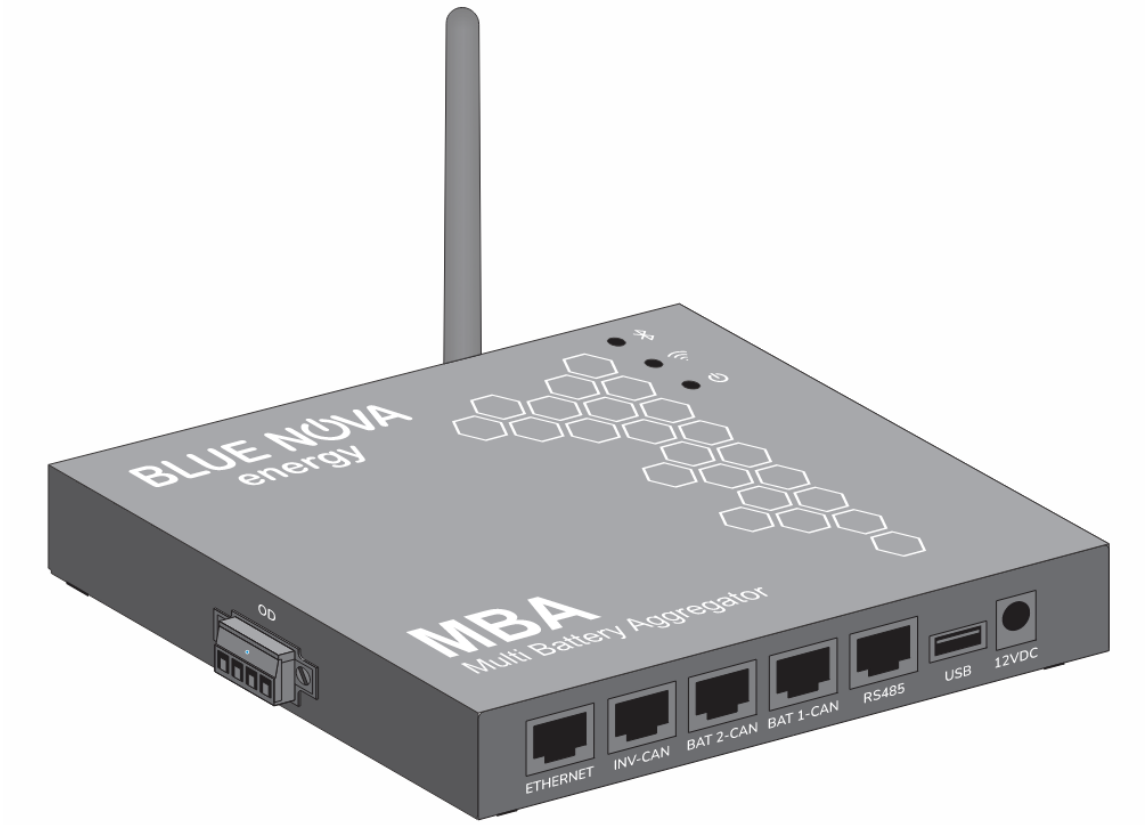
BLUE NOVA energy



Product User Manual

MBA Module

Multi-Battery Aggregator

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01 DOCUMENT SCOPE

1.1 Applicable products

This user manual contains information specific to BlueNova's **Multi-Battery Aggregator** module (hereinafter "MBA").

If you are unsure whether the information in this document is applicable to your specific product, please contact BlueNova's Technical Support department for confirmation before proceeding with carrying out any guidelines and/or instructions contained herein.

1.2 Target audience

Section A in this document (incl. this chapter) contains introductory & supportive information on this document itself (i.e. scope, terminology & symbols used, etc.) as well as information that is of **critical importance** to the preservation of personal **health & safety**.

Section B in this document contains product **operating** instructions & other information relevant to **owners** and regular **operators** of BlueNova energy storage systems in which one or more BlueNova MBA modules have been installed.

Section C in this document contains **installation** instructions & other **technical** information on the MBA module. The information in this section is included in this document exclusively to support qualified & experienced energy industry professionals with the installation, maintenance, fault-finding and/or other similar technical tasks associated with such professions. Such individuals should be:

- adequately trained and experienced in the installation and maintenance of electrical DC systems.
- capable of interpreting electrical circuit diagrams.
- familiar with the composition and operating principles of energy storage systems.
- aware of- and compliant to the industry safety requirements & standards of the associated country / region.

1.3 Symbols

The table below lists the various symbols used throughout this manual alongside the meaning of each:

Symbol	Meaning	Description
	NOTICE	Indicates supplementary information relevant to the chapter / section. Taking note of this information may provide further insight into the topic at hand.
	WARNING	Indicates information that is of critical importance to product/system functionality. Failure to adhere to these instructions may lead to product/system malfunction and/or damage.
	DANGER!	Indicates information that is of critical importance to product/system functionality and personal safety. Failure to adhere to these instructions may lead to product/system malfunction and/or damage, serious personal injury or even death.

1.4 Terminology

The table below lists some of the product- and system-specific terms & abbreviations used throughout this manual:

Abbr.	Term	Description
BMS	Battery Management System	A battery-integrated electronic system used to facilitate balanced charging, autonomous protective countermeasures & other functions.
EMS	Energy Management System	An energy system-integrated solution used to facilitate serial communication, remote monitoring & other system control measures.
ESS	Energy Storage System	An electrical system which includes one or more batteries.
MBA	Multi-Battery Aggregator	The product covered in this manual.
PCS	Power Conversion System	A bi-directional inverter used in energy storage systems.
PPE	Personal Protective Equipment	Equipment worn by operators to minimise the risk of personal injury.

Additionally, the table below lists some of the industry-specific terms & abbreviations used throughout this manual:

Term / abbr.	Meaning
A	**Ampere.** The unit of measurement of electrical current.
AC	**Alternating current**. Electrical current that changes direction several times per second, such as supplied by utility grids, inverter output to loads & other devices. Incompatible with batteries directly.
Ah	**Ampere-hour**. The unit of measurement of cell capacity. Battery capacity is not specified in Ah as a rule, but instead in Wh / kWh / MWh.
C*(n)*	Battery **rate of charge** and/or discharge (where n = the number of hours required to hypothetically recharge the battery in question from 0-100% SoC at constant current).
CAN	**Controller Area Network.** A widely used serial communication protocol.
DC	**Direct current**. Electrical current that flows in one direction only, such as supplied by batteries and solar PV panels/-arrays.
EoL	**End-of-life.** The point at which a battery reaches a predetermined number of cycles. Normally specified alongside the minimum capacity retained at this point.
FW	**Firmware**. Specialised software normally installed directly onto one or more hardware-integrated ROM modules for the purposes of establishing functionality in the hardware.
HVAC	**Heating, ventilation & air conditioning.** In energy storage systems, this refers to the peripheral hardware and/or integrated subsystem(s) used for system temperature regulation.
IP*(xy)*	**Ingress protection** rating. Indicates how well an electrical device's enclosure protects the device from contamination by foreign matter (where x = numerical rating for solids, and y = for liquids).
kWh	**Kilowatt-hour**. The unit of measurement of energy (and by extension, also battery capacity).
LiFePO4	**Lithium iron phosphate**. Part of the lithium-ion family of battery chemistries. Unlike almost all other lithium battery chemistries, LiFePO4 (sometimes also: LFP) is inherently safe.
Ω	**Ohm**. The unit of measurement of electrical resistance.
RS485	**Recommended Standard #485.** A serial communication protocol standard for multi-node systems.
SoC	Battery **state of charge.** Expressed as a percentage.
SoH	Battery **state of health**. Expressed as a percentage of the maximum remaining usable capacity in comparison to the original capacity of a battery.
V	**Voltage**. The unit of measurement of an electrical source's potential to deliver energy.
VAC	The **voltage** of an electrical source with **alternating current.**
VDC	The **voltage** of an electrical component / source with **direct current.**
Wh	**Watt-hour**. The unit of measurement of energy (and by extension, also battery capacity).

02 SAFETY REQUIREMENTS

2.1 Safety introduction

IMPORTANT: Due to the inherently high risks associated with live electrical systems, the information included in this chapter should be regarded as of **critical importance**. Failure to adhere to any of to the safety requirements listed in this chapter may lead to damaged products/components and voiding of the associated product warranties (where applicable), damage to property in proximity to such systems, electrical shock, serious personal injury and even death.

2.2 General safety requirements

The following non-exhaustive list of safety requirements are applicable to electrical systems in general:

- Electrical devices & components (incl. SBB™ MKII batteries) should always be installed, uninstalled, operated and/or serviced by suitably qualified personnel only.
- Always wear appropriate PPE and use tools & equipment of the correct type and condition when installing, uninstalling, operating, servicing, transporting and/or otherwise handling electrical equipment.
- Electrical connections between any two or more stand-alone electrical components/devices in an electrical system should include some slack. High tension connections between such components/devices may lead to deterioration of connection integrity over time, increase the risk of heat build-up and lead to thermal events.
- Do not use water or other electrically conductive fluids to clean electrical device enclosures and/or any other surface(s) in close direct contact with connected components in an electrical system.
- Electrically conductive accessories and/or jewellery should be removed before commencing with installation, uninstallation and/or maintenance of electrical systems, components or devices.
- Before connecting any wires, cables or components in any electrical system which includes one or more live energy sources, measure the voltage between the relevant connector(s) and intended connection point(s) first. Do not proceed with any such connections if the measured voltage may damage connecting surfaces.
- Air inlets and/or outlets of electrical device enclosures should remain free from obstruction. Obstructed air inlets/outlets may lead to insufficient heat dissipation and cause additional side effects incl. malfunction, damage and/or failure of such devices, thermal events & additional damage to peripheral assets.

2.3 Battery safety requirements

The following list of safety requirements are applicable specifically to electrical systems that contain batteries:

Avoid direct contact with non-isolated conductive surfaces & potentially live connection points (i.e. battery terminals) in an electrical system. Do not install, service or otherwise directly interact with batteries, battery-connected circuitry & components without wearing the required PPE or using the appropriate tools.

Batteries must be isolated (i.e. switched off and disconnected from all peripheral components) before being installed, serviced, repaired, uninstalled or relocated for any purpose at any given time.

Do not short-circuit the positive and negative electrodes of individual battery cells, batteries or multi-battery configurations. Voltage may remain present over any two or more such electrodes even when the associated batteries/cells are disconnected from the associated electrical system and switched off.

All conductive wiring & connection points in battery-integrated systems should be electrically insulated. Do not install batteries in systems where connective wiring or connection points are not sufficiently insulated.

Take care when transporting, unboxing, relocating and/or otherwise moving SBB™ MKII Series batteries. SBB™ MKII Series batteries weigh ±140kg each and may cause serious injuries if not handled correctly.

Before commencing with the installation of one or more SBB™ MKII Series batteries, each battery should be earthed first. Conversely, when uninstalling SBB™ MKII Series batteries, the earthing connection to each battery should be left intact (connected) until all other connections to each battery have been disconnected.

(Re)connecting & powering on the various components connected to any electrical system in which one or more SBB™ MKII Series batteries have been (re)installed should be done in strict accordance with the associated procedure(s) included in this document.

Do not store, install, service or repair batteries in locations where ambient factors such as temperature, humidity, etc. exceed (or will likely exceed in the foreseeable future) the acceptable range associated with each, as specified on the product datasheet.

Do not connect SBB™ MKII Series batteries to AC power sources directly. Do not connect SBB™ MKII Series batteries to non-compatible DC power sources directly. Do not connect SBB™ MKII batteries in series.

Do not connect batteries to PV panels or -configurations directly. Always install the appropriate fusing & compatible supplier pre-approved MPPT module(s) between batteries and PV panel configurations.

SBB™ MKII Series batteries of which any integrated $LiFePO_4$ cell(s) exhibit expansion/bulging should be discontinued from use immediately and repaired/replaced as necessary.

SBB™ MKII Series batteries stored for extended periods should be recharged at least once every 3 months. In such cases, a calibrated product-compatible inverter/charger should be used to recharge each battery individually to 40~60% SoC in accordance with the relevant procedure(s) contained in this document.

03 PRODUCT OVERVIEW

3.1 Product applications

BlueNova's MBA is an electronic module that is designed to be installed in electrical systems alongside select BlueNova batteries and serial communication-compatible inverters to establish the following functionalities:

- Provides a single centralised point from which the serial communication connections in any associated system may be established, accessed and managed.
- Translates serial communication data transmitted by devices with different serial communication protocols (CAN / RS485) in the same system.
- Logs system health & performance metrics on an ongoing basis and provides secure on-demand access to this data via properly configured channels.
- Supports battery service life preservation by allowing discharge limit to be set (optional).
- Promotes pro-active system management via 2 x integrated relays which can be switched on or off independently to connect or disconnect up to 2 x designated electrical loads.

