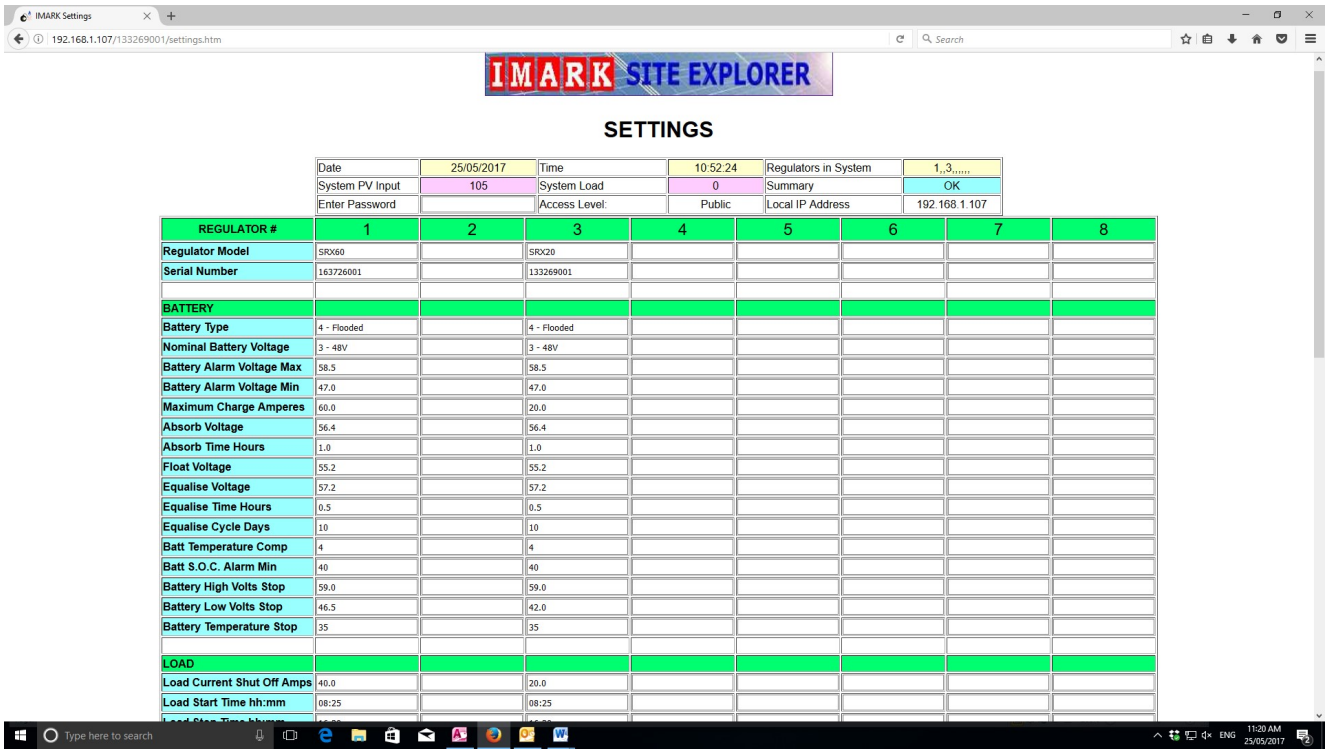
This index page allows users to navigate to other screens, and to download data from a remote SRX Regulator. Pressing the pink buttons will take the user to the respective page, or perform the selected action. The web browser heading indicates the Local IP Address to which the regulator is connected.

Clicking on the IMARK SITE EXPLORER logo on any screen will return to the Home page shown below.



9.2 SETTINGS PAGE

The Settings page shows the settings for all regulators in the system. It also permits setting changes from this page (password protected).
The top line of the header shows the Date and Time that the information was downloaded, and lists the number of each regulator installed in that system. The second line provides a means of entering a valid password, shows the access level enabled by the password, and shows the Local IP Address.
Some fields, such as serial #, are only factory changeable.



The settings are described as follows:

REGULATOR

Regulator Model	Shows the Regulator Model Number
Serial Number	Shows the Serial Number of this regulator

BATTERY

Battery Type	Sets the battery type.
Nominal Battery Voltage	Sets the nominal battery voltage. Setting '0 - Auto' causes the regulator to automatically select the appropriate battery voltage.
Battery Alarm Voltage Max	Sets the upper voltage at which the Battery Voltage Alarm will be activated.
Battery Alarm Voltage Min	Sets the lower voltage at which the Battery Voltage Alarm will be activated.
Maximum Charge Amperes	Sets the battery maximum charge ampere rating.
Absorb Voltage	Sets the Absorption charge voltage.
Absorb Time Hours	Sets the time that the battery will be kept at the Absorption Voltage during the Absorption Charge.
Float Voltage	Sets the voltage that the battery will be kept at after the Absorption charge has been completed.
Equalise Voltage	Sets the Equalise charge voltage.

Equalise Time Hours	Sets the time that the battery will be kept at the Equalise Voltage during the Equalise Charge.
Equalise Cycle Days	Sets the number of days after the most recent Equalise Charge when the next Equalise Charge will take place.
Batt Temperature Comp	Sets the Compensation in mV/°C per cell that is applied to the charging voltage to prevent overcharging the battery bank. Installers should follow the battery manufacturer's recommendations when setting the Temperature Compensation.
Battery S.O.C. Alarm Min	Set the Battery State of Charge Minimum at which the regulator will activate the State of Charge alarm.
Battery High Volts Stop	Sets the high voltage at which the regulator will stop charging the battery.
Battery Low Volts Stop	Sets the low voltage at which the regulator will stop charging the battery and disconnect the load terminals.
Battery Temperature Stop	Set the Temperature above which the regulator will stop charging the battery.

LOAD

Load Current Shut Off Amps	Sets the maximum amperes that may be drawn from the Load terminals. This is limited to the maximum rating of the regulator.
Load Start Time hh:mm	Sets the Load Start Time condition at which time the Load output terminals are connected.
Load Stop Time hh:mm	Sets the Load Stop Time condition at which time the Load output terminals are dis-connected. **Note:** Setting both the Load Start Time and the Load Stop time to the same time, or to 00:00, disables this function.
Load Timer Cycle DD	Sets the number of days before the Load Output is again activated.
Battery S.O.C Start %	Sets the Battery State of Charge condition at which the Load Output terminals will activate.
Battery S.O.C Stop %	Sets the Battery State of Charge condition that will disconnect the Load Output terminals. Note: A 10% hysteresis should be used between the SOC Start & SOC Stop settings. In any case, this condition is disabled if both settings are identical, or 0%.
Temperature Start °C	Sets the Temperature Start condition that has to be met before the Load Output will activate.
Temperature Stop °C	Sets the Temperature Stop condition that will disconnect the Load Output terminals Note: This condition is disabled if both settings are identical, or are 0°C.
Batt Low Volt Load Release	Sets the voltage at which the Battery Low Voltage Load Release will disconnect the Load Output.
Batt. Low Vt Load ReConnct	Sets the voltage at which the Battery Low Voltage Load Release will reconnect the Load Output. This setting MUST be at least 1.0 Volts above the Low Voltage Load Release Voltage.

REMOTE OUTPUT SIGNAL

Start Time > hh:mm	Sets the Start Time condition at which time the Remote Output Signal is activated.
Stop Time > hh:mm	Sets the Stop Time condition at which time the Remote Output Signal become inactive. **Note:** Setting both the Remote Output Start Time and the Remote Output Stop time to the same time, or to 00:00, disables this function.
Battery S.O.C Start %	Sets the Battery State of Charge condition at which the Remote Output Signal will activate.

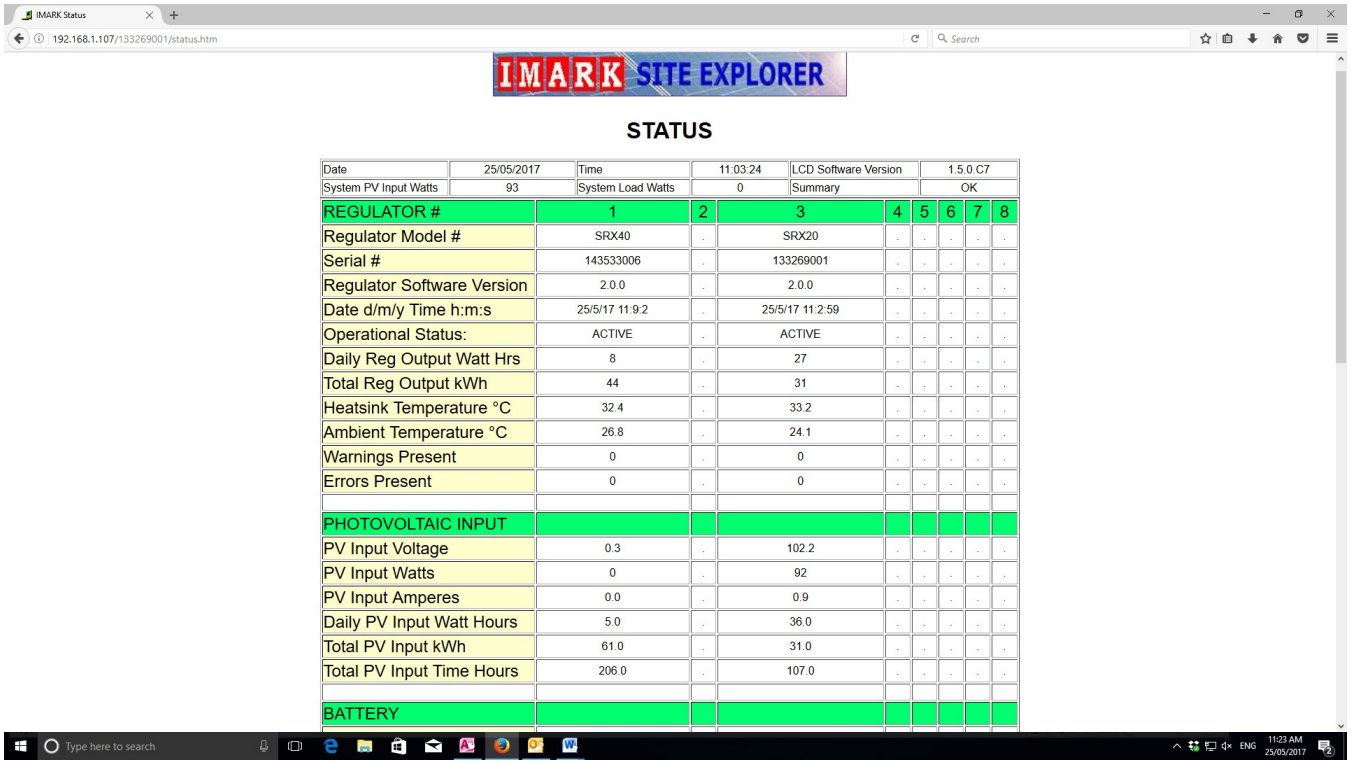
Battery S.O.C Stop %	Sets the Battery State of Charge condition at which the Remote Output Signal will become inactive. Note: A 10% hysteresis should be used between the SOC Start & SOC Stop settings. In any case, this condition is disabled if both settings are identical, or 0%.
Temperature Start +/-°C	Sets the Temperature Start condition temperature at which the Remote Output Signal will activate.
Temperature Stop +/-°C	Sets the Temperature Stop condition temperature at which the Remote Output Signal will disconnect the Load Output terminals Note: This condition is disabled if both settings are identical, or are 0°C.
Exercise Cycle Days	This field can be used to set the operating states for the REM_ON input, Remote Output, GENSTR Output, DLYSTR Output, and RELAY Output terminals on the 16 way connector.
Remote Output Func Text	This field can be used to add text to indicate what the Remote Output Signal is controlling, such as Generator, or Air-Conditioner, or Lights, etc. **Note:** This text can only be entered using the IMARK Site Explorer. A total of 6 characters are available, and can be used to enable extra functions. Please contact Imark if further information on these functions is required. See Addendum #5 for further information.
Generator Exercise Cycle	Sets the number of days before the Generator Start signal is again activated.
2nd Start Delay (secs)	Sets the number of seconds after issuing the Generator Start signal when the 2nd Delayed Start signal is activated.
Gen Start Time > hh:mm	Sets the Start Time condition at which time the Generator Start Signal is activated.
Gen Stop Time > hh:mm	Sets the Stop Time condition at which time the Generator Stop Signal become inactive. **Note:** Setting both the Generator Start Time and the Generator Stop time to the same time, or to 00:00, disables this function.
Generator S.O.C Start %	Sets the Battery State of Charge condition at which the Generator Start Signal will activate.
Generator S.O.C Stop %	Sets the Battery State of Charge condition at which the Generator Stop Signal will become inactive. Note: A 10% hysteresis should be used between the SOC Start & SOC Stop settings. In any case, this condition is disabled if both settings are identical, or 0%.
Temperature Start +/-°C	Sets the Temperature Start condition temperature at which the Generator Start Signal will activate.
Temperature Stop +/-°C	Sets the Temperature Stop condition temperature at which the Generator Start Signal will become inactive to stop the Generator. Note: This condition is disabled if both settings are identical, or are 0°C.

