



POWR2 POWRBANK User Manual V5.4 - 2022



For models:
POWRBANK PRO MKII
POWRBANK XPRO

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1 INTRODUCTION

1.1 Foreword

Thank you for purchasing your POWR2 POWRBANK.

The POWR2 POWRBANK is rental ready power supply that integrates with diesel generator systems to optimize efficiency and reduce noise, emissions and fuel waste.

ECM, the Energy Control Module is the brain of the unit, a touchscreen control panel enabling high-level monitoring and control over the system.

POWR2 PORTAL, our Energy Management System (EMS) platform allows you to manage your fleet. It enables you to monitor and report on each unit and the entire fleet at multiple levels to support the various user groups you may have from end users to fleet managers to service engineers. POWR2 PORTAL provides the very best means of managing your energy storage allowing you to get the most out of the system and respond to your customers' needs more effectively.

This manual will take you through the steps needed to own and operate this equipment safely and effectively. You will also be able to manage and maintain the asset throughout its operational life.

POWR2 provides a one year return to base warranty on all its equipment. We offer various levels of service contracts designed to suit your needs so please contact us about your requirements.

Thank you for choosing POWR2 and we look forward to working alongside you on this energy journey towards a cleaner safer future.

1.2 Conventions

Throughout this user manual, the following symbols are used:



WARNING

This symbol warns of the presence of a dangerous voltage which could cause harm to the operator or others.



This symbol indicates the potential of damage to the unit or connected devices.



This symbol indicates important or useful information.

The following terms are used in this manual to provide greater clarity:

- POWR2 will be referred to as “The Manufacturer”.
- The POWR2 Hybrid Energy System will be referred to as “POWRBANK” or “Unit”.
- Any AC input or supply to the POWRBANK will be referred to as "AC source".
- Any items that consume power will be referred to as “Loads”.
- POWRBANK internal power electronics will be referred to as "Inverter"
- Solar Charge Controller will be referred to as "MPPT".

1.3 Warnings



This user manual is an important part of POWRBANK. It must be available to all operators and kept close to the unit so that it can be referred to at any time.



WARNING

When the unit is operating it generates potentially lethal voltages. Work must only be performed on the unit by the manufacturer or a qualified service engineer approved by the manufacturer.

All items connected to the unit including distribution cables and boxes should be regularly checked and adhere to the same local regulations and standards as a regular grid-tied mains installation.

1.4 Disposal & Recycling

POWRBANK comprises of components that must be disposed of responsibly. For environmental purposes, many of the components within the unit can be recycled or reused. POWR2 will ensure the safe decommissioning and recycling of the unit at no charge if the unit is returned to the manufacturer. Otherwise, please contact the manufacturer for more information on safe and proper decommissioning of your POWRBANK.

1.5 POWR2 Contact Details

USA +1.800.354.4502
UK +44.330.128.9175
E-mail: customerservice@powr2.com
Web: www.powr2.com

1.6 About POWR2

POWR2 are dedicated to developing and marketing solutions that give our clients a competitive edge with ground breaking offerings and new industry best practices. The POWRBANK has been designed by a team of industry experts who have had 10 years' experience in the renewable and energy storage sector.

POWR2 designs and builds Energy Storage Systems that seamlessly connect to solar PV, mains grid and diesel generators to optimize performance and efficiency.

The team have engineered state of the art systems that are robust, cost effective and reliable. Over the course of our evolution we have evaluated and tested countless designs, components and suppliers. We currently manage a diverse and complex supply chain of over fifty manufacturers providing more than one hundred and twenty separate components.

We apply strict quality control methods to every aspect of the process, from design, to procurement, to manufacture, assembly and to testing.

The organization is built around our core values of efficiency, innovation, integrity and customer service of which helps us create a long term sustainable business.

We believe that everyone wants to grow and become a better person. Our team is family, we want to support, train, stretch and develop each one so they have the competitive advantage and are the winning team.

2 GETTING STARTED



WARNING

Powr2 offers no direct support for untrained individuals carrying out any action on the unit. Please, contact Powr2 to request training.

2.1 Storage

1. The internal energy storage must be maintained while the unit is not in use. See **“4.1 Charging the Unit: Caring For The Energy Storage”** on page 38.
2. POWRBANK is designed to be used and stored outside. However, it is recommended that the unit is stored undercover when possible to prevent unnecessary weathering.

2.2 Transporting, Lifting and Positioning

2.2.1 Transportation



Be sure to double check the capacity of lifting equipment before lifting the unit.

3. POWRBANK can be transported using a trailer or goods vehicle with adequate available payload. Check the relevant transportation documentation for suitability.
4. The gross weight of the unit can be found on the rating plate positioned on the central front door.
5. It is recommended that the unit is secured using suitable straps when in transit to prevent it from moving.



It is the user's responsibility to check local regulations for transport of POWRBANK as it contains lithium-based batteries.

2.2.2 Lifting (Loading/Unloading)



Always check the rating plate to ascertain the gross weight of the unit.



The unit must remain upright at all times.

1. POWRBANK must be loaded or unloaded using the correct equipment operated by suitably trained personnel.
2. Using the fork pockets, POWRBANK can be loaded or unloaded with a suitable fork-lift truck or telehandler.

2.2.3 Positioning



Ensure that the exhaust and hot air flow of diesel generators are directed away from POWRBANK.

3. The unit must be positioned upright on a flat, solid surface. Ensure that the unit is not at risk of being submersed in water above the fork pockets.
4. The unit should be positioned as close as possible to the chosen input source (e.g. diesel generator) and where applicable, close to its earth point.
5. At least 3 feet should be allowed for ventilation on all sides of the unit.
6. Ensure that vents are not obstructed and heat sources are not directed at the unit.

2.3 The POWRBANK Control Panel

2.3.1 POWRBANK PRO (EU version)

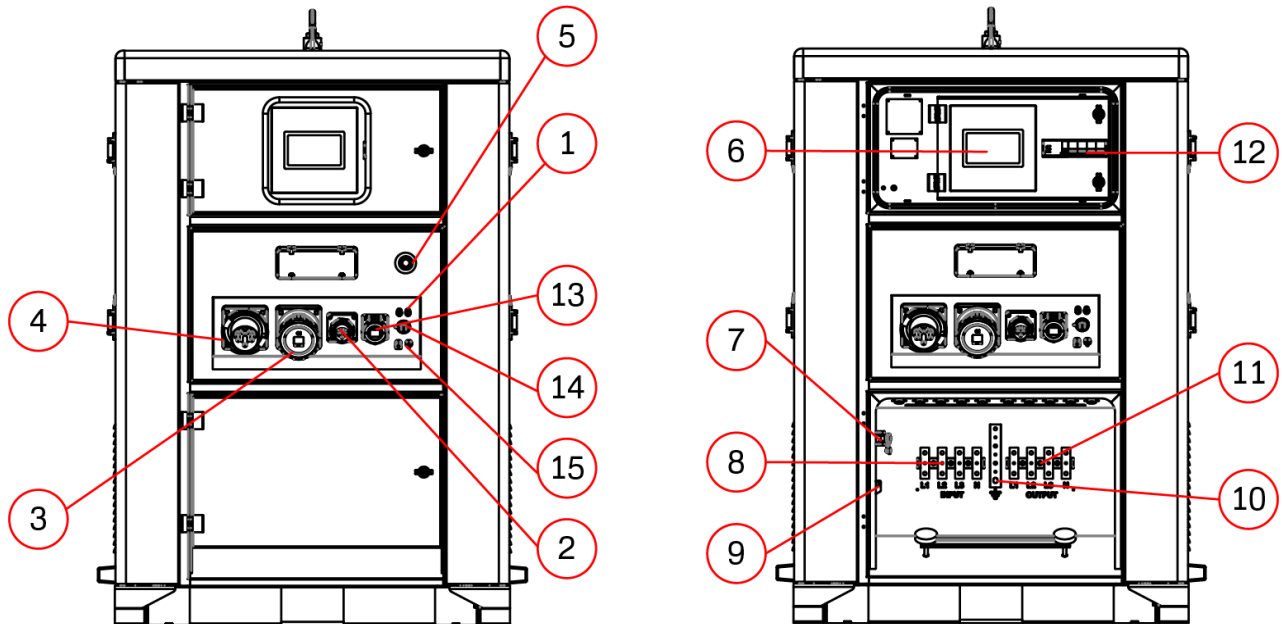


Fig. 2 - EU Version Control Panel

1. **Generator Remote Start** Binding posts for connecting wires to send start and stop signals to a connected diesel generator (circuit is normally open).
2. **Panel Mount CEE-Form Inlet 16A 230V** maintenance charge inlet.
3. **Panel Mount CEE-Form Outlet 125A 400V**
4. **Panel Mount CEE-Form Inlet 125A 400V**
5. **Emergency stop** Press in to immediately shut down AC Output.
6. **ECM** The brain of the POWRBANK; interfaces with and controls the various system components whilst data logging and connecting with the cloud platform.
7. **Safety Limit Switch** Switches off the AC Output when the bottom distribution door has been opened.
8. **AC Input Busbar Power Terminals**
9. **Generator RS485 Bus** Terminals for connecting the RS485 Bus from a generator control panel to the ECM.
10. **Earth Busbar** Earth Input/Output terminal for the unit.
11. **AC Output Busbar Power Terminals**
12. **Output circuit breaker**
13. **Panel Mount CEE-Form Outlet 230V**
14. **RJ45 Connector (WAN)**
15. **MC4 Solar Input**

2.3.2 POWRBANK PRO (US version)

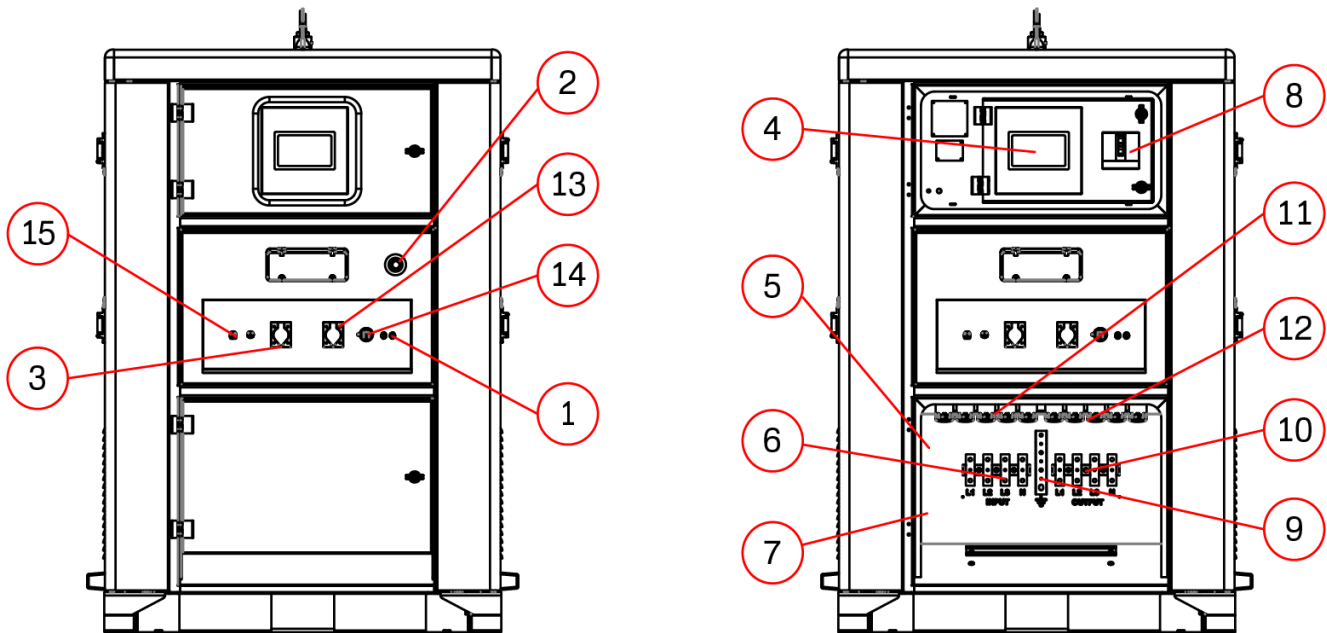


Fig. 3 - US Version Control Panel

1. **Generator Remote Start** Binding posts for connecting wires to send start and stop signals to a connected diesel generator (circuit is normally open).
2. **Emergency stop** Press in to immediately shut down AC Output.
3. **Nema 5-15P Maintenance Charge Inlet**
4. **ECM Controller** The brain of the Powrbank; interfaces with and controls the various system components whilst data logging and connecting with the cloud platform.
5. **Safety Limit Switch** Switches off the AC Output when the bottom distribution door has been opened.
6. **Input Busbar Power Terminals**
7. **Generator RS485 Bus** Terminals for connecting the RS485 Bus from a generator control panel to the ECM.
8. **Output circuit breaker**
9. **Earth Busbar** Earth Input/Output terminal for the unit.
10. **Output Busbar Power Terminals**
11. **Input CAM Connectors**
12. **Output CAM Connectors**
13. **Nema 5-20R Outlet**
14. **RJ45 Connector (WAN)**
15. **MC4 Solar Input**

2.3.3 POWRBANK XPRO (EU version)

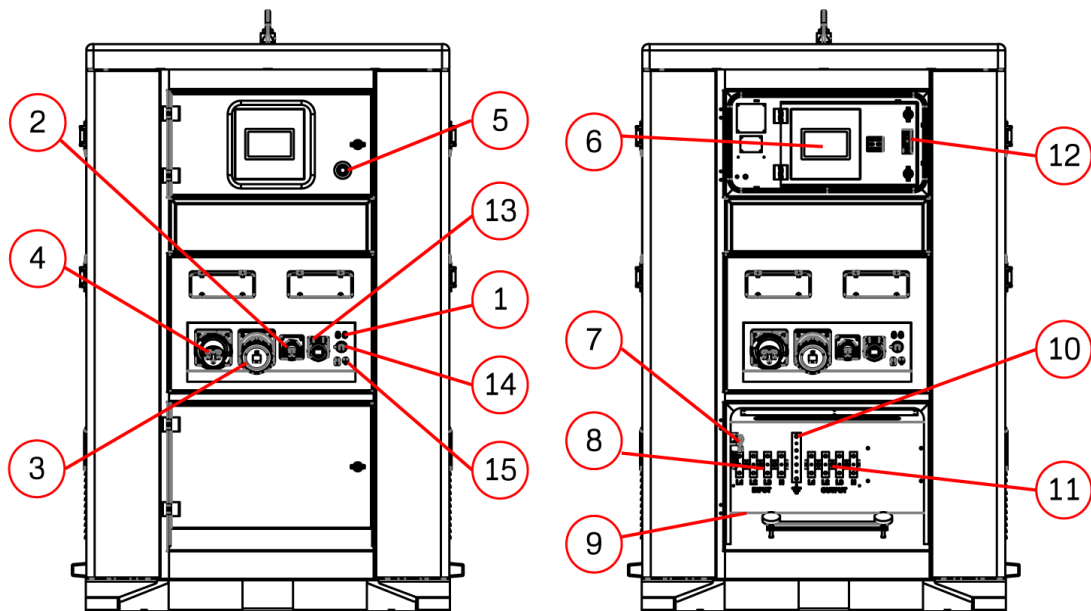


Fig. 4 - EU Version Control Panel

1. **Generator Remote Start** Binding posts for connecting wires to send start and stop signalsto a connected diesel generator (circuit is normally open).
2. **Panel Mount CEE-Form Inlet 16A 230V** maintenance charge inlet.
3. **Panel Mount CEE-Form Outlet 125A 400V**
4. **Panel Mount CEE-Form Inlet 125A 400V**
5. **Emergency stop** Press in to immediately shut down AC Output.
6. **ECM** The brain of the POWRBANK; interfaces with and controls the various system components whilst data logging and connecting with the cloud platform.
7. **Safety Limit Switch** Switches off the AC Output when the bottom distribution door has been opened.
8. **AC Input Busbar Power Terminals**
9. **Generator RS485 Bus** Terminals for connecting the RS485 Bus from a generator control panel to the ECM.
10. **Earth Busbar** Earth Input/Output terminal for the unit.
11. **AC Output Busbar Power Terminals**
12. **Output circuit breaker**
13. **Panel Mount CEE-Form Outlet 16A 230V**
14. **RJ45 connector (WAN)**
15. **MC4 Solar Input**

2.3.4 POWRBANK XPRO (US version)

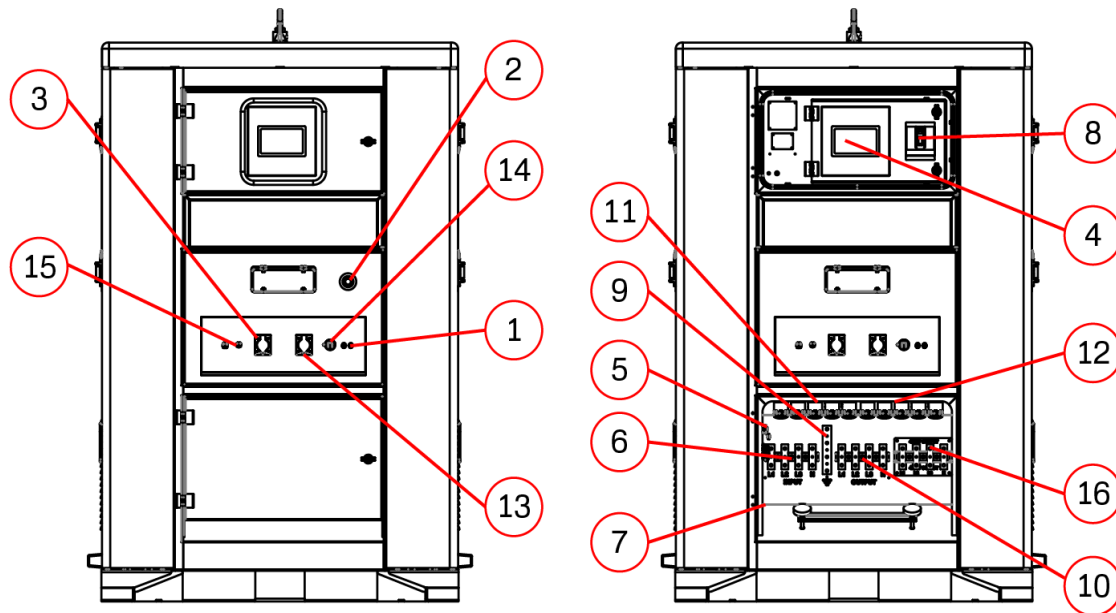


Fig. 5 - US Version Control Panel

1. **Generator Remote Start** Binding posts for connecting wires to send start and stop signals to a connected diesel generator (circuit is normally open).
2. **Emergency stop** Press in to immediately shut down AC Output.
3. **Nema 5-15P Maintenance Charge Inlet**
4. **ECM Controller** The brain of the Powrbank; interfaces with and controls the various system components whilst data logging and connecting with the cloud platform.
5. **Safety Limit Switch** Switches off the AC Output when the bottom distribution door has been opened.
6. **Input Busbar Power Terminals**
7. **Generator RS485 Bus** Terminals for connecting the RS485 Bus from a generator control panel to the ECM.
8. **Output circuit breaker**
9. **Earth Busbar** Earth Input/Output terminal for the unit.
10. **Output Busbar Power Terminals**
11. **Input CAM Connectors**
12. **Output CAM Connectors**
13. **Nema 5-20R Outlet**
14. **RJ45 connector (WAN)**
15. **Solar MC4 Connectors**
16. **480V output Busbar Power terminals**

2.4 The Busbar Panel

The Busbar panel is located behind the lower distribution door. It is accessed by opening the lock at the right of the door.