3.2 Dimensions & layout

The diagram below illustrates the dimensions and external component layout of an MBA module:

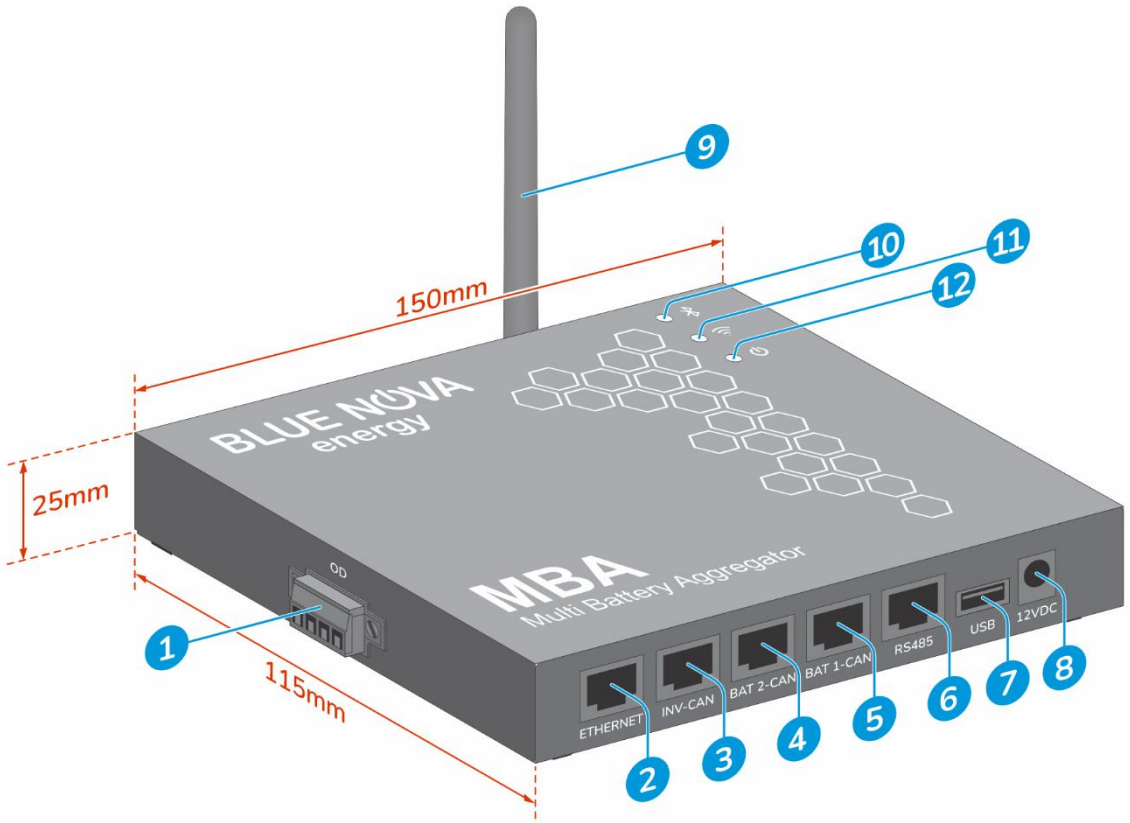


Illustration 3.2 - MBA module dimensions & component layout

The 11 x numbered components in the previous diagram are described in the table below:

#	Label	Type	Function
1	OD	Dry contact terminal block	May be used to connect / disconnect up to 2 x designated loads by relay via the MBA module's dashboard interface.
2	ETHERNET	RJ45 port	May be used to connect the module to a LAN access point with a standard 1-to-1 pin RJ45 network cable.
3	INV-CAN	RJ45 port	Connect the system's inverter to this port to establish serial communication between the inverter and MBA module. Refer to section x.x in this manual for RJ45 pin-out configuration.
4	BAT 2-CAN	RJ45 port	May be used to connect a second CAN-compatible BlueNova battery to the MBA module to establish serial communication. Refer to section x.x in this manual for RJ45 pin-out configuration. Refer to section x.x. in this manual for port allocation instructions.
5	BAT 1-CAN	RJ45 port	May be used to connect a (primary) CAN-compatible BlueNova battery to the MBA module to establish serial communication. Refer to section x.x in this manual for RJ45 pin-out configuration. Refer to section x.x. in this manual for port allocation instructions.
6	RS485	RJ45 port	May be used to connect a (primary) RS485-compatible BlueNova battery to the MBA module to establish serial communication. Refer to section x.x in this manual for RJ45 pin-out configuration. Refer to section x.x. in this manual for port allocation instructions.
7	USB	USB port	Reserved for firmware updates & testing procedures.
8	12VDC	Power adapter port (centre-positive)	Used to power the MBA module from a 12VDC power source. Refer to section x.x in this manual for instructions on how to power the MBA module.
9	*(N/A)*	Antenna	Used to transmit & receive Wi-Fi signals.
10	ᛒ	LED	Indicates whether a third-party device within range is connected to the MBA module via Bluetooth.
11	⌔	LED	Indicates whether a third-party device within range is connected to the MBA module's Wi-Fi access point and/or whether the MBA is connected to an on-site Wi-Fi access point within range.
12	⏻	LED	Indicates whether the MBA module is powered on.

3.3 Additional components

The following components should be included in the packaging with every new MBA module shipped:

Item / component	Description
12V DC power supply	White. Includes wiring for peripheral connections. Used to convert & supply power to the MBA module from a compatible connected power source.
CAN cable	Normally light grey (incl. grey connector boots). All pins connected. Used to connect the MBA module to a CAN-compatible inverter or other CAN-compatible peripheral device.
RS485 cable	Normally dark grey (incl. blue connector boots). Only 2 x pins are connected on each connector. Used to connect the MBA module to an RS485-compatible inverter.

04 PRE-INSTALLATION

This chapter provides supporting information on the various hardware components (i.e. serial communication cables, power supply, etc.) required to successfully install an MBA module.

4.1 Module power supply

Each newly ordered MBA module is shipped with a 12VDC power supply which should be used to power each module. For this purpose, the input side of the power supply should be connected to an energy source with an output of 12~100VDC. In systems where the voltage of the BlueNova battery included in the system falls within this range, it is strongly recommended that the power supply's input be connected to the battery.

4.2 Serial communication

Serial communication between MBA modules and compatible peripheral devices are established by connecting each MBA to such devices with a correctly configured RJ45 cable in each case.