SETTINGS

Change Date DD/MM/YY	Sets the Date.
Change Time hh:mm:ss	Sets the Time.
Installation Date dd/mm/yy	Installers should set this date at installation for reference purposes only.
Installer's Name	The Reseller or Installer can enter their details here for reference purposes.
Contact Number	This is a free text field in which the installer can enter their contact number.
Note:	This text can only be entered using the IMARK Site Explorer.
Serial Number	This field sets the regulator serial number. This field can only be set at the factory during production.
Collect Regulator Log	Selecting “Y” in this field instructs the regulator to save the logged data onto the storage media. This requires the storage media is already inserted into either the USB or SD Card port on the regulator. No logged data will be save if “N” has been selected
Ground Fault Interrupt	Selecting “Y” enables the Ground Fault Circuit and Alarm. Selecting “N” will disable this circuit.
Modify 1	It is necessary to press the brown ‘**Modify x**’ button to save any changed settings. This requires a valid password to be entered in the password field at the top of this page. If a valid password has not been entered, it will be necessary to go to the password field and enter a valid password. It will then be necessary to click on the ‘Modify x’ field to save the changed settings. Screen prompts will appear on the page during this process to ensure that inadvertent setting changes cannot occur. **Note**: Pressing the **Modify x** button ONLY changes the settings for the nominated regulator. It is necessary to press the **Modify x** button for all regulators that you wish to change.

9.3 STATUS PAGE

The status page shows information and operating parameters for all regulators in the system. The top heading line advises the date, time, and LCD Software version number, while the second header line advises the System PV Input and System Load as totals for all regulators, as well as the current operating condition of the system.
The rest of the page shows the operating parameters for all regulators grouped under the major headings.



Date	25/05/2017	Time	11:03:24	LCD Software Version	1.5.0.C7
System PV Input Watts	93	System Load Watts	0	Summary	OK

REGULATOR #	1	2	3	4	5	6	7	8
Regulator Model #	SRX40		SRX20					
Serial #	143533006		133269001					
Regulator Software Version	2.0.0		2.0.0					
Date d/m/y Time h:m:s	25/5/17 11:9:2		25/5/17 11:2:59					
Operational Status:	ACTIVE		ACTIVE					
Daily Reg Output Watt Hrs	8		27					
Total Reg Output kWh	44		31					
Heatsink Temperature °C	32.4		33.2					
Ambient Temperature °C	26.8		24.1					
Warnings Present	0		0					
Errors Present	0		0					
PHOTOVOLTAIC INPUT								
PV Input Voltage	0.3		102.2					
PV Input Watts	0		92					
PV Input Amperes	0.0		0.9					
Daily PV Input Watt Hours	5.0		36.0					
Total PV Input kWh	61.0		31.0					
Total PV Input Time Hours	206.0		107.0					
BATTERY								

Note: The readings displayed in the fields on the Status Page are actual instantaneous readings, as at the time the data is refreshed. The column will momentarily change to **RED** while the readings are being updated. The columns are updated sequentially at about 15 second intervals.

Specific details are as follows:

REGULATOR

Regulator Model	States the actual regulator model number.
Serial #	Shows the serial number of the regulator assembly.
Regulator Software Version	Shows the software version of the regulator. This will be different to the software version of the LCD display.
Date d/m/y Time h:m:s	Shows the current date and time used by the solar regulator. Bear in mind that the regulator may be in a different time zone.
Operational Status:	Shows the current operating state of the particular regulator.
Daily Reg Output Watt Hrs	Shows the total WattHours of energy output produced by a regulator since midnight. (This would approximately equal the Load WHrs plus the Battery Charge WHrs).
Total Reg Output kWh	Shows the total WattHours of energy output produced by the regulator since installation.
Heatsink Temperature °C	Shows the internal temperature of the heatsink.

Ambient Temperature °C	Shows the ambient Temperature at the site (assuming the optional temperature sensor has been fitted).
Warnings Present	Shows the number of active Warnings. Cleared warnings are not included. The regulator continues to operate when Warnings are active.
Errors Present	Shows the number of active Errors. The regulator will NOT be operating if Errors are active.

PHOTOVOLTAIC INPUT

PV Input Voltage	Shows the voltage being presented to the regulator by the PV Panels at the time stated above.
PV Input Watts	Shows the power being produced from the solar panels at the above time.
PV Input Amperes	Shows the current being drawn from the PV panels at the above time.
Daily PV Input Watt Hours	Shows the PV Input WattHours produced by the PV panels since midnight.
Total PV Input kWh	Shows the PV Input WattHours produced by the PV panels since installation.
Total PV Input Time Hours	Shows the Total Time that the PV Panels have been producing input power. Note: Inputs of less than 1 Amp are ignored.

BATTERY

Battery Charge Status	Shows the charging status of the battery.
Battery SOC %	Shows the Battery State of Charge (SOC) in 10% increments.
Battery Voltage (Actual)	Shows the actual Battery Voltage. (This is NOT the nominal battery voltage).
Battery Temperature °C	Shows the temperature of the battery bank as reported from the battery temperature sensor.
Battery Charge Amps	Shows the charge rate in Amperes at the above time.
Total Charge AmpHrs	Shows the Total Charge AmpHours since installation.
Total Charge Time Hrs	Shows the Total Charge Time for the Battery Bank since installation. Note: Inputs of less than 1 Amp are ignored.
Days Since Last Equalise	Shows the number of days since the battery bank last received an Equalise Charge.

LOAD

Present Load Power Watts	Shows the present Load Power in Watts being drawn by the equipment connected to the Load terminal.
Present Load Voltage	Shows the present Voltage being presented at the Load terminals.
Present Load Current	Shows the present Current in Amperes being drawn by the equipment connected to the Load terminal.
Daily Load Power Watt Hrs	Shows the power in WattHours that has been drawn from the regulator by the Load equipment since midnight.
Total Load Power kWhrs	Shows the power in KiloWattHours that has been drawn from the regulator by the Load equipment since installation.
Timer Condition	Shows the state of the Load Timer condition from NONE, STANDBY, or ACTIVE.
Battery SOC Condition	Shows the state of the Battery SOC condition from NONE, STANDBY, or ACTIVE.
Temperature Condition	Shows the state of the Ambient Temperature condition from NONE, STANDBY, or ACTIVE.
Cycle Condition	Shows the state of the Cycle Period condition from NONE, STANDBY, or ACTIVE.
LoBatVlt Load Discnt Cndn	Shows the state of the Low Battery Voltage Load Release condition where NONE = Not enabled, STANDBY = Enabled but not valid, and ACTIVE = Enabled and valid.
Total Load Time Hours	Shows the time in hours that the regulator has been supplying power from the Load Terminal. Loads of less than 1.0 Amps are not included.

