

BLUE NOVA energy

User Manual BMAC Module version D

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| Approved by | C. Delport |

A. DOCUMENT SCOPE

Congratulations on purchasing a high quality BlueNova® product

This document covers structural information, installation instructions, troubleshooting & maintenance instructions for **BlueNova's BMAC module**.

If you have any questions or comments, kindly contact BlueNova® Technical Support:

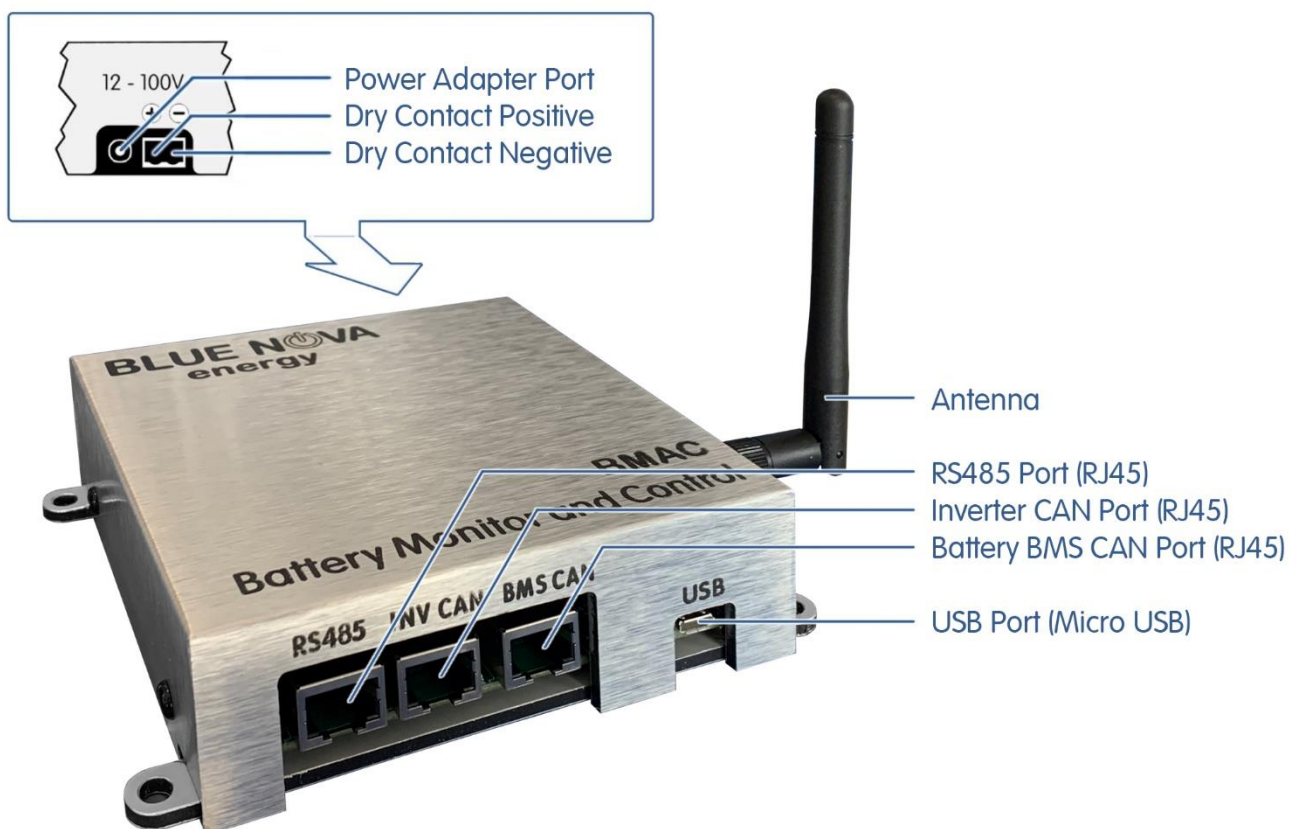
☎ Office: +27 21 205 2000 ✉ E-mail: support@bluenova.co.za

Please do not discard this document as it contains valuable information that might have to be referenced later.

B. STRUCTURAL OVERVIEW

BlueNova's BMAC module has been designed to integrate with a BlueNova battery and inverter system. The BMAC will handle all serial communication (CAN/RS485) between a BlueNova battery and listed compatible inverter systems as well as provide remote system monitoring and control functionality.

The diagrams below illustrate the locations of the power & communication ports:

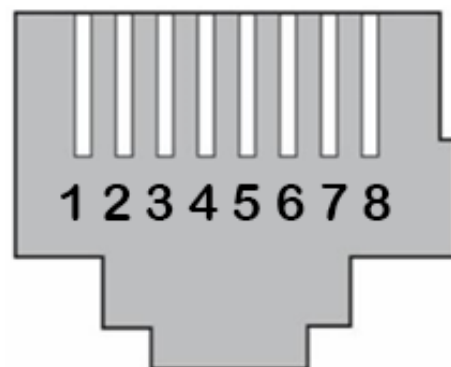


The following components are also packaged with the main module:

| COMPONENT | FUNCTION / DESCRIPTION |
|------------------------|---|
| DC Power Supply | Off-white. Pre-wired & fused on the positive (red) wire with a 1A fuse. Used for powering the BMAC module. |
| CAN cable | Normally light grey, with grey connector boots. All pins are connected on both connectors of this cable. This cable is used to connect the BMAC module to a CAN-compatible inverter or peripheral device. |
| RS485 cable | Normally dark grey, with blue connector boots. Only two pins are connected on each connector of this cable. This cable is used to connect the BMAC module to a BlueNova RacPower battery. Labelled "BMAC" on one end and "RACPOWER" on the other end. |
| USB-to-micro-USB cable | Black. Used for programming and/or updating the BMAC module's firmware. |
| Connector lugs | 3 sets of 2 each, various sizes. The correct pair of lugs should be connected to the DC power supply's red & black input wires so that the power supply can be connected to a suitable power source. |