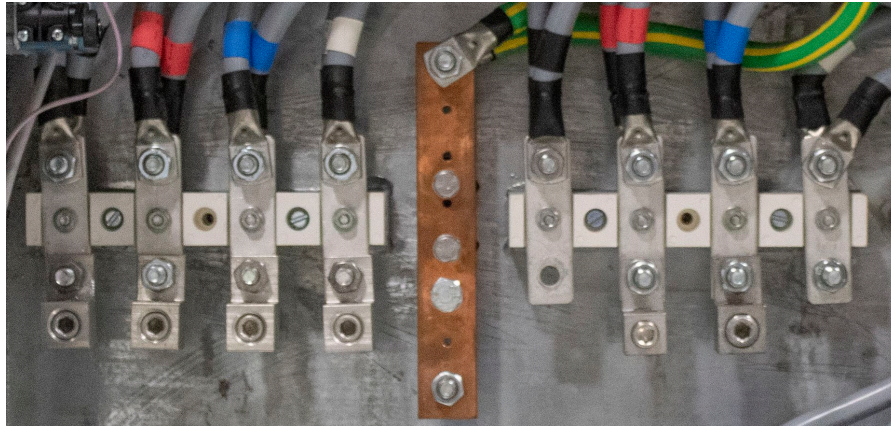


Fig. 6 - 3-Phase Busbar Panel (Listed left to Right)

1. AC Input Busbar - (L1,L2,L3,N) For attachment of 10 mm ring terminals.
2. Earth Busbar - Earth connection for 10 mm ring terminals.
3. AC Output Busbar - (L1,L2,L3,N) For attachment of 10 mm ring terminals.

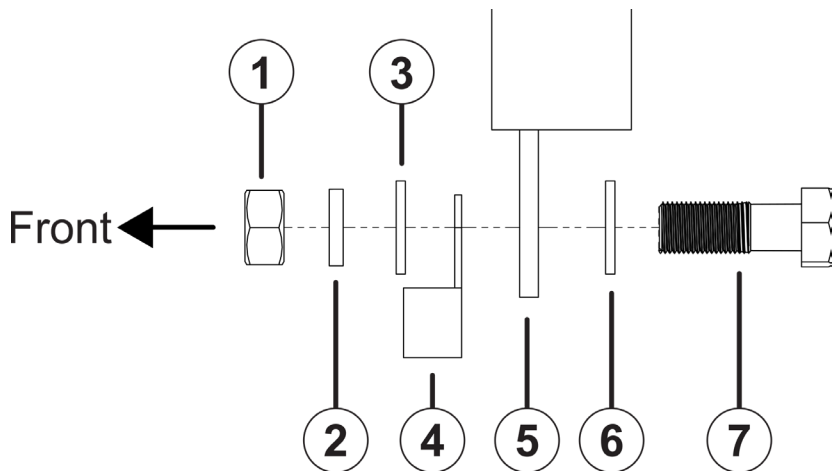


Fig. 7 - Busbar Connection Diagram

N°	Item
1	M10 Plain Nut
2	M10 Spring Washer
3	M10 Flat Washer
4	M10 Ring Terminal
5	Busbar
6	M10 Flat Washer
7	M10 Bolt

2.5 Connecting POWRBANK

2.5.1 Earth Connection



WARNING

A protective earth must be connected to POWRBANK in compliance with applicable local standards and regulations.

When the unit is connected to an AC source, a separate earth connection should not be connected to the earth busbar, only when working as stand alone. Refer to “**Fig. 3 - US Version Control Panel**” on page 11.

2.5.2 Input Options

The unit can accept input from a 3-phase AC power source or a Split phase AC power source depending on its configuration. Further information on connecting an AC Input is provided in section “**2.6 Connect the main AC Input**” on page 16.



WARNING

The unit will only accept a specific range of voltage according to its configuration. If a higher voltage source is used it could severely damage the system and this will invalidate the product warranty!

In Maintenance charge the AC Input current is limited automatically allowing the unit to be charged from a single phase AC sources with lower current capacity.

2.6 Connect the main AC Input

2.6.1 Connecting by Hard-Wiring into the AC Input Busbar or CAM Terminals

1. Ensure that the circuit breaker of the AC source being connected to the unit is switched OFF.
2. Turn inverters OFF on the ECM onboard screen by selecting OFF mode (Home tab-System OFF)
3. Switch OFF the output circuit breaker.
4. Open the lower distribution door. See **“2.3 The POWRBANK Control Panel”** on page 10.
5. The Input busbar is located centrally and is the left hand side set. Ensure power terminals are dry; wipe off any excess moisture with an absorbent cloth. The Input CAM terminal set is located at the bottom right corner and is the top set.
6. Attach the AC supply connectors to the inlet CAM connectors or ring terminals to input power terminals.
7. Close the lower distribution door.
8. Turn the inverters ON on the ECM onboard screen by selecting Operation mode (Home tabSystem ON).
9. Switch on the AC input's power supply.
10. Switch ON the output circuit breaker.

2.6.2 Connecting by using the 125/3 CEE-Form Inlet

11. Ensure that the circuit breaker of the AC source being connected to the unit is switched OFF.
12. Turn inverters OFF on the ECM onboard screen by selecting OFF mode (Home tab-System OFF)
13. Switch OFF the output circuit breaker.
14. Attach the AC input source 125/3 CEE-Form in-line socket
15. Turn the inverters ON on the ECM onboard screen by selecting Operation mode (Home tabSystem ON).
16. Switch ON the AC input's power supply.
17. Switch ON the output circuit breaker.

2.7 Connecting to a Diesel Generator For Automatic Stop/Start

A Remote Generator Start function is provided to automatically control a diesel generator. The Start and Stop conditions are programmed using the ECM.

2.7.1 Remote Generator Start Binding Posts Connection

Remote Generator Start terminals are located on the bottom door. See “**Fig. 2 - EU Version Control Panel**” on page 10 or “**Fig. 3 - US Version Control Panel**” on page 11. This is a connection that is used to send a start or stop signal to a remote fuel powered generator using its auto-start lead.

2.8 Setting Up a Diesel Generator to Be Part of a Hybrid System

When setting up a hybrid system the overall performance of combining POWRBANK with the diesel generator can be enhanced by making some simple adjustments to the diesel set.



WARNING

If the generator is not configured to the right voltage, this will severely damage the unit and void the warranty.

In automatic mode some diesel sets will start and run as soon as a start signal is received, however some have a number of delays which can hinder the diesel generator from starting up and generating power as quickly as possible. These delays should be minimized wherever practical.

2.8.1 Common Causes of Diesel Generator Startup Delays

2.8.1.1 Start Delay

This delay allows for short "false start" signals and can be as long as five seconds, when used with the hybrid unit it is important that the diesel generator starts immediately. Where possible this delay should be removed.

2.8.1.2 Pre-Heat Delay, Safety On Timer & Warm Up Timer

Always try to reduce the delays to the minimum acceptable level.

2.8.1.3 Automatic Mode

Ensure diesel generator is switched to automatic mode.

2.9 Connect The AC Output

NOTE: If the unit has been put into SLEEP MODE it will be necessary to WAKE the unit by following the procedure in section 8.2

2.9.1 Connecting by Hard-Wiring Into The AC Output Busbar or CAM Terminals

1. Ensure that the circuit breaker of the AC source being connected to the unit is switched OFF.
2. Turn inverters OFF on the ECM onboard screen by selecting OFF mode (Home tab-System OFF)
3. Switch OFF the output circuit breaker.
4. Open the lower distribution door. See “2.3 The POWRBANK Control Panel” on page 10.
5. The Output busbar is located centrally and is the right hand side set. Ensure power terminals are dry; wipe off any excess moisture with an absorbent cloth. The output CAM terminal set is located at the bottom right corner and is the bottom set.
6. Attach the load connectors to the outlet CAM connectors or ring terminals to output power terminals.
7. Close the lower distribution door.
8. Turn the inverters ON on the ECM onboard screen by selecting Operation mode (Home tabSystem ON).
9. Switch on the AC input's power supply
10. Switch ON the output circuit breaker.

2.9.2 Connecting with CEE-Form output sockets

11. Ensure that the circuit breaker of the AC source being connected to the unit is switched OFF.
12. Turn inverters OFF on the ECM onboard screen by selecting OFF mode (Home tab-System OFF)
13. Switch OFF the output circuit breaker.
14. Attach 125/3 CEE-Form in-line plug
15. Turn the inverters ON on the ECM onboard screen by selecting Operation mode (Home tabSystem ON).
16. Switch ON the AC input's power supply.
17. Switch ON the output circuit breaker.

3 GENERAL OPERATION

3.1 Turning the Power On

NOTE: If the unit has been put into SLEEP MODE it will be necessary to WAKE the unit by following the procedure in section 8.2

Once all connections are complete, the unit is ready to be switched on.

3.1.1 Turn ON sequence

Ensure that the lower distribution door is closed.

Switch ON the output circuit breaker (UP position).

Turn the inverters ON on the ECM onboard screen by selecting Operation mode (Home tab-System ON).

The load metrics can now be observed on the ECM and Powr2 Portal.

3.2 Turning the Power Off

When Power is not needed at the output, the unit can be turned off.

3.2.1 Turn OFF sequence

Turn inverters OFF on the ECM onboard screen by selecting OFF mode (Home tab-System OFF).

Switch OFF the input and output circuit breaker (DOWN position)



ONLY use the emergency stop button in an emergency.

3.3 Emergency Stop Button

1. If there is an emergency and it is necessary to turn off the unit's power, press the Emergency Stop Button on the Upper Control Panel Door.
2. The unit will then shut down and the main output breaker will trip. POWRBANK can not be switched on again until the Emergency Stop Button is released by rotating it clockwise.
3. Once the problem has been rectified, follow the instructions in **“3.1 Turning the Power On” on page 19** to switch the power back on.

3.4 Power Assist

The Power Assist facility will activate automatically as required with no programming required by the customer.

It will activate when the load demand rises above the input limit of the AC source, when activated the inverter(s) will synchronize themselves with the AC source and add their power to the incoming power. This function is useful when a high load demand is needed at intervals which the POWRBANK cannot supply.



When using Power Assist please note that although there is an incoming supply, the storage will be depleted whilst Power Assist is being used. [Only in the condition that the AC source is not big enough. If the AC source is big enough then the storage would not be depleted.]

Please contact the manufacturer for further information.

3.5 Monitoring and Controlling the POWRBANK using ECM

3.5.1 HOME Screen

The HOME tab allows users to visualize the current system performance as well as turn on and off the POWRBANK with one single click on the SYSTEM ON/OFF switch. Available energy sources, real-time power distribution, how much energy is being produced and consumed or the current status of warnings and alarms are shown on this tab where the central logo represents the POWR2 POWRBANK.

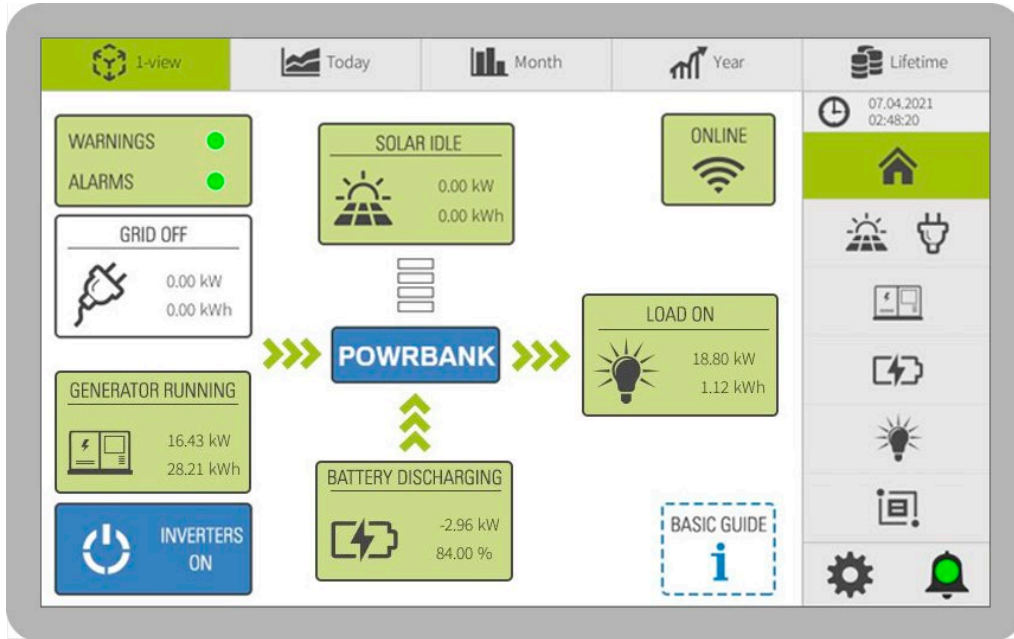


Fig. 8 - ECM HOME Screen

N°	Description
1	Inverter switch: On or Off ON = Inverters and Solar Charge Controller are Active OFF = Inverters and Solar Charge Controller are OFF
2	Generator Status: Running, Idle or Off Data: Instantaneous Power and Daily Energy
3	Grid Status: On or Off Data: Instantaneous Power and Daily Energy
4	Solar Status: Producing, Idle or Off Data: Instantaneous Power and Daily Energy
5	Load Status: On, Idle or Off Data: Instantaneous Power and Daily Energy
6	Battery Status: Charging, Discharging, Idle or Disconnected Data: Instantaneous Charging or Discharging Power and SoC
7	Warnings Status: Orange if one or more warnings are active or Green if no warnings are present on the system. Alarms Status: Red if one or more alarms are active or Green if no alarms are present on the system.
8	Basic Guide: A basic explanation of how to use the ECM specially recommended for first-time users.

3.5.1.1 BASIC GUIDE

Additional sub tab to help first time-users identify the main tabs of the control panel located on the right side as well as their sub tabs which are shown by blue dashed rectangles, and the basic steps to setup the powerbank.

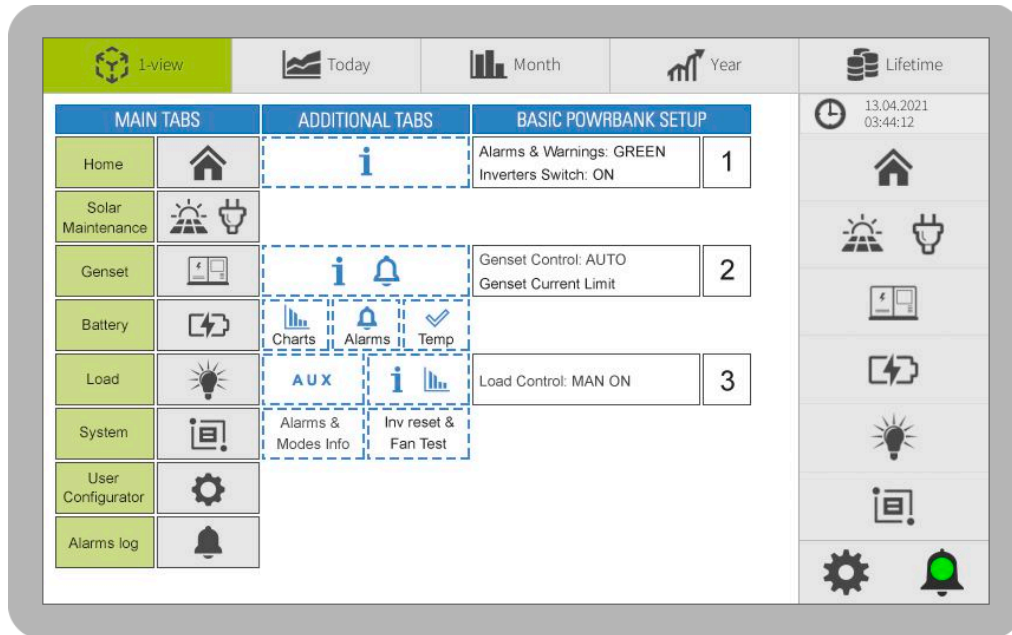


Fig. 9 - ECM Home, Basic Guide

3.5.2 MAINTENANCE CHARGE & SOLAR Screen

Displays information generated from the DC-coupled MPPT solar charge controller and the AC single phase maintenance charge input.