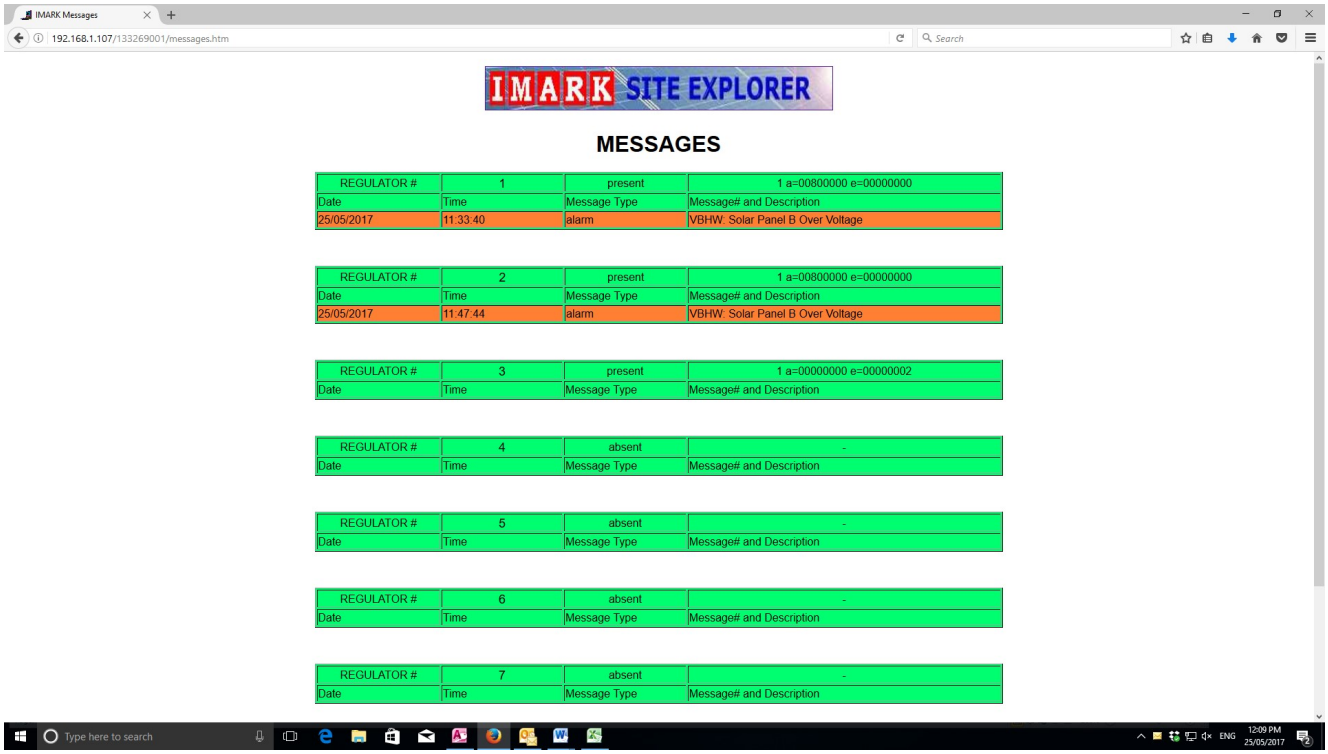
REMOTE OUT SIGNAL

Remote Output State	Shows the state of the Remote Output Signal terminal where OFF = Open Circuit, and ON = Closed Circuit
Timer Condition	Shows the state of the Timer Condition where NONE = No conditions set, STANDBY = Conditions are set but not met, and ACTIVE = Conditions set and valid.
Battery SOC Condition	Shows the state of the S.O.C. Condition where NONE = No conditions set, STANDBY = Conditions are set but not met, and ACTIVE = Conditions set and valid.
Temperature Condition	Shows the state of the Temperature Condition where NONE = No conditions set, STANDBY = Conditions are set but not met, and ACTIVE = Conditions set and valid.
Cycle Condition	Shows the state of the Cycle Condition where NONE = No conditions set, STANDBY = Conditions are set but not met, and ACTIVE = Conditions set and valid.
Remote Out Run Time Hrs	Shows the total hours that the Remote Output Signal terminal has been in the ON state since installation.

Note: The Remote Output Signal applies to the whole regulator. Accordingly, Powerboard A (#1) and Powerboard B (#2) will show identical information.

9.4 MESSAGES PAGE

The Message Page shows all active Messages for all regulators. Messages will automatically clear after a few seconds whenever the issue causing the message is rectified. e.g. A Low Battery Voltage may be present at daybreak, but will clear itself after a period of solar input has raised the battery voltage.
Messages are colour coded to indicate how critical a message may be. A YELLOW background message is generally a WARNING ONLY and the regulator is operating normally, while an ORANGE coloured message is an ALARM with some part of the regulator not operating normally and may correct itself without any human intervention. However, RED coloured messages are SHUTDOWN messages and indicate conditions that will NOT self-correct and will require human intervention to rectify the problem.



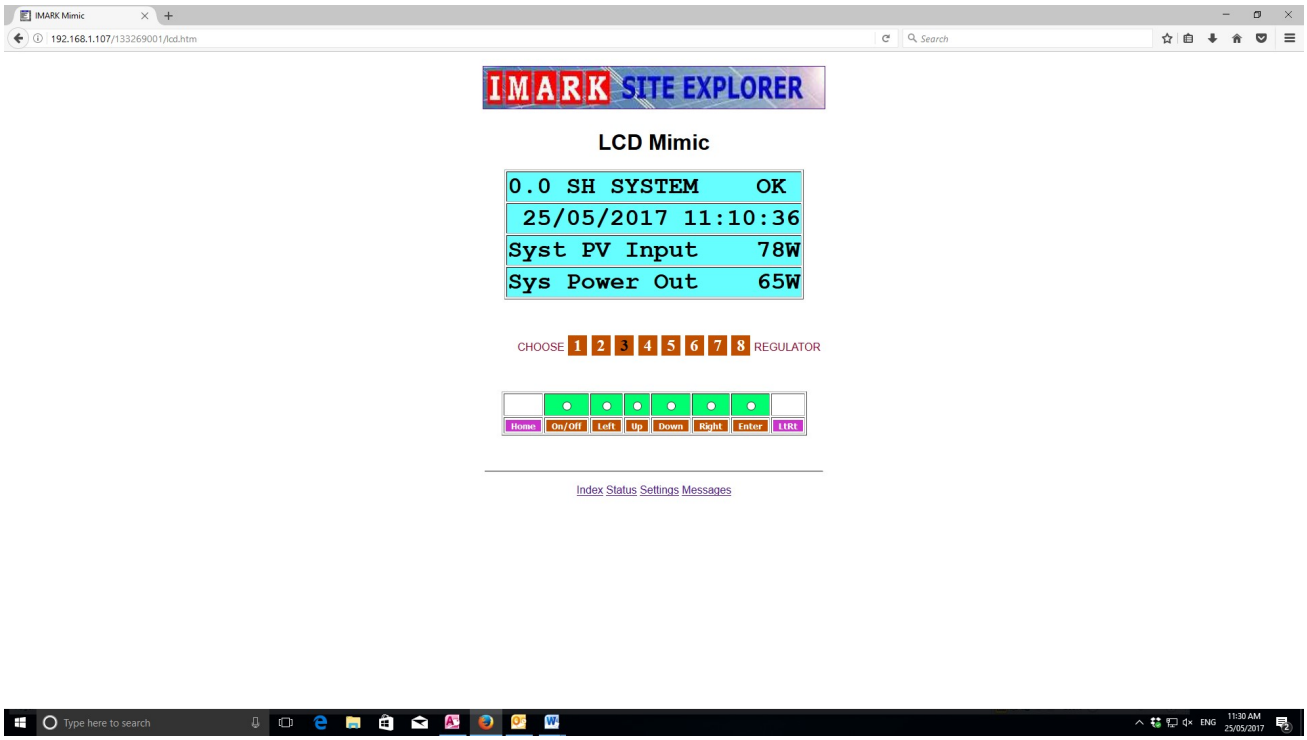
This list on the following page shows the messages that may be displayed, and includes the message flag, message description, and a brief explanation of the message.
Not all messages are supported by all models.

Flag	Message Description	Explanation
OT_AMB	Ambient Temperature	The ambient temperature at the site has exceeded 50°C
HT_HTS	Heatsink High Temperature Warning	The regulator's heatsink temperature has exceeded the internal temperature warning setting and the regulator's current rating has been reduced accordingly.
IBMAX	Battery Charge Current too High	The charge current to the battery is more than the maximum charge current rating of the regulator
OV_OUT	Over Battery Voltage	The PWM Power Voltage has exceeded the expected battery voltage.
ILDMAX	Load Maximum Current	The Load Current has exceeded the regulator's Load current setting in screen 4.2. Switching the regulator OFF, then ON, after removing the excessive load, is required to restart normal operation.

Flag	Message Description	Explanation
OT_HTS	Heatsink Over Temperature	The regulator's heatsink temperature has exceeded the internal maximum temperature setting and the regulator has shutdown
BAT_LSOC	Battery Load S.O.C. Stop	The battery S.O.C. is less than the SOC STOP setting in screen 4.4, and has disconnected the Load terminals.
VBAT_LO	Battery Low Voltage	Not Used
VBHW	Battery High Voltage Warning	This is a Warning and indicates that the battery voltage is higher than the high warning voltage set in screen 3.3.
VBLW	Battery Low Voltage Warning	This is a Warning and indicates that the battery voltage is lower than the low warning voltage set in screen 3.3.
GFW	Ground Fault Warning	This function has not been implemented
BLO_SOC	Battery Low S.O.C.	This is a Warning and indicates that the battery State of Charge is lower than the low State of Charge warning setting in screen 3.7.
VBHS	Battery Volts High Stop	The battery voltage has exceeded the High Voltage Stop setting in Screen 3.4, and the regulator has stopped charging the battery. A setting of 0 will disable this function.
VBLS	Battery Volts Low Stop	The battery voltage is less than the Low Voltage Stop setting in Screen 3.4, and the regulator has stopped charging the battery, and has also stopped supplying power to the Load terminals. A setting of 0 will disable this function.
OT_BATW	High Battery Temperature Warning	Indicates that the battery temperature has exceeded the internal battery warning temperature setting of 50°C.
SUR_NG	Surge Protection Failure	The Surge Fuse on the terminal Pcb assembly has failed.
BV_UL	Battery Voltage too low for Operation	The Storage Battery voltage is too low to support the internal Power Supply and the regulator has ceased operating.
IP_MAX	Solar Input Over Current	Indicates that the PV input current has exceeded the internal maximum input setting and that the regulator has restricted the PV Input.
OV_PV	Solar Input Over Voltage	Indicates that the PV Input Voltage has exceeded the regulator's rating and stopped charging the battery, but is still supplying the Load power.
VSBAT_E	Battery Voltage Error	Not Used
OV_BAT	Battery Over Voltage	Indicates that the battery voltage has exceeded the internal battery maximum voltage setting and the regulator has ceased operating.
OT_BAT	Battery Temperature Stop	Indicates that the battery temperature has exceeded the maximum battery temperature set in Screen 3.4, and has ceased charging.
IBPK	Over Peak Battery Current	Indicates that the peak battery current has exceeded the regulator's internal peak current rating and the regulator has ceased operating.
ADC_NG	Analogue to Digital Converter Failure	Indicates that an internal ADC error has occurred and that the regulator has ceased operating.
PSD_D	Internal Regulator Failure	Not used
EE_NG	EEPROM Failure	Indicates a bad EEPROM read, and that the regulator is operating using the default value settings
GFSH	Ground Fault Shutdown	Indicates that the regulator has stopped operating due to a ground fault existing in the installation. This function can be disabled in Screen 1.7.
START_FAIL	Intitial Diagnostics Check Failure	Indicates that the regulator has stopped operating due to an internal diagnostics error on start-up.
PC_NG	Power Channel Failure	Indicates that the regulator has stopped operating due to a failure of the internal power channel.
HW_FAIL	Hardware Failure Error	Indicates a hardware failure
IBLIM	Battery Current Limit	Not Used.
IBMIN	Battery Current Minimum	Not Used
VPV_LO	Low Voltage PV	Not Used
BU_OF nn	PV Input Operating Mode	Where nn indicates the following: 1 = Powerboard A ON 2 = Powerboard A OFF 3 = Powerboard B ON 4 = Powerboard B OFF 10 = Channel A PV Volts ON during Power-Up 11 = Channel B PV Volts ON during Power-Up
TBHS	Battery Temp High Stop	The battery temperature has exceeded the High Temperature Stop setting in Screen 3.4, and the regulator has stopped charging the battery. A setting of 0.0 will disable this function.