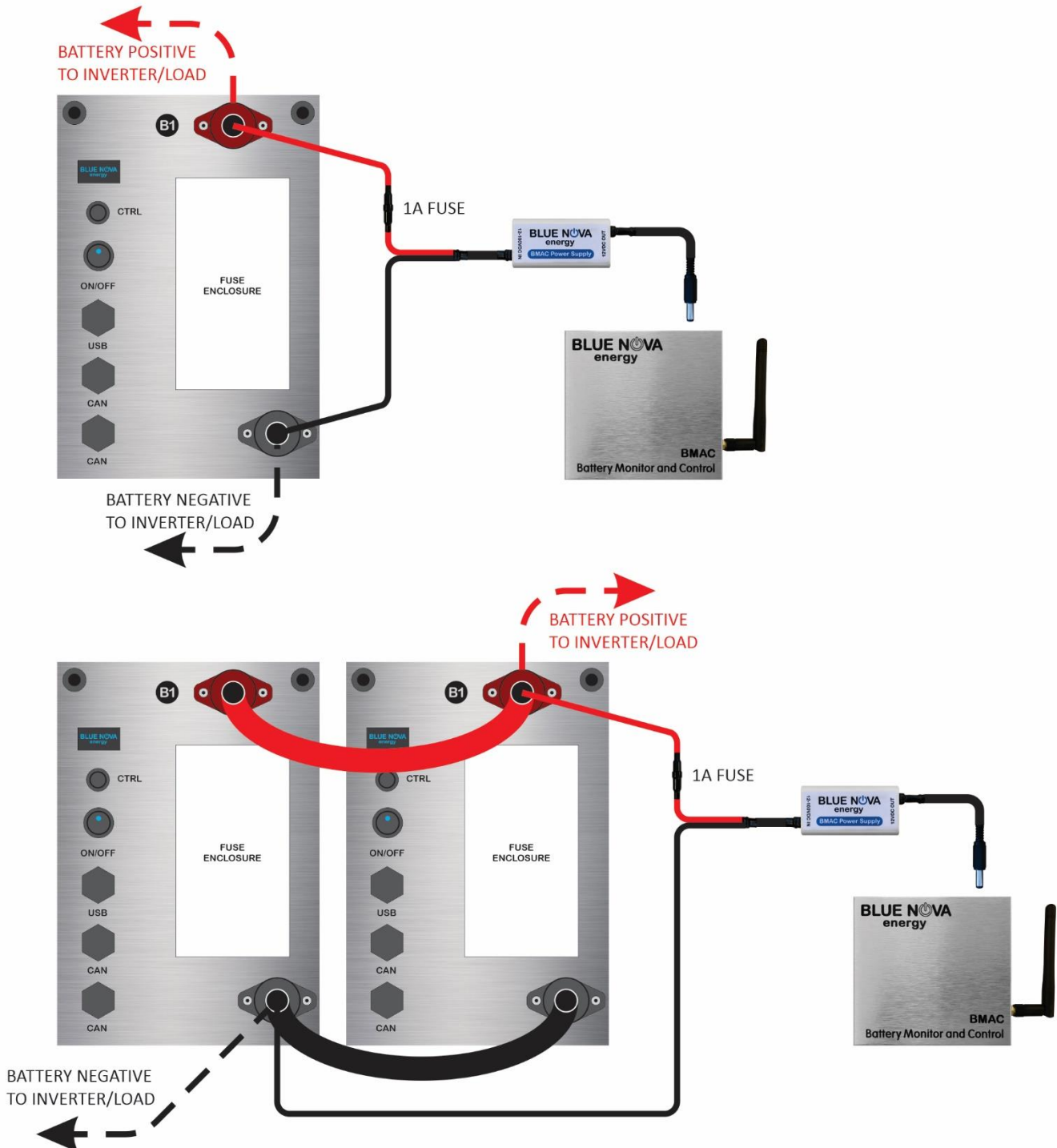
C. COMMUNICATION PORTS

| COMPONENT | FUNCTION / DESCRIPTION |
|--------------------------|--|
| RS485 (RJ45) | PIN configuration as follows: <ul style="list-style-type: none"> - Pin 1: RS485-A - Pin 3: RS485-B |
| INV CAN (RJ45 connector) | Serial communication via CAN Bus between the battery and the BMAC. PIN configuration as follows: <ul style="list-style-type: none"> - 7 & 4: CAN-H - 8 & 5: CAN-L |
| BMS CAN (RJ45 connector) | Serial communications via CAN Bus between the BMAC and Inverter. Pin configuration as follows: <ul style="list-style-type: none"> - 7 & 4: CAN-H - 8 & 5: CAN-L |
| USB | Used for firmware updates and data logging. |



