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**USER MANUAL**

**COOLMAX SR**
Australian Energy Research Laboratories
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# COOLMAX SR MAXIMIZER
## WALL MOUNT

## Installation and Operational User Manual


***Models***

**SRMVW**
**SRHVW**

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# Important Safety Information

This User Manual contains important Safety information and Installation instructions for the AERL COOLMAX SR MAXIMIZER Wall Mount MPPT.

The following symbols are used throughout this User Manual to indicate ideal installation methods, potential dangerous conditions and important operational information.

**Important**
Indicates information that must be followed to ensure proper operation of the COOLMAX SR unit.


**Caution**
Indicates a critical procedure for the safe Installation of the COOLMAX SR unit. Use extreme caution when performing this task.

## PLEASE NOTE:


**Caution**

- **This User Manual provides detailed installation and usage instructions for the COOLMAX SR unit. It is recommended that all of the Instructions and Cautions in this User Manual be read before beginning installation.**
- **Only qualified electricians and technicians should install the COOLMAX SR System. This manual is intended for all Installation technicians and the system owner.**
- **Do not disassemble or attempt to repair the COOLMAX SR unit unless you are a qualified technician and have authority in writing from AERL to do so.**
- **AERL will not be held responsible in any way for the mishandling of this product or for installation of the product in a manner that does not follow the instructions in this manual.**

# 1 PRODUCT WARRANTY

1. AERL warrants that the Product will be free from manufacturing defects for a period of 24 months from the date of dispatch of the products by AERL to the customer.
2. The Products technical specifications are contained within the Product Datasheet and User Manual. The Product will conform to the technical specifications contained in the Product Datasheet and User Manual at the time of dispatch of the Products to the Customer. If the technical specifications as contained in the Product Datasheet and User Manual are not met, AERL will repair, replace the Product, or refund the amount paid by the Customer in relation to the Product at the Customers option. AERL is under no obligation to provide assistance or advice to the Customer in relation to the technical specifications.
3. The Products must be installed in strict accordance with the Installation Recommendations listed in this User Manual.
4. In no event will AERL be liable for:

a) any loss or damage which the Customer suffers arising from, or caused or contributed to by, the Customer's negligence or the negligence of the Customer's agents or servants; and

b) special, indirect or consequential loss or damage as a result of a breach by the Customer of these Standard Terms including, without limitation, loss of profits or revenue, personal injury, death, property damage and the costs of any substitute Products which the Customer obtains.

5. The Product is not covered for damage occurring due to water, including but not limited to condensation, moisture damage and other forms of precipitation.
6. The Product is not covered for damage occurring due to the Product being incorrectly installed or installed in a manner not in accordance with the Installation Recommendations listed in the Product User Manual.
7. The Product is not covered for damage occurring due to failure on the part of the customer to operate the product in accordance with the technical specifications as listed in the Product Datasheet.
8. The Product is not covered for damage occurring due to lightning.
9. The Product is not covered for situations where it is used in a manner not specifically outlined in the Product Manual.
10. If any provision in this document is invalid or unenforceable this document will remain otherwise in full force apart from such provision, which will be deemed deleted

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a) Disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product
b) Assumes no responsibility or liability for loss or damage whether direct, indirect, consequential or incidental, which might arise out of use of such information. The use of any such information will be entirely at the user's risk.
c) Reserves the right to change any AERL product, product specifications and data without notice to improve reliability, function or design or otherwise.

## 1.1 PRODUCT SPECIFICATIONS

| CHARACTERISTIC | SRMVW | SRHVW |
|---|---|---|
| Nominal Battery Voltage - Selectable | 24 to 84V | 48 to 132V |
| Maximum Output Current | 60A | 45A |
| Maximum Recommended PV Arrray | 5000W @ 84Vout(nom)<br>3800W @ 60Vout(nom)<br>3000W @ 48Vout (nom)<br>1500W @ 24Vout(nom) | 5200W @ 132Vout(nom)<br>5000W @ 120Vout(nom)<br>4500W @ 96Vout(nom)<br>2300W @ 48Vout(nom) |
| Maximum PV Voltage Open Circuit | 180V | 290V |
| Power Conversion Efficiency | 99+% | 98.5+% |
| Battery Temperature Compensation | Yes | Yes |
| Operating Temperature Range | -20° to 50°+C | -20° to 50°+C |
| Remote Temperature Sensor | Included | Included |
| Storage Temperature | -30° to 70° C | -30° to 70° C |
| Self Consumption | 100mA @ 20V | 75mA @ 40V |
| Communication Protocol Options | CAN and Modbus RTU | CAN and Modbus RTU |
| Communication Ports | RS485 & USB | RS485 & USB |
| Required cabinet air exchange rate (intake at 40°C) | 40 $m^3$/hour | 40 $m^3$/hour |
| Operating temperature of heatsink at full rated power | 35°C temperature rise | 35°C temperature rise |
| Cable entry conduit diameter | 40mm | 40mm |
| High power wire size | 16$mm^2$ Max | 16$mm^2$ Max |
| Enclosure type | Indoor Type1 | Indoor Type 1 |
| Weight | 3.7kg | 3.7kg |
| Outer dimensions (L x W x H) | 356 x 133 x 104 mm | 356 x 133 x 104 mm |
| Languages (other language updates to come) | English | English |

# 2 OVERVIEW

The AERL COOLMAX SR is a high efficiency, buck only, common positive Maximum Power Point Tracker (MPPT). It is the latest development in the MAXIMIZER range, which was pioneered by AERL in 1985. The COOLMAX SR blends the famously reliable AERL power stage with easy to use digital features such as system performance logging, fully configurable alarms and remote system monitoring and control.

The COOLMAX SR employs a maximum power point tracking strategy which has been proven to be highly robust, resistant to local extremes, and results in power losses of less than 0.5% over the whole operating temperature range of a PV Array.

Some of the device's key features include:

- Increase PV output by up to 35%
- Super high conversion efficiency > 99%
- Common positive wiring configuration
- Highly advanced colour touch screen LCD display
- Modbus, CAN bus and standard USB interface
- High power density — 1kW/l & 1.5kW/kg

## 2.1 WHY USE AN MPPT?

In simple terms, a Maximum Power Point Tracker sets the voltage of the solar panels to the ideal operating point of the panels. This is the maximum power voltage, or the voltage at which the solar cells can deliver maximum power to the load. This means that by using MPPT technology, the COOLMAX SR can harvest up to 35% more energy from a solar array compared to a non-MPPT charge controller.

The bottom line for solar system installers is that a cheaper, less powerful solar array can always be installed when using an MPPT – this saves cost, wiring and solar area. Because the MPPT can boost the panel's output by up to 35%, the required array size and cost is reduced.

The other benefit of MPPT converters is that a high voltage solar array can be converted down to a low voltage battery pack. This is advantageous because solar arrays are designed to be wired in series, and require much lighter wire when doing so. Additionally, a low voltage battery pack is substantially safer than a lethal, high voltage pack.

# 3 INSTALLATION

**Important**

The COOLMAX SR must be installed in a clean and dry location away from direct sunlight.

Best cooling is achieved when the COOLMAX SR is mounted vertically against a wall with a clear open area at the top of the unit. At least 20cm should be kept clear above the COOLMAX SR to allow free air flow.

## 3.1 MOUNTING

The COOLMAX SR should be fixed to a vertical surface using M5 screws through the 8 mounting holes in the chassis as seen below in **Fig.1**.

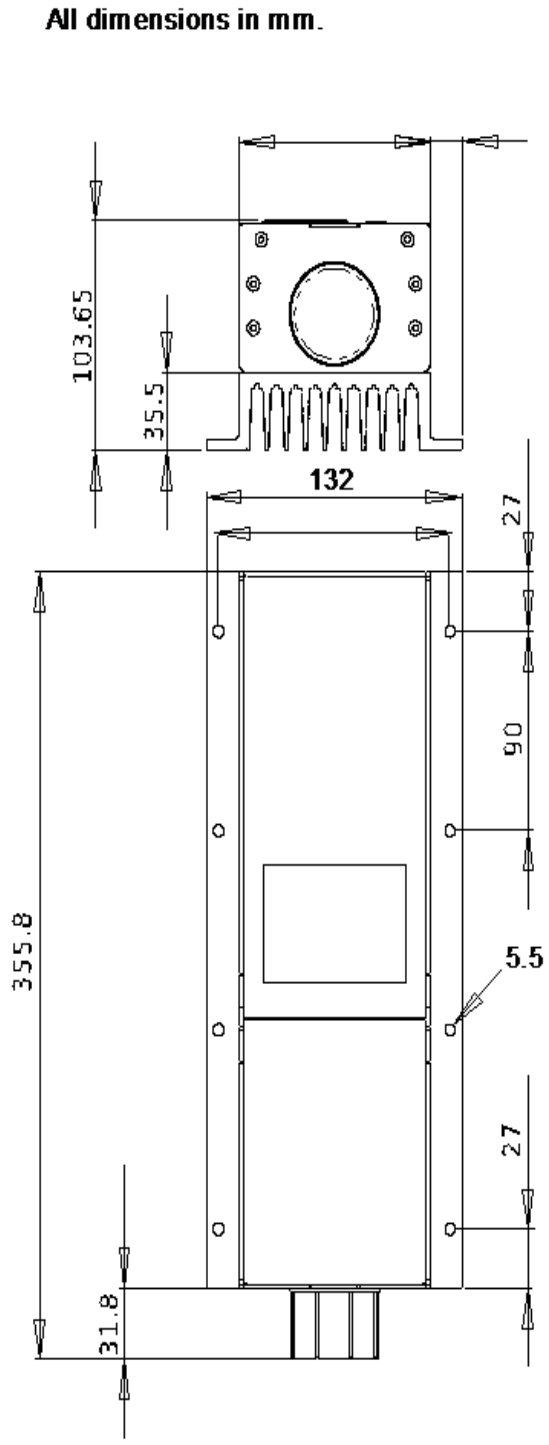


***Figure 1: Mounting Holes***

# 4 WIRING

All COOLMAX SR wiring must enter the unit via a 40mm conduit fitting at the bottom of the unit. Remove the access cover at the bottom of the COOLMAX SR to install the cabling. This is done by removing the two M3 countersunk hex screws on the bottom of the enclosure at the front as shown below in **Fig. 2**.

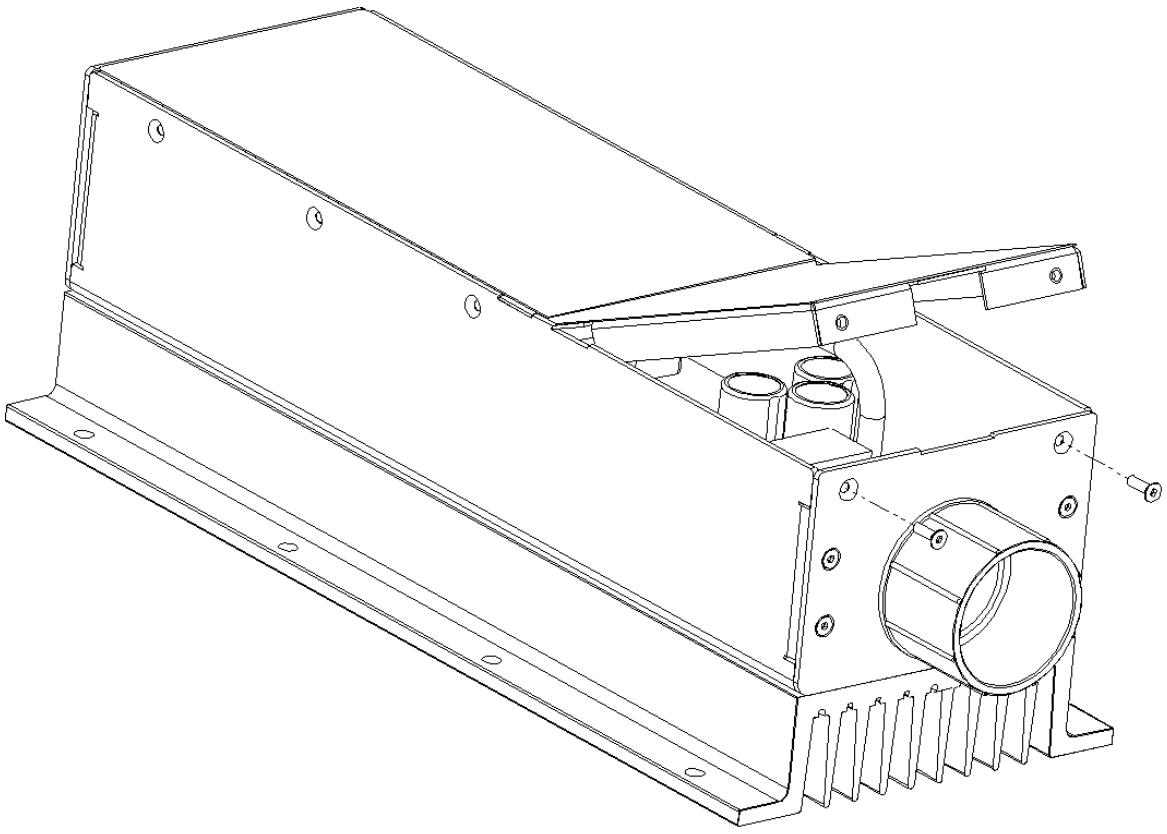

***Figure 2: Removal of the Access Panel***

With the access cover removed, three terminal blocks should be visible. The left most terminal block **(J1)** is for the alarm output, remote shutdown input, and temperature compensation. The terminal block **(J3)** on the right is for the Controller Area Network (CAN). The central terminal block **(J2)** is for power in and power out. Figure **3** below shows the PIN-outs for these terminals.

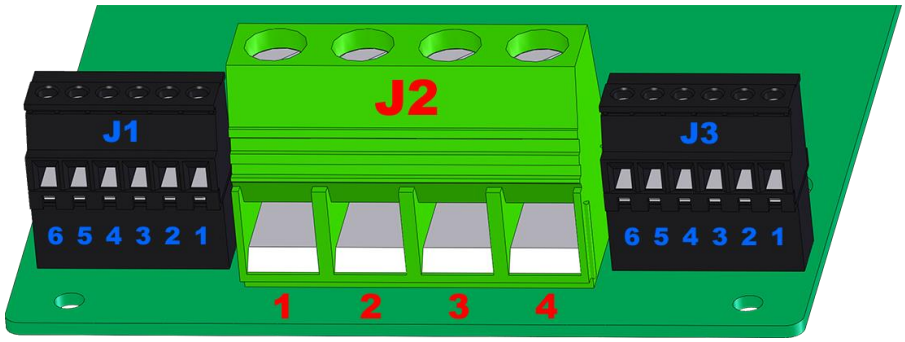


***Figure 3 - Terminal Board PIN-out (Looking into Access Port)***

Signal PIN Assignment

| PIN | Assignment | Type | Functional Description | Isolated |
|---|---|---|---|---|
| J1-1 | GND | Analogue input | Temperature compensation thermistor | NO |
| J1-2 | TMPCMP | | | |
| J1-3 | GND | Digital input | Pull these lines together to disable output of the COOLMAX SR | NO |
| J1-4 | ON/OFF | | | |
| J1-5 | Alarm NO | Clean contact output | Will close when an alarm is active | YES - 1000V |
| J1-6 | Alarm COM | | | |
| J2-1 | PV IN- | PV PWR IN | Refer to Product datasheet for the current and voltage limitations | NO |
| J2-2 | PV IN+ | | | |
| J2-3 | BATT OUT + | BATT PWR OUT | Refer to Product datasheet for the current and voltage limitations | NO |
| J2-4 | BATT OUT - | | | |
| J3-1 | CAN +12V | Output power | Power for the CAN bus | YES |
| J3-2 | CAN GND | | | |
| J3-3 | SHIELD | | | YES |
| J3-4 | CAN H | Digital IO | CAN signals | |
| J3-5 | CAN L | | | |
| J3-6 | NC | | | |

*Table 1 - Signal PIN Assignment*

# 5 CIRCUIT BREAKERS

AERL recommends the use of 6kA, 8kA or 10kA DC rated circuit breakers with an appropriate voltage rating on both input and output. Double or triple ganged circuit-breakers can be connected in series to give the desired voltage rating as shown in the example configurations below in **Figure 4.**

It is important that the peak voltages are taken into account when selecting breakers. For example, a 120V nominal battery pack will be close to 150V at top of charge, so the breaking capability of the circuit breakers will need to be selected accordingly.