9.5 MIMIC PAGE

Mimic Pages are an exact replication of the 4 x 20 LCD display at the site excepting the eight numbered buttons in the middle of the screen. This permits remote monitoring of settings and could be helpful should engineers wish to assist technicians when on site commissioning a regulator.
Changes CANNOT be made using the Mimic Screens.



The screen is self-explanatory. However, it is necessary to select the regulator being monitored. This is achieved by clicking on the appropriate numbered button in the middle of the screen. Navigation around the various screens is achieved by clicking on the Left, Up, Down, or Right buttons in the same manner that would be used pressing the actual buttons on the front of the actual regulator. Clicking on the “Home” is the same as pressing the UpDn buttons simultaneously on the regulator, and will return to the HOME screen (Screen 0.0).
If you click on a regulator # that is NOT installed, the data fields mostly return “0” values.

LCD WATCHDOG RESET

It is possible to remotely reset the LCD display part of the IMARK Solar Regulator should it “lock-up” for any reason.
This can be done by entering a valid password in the vacant box to the right of “Index Status, Settings, Messages” on the lower part of the MIMIC screen, and then clicking on the “On/Off” button in the buttons row of the screen.

9.6 DOWNLOAD DATA PAGE

Downloading data can only be done from the Index page. Highlight the required fields and the press the 'Download' button. This will automatically download the specified data, open Microsoft Excel, and place the data in the various cells. Users may have to format the page to their liking. Once the data is in the Excel page, it can be used to create charts or manipulated as the user chooses.

NOTE: Turn OFF "Collect Reg n Log" (Screen 8.2) before inserting the memory storage device. Turn ON "Collect Reg n Log" (Screen 8.2) after inserting the memory storage device.

Always ensure that the Regulator Date and Time are correct before inserting the Memory Storage device.

When downloading the data, it is necessary to activate one field in each dropdown box. These fields specify the following:

Period:

where the fields have the following meanings:

'live'	gets the actual real-time data directly from the regulator. This is probably only useful to users using devices such as the 'Cellvisor' to gather real-time data, for display on live monitoring stations or help-desks, or to process and forward messages to maintenance personnel.
'day'	gets the historical data for the previous 24 hours from the data stored on the SD Card (or Memory stick). Users should note that this data is historical data and may be up to 30 minutes old.
'week'	gets the historical data for the previous week from the data stored on the SD Card (or Memory stick).
'month'	gets the historical data for the previous month from the data stored on the SD Card (or Memory stick).
'quarter'	gets the historical data for the previous three months from the data stored on the SD Card (or Memory stick).
'year'	gets the historical data for the previous year from the data stored on the SD Card (or Memory stick).
'decade'	gets the historical data for the previous 10 years from the data stored on the SD Card (or Memory stick).
'all'	gets all the historical data since the regulator was installed from the data stored on the SD Card (or Memory stick). This assumes an SD Card or USB memory stick has been installed at all times.

Note 1: It is unlikely that any data will be lost if the storage device is removed for a short period (say, 10 minutes). However, if it is removed for a period of, say, one month, then the data for that month will be lost.

Note 2: A standard 2GB SD Card will have the ability to store the data from up to 8 regulators for about 100 years.

Regulator:

Where

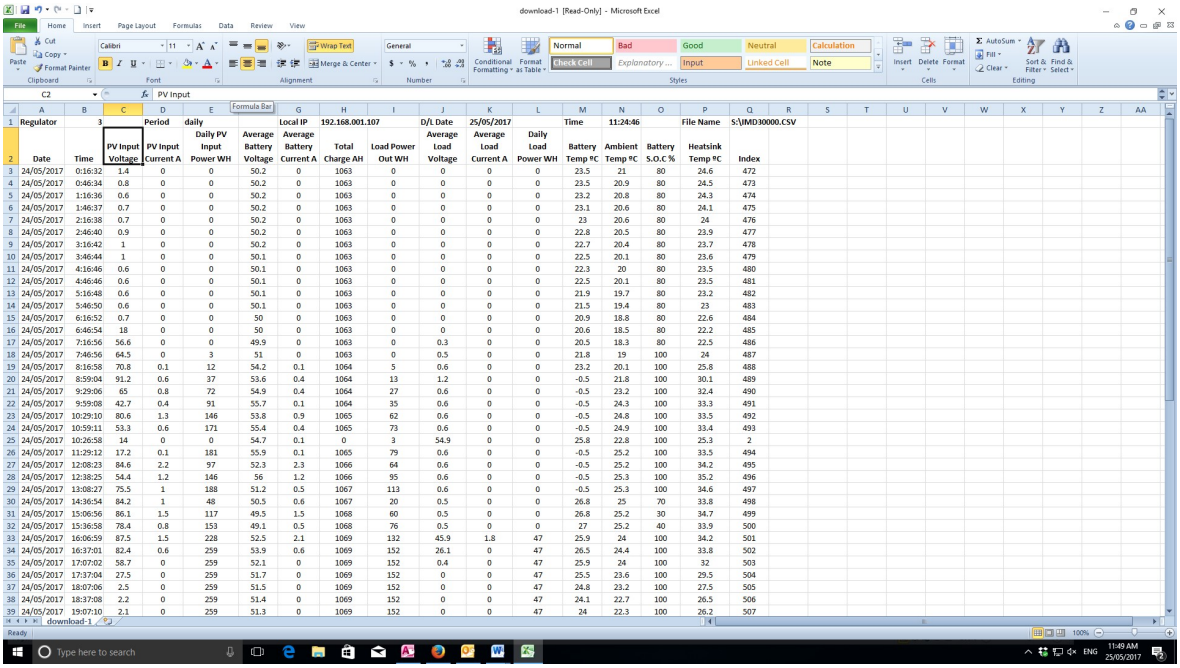
'default'	will select the lowest regulator, or the only regulator in cases where the identity of a regulator is not known .
'reg1'	will select the data from regulator #1 only.
'reg2'	will select the data from regulator #2 only.

etc, etc.

Category:
where
'regular half hour logged data' gets the logged data,
or
'warnings, alarms, & events' gets the events for the specified time period.

Downloaded Logged Data

The top row of the Excel page shows the Regulator #, the time period that the data relates to, the IP Address of the regulator site, and the date of the download.
The second row displays the headings for the data columns.
The screen shown below has had the headings formatted for clarity.



Regulator	1	Period	daily	Local IP	192.168.001.107	D/L Date	25/05/2017	Time	11:24:46	File Name	S:\IMD30000.CSV

Date	Time	PV Input Voltage	PV Input Current A	Daily PV Input Power WH	Average Battery Voltage	Average Battery Current A	Total Charge AH	Load Power Out WH	Average Load Voltage	Average Load Current A	Daily Load Power WH	Battery Temp °C	Ambient Temp °C	Battery S.O.C %	Heatsink Temp °C	Index
24/05/2017	0:16:32	1.4	0	0	50.2	0	1063	0	0	0	0	23.5	21	80	24.6	472
24/05/2017	0:46:34	0.8	0	0	50.2	0	1063	0	0	0	0	23.5	20.9	80	24.5	473
24/05/2017	1:16:36	0.6	0	0	50.2	0	1063	0	0	0	0	23.2	20.8	80	24.3	474
24/05/2017	1:46:37	0.7	0	0	50.2	0	1063	0	0	0	0	23.1	20.6	80	24.1	475
24/05/2017	2:16:38	0.7	0	0	50.2	0	1063	0	0	0	0	23	20.6	80	24	476
24/05/2017	2:46:40	0.9	0	0	50.2	0	1063	0	0	0	0	22.8	20.5	80	23.9	477
24/05/2017	3:16:42	1	0	0	50.2	0	1063	0	0	0	0	22.7	20.4	80	23.7	478
24/05/2017	3:46:44	1	0	0	50.1	0	1063	0	0	0	0	22.5	20.1	80	23.6	479
24/05/2017	4:16:46	0.6	0	0	50.1	0	1063	0	0	0	0	22.3	20	80	23.5	480
24/05/2017	4:46:46	0.6	0	0	50.1	0	1063	0	0	0	0	22.5	20.1	80	23.5	481
24/05/2017	5:16:48	0.6	0	0	50.1	0	1063	0	0	0	0	21.9	19.7	80	23.2	482
24/05/2017	5:46:50	0.6	0	0	50.1	0	1063	0	0	0	0	21.5	19.4	80	23	483
24/05/2017	6:16:52	0.7	0	0	50	0	1063	0	0	0	0	20.9	18.8	80	22.6	484
24/05/2017	6:46:54	18	0	0	50	0	1063	0	0	0	0	20.6	18.5	80	22.2	485
24/05/2017	7:16:56	56.6	0	0	49.9	0	1063	0	0.3	0	0	20.5	18.3	80	22.5	486
24/05/2017	7:46:56	64.5	0	3	51	0	1063	0	0.5	0	0	21.8	19	100	24	487
24/05/2017	8:16:58	70.8	0.1	12	54.2	0.1	1064	5	0.6	0	0	23.2	20.1	100	25.8	488
24/05/2017	8:59:04	91.2	0.6	37	53.6	0.4	1064	13	1.2	0	0	-0.5	21.8	100	30.1	489
24/05/2017	9:29:06	65	0.8	72	54.9	0.4	1064	27	0.6	0	0	-0.5	23.2	100	32.4	490
24/05/2017	9:59:08	42.7	0.4	91	55.7	0.1	1064	35	0.6	0	0	-0.5	24.3	100	33.3	491
24/05/2017	10:29:10	80.6	1.3	146	53.8	0.9	1065	62	0.6	0	0	-0.5	24.8	100	33.5	492
24/05/2017	10:59:11	53.3	0.6	171	55.4	0.4	1065	73	0.6	0	0	-0.5	24.9	100	33.4	493
24/05/2017	10:26:58	14	0	0	54.7	0.1	0	3	54.9	0	0	25.8	22.8	100	25.3	2
24/05/2017	11:29:12	17.2	0.1	181	55.9	0.1	1065	79	0.6	0	0	-0.5	25.2	100	33.5	494
24/05/2017	12:08:23	84.6	2.2	97	52.3	2.3	1066	64	0.6	0	0	-0.5	25.2	100	34.2	495
24/05/2017	12:38:25	54.4	1.2	146	56	1.2	1066	95	0.6	0	0	-0.5	25.3	100	35.2	496
24/05/2017	13:08:27	75.5	1	188	51.2	0.5	1067	113	0.6	0	0	-0.5	25.3	100	34.6	497
24/05/2017	14:36:54	84.2	1	48	50.5	0.6	1067	20	0.5	0	0	26.8	25	70	33.8	498
24/05/2017	15:06:56	86.1	1.5	117	49.5	1.5	1068	60	0.5	0	0	26.8	25.2	30	34.7	499
24/05/2017	15:36:58	78.4	0.8	153	49.1	0.5	1068	76	0.5	0	0	27	25.2	40	33.9	500
24/05/2017	16:06:59	87.5	1.5	228	52.5	2.1	1069	132	45.9	1.8	47	25.9	24	100	34.2	501
24/05/2017	16:37:01	82.4	0.6	259	53.9	0.6	1069	152	26.1	0	47	26.5	24.4	100	33.8	502
24/05/2017	17:07:02	58.7	0	259	52.1	0	1069	152	0.4	0	47	25.9	24	100	32	503
24/05/2017	17:37:04	27.5	0	259	51.7	0	1069	152	0	0	47	25.5	23.6	100	29.5	504
24/05/2017	18:07:06	2.5	0	259	51.5	0	1069	152	0	0	47	24.8	23.2	100	27.5	505
24/05/2017	18:37:08	2.2	0	259	51.4	0	1069	152	0	0	47	24.1	22.7	100	26.5	506
24/05/2017	19:07:10	2.1	0	259	51.3	0	1069	152	0	0	47	24	22.3	100	26.2	507