D. COMMUNICATION PORTS

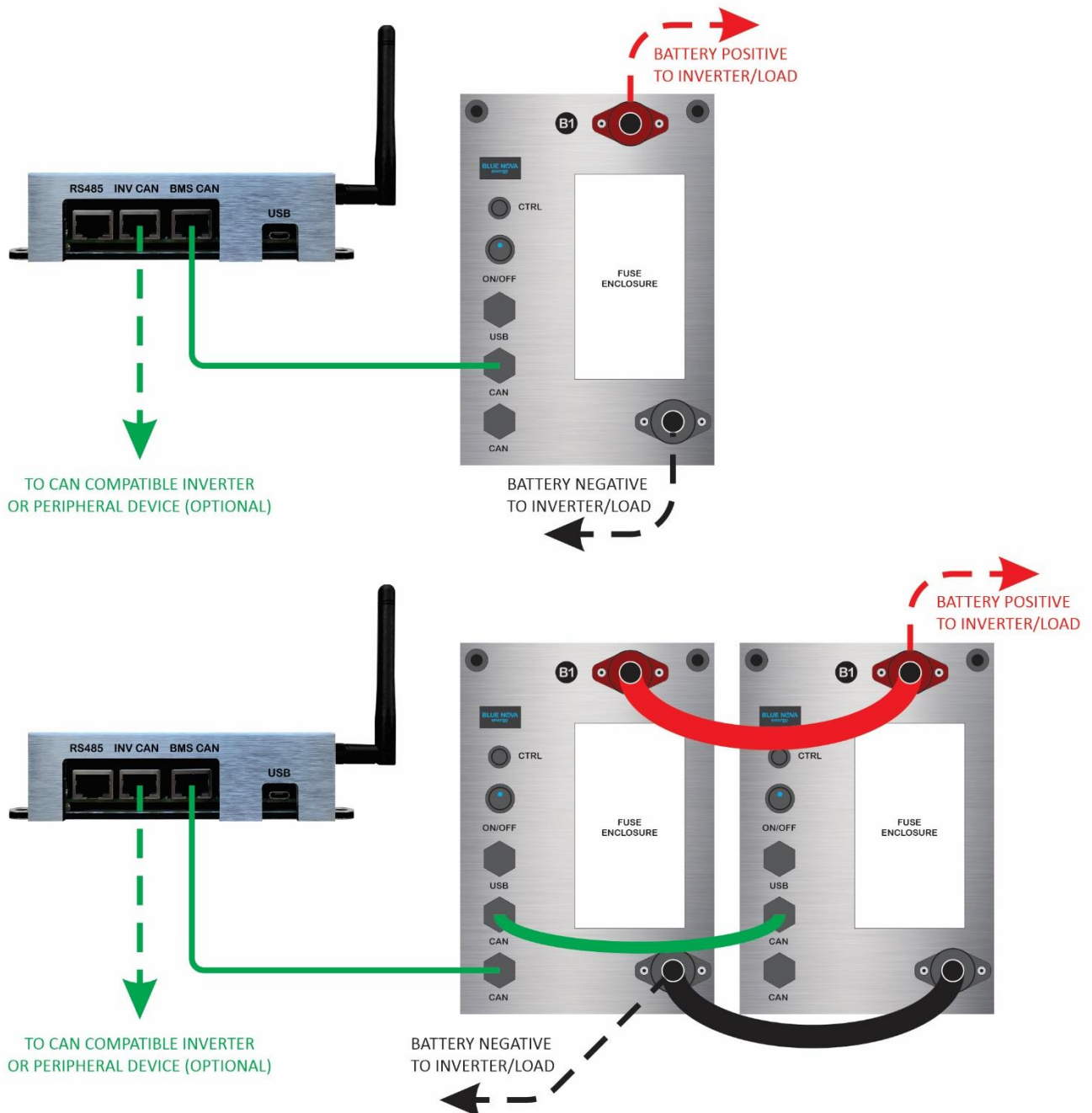
The BMAC can be powered either by connecting its **dry contacts** (see B. STRUCTURAL OVERVIEW) directly to a suitable power source with an output of 12VDC ~ 100VDC (**excluding** the battery itself), or by connecting the DC power supply to the BMAC's **power adapter port** and a suitable power source (**including** the battery itself). BlueNova recommends using the power supply to power the BMAC module directly from the battery/-ies:



1. STEP-BY-STEP: POWERING YOUR BMAC

- 1.1 Check the battery's terminals to determine the required lug size. Crimp one lug to each end of the BMAC power supply's positive (red) & negative (black) input wires respectively with an appropriate crimping tool.
- 1.2 Connect the power supply's positive (red) wire to the battery's positive terminal.
- 1.3 Connect the power supply's negative (black) wire to the battery's negative terminal, then plug the power supply's adaptor jack into the BMAC module. Screw in the BMAC module's antenna, if not done already.