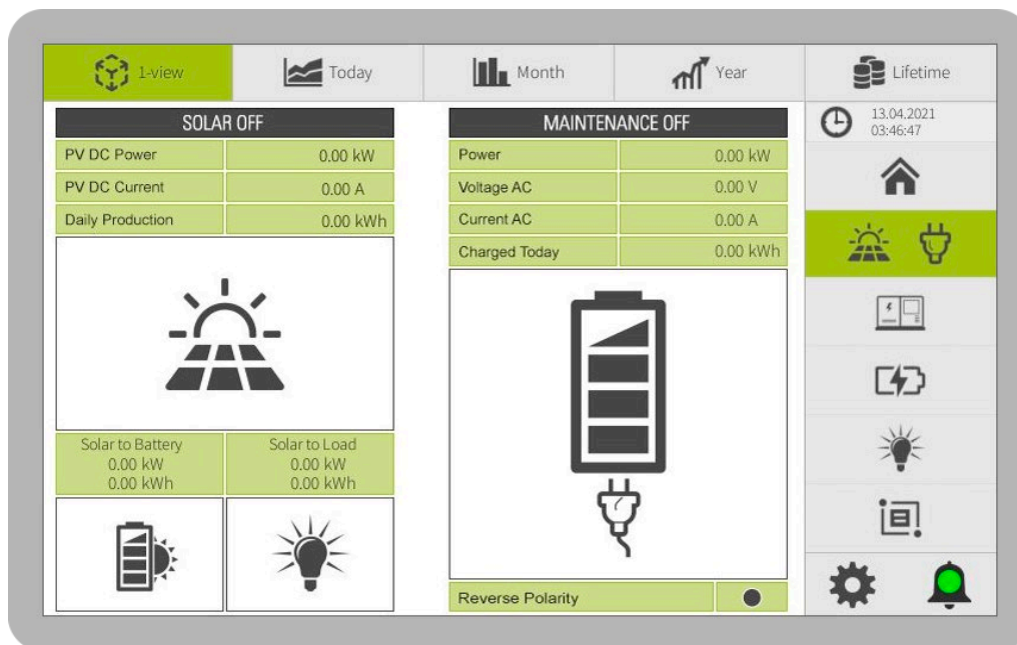


Fig. 10 - ECM SOLAR & GRID Screen

N°	Solar Description
1	PV DC Power Instantaneous PV production (kW)
2	PV DC Current MPPT DC Output Current (A)
3	Daily Production Total Produced (kWh)
4	Solar to Battery Excess solar stored (kW & kWh)
5	Solar to Load Direct consumed (kW & kWh)

N°	Grid Description
1	Power Instantaneous consumption (kW)
2	Voltage AC Output Voltage (V)
3	Current AC Input Current (A)
4	Charged Today from maintenance charge inlet (kWh)
5	Maintenance charge icon which turns blue if maintenance charge is active.
6	Reverse Polarity: Warning LED (orange/grey)

3.5.3 GENERATOR Screen

Information recorded from the generator is displayed on this tab as well as custom controls over the genset operation such as **Input Current Limit** and **Generator Remote Control** based on management optimization algorithms according to user requirements and the **Genset Timer** to program up to 3 timers per day.

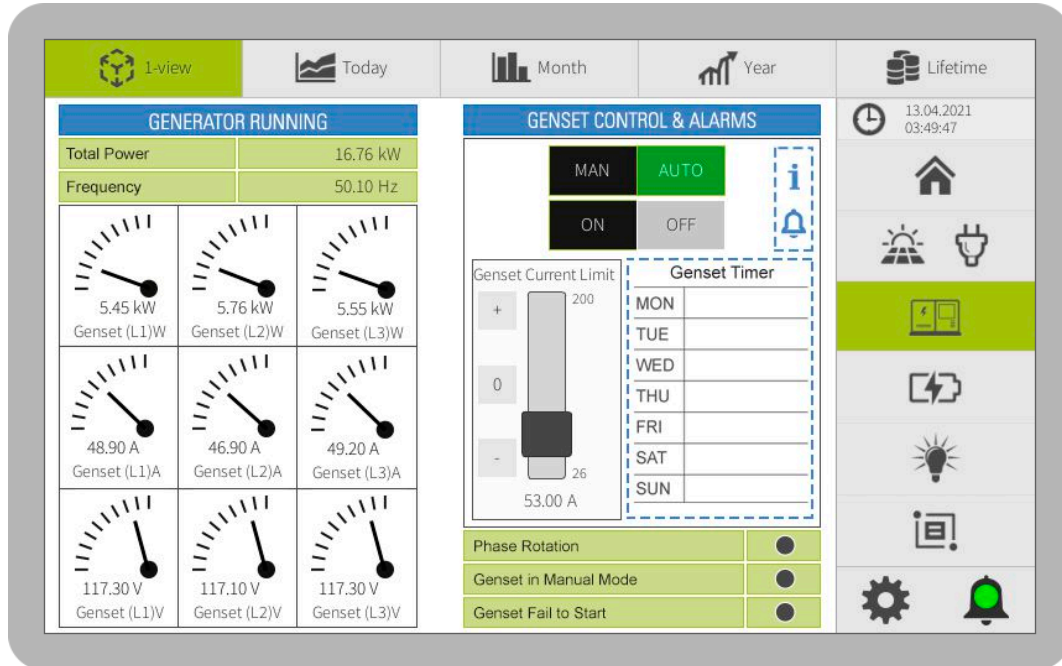



Fig. 11 - ECM GENERATOR Screen

N°	Description
1	Total Power total active power coming from the genset (kW)
2	Frequency Genset output operating frequency (Hz)
3	Analog Gauges Visual indicators for Power, Current and Voltage readings by phase
4	GENERATOR REMOTE CONTROL Main control of the genset status: MAN: Genset permanently ON or OFF AUTO: Switches the genset status based on custom management algorithms (see Genset Auto Start Information in section 3.5.3.2)
5	Genset Info Tab: See section 3.5.3.2 Generator Info Screen 
6	Genset Current Limit This function allows the setting of the maximum current per phase that can be input into the POWR2 POWRBANK. This setting may be used, for example, to prevent a low power Generator from overloading and too frequent switching of the inverter transfer relay because, most often, the voltage of the Generator drops before its rated power.

N°	Description
7	Genset Timer Weekly Schedule Chart (see section 3.5.3.1).
8	Phase Rotation Warning LED (orange/green).
9	Genset in Manual Mode Warning LED (orange/green).
10	Genset Fail to Start Warning LED (orange/green).

3.5.3.1 Genset Timer

Up to 3 timers can be added per day every day of the week to run the generator for specific period of times. If no timers are added, the Powrbank will not use this function to run the generator.

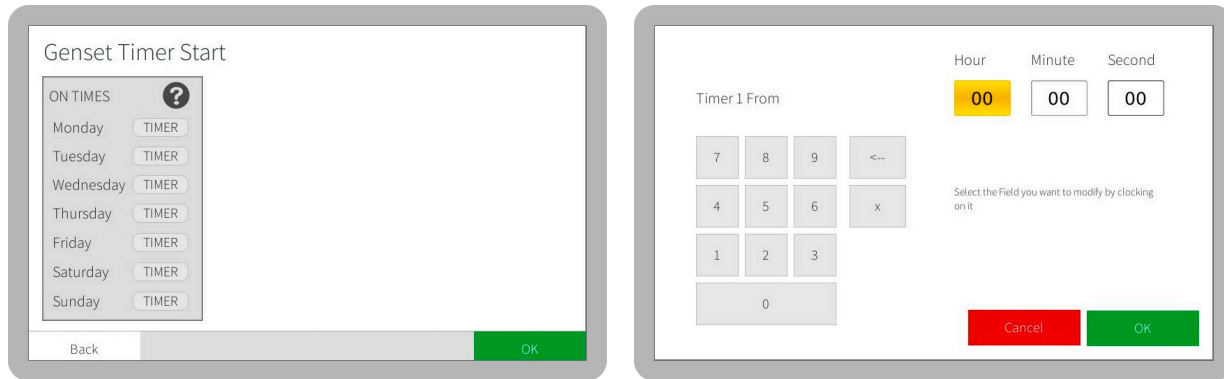


Fig. 12 - ECM Genset Timer Screens

3.5.3.2 Genset Information Screen

Click on the info tab icon on the Generator screen to access the content which shows the steps to make sure the Powrbank is properly controlling the Generator once both are attached on site as well as the turning on conditions by ON/OFF indicators according to the management optimization algorithms such as the Power Start, Battery Low Start and the Genset Timer Start. Moreover, a troubleshooting section displays instructions on how to solve the Genset alarms.

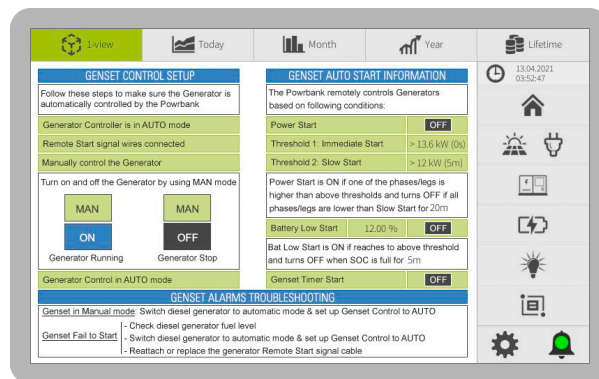





Fig. 13 - ECM GENERATOR Screen

3.5.4 STORAGE Screen

Historical and instantaneous information from the batteries is displayed on this tab.



Fig. 14 - ECM STORAGE Screen

N°	Description
1	Battery Status Charging, Discharging, Idle or Disconnected
2	Battery SoC System generated State of Charge percentage and indicator graphic.
3	Heater ON/OFF status indicator.
4	Voltage Battery and DC bus voltage (V)
5	Current Battery and DC bus current (+/- A)
6	Power DC battery power (+/- kW)
7	Charged Today Daily stored (kWh)
8	Discharged Today Daily consumption from batteries (kWh)
9	Charge from Genset Daily excess generator power stored (kWh)
10	Charge from Solar Daily excess solar power stored (kWh)
11	Temperature Average battery bank temperature (° C or °F) & status icon.
12	Battery Info  tap to go to Energy Storage Information Screen
13	Alarms Info  tap to go to Battery Alarms Information Screen
14	Temperature Info  tap go to Battery Temperature Restrictions Screen

N°	Description
15	Battery Low Warning LED (orange/green)
16	Battery Critically Low Alarm LED (red/green)
17	Battery Error Alarm LED (red/green)

3.5.4.1 Energy Storage Information Screen

The storage info screen is accessible by clicking on the info tab icon and contains the parameters which limit the charge & discharge battery power as well as a graph with most relevant battery parameters. See **section 3.5.8** on how to use the top buttons.

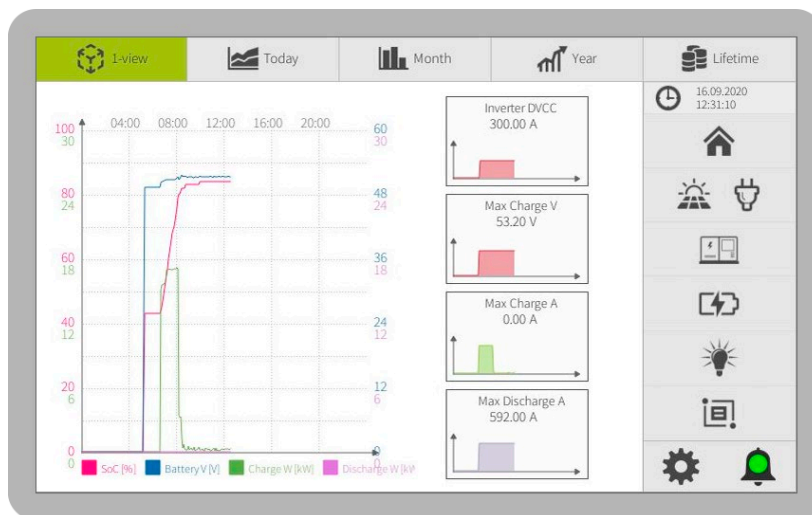


Fig. 15 - ECM Energy Storage Information Screen

N°	Description
1	Chart SoC, Battery V, Charge AC kW, Discharge AC kW.
2	Inverter DVCC Max dc current from inverter allowed to charge the batteries (A).
3	Max Charge V Max dc voltage allowed to charge the batteries (V).
4	Max Charge A Max dc current allowed to charge the batteries (A).
4	Max Discharge A Max dc current allowed to discharge the batteries (A).

NOTE: The lowest value of **Inverter DVCC** and **Max Charge A** will be the **charge current limit** on the POWRBANK.

3.5.4.2 Battery Alarms and Temperature Restriction Screen

Troubleshooting and temperature restriction sections are accessible by clicking on the Alarms Info or Temp Info tabs. This tab displays instructions of how to solve the battery alarms as well as an overview of the charge & discharge restrictions based on battery temperature.

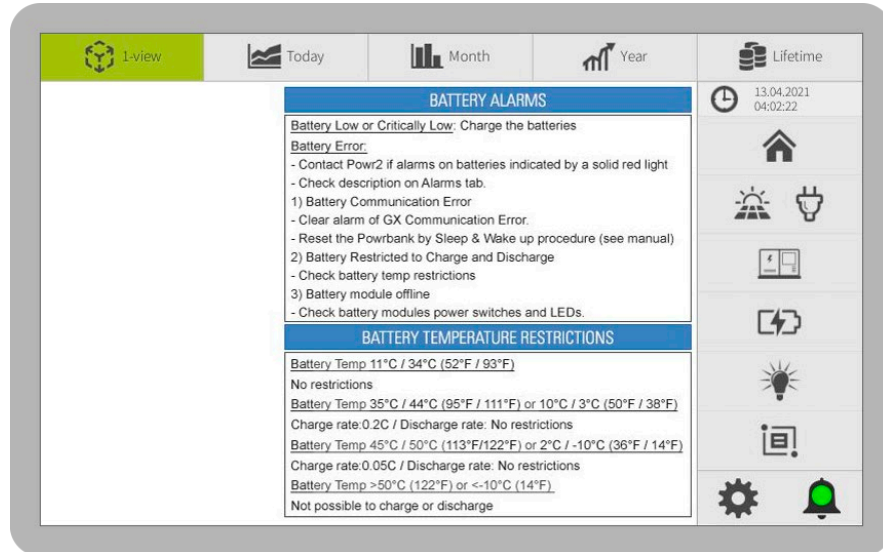


Fig. 16 - Battery Information Screen

3.5.5 LOAD Screen

Information recorded from the load is displayed on this tab which also allows users to add customer controls over the main and auxiliary loads.

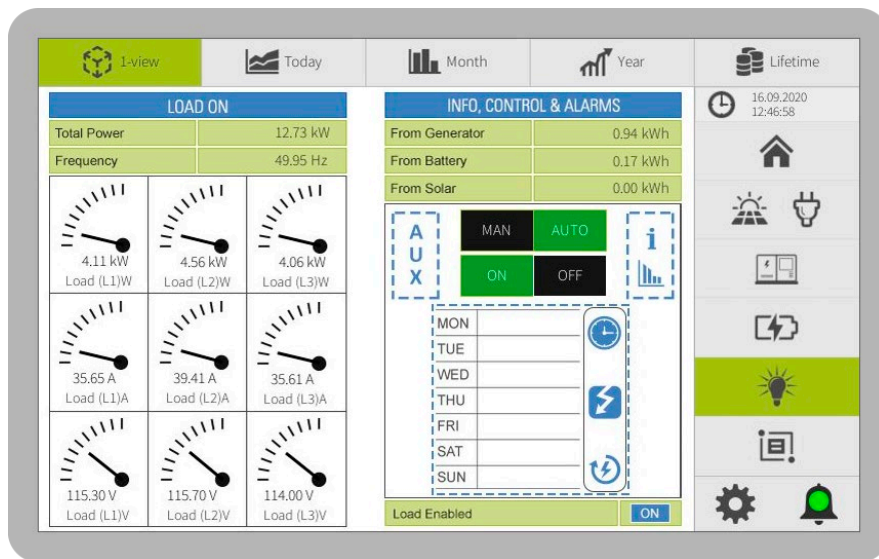




Fig. 17 - ECM LOAD Screen

N°	Description
1	Total Power instantaneously consumed (kW).
2	Frequency AC output operating frequency (Hz).
3	Analog Gauges Visual indicators for Power, Current and Voltage readings by phase.
4	From Generator Daily consumption from generator (kWh),
5	From Battery Daily consumption from the batteries (kWh),
6	From Solar Daily consumption from solar (kWh),
7	LOAD CONTROL Main control of the load status. See section 3.5.5.2.
8	Load Info tab  tap to go to the Load Information Screen
9	Auxiliary Load tab  Control of the auxiliary output status. See section 3.5.5.3.
10	Load Control Configuration (Weekly Schedule Icon). See section 3.5.5.1
11	Load Enabled On/Off status indicator

3.5.5.1 Load AUTO mode configuration screen

This function allows users to disable the load if energy has exceeded a given value, or enable the load between given times on a weekly schedule. This page is displayed after tapping the weekly schedule icon on the main Load screen.

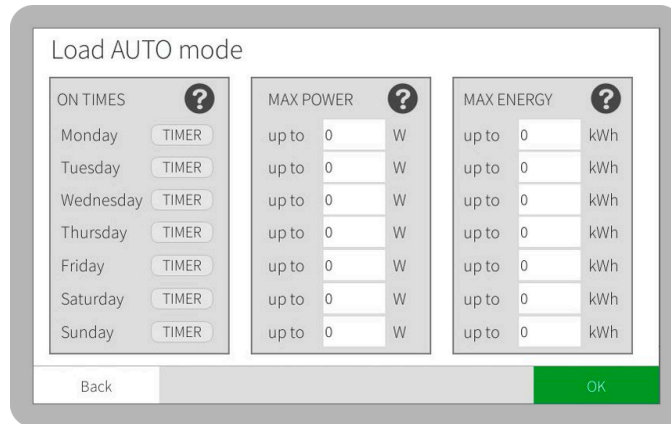


Fig. 18 - ECM Load Auto Mode Configuration Screen

N°	Description
1	Timers For each day of the week there is a "TIMER" button which will take the user to a page where 3 timer programmes are available to be set. The load is active only within the chosen time periods and if no times are chosen for that day then the load will be active all the time.
2	Max. Power If the Max. Power of the load is greater than the value given for 5 minutes, the output of the machine will be disabled, turning off the load. If this condition is triggered the output will be disabled for 30 minutes. Do not add values if you do not want to turn off the load under this condition.
3	Max. Energy If the overall energy usage has reached the value given here, the output of the machine will be disabled for the rest of the day, turning off the load. Do not add any values if you do not want to turn off the load under this condition.

3.5.5.2 Load Information Screen

The load info tab contains information to show the conditions on which the load is enabled or disabled as well as a view of historical data of power per phase by clicking on the chart. See **section 3.5.8** on how to use the top buttons.

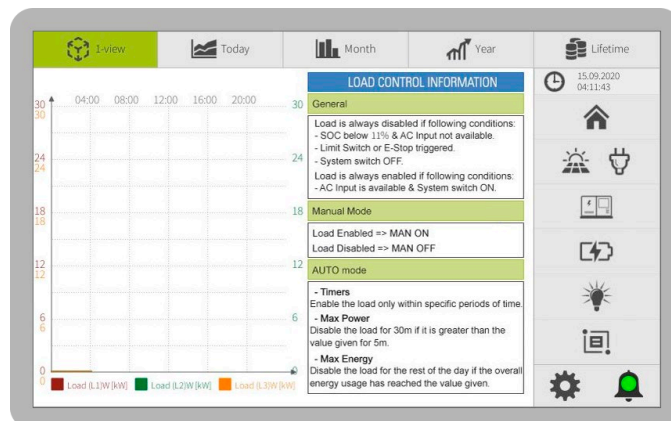


Fig. 19 - ECM load Information Screen

3.5.5.3 Auxiliary Load Screen

This tab contains the customer controls over the auxiliary output.