Heading Explanation

Note: Some column headings for "day", "week", "month", "quarter", "year", "decade", & "all" show readings that are averaged over 30 minutes, while the downloaded data for the "live" period" are actual instant readings.

The following table provides a more detailed explanation of the information included in the page heading and in each column.

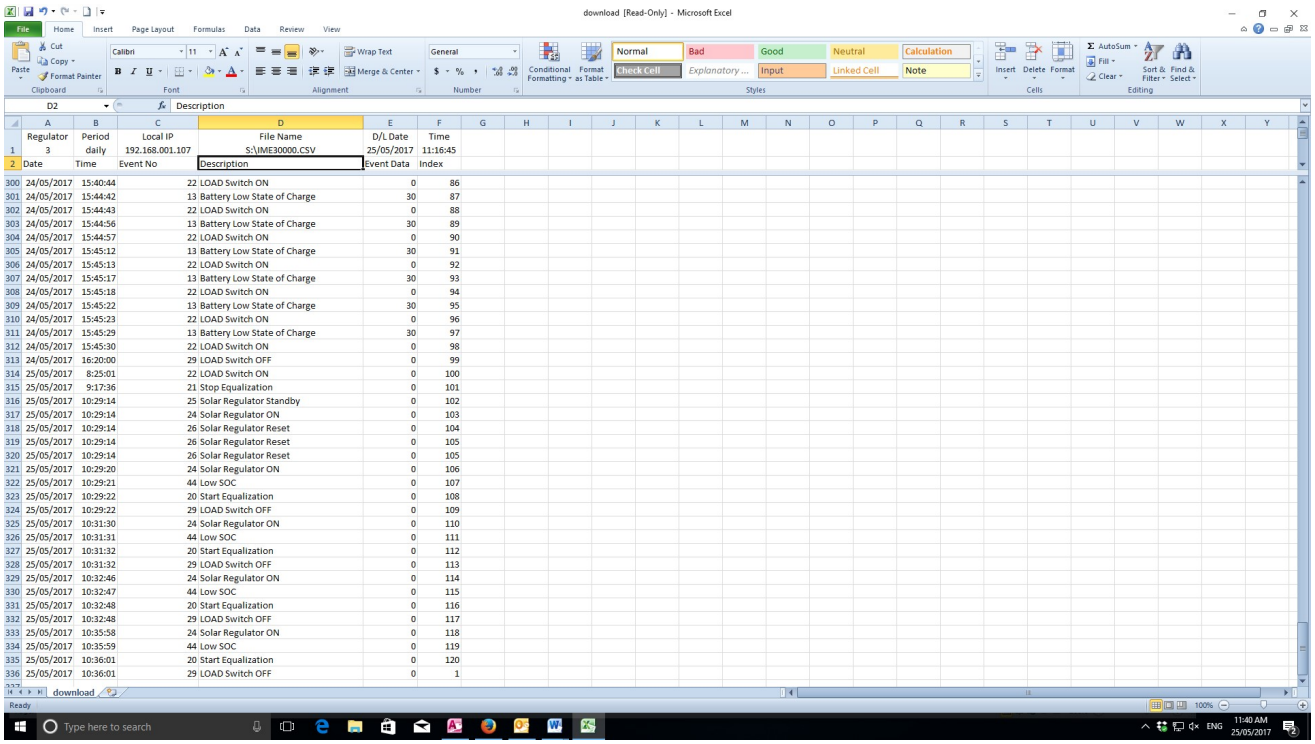
Regulator 1	This indicates that this data has been retrieved from Regulator #1. Where more than one regulator is included in a system, the regulator # can be any number from 1 – 8.
Local IP	When the data is downloaded via the internet, the Local IP Address will be shown. 000.000.000.000 will be shown when the data is retrieved directly from a USB or SD Card storage device.

Download Date & Time	Created Date indicates the date and time that the regulator was instructed (through screen # 8.2) to record the performance data.
File Name	File Name indicates the Directory, Folder, and File Name for that set of data. “U:/“ indicates that the data has been retrieved from a USB storage device, while “S:/” indicates that the data has been retrieved from an SD Card storage device.
Date & Time	The data will be recorded at about 30 minute intervals, and the two LH columns will show the date and time of each data recording.
Average PV Input Voltage	This shows the PV Input Voltage (in Volts dc) at the input terminals to the solar regulator averaged over the previous 30 minutes. This voltage will be influenced by the time of day, and the regulators’ operating mode. e.g. When the regulator is in Bulk Charge Mode, the MPPT function will be operating and the PV Input Voltage will approximately indicate the MPPT voltage of the PV string allowing for haze, dust, cloud cover, and panel inclination. However, when the battery bank is fully charged, the PV Input Voltage will move towards the Voc of the PV string, and at night, the PV Input Voltage will be approx 0 Volts.
Average PV Input Current A	PV Input Current shows the amperage of the input current at the PV Input Voltage terminals averaged over the previous 30 minutes, and again will be influenced by the operating mode of the solar regulator as well as the battery bank voltage.
Daily PV Input Power WH	Daily PV Input Power shows the input power from the PV panels since midnight in WattHours. This is a cumulative figure and resets to 0 at midnight every day. Disconnecting the PV Input during the day (e.g. opening the PV Circuit Breaker), pressing the RESET button, and/or switching the regulator OFF, then ON, (as well as midnight) will cause the regulator to reset this reading to 0.
Average Battery Voltage V	Battery Voltage V shows the battery voltage presented at the regulator’s battery terminals averaged over the 30 minutes prior to the stated day and time.
Average Battery Current A	Battery Current A shows the average current for the 30 minutes, prior to the date & time shown, in amperes being fed to both the Battery and Load output terminals.
Total Charge AH	Total Charge AH shows the total charge in AmpereHours that has been supplied to both the Battery Bank and Load output since installation.
Daily Output Power WH	Load Power Out shows the power produced by the regulator and includes the power supplied to the load terminals plus the power supplied to the battery terminal less the power taken from the battery terminals in WattHours since midnight. This figure resets to 0 at midnight each day.
Average Load Voltage	Average Load Voltage V shows the voltage, at the load terminals averaged over the previous 30 minutes, being supplied to the load on the load terminals.
Average Load Current A	Average Load Current A shows the current in Amperes at the load terminals, averaged over the previous 30 minutes, being drawn by the load at the time the data was recorded.
Daily Load Output Power WH	Daily Load Power W shows the amount of power consumed by the load. This is a cumulative figure since midnight recorded in WattHours. This figure is reset at midnight.

Battery Temp °C	Battery Temp °C shows the battery temperature in degrees Celsius at the time the data was recorded. An erroneous reading would probably indicate that the temperature sensor wiring is reverse polarised, while a constant reading of approx –1.5°C would indicate that the temperature sensor is not fitted or has failed. This temperature is used to calculate the temperature compensation used when charging the batteries set through Screen # 3.2.
Ambient Temp °C	Ambient Temp °C shows the Ambient temperature in degrees Celsius at the time the data was recorded. An erroneous reading would probably indicate that the temperature sensor wiring is reverse polarised, while a constant reading of approx –1.5°C would indicate that the temperature sensor is not fitted or has failed. This temperature is used for the "temperature condition" that can be applied to the Load Output in Screen # 4.5 and/or to the Remote Output signal terminal set through Screen # 5.5.
Battery S.O.C. %	Battery S.O.C. % shows the estimated State of Charge of the battery bank. This SOC % is based on the voltage of the battery, the type of battery, and the charge/discharge current..
Heatsink Temp °C	Heatsink Temp °C shows the temperature of the regulator's heatsink (recorded near the PWM MOSFET's. This temperature reading is used internally by the regulator to reduce the current being supplied by the regulator at elevated temperatures.
Index	Index is a control number that will increment by 1 each time the data is recorded. A missing number would indicate that the data recording at the expected time interval was missed for an unknown reason.

Downloaded Event Data

The top row of the Excel page shows the Regulator #, the period covered by the download (e.g. Month, week, day, etc), the IP Address of the regulator site, the events fine name, the date & time of the download.
The second row displays the headings for the data columns, and includes the date and time of the event, the event number, a brief description of the event, the event data, and the index control number.
Note 1: The 'Index' control numbers should be consecutive. Thus, a missing 'Index' number would indicate that a particular event has not been recorded.
Note 2: Downloading of "LIVE" events is NOT supported as taking instantaneous readings of events is not practicable.