The table below lists the pin configurations of all the RJ45 ports on an MBA module allocated to serial communication and specifies the correct device to which each RJ45 port should be allocated:

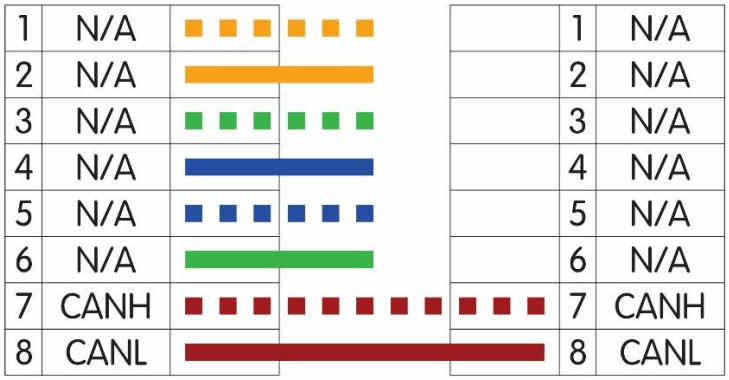
RJ45 port label	Pin configuration	Connect port to	Pin numbering
BAT 1-CAN	Pins 4 & 7 : CAN-H Pins 5 & 8 : CAN-L	CAN-compatible battery (in single-battery systems) -OR- CAN-compatible master battery (in dual-battery systems) only if slave battery is not RS485 but also CAN-compatible.	
BAT 2-CAN	Pins 4 & 7 : CAN-H Pins 5 & 8 : CAN-L	CAN-compatible slave battery (in dual-battery systems only).	
INV-CAN	Pins 4 & 7 : CAN-H Pins 5 & 8 : CAN-L	CAN-compatible inverter.	
RS485	Pin 1 : RS485-A Pin 3 : PS485-B	RS485-compatible battery (in single-battery systems) -OR- RS485-compatible master battery (in dual-battery systems) only if slave battery is not RS485 but instead CAN-compatible.	

In dual battery systems wherein one battery communicates via RS485 and the other via CAN, the RS485 battery would automatically be designated by the MBA module as the primary (master) battery. In such cases, the CAN battery's serial communication should be connected to the MBA module's BAT 2-CAN port.

The following section details the correct RJ45 connector pin-out configuration needed to establish serial communication between an MBA module and select inverter types. For inverter types not included in this section, please refer to the supporting documentation of the OEM in question or contact BlueNova Technical Support for assistance.

4.2.1 Pin-out configuration for connecting an MBA module to Victron® or Studer®

MBA module INV-CAN port: **Inverter CAN port:**

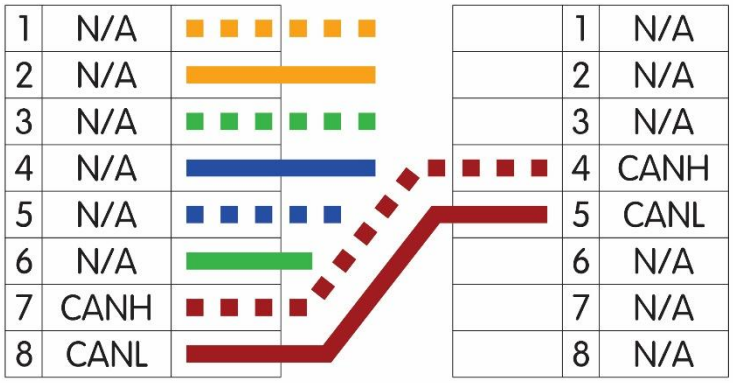


Step-by-step instructions:

1. Connect **MBA module** connector **PIN #7** to **inverter** connector **PIN #7**.
2. Connect **MBA module** connector **PIN #8** to **inverter** connector **PIN #8**.
3. Do not connect PINS 1-6.
4. Refer to product-specific BlueNova & inverter OEM supporting materials to confirm if any remaining RJ45 ports should be **terminated**.

4.2.2 Pin-out configuration for connecting an MBA module to SMA® GoodWe® or Sunsynk®

MBA module INV-CAN port: **Inverter CAN port:**

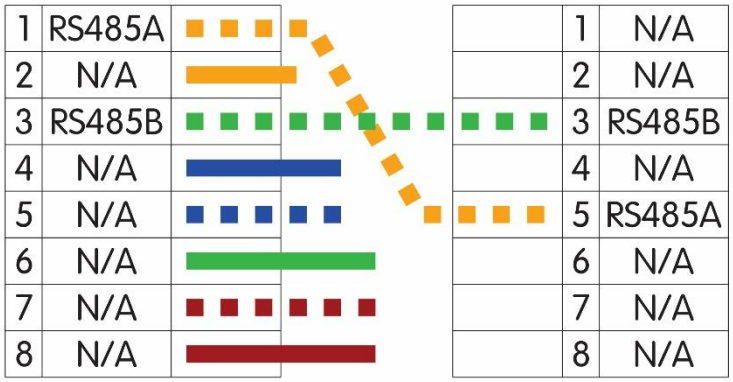


Step-by-step instructions:

1. Connect **MBA module** connector **PIN #7** to **inverter** connector **PIN #4**.
2. Connect **MBA module** connector **PIN #8** to **inverter** connector **PIN #5**.
3. Do not connect PINS 1-6.
4. Refer to product-specific BlueNova & inverter OEM supporting materials to confirm if any remaining RJ45 ports should be **terminated**.

4.2.3 Pin-out configuration for connecting an MBA module to Voltronic® (Axpert)

MBA module RS485 port: **Inverter RS485 port:**



Step-by-step instructions:

1. Connect **MBA module** connector **PIN #1** to **inverter** connector **PIN #5**.
2. Connect **MBA module** connector **PIN #3** to **inverter** connector **PIN #3**.
3. Do not connect PINS 1-6.
4. Refer to product-specific BlueNova & inverter OEM supporting materials to confirm if any remaining RJ45 ports should be **terminated**.

4.3 Relay terminal

Each MBA module includes 2 x relay outputs which may be configured for controlling up to 2 x external loads via the MBA's dashboard interface. The relay connections are located on the terminal block labelled "OD" (illustrated below).

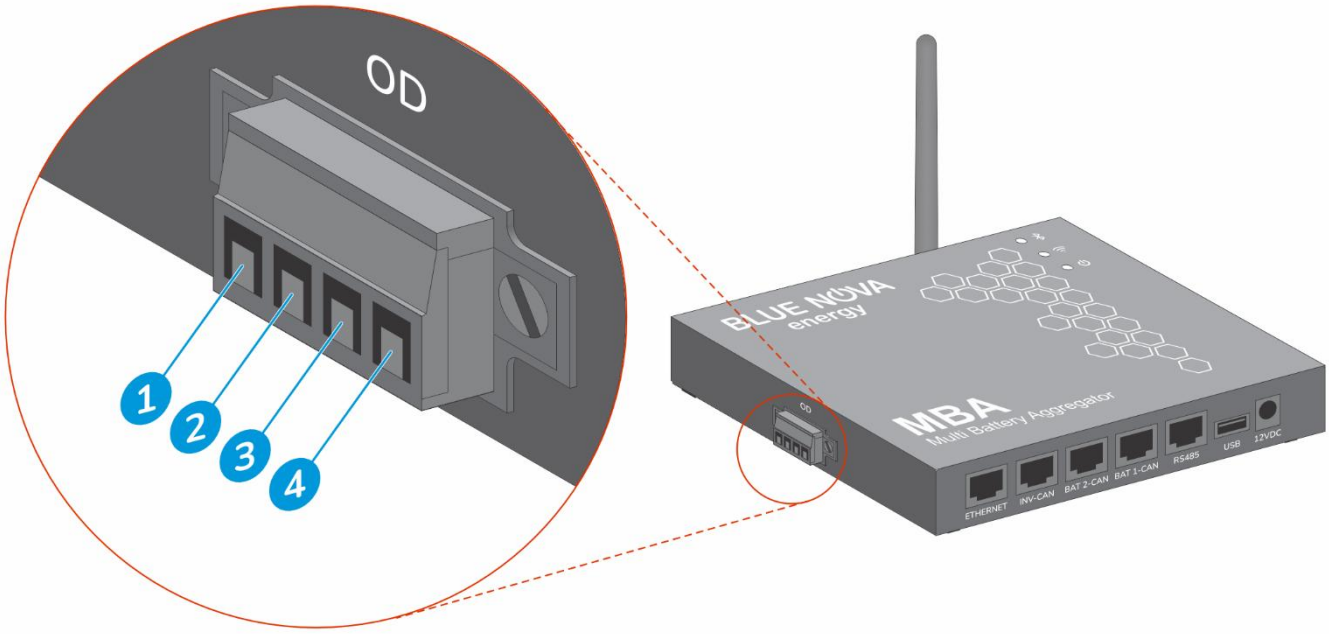


Illustration 4.3 - Relay terminal connection points

The numbered terminal connection points in the diagram above are explained in the 2 x tables below:

Number	Description
1	Relay 1 – Common (C) terminal
2	Relay 1 – Normally open (NO) terminal

Number	Description
3	Relay 2 – Common (C) terminal
4	Relay 2 – Normally open (NO) terminal

Relay connection instructions:

1. Connect the first designated load to relay 1 between the Common (C) and Normally Open (NO) terminals.
2. Connect the second designated load to relay 2 between the Common (C) and Normally Open (NO) terminals.
3. Relay-connected loads may then be independently connected & disconnected from the associated system on demand from any compatible smart device with access to the associated MBA's dashboard interface.

The maximum current for relay-connected 230VAC applications (excl. inductive loads) is 1.6A (375VA).
The maximum current for relay-connected DC applications (excl. inductive loads) is 3A @30VDC (90W).
For any inductive loads (i.e. motors, solenoids etc.) the maximum current should be reduced to 0.8A.

In AC applications, relays should always be connected to the LIVE (not neutral) branch of the circuit. In DC applications, the load's positive terminal should always be connected to the relay's common (C) terminal while the load's negative terminal should always be connected to the relay's normally open (NO) terminal.

Should the input power supply of an MBA module be interrupted, the module's relays will automatically open and by extension disconnect the load connected to each. This is an integrated safety feature to prevent unintended operation during power failures.

05 INSTALLATION

This chapter provides complete step-by-step instructions for the installation of MBA modules in compatible systems. In the interest of brevity, the procedures in this chapter don't extend to the point of covering installation of the various individual components included in such systems (incl. BlueNova batteries). For such instructions, please refer to the relevant supporting documentation of the product(s) in question.

5.1 Installation overview

The following objectives should be completed in the order specified to successfully install an MBA module:

- Connect the MBA module to a 12VDC power source.
- Establish serial communication connections between the battery/-ies, inverter and MBA.
- Access the MBA's dashboard interface to configure battery & inverter parameters.
- Connect the MBA to an on-site Wi-Fi network within range.

Each of the above objectives are covered sequentially in the subchapters below.

5.2 Power supply connection

The following procedure should be completed to connect your MBA module to the 12VDC power supply:

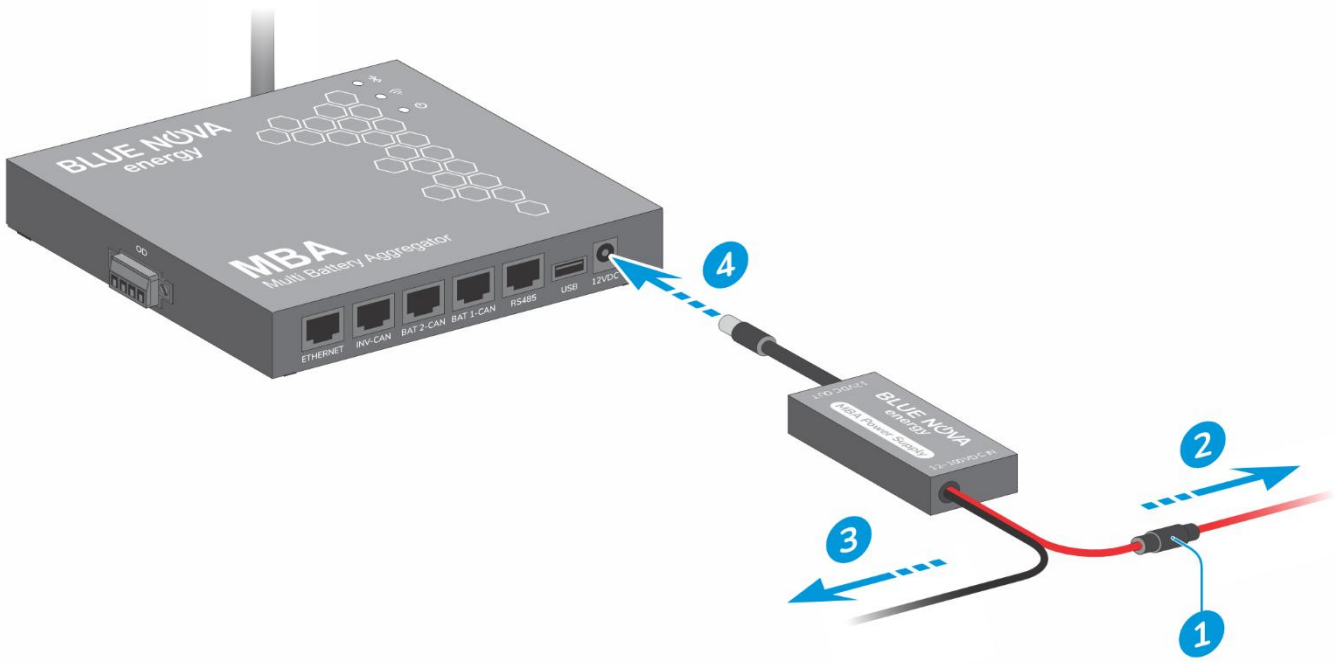


Illustration 5.2 - MBA module power supply connection

Step-by-step instructions:

1. Check to ensure that the in-line fuse (rated 1A) on the power supply's positive (red) input wire is not blown.
2. Connect the 12VDC power supply's **positive (red)** input wire to the **positive** terminal of the system's battery.
3. Connect the 12VDC power supply's **negative (black)** input wire to the **negative** terminal of system's battery.
4. Connect the power supply's output jack to the **12VDC** socket on the MBA.
5. The LED indicated in the illustration should switch on.

> The input voltage range of the 12VDC power supply shipped with each MBA module is 12~100VDC. Do not connect the input of the power supply to an AC power source. Do not connect the input of the power supply to a battery's terminals if the operating voltage of the battery might exceed 12~100VDC at any time.

5.3 Serial communication connections

The following procedure should be completed to establish serial communication connections between battery/-ies and inverter via the MBA module. See section 4.2 in this manual for supporting information on serial communication.

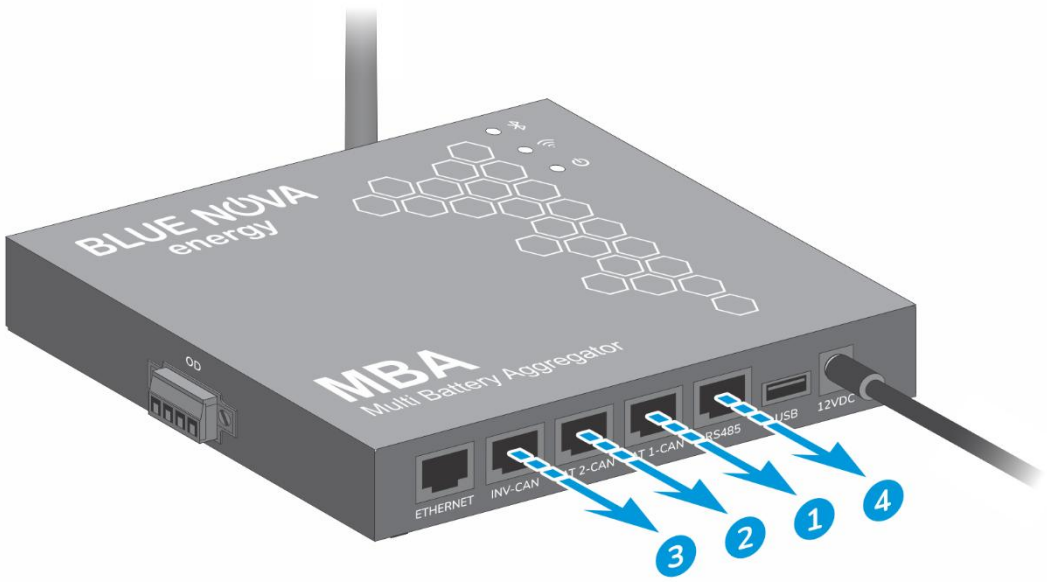


Illustration 5.3 - Serial communication connections

Step-by-step instructions:

1. Connect the **BAT 1-CAN** port of the MBA module to the applicable port of a CAN-compatible battery (in single battery systems) OR to the applicable **remaining port** of a CAN-compatible parallel battery bank in which serial communication between the individual batteries are interconnected. Use a straight 1-to-1 pin RJ45 cable.
2. The **BAT 2-CAN** port on the MBA module should only be connected to the applicable CAN port of a second battery in the system if this second battery is connected in parallel to the first (master) battery and serial communication between the 2 x batteries in the configuration is NOT connected/consolidated. Use a straight 1-to-1 pin RJ45 cable.
3. Connect the **INV-CAN** port of the MBA module to the associated port of a CAN-compatible inverter, OR...
4. Connect the **RS485** port of the MBA module to the associated port of an RS485-compatible inverter.

06 DASHBOARD INTERFACE

6.1 Overview of features

After having connected the MBA module to its 12VDC power supply and establishing serial communication connections to the system's batter/-ies and inverter, final configuration of the MBA module should be completed via the module's dashboard interface. The following data and functionalities will be available in the dashboard interface:

6.1.1 Performance & health metrics

Upon having completed final configuration of the MBA module (see section 5.4.2), the dashboard interface will display the performance metrics & configuration data listed in the table below in real-time:

Section	Variables displayed	Description
Basic parameters	Voltage	The total voltage measured across the terminals of each connected battery /-bank.
	Current	The measured current with which each connected battery /-bank is being charged or discharged with at the time.
	SOH	The state-of-health percentage of each connected battery /-bank.
	Battery temperature	The average temperature measured & reported by the BMS of each connected battery (bank).
	Parallel batteries	The parallel configuration of each connected battery bank.
	BMS firmware	The firmware version of each connected battery's /-bank's BMS.
Cell voltages	Cell 1-4	The 2 x highest and 2 x lowest cell voltage values reported by the BMS of each connected battery /-bank.
Extremes	Min./ max. cell voltage	The single lowest and highest cell voltage measured within each connected battery /-bank.
	Min./ max. cell temperature	The single lowest and highest cell temperature measured within each connected battery /-bank.
System parameters & energy / limits	System capacity	The total installed capacity of each connected battery /-bank.
	Total energy in / out	The total amount of energy supplied to and from each connected battery /-bank since installation.
	CVL / CCL	The maximum charge voltage & charge current limits for each connected battery /-bank.
	DVL / DCL	The maximum discharge voltage & discharge current limits for each connected battery /-bank.

The MBA module can interpret & display serial communication data for up to 2 x independently connected batteries/battery banks (labelled "Bank 1" and "Bank 2" respectively). Variables to be displayed are replaced with "N/A" in in cases where one or more batteries/battery banks are not connected or configured properly.

The MBA module computes the ideal CVL / CCL / DVL / DCL limits of each connected battery /-bank automatically based on the measured health & performance metrics of each and transmits these values to the connected inverter. In cases where 2 x batteries / battery banks with different performance capabilities are connected, the most conservative value in each case is selected and transmitted to the inverter.

The following options are included in the list of serial communication protocols with which each connected battery / battery bank may be configured. The protocol with which each battery /-bank connected to the MBA module has been configured is displayed below the main section in the dashboard interface:

Listed protocol	Applicable to	BAUD rate
CAN / SSS	• Legacy HC (High Current) Series batteries • Legacy NG (New Generation) Series batteries	500kbps
CAN / SBB	• SBB™ MKII Series (BN52V-314-16k SBB MKII)	250kbps
RS485 / RacPower	• Legacy RacPower™ BP & DU batteries (BN52V-100-5.2k BP / -DU)	N/A
Not configured	None (displayed when no battery /-bank is connected or detected)	N/A

The following device information specific to the MBA module installed is also displayed in the dashboard interface:

Specification	Description
MBA ID / MAC address	The device ID and MAC address numbers unique to the installed MBA module.
MBA firmware version	The firmware version currently installed on the MBA module.
Uptime / Free heap	Specifies the time elapsed since last reboot & available memory of the MBA module.

6.1.2 Relay configuration (optional)

Each MBA module includes 2 x integrated relays with which up to 2 x designated loads connected to the module's relay terminals may be controlled. The dashboard interface includes the following options for configuring / controlling relays:

Displayed feature	Description
Relay 1 / Relay 2 (buttons)	Manually switch either relay ON or OFF on demand by clicking on the associated button in the dashboard. A "Manual" status indicates that the relay holds the specified state.
Master Auto-Control (checkbox)	Set this parameter to ON to enable both relays to be controlled by the MBA module autonomously. The state of each relay is then determined every 1.5 seconds based on continued evaluation of the state-of-charge of the connected batteries. Set this parameter to OFF to limit relays to respond to manual control inputs only.
Per-Relay Auto-Control (various elements)	Enable autonomous operation of either relay based on custom parameter configuration. Parameters include: • Enable (check to enable the MBA module to control the relay autonomously) • Condition (select conditional variable "above" or "below") • Threshold (set the SoC percentage for the conditional variable selected above) • Action (set the action to be triggered when the condition is met) • Hysteresis (set the percentage value required to prevent rapid ON/OFF cycling of the relay near the specified threshold percentage).

The MBA module will override any manual relay control inputs within 1.5 seconds if master auto-control is enabled and SoC-based logic conditions are met.

6.1.3 Discharge limit configuration (optional)

As an additional safety measure, the dashboard interface includes a section wherein the discharge limitation for each connected battery /-bank may optionally be configured. The following parameters can be set for this purpose:

Displayed feature	Description
Enable SoC limit	Check to enable discharge limitation configuration of the associated battery /-bank.
Discharge SoC limit	Specify the SoC percentage of the associated battery /-bank at which the MBA module should transmit instructions to the inverter to cease battery discharge.
Set limit	Click/tap this button to save configured parameters & activate this feature.

6.2 Dashboard configuration

6.2.1 Accessing the dashboard interface

1. Connect to the MBA module's Wi-Fi access point from a smartphone/laptop within range. The SSID of this access point will be broadcasted in the format "MBA########" where # represents the module's device ID.
2. If prompted for a password, enter: **bluenova**
3. On the same phone/laptop, open a web browser and type **192.168.4.1** into the web browser's address bar.
4. Hit Enter to proceed. The dashboard interface illustrated below should then be displayed in the web browser:

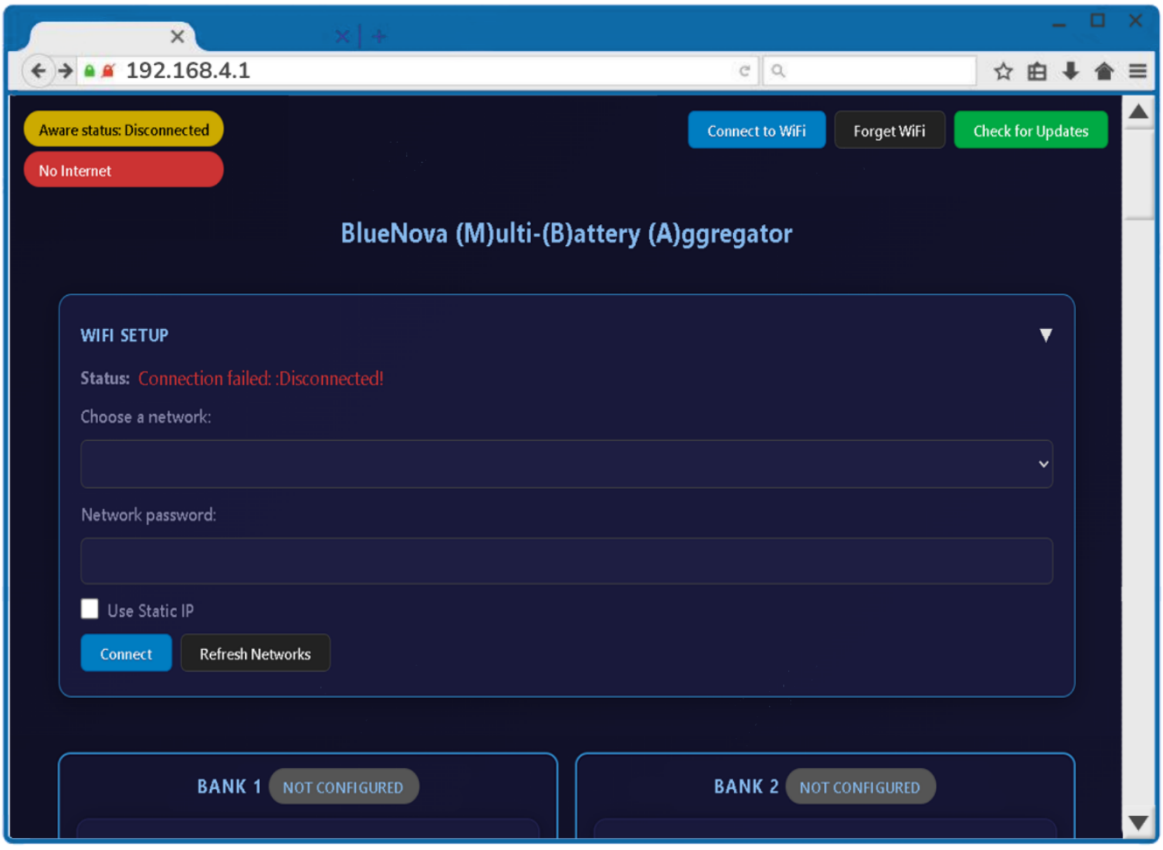
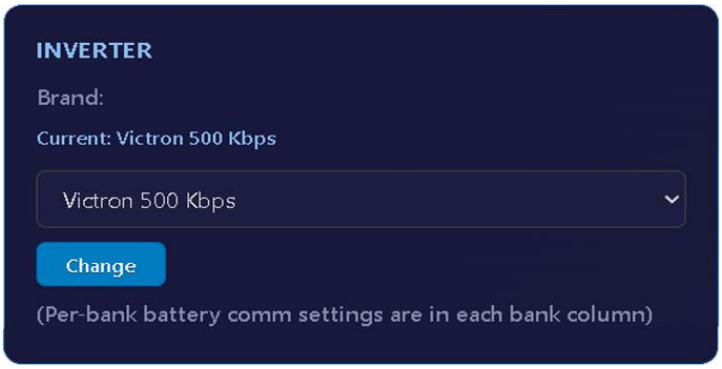


Illustration 5.4.1 - MBA module dashboard interface

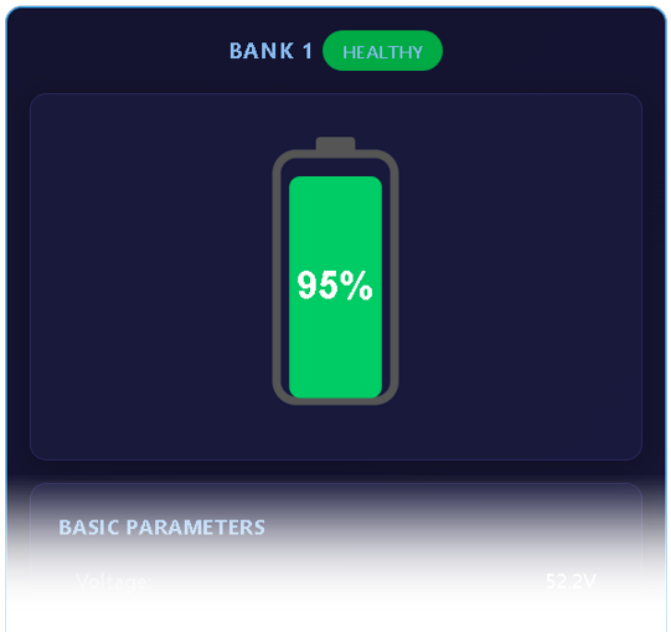
6.2.2 Configuring battery & inverter parameters

The following procedure should be completed to set up inverter & battery parameters via the dashboard interface:



1. Scroll to the bottom of the page to the **INVERTER** section (illustrated on left).
2. Select the applicable manufacturer and BAUD rate option from the drop-down menu based on the inverter installed.
3. Click/tap on the **Change** button to save the configuration. The MBA module should then start communicating with the inverter.
4. Scroll to the **BATTERY COMMUNICATION** sections (illustrated below) to configure battery parameters based on the battery/-ies installed in the system. Click/tap on the **Apply** button to save configuration:

5. The status of the configured battery/-ies should then be displayed in the top section of the interface:



6.2.3 Connecting the MBA module to the internet

Once inverter & battery parameters have been configured, the following procedure may be completed to connect the MBA module to an on-site Wi-Fi network. This is a prerequisite for enabling remote monitoring of the system:

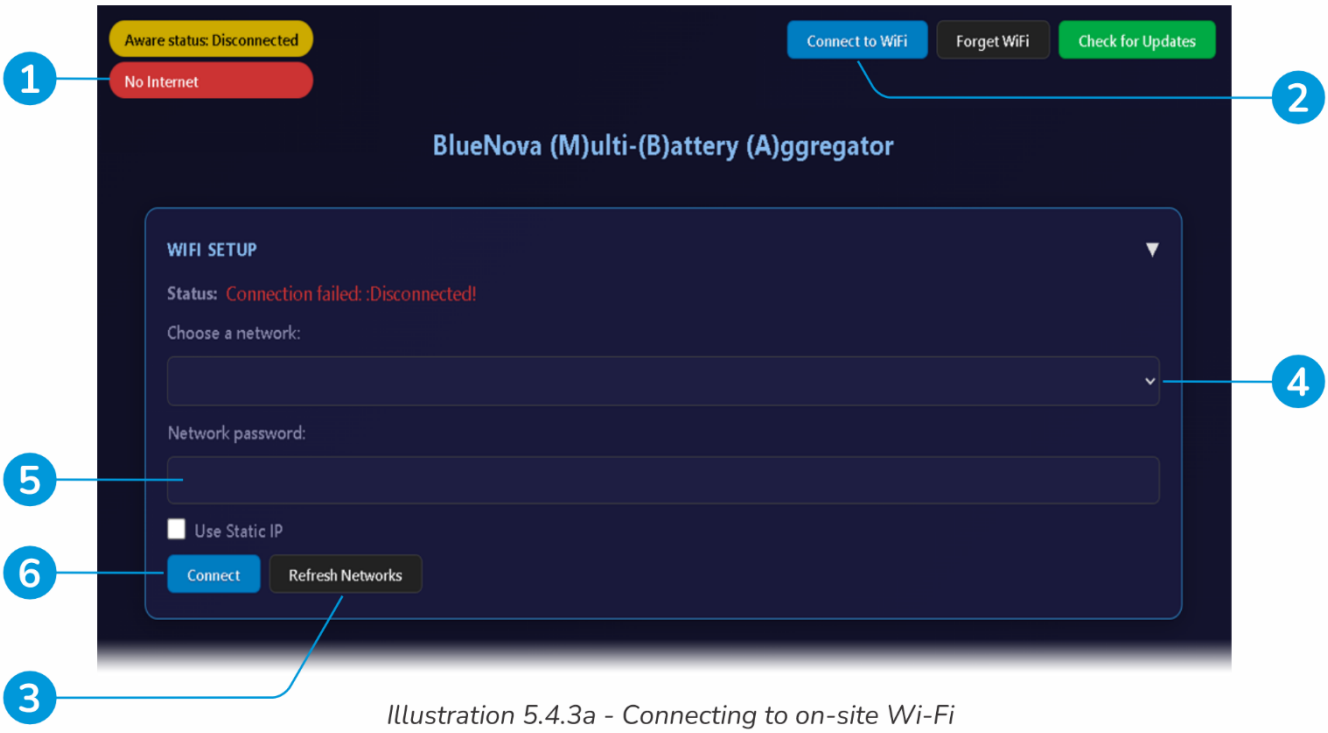


Illustration 5.4.3a - Connecting to on-site Wi-Fi

1. The internet connection status of the MBA module is indicated at the top left of the dashboard interface.
2. Click/tap on the **Connect to WiFi** button at the top right of the dashboard interface.
3. Click/tap on the **Refresh Networks** button to scan for Wi-Fi networks within range of the MBA module.
4. Select the preferred Wi-Fi network to connect the MBA module to from the drop-down menu.
5. Enter the correct password to connect to the chosen Wi-Fi network.
6. Click/tap on the **Connect** button to initiate connection. Note: This step might have to be repeated a few times.

Upon successful connection, the **WIFI SETUP** section illustrated above will disappear and the top section of the dashboard interface will be updated to display something similar to the below:

Illustration 5.4.3b - Connection status updated