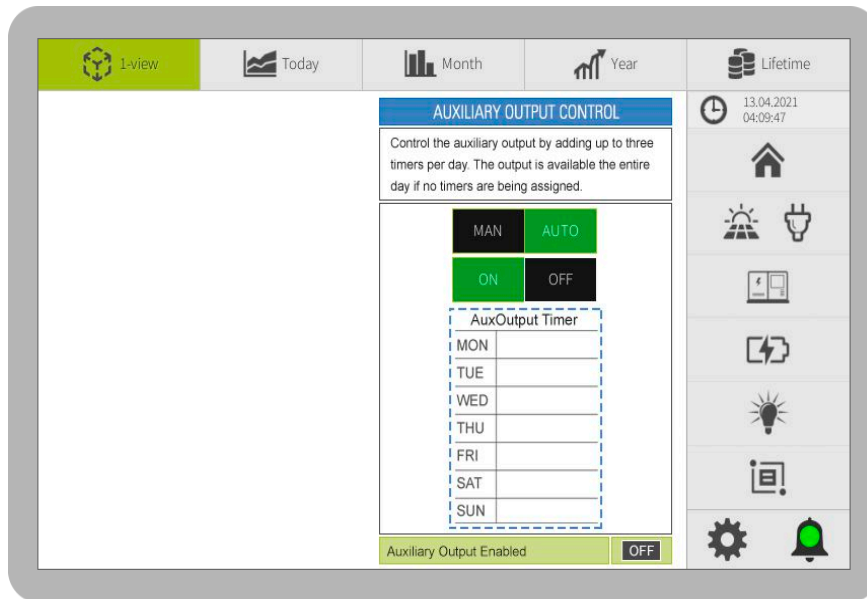


Fig. 20 - AUXILIARY OUTPUT

Label	Description
Auxiliary Control	MAN ON => Auxiliary enabled MAN OFF => Auxiliary disabled AUTO => Auxiliary enabled or disabled based on timers
Auxiliary Output Timer	Function to add ON Times.
Auxiliary Output Enables	On/Off status indicator.

3.5.6 SYSTEM Screen

The system tab displays general system information for the POWRBANK with access to inverter reset & fan test functions, system mode descriptions and VEBus Error code meanings.

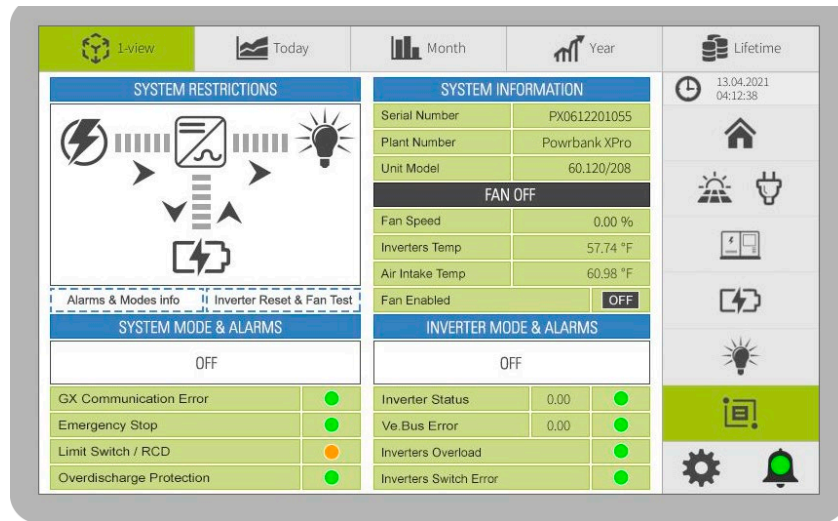


Fig. 21 - ECM SYSTEM Screen

N°	Description
1	Restrictions This diagram shows "at-a-glance" if the system has any restrictions mostly to avoid internal components damage or because the system is off. The colour of the arrows indicate power restrictions between the system elements where Grey means restricted and Blue means permitted.
2	Alarms & Modes Information Alarms & Modes info tap to go to System Information Screen. See section 3.5.6.1
3	Inverter Reset & Fan Test Inverter Reset & Fan Test tap to go to System Information Screen. See section 3.5.6.2
3	System Mode & Alarms See description of system modes on section 3.5.6.1 <ul style="list-style-type: none"> • GX Communication Error Powr2 asset controller alarm LED (red/green). • Emergency Stop warning LED (orange/green) • Limit Switch/RCD warning LED (orange/green) • Overdischarge Protection warning LED (orange/green).
4	FAN Shows its status (ON/OFF). <ul style="list-style-type: none"> • Fan Speed From 0% to 100% • Inverter Temperature: Sensor located above inverters to measure the peak internal temperature • Air intake Temperature: Sensor located at the air intake to measure external temperature • FAN Enabled status indicator (ON/OFF).
5	Inverter Mode & Alarms Shows the status of the inverters which can be ON, Charger Only, OFF or Communication Error. <ul style="list-style-type: none"> • Inverter Status code number & alarm LED (red/green). See description of inverter status on section 3.5.6.1 • VE.Bus Error code number & warning LED (orange/green). See description of errors on section 3.5.6.1 • Inverter Overload warning LED (orange/green). • Inverter Switch Error alarm LED (red/green).

3.5.6.1 System Information Screen

This tab contains a description of the system modes, VE.Bus error codes, Inverter Status codes and a troubleshooting section of the system and inverter alarms.

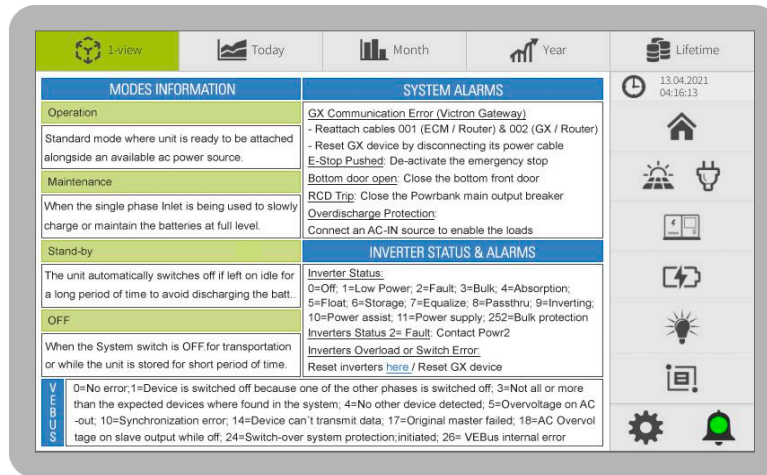


Fig. 22 - ECM System Information Screen

N°	Description
1	Modes Information description of the Powrbank modes such as Operation, Maintenance, Stand-by and OFF.
2	VE.Bus Error code description. See section 7.3 for further information about the cause and solution for these errors.
3	System Alarms troubleshooting section.
4	Inverter Status Alarms code number description & troubleshooting section.

3.5.6.2 Inverter Reset and Fan Test Screen

This tab contains the button which allows to run the fan at max speed for 10s and the inverter reset button.

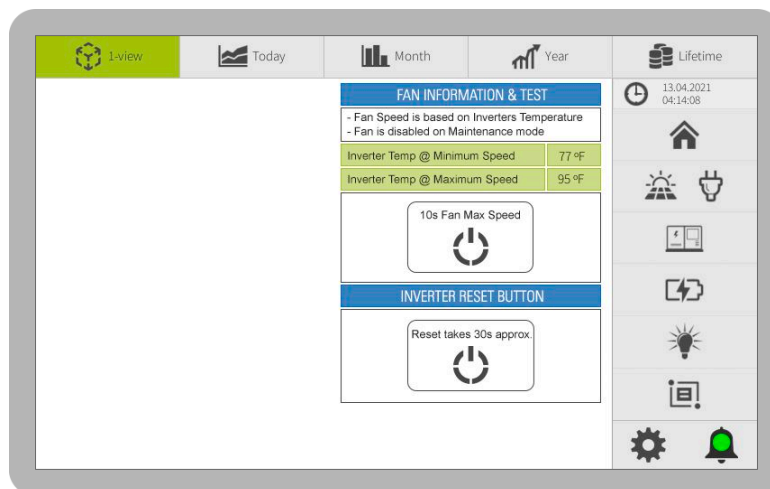


Fig. 23 - ECM System Inverter Reset

3.5.7 USER CONFIGURATOR

The User Configurator Screen displays advanced controls to edit some management algorithms and settings of the ECM such as updating firmware or changing time. It is very important to know the ECM will reset itself to update the changes once the user click on SAVE button. Make sure to do the changes when POWRBANK is in OFF mode.

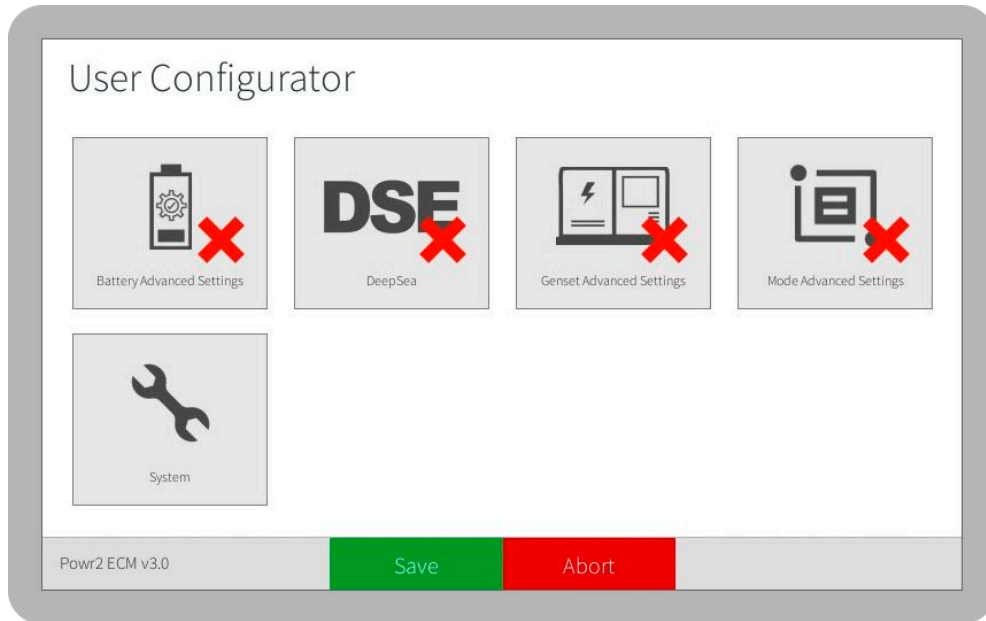


Fig. 24 - ECM SYSTEM Screen

3.5.7.1 Genset Advanced Settings

This screen allows to modify some functions related to the Genset.

Click on Deactivate and then on Save button to restore default settings after the ECM is reset.

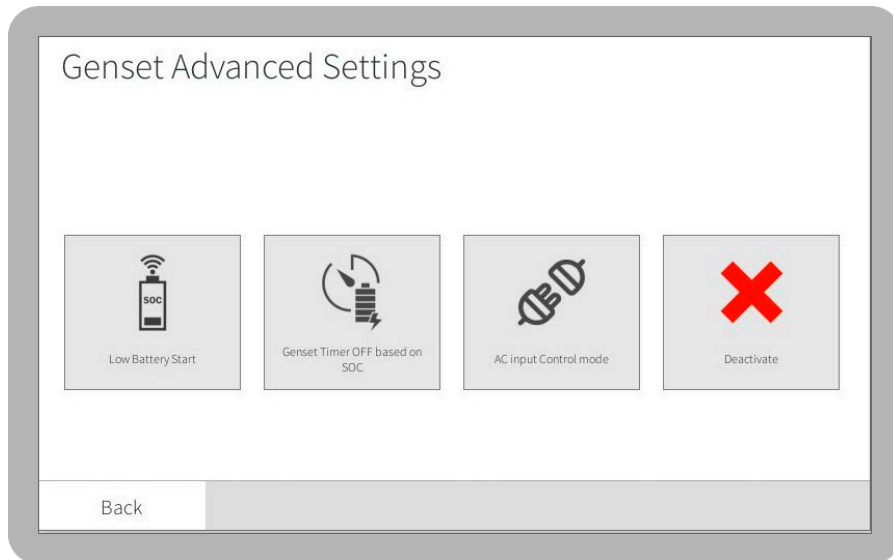


Fig. 25 - ECM Genset Advanced Settings Screen

3.5.7.1.1 Low Battery Start

This screen allows to modify the setpoints to control the Genset based on Battery SOC.

The new threshold condition will be effective once the ECM reset after clicking on Activate and Save buttons.

To activate this function, click on the Activation field, select "Enable" and click on Activate and Save buttons.

To deactivate this function, click on the Activation field, select "Disable" and click on Activate and Save buttons.

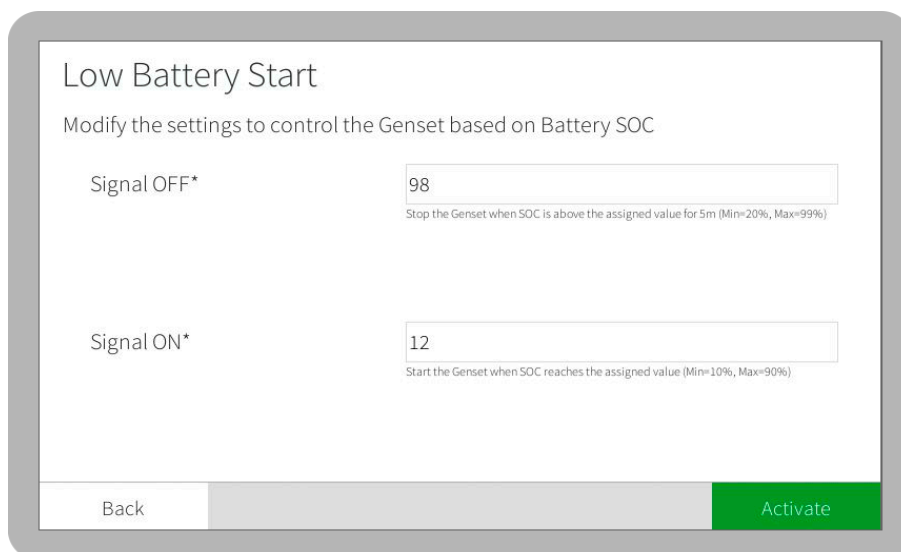


Fig. 26 - ECM Genset Start Setting Screen

3.5.7.1.2 Genset Timer OFF Based on SOC

To add an additional condition to switch off the timer when SOC reaches to assigned setpoint. This function can be used in situations where the generator must start based on timer but can be turned off as soon as the batteries are completely charged.

To activate this function, click on the Activation field, select “Enable” and click on Activate and Save buttons.

To deactivate this function, click on the Activation field, select “Disable” and click on Activate and Save buttons.

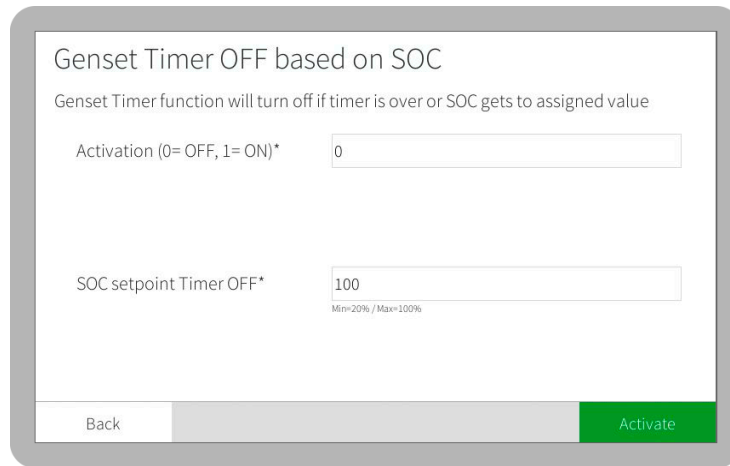


Fig. 27 - ECM Genset Timer

3.5.7.1.3 AC Input Control Mode

This Screen allows to control the AC Input via “Genset Remote Control” function (See section 3.5.3). Therefore, if this function is enabled, the AC Input is disconnected when Genset Remote Control is OFF.

To activate this function, click on the Activation field, select “Enable” and click on Activate and Save buttons.

To deactivate this function, click on the Activation field, select “Disable” and click on Activate and Save buttons.

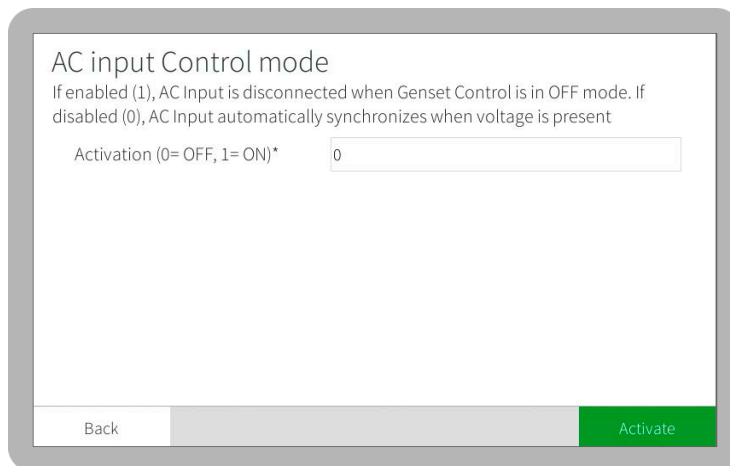


Fig. 28 - ECM AC Input Control

3.5.7.2 Battery Advanced Settings

This screen allows to modify the algorithm threshold of the Battery Low Alarm based on SOC. For instances, it is useful for applications that require this alarm to be notified at higher battery capacity due to difficult service access on site.

The new threshold condition will be effective once the ECM reset after clicking on Activate and Save buttons. Click on Deactivate and then on Save button to be back to standard Genset Start Settings threshold after the ECM is reset.