Regulator	Period	Local IP	File Name	D/L Date	Time
3	daily	192.168.001.107	S:\IME30000.CSV	25/05/2017	11:16:45

Date	Time	Event No	Description	Event Data	Index
24/05/2017	15:40:44	22	LOAD Switch ON	0	86
24/05/2017	15:44:42	13	Battery Low State of Charge	30	87
24/05/2017	15:44:43	22	LOAD Switch ON	0	88
24/05/2017	15:44:56	13	Battery Low State of Charge	30	89
24/05/2017	15:44:57	22	LOAD Switch ON	0	90
24/05/2017	15:45:12	13	Battery Low State of Charge	30	91
24/05/2017	15:45:13	22	LOAD Switch ON	0	92
24/05/2017	15:45:17	13	Battery Low State of Charge	30	93
24/05/2017	15:45:18	22	LOAD Switch ON	0	94
24/05/2017	15:45:22	13	Battery Low State of Charge	30	95
24/05/2017	15:45:23	22	LOAD Switch ON	0	96
24/05/2017	15:45:29	13	Battery Low State of Charge	30	97
24/05/2017	15:45:30	22	LOAD Switch ON	0	98
24/05/2017	16:20:00	29	LOAD Switch OFF	0	99
25/05/2017	8:25:01	22	LOAD Switch ON	0	100
25/05/2017	9:17:36	21	Stop Equalization	0	101
25/05/2017	10:29:14	25	Solar Regulator Standby	0	102
25/05/2017	10:29:14	24	Solar Regulator ON	0	103
25/05/2017	10:29:14	26	Solar Regulator Reset	0	104
25/05/2017	10:29:14	26	Solar Regulator Reset	0	105
25/05/2017	10:29:14	26	Solar Regulator Reset	0	105
25/05/2017	10:29:20	24	Solar Regulator ON	0	106
25/05/2017	10:29:21	44	Low SOC	0	107
25/05/2017	10:29:22	20	Start Equalization	0	108
25/05/2017	10:29:22	29	LOAD Switch OFF	0	109
25/05/2017	10:31:30	24	Solar Regulator ON	0	110
25/05/2017	10:31:31	44	Low SOC	0	111
25/05/2017	10:31:32	20	Start Equalization	0	112
25/05/2017	10:31:32	29	LOAD Switch OFF	0	113
25/05/2017	10:32:46	24	Solar Regulator ON	0	114
25/05/2017	10:32:47	44	Low SOC	0	115
25/05/2017	10:32:48	20	Start Equalization	0	116
25/05/2017	10:32:48	29	LOAD Switch OFF	0	117
25/05/2017	10:35:58	24	Solar Regulator ON	0	118
25/05/2017	10:35:59	44	Low SOC	0	119
25/05/2017	10:36:01	20	Start Equalization	0	120
25/05/2017	10:36:01	29	LOAD Switch OFF	0	1

The following table describes the events in more detail:

Note: Where Event Data is displayed, the value that relates to the event can be calculated by using the simple formula shown in the table below under "Event Data". The number in this column should replace the "nnn" in the formula shown.

Event #	Event Name	Event Data *	Event Description
1	Ambient Over Temperature	(nnn/7.75)-20°C = Temp °C	Warning activated if Ambient Temperature exceeds 50°C
2	Heatsink High Temperature	(nnn/7.75)-20°C = Temp °C	Warning activated if Heatsink Temperature exceeds 55°C. Regulator output de-rated from 55°C to 75°C.
3	Heatsink Over Temperature	(nnn/7.75)-20°C = Temp °C	Alarm activated if Heatsink Temperature exceeds 75°C. Regulator output stopped when Temperature exceeds 75°C. The cooling fans will activate at 45°C.

Event #	Event Name	Event Data	Event Description
4	PV Input Operating Mode	1 2 3 4 10 11	Power Channel A is ON (PWM active) Power Channel A is OFF (PWM in-active) Power Channel B is ON (PWM active) Power Channel B is OFF (PWM in-active) PV A Input ON when Battery is Open Circuit PV B Input ON when Battery is Open Circuit
5	Power Channel Failure		Hardware protection triggered Check if all other states are ok. If yes, re-start the unit again.
6	Failure during initial diagnostic check		Internal diagnostic failure during start up. Alarm activated, Battery switch opens, and regulator shuts down.
7	Hardware Failure		Not Implemented
8	ADC Failure		Activates when the internal 2.5V reference is out of range.
9	Battery Voltage Ultra Low (approx. 40% if nominal Voltage)	nnn/10.13 = Volts	Activates when the Battery Voltage is less than 20V (48V model) or 60V (120V model). The Battery switch opens, the regulator shuts down, and the alarm is activated
10	Solar Panel A Over Max Current	nnn/7.75 = Amps	Solar Input 1 current is greater than 25A on the PV1 Input. When/if the minimum PWM width is reached, the Battery current limit activates, the regulator shuts down, and the alarm activates when the if/when the Minimum PWM width is reached.
11	Solar Panel Over Voltage	nnn/10.13 = Volts	Activates when any PV input voltage exceeds 500V. Battery switch opens, regulator shuts down, and alarm activated if/when the minimum PWM width is reached.
12	Powerboard A Output Over Maximum Current	nnn/7.75 = Amps	Activates when output current from Powerboard A exceeds 52 Amps. When/if the minimum PWM width is reached, the Battery switch opens, the regulator shuts down, and the alarm is activated.
13	Battery Low State of Charge	nn%	Default = 25%. In **SR Models**, the default setting is 25%. This can be adjusted to 25%, 50% or 75% with the dip switch settings. Resets when SOC is 10% above the set limit, e.g. 25% + 10% = 35%. In **SRX models**, this can be set from 0 to 100% in 10% steps via LCD Screen # 3.7. Resets when the SOC reaches the Reconnect level as set in screen # 4.4. Load Switch opens when the SOC reaches the (lower) set level, and closes when the higher SOC setting is reached.
14	Battery Low Voltage	nnn/10.13 = Volts	Activates when the battery voltage is <20V in a 48V System or <50V in a 120V System.
15	Surge Protection Failure		Indicates that the MOV fuse ruptured
16	Battery Over Voltage	nnn/10.13 = Volts	Activates if the battery voltage is greater than 63V in 48V systems, and 157.5V in 120V systems for **more than 1 minute**. Activates **immediately** if the battery voltage exceeds 64V in 48V systems, and 160V in 120V systems. Whenever these conditions are met, the Battery switch opens, the Load switch opens, the Regulator shuts down, and the alarm displays,\.

Event #	Event Name	Event Data	Event Description
17	BAT Over Temperature	(nnn/7.75)-20°C = Temp °C	Activates when the Battery Temperature exceeds the High Temp Stop setting in Screen 3.4. This causes the Regulator to stop charging, and displays an alarm.
18	Output A Over Peak Current	nnn/7.75 = Amps	Activates when the battery output current from Powerboard A exceeds 60 Amps peak current. The Battery switch opens, the Regulator shuts down, and the alarm displays.
19	Load Max Current	nnn/7.75 = Amps	Activates when the LOAD current exceeds 10A at battery voltage in all SR/X 100 models. Load switch opens, and alarm displays.
20	Charge Mode	0 1 2 3 4	Night Mode Bulk Charge Mode Absorption Mode Float Mode Equalise Mode
21	Stop Equalization		Indicates that Equalise Charge ceased at the displayed date & time.
22	LOAD Switch ON		Indicates that the Load Switch closed at the displayed date & time.
23	Remote Output Switch ON		Indicates that the Remote Output Signal Switch closed at the displayed date & time.
24	Solar Regulator ON		Indicates that the solar regulator started at the displayed date & time. This may occur when the regulator powers up, or when the battery bank is connected.
25	Solar Regulator Standby		Indicates that the regulator is in Standby mode. This may occur if the regulator is turned OFF using the ON/OFF button, or via the Remote ON/OFF terminals on the 12 way accessory connector. (OFF if the pins # 9 & 10 are closed).
26	Solar Regulator Reset		Indicates that the Reset key on the regulator was pressed at the displayed date & time.
27	Solar Regulator Return from Standby		Indicates that the regulator has commenced normal operation after being in Standby mode.
28	EEPROM Failure		Displays when the regulator's microprocessor cannot read the EE_OK flag in the Regulators EEPROM.
29	LOAD Switch OFF		Indicates that the Load Switch opened at the displayed date & time.
30	Remote Output Switch OFF		Indicates that the Remote Output Signal Switch opened at the displayed date & time.
31	Solar Input A Over Voltage	nnn/10.13 = Volts	Solar input voltage is greater than 500V on the PV1 Input. Battery switch opens, regulator shuts down, and alarm activated
32	Solar Inpuy B Over Voltage	nnn/10.13 = Volts	Solar input voltage is greater than 500V on the PV2 Input. Battery switch opens, regulator shuts down, and alarm activated
33	Output B Peak Current	nnn/7.75 = Amps	The Battery Charge current from Channel B has exceeded 60 Amps peak
34	Solar Panel B over Max Current		Not Implemented. See Event #10
35	Output B Over Maximum Current		Not Implemented. See Event #12
36	Output A Current Limited	nnn/7.75 = Amps	The regulator has Limited the Charge Current output from Powerboard A to the Maximum Charge Limit set at Screen 3.3.

Event #	Event Name	Event Data	Event Description
37	Output B Current Limited	nnn/7.75 = Amps	The regulator has Limited the Charge Current output from Powerboard B to the Maximum Charge Limit set at Screen 3.3.
38	Output A Over Voltage	nnn/10.13 = Volts	The regulator has Shut Down due to an over-voltage event on the Battery Output
39	Output B Over Voltage	nnn/10.13 = Volts	The regulator has Shut Down due to an over-voltage event on the Battery Output
40	Output B Peak Current		Activates when the battery output current from Powerboard B exceeds 60 Amps peak current. Battery switch opens, Regulator shuts down, and alarm displays.
41	Ground Fault		Indicates that there is a Ground Fault within the system installation, and will require a technician to rectify the issue.
42	Generator On		The regulator has sent a signal to start the generator
43	Generator Off		The regulator has sent a signal to stop the generator
44	Low SOC		Indicates that the LOW SOC setting (set via Screen 3.7) has been exceeded.
45	Battery Voltage High Stop	nnn/10.13	The regulator has stopped charging the battery due to the battery voltage exceeding the Battery High Voltage Stop setting (set via Screen 3.4).
46	Battery Voltage Low Stop	nnn/10.13	The regulator has stopped charging the battery due to the battery voltage exceeding the Battery Low Voltage Stop setting (set via Screen 3.4).
47	Panel Voltage Limit A		The PV1 Input voltage has been limited at 500 Volts DC.
48	Panel Voltage Limit B		The PV2 Input voltage has been limited at 500 Volts DC.
49	Panel Current Limited A		The PV1 Input current has been limited at 25 Amps.
50	Panel Current Limited B		The PV2 Input current has been limited at 25 Amps.