It is important to note that the COOLMAX SR attempts to process all available power from the PV array and therefore the output current from the UNIT increases with decreasing output voltage. At a low enough output voltage, the current will exceed the COOLMAX SR's over current trip point and shut-down in order to protect itself. In the COOLMAX SR MV unit, this trip point is 72A and in the COOLMAX SR HV it is 55A. This implies that a PV panel rated to produce the COOMAX SR's maximum battery charge current at nominal battery voltage will shut-down due to over current if the battery voltage falls below 1.7V per cell.

The implication of the COOLMAX SR'S behaviour described above is that an 80A rated circuit breaker should be used for the COOLMAX SR MV and a 63A rated breaker should be used for the COOLMAX SR HV.

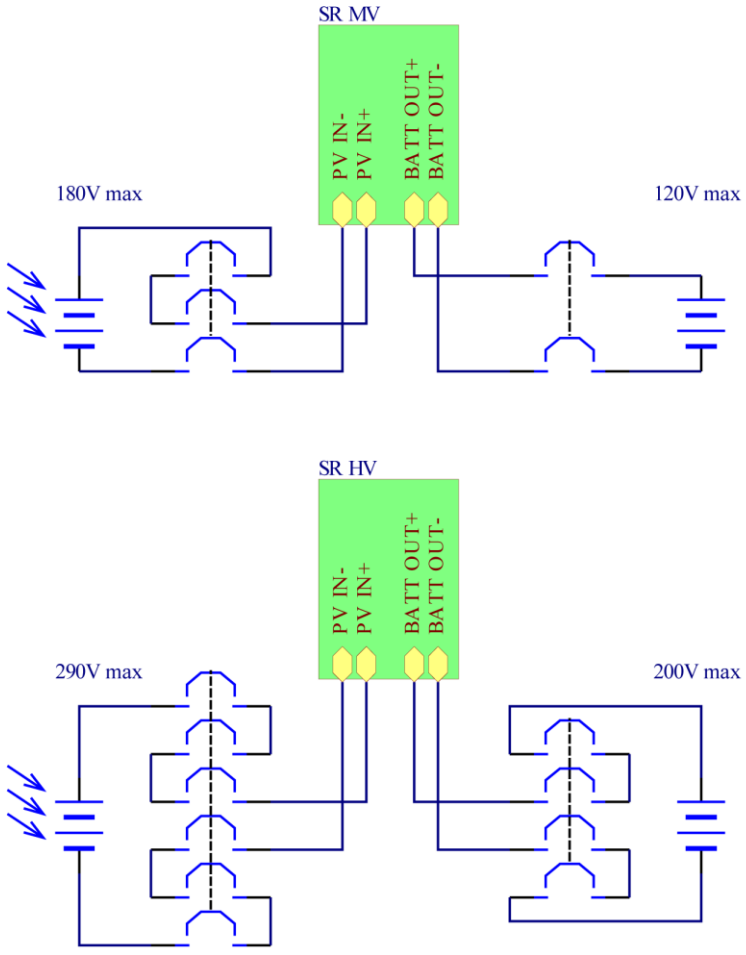


***Figure 4 - Example breaker configuration for both the MV and HV COOLMAX SR assuming 60V rated DC breakers***

# 6 EARTHING


**Equipment Damage**

**The chassis of the COOLMAX SR should be earthed by installing an earthed ring terminal under the bottom left mounting bolt of the chassis. DO NOT EARTH THE ARRAY** in any way **IF** a negative earth is used for the batteries or DC system.

AERL recommends that the COOLMAX SR be utilized in a floating system (no earthing to the power terminals) whenever possible. For very exposed systems, it is recommended that a lightning conductor be provided nearby to prevent damage to PV equipment, batteries and the COOLMAX SR.

For systems using SunPower PV arrays, it is necessary to provide a positive earth for the array.

## 6.1 CONNECTIONS

Use only appropriately rated wire to connect PV input and battery bank output. Check the polarity in the diagram provided in this User Manual.


**Reversing polarity of either the input or the output will cause damage to the COOLMAX SR**

**Install circuit breakers as described in Section 5 - Circuit Breakers.**

**Check the polarity of the input and output with a multimeter before closing the breakers.**

# 7 LCD FAULT CODES

If the COOLMAX SR detects a fault, it will display a code on the LCD display, as well as illuminating the 'HOLD' symbol. The fault codes are described in the following table. Faults can be reset by disconnecting the input and output of the COOLMAX SR until the LCD display switches off.

| Fault Code | Fault | Description |
|---|---|---|
| 1 | Negative PV Current | Current was detected flowing into the PV array. |
| 2 | High PV Current | PV current high enough to damage COOLMAX SR. |
| 4 | High PV Voltage | PV voltage high enough to damage COOLMAX SR. |
| 8 | High Battery Current | Battery current high enough to damage COOLMAX SR. |
| 16 | High Battery Voltage | Battery voltage high enough to damage COOLMAX SR. |
| 32 | High Temperature | Heat−sink temperature high enough to damage COOLMAX SR. |
| 64 | Fan Failure | Fan has failed to start. |

*Table 2 - LCD Fault Codes*

If multiple faults were detected by the COOLMAX SR, the fault code displayed will be the sum of the fault codes of the individual faults. For example if high PV current and high battery voltage were detected together, the LCD display would show 18 (i.e. 2 + 16 = 18).

# 8 CAN COMMUNICATIONS

## 8.1 CAN NETWORK TOPOLOGY

Multiple COOLMAX SR units can exist on the same CAN bus and this can be connected to other networks using a CAN-Ethernet Bridge adaptor.

The CAN bus is structured as a linear network, with short stubs branching from 'T' connectors on the main bus backbone to each device. The CAN bus data lines must be terminated at each end of the main bus with 120 Ω resistors between the CAN-H and CAN-L signals.

A simple method of implementing the 'T' junction is shown in Figure **5**. The in and out wire of each CAN line are twisted together and screwed into the appropriate terminal on the CAN connector, as shown in below in **Figure 6**. This connector plugs into J3 as shown in **Figure 3** on page 9 of the manual.

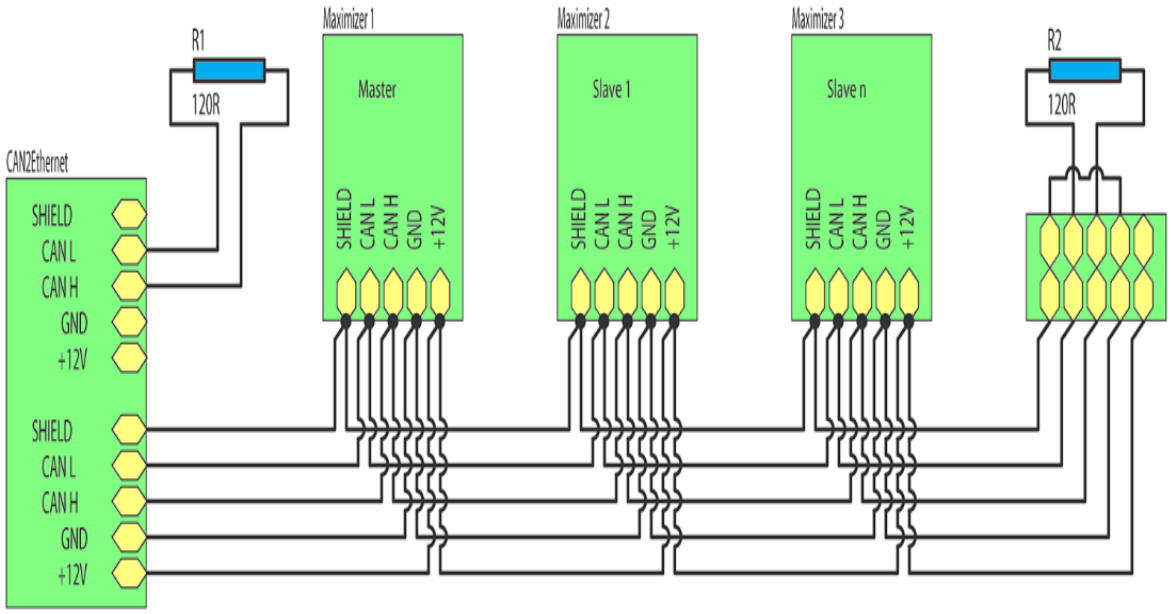


***Figure 5 - CAN Network Wiring Diagram***

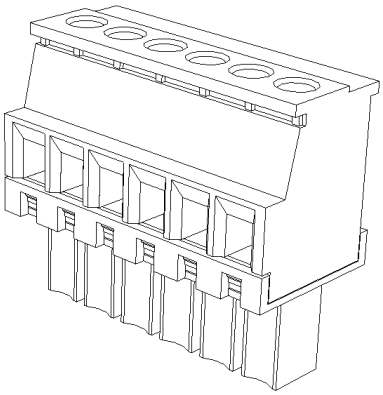

*Figure 6 - CAN Connector (6-Way Screw Terminal)*

## 8.2 CAN WIRING

The CAN data lines (CAN-H and CAN-L) must be implemented with twisted-pair wire for proper data integrity. The wire should have a characteristic impedance of 120 Ω.

Power should also be provided along the CAN cable, ideally with another twisted pair to minimise noise pickup. An overall shield can also be advantageous.

**Important**

The recommended choice of cable is 7mm DeviceNet CAN-Bus 'thin' cable, with 24 AWG (data) + 22 AWG (power) twisted pairs and a braided shield. Using this cable will result in a robust installation.

Standard CAT5 network cabling (which has an impedance of 100 Ω) can be used, but may become unreliable in longer networks or in the presence of electrical noise from DC/DC converters and other electrical devices in the system.

## 8.3 SHIELDING

**Important**

Correct shielding practice is important for error free communications. Incorrect shielding can cause more interference than unshielded cables would experience. Shields should be linked between each wire segment along the network but only grounded in one place. The following paragraphs explain how to achieve this.

The shield should be wired through the entire network independently of the ground and connected to ground at the end of the network and nowhere else in the network. This is shown below at the right hand end of the example network in **Figure 5**.

## 8.4 CAN TERMINATION

A 120 Ω resistor needs to be wired between the CAN-H and CAN-L lines at either end of the linear network in order to terminate both ends of the network. At the far end of the network the resistor can be simply installed into the last terminal block.

If no CAN-Ethernet Bridge adapter is present on the network the same terminal block style termination can be made on the other end of the network. However, if a CAN-Ethernet Bridge adapter is present on the network, it can be used to terminate the network by wiring a termination resistor across CAN-H and CAN-L on the unused header.

# 8a MODBUS COMMUNICATIONS

## 8a.1 MODBUS NETWORK TOPOLOGY

Multiple COOLMAX SR units can exist on the same Modbus and this can be connected to other networks using a Modbus-Ethernet Bridge adaptor.

The Modbus is structured as a linear network, with short stubs branching from 'T' connectors on the main bus backbone to each device. The Modbus data lines must be terminated at each end of the main bus with 120 Ω resistors between the Modbus-A and Modbus-B signals.

A simple method of implementing the 'T' junction is shown below in **Fig.7**. The in and out wire of each Modbus line are twisted together and screwed into the appropriate terminal on the Modbus connector, as shown in **Fig.9.** The Modbus connector is then connected into the COOLMAX SR as shown in **Fig.10**.

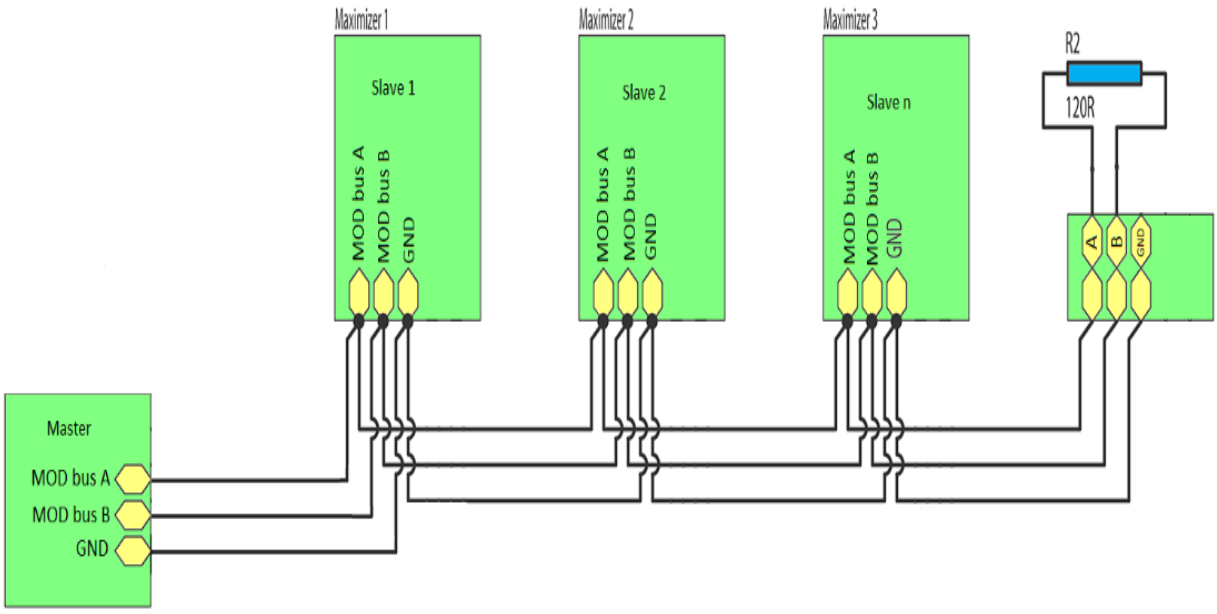


***Figure 7 – Modbus Wiring Diagram***

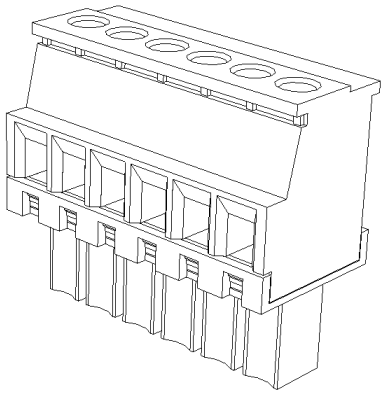

*Figure 8 – Modbus Connector (6-Way Screw Terminal)*

## 8a.2 MODBUS WIRING

The Modbus data lines (Modbus-A and Modbus-B) must be implemented with twisted-pair wire for proper data integrity. The wire should have a characteristic impedance of 120 Ω.

Power should also be provided along the Modbus cable, ideally with another twisted pair to minimise noise pickup. An overall shield can also be advantageous.

**Important**

The recommended choice of cable is 7mm DeviceNet Modbus 'thin' cable, with 24 AWG (data) + 22 AWG (power) twisted pairs and a braided shield. Using this cable will result in a robust installation.

Standard CAT5 network cabling (which has an impedance of 100 Ω) can be used, but may become unreliable in longer networks or in the presence of electrical noise from DC/DC converters and other electrical devices in the system.

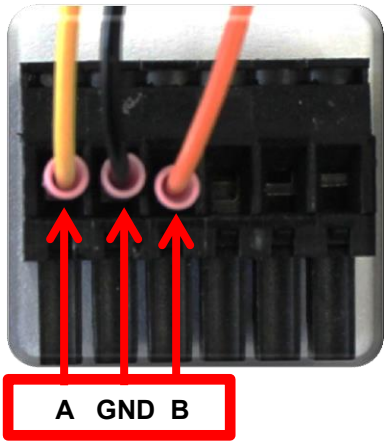


*Figure 9 – Modbus Connector*

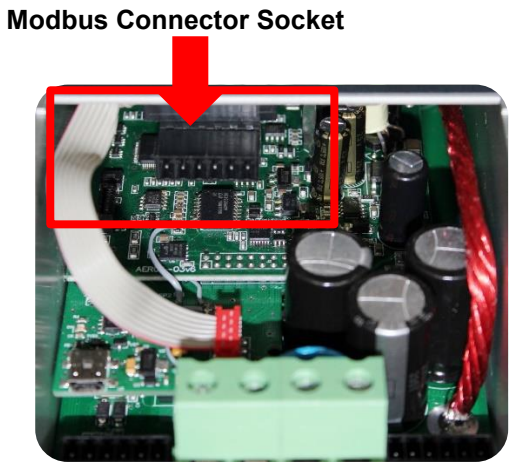


*Figure 10 – Modbus Connector Socket*

### 8a.3 SHIELDING

**Important**

Correct shielding practice is important for error free communications. Incorrect shielding can cause more interference than unshielded cables would experience. Shields should be linked between each wire segment along the network but only grounded in one place. The following paragraphs explain how to achieve this.

The shield should be wired through the entire network independently of the ground and connected to ground at the end of the network and nowhere else in the network. This is shown at the right hand end of the example network in **Fig.7**.