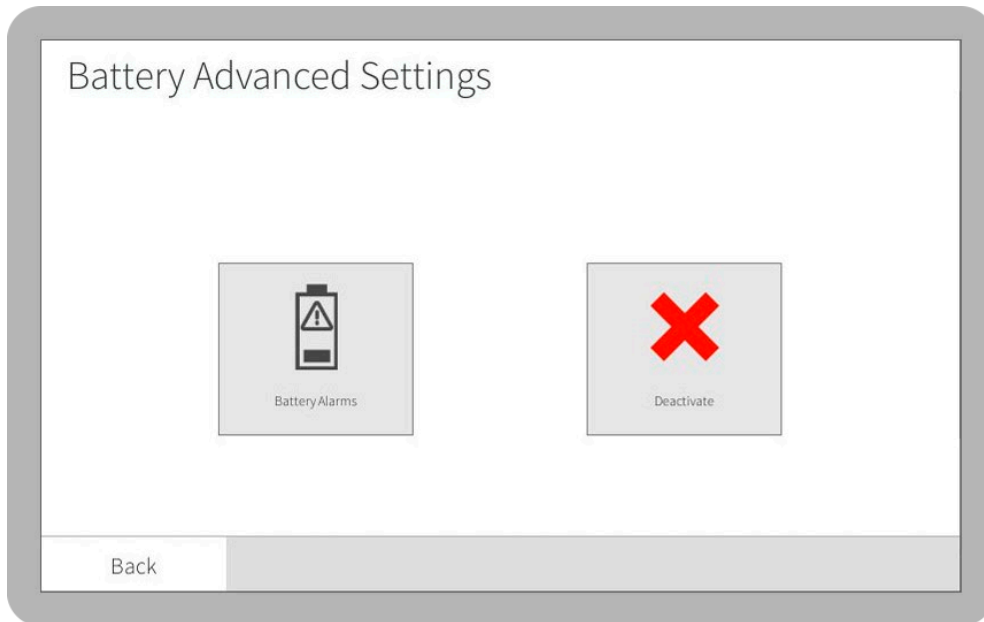


Fig. 29 - ECM Battery Advanced Settings Screen

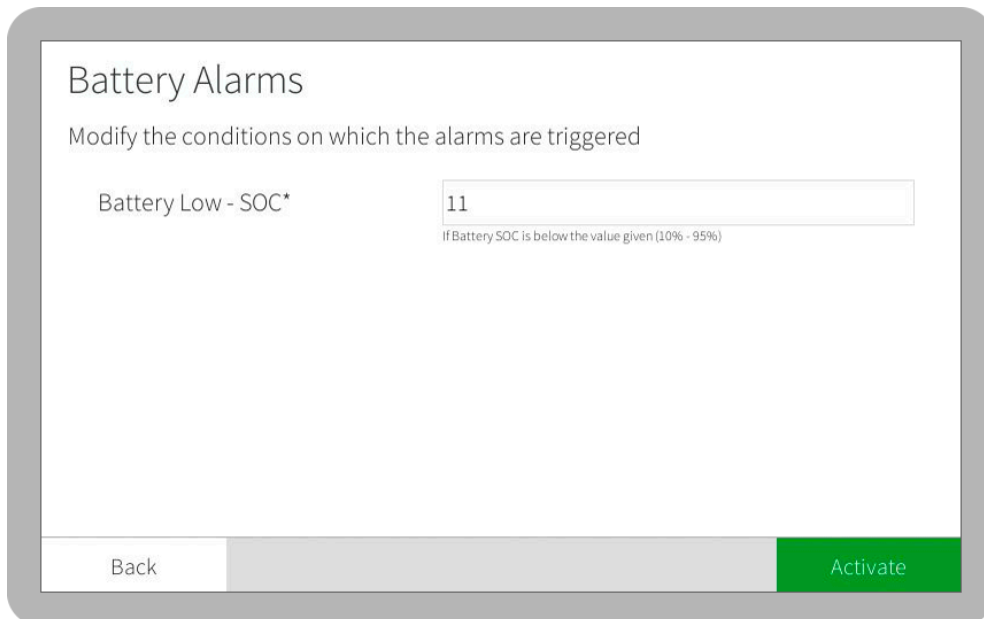


Fig. 30 - ECM Battery Alarms Setting Screen

3.5.7.3 Mode Advanced Settings

Allows to customize the modes of Powrbank.

Click on Deactivate and then on Save button to restore default settings after the ECM is reset.

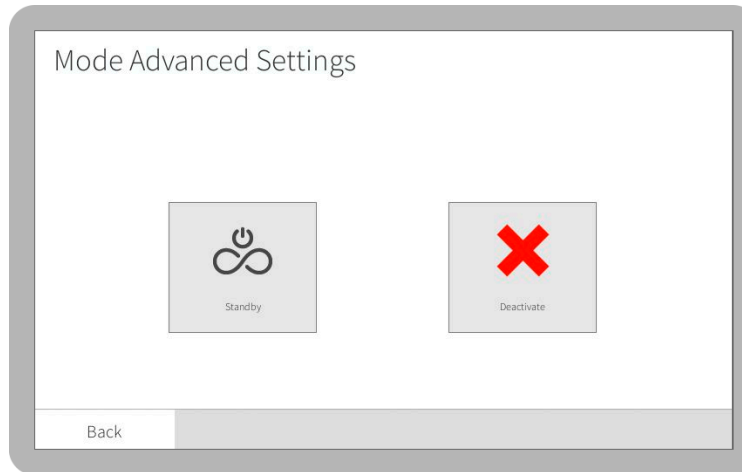


Fig. 31 - ECM Mode Advanced Settings Screen

3.5.7.3.1 Standby

The user can edit the following settings:

Enable or disable: If disabled, the unit will not switch to Standby mode. Enabled as default.

Idle duration: decide for how long the unit is in idle mode before switching to standby mode. Default is 2 days. Value must be entered in seconds.

To activate this function, click on the Activation field, select "Enable" and click on Activate and Save buttons.

To deactivate this function, click on the Activation field, select "Disable" and click on Activate and Save buttons.

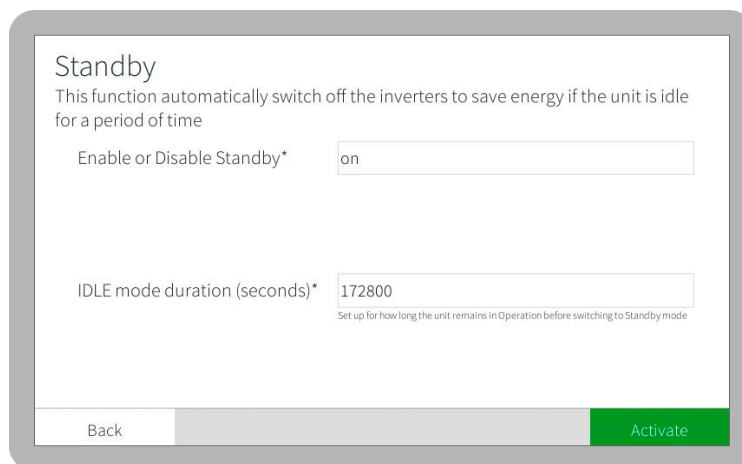


Fig. 32 - ECM Mode Advanced Standby Screen

3.5.7.4 System Settings

This screen displays system controls for the POWRBANK ECM.

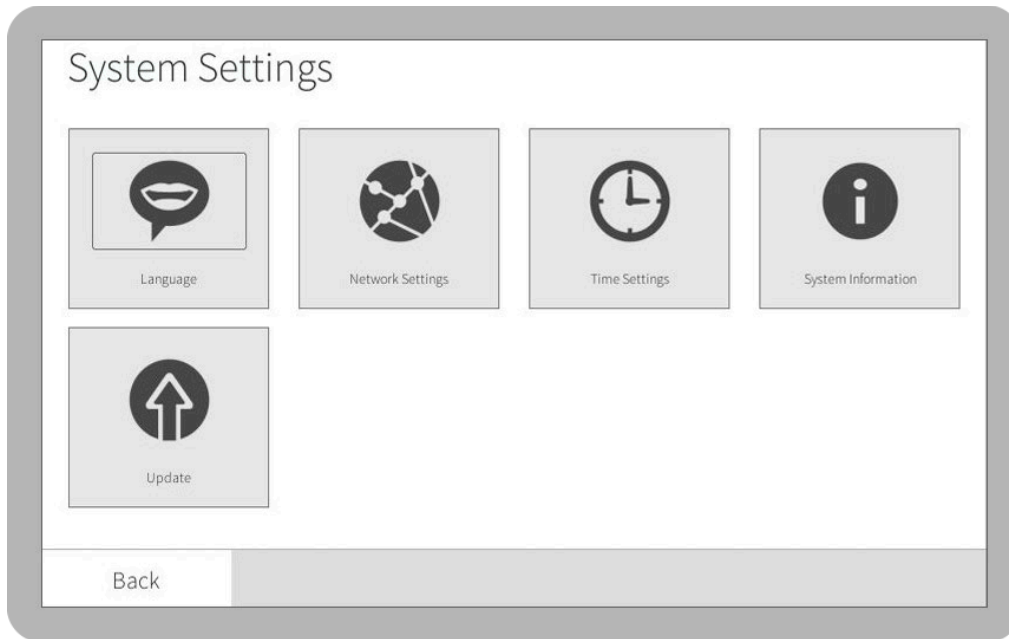


Fig. 33 - ECM System Settings Screen

3.5.7.4.1 Time Settings

Modify the default time settings of the Powrbank ECM on this screen.

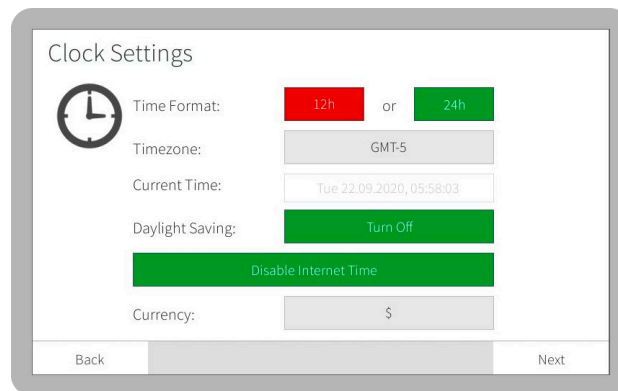


Fig. 34 - ECM System Settings Screen

N°	Description
1	Time Format choose between 12h or 24h.
2	Timezone Select the Powrbank time zone location.
3	Current Time Follows the selected GMT zone and be editable if Disable Internet Time switch is off (in red position)
4	Daylight Saving Enabled as standard, this button allows to active or deactivate the daylight saving time.
5	Currency This function is not used for standard applications.

3.5.7.4.2 System Information

Information related to the ECM firmware and hardware is displayed on this screen where also allows to manually reset or delete the current alarms.

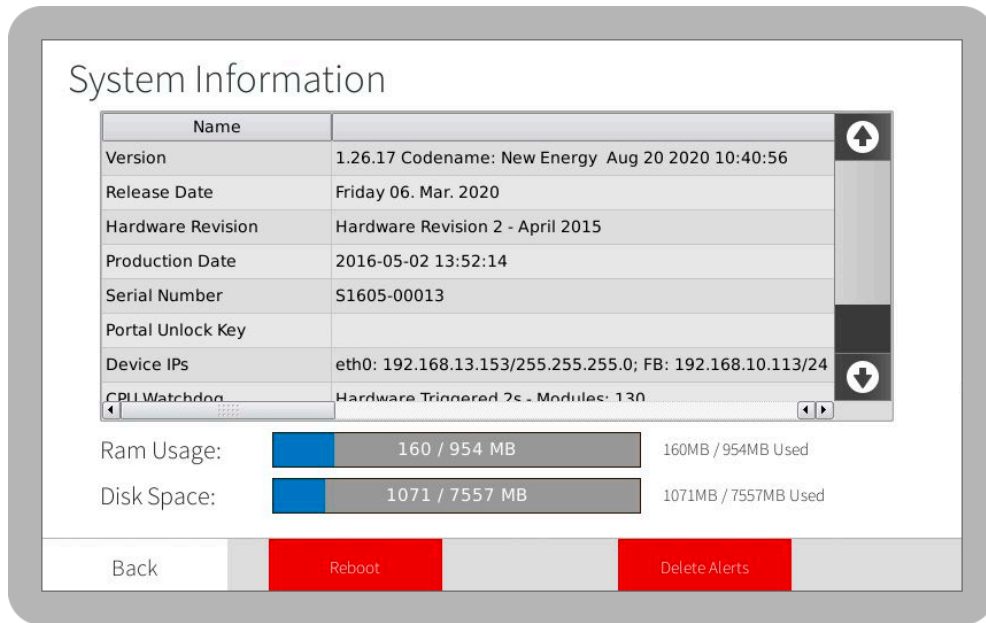


Fig. 35 - ECM System Information Screen

3.5.7.4.3 System Update

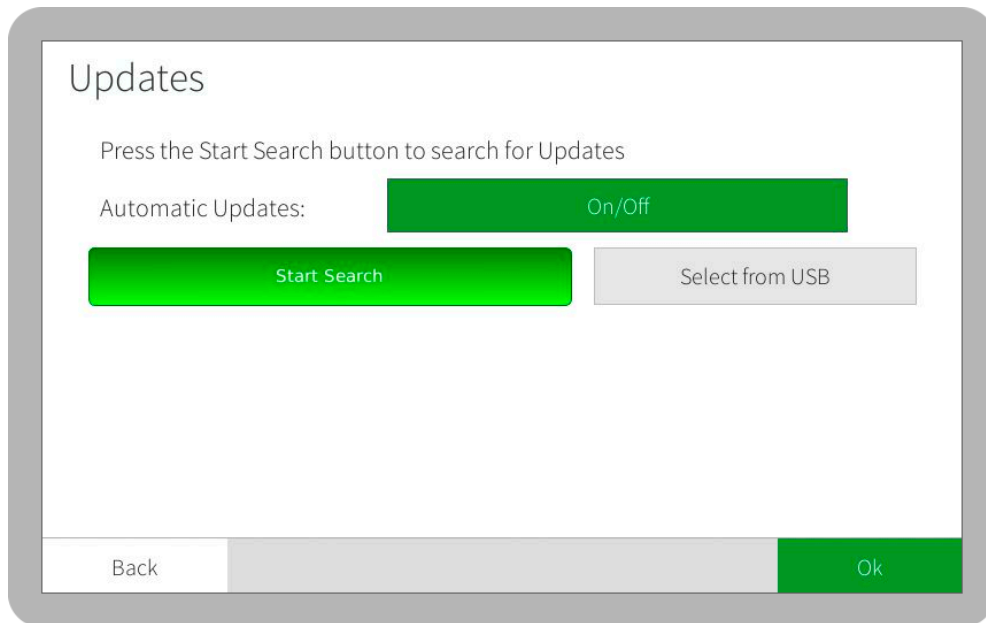


Fig. 36 - ECM Updates Screen

Follow these steps to update a new firmware:

1. Click on **Start Search** button
2. Click on the arrow icon to update the firmware. The ECM will reboot itself after the firmware is updated.

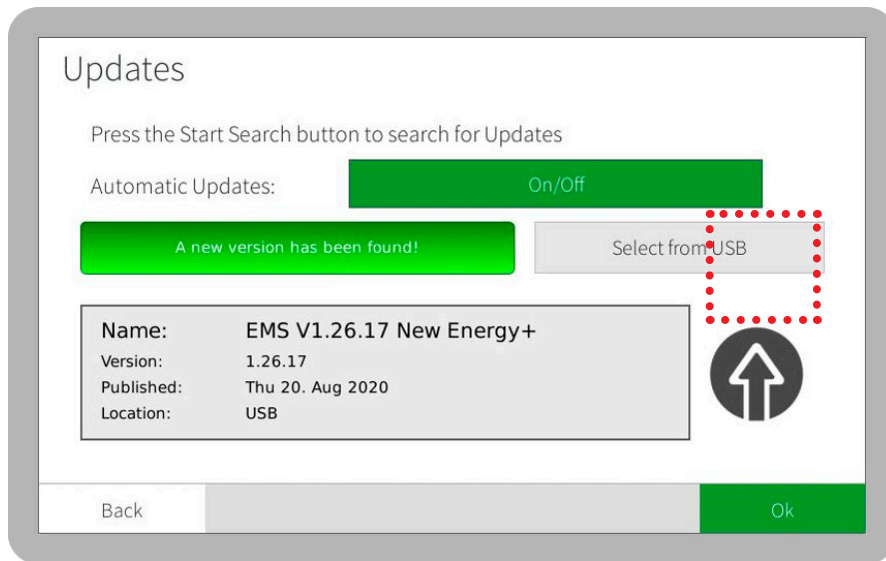
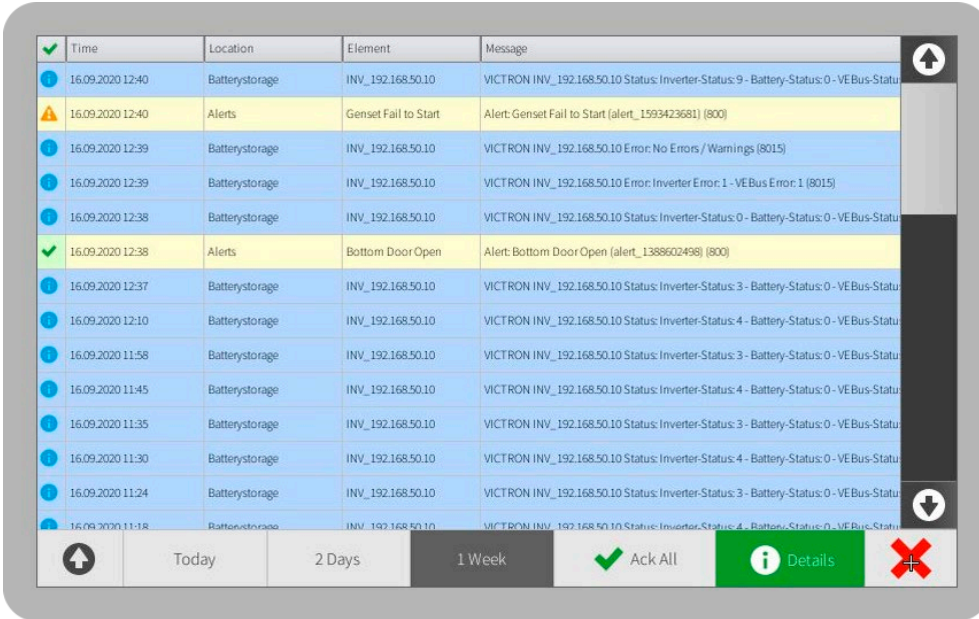


Fig. 37 - ECM Update Start Screen

3.5.8 SYSTEM ALARMS

The Alarms screen can be accessed by pressing the bottom right 'alarm' icon of the ECM and is a useful log of real-time and historical system alarms & warnings.