Note: A “0” shown in the Event Data column indicates “Not Applicable”.

10.0 TECHNICAL SPECIFICATIONS

SPECIFICATIONS						
Model #	**SR100-24**	**SRX100-24**	**SR100-48**	**SRX100-48**	**SR100-120**	**SRX100-120**
PV Input Voltage Range	60 – 500Voc dc (Max)		120 - 500Voc dc (Max)		300 - 500Voc dc (Max)	
Nominal DC Battery Voltages	24 Volts dc (nominal)		48 Volts dc (nominal)		120 Volts dc (nominal)	
Battery Voltage Range	20 - 30.0Vdc		40 - 60.0Vdc		105 - 150.0Vdc	
Maximum PV Input (Total)	Based on Maximum Actual Battery Voltage x 100 Amps					
Maximum Charge Current	100 Amps (50 Amps per MPPT Powerboard)					
Regulator Operating Modes	OFF, Standby, Bulk Charge, Absorption Charge, Float Charge, & Equalize Charge					
Maximum Load Current	2 x 5 Amps combined for 10 Amps Total					
Load Voltages	Same as Battery Voltages					
Load Dis-Reconnect Voltages	Based on the settings for each regulator					
DC Load Voltage Regulation	Battery Voltage ±50 mVdc					
Status Display Method	6 x LED's	6 x LED's + 4x20 LCD	6 x LED's	6 x LED's + 4x20 LCD	6 x LED's	6 x LED's + 4x20 LCD
Historical Data Storage	N/A	USB & SD Card		USB & SD Card	N/A	USB & SD Card
Maximum Efficiency	Approx 95%					
Operating Temperature Range	0 °C to 50 °C					
Storage Temperature Range	-30 °C – +70 °C					
Pollution Degree	2				2	
Ingress Protection	IP20				IP20	
Maximum Altitude Rating	2,000 Metres				2,000 Metres	
Relative Humidity	0 - 95% non-condensing					
Low Battery Load Release Low Battery Load Re-Connect	0–60 Vdc adjustable 0–60 Vdc adjustable		0–60 Vdc adjustable 0–60 Vdc adjustable		0 – 150 Vdc adjustable 0 – 150 Vdc Adjustable	
Battery Drain in Standby Mode	50mW to 100mW (depending on Regulator and LCD states)					
Dimensions (excluding protrusions) and Weight	370W x 320H x 170D mm 20 Kgs (approx.)				375W x 430H x 170D mm 23 Kgs (approx.)	
Shipping Dimensions and Weight	450W x 540H x 280D mm 24 Kgs (approx.)				450W x 540H x 280D mm 29.5 Kgs (approx.)	
Safety Standards	IEC 62109:1, AS5033					
ERAC Registration	E4049					
Compliance Markings	N8					
STANDARD FEATURES						
Battery Protection	Load Output Disconnect or Re-Connect, & Charge Stop based on setup settings					
Battery Temperature Sensor	Included as standard with 5M Cable and bootlace terminals					
Battery Charger	Five stage battery charging regime (Night, Bulk, Absorption, Float, & Equalise)					
Remote Output Signal	Automatic selection based on S.O.C., Time, Temperature, & Period conditions					
Remote Output Signal	Voltage Free signal terminal to activate external equipment (OPEN/CLOSE) with 100mA max sink current x 2					
Inputs/Outputs	PV Inputs x 2 or 4, Battery + & Battery -, Load Output x 2 pairs,16 way for external device I/O, CANBus x 2, Ethernet, SD-Card, Keys x 6					
Cooling	Two internal DC Fans with operation controlled by the heatsink temperature					
Temperature De-rating	Output current is progressively reduced to 0 Amps from 60 °C to 80 °C.					
OPTIONS						
19" Rack Mounting Versions	Same Electrical Specifications as Wall Mount versions					
Rack Mounting Version Sizes	482W x 420D x 176H mm (excluding Protrusions)				482W x 475D x 176H mm excluding Protrusions	
Remote Control Unit (Optional)	In-built 4x20 back-lit alphanumeric liquid crystal display with 6 LED Status indicators, 6 keys, CANBus, RS232, RS485, & Ethernet connectors.					
Ambient Temperature Sensor	With 5M Cable and bootlace terminals					
SC Card (Optional)	Different capacity SD Storage Cards					
REMOTE LCD UNIT SPECIFICATIONS						
Imark Model #	RLCD					
Size	160mm (W) x 130mm (H) x 55mm (D) or 6¼" (W) x 5¼" (H) x 2¼" (D) excl. Protrusions					
Weight	1.3 Kgs (2.9 pounds)					
Shipping Dimensions	180 x 170 x 80 mm 1.4 Kgs					

ADDENDUM #1

Battery Fully Charged State (100% S.O.C. State)

This function can ONLY be applied with SRX model Regulators.

Some customers have requested a Battery Fully Charged (100% S.O.C.) signal for use when interfacing with some inverters. The Imark SRX Solar Regulators can provide this signal by making the following settings:

1. Under the Remote Output Signal settings (or using screen # 5.4),
   - Set the Battery S.O.C. Start setting to 100%
   - Set the Battery S.O.C. Stop setting to 100%

With these settings, the IRELAY signal pin on the Interface Terminal (pin 12 on Cn P4) will close the circuit to IGND for 5 seconds, when the battery becomes fully charged. See Clause 4.4

Note: The Imark SRX Solar Regulators will assume that the battery is fully charged (100% S.O.C.) when the regulator transitions from Absorbtion (or Equalise) Charge mode to Float Charge mode. Hence, the fully charged state of the battery may be influenced by the Absorb Time Hours setting, and also by the load current at that time. Thus, it is important that the various battery charge settings be set correctly.

ADDENDUM #2

Dual Timer settings for the Load Output Terminal

Some customers wish to have two Load Output Timer settings to activate lights (for example) for 1 or 2 hours before daylight in the morning and for 1 or 2 hours after dusk in the evening.

This can be achieved by making the following settings:

1. Use the Load Output settings (or screen 4.2 & 4.3) to activate the Load Output for the first timer.
   for example
   - set the Load Start Time as required e.g. 06:00
   - set the Load Stop Time as required e.g. 08:00
   - set the Load Timer Cycle DD as required e.g. 1

2. These settings will cause the Remote Output Start, and the Remote Output Stop settings to control a second Load Output timer.
   Under Remote Output Signal in settings (or using 5.n screens)
   - set the Battery S.O.C. Start setting to 100%
   - set the Battery S.O.C. Stop setting to 100%
   - set the Remote Start Time as required e.g. 18:00 (in screen 5.3)
   - set the Remote Stop Time as required e.g. 20:00 (in screen 5.3)
   - set the Exercise Cycle Days as required e.g. 1 (in screen 5.2)

In this example, the Load Output Voltage terminal will provide DC Voltage (12/24/48Vdc) from 6:00am to 8:00am in the mornings, and also from 6:00pm to 8:00pm in the evenings, on a daily basis.
Further, any set Battery S.O.C. conditions (screen 4.4) and any set Temperature conditions (screen 4.5) will also apply to these settings.

ADDENDUM #3

Using the Remote Output Signal to run a generator for battery charging purposes.

When using the **Remote Output Signal** to start and stop a generator for battery charging purposes (based on **Battery S.O.C.),** the generator's charging mechanism (Battery Charger, Inverter, alternator, etc) **MUST** have the charger leads connected directly to the terminals on the battery bank.
In this situation, the Solar Regulator cannot "see" the battery charging current, and may therefore assume that the battery is in the "rest" condition. In this situation, the battery S.O.C. calculations will indicate the battery is at 100% S.O.C. at a lower voltage than the actual 100% S.O.C. voltage (approx 6% above the nominal battery voltage), and will "de-activate" the Remote Output Signal prematurely, thereby switching the generator OFF, and ceasing to charge the battery bank. See Screen 5.4
By setting the **S.O.C. Stop** condition to 100% will cause the regulator to partly ignore the internal S.O.C. table, and will activate the Remote Output signal (start the generator) based on the S.O.C. Start condition, and de-activate the Remote Output Signal (Stop the generator) based on the **Absorb Voltage** setting **AND** the **Absorb Time**. (Screen 3.5). The Remote Output signal (on the 12way connector Pins 10 & 12) will de-activate as soon as the battery has been charged to the **Absorb Voltage** setting for the **Absorb Time** period (as has been set in screen # 3.5.)

NOTE:
The above only applies when using the Remote Output Signal to operate external devices **based on the Battery S.O.C. state.** The other settings for the Remote Output Signal still apply as described for the different settings. (Screens 5.2, 5.3, & 5.5)
This setting arrangement does **NOT** apply to the **S.O.C. Start & S.O.C. Stop** settings for the **Load** output terminals. (Screen 4.4)

CAUTIONS:
When the battery bank is being charged directly from another device, such as a bi-directional inverter, or battery charger, the regulator has no control over the battery charging process. Thus, it is the responsibility of the installer to be sure the **Absorb Voltage** and **Absorb Time** settings in the **inverter or battery charger** are correct.
Imark will **NOT** accept any responsibility for any damage to the battery bank due to any overcharging of the battery bank that results from incorrectly setting the operating parameters of any connected equipment.

NEVER set **BOTH** the **S.O.C. Start** and the **S.O.C. Stop** conditions to **100%** as this will activate **the Battery Fully Charged State** signal for this application. See Addendum #1.

REMEMBER:
The **Absorb Volatage**, the **Equalise Voltage**, and the **Float Voltage** settings are all influenced by the battery **Temperature Compensation** setting. Accordingly, the Imark regulator will assume the set voltages when the battery temperature is less than 25°C, and will assume a lower voltage when the battery temperature is greater than 25°C. In cases where the temperature sensor is not fitted, the regulator will assume the battery temperature is at 0°C.
This needs to be considered by the installer whenever using external equipment to charge the battery bank with activation being based on the use of the Remote Output Signal terminal.

This change was introduced from Software version 1.2.3 (See screen 1.1).

ADDENDUM #4

IM Command for External IO on IMARK SRX100 Solar Regulators

Addittional and/or changed operating parameters can be programmed through the text field in Screen 5.1. This can be done with a computer connected to the Ethernet connector, via the Siyr Explorer Settings Screen, or by external equipment.