After the above steps have been completed, serial communication (CAN) connections should be made as follows:



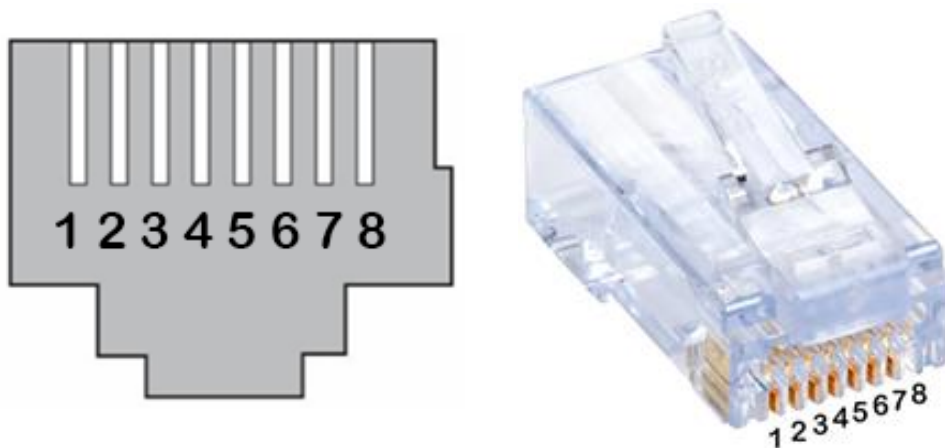
2. STEP-BY-STEP: SERIAL COMMUNICATION (CAN) CONNECTIONS

- 2.1 To connect your BMAC to a single (non-paralleled) Standard Product Range battery, simply connect the BMAC's **BMS CAN** port to any one of the two available **CAN** ports on the battery with a straight 1-to-1 pin RJ45 network cable.
- 2.2 To connect you BMAC to a parallel battery configuration, first daisy-chain connect the batteries to each other from any one of the available two **CAN** ports on each battery to the next one. This should leave one available **CAN** port remaining on the first and last battery in the parallel configuration. Connect the BMAC's **BMS CAN** port to either one of the two remaining **CAN** ports on either battery at the end of the string with a straight 1-to-1 pin RJ45 network cable.
- 2.3 The BMAC can then be connected to a serial communication-compatible inverter or peripheral device from the BMAC's **INV CAN** port to the appropriate port on the peripheral device.

IMPORTANT: The above instructions are only applicable to connections between the BMAC module and BlueNova's **Standard Product Range**. For serial communication connections between the BMAC and products from other BlueNova product ranges (i.e. RacPower etc.), please reference the latest relevant product manuals.

3. SERIAL COMMUNICATION: CONNECTOR PIN CONFIGURATIONS

To connect your BMAC module to a serial communication-compatible inverter or peripheral device, the correct RJ45 cable is required. The pin numbering of RJ45 ports and connectors are illustrated below:



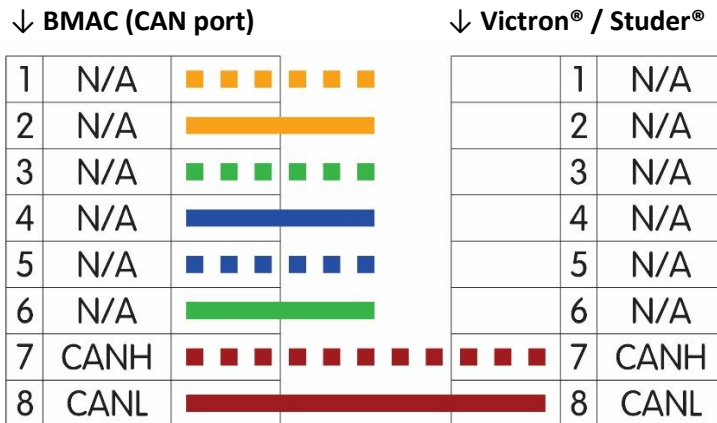
At the time of publishing this manual, the following BlueNova product ranges are serial communication compatible with the inverter manufacturers listed below:

| | Victron® | SMA® | Studer® | Ingeteam® | GoodWe® | Sunsynk® | Axpert® * |
|---------------------|----------|------|---------|-----------|---------|----------|-----------|
| Standard Range (HC) | CAN | CAN | CAN | CAN | CAN | CAN | RS485 |
| RacPower BP/DU | CAN | CAN | CAN | CAN | CAN | CAN | RS485 |
| 13V Mobile Power | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

* Compatible only with Axpert® King 5kVA & 8kVA inverters

Connector pin configurations for the above-mentioned inverter manufacturers are listed below:

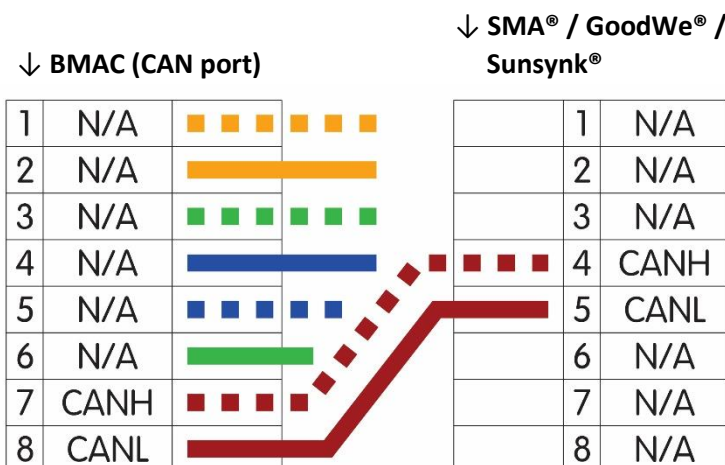
3.1 Connecting a BMAC module to a Victron® or Studer® device:



Step-by-step instructions:

1. Connect **pin 7** (battery CAN) to **pin 7** (Cerbo GX - BMS CAN).
2. Connect **pin 8** (battery CAN) to **pin 8** (Cerbo GX – BMS CAN).
3. Pins 1-6 should not be connected.
4. Any remaining open CAN ports do not have to be terminated.