Time	Location	Element	Message
16.09.2020 12:40	Batterystorage	INV_192.168.50.10	VICTRON INV_192.168.50.10 Status: Inverter-Status: 9- Battery-Status: 0- VEBus-Status: 0
16.09.2020 12:40	Alerts	Genset Fail to Start	Alert: Genset Fail to Start (alert_1593423681) (800)
16.09.2020 12:39	Batterystorage	INV_192.168.50.10	VICTRON INV_192.168.50.10 Error: No Errors / Warnings (8015)
16.09.2020 12:39	Batterystorage	INV_192.168.50.10	VICTRON INV_192.168.50.10 Error: Inverter Error: 1 - VEBus Error: 1 (8015)
16.09.2020 12:38	Batterystorage	INV_192.168.50.10	VICTRON INV_192.168.50.10 Status: Inverter-Status: 0- Battery-Status: 0- VEBus-Status: 0
16.09.2020 12:38	Alerts	Bottom Door Open	Alert: Bottom Door Open (alert_1388602498) (800)
16.09.2020 12:37	Batterystorage	INV_192.168.50.10	VICTRON INV_192.168.50.10 Status: Inverter-Status: 3- Battery-Status: 0- VEBus-Status: 0
16.09.2020 12:10	Batterystorage	INV_192.168.50.10	VICTRON INV_192.168.50.10 Status: Inverter-Status: 4- Battery-Status: 0- VEBus-Status: 0
16.09.2020 11:58	Batterystorage	INV_192.168.50.10	VICTRON INV_192.168.50.10 Status: Inverter-Status: 3- Battery-Status: 0- VEBus-Status: 0
16.09.2020 11:45	Batterystorage	INV_192.168.50.10	VICTRON INV_192.168.50.10 Status: Inverter-Status: 4- Battery-Status: 0- VEBus-Status: 0
16.09.2020 11:35	Batterystorage	INV_192.168.50.10	VICTRON INV_192.168.50.10 Status: Inverter-Status: 3- Battery-Status: 0- VEBus-Status: 0
16.09.2020 11:30	Batterystorage	INV_192.168.50.10	VICTRON INV_192.168.50.10 Status: Inverter-Status: 4- Battery-Status: 0- VEBus-Status: 0
16.09.2020 11:24	Batterystorage	INV_192.168.50.10	VICTRON INV_192.168.50.10 Status: Inverter-Status: 3- Battery-Status: 0- VEBus-Status: 0
16.09.2020 11:18	Batterystorage	INV_192.168.50.10	VICTRON INV_192.168.50.10 Status: Inverter-Status: 4- Battery-Status: 0- VEBus-Status: 0

Fig. 38 - ECM Alarms Screen

User-customizable alarms:

- **Battery Critically Low** - If SoC below 9% if unit with pylontech or SOC below 5% if unit with BYD batteries.
- **GX Communication Error** – Failure of the communication unit between the inverter and the controllers.
- **Inverter Fault** – Internal alarm.
- **Battery Communication Error** – Failure battery management system communication.
- **Battery Restricted to Charge & Discharge** – The battery management system does not allow the battery bank to charge or discharge.
- **Battery Low** – If SOC below default or assigned value (see section 3.5.7.2).

User-customizable warnings:

- **Bottom door open** - If limit switch trips because bottom front door is open.
- **E-Stop Pushed** - If Emergency Stop has been activated.
- **Genset Fail to Start** - If Generator Remote Control on ECM Genset tab is ON (See section 3.5.3) and no AC input power is available after 5 minutes.
- **Genset in Manual Mode** - If Generator is running and Generator Remote Control on the ECM Genset tab is OFF (See section 3.5.3).
- **Phase Rotation** - If Generator phase wires are not connected on the right Powrbank phase input connections.
- **System in Standby mode** - Powrbank is automatically switched off after a long period on idle mode.
- **Overdischarge Protection** – Battery protection algorithm which disables the load when battery SOC is low.
- **VE.Bus Error** – Inverter manufacturer error code (see section 7.3).
- **RCD Trip** – available on EU units.
- **Maintenance Reverse Polarity** - If the single phase source is reversed polarity.
- **Inverter Switch Error** – activated when inverter switch is ON and inverters status is OFF.
- **Battery module Offline** – activated when one or more modules are missing from the system.

3.5.9 HISTORICAL Data

There are four buttons at the top of the display which provide access to historic data with graphs for solar, battery and the load.

N°	Description
1	Counters Display power and energy data such as charging, discharging, Load Power
2	Sensors Display the rest of parameters such as voltage, current or SoC
3	Arrows (Icons) Navigate to previous or next day, month, year
4	Home (Icon) Back to current day, month or year
5	Calendar (Icon) Pop-up calendar to select a specific day, month or year
6	Grid (Icon) Opens up the data in CSV format instead of graphs (see figure 29)



Fig. 39 - ECM Historical Graph Data

Date	Charge W	Discharge W
06.09.2019	0.00kWh	0.00kWh
07.09.2019	0.00kWh	0.00kWh
08.09.2019	0.00kWh	0.00kWh
09.09.2019	0.00kWh	0.00kWh
10.09.2019	0.00kWh	0.00kWh
11.09.2019	22.18kWh	49.61kWh
12.09.2019	123.81kWh	50.35kWh
13.09.2019	6.62kWh	14.60kWh
14.09.2019	7.16kWh	0.00kWh
15.09.2019	0.00kWh	0.00kWh
16.09.2019	0.00kWh	0.00kWh
17.09.2019	0.00kWh	0.00kWh
18.09.2019	7.71kWh	1.03kWh

Fig. 40 - ECM Historical CSV Data

3.5.10 NETWORK

This screen contains the controls to modify the ECM Network; it can be found in System Settings / Network Settings / Online Mode / LAN (RJ45).

Field	Value
DHCP	Use DHCP
IP Address	192.168.1.100
Network-Mask	255.255.255.0
Gateway	192.168.1.1
1st DNS-Server	192.168.1.1
2nd DNS-Server	

Fig. 41 - ECM Network Configuration Screen

Assigning a new IP address:

To reset the ECM with a new IP address follow these steps:

- Modify the IP address (see predefined IP Addresses opposite).
- Click on “Next” button
- The following pop-up window is displayed if communication is successful:

Communication Test

Communication Test successful. An working Internet Connection was detected. Press the Next Step!

Next Step -->

Fig. 42 - ECM Network Configuration Screen

-
- Click on “Next Step” / “Back” and then “Save” to reboot the ECM.

Predefined IP addresses are as follows:

EU Version

IP Address: 192.168.1.100

Network mask: 255.255.255.0

Gateway: 192.168.1.1

DNS: 192.168.1.1

US Version

IP Address: 192.168.50.100

Network mask: 255.255.255.0

Gateway: 192.168.50.1

DNS: 192.168.50.1

4 CARE AND MAINTENANCE

4.1 Charging the Unit: Caring For The Energy Storage

POWRBANK requires regular storage maintenance charging when not in use by connecting an AC source either all of the time or at least every 4 weeks, ensuring a full charge is maintained.

Storage maintenance charging must be performed from a single phase source, from either the AC grid or a secondary power system e.g. Diesel generator.



While the unit is in storage, an AC source must be made available to allow storage maintenance as described in this section.



Failure to correctly maintain the health of the batteries by keeping them charged will invalidate the warranty!

4.1.1 Performing Storage Maintenance Charging

While the unit is in storage, a constant AC single phase supply should be connected to the dedicated maintenance charge input. Follow this procedure for maintenance charge:

1. On the ECM Home screen press the “Inverter Switch” soft button to turn the inverters OFF.
2. Switch OFF the output circuit breaker.
3. Connect an AC source to the AC maintenance charge inlet. See “**Fig. 2 - Control/Distribution Panel**” on page 10.
4. On the ECM Home screen press the “Inverter Switch” soft button to turn the inverters ON.
5. Turn ON the circuit breaker for the AC maintenance charge inlet.
6. The unit should now charge at a low rate to prevent battery depletion.

If a constant AC supply is not available, it will be necessary to provide a temporary AC supply source. In order to maintain the storage, perform the relevant following procedure:

4.1.2 Rotational Storage Maintenance

7. Perform a Storage Maintenance charge until 100% State of Charge is reached.
8. It is recommended that the AC supply is left constantly plugged in. If this is not possible, to maintain the product warranty it is necessary to charge the POWRBANK unit at least every 3 weeks or when the state of charge depletes to 10%.

ADDENDUM

Section 4.1 Charging the Unit

NOTE: Applicable for US units only. GFCI outlets are not compatible for maintenance charge, please use non GFCI receptables to perform maintenance charging.

NOTE: Charging the unit using the AC maintenance charge inlet, as described on section 4.1.1, is only possible when battery SOC is above 10%, the operator must use the main AC input to recharge the batteries as describe on section 2.6. Please, check the maintenance tab of the ECM to make sure the batteries are getting charge as described on section 3.5.2.

NOTE: Maintenance charge inlet is not meant to be used as your main AC input on site. If the output current exceed the maintenance charge inlet current rating, the input breaker will trip.

Only the PowrBank PRO 45.60/400 is compatible for such 1Ph in and 3Ph out application.

4.2 Servicing

For safety, peak performance and to maintain the warranty, POWRBANK must be serviced annually by a qualified technician.



Failure to comply with The Manufacturer's servicing schedule will invalidate the warranty!

4.2.1 Annual Service Procedure

1. All connections should be checked. Torque values should be as follows:

Torque Values	
Connection	Nm
Inverter Battery Terminals	11
Inverter AC in and AC out terminals	6
Battery Terminals	25
Lifting Ring	250
M6 Bolts	6
M8 Bolts	15

2. Unit must be kept clean and away from moisture and oil/soot/vapours. Air filters should be replaced at least once per year, ensuring they are installed in the right air flow direction.

PRO			
Item	Manufacturer	Manufacturer P.N.	Qty
Pleated Panel filter, G4 Grade, 394x495x20mm	RS Pro	730-2886	2
Pleated Panel filter, G3 Grade, 495x622x20mm	RS Pro	730-2909	1

XPRO			
Item	Manufacturer	Manufacturer P.N.	Qty
Pleated Panel filter, G4 Grade, 394x495x20mm	RS Pro	730-2886	2
Pleated Panel filter, G3 Grade, 495x622x20mm	RS Pro	730-2909	1

3. Contact Powr2 to check whether or not the unit needs any firmware or software configuration update.

4.2.2 Service Log

Date	Work Carried Out	Technician



5 SAFETY & PROTECTION

5.1 Earthing POWRBANK

The POWRBANK system must be earthed. See **“2.5.1 Earth Connection”** on page 15.

5.2 Safety Notice Regarding The Unit's Batteries

Servicing of the batteries should be performed or supervised by personnel knowledgeable about batteries and required precautions.

When replacing batteries, replace with the same type and number of batteries.



CAUTION: Do not dispose of batteries in a fire. The batteries may explode.

CAUTION: Do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.

Battery replacement is only to be performed by The Manufacturer or an authorised service partner. Tampering with the batteries or monitoring systems may be dangerous and will invalidate the warranty.

6 PREDELIVERY & POST-RENTAL/POST-HIRE INSPECTIONS

6.1 Pre-delivery

PDI checks should be carried prior delivering a Powrbank to site and/or hand over to a client to ensure that the Powrbank is ready to be installed:

Pre-Delivery Inspection	Checked?
All casing free from dust, dirt, marks and scratches	
All bolts present and securely tightened	
Lifting ring is securely tightened with right Torque (250Nm)	
Inlet and outlet filters are clean	
All safety stickers present	
Dangerous goods stickers present at both sides	
Keys present	
All doors except top front one are locked with key.	
Battery Bank SOC \geq 99%	
Battery-Inverter Isolators ON	
Unit can be turn ON/OFF through the soft switch on the ECM. Leave unit in OFF mode	
Unit is online on Powr2 Remote Portal and SIM Card has data	
ECM: Alarms are cleared	
Update time zone on ECM if needed (Setting tab / system / clock setting)	
Output Breaker is switched OFF	
Unit is ready to be used by customer	

6.2 Post-Rental/Post-Hire Inspection

Return to yard checks should be carried out to ensure the POWRBANK is prepared properly for storage:

Post-Rental/Post-Hire Inspection	Checked?
All casing free from dust, dirt, marks and scratches	
All bolts present and securely tightened	
Lifting ring is securely tightened with right Torque (250Nm)	
Keys present	
All doors except top front one are locked with key.	
Battery Bank is ON and SOC \geq 99%	
Battery-Inverter Isolators ON	
Unit can be turn ON/OFF through the soft switch on the ECM. Leave unit in OFF mode	
Unit is online on Powr2 Remote Portal and SIM Card has data	
ECM: Alarms are cleared - refer to section 3.5.8	
Update time zone on ECM if needed (Setting tab / system / clock setting)	
Output Breaker is switched OFF	
Check air filters and replace if soiled	
Return unit to default settings via the ECM - refer to section 6.3 below	
Unit is ready for storage - refer to sections 2.1 & 4.1 for proper storage instructions	

6.3 Default Settings

Default settings can be restored on the ECM as follows:

GENERATOR Screen (refer to section 3.5.3):

Set **GENERATOR REMOTE CONTROL** to **AUTO**

Set **GENSET CURRENT LIMIT** to the **highest value**

LOAD Screen (refer to section 3.5.5):

Set **LOAD CONTROL** to **MAN-ON**

7 TROUBLESHOOTING

7.1 General Troubleshooting

Issue	Possible cause	Suggestion
Unit on but there is no output power.	The output circuit breaker may not be switched on	Check that the circuit breaker is pushed up to the on position
	The ECM "Load Control" is OFF	Review the configured "Load Control" or change to ON
	Emergency Stop may be activated	Turn clockwise to deactivate the emergency stop
	Inverter Physical Switch is in OFF position	Check the inverter switch and put it on ON position
	Battery SoC is below 10% and no source of power is connected to the POWRBANK.	Connect your chosen renewable power source, from an AC grid connection or secondary power system to the POWRBANK
	Battery-Inverter Isolator switches are OFF	Switch ON Battery-Inverter Isolator switches
Unit inverters may be in Off mode	 <p>1. Select OFF mode 2. Wait 10 seconds 3. Select ON mode</p> <p>Note: Check that the 480V protection contactor and relay closes properly (manually push in)</p>	
External power source is active (e.g. diesel generator is running) but Powrbank not synchronising	Phase rotation of diesel generator or its connecting cable is incorrect	Check the phase rotation of the supplying generator
	Damaged cable between diesel generator and PowrBank	Test or replace cables and connectors
	Input MCB may not be switched ON	Check the input MCBs are pushed up to the on position
	Generator Output breaker may not be switched ON	Check Generator Output breaker is switched ON
The system power has been switched on but there is no display on ECM	The ECM Fuse may have blown	Replace the ECM Fuse
	The 24V DC Regulator Fuse may have blown	Replace the 24V DC Regulator Fuse

Issue	Possible cause	Suggestion
There is power being sent to POWRBANK but it is not charging or passing through power	The battery isolator switch is in OFF position	Turn it ON
	The ECM "Load Control" is OFF	Review the configured "Load Control" or change to ON
External power source is active (e.g. diesel generator is running) but power only passing through on first phase (L1)	Phase rotation of diesel generator or its connecting cable is incorrect	Check the phase rotation of the supplying generator and its cable
	Damaged cable between diesel generator and POWRBANK	Test or replace cables and connectors
Output voltage is lower than 400 V AC over distance	If the distance between the unit and the consumers is more than 50 meters the voltage can drop too low	Contact POWR2 Technical services to arrange adjustment of system settings
SoC reading 0% and AC Output disconnected	This indicates that the storage voltage has reached its lower limit and has turned off its output to protect the batteries	Charge POWRBANK from your chosen renewable power source, from an AC grid connection or secondary power system
Output circuit breaker continually trips	The consumers being connected draw too much power for the rated output of the unit	Refer to the maximum output rating on the unit's rating plate and reduce the total power draw accordingly. For 50Hz units, also check if the RCD is properly adjusted.
Remote Generator Start not working	Generator Remote Start signal cable is loose or has been damaged	Reattach or replace the cable
	Remote start switching mode incorrect (normally open/ normally closed)	For further details on changing the switching mode, please contact POWR2 technical services for assistance
	Diesel generator is in manual mode	Switch diesel generator to automatic mode
	Generator remote start not configured properly	Contact Technical services for the party responsible for the generator
	Generator remote control might be in MANUAL	Set up Generator Remote Control to AUTO
Diesel generator constantly running	POWRBANK may be in manual ON generator mode	Check the AC input fuses, connect or replace if necessary
	There may be a phase imbalance: too much power is being drawn on one phase.	Consumers should be distributed evenly across the three phases as much as possible
	The load may be too high	Reduce the load

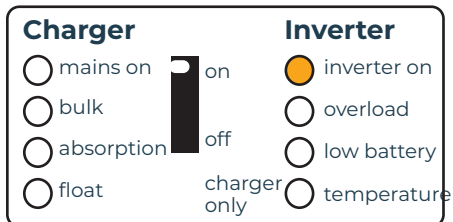
Issue	Possible cause	Suggestion
The RCD continually trips	There is an electrical fault with the consumers connected to the AC output	Check the electrical integrity of the consumers being connected to the unit
Output breaker on diesel set tripping on start-up / shut down	There may be an RCD conflict	Increase the tripping current limit on the diesel generator's RCD and adjust Variable RCD on Powrbank. Adjustment to any RCD must be made by a qualified electrician in compliance with applicable local standards and regulations.
Output voltage drops when the generator switches OFF	Generator output voltage is outside the acceptable voltage range for seamless transition to inverter mode	Check the Voltage per phase on the generator to make sure is according to the electrical standards of the unit (230V or 120V depending on the configuration)
Maintenance charge isn't properly charging the unit	Will not take charge if SoC is below 10% There is a reverse polarity	Make sure the contactor and relay are closed properly Check that the input wires are installed correctly

7.2 Inverter LED indications and their meaning

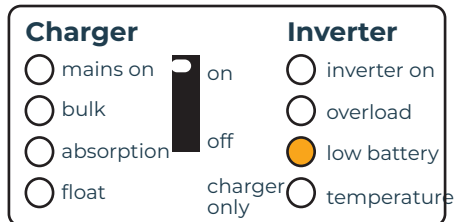
The inverters are located behind the service doors at both sides of the unit. There are some indicator lights on the front panel of each inverter.

 LED off  LED lights

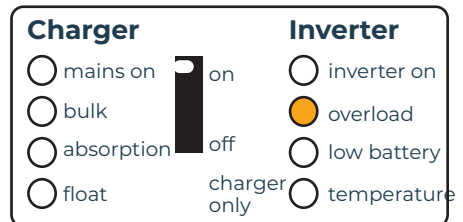
Inverter



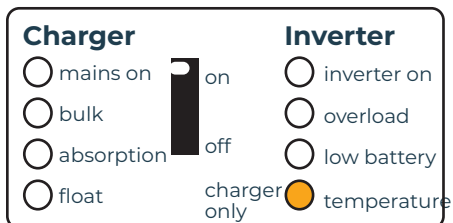
The inverter is on, and supplies power to the load.



