



16.1kWh 51.2V

ECO 314Ah LIFEPO4 BATTERY

TECHNICAL MANUAL

VERSION 1



THIS UNIT IS HEAVY AND EASY TO TIP

This unit tips the scales at a whopping 122.5KG, please ensure you have adequate lifting equipment in place.

16.1kWh

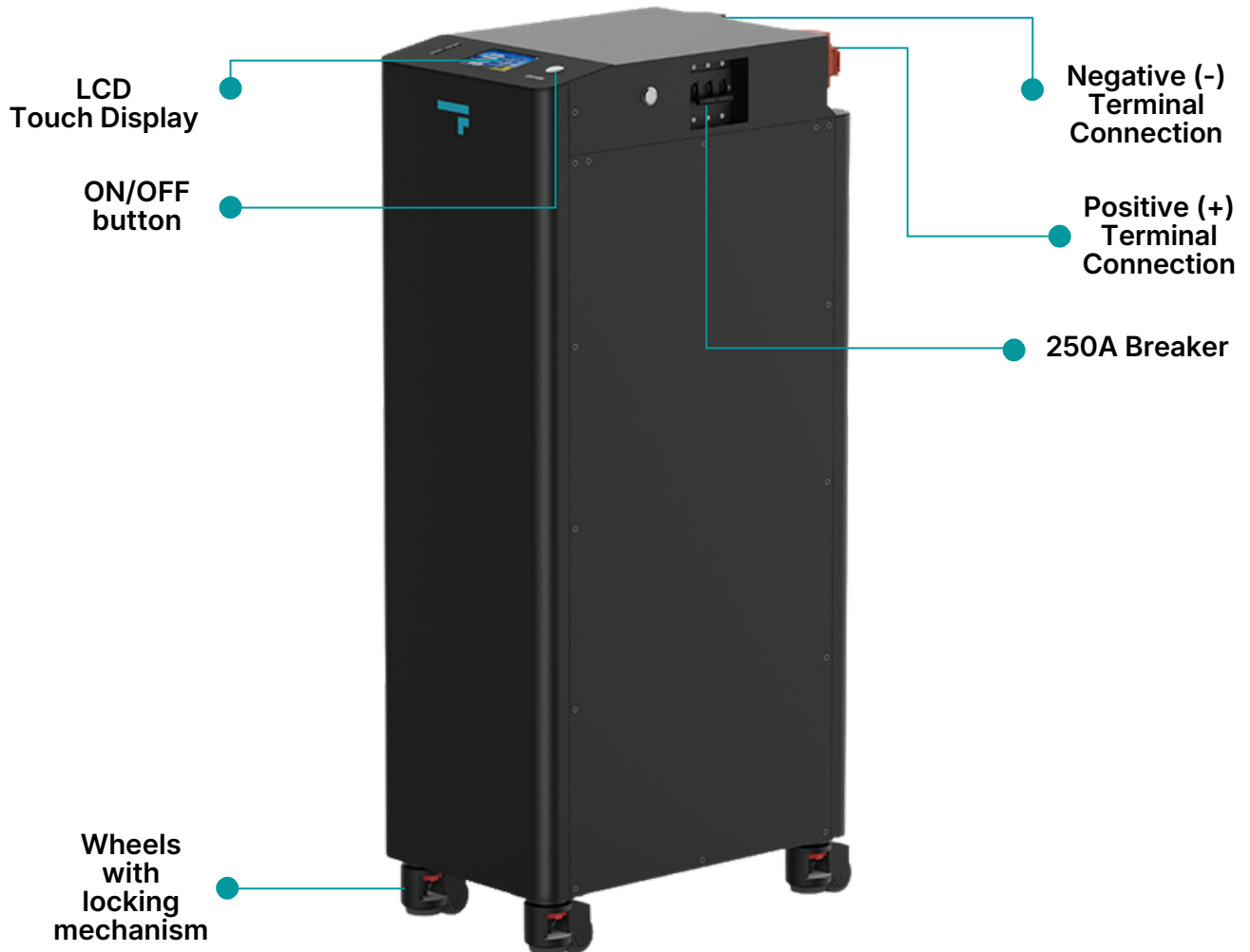


CONTENTS

3	YOUR BATTERY
4	SAFETY
5	BATTERY SPECIFICATIONS
6	DIMENSIONS