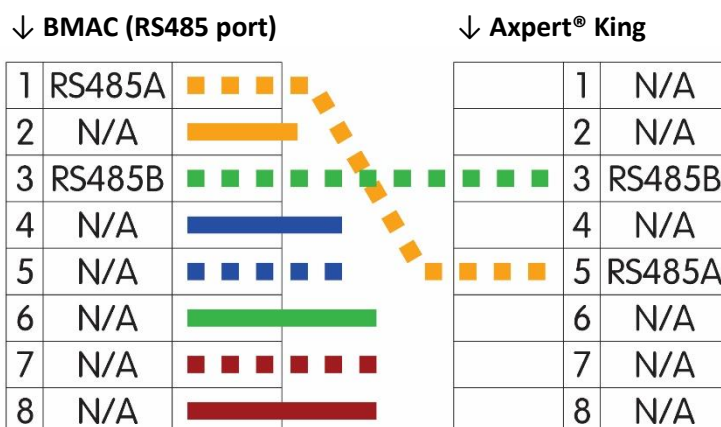
3.2 Connecting a BMAC module to an SMA®, GoodWe® or Sunsynk® device:



Step-by-step instructions:

1. Connect **pin 7** (battery CAN) to **pin 4** (GoodWe® BMS CAN).
2. Connect **pin 8** (battery CAN) to **pin 5** (GoodWe® BMS CAN).
3. Do not connect the remaining pins.
4. Any remaining open CAN ports do not have to be terminated.

3.3 Connecting a BMAC module to an Axpert® King inverter:



Step-by-step instructions:

5. Connect **pin 1** (battery RS485) to **pin 5** (Axpert® King RS485 port).
6. Connect **pin 3** (battery RS485) to **pin 3** (Axpert® King RS485 port).
7. Do not connect the remaining pins.
8. Any remaining open CAN/RS485 ports do not have to be terminated.

E. SOFTWARE SETUP

Once the BMAC is powered and serial communication connections have been established to the battery and inverter/peripheral devices, the following steps should be followed:

- 1) The BMAC will automatically broadcast a Wi-Fi hotspot in the format "BMAC #####". Connect to the BMAC's hotspot from a smartphone, tablet or PC. Password = **bluenova**

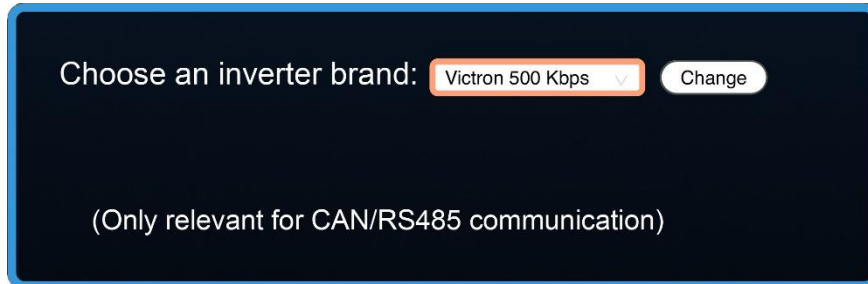


- 2) After establishing a connection to the BMAC's hotspot, open a web browser (Google Chrome is recommended) and type the following IP address in the URL bar: "**192.168.4.1**". The following monitoring screen will be displayed:

The screenshot shows the BlueNova Battery Monitor web interface with the following components:

- Functions & settings:** A top navigation bar with buttons for 'Manual firmware update', 'Forget WiFi networks', and 'Connect BMAC to a WiFi network'.
- Connection status:** A status bar showing 'WiFi Status: Disconnected' and 'No internet'.
- Battery state-of-charge graphic:** A large blue battery icon displaying '99%'.
- Battery performance variables:** A list of technical specifications including SOC (99%), Voltage (26.30V), Current (0A), SOH (100%), Battery temperature (19°C), Parallel batteries (1), Min cell voltage (3280mV), Max cell voltage (3310mV), Min cell temperature (15°C), Max cell temperature (19°C), System capacity (77Ah), Total energy out (1000KWh), Total energy in (0KWh), Charge voltage limit (28.1V), and Charge current limit (125A).
- BMAC module specifications:** A list of identifiers including BMAC ID (4004D62A03A8), BMAC firmware version (3.1), MAC address (A8:03:2A:D6:04:40), and BMS firmware version (3.8).
- Inverter selection:** A dropdown menu to 'Choose an inverter brand' with 'Victron 500 Kpps' selected and a 'Change' button.
- State-of-charge limit bar:** A slider for 'Discharge SOC limit' set to 0% with a 'Set Limit' button.