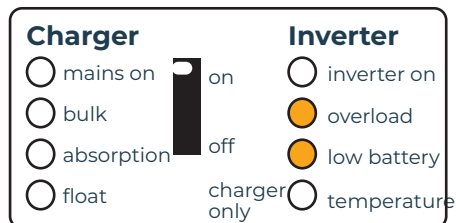
The inverter is switched off due to low battery voltage.



The inverter is switched off due to overload or short circuit.

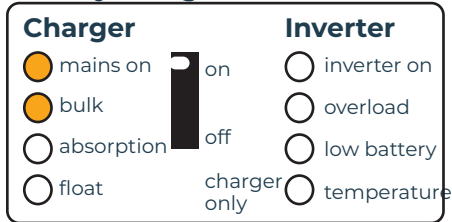


The inverter is switched off due to excessively high internal temperature.

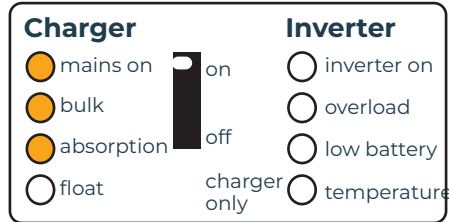


The inverter is switched off due to an excessively high ripple voltage on the battery connection.

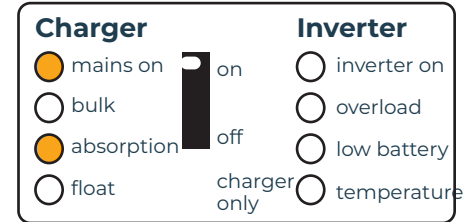
Battery charger



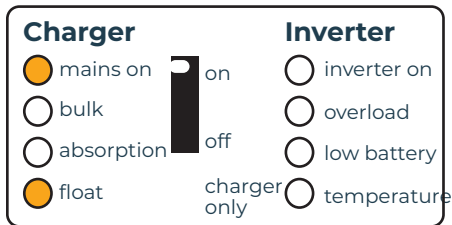
The AC voltage on AC-in-1 or AC-in-2 is switched through, and the charger operates in bulk phase.



The AC voltage on AC-in-1 or AC-in-2 is switched through and the charger operates, but the set absorption voltage has not yet been reached (battery protection mode).



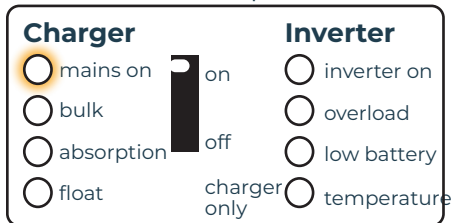
The AC voltage on AC-in-1 or AC-in-2 is switched through, and the charger operates in absorption phase.



The AC voltage on AC-in-1 or AC-in-2 is switched through, and the charger operates in float or storage phase.

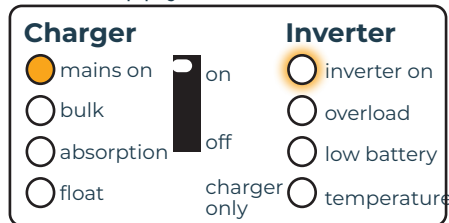
Special indications

Set with limited input current



The AC voltage on AC-in-1 or AC-in-2 is switched through, and the charger operates in bulk phase.

Set to supply additional current



The AC voltage on AC-in-1 or AC-in-2 is switched through and the charger operates, but the set absorption voltage has not yet been reached (battery protection mode).










General error indications

Problem	Cause	Solution
“Low battery” LED flashes.	The battery voltage is low.	Charge the battery or check the battery connections.
“Low battery” LED lights.	The converter switches off because the battery voltage is too low.	Charge the battery or check the battery connections.
“Overload” LED flashes.	The converter load is higher than the nominal load.	Reduce the load.

Problem	Cause	Solution
“Overload” LED lights.	The converter is switched off due to excessively high load.	Reduce the load.
“Temperature” LED flashes or lights.	The environmental temperature is high, or the load is too high.	Install the unit in cool and well-ventilated environment, or reduce the load.
“Low battery” and “overload” LEDs flash intermittently.	Low battery voltage and excessively high load.	Charge the batteries, disconnect or reduce the load,
One alarm LED lights and the second flashes.	The inverter is switched off due to alarm activation by the lighted LED. The flashing LED indicates that the inverter was about to switch off due to the related alarm.	Check this table for appropriate measures in regard to this alarm state.
“Mains on” flashes and there is no output voltage.	The device is in “charger only” operation and mains supply is present. The device rejects the mains supply or is still synchronising	If the unit does not synchronise with the ac input supply, check that AC supply is within the voltage and frequency parameters accepted by the unit.

7.3 VE.Bus Error Codes and their meanings

The Inverters VE Bus system can display various error codes. These codes are displayed with the “inverter on”, “bulk”, “absorption” and “float” LEDs

Problem	Code	Cause	Solution
	1	Device is switched off because one of the other phases in the system has switched off.	Check the failing phase.
	3	Not all, or more than, the expected devices were found in the system.	Communication cable error. Check the cables and switch all equipment off, and then on again.
	4	No other device whatsoever detected.	Check the communication cables.
	5	Overvoltage on AC-out.	Check the AC cables.
	10	System time synchronisation problem occurred.	Should not occur in correctly installed equipment. Check the communication cables.
	14	Device cannot transmit data.	Check the communication cables
	17	One of the devices has assumed 'master' status because the original master failed.	Check the failing unit. Check the communication cables.
	18	Overvoltage has occurred.	Check AC cables.
	26	Internal error.	Should not occur. Switch all equipment off, and then on again. Contact Powr2 if the problem persists.

7.4 Alarm indicated by the LV Hub and Solution

LED indicator	Possible cause	Solution
Status: RED solid	No battery connected or at least one of the groups is off line.	Option 1: Switch off the LV Hub and disconnect and connect all the rj45 communication cable. Switch on the LV Hub again. Option 2: Press the reset button for 4s to restart the LV Hub. Wait until the LV Hub is communicating with the battery modules and the Venus. Option 3: Replace the LV Hub.
Indicator 1: Flash	Battery group 2 is missing on the LV Hub	Option 1: Check the connection between master battery of group 2 and LV Hub. Make sure all batteries are switched on and signal cables are properly connected. Option 2: Reset LV Hub by pressing its reset button for 4s.

7.5 Alarm displayed on Battery Module US3000

Alarm is indicated by a solid red light on the ALM led.

Possible cause	Solution
Short Circuit	Contact Powr2
High / Low Temperature (cell / BMS)	
Charge / Discharge Over Current	
Charge Over Voltage	
Discharge Under Voltage	
Power Cable Reverse	
Charge / Discharge End	

8 SLEEP & WAKE PROCEDURES

8.1 POWRBANK Sleep Mode Procedure

POWRBANKs must be always kept ON and charged, however, if the unit is going to be shipped, in transport or not accessible for maintenance charge for longer than 3 weeks, the batteries should be switched to “Sleep Mode” to prevent over-discharging.

In Sleep Mode, the batteries will remain in standby, the electronics will be powered off and the unit offline, therefore the consumption will be minimum. However, in order to maintain the warranty, the POWRBANK must not be left in sleep mode unattended for longer than 6 months without a maintenance charge.

The following steps must be followed in the correct order:

8.1.1 Powrbank PRO

1. Ensure that:

- Batteries are fully charged. Do not perform Sleep mode with batteries at lower SOC.
- Powrbank is in turned OFF mode on the ECM screen (Home tab-System OFF).
- Battery-Inverter isolator switches are in the OFF position.
- E-Stop is in OFF position
- Main output breaker is in OFF position
- Inverter toggle switches are in ON position

2. Press the SW red button of the Master Battery for 3 seconds.

- The Master Module is located at front top row on the left hand side of the unit. it can also be identified as the one with the empty link port 0 and the CAN port connected.
- Rest of modules will turn OFF. (double check that RUN, ALM and SOC leds are all OFF).
- All switches can be accessed through the side doors without having to remove the battery side panel.



3. Switch OFF the power switch of the Master Battery.

4. The unit should now be in sleep mode and there should not be any voltage presence on the unit.

Follow Powrbank “Wake Up” procedure when switching unit back ON.

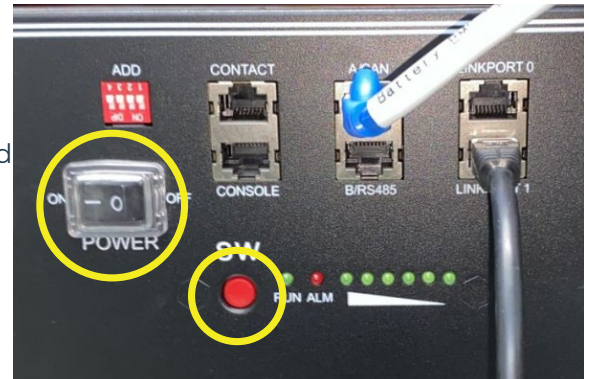
8.1.2 Powrbank XPRO

1. Ensure that:

- Batteries are fully charged. Do not perform Sleep mode with batteries at lower SOC.
- Powrbank is in turned OFF mode on the ECM screen (Home tab-System OFF).
- Battery-Inverter isolator switches are in the OFF position.
- E-Stop is in OFF position
- Main output breaker is in OFF position
- Inverter toggle switches are in ON position
- LV-HUB switch is in ON position

2. Press the SW red button of the Group 3 Master Battery for 3 seconds.

- The Group 3 Master Module is located at the rear top row at the right-hand side of the unit, where LV Hub and battery-inverter isolator switches are located. It is identified as the one with empty link port 0.
- All switches can be accessed through the side doors without having to remove the battery side panel.



3. Switch OFF the power switch of the Group 3 Master Battery

- Group 3 slave modules will turn OFF. (double check that RUN, ALM and SOC leds are all OFF).

4. Press the SW red button of the Group 2 Master Battery for 3 seconds.

- The Group 2 Master Module is located at the middle top row at the right-hand side of the unit, where LV Hub and battery-inverter isolator switches are located. It is identified as the one with empty link port 0.
- All switches can be accessed through the side doors without having to remove the battery side panel.

5. Switch OFF the power switch of the Group 2 Master Battery.

- Group 2 slave modules will turn OFF. (double check that RUN, ALM and SOC leds are all OFF).

6. Press the SW red button of the Group 1 Master Battery for 3 seconds.

- The Group 1 Master Module is located at the front top row at the right-hand side of the unit, where LV Hub and battery-inverter isolator switches are located. It is identified as the one with empty link port 0.
- All switches can be accessed through the side doors without having to remove the battery side panel.

7. Switch OFF the power switch of the Group 1 Master Battery.

- Group 1 slave modules will turn OFF. (double check that RUN, ALM and SOC leds are all OFF).

8. Change group 1 Master Battery dip switch address from 0100 to ADD: 0000.

9. Switch OFF the power switch of the LV-HUB.

The unit should now be in sleep mode and there should not be any voltage presence on the unit.

Follow Powrbank “Wake Up” procedure when switching unit back ON.

8.2 POWRBANK Wake Up Procedure

When a brand-new unit is shipped or when a unit is left in storage for a long period of time, it is switched to sleep mode for safety reasons. To initialise and wake up the unit, the following steps must be followed in the correct order:

8.2.1 Powrbank PRO

1. Ensure that:

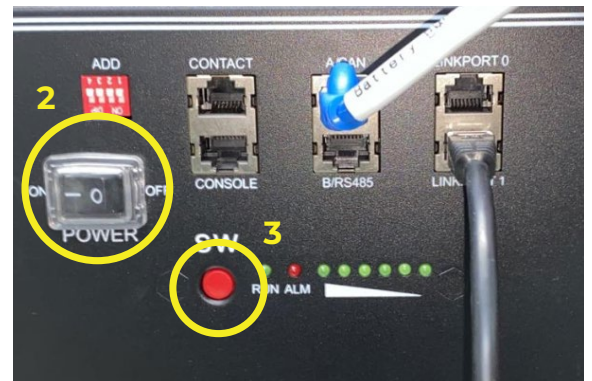
- There is no voltage presence on the unit.
- Battery-Inverter isolator switches are in the OFF position.
- E-Stop is in OFF position
- Main output breaker is in OFF position
- Inverter toggle switches are in ON position

2. Switch ON the power switch of the Master Battery module.

- The Master Module is located at front top row on the left hand side of the unit. it can also be identified as the one with the empty link port 0 and the CAN port connected.
- All switches can be accessed through the side door without having to remove the battery side panel.

3. Press the red SW button of Master Battery module to power ON

- All batteries' LED lights will be turned on one by one by the Master battery.
- Turn ON Battery-Inverter isolator switches one at a time waiting 20 seconds between each one to allow inverter capacitors to charge without putting strain on the battery.



4. Wait for the control panel to start up. The ECM will take one to five minutes to start communicating with the rest of electronic devices. This can be checked by looking at the GX Communication Error alarm that should be green on the ECM onboard screen (System tab).

5. Turn system ON by pressing on System ON mode on the ECM Home tab.

The unit is now initialised, please refer to the appropriate user manual sections for set up and operation instructions.

8.2.2 Powrbank XPRO

1. Ensure that:

- There is no voltage presence on the unit.
 - Battery-Inverter isolator switches are in the OFF position.
 - E-Stop is in OFF position
 - Main output breaker is in OFF position
 - Inverter toggle switches are in ON position
 - LV-HUB switch is in ON position
- Group 1 Master Battery ADD is 0000.

2. Switch ON the power switches of the Groups 1, 2 & 3 Master Battery modules.

- The Master Modules are located at the top rows at the right hand side of the unit, where LV Hub and battery-inverter isolator switches are located. They can also be identified as the ones with the empty link port 0. Group 1 (front); Group 2 (middle) and Group 3 (rear).
- All switches can be accessed through the side door without having to remove the battery side panel.



3. Press the red SW button of the group 1 Master Battery module to power ON

- All batteries' LED lights will be turned on one by one by the Master battery.
- After all batteries running and buzzer of master battery in group1 rings 3 times. Means all groups are online.

4. Change the dip switch of master battery in group 1 (front) from 0000 to 0100.

5. Turn ON LV-HUB.

- NUMBER/BIN 1 and 2 Leds must be solid green. That means that the 3 groups are communicating.

6. Turn ON Battery-Inverter isolator switches one at a time waiting 20 seconds between each one to allow inverter capacitors to charge without putting strain on the battery.

Wait for the control panel to start up. The ECM will take one to five minutes to start communicating with the rest of electronic devices. This can be checked by looking at the GX Communication Error alarm that should be green on the ECM onboard screen (System tab).

7. Turn system ON by pressing on System ON mode on the ECM Home tab.

- The unit is now initialised. Make sure no warnings and alarms are displayed on the ECM. Please refer to the appropriate user manual sections for set up and operation instructions.

9 FLAT BATTERIES - RECOVERY PROCEDURE

Powrbanks requires regular maintenance charging when not in use ensuring charge of the batteries is maintained. Failure to correctly maintain the health by letting the batteries to go down to 0% will damage the batteries and invalidate the warranty. In case the batteries go flat and disconnect from the system, please immediately follow this procedure to re-charge the batteries and bring the unit online:

1. Connect the unit to an available ac power supply. Wait for several minutes to allow the unit to recover itself. If the batteries and inverters are not automatically turning them on and start charging the batteries, do the following steps:
2. Make sure unit is disconnected by following steps on chapter 8.1. Ignore first step.
3. Make sure unit is connected by following steps on chapter 8.2. Ignore steps 12 & 13.
4. Try again step 1. If Powrbank is not capable to charge the batteries, do the following steps:
5. Make sure unit is disconnected by following steps on chapter 8.1. Ignore first step.
6. Connect an external DC Power Supply to the DC BusBar.
7. Follow steps on chapter 8.2 until step 7 to turn on the batteries. Make sure battery isolators are switched off.
8. Set up Power Supply to 53.2V and leave batteries charging until the voltage reaches 49V.
9. In case is there is any module/s with the red ALM led in solid red, those module/s have to be charged individually by following this procedure:
 - a. Switch all battery modules OFF.
 - b. Disconnect Power cables from the Module/s with Alarm/s. Isolate cable lead terminals to prevent any short circuit.
 - c. Disconnect communication cables.
 - d. Connect DC Power Supply to P+ and P- Terminals
 - e. Set up Power Supply to 50V and charge module/s until the voltage reaches 49V.
 - f. Re-connect battery module/s to the system by re-connecting the power cables and the communication cables
 - g. Switch all battery modules ON.
 - h. Press the red button SW located at the bottom of the POWER button ONLY on the master module from group 1 which is the first module below the LV hub. Once pressed, rest of battery modules will automatically turn to operation mode too.
10. All modules on the system should be at 49V and status led in solid green with no ALM LEDs.
11. Switch ON the LV Hub.
12. Disconnect DC Power supply.
13. Turn ON Battery-Inverter isolators one at a time waiting 20 seconds between each one to allow inverter capacitors to charge without putting strain on the battery.
14. When ECM is capable of communicating with the inverters, turn the system ON. You can check if there is communication by looking at the system tab / System Mode. Make sure the bottom front door is closed and E-Stop button is released.
15. Connect an AC input power source to the Powrbank.
16. Powrbank should start charging the batteries. Leave the unit charging up to 100%.
17. Once the battery SoC level has reached 100%, close the bottom side door panels.

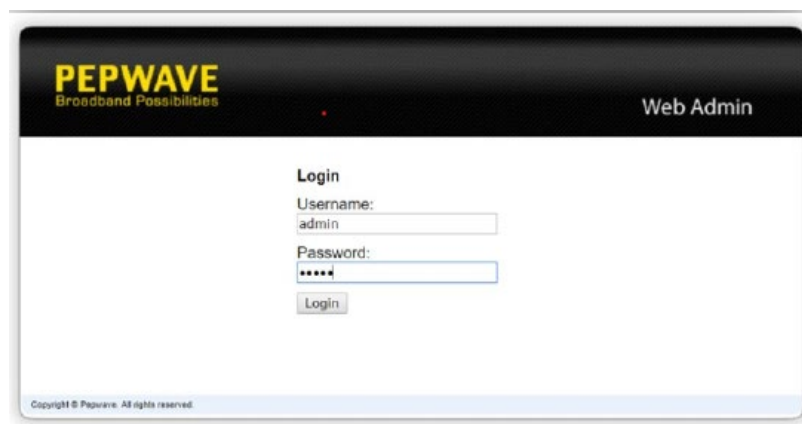
10 HES SIM CARD INSTALLATION

10.1 US

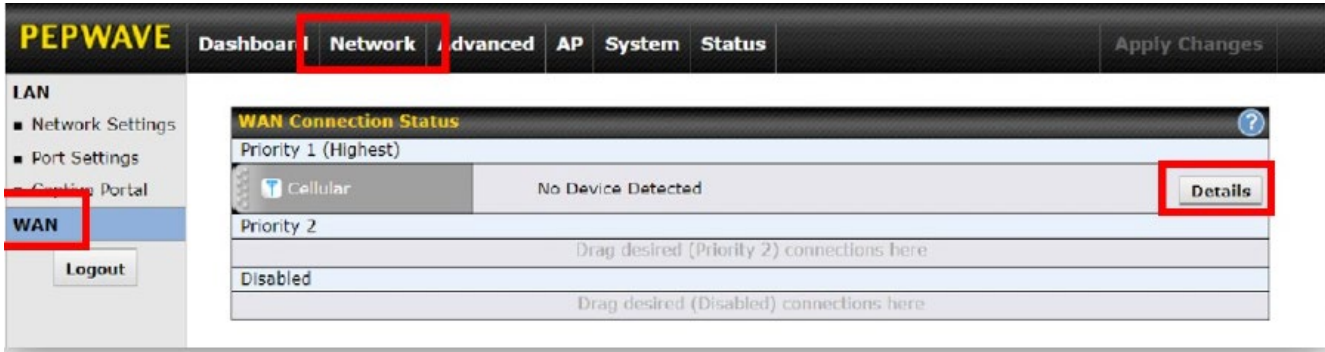


Note: Remove the rear panel of the unit to have better access to the router's sim card slot. Rear panel has three bolts at the top attached to the frame as well as a cable connection on the fan.

1. Turn off the router by disconnecting its power cable.
2. Connect the SIM card on slot A. Following video tutorial shows how to insert sim cards: <https://www.youtube.com/watch?v=ch-6SfflwTw>
3. Turn on the router by connecting back its power cable.
4. Once the status light is green, connect to the router wifi.
 - Name: Unit ID wifi. Eg, S1909-00014 wifi
 - Pw: P0wr2wifi (same to all of the Powr2 HES units)
5. Once you are connected to the router wifi, open the following link on a browser:
 - 192.168.50.1
6. Login details:
 - Username: admin
 - Pw: admin or Admin12345

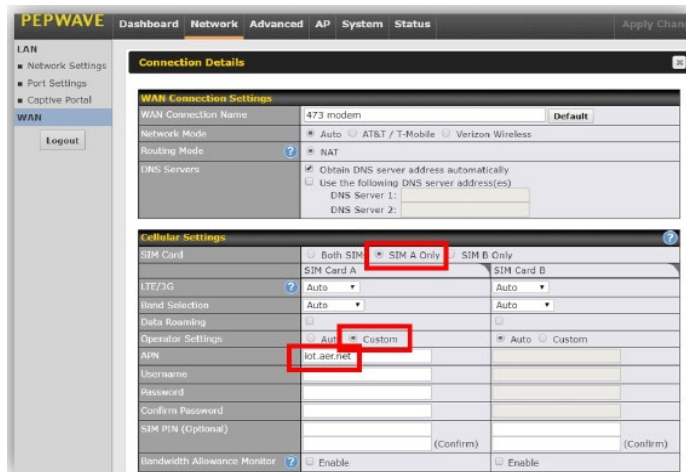


1. Go to Network, WAN and under “Cellular 1” click on details



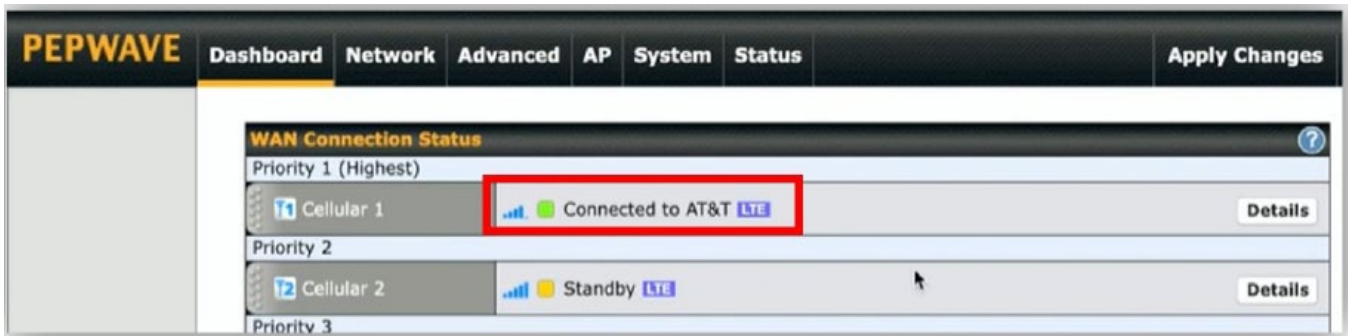
2. Under “Cellular Settings”, add the following details:

- Select “SIM A Only”
- Select “Custom” on “Operator Settings”
- Add the APN and click on Save



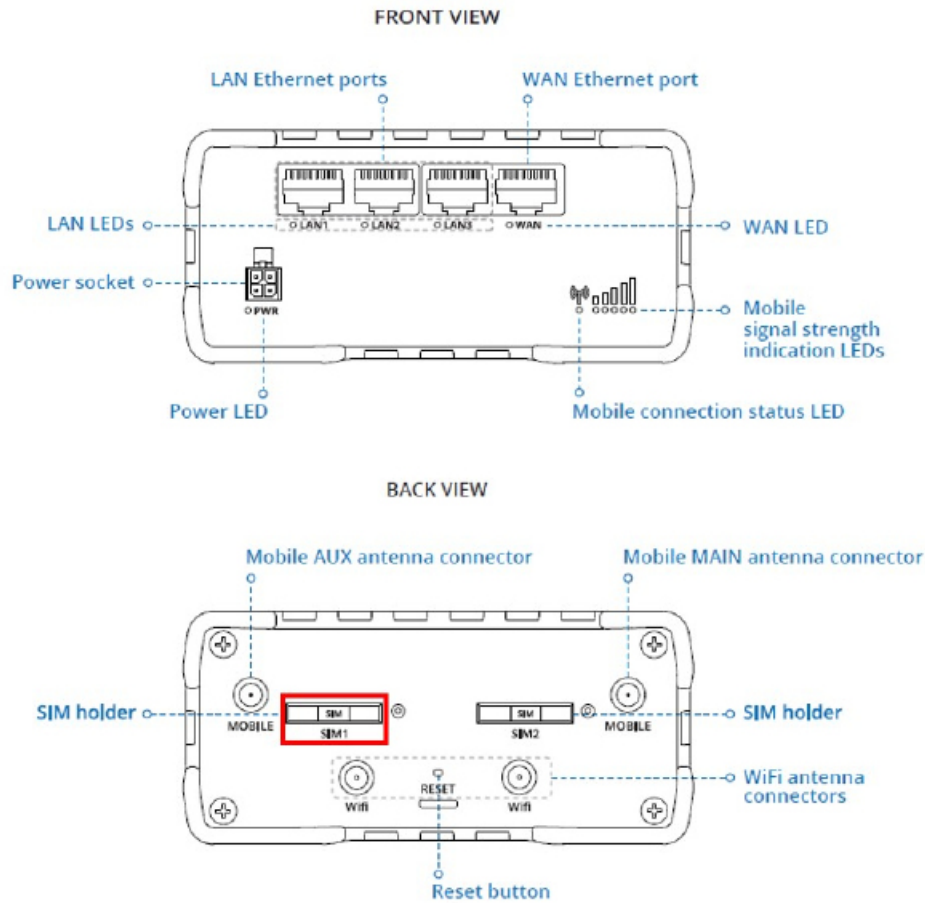
3. Check router is online by the following methods:

- Go to Dashboard and check the status of Cellular 1



4. At this point you should be able to navigate through internet using the router wifi.

10.2 Rest of World



Note: Remove the rear panel of the unit to have better access to the router's sim card slot. Rear panel has three bolts at the top attached to the frame as well as a cable connection on the fans.

1. Turn off the router by disconnecting its power cable.
2. Push the SIM1 holder button with the SIM needle.
3. Pull out the SIM holder.
4. Insert your SIM card into the SIM holder.
5. Slide the SIM holder back into the router.
6. Following video tutorial shows how to insert sim cards from 0:50 to 1:16: <https://www.youtube.com/watch?v=jSVu31DoiMk>
7. Turn on the router by connecting back its power cable.
8. Once the status light is green, connect to the router wifi.
 - Name: Unit ID wifi. Eg, S1909-00021 wifi
 - Pw: P0wr2wifi (same to all of the Powr2 HES units)

9. Once you are connected to the router wifi, open the following link on a browser:

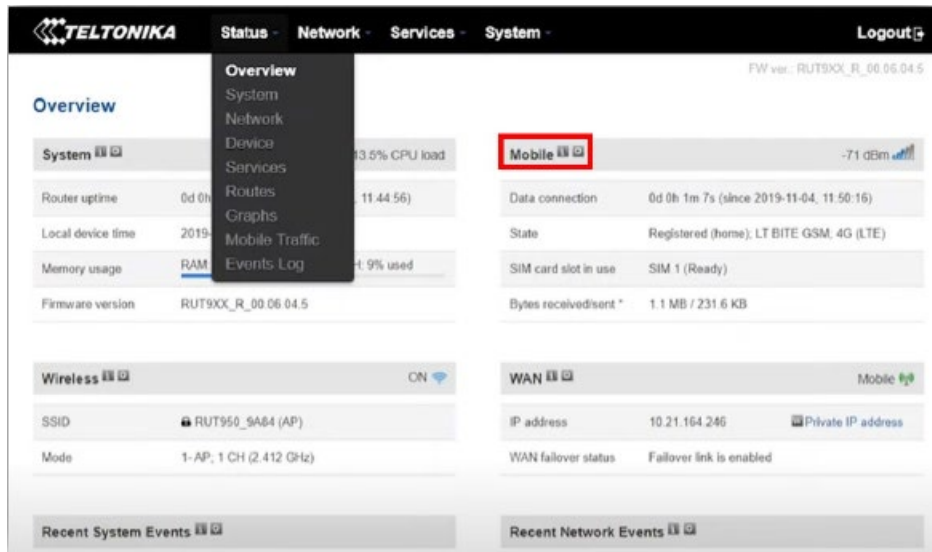
- 192.168.1.1

10. Login details:

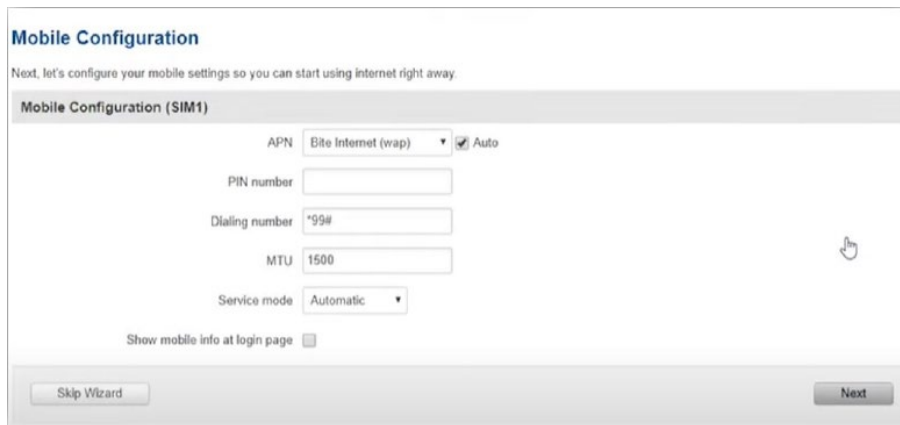
- Username: admin
- Pw: P0wr2wifi

For firmware earlier than v7.02.1

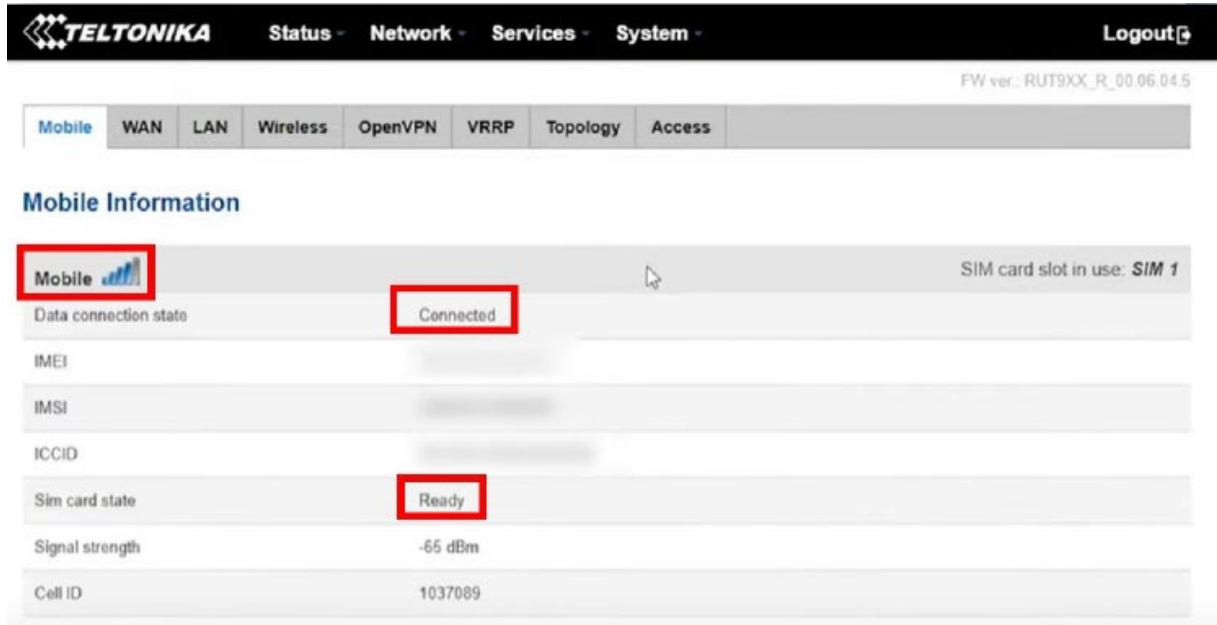
11. Go to Status / Overview and click on the gear icon on “Mobile” section. Alternatively, you can access through Network / Mobile.



12. Enter the APN details of your SIM card.



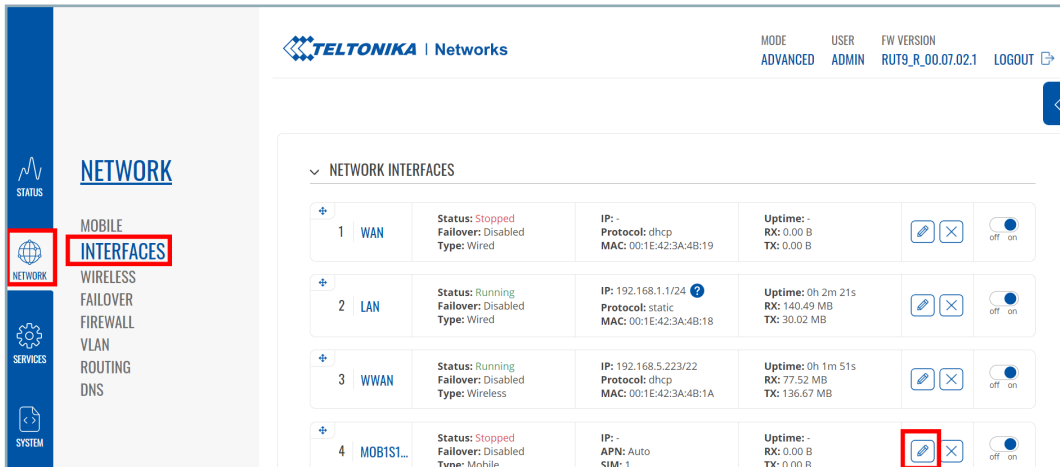
13. Check the router is online by going to Status / Network / Mobile



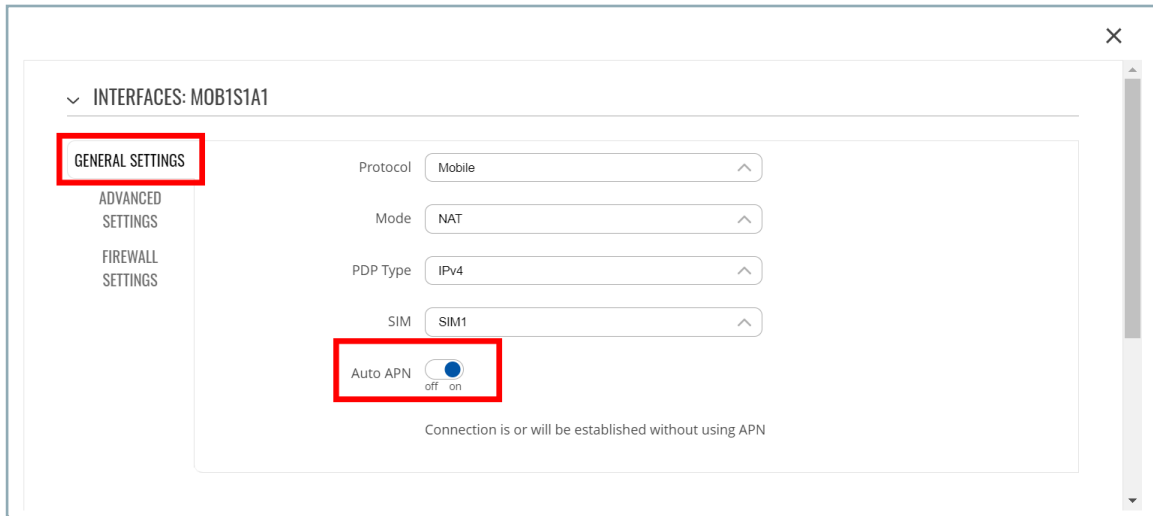
14. At this point you should be able to navigate through internet using router wifi.

For firmware v7.02.1 or later

11. Go to Network / Interfaces / MOB1S1A1 and click on "Edit"



12. Under general settings, enter the settings of your SIM card and select Auto APN “on”



13. At this point you should be able to navigate through internet using router wifi.

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