### 8a.4 MODBUS TERMINATION

A 120 Ω resistor needs to be wired between the Modbus-A and Modbus-B lines at either end of the linear network in order to terminate both ends of the network. At the far end of the network the resistor can be simply installed into the last terminal block.

If no Modbus-Ethernet Bridge adapter is present on the network the same terminal block style termination can be made on the other end of the network. However, if a Modbus-Ethernet Bridge adapter is present on the network, it can be used to terminate the network by wiring a termination resistor across Modbus-A and Modbus-B on the unused header.

## 9 OPERATING GUIDELINES

### 9.1 BATTERY CHARGING SETUP

The batteries are charged using an automatic equalise / anti-sulphation charging profile. This profile is designed for lead-acid batteries, which can be equalised automatically by allowing each battery to vent for a short time.

The charge profile can be edited for other battery chemistries by manipulating the following parameters

- Bulk voltage
- Float voltage
- Bulk reset voltage
- Bulk time

Battery chemistries other than lead acid should be used with extreme caution as it is not safe to overcharge individual cells. It is always recommended to employ a battery monitoring system as an unbalanced battery pack can result in damage to batteries due to overcharging.

An example charge profile for the COOLMAX SR is shown below to illustrate the charge profile parameters above. To edit the charge profile parameters, please refer to the documentation for the COOLMAX SR communications software.

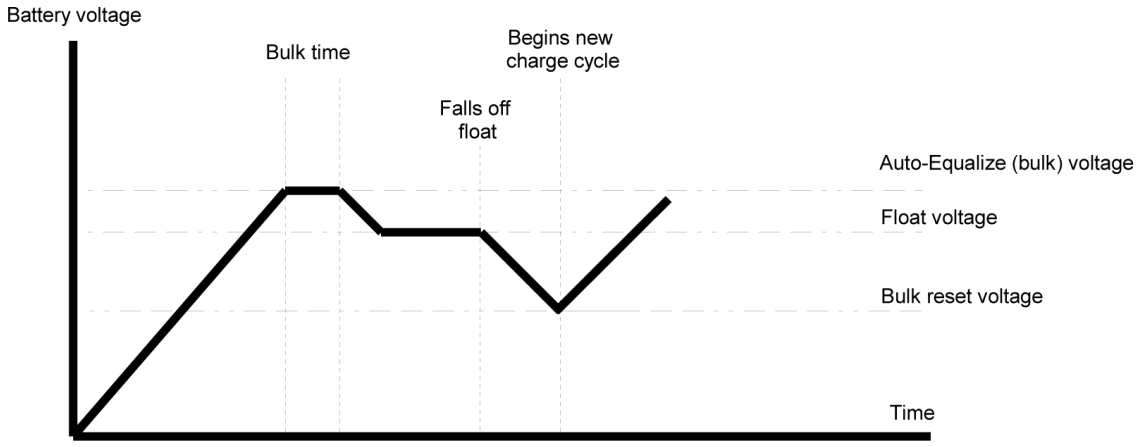


***Figure 11 - Battery Charge Control Profile***

## 9.2 TEMPERATURE COMPENSATION

Temperature compensation measures the temperature of the batteries and adjusts the float voltage set point to the ideal voltage for batteries at that temperature.

The thermistor is connected between J1-1 and J1-2 as shown in **Figure 3.** The COOLMAX SR measures the voltage between TMPCMP+ and GND to determine the temperature of the batteries.

Using the temperature of the batteries, the COOLMAX SR adjusts the float voltage by a user specified factor in millivolts per °C.

**NOTE:** The temperature compensation factor is adjusted using the COOLMAX SR software. Please refer to its documentation for more information.

## 9.3 RELAY ALARM / GENSET CONTROL

The ALARM PINs are the contacts of an isolated 12V, 1A relay. When an alarm state is in effect, ALARM will be connected inside the COOLMAX SR. When the alarm state is removed, ALARM will be completely disconnected from each other.

An external alarm or Genset control circuit can be used to sense whether ALARM is open or closed.

Many different events can be attached to the relay. These are:

- System init (system starts up after a reset or off period)
- Low output voltage warning
- Low output voltage fault
- Low output voltage Genset start
- High output voltage fault
- High output current fault
- High discharge current fault
- Input breaker open
- Output breaker open

- Temperature sensor fault
- Regulation fault
- Log file full
- Panel missing

These are configurable so that multiple faults could trigger the relay. There is also a time hysteresis which prevents the relay from triggering on spurious readings.

To configure the events, consult the documentation for the COOLMAX SR software.

## 9.4 REMOTE ON/OFF CONTROL

The remote ON/OFF control can be implemented with a single switch connected between the ON/OFF PIN and GND PIN.

The COOLMAX SR will sense if the ON/OFF PIN has been connected to GND when the switch closes and this will disable the unit.

## 9.5 MAXIMIZER STARTUP

The COOLMAX SR electronics will begin to run when either the input or output is connected with a voltage above the start-up voltage listed in the datasheet. CAN communications can be used whenever the COOLMAX SR is powered up.

# 10 ADJUSTING THE CHARGE PROFILE

## 10.1 REAL TIME

When the COOLMAX SR Unit is first powered on, the Real Time Screen **(see Fig.12)** is the first screen to appear. The Real Time screen displays all the telemetry information relevant to the COOLMAX SR Unit and is the starting point from which all other COOLMAX SR screens are accessible.

**Important: The COOLMAX SR unit typically requires a Battery or PV voltage above 40 volts to be able to power on**

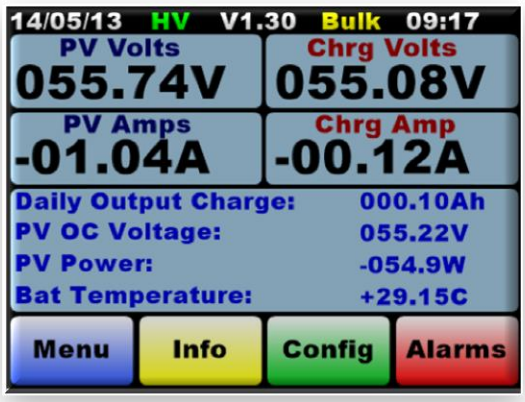


***Figure 12 - Real Time Screen***

## 10.2 MAIN MENU

To access the Main Menu Screen press the Menu Button that is at the bottom left of the Real Time Screen **(Fig.12).** This will go the Main Menu Screen **(Fig.13)** from which the Settings, Info and Alarms screen can be accessed.

To go back to the Real Time Screen (**Fig.12**) from the Main Menu Screen **(Fig.13)** press the Back Button at the top left of the Menu Screen. This will go back to the Real Time Screen.

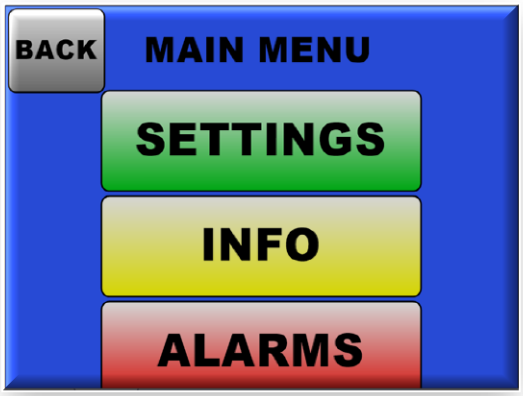


***Figure 13 - Main Menu Screen***

## 10.3 SETTINGS

From the Main Menu **(Fig.13)** press the Settings Button, this will go the Settings Menu screen **(Fig.14)** from where the various set points can be edited. The Settings Screen can also be accessed from the Real Time Screen **(Fig.12**) by pressing the Green Config Button at the bottom of the screen.


***Figure 14-Settings Menu Screen***

## 10.4 SET POINTS

The Set Points Screen (**Fig.15**) allows the user to modify the factory settings of the COOLMAX SR to customise the unit for a particular Solar Array and Battery Bank configuration. To scroll through the various Set Points on Page 1 and 2, press the Up or Down Buttons at the bottom of the screen. This will enable the user to scroll up or down through the various Set Points and also be able to move from Page 1 to Page 2 (**Fig.15 & 15A)**.

To Edit the selected Set Point press the Edit Button at the bottom left of the screen. This will go to a PIN Code Entry Screen **(see Fig:16)** where a 4 Digit PIN Code has to be entered.

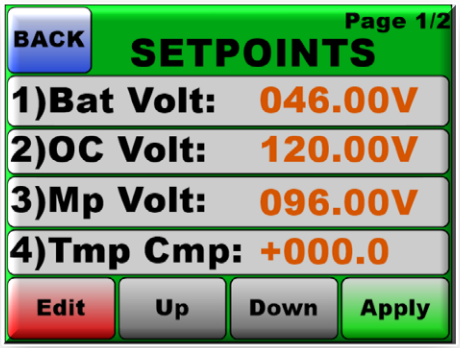


*Figure 15 – Set Points Screen*

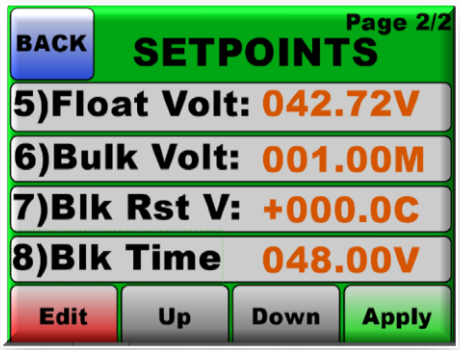


*Figure 15A – Set Points Screen*

## 10.5 PIN CODE

The PIN Code screen **(Fig.16)** requests the user to input a 4 digit PIN Code before any set point data can be edited. This ensures that only authorised personnel can edit the set point data. Once the 4 digit PIN Code has been entered press the Enter Button and this will allow access to the relevant set point screen that needs to be edited. If a mistake is made while entering the PIN Codes press the Delete Button to re-enter the number again. Unauthorised users who access this screen should immediately press the Delete Button to exit back to the Set Points screen.

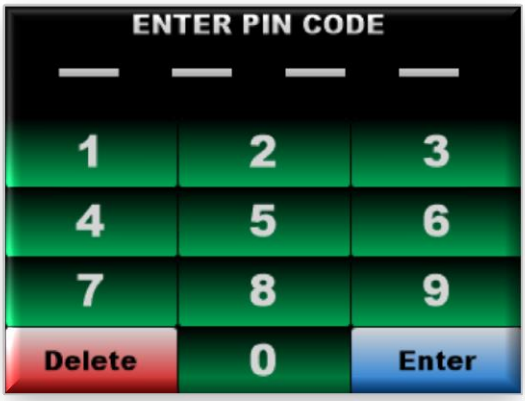


*Figure 16 - PIN Code Entry Screen*

## 10.6 SET POINT EDIT

Once the 4 Digit PIN Code has been entered correctly (**Fig.16**) the relevant data to be edited will appear (**Fig.17**). To scroll between the digits to be edited, press the Next Button. To increase or decrease the digit press the Up and Down Button. Once the relevant digits have been edited, press the Accept button to return to the Set Point Screen (**Fig:15)**

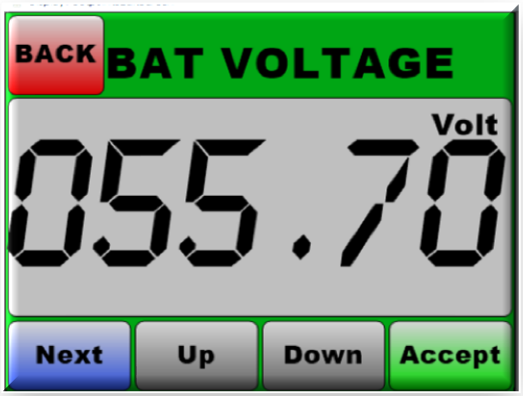


*Figure17- Set Point Edit Screen*

## 10.7 EDITING OC VOLTAGE SET POINT

The following steps illustrate the correct procedure to modify the OC Voltage Set Point to customise the unit.

**Step 1**

Once the unit has been powered up and the Real Time Screen (**Fig.18**) appears, Press the Menu button to go the Main Menu Screen **(Fig18**). From the main Menu Screen **(Fig.18A**) press the Settings button to go to the Settings Screen. **(Fig.18B)**

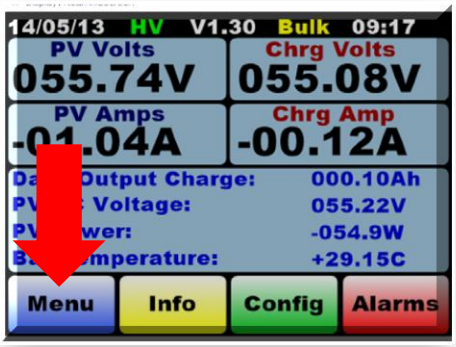


*Figure 18 – Real Time Screen*

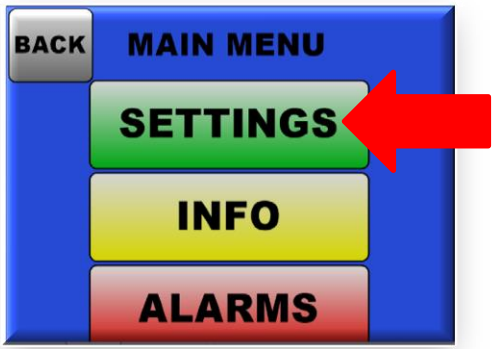


*Figure 18A – Main Menu Screen*

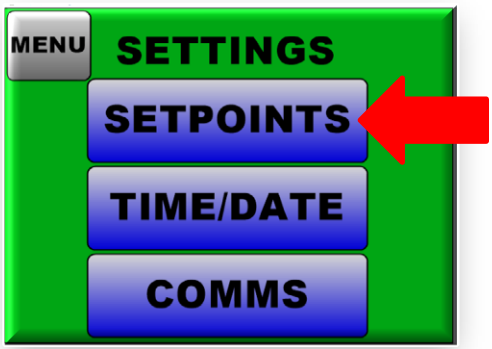


*Figure 18B – Settings Screen*

**Step 2**

On the Settings Screen (**Fig.18B**) press the "SETPOINTS" Button to go the Set Points Screen **(Fig.19).** On the Set Point Screen **(Fig.19**) select the OC Volt Set Point by pressing the Down Button. Then press the Edit Button which goes to the PIN Code screen **(Fig.20)** where a 4 Digit PIN Code has to be entered.

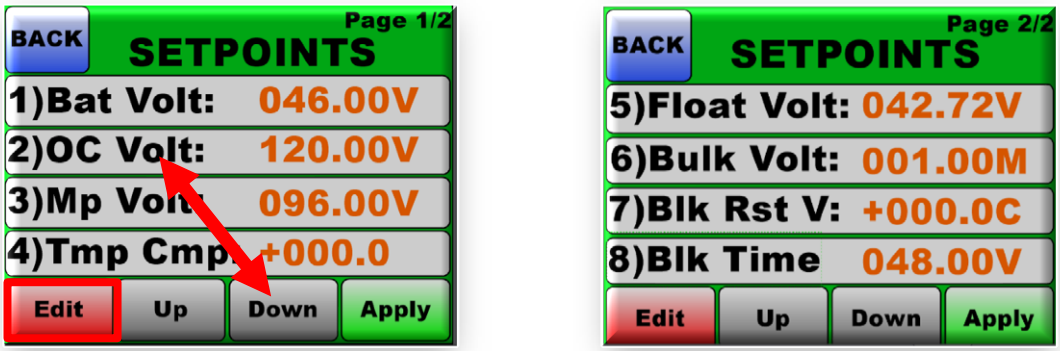


*Figure 19 – Set Points Screen*

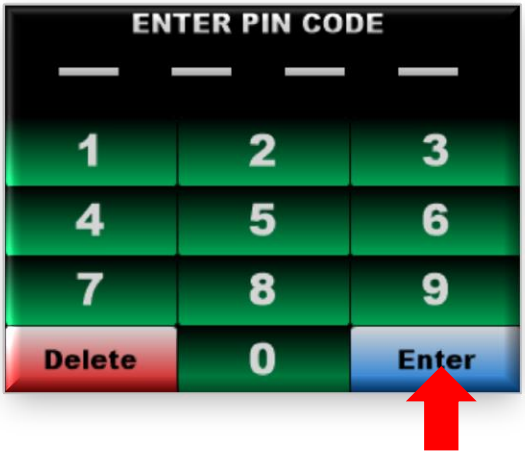


*Figure 20 – PIN Code Entry Screen*

**Step 3**

Once the 4 Digit PIN Code has been entered in the PIN Code Entry Screen **(Fig.20)** press the Enter Button which would then go to the Set Point Edit Screen **(Fig.21)** where the Set Points can be modified. To move between the various digits on the Set Point edit screen press the Next Button and to Increase or Decrease the digits press the "UP" and "Down Button". Once the required digits have been entered press the "Accept" Button which would go back to the Set Points Screen. .

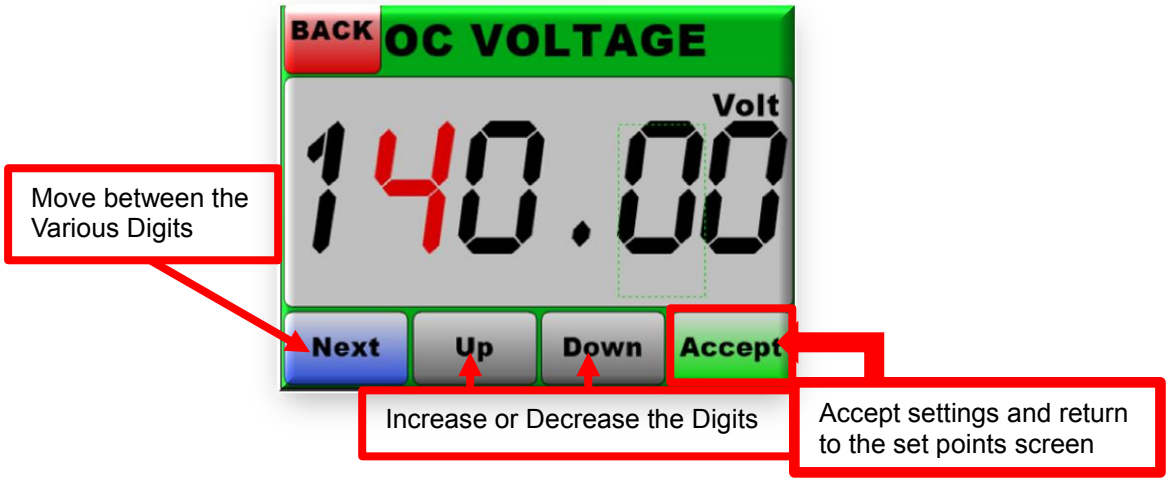


*Figure 21 – Set Point Edit Screen*

**Step 4**

On the Set Points Screen **(Fig.22)** press the "Apply" Button. If the Set Point data has been set correctly the configuration is uploaded and the progress is displayed on the notification screen **(Fig.23**). Once the Data has been successfully uploaded, the COOLMAX SR will initiate an auto-reset and return back to the Real Time Screen.

**Note: Listen for the Fan Noise while the COOLMAX SR Unit Resets to indicate a successful reboot.**

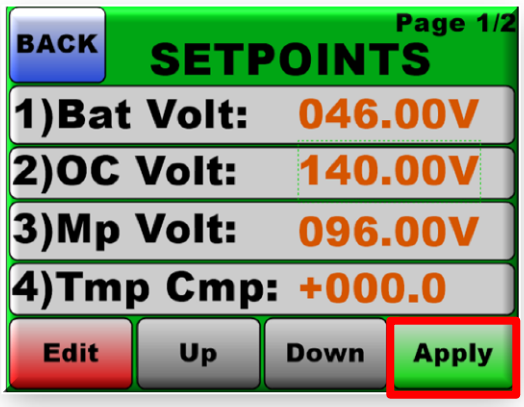


*Figure 22 – Set Points Screen*

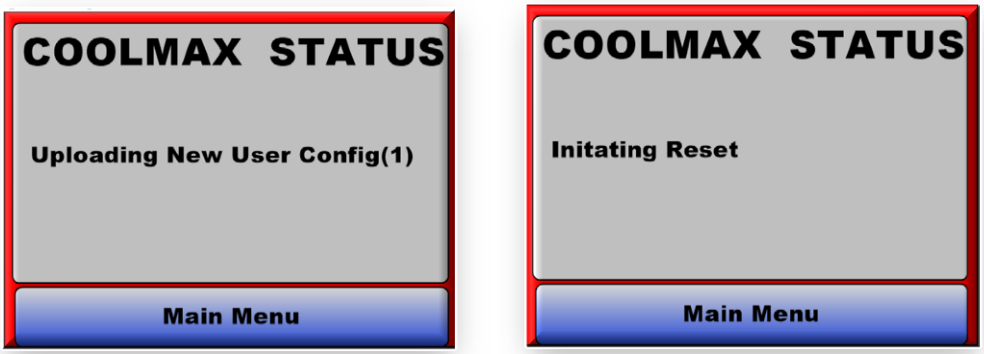


*Figure 23 – Notification Screen*

## 10.8 EDITING MP VOLTAGE SET POINT

The following steps illustrate the correct procedure to modify the MP Voltage Set Point to customise the unit.

**Step 1**

Once the unit has been powered up and the Real Time Screen **(Fig.24**) appears Press the Menu Button to go the Main Menu Screen **(Fig.24A**). From the main Menu Screen **(Fig.24A)** press the Settings Button to go to the Settings Screen. **(Fig.24B)**

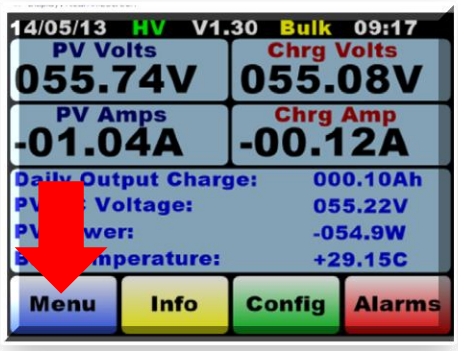


*Figure 24 – Real Time Screen*

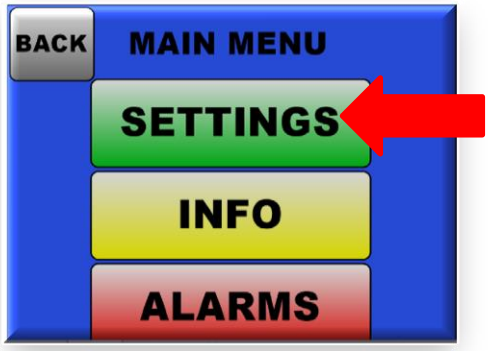


*Figure 24A – Main Menu Screen*

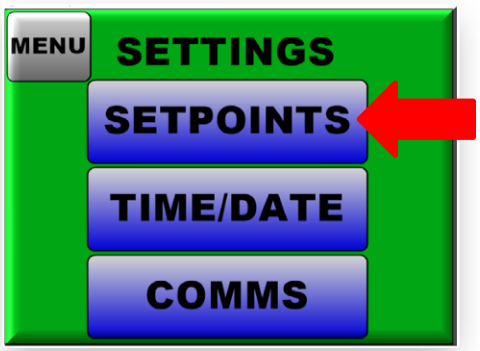


*Figure 24B – Settings Screen*

**Step 2**

On the Settings Screen **(Fig.24B**) press the Set Points Button to go the Set Points Screen **(Fig:25).** On the Set Points Screen **(Fig.25**) select the MP Volt Set Point by pressing the Down Button. Then press the Edit Button which goes to the PIN Code screen **(Fig.26)** where a 4 Digit PIN Code has to be entered.

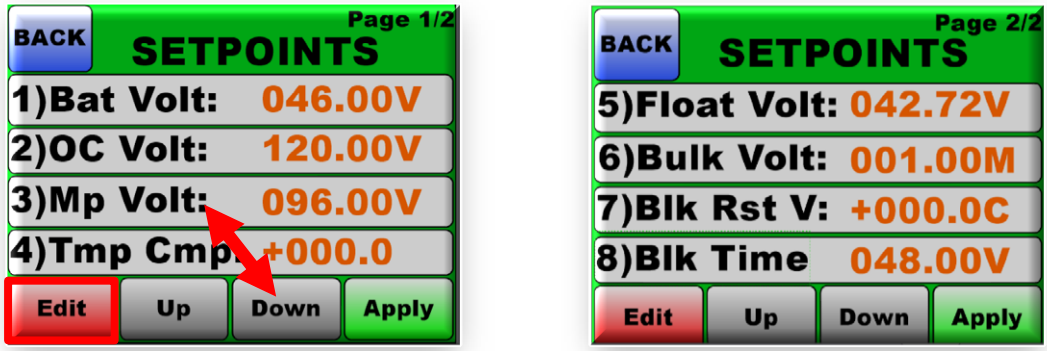


*Figure 25 – Set Points Screen*

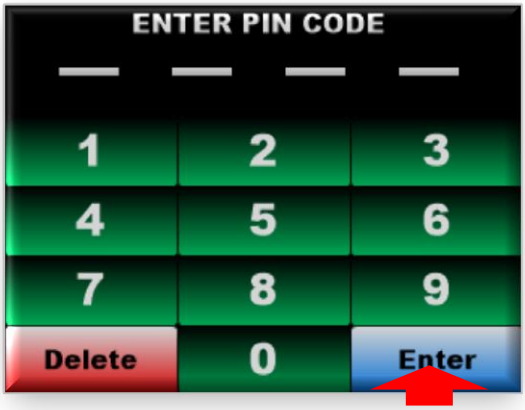


*Figure 26 – PIN Code Entry Screen*

**Step 3**

Once the 4 Digit PIN Code has been entered in the PIN Code Entry Screen **(Fig.26)** press the Enter Button which will take you to the Set Point Edit Screen **(Fig.27)** where the Set Points can be modified. To move between the various digits on the Set Point edit screen press the Next Button and to Increase or Decrease the digits press the UP and Down Button. Once the required digits have been entered press the Accept Button which would then go back to the Set Point Screen.

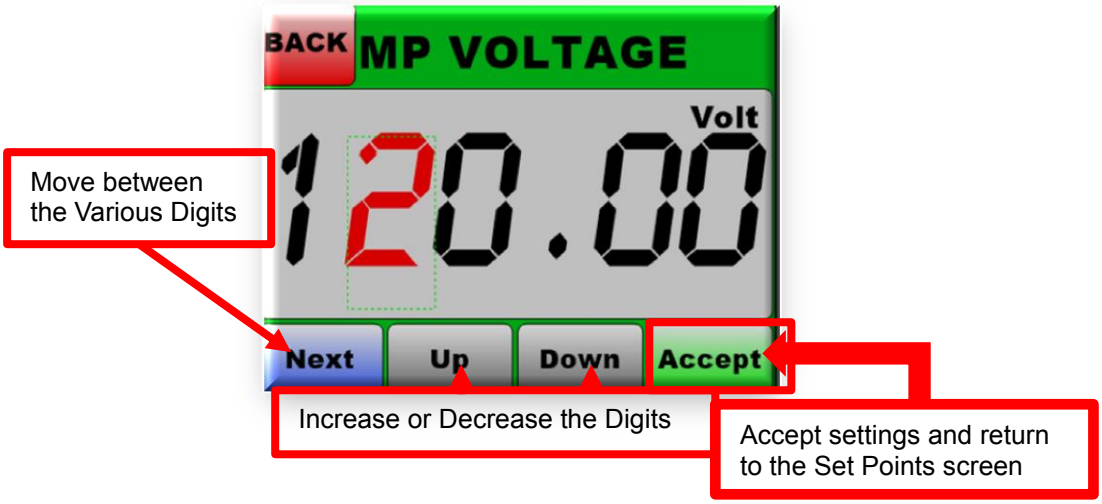


*Figure 27 – Set Point Edit Screen*

**Step 4**

On the Set Points Screen **(Fig.28)** press the Apply Button. If the Set Point data has been set correctly the configuration is uploaded and the progress is displayed on the notification screen **(Fig.29**). Once the Data has been successfully uploaded the COOLMAX SR will initiate an auto-reset and return back to the Real Time Screen.

**Note: Listen for the Fan Noise while the COOLMAX SR Unit Resets to indicate a successful reboot.**

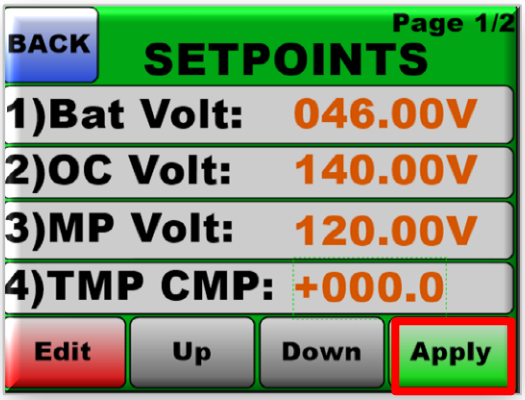


*Figure 28 –Set Points Screen*

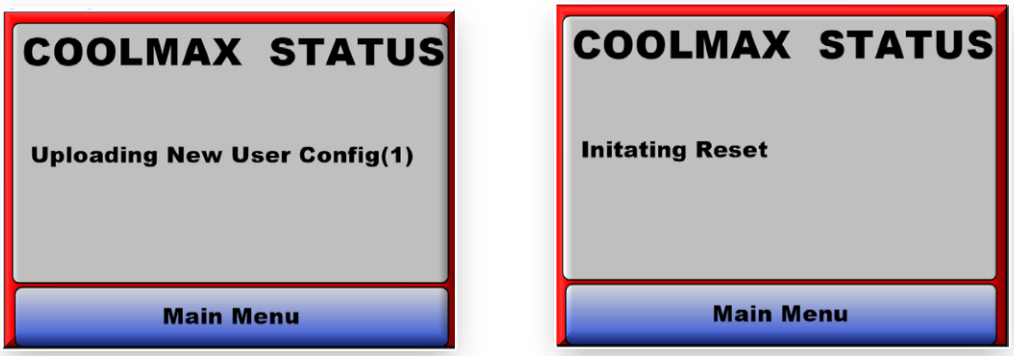


*Figure 29 – Notification Screen*

## 10.9 EDITING TMP COMP SET POINT

The following steps illustrate the correct procedure to modify the MP Voltage Set Point to customise the unit.

**Step 1**

Once the unit has been powered up and the Real Time Screen **(Fig.30)** appears. Press the Menu Button to go the Main Menu Screen **(Fig.30A)**. From the main Menu Screen **(Fig.30A)** press the Settings Button to go to the Settings Screen. **(Fig.30B)**

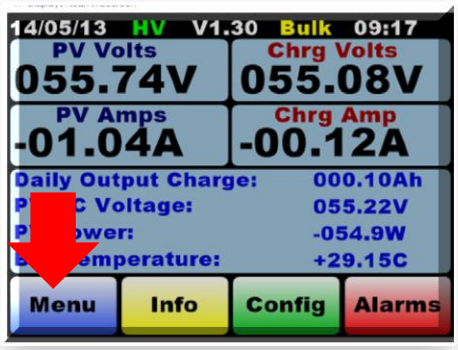


*Figure 30 – Real Time Screen*

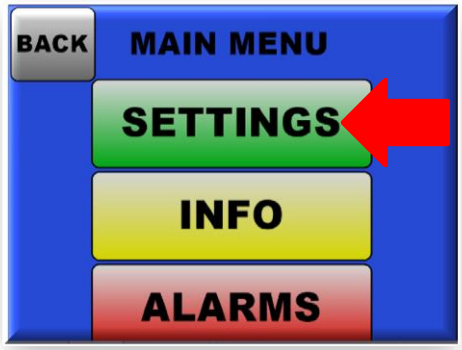


*Figure 30A – Main Menu Screen*

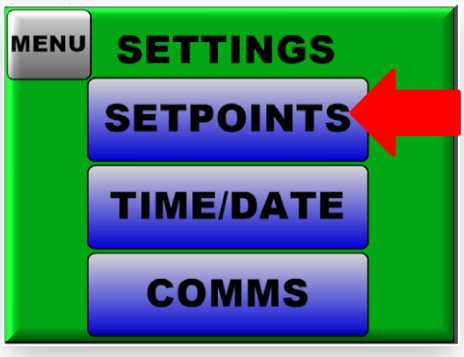


*Figure 30B – Settings Screen*

**Step 2**

On the Settings Screen **(Fig.30B)** press the Set Points Button to go the Set Points Screen **(Fig:31).** On the Set Points Screen **(see Fig:31**) select the Tmp Cmp Set Point by pressing the Down Button. Then press the Edit Button which goes to the PIN Code screen **(Fig.32)** where a 4 Digit PIN Code has to be entered.


*Figure 31 – Set Points Screen*

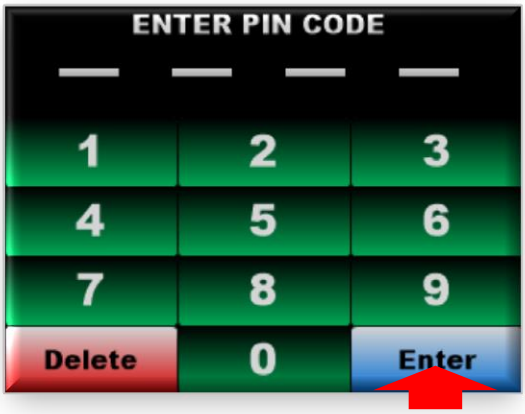


*Figure 32 – PIN Code Entry Screen*

**Step 3**

Once the 4 Digit PIN Code has been entered in the PIN Code Entry Screen **(Fig.32)** press the Enter Button which would then go to the Set Point Edit Screen **(Fig.33)** where the Set Points can be modified. To move between the various digits on the Set Point edit screen press the Next Button and to Increase or Decrease the digits press the UP and DOWN Button. Once the required digits have been entered press the Accept Button which would go back to the Set Points Screen. .

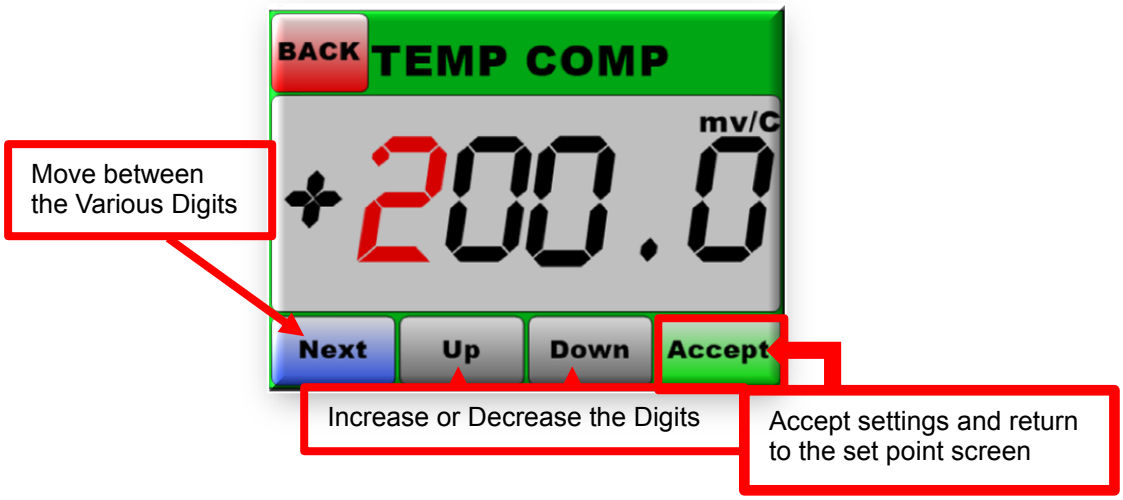


*Figure 33 – Set Point Edit Screen*

**Step 4**

On the Set Points Screen **(Fig.34)** press the Apply Button. If the Set Point data has been set correctly the configuration is uploaded and the progress is displayed on the notification screen **(Fig.35**). Once the Data has been successfully uploaded the COOLMAX SR will initiate an auto-reset and return back to the Real Time Screen.

**Note: Listen for the Fan Noise while the COOLMAX SR Unit Resets to indicate a successful reboot.**

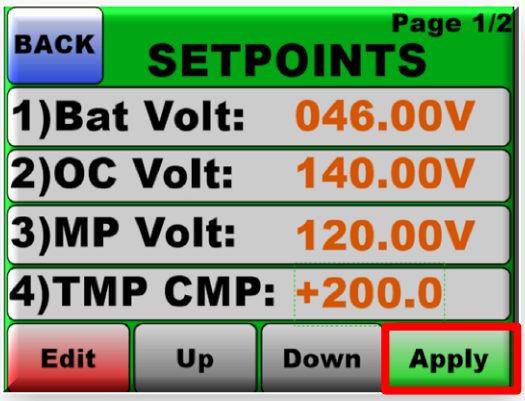


*Figure 34- Set Point Screen*

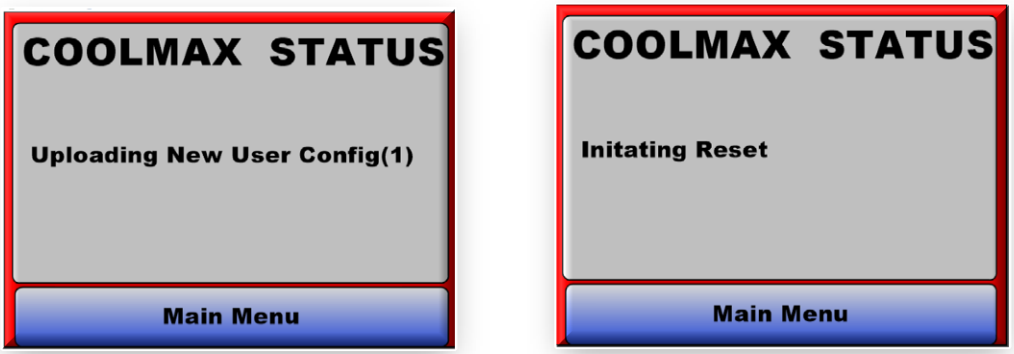


*Figure 35 – Notification Screen*

## 10.10 NOTIFICATION SCREEN

Once all Set Point data has been edited to the required values **(Fig.36)** Press the Apply Button at the bottom of the Set Point Screen, to load these settings into the COOLMAX SR configuration memory. The Notification Screen **(Fig.37 & 37A**) will be displayed to give the user information on update status of the configuration load or warning messages of the COOLMAX SR System.

When data entered on set points are above or below the allowable system parameters, a warning message is displayed **(Fig.37)** and the loading of the Set Point data is aborted. The user must return to the Set Points Screen to change the Set Point that was the cause of the warning message to an allowable value.

If all set point data has been set correctly the user is shown the progress of the configuration upload on the notification screen **(Fig.37A)**, once the data is successfully uploaded the COOLMAX SR will auto-reset and return the user to the Real Time Screen. **(Fig.12)**

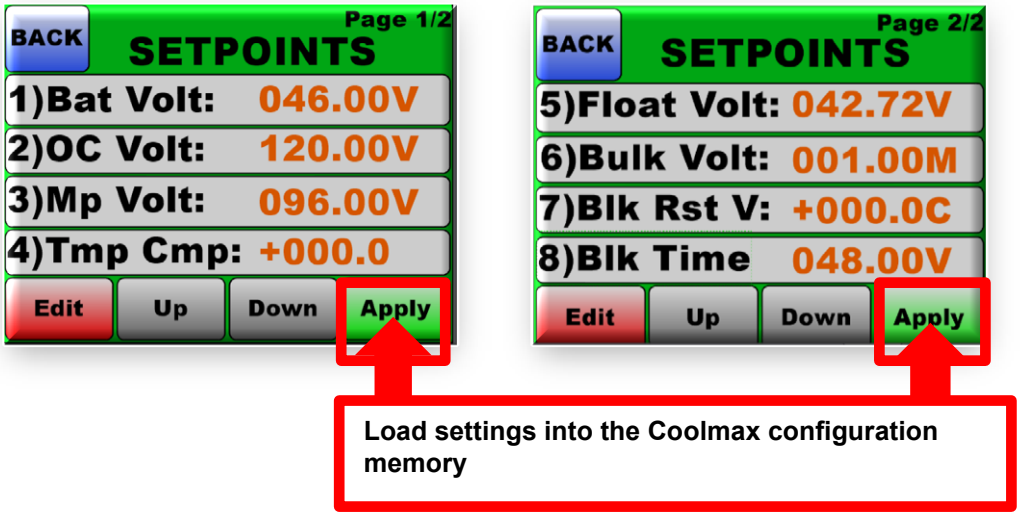


*Figure 36 – Set Point Screen*


*Figure 37- Warning Message Screen*

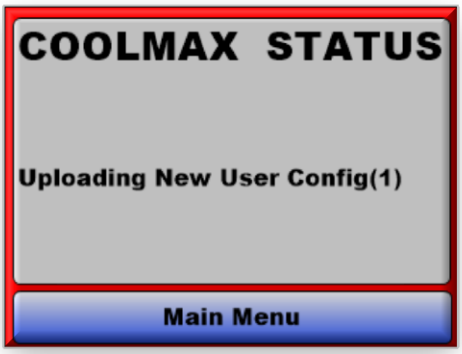


*Figure 37A- Update Message Screen*

**Note: Listen for the Fan Noise when the COOLMAX SR Unit Reboots to indicate successful**

**Important**

**It is advisable to check if the data has been updated correctly by going back to the Set Points Screen and ensuring the recently edited data is still correct**.

## 10.11 TIME / DATE

From the Main Menu **(Fig.13**) click on the Settings button. This will go to the Settings Screen **(Fig.14)**. On the Settings Screen **(Fig.14),** press the Time / Date button and this will go to the Time / Date Screen **(Fig.38)**. Press the Time Button to go to the Time Edit Screen **(Fig.38A).** Press the Date Button to go to the Date Edit Screen **(Fig.38B).**

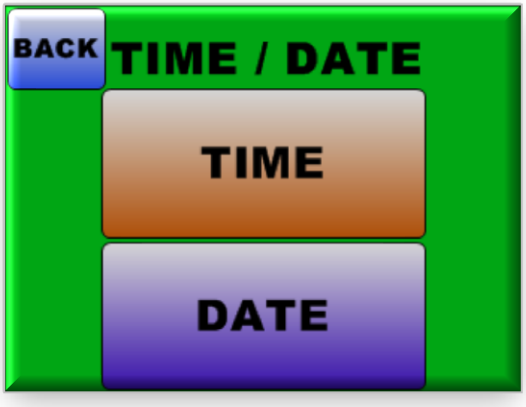


*Figure 38 – Time / Date Edit Screen*


*Figure 38A – Time Edit Screen*


*Figure 38B- Date Edit Screen*

## 10.12 EDITING THE TIME

The following steps illustrate the correct procedure to set the time for the COOLMAX SR MAXIMIZER Unit

**Step 1**
From the Real Time Screen **(Fig.39)** press the Menu Button to go to the Main Menu screen **(Fig.39A).** From the Main Menu Screen **(Fig39A)** press the Settings Button to go to the Settings Menu screen.

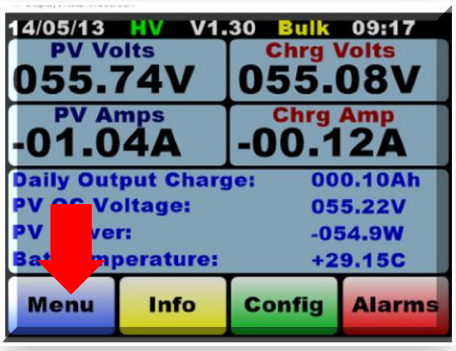


*Figure 39 – Real Time Screen*

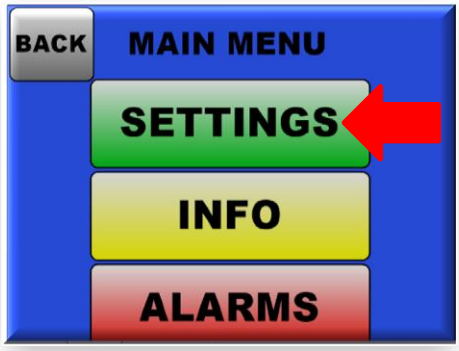


*Figure 39A – Main Menu Screen*

**Step 2**

From the Settings Menu screen **(Fig.40),** press the Time / Date button to go to the Time / Date screen **(Fig.40A)**. On the Time / Date screen **(Fig.40A)** press the Time Button to go to the Time Edit screen

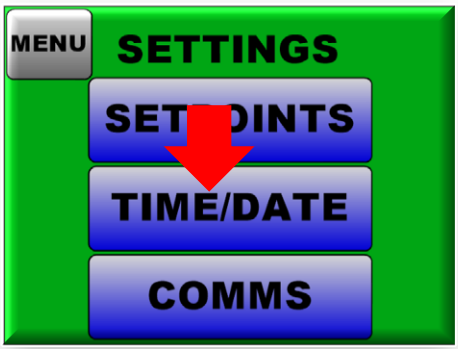


*Figure 40 – Settings Menu Screen*

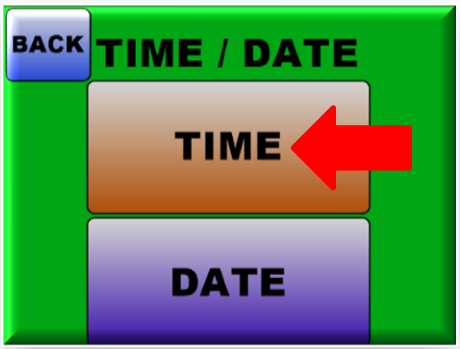


*Figure 40A – Time / Date Screen*

**Step 3**

On the Time Edit screen **(Fig.41)** press the Next Button to move between the various digits and the Up / Down Button to increase or decrease the Time. Once the Time has been set press the Accept Button to accept the Time and this would return back to the Time / Date screen **(Fig.40A)**.


*Figure 41 – Time Edit screen*

**Step 4**

From the Time / Date Screen **(Fig.42)** press the Back Button to go back to the Settings Menu screen **(Fig.42A)**. From the Settings Menu screen **(Fig.42A)** Press the Menu Button to go back to the Main Menu screen **(Fig.42B)**. From the Main Menu **(Fig.42B)** screen press the Back Button to go back to the Real Time screen **(Fig.42C**). On the Real Time screen **(Fig.42C)** ensure the time has been set correctly on the LCD Screen.

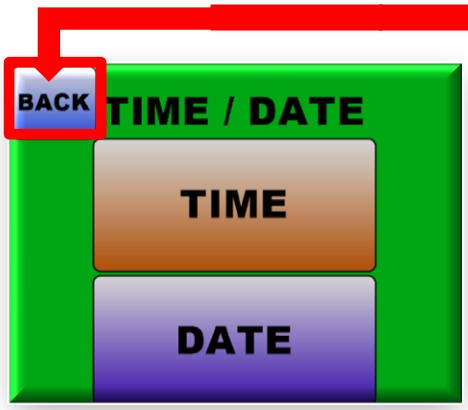


*Figure 42 – Time /Date*

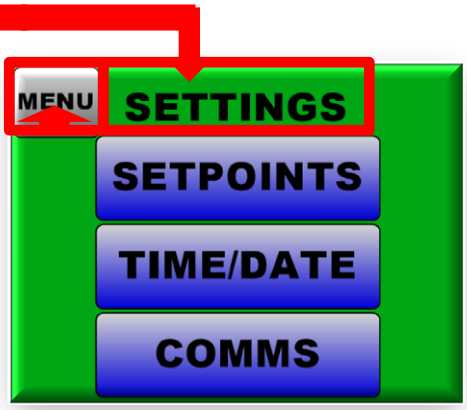


*Figure 42A – Settings Menu Screen*

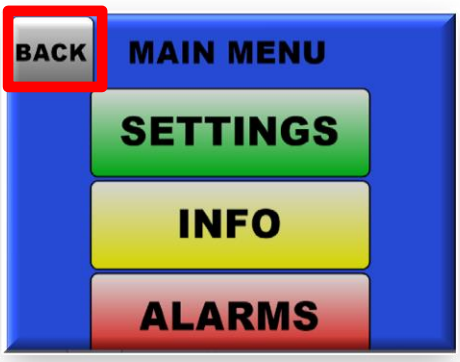


*Figure 42B – Main Menu Screen*

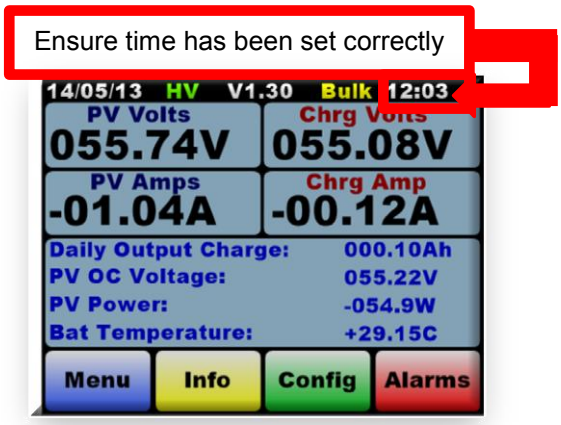


*Figure 42C – Real Time Screen*

## 10.13 EDITING THE DATE

The following steps illustrate the correct procedure to set the Date for the unit.

**Step 1**

From the Real Time Screen **(Fig.43)** press the Menu Button to go to the Main Menu screen. **(Fig.43A).** From the Main Menu Screen **(Fig.43A)** press the Settings Button to go to the Settings Menu Screen.

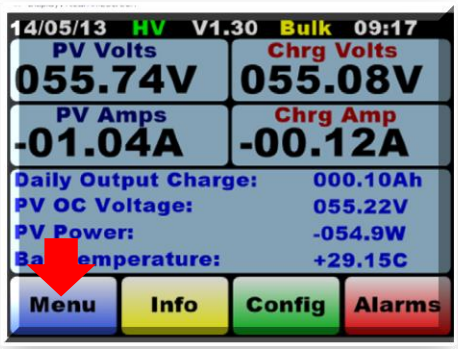


*Figure 43 – Real Time Screen*

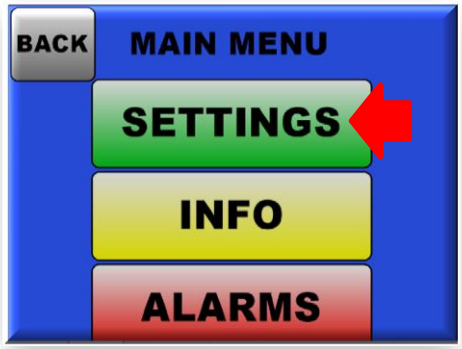


*Figure 43A – Main Menu Screen*

**Step 2**

From the Settings Menu screen **(Fig.44)** press the Time / Date button to go to the Time / Date screen **(Fig.44A)**. On the Time / Date screen **(Fig.44A)** press the Date Button to go to the Date Edit screen.

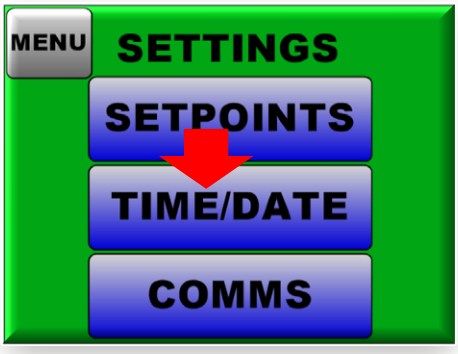


*Figure 44 – Settings Menu Screen*

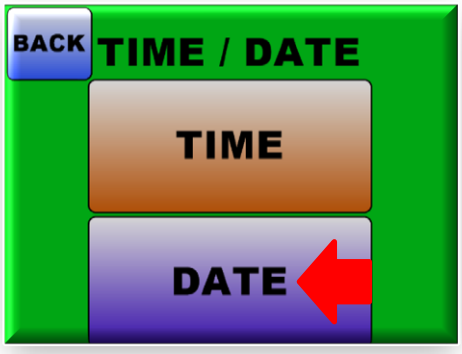


*Figure 44A – Time / Date Screen*

**Step 3**

On the Date Edit screen **(Fig.45)** press the Next Button to move between the various digits and the Up / Down Button to increase or decrease the Time. Once the Date has been set press the Accept Button to accept the Date and this would return back to the Time / Date screen **(Fig.44A).**

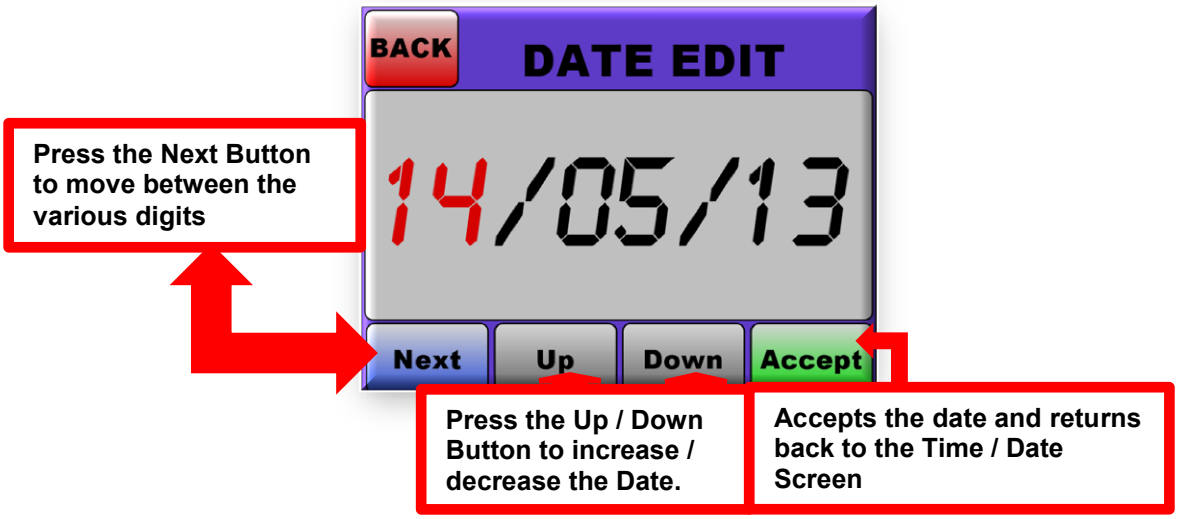


***Figure 45 – Date Edit Screen***

**Step 4**

From the Time / Date Screen **(Fig.46)** press the Back Button to go back to the Settings Menu screen **(see Fig:46A)**. From the Settings Menu screen **(Fig.46A)** Press the Menu Button to go back to the Main Menu screen **(Fig.46B)**. From the Main Menu **(Fig.46B)** screen press the Back Button to go back to the Real Time screen **(Fig.46C**). On the Real Time screen **(Fig.46C)** ensure the Date has been set correctly on the LCD Screen.

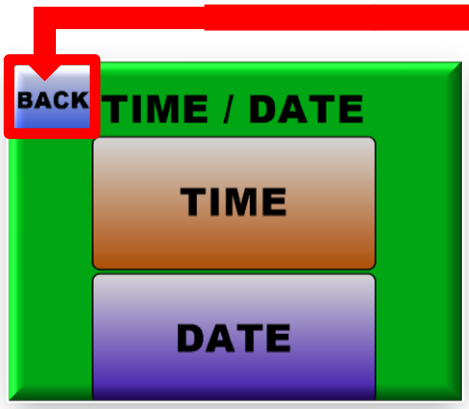


**Figure 46 – Time / Date Screen**

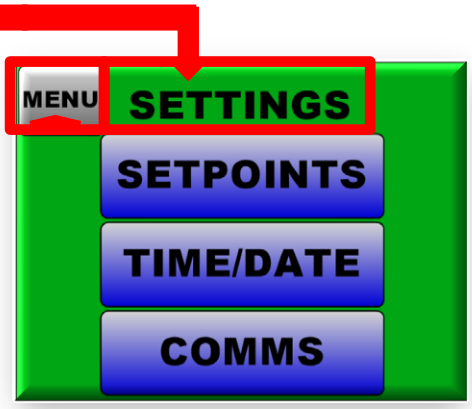


***Figure 46A – Settings Menu Screen***

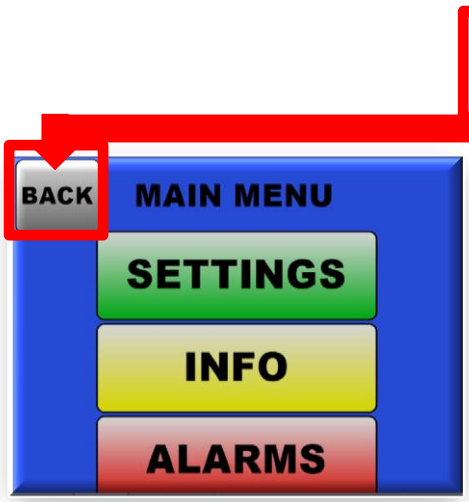


*Figure 46B – Main menu*


*Figure 46C – Real Time Screen*

## 10.14 COMMS INFO

The Comms / Connections Info displays all relevant information with which the COOLMAX SR Unit communicates with external devices on any network.

The Commss Info screen **(Fig.47**) can be accessed from the Setting's Menu **(Fig.14)** by pressing the Comms Button. This screen can also be accessed by pressing the Green Config Button from the Real Time Screen **(Fig.12**)

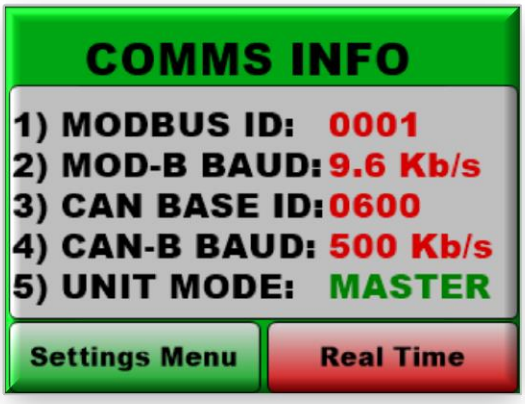


*Figure 47- Comms Info Screen*

## 10.15 UNIT INFO

From the Main Menu Screen (**Fig.12**) press the Info Button. This will go to the Unit Info Screen **(Fig.48**). The Unit Info Screen can also be accessed from the Real Time Screen (**Fig.12**) by pressing the Yellow Info Button.

Unit Info displays all relevant System Information relating to the COOLMAX SR Unit. The information displayed on the Info Screen page consists of:

- **Serial Number**
- **Product Model Number**
- **Hardware Version**
- **Firmware Version**
- **Battery Nominal Voltage**
- **Status Code A (For Internal Use Only)**
- **Status Code B (For Internal Use Only)**

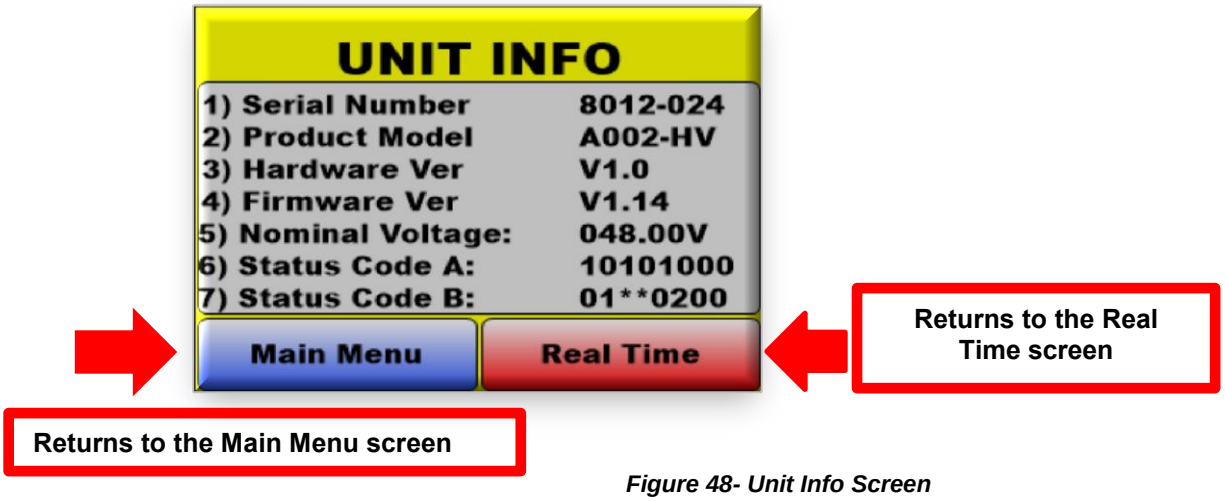


***Figure 48- Unit Info Screen***

To return back to the Main Menu from the Unit Info Screen press the Main Menu Button. To go back to the Real Time Screen press the Real Time button on the Info Screen page.

## 10.16 ALARMS / RESET

To check the status of a system alarms press the Alarms button from the Real Time Screen **(Fig.12)** or from the Main Menu Screen **(Fig.13**). This will take you to the Alarms Screen **(Fig:49)** where all the status of any active alarms will be displayed.

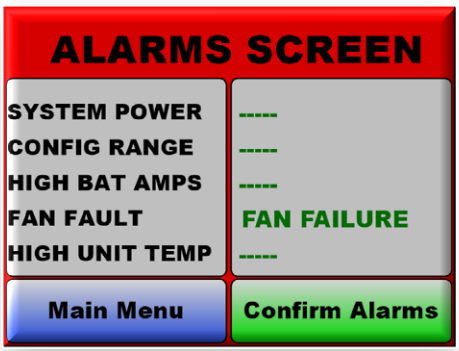


*Figure 49- Alarms Screen*

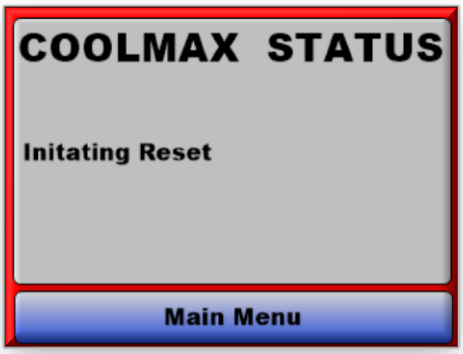


*Figure 49A- Notification Screen*

Press the Confirm Alarms Button to enable the COOLMAX SR Unit to try and reset the system to clear the alarms. The Notification Screen **(Fig.49A**) will be shown as it displays the reset status of the COOLMAX SR System. Pressing the Main Menu Button will not reset the alarms and return the user to the Main Menu. If the Alarm still exists after the COOLMAX SR System reboots please contact AERL technical support on advice on how to fix or remove the cause of the alarm.

**Important**

**Even if there are no alarms just pressing the confirm alarms button (Fig.49) will reset the COOLMAX SR**

.

**Important**

**When critical errors occur that causes the output to be shut down the Alarms button on the Real Time Screen (Fig.50) will start to flash. Press the Confirm Alarms button (Fig.50A) to reset the unit and try and rectify the alarms. If the Alarm still exists after the COOLMAX SR System reboots please contact AERL technical support on advice on how to fix or remove the cause of the alarm.**

**Note: Listen for the Fan Noise while the COOLMAX SR Unit Resets to indicate a successful**

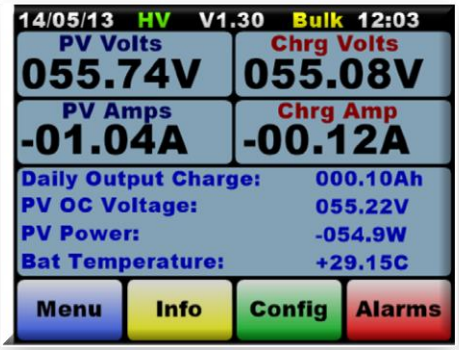


*Figure 50 – Real Time Screen*

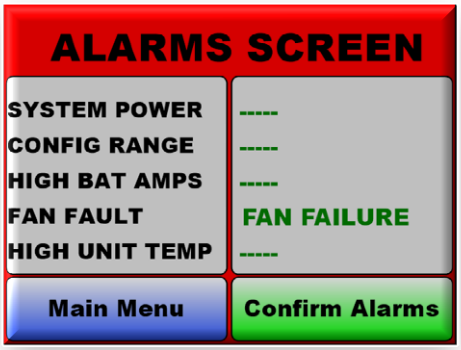


*Figure 50A – Alarms Screen*

# 11 LCD POWER SAVING FEATURE

The COOLMAX SR unit is fitted with a power saving feature where the LCD Screen dims after 40 Seconds. This results in the COOLMAX SR unit consuming just 10watts of power once the LCD Screen has been dimmed. To enable the backlight for the LCD Screen to turn back on just touch the LCD Screen. The Dim light function cannot be disabled completely. This power saving feature enables customers to differentiate between a unit that is not powered and a unit which is on but whose screen has been dimmed to save power.

# 12 OUTPUT CHARGE POWER SWITCH

The COOLMAX SR unit is fitted with a power switch to enable or disable the charge output or when required to be turned off during regular maintenance. The power switch is located at the base of the MPPT unit next to the conduit.

**Safety Information**

**To prevent the possibility of damaging the unit or the battery system it is advisable to turn off the output charge using the power switch during regular maintenance or when adjusting the charge profile.**

## 12.1 BATTERY CHARGE POWER TURN ON

When the unit is first turned on, output battery charge power is disabled. To activate output battery charge power toggle and hold the power switch (located near the conduit entry ) in either the up or down position for 5 seconds until the LCD display screen no longer shows it is “OFF” mode (**Fig.51**)
.