- 3) Set up communication between the BMAC and inverter/peripheral device that has been connected to. At the bottom of the monitoring screen, select the relevant inverter manufacturer & communication rate from the drop-down menu, then click on the **Change** button:



Once the **Change** button is clicked the BMAC will start communicating with the inverter. This will only have to be set up once, after which the BMAC will remember the setting and automatically start communicating when powered on again.

To verify whether CAN communication is functional, please check the following:

- Functioning CAN transmissions between the **BMAC** and the **battery** can be observed via the green flashing LED located on the PCB on the right-hand side of the "BMS CAN" port.
- Functioning CAN transmissions between the **BMAC** and the **inverter/peripheral device** can be observed via the green flashing LED located on the PCB on the right-hand side of the "INV CAN" port.


If the above LED's cannot be seen flashing & CAN communication is not functional, please contact BlueNova Technical Support for assistance.

- 4) If there is an internet-connected local Wifi network available within range of the BMAC, the BMAC can be connected to this network. This will enable remote monitoring functionality of the battery via the BMAC Online Platform.

If the BMAC is not connected to a local Wifi network yet, the following status will be displayed at the top left of the monitoring screen:



At the top right of the monitoring screen, click on the **Connect BMAC to a Wi-Fi network** button. The following screen should be displayed:



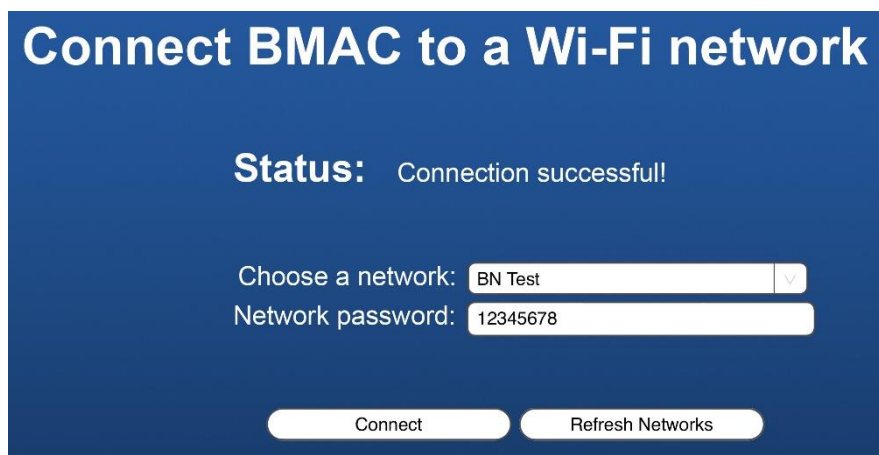
Connect BMAC to a Wi-Fi network

Status: 9 Networks Found!

Choose a network:

Network password:

Click on the **Refresh Networks** button first to populate the drop-down menu. Select the appropriate SSID from the network drop-down menu & fill in the password. Click the **Connect** button. If the selected SSID is connected to the internet & the password is correct, the BMAC will then connect to the internet via this network, after which remote monitoring of your battery would be enabled.



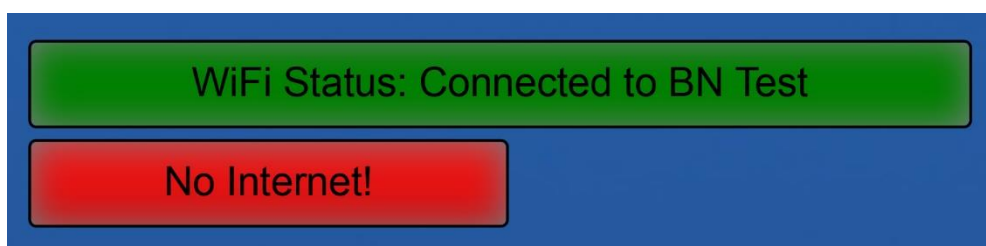
Connect BMAC to a Wi-Fi network

Status: Connection successful!

Choose a network:

Network password:

Once the BMAC connects successfully to a Wifi network, the following status will be displayed at the top left of the monitoring screen:



WiFi Status: Connected to BN Test

No Internet!

Note that the BMAC first connects to the local Wifi network after which it will attempt to connect to the internet. The “No Internet” status will disappear after a few seconds once data transmission commences.

F. BMAC ONLINE PLATFORM

BlueNova batteries that have been installed with a BMAC connected to the internet can be remotely monitored via BlueNova's BMAC Online Platform. To do this, follow the steps below:

1. In a web browser (Google Chrome is recommended), navigate to live.bluenova.co.za
The following login window (pictured below left) should be displayed on the page:

The image displays two side-by-side screenshots of the BlueNova Energy online platform. The left screenshot is the login page, titled 'Sign in with your account' and 'Blue Nova Energy Account login'. It features input fields for 'Email' and 'Password', a 'LOGIN' button, and a 'Register' link highlighted with a red box and arrow. Below the 'Register' link is a 'Forgot your password?' link. The right screenshot is the registration page, titled 'Register your profile' and 'Blue Nova Energy'. It features input fields for 'First name', 'Last name', 'Email', and 'Cell number', a 'Role' dropdown menu, 'Password' and 'Password confirm' fields with eye icons, a 'REGISTER' button, and a 'Login' link at the bottom.