The addressing allocations are as follows:

rem_setting.rfunch						
			000000xx	0000xx00	00xx0000	xx000000
Byte	0	1	2	3	4	5
Programs Pins	I	M	REM_ON	REM_OUT	GENSTR	DLYSTR
	I	M	X	X	X	X
	49	4D				

Byte 2, REM_ON, Input.

Command:
- X (58H) - Default, REM_ON/OFF
- B (42H) - Equalize / Boost charge
- L (4CH) - LCD reset at midnight
- C (43H) - Cool heatsink, turn on the fan
- S (53H) - Load sharing, 0.1V/10A drop
- E (45H) - Ecoult mode
- 1 (31H) - Short enable PWM
- 0 (30H) - Open enable PWM

Byte 3, Remote, Output.

Command:
- X (58H) - Default, Remote output
- F (46H) - Show Full SOC, Give 5sec pulse if Battery mode goes from Absorption mode to Float mode AND second load timer
- L (4CH) - LCD reset at midnight
- C (43H) - Cool heatsink, turn on the fan
- 1 (31H) - Remote output on
- 0 (30H) - Remote output off
- S (53H) - Load sharing, 0.1V/10A droop

Byte 4, GENSTR, Output.

Command:
- X - Default, Generator start
- F - Show Full SOC, Give 5sec pulse if Battery mode goes from Absorption mode to Float mode
- L (4CH) - LCD reset at midnight
- C (43H) - Cool heatsink, turn on the fan
- 1 (31H) - GENSTR output on
- 0 (30H) - GENSTR output off
- S (53H) - Load sharing, 0.1V/10A droop

Byte 5, DLYSTR, Output.

Command:
- X - Default, Delay start
- F - Show Full SOC, Give 5sec pulse if Battery mode goes from Absorption mode to Float mode
- L (4CH) - LCD reset at midnight
- C (43H) - Cool heatsink
- 1 (31H) - DLYSTR output on
- 0 (30H) - DLYSTR output off
- S (53H) - Load sharing, 0.1V/10A droop

IMARK SOLAR REGULATOR PROGRAMMING SHEET

ADDENDUM #5

This document has been prepared to assist installers correctly program the IMARK SRX20, SRX40, SRX60, and SRX100 Solar Regulators. These regulators can be programmed either directly via the LCD on the front of the regulator or directly from a computer via the internet enabled RJ45 connector using your web-browser.
Some settings must be tailored to match the requirements of the battery manufacturer, or the requirements of the site equipment, and we therefore suggest installers have the appropriate battery and equipment manuals on hand to refer to during the commissioning process.
Further, specific site requirements may dictate the correct settings. Accordingly, programming of these regulators should only be done by suitable qualified installers.
We also suggest having a copy of the Imark Solar Regulator manual on hand to refer to while programming these Imark Solar Regulators.

These instructions are a guide only, and show the programming steps in a sequential manner to make programming simple and easy.
Where numerous sites are to be programmed, we suggest you populate the 5th column of this sheet with YOUR required settings prior to going to site.
Always have an independent person check your programmed settings prior to leaving the site.
Note: **RED** cells mark the settings that MUST be made, while **GREEN** indicates optional settings or Site/Installation dependent. Always check the **YELLOW** settings.

SITE NAME:		**Enter Customer name**			**Date:** February 13, 2023	
Battery Type	***Enter Battery Type***		**Capacity AHr** _ _ _ _ _ _ _ _ _	**PV Panels** x P 10 String	**Programmed by:** **Checked by:**	
Step #	**Screen #**	**Settings *Line***	**Factory Setting**	**Regulator Setting**	**Checked By:**	**Comments**
1	0.1	Select Regulator	1			
		Enter PIN#	000002			000001 is user password. 000002 is technician default
2	1.x	REGULATOR INFO	Serial #	nnnnnnnnn		Nothing to do here
3	1.5	Installation Date	Date	13-Feb-23		
		others				Text CANNOT be entered via the LCD. Use web Browser
4	1.x	Network address for this	1			Power Board A has Network Address #1
		ONE regulator ….	2			Power Board B has Network Address #2
	2.x	PV PANEL INFO				Nothing to do here
5	3.2	Type	7 - Custom			Refer to the battery manufacturers specifications
		Nominal Volts	3 – 48V			48Vdc
		Compensation	0mV/C/°C	X mV/C/°C		Refer to the battery manufacturers specifications
6	3.3	Max Alarm Voltage	59.0 V			Alarm Only - Activates when greater than setting
		Min Alarm Voltage	44.0			Alarm Only - Activates when less than setting

IMARK SOLAR REGULATOR PROGRAMMING SHEET

		Max Charge	50.1A			Set on a “per Powerboard Basis”, based on TOTAL AHrs
7	3.4	High Voltage Stop	60.0V			
		Low Voltage Stop	25.0V			
		Batty Temp Stop	50°C			Follow Battery Manufacturers requirements
8	3.5	Float Voltage	55.2V			e.g. 24 cells x 2.25V = 54.0 Volts
		Absorb Voltage	56.0V			e.g 24 cells x 2.35V = 56.4.0 Volts
		Absorb Time	1.0Hr			1.0 or even 2 hours if load is constant & high
9	3.6	Equalise Volts	00.0 V			Temp Compensation NOT required.
		Equalise Time	0.0 Hr			0.0 Hr setting disables this function.
		Equalise Cycle	0 Dys			0 days setting disables this function
10	3.7	S.O.C. Alarm Min	30 %			Alarm will activate at or below this setting
11	4.2	Current Shut-Off	10.00			MAX setting is 10.1 Amps TOTAL from Powerboard 1.
		Load Timer Cycle	0 D			Site dependent
12	4.3	Load Start Time	00:00			Mostly used to switch lights ON or OFF.
		Load Stop Time	00:00			As above
13	4.4	S.O.C. Start %	80%			e.g. 70% if site load is low & constant. Otherwise 80%
		S.O.C. Stop %	50%			Always allow 30% for hysteresis
14	4.5	Tempr Start	00 °C			Probably only used to start/stop heaters or air conditioners
		Tempr Stop	00 °C			Probably only used to start/stop heaters or air conditioners
15	5.1	Function				IM1xxx stops charging when/if BMS open-circuits battery. NOTE: This can only be set using the Imark Explorer app.
16	5.2	Exercise Cycle	n Days			Where “n” is the required number of days.
17	5.3	Remote Start Time	00:00			Site/installation specific requirement.
		Remote Stop Time	00:00			Site/installation specific requirement.

IMARK SOLAR REGULATOR PROGRAMMING SHEET

18	5.4	S.O.C. Start	00:00			Site/installation specific requirement.
		S.O.C. Stop	00:00			Site/installation specific requirement.
19	5.5	Tempr Start	00 °C			Site/installation specific requirement.
		Tempr Stop	00 °C			Site/installation specific requirement.
	6.x	MESSAGES				Nothing to do here
	7.x	ALARMS				Nothing to do here
20	8.1	Dev: SDC Present	SDC			Regulator will change to “yes” when it sees the SDC/USB
		Fil: IMDn00xx	IMDn00xx			Where “n” is the regulator’s power-board identity #. The last two digits “xx” can be used to identify the site.
21	8.2	Collect Reg n Log	Y			Where “n” is number of the regulator
		Delete Reg n File	N			Where “n” is number of the regulator
		Write Protect File	N			Will not save data if set to “Y”.
22	8.3	Dev: SDC Present	SDC			
		Fil WP00000.CUS				This is only for a customer specific web page
23	8.4	IP				This info is site dependent
		Use Automatic DHCP:				This info is site dependent
24	8.5	Change Date & Time				Enter date and time here
		Export to Reg n:				Where “n” is number of the regulator
25	8.7	Do Watchdog Reset:	N			Only necessary to clear a “locked” LCD uProcessor

IMPORTANT.
In the event of the Battery Circuit Breaker, or the ECO4840P’s BMS Tripping, the Imark SRX100 regulator MUST be shut-down immediately. This can be achieved by connecting Pins 5 & 6 of the PPE Alarm Output connector and pins 9 & 10 on the SRX100 Regulator’s 16 way connector. Further, the 4th line in Screen 5.1 should be set to “IM1xxx”. This is **MANDATORY** in all installations to prevent possible damage to the SRX100 and/or other equipment operating from the battery.

IMARK SOLAR REGULATOR PROGRAMMING SHEET

When programming the regulator/s using the IMARK Site Explorer, you will see a screen like the screen below. It is only necessary to populate the “Password” cell and the required white cells below the first green header line. The pink & yellow cells will be populated by IMARK’s Site Explorer from the regulator.

Date		Time		Regulators in System	1,2, , , , , ,
System PV Input		System Load		Summary	
Enter Password		Access Level		Local IP Address	

REGULATOR #	1	2	3	4	5	6	7	8
Regulator Model								
Serial Number								
BATTERY								
Battery Type								
Nominal Battery Voltage								
Battery Alarm Voltage Max								
Battery Alarm Voltage Min								
Maximum Charge Amperes								
Absorb Voltage								
Absorb Time Hours								
Float Voltage								
Equalise Voltage								
Equalise Time Hours								
Equalise Cycle Days								
Batt Temperature Comp								
Battery S.O.C. Alarm Min								
Battery High Voltage Stop								
Battery Low Voltage Stop								
Battery Temperature Stop								
LOAD								
Load Current Shut Off Amps								
Load Start Time hh:mm								
Load Stop Time hh:mm								
Load Timer Cycle DD								
Battery S.O.C. Start %								
Battery S.O.C. Stop %								
Temperature Start °C								
Temperature Stop °C								
Batt Low Volt Load Release								
Batt Low Volt Load ReConnct								

IMARK SOLAR REGULATOR PROGRAMMING SHEET

REGULATOR #	1	2	3	4	5	6	7	8
REMOTE OUTPUT SIGNAL								
Start Time > hh:mm								
Stop Time > hh:mm								
Battery S.O.C. Start %								
Battery S.O.C. Stop %								
Temperature Start +/- °C								
Temperature Stop +/- °C								
Exercise Cycle Days								
Remote Output Func Text								
Gen Exercise Cycle (days)								
2nd Start Delay (secs)								
Gen Start Time > hh:mm								
Gen Stop Time < hh:mm								
Gen S.O.C. Start								
Gen S.O.C. Stop								
Gen Temperature Start								
Gen Temperatue Stop								
SETTINGS								
Change Date DD/MM/YY								
Change Time hh:mm:ss								
Installation Date dd/mm/yy								
Installer's Name								
Contract Number								
Spare								
Spare								
Spare								
Spare								
Spare								
Spare								
	Modify 1	Modify 2	Modify 3	Modify 4	Modify 5	Modify 6	Modify 7	Modify 8