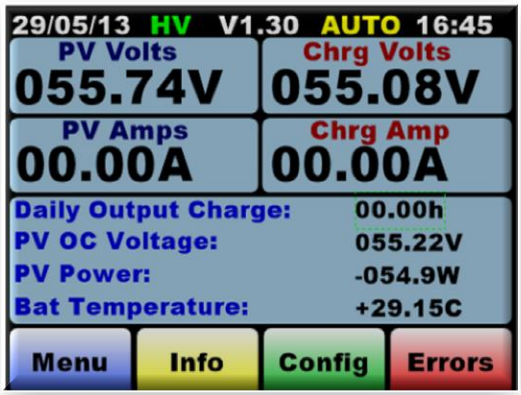


***Figure 51 – Battery Charge Power On***

**Important**

**If no Battery Output voltage or Input PV Voltage is detected by the COOLMAX SR unit when it attempts to start battery charging, it goes into auto mode whereby it attempts to activate the Output Battery Charge Output every 30 seconds. If Battery Voltage or PV Input is still not detected the unit shutdowns the charge output until the unit tries again on the next 30 second cycle.**

## 12.2 BATTERY CHARGE POWER TURN OFF

**Prior to adjusting any charge profile settings or prior to reconnecting output or input breakers that have tripped or if performing any maintenance on the battery system, it is essential to turn off the COOLMAX SR Battery Charge Output.** To do this toggle and hold the power switch in either the up or down position for 5 seconds until the LCD display screen shows it is "OFF" mode. **(Fig.52)**

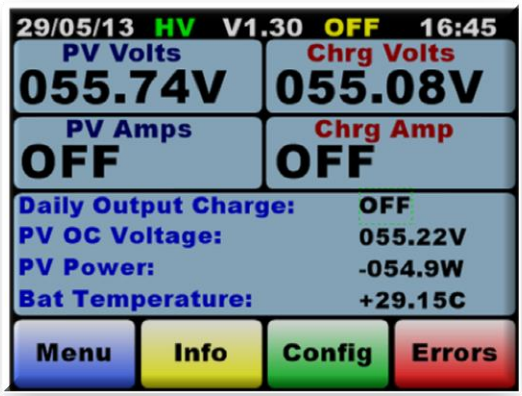


*Figure 52 – Battery Charge Power Off*

# 13 PV ARRAY CONFIGURATION NOTES

## 13.1 OPTIMAL PV ARRAY CONFIGURATION

- The minimum Vmp of the array must be greater than the battery bulk charge point.
- The closer the nominal Vmp of the array is to the nominal battery voltage the more efficient is the COOLMAX SR.
- The input open circuit voltage (Voc) must be above the minimum voltage listed in the datasheet for the COOLMAX SR to run.

## 13.2 PV INPUT BLOCKING DIODE

A PV Input blocking diode should not be used as long as the open circuit voltage of the PV array is within the range specified by the datasheet for the appropriate COOLMAX SR model and battery voltage.

The idea of the blocking diode is to prevent night time reverse leakage from the battery into the PV array. However the diode introduces power wastage during operation which outweighs the leakage, resulting in a net power loss.

## 13.3 PV MODULE POWER RATING AND MOUNTING CONSIDERATIONS

The nominal power output rating of a particular PV Module is specified by the PV Module Manufacturer, at One Sun (1000W/sq.m of sunlight radiation) and 25°C.

PV Module Maximum Power Voltage (and consequently maximum power) falls off by 4% per every 10°C that the PV panel rises above this 25°C specification, so typical panel temperatures on a hot

summers day of 65°C will result in a panel power derating of 16% of the manufacturers rating.

It is best to mount the PV Array in a way that the hot air behind the panels can easily escape via the natural breezes or convection. So don't mount the PV Array flat against the roof surface, but ensure there is at least 40mm spacing below the panels. Small gaps (20-30mm) left between adjacent panels are also a good idea to let out the hot air from the sides.

**Important**: **Around 80% of the sun-light energy falling on the solar cells is converted directly into heat, not electricity, and heat is the power output enemy**

# 14 TROUBLESHOOTING

## 14.1 LOW BATTERY ALARM TRIGGERS OFTEN

This could indicate that the PV system is underpowered, never reaching a full 108% equalise value. The battery life will be severely compromised in this situation. The more often the alarm activates the more power should be added to the PV array.

Solution: Add more PV modules to the array to increase the power output.

If the array is sufficiently powerful, but the alarm is activated frequently check that the unit is set up for the correct voltage of the battery pack. See adjusting the battery float voltage. Also check that the COOLMAX SR is charging the battery by checking the Real Time Screen **(Fig.12)**. If the COOLMAX SR unit is not functioning correctly, contact AERL Technical Support.

## 14.2 BATTERY BANK USING EXCESSIVE WATER (ELECTROLYTE)

The battery bank is lightly loaded compared to the input PV power and rarely comes off float voltage.

See Section 10 to adjust the Charge Profile.

# 15 APPENDIX A – CAN COMMUNICATIONS PROTOCOL

## 15.1 OVERVIEW

### 15.1.1 Hardware

The CAN hardware interface used is compatible with the CAN 2.0B standard. The supported bit rates (bits per second) are 1 Mbps, 500 kbps (default), 250 kbps, 125 kbps, 100 kbps and 50 kbps.

### 15.1.2 Software

The CAN protocol uses data frames for most communication. Remote frames are also enabled. All measurement data is transmitted using IEEE single-precision 32-bit format (IEEE 754) with most significant byte (MSB) sent first.

| Bit Length | 1 | 11 | 6 | 8 Bytes | 16 | 2 | 7 |
|---|---|---|---|---|---|---|---|
| | Start | Identifier | Control | Data Field | CRC | Ack | End |

***Figure 53 - CAN Data Frame***

### 15.1.3 Identifier

The identifier field has been split into two sections for the COOLMAX SR. Bits 10-5 contain the device identifier and bits 4-0 contains the message identifier associated with that device, as shown below.

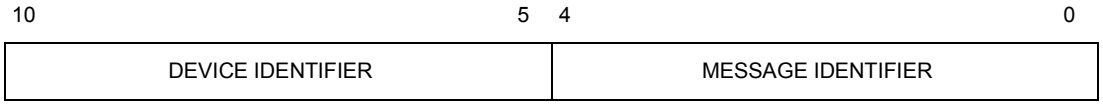


***Figure 54 - CAN Device Identifier Address Format***

### 15.1.4 Data Field

The data field in all frames is fixed at 8 bytes (64 bits) which allows space for two IEEE 754 32-bit floating point variables as shown in the Figure below. The data field is sent and expected to be received least significant byte first. This allows a direct overlay of a float[2] array and char[8] array on a little endian processor.

| High float | Low float |
|---|---|
| s eeeeeeee mmmmmmmmmmmmmmmmmmmmmmm<br>^ ^ ^ ^ ^<br>63 62 55 54 32 | s eeeeeeee mmmmmmmmmmmmmmmmmmmmmmm<br>^ ^ ^ ^ ^<br>31 30 23 22 0 |

***Figure 55 - Format of a Data Field in a Data Frame***

## 15.2 COOLMAX SR BROADCAST MESSAGES

Data frames containing telemetry values are periodically broadcast onto the bus by the COOLMAX SR.

### 15.2.1 Identification Information

**ID:** COOLMAX SR Base Address + 0

| Variable | Bits | Type | Description |
|---|---|---|---|
| Serial Number | 63…32 | Uint32 | Device serial number, allocated at manufacture. |
| Product ID | 31…0 | Uint32 | “A001” stored as a string. |

### 15.2.2 PV Voltage/Current Measurement

**ID:** COOLMAX SR Base Address + 1

| Variable | Bits | Type | Description |
|---|---|---|---|
| PV Current | 63…32 | float | PV Current |
| PV Voltage | 31…0 | float | PV Voltage |

### 15.2.3 Output Voltage/Current Measurement

**ID:** COOLMAX SR Base Address + 2

| Variable | Bits | Type | Description |
|---|---|---|---|
| Output Current | 63…32 | float | Output Current |
| Output Voltage | 31…0 | float | Output Voltage |

### 15.2.4 PV Open Circuit Voltage/Output Charge Measurement

**ID:** COOLMAX SR Base Address + 3

| Variable | Bits | Type | Description |
|---|---|---|---|
| Output charge | 63…32 | float | Output charge |
| PV OC Voltage | 31…0 | float | PV OC Voltage |

### 15.2.5 PV Power/Battery Temperature Measurement

**ID:** COOLMAX SR Base Address + 4

| Variable | Bits | Type | Description |
|---|---|---|---|
| Battery Temperature | 63…32 | float | Battery Temperature |
| PV Power | 31…0 | float | PV Power |

### 15.2.6 Active Flags

**ID:** COOLMAX SR Base Address + 5

| Variable | Bits | Type | Description |
|---|---|---|---|
| Unused | 63…13 | - | - |
| Panel missing | 12 | Boolean | Input voltage indicates panel missing |
| Log file full | 11 | Boolean | Log file full |
| Maximizer fault | 10 | Boolean | Regulation or power stage fault |
| Bat temp sensor fault | 9 | Boolean | Battery temperature sensor fault |
| Not used | 8 | Boolean | - |
| Not used | 7 | Boolean | - |
| Hi bat temp | 6 | Boolean | High battery temp fault |
| Bat current | 5 | Boolean | High battery discharge current fault |
| Iout fault | 4 | Boolean | High output current fault |
| Vout high fault | 3 | Boolean | High output voltage fault |
| Not used | 2 | - | - |

| Variable | Bits | Type | Description |
|---|---|---|---|
| Vout low fault | 1 | Boolean | Low output voltage fault |
| Vout low warning | 0 | Boolean | Low output voltage warning |

### 15.2.7 Time

**ID:** COOLMAX SR Base Address + 7

| Variable | Bits | Type | Description |
|---|---|---|---|
| Time | 63…0 | Uint64 | System Unix time |

## 15.3 COOLMAX SR COMMAND MESSAGES

### 15.3.1 Reset Command

**ID:** Driver Controls Base Address + 23

| Variable | Bits | Units | Description |
|---|---|---|---|
| Unused | 63…32 | Unit32 | - |
| Reset command string<br>ALL – full reset<br>RCO – remote config reset | 31…0 | Uint32 | Send 'ALL' or 'RCO' as a string (“00000ALL”)<br>COOLMAX SR replies with Y or N in byte 0 |

# 16 APPENDIX B – MODBUS COMMUNICATIONS PROTOCOL

## 16.1 OVERVIEW

### 16.1.1 Hardware

The Modbus hardware interface used is compatible with the Modbus RTU standard. The supported bit rates (bits per second) is 9600 bps.

**Software**

All measurement data is transmitted using IEEE single-precision 32-bit format (IEEE 754) with most significant byte (MSB) sent first.

### 16.1.2 Modbus Address

The Modbus address is a single byte field, valid address ranges from 1 to 128.

## 16.2 MODBUS MEMORY MAP (DISCRETE INPUTS)

Single−Bit (Read−Only)
Returns : 0 to 255 (***byte*** data type) 0x00 to 0xFF (i.e. 8 Bits)
Notes : When a request is sent to read a discrete input, a byte is returned containing the values of 8 consecutive inputs, with the addressed input as the LSB. If the returned input quantity is not a multiple of 8 bits, then the final data byte is padded with zeros.

| Memory Offset | Input Address | Description | Input Range | Data Range | Read/Write | Comment |
|---|---|---|---|---|---|---|
| – | 10000 | – | – | – | – | – |
| 0 | 10001 | **ACTIVE EVENTS** System Power | Bit | 0 or 1 | Read−Write | 0 → Event Cleared 1 → Event Triggered |
| 1 | 10002 | **ACTIVE EVENTS** Low Out Voltage Warning | Bit | 0 or 1 | Read−Write | 0 → Event Cleared 1 → Event Triggered |
| 2 | 10003 | **ACTIVE EVENTS** Low Out Voltage Fault | Bit | 0 or 1 | Read−Write | 0 → Event Cleared 1 → Event Triggered |
| 3 | 10004 | **ACTIVE EVENTS** Low Out Voltage Gen−Set | Bit | 0 or 1 | Read−Write | 0 → Event Cleared 1 → Event Triggered |
| 4 | 10005 | **ACTIVE EVENTS** High Out Voltage Fault | Bit | 0 or 1 | Read−Write | 0 → Event Cleared 1 → Event Triggered |
| 5 | 10006 | **ACTIVE EVENTS** High Out Current Fault | Bit | 0 or 1 | Read−Write | 0 → Event Cleared 1 → Event Triggered |
| 6 | 10007 | **ACTIVE EVENTS** High Discharge Current Fault | Bit | 0 or 1 | Read−Write | 0 → Event Cleared 1 → Event Triggered |
| 7 | 10008 | **ACTIVE EVENTS** High Battery Temperature Fault | Bit | 0 or 1 | Read−Write | 0 → Event Cleared 1 → Event Triggered |
| 8 | 10009 | **ACTIVE EVENTS** Input Breaker Open | Bit | 0 or 1 | Read−Write | 0 → Event Cleared 1 → Event Triggered |
| 9 | 10010 | **ACTIVE EVENTS** Output Breaker Open | Bit | 0 or 1 | Read−Write | 0 → Event Cleared 1 → Event Triggered |
| 10 | 10011 | **ACTIVE EVENTS** Temperature Sensor Fault | Bit | 0 or 1 | Read−Write | 0 → Event Cleared 1 → Event Triggered |
| 11 | 10012 | **ACTIVE EVENTS** Negative PV Current Shutdown | Bit | 0 or 1 | Read−Write | 0 → Event Cleared 1 → Event Triggered |

| Memory Offset | Input Address | Description | Input Range | Data Range | Read/Write | Comment |
|---|---|---|---|---|---|---|
| 12 | 10013 | **ACTIVE EVENTS** High PV Current Shutdown | Bit | 0 or 1 | Read−Write | 0 → Event Cleared 1 → Event Triggered |
| 13 | 10014 | **ACTIVE EVENTS** High PV Voltage Shutdown | Bit | 0 or 1 | Read−Write | 0 → Event Cleared 1 → Event Triggered |
| 14 | 10015 | **ACTIVE EVENTS** High Output Current Shutdown | Bit | 0 or 1 | Read−Write | 0 → Event Cleared 1 → Event Triggered |
| 15 | 10016 | **ACTIVE EVENTS** High Output Voltage Shutdown | Bit | 0 or 1 | Read−Write | 0 → Event Cleared 1 → Event Triggered |
| 16 | 10017 | **ACTIVE EVENTS** Heat−Sink Temperature Too High | Bit | 0 or 1 | Read−Write | 0 → Event Cleared 1 → Event Triggered |
| 17 | 10018 | **ACTIVE EVENTS** Fan Fault | Bit | 0 or 1 | Read−Write | 0 → Event Cleared 1 → Event Triggered |
| 18 | 10019 | **ACTIVE EVENTS** Log File Full | Bit | 0 or 1 | Read−Write | 0 → Event Cleared 1 → Event Triggered |
| 19 | 10020 | **ACTIVE EVENTS** Solar Panel Missing | Bit | 0 or 1 | Read−Write | 0 → Event Cleared 1 → Event Triggered |
| 20 | 10021 | **ACTIVE EVENTS** Config Value Out−Of−Range | Bit | 0 or 1 | Read−Write | 0 → Event Cleared 1 → Event Triggered |
| 21 | 10022 | **ACTIVE EVENTS** (Not Used) | Bit | 0 or 1 | Read−Write | Reserved |
| 22 | 10023 | **ACTIVE EVENTS** (Not Used) | Bit | 0 or 1 | Read−Write | Reserved |
| 23 | 10024 | **ACTIVE EVENTS** (Not Used) | Bit | 0 or 1 | Read−Write | Reserved |
| 24 | 10025 | **ACTIVE EVENTS** (Not Used) | Bit | 0 or 1 | Read−Write | Reserved |
| 25 | 10026 | **ACTIVE EVENTS** (Not Used) | Bit | 0 or 1 | Read−Write | Reserved |
| 26 | 10027 | **ACTIVE EVENTS** (Not Used) | Bit | 0 or 1 | Read−Write | Reserved |
| 27 | 10028 | **ACTIVE EVENTS** (Not Used) | Bit | 0 or 1 | Read−Write | Reserved |

| Memory Offset | Input Address | Description | Input Range | Data Range | Read/Write | Comment |
|---|---|---|---|---|---|---|
| 28 | 10029 | **ACTIVE EVENTS** (Not Used) | Bit | 0 or 1 | Read−Write | Reserved |
| 29 | 10030 | **ACTIVE EVENTS** (Not Used) | Bit | 0 or 1 | Read−Write | Reserved |
| 30 | 10031 | **ACTIVE EVENTS** (Not Used) | Bit | 0 or 1 | Read−Write | Reserved |
| 31 | 10032 | **ACTIVE EVENTS** (Not Used) | Bit | 0 or 1 | Read−Write | Reserved |
| 32 | 10033 | **STATUS – Configuration** Factory Config CRC | Bit | 0 or 1 | Read−Only | 0 → CRC Invalid<br>1 → CRC Valid |
| 33 | 10034 | **STATUS – Configuration** Factory Config Check | Bit | 0 or 1 | Read−Only | 0 → Check Failed<br>1 → Check Passed |
| 34 | 10035 | **STATUS – Configuration** User Config CRC | Bit | 0 or 1 | Read−Only | 0 → CRC Invalid<br>1 → CRC Valid |
| 35 | 10036 | **STATUS – Configuration** User Config Check | Bit | 0 or 1 | Read−Only | 0 → Check Failed<br>1 → Check Passed |
| 36 | 10037 | **STATUS – Configuration** Event Config CRC | Bit | 0 or 1 | Read−Only | 0 → CRC Invalid<br>1 → CRC Valid |
| 37 | 10038 | **STATUS – Configuration** Event Config Check | Bit | 0 or 1 | Read−Only | 0 → Check Failed<br>1 → Check Passed |
| 38 | 10039 | **STATUS – Configuration** Telemetry Config CRC | Bit | 0 or 1 | Read−Only | 0 → CRC Invalid<br>1 → CRC Valid |
| 39 | 10040 | **STATUS – Configuration** Telemetry Config Check | Bit | 0 or 1 | Read−Only | 0 → Check Failed<br>1 → Check Passed |
| 40 | 10041 | **STATUS – Statistics** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 41 | 10042 | **STATUS – Statistics** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 42 | 10043 | **STATUS – Statistics** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 43 | 10044 | **STATUS – Statistics** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 44 | 10045 | **STATUS – Statistics** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |

| Memory Offset | Input Address | Description | Input Range | Data Range | Read/Write | Comment |
|---|---|---|---|---|---|---|
| 45 | 10046 | **STATUS – Statistics** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 46 | 10047 | **STATUS – Statistics** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 47 | 10048 | **STATUS – Statistics** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 48 | 10049 | **STATUS – Flags** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 49 | 10050 | **STATUS – Flags** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 50 | 10051 | **STATUS – Flags** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 51 | 10052 | **STATUS – Flags** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 52 | 10053 | **STATUS – Flags** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 53 | 10054 | **STATUS – Flags** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 54 | 10055 | **STATUS – Flags** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 55 | 10056 | **STATUS – Flags** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 56 | 10057 | **STATUS – Telemetry** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 57 | 10058 | **STATUS – Telemetry** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 58 | 10059 | **STATUS – Telemetry** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 59 | 10060 | **STATUS – Telemetry** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 60 | 10061 | **STATUS – Telemetry** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 61 | 10062 | **STATUS – Telemetry** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 62 | 10063 | **STATUS – Telemetry** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 63 | 10064 | **STATUS – Telemetry** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 64 | 10065 | **STATUS – Communications** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 65 | 10066 | **STATUS – Communications** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 66 | 10067 | **STATUS – Communications** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 67 | 10068 | **STATUS – Communications** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |

| Memory Offset | Input Address | Description | Input Range | Data Range | Read/Write | Comment |
|---|---|---|---|---|---|---|
| 68 | 10069 | **STATUS – Communications** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 69 | 10070 | **STATUS – Communications** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 70 | 10071 | **STATUS – Communications** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 71 | 10072 | **STATUS – Communications** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 72 | 10073 | **STATUS – Flash** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 73 | 10074 | **STATUS – Flash** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 74 | 10075 | **STATUS – Flash** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 75 | 10076 | **STATUS – Flash** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 76 | 10077 | **STATUS – Flash** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 77 | 10078 | **STATUS – Flash** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 78 | 10079 | **STATUS – Flash** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 79 | 10080 | **STATUS – Flash** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 80 | 10081 | **STATUS – Control** Master / Slave | Bit | 0 or 1 | Read−Only | 0 → Device is Master<br>1 → Device is Slave |
| 81 | 10082 | **STATUS – Control** Active Set−Point Mode | Bit | 0 or 1 | Read−Only | 0 → Using Float Set−Point<br>1 → Using Bulk Set−Point |
| 82 | 10083 | **STATUS – Control** Control Mode | Bit | 0 or 1 | Read−Only | 0 → MPPT<br>1 → Output Voltage<br>2 → Input Voltage<br>3 → Not Used |
| 83 | 10084 | | | | | |
| 84 | 10085 | **STATUS – Control** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |

| Memory Offset | Input Address | Description | Input Range | Data Range | Read/Write | Comment |
|---|---|---|---|---|---|---|
| 85 | 10086 | **STATUS – Control** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 86 | 10087 | **STATUS – Control** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 87 | 10088 | **STATUS – Control** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 88 | 10089 | **STATUS – Safety** Shutdown State | Bit | 0 or 1 | Read−Only | 0 → Shutdown 1 → Operating |
| 89 | 10090 | **STATUS – Safety** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 90 | 10091 | **STATUS – Safety** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 92 | 10093 | **STATUS – Safety** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 93 | 10094 | **STATUS – Safety** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 94 | 10095 | **STATUS – Safety** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |
| 95 | 10096 | **STATUS – Safety** (Not Used) | Bit | 0 or 1 | Read−Only | Reserved |

# MODBUS MEMORY MAP (Input Registers)

16−Bit (Register)

Returns : 0 to 65535 (***unsigned short*** data type) 0x0000 to 0xFFFF (i.e. 2 x 8 Bits)

Notes : When a request is sent to read an input register, two bytes are returned for each register.
The result may be stored as an unsigned short data type.
Integers and Floating point values (32−bits) are stored over two registers.
Long values (64−bits) are stored over 4 registers.

| Memory Offset | Register Address | Description | Register Range | Data Range | Read/Write | Comment |
|---|---|---|---|---|---|---|
| – | 30000 | – | – | – | – | – |
| 0 | 30001 | **LIVE TELEMETRY** Product ID (8 Characters) | 16−Bits | 0 to 65535 | Read−Only | Product ID (Byte 1 − High)<br>Product ID (Byte 2 − Low) |
| 1 | 30002 | | 16−Bits | 0 to 65535 | Read−Only | Product ID (Byte 3 − High)<br>Product ID (Byte 4 − Low) |
| 2 | 30003 | | 16−Bits | 0 to 65535 | Read−Only | Product ID (Byte 5 − High)<br>Product ID (Byte 6 − Low) |
| 3 | 30004 | | 16−Bits | 0 to 65535 | Read−Only | Product ID (Byte 7 − High)<br>Product ID (Byte 8 − Low) |
| 4 | 30005 | **LIVE TELEMETRY** Serial Number (8 Characters) | 16−Bits | 0 to 65535 | Read−Only | Serial # (Byte 1 − High)<br>Serial # (Byte 2 − Low) |
| 5 | 30006 | | 16−Bits | 0 to 65535 | Read−Only | Serial # (Byte 3 − High)<br>Serial # (Byte 4 − Low) |
| 6 | 30007 | | 16−Bits | 0 to 65535 | Read−Only | Serial # (Byte 5 − High)<br>Serial # (Byte 6 − Low) |
| 7 | 30008 | | 16−Bits | 0 to 65535 | Read−Only | Serial # (Byte 7 − High)<br>Serial # (Byte 8 − Low) |
| 8 | 30009 | **LIVE TELEMETRY** PV Voltage (Volts) (Float) | 16−Bits | 0 to 65535 | Read−Only | PV Voltage (Byte 1 − High)<br>PV Voltage (Byte 2 − Low) |
| 9 | 30010 | | 16−Bits | 0 to 65535 | Read−Only | PV Voltage (Byte 3 − High)<br>PV Voltage (Byte 4 − Low) |
| 10 | 30011 | **LIVE TELEMETRY** PV Current (Amps) (Float) | 16−Bits | 0 to 65535 | Read−Only | PV Current (Byte 1 − High)<br>PV Current (Byte 2 − Low) |
| 11 | 30012 | | 16−Bits | 0 to 65535 | Read−Only | PV Current (Byte 3 − High)<br>PV Current (Byte 4 − Low) |
| 12 | 30013 | **LIVE TELEMETRY** Output Voltage (Volts) (Float) | 16−Bits | 0 to 65535 | Read−Only | Out Voltage (Byte 1 − High)<br>Out Voltage (Byte 2 − Low) |
| 13 | 30014 | | 16−Bits | 0 to 65535 | Read−Only | Out Voltage (Byte 3 − High)<br>Out Voltage (Byte 4 − Low) |
| 14 | 30015 | **LIVE TELEMETRY** Output Current (Amps) (Float) | 16−Bits | 0 to 65535 | Read−Only | Out Current (Byte 1 − High)<br>Out Current (Byte 2 − Low) |
| 15 | 30016 | | 16−Bits | 0 to 65535 | Read−Only | Out Current (Byte 3 − High)<br>Out Current (Byte 4 − Low) |
| 16 | 30017 | **LIVE TELEMETRY** PV Open−Circuit Voltage (Volts) (Float) | 16−Bits | 0 to 65535 | Read−Only | OC Voltage (Byte 1 − High)<br>OC Voltage (Byte 2 − Low) |
| 17 | 30018 | | 16−Bits | 0 to 65535 | Read−Only | OC Voltage (Byte 3 − High)<br>OC Voltage (Byte 4 − Low) |
| 18 | 30019 | **LIVE TELEMETRY** Daily Output Charge (Ah) (Float) | 16−Bits | 0 to 65535 | Read−Only | Out Charge (Byte 1 − High)<br>Out Charge (Byte 2 − Low) |
| 19 | 30020 | | 16−Bits | 0 to 65535 | Read−Only | Out Charge (Byte 3 − High)<br>Out Charge (Byte 4 − Low) |
| 20 | 30021 | **LIVE TELEMETRY** Photovoltaic Power (W) (Float) | 16−Bits | 0 to 65535 | Read−Only | PV Power (Byte 1 − High)<br>PV Power (Byte 2 − Low) |
| 21 | 30022 | | 16−Bits | 0 to 65535 | Read−Only | PV Power (Byte 3 − High)<br>PV Power (Byte 4 − Low) |

| Memory Offset | Register Address | Description | Register Range | Data Range | Read/Write | Comment |
|---|---|---|---|---|---|---|
| 22 | 30023 | **LIVE TELEMETRY** Case Temperature (°C) (Float) | 16−Bits | 0 to 65535 | Read−Only | Out Current (Byte 1 − High)<br>Out Current (Byte 2 − Low) |
| 23 | 30024 | | 16−Bits | 0 to 65535 | Read−Only | Out Current (Byte 3 − High)<br>Out Current (Byte 4 − Low) |
| 24 | 30025 | **LIVE TELEMETRY** Active Events (Uint32) | 16−Bits | 0 to 65535 | Read−Only | Active Events (Byte 1 − High)<br>Active Events (Byte 2 − Low) |
| 25 | 30026 | | 16−Bits | 0 to 65535 | Read−Only | Active Events (Byte 3 − High)<br>Active Events (Byte 4 − Low) |
| 26 | 30027 | **LIVE TELEMETRY** Status Flags (UInt64) | 16−Bits | 0 to 65535 | Read−Only | Status Flags (Byte 1 − High)<br>Status Flags (Byte 2 − Low) |
| 27 | 30028 | | 16−Bits | 0 to 65535 | Read−Only | Status Flags (Byte 3 − High)<br>Status Flags (Byte 4 − Low) |
| 28 | 30029 | | 16−Bits | 0 to 65535 | Read−Only | Status Flags (Byte 5 − High)<br>Status Flags (Byte 6 − Low) |
| 29 | 30030 | | 16−Bits | 0 to 65535 | Read−Only | Status Flags (Byte 7 − High)<br>Status Flags (Byte 8 − Low) |
| 30 | 30031 | **LIVE TELEMETRY** Unix Time (UInt64) | 16−Bits | 0 to 65535 | Read−Only | Unix Time (Byte 1 − High)<br>Unix Time (Byte 2 − Low) |
| 31 | 30032 | | 16−Bits | 0 to 65535 | Read−Only | Unix Time (Byte 3 − High)<br>Unix Time (Byte 4 − Low) |
| 32 | 30033 | | 16−Bits | 0 to 65535 | Read−Only | Unix Time (Byte 5 − High)<br>Unix Time (Byte 6 − Low) |
| 33 | 30034 | | 16−Bits | 0 to 65535 | Read−Only | Unix Time (Byte 7 − High)<br>Unix Time (Byte 8 − Low) |
| 40 | 30041 | **SYSTEM INFO** Hardware Version (8 Characters) | 16−Bits | 0 to 65535 | Read−Only | Hardware Ver. (Byte 1 − High)<br>Hardware Ver. (Byte 2 − Low) |
| 41 | 30042 | | 16−Bits | 0 to 65535 | Read−Only | Hardware Ver. (Byte 3 − High)<br>Hardware Ver. (Byte 4 − Low) |
| 42 | 30043 | | 16−Bits | 0 to 65535 | Read−Only | Hardware Ver. (Byte 5 − High)<br>Hardware Ver. (Byte 6 − Low) |
| 43 | 30044 | | 16−Bits | 0 to 65535 | Read−Only | Hardware Ver. (Byte 7 − High)<br>Hardware Ver. (Byte 8 − Low) |

| Memory Offset | Register Address | Description | Register Range | Data Range | Read/Write | Comment |
|---|---|---|---|---|---|---|
| 44 | 30045 | **SYSTEM INFO** Firmware Version (8 Characters) | 16−Bits | 0 to 65535 | Read−Only | Firmware Ver. (Byte 1 − High) Firmware Ver. (Byte 2 − Low) |
| 45 | 30046 | | 16−Bits | 0 to 65535 | Read−Only | Firmware Ver. (Byte 3 − High) Firmware Ver. (Byte 4 − Low) |
| 46 | 30047 | | 16−Bits | 0 to 65535 | Read−Only | Firmware Ver. (Byte 5 − High) Firmware Ver. (Byte 6 − Low) |
| 47 | 30048 | | 16−Bits | 0 to 65535 | Read−Only | Firmware Ver. (Byte 7 − High) Firmware Ver. (Byte 8 − Low) |
| 48 | 30049 | **SYSTEM INFO** Model Type (4 Characters) | 16−Bits | 0 to 65535 | Read−Only | Model Type (Byte 1 − High) Model Type (Byte 2 − Low) |
| 49 | 30050 | | 16−Bits | 0 to 65535 | Read−Only | Model Type (Byte 3 − High) Model Type (Byte 4 − Low) |
| 50 | 30051 | **SYSTEM INFO** Product ID (8 Characters) | 16−Bits | 0 to 65535 | Read−Only | Product ID (Byte 1 − High) Product ID (Byte 2 − Low) |
| 51 | 30052 | | 16−Bits | 0 to 65535 | Read−Only | Product ID (Byte 3 − High) Product ID (Byte 4 − Low) |
| 52 | 30053 | | 16−Bits | 0 to 65535 | Read−Only | Product ID (Byte 5 − High) Product ID (Byte 6 − Low) |
| 53 | 30054 | | 16−Bits | 0 to 65535 | Read−Only | Product ID (Byte 7 − High) Product ID (Byte 8 − Low) |
| 54 | 30055 | **SYSTEM INFO** Serial Number (8 Characters) | 16−Bits | 0 to 65535 | Read−Only | Serial # (Byte 1 − High) Serial # (Byte 2 − Low) |
| 55 | 30056 | | 16−Bits | 0 to 65535 | Read−Only | Serial # (Byte 3 − High) Serial # (Byte 4 − Low) |
| 56 | 30057 | | 16−Bits | 0 to 65535 | Read−Only | Serial # (Byte 5 − High) Serial # (Byte 6 − Low) |
| 57 | 30058 | | 16−Bits | 0 to 65535 | Read−Only | Serial # (Byte 7 − High) Serial # (Byte 8 − Low) |
| 58 | 30059 | **SYSTEM INFO** Reserved | 16−Bits | 0 to 65535 | Read−Only | Reserved |
| 59 | 30060 | **SYSTEM INFO** Reserved | 16−Bits | 0 to 65535 | Read−Only | Reserved |
| 60 | 30061 | **SYSTEM INFO** Reserved | 16−Bits | 0 to 65535 | Read−Only | Reserved |
| 61 | 30062 | **SYSTEM INFO** Reserved | 16−Bits | 0 to 65535 | Read−Only | Reserved |
| 62 | 30063 | **SYSTEM INFO** Reserved | 16−Bits | 0 to 65535 | Read−Only | Reserved |
| 63 | 30064 | **SYSTEM INFO** Reserved | 16−Bits | 0 to 65535 | Read−Only | Reserved |