- 1.1 If you have not done so already, create an account by clicking on the **Register** link (pictured above) and filling in the form (pictured on the right).

Then click the **REGISTER** button here... →


- 1.2 If you have an account already, skip step 1.1 above and simply log in by filling in your email address & password in the first window (top left). Then click on the **LOGIN** button.

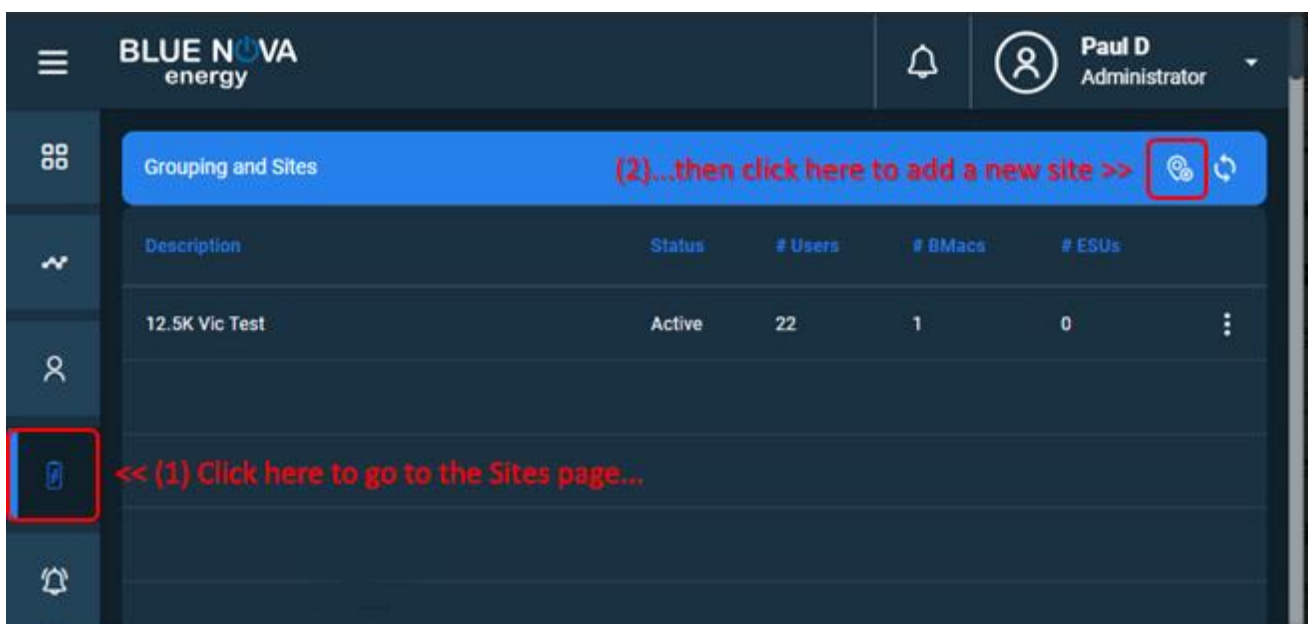
Creating new sites and groupings


After logging in the dashboard page will be displayed:



Start by adding sites to profile by using the tab on the left-hand side to navigate to the Sites page.

From the Sites page, click on the  icon to add a new site:



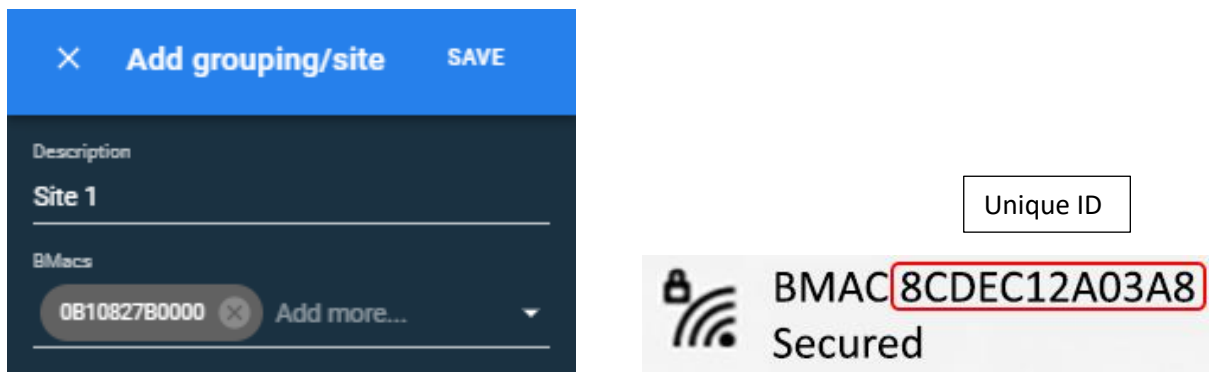
When clicking on the  icon, the following options will be displayed:

- Add a new grouping containing multiple sites/locations
- Add a new site/location to an existing grouping
- Add a new site/location without a grouping

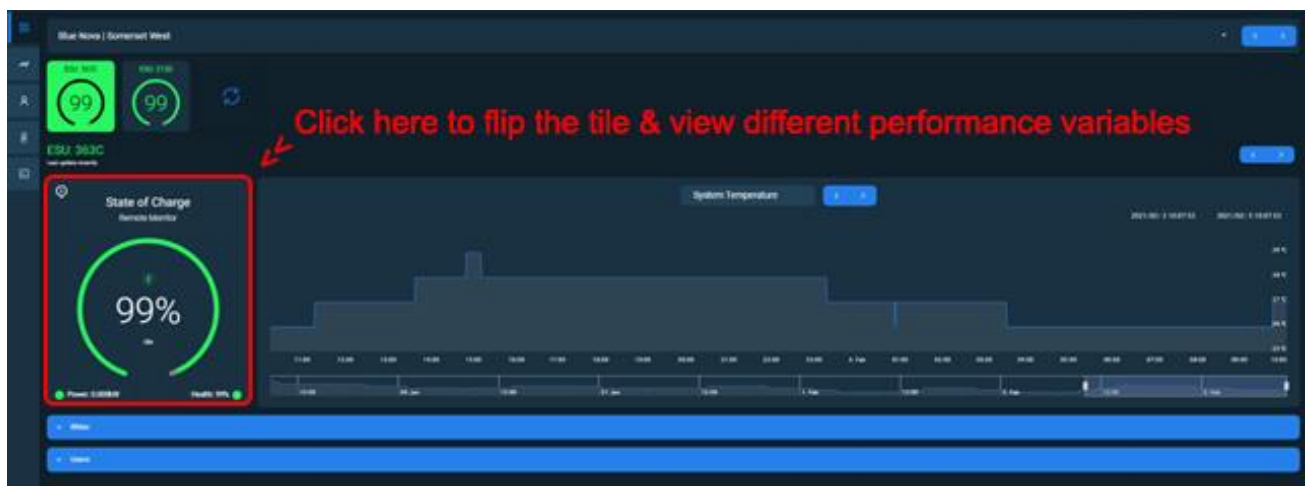
Groupings can be used to group various sites to each other. Sites can be created without having to add them to a specific group as well. Any name can be given to a site in the Description tab.

The 12-digit unique ID of the BMAC must be entered to link the BMAC to the site. This unique hexadecimal ID can be found:

- in the BMAC's broadcasted network access point name (example pictured below right) or
- on the BMAC packaging, as a handwritten ID under the "SSID" tab.

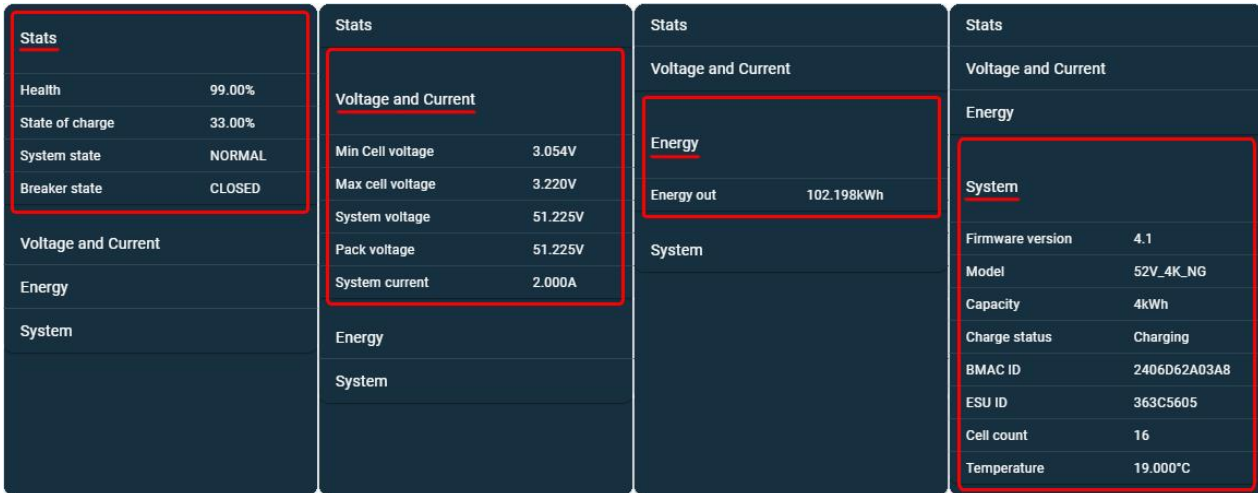


After adding a site successfully, the battery's performance parameters will be displayed on the Dashboard page. The large tile (pictured below) can be clicked to view different performance variables:



Click on the following headers on the flipped tile to view specific information:

- **Stats:** Displays battery state-of-health, state-of-charge, system state & breaker state.
- **Voltage and Current:** Displays min. & max. cell voltage, system & pack voltage and system current.
- **Energy:** Displays the total amount of energy discharged from the battery to-date.
- **System:** Displays hardware specifics such as battery firmware version, model name, capacity, charge/discharge status, cell quantity & internal temperature as well as BMAC specifics such as unique ID and ESU ID numbers.



Additional system information can be viewed by clicking on one of the four drop-down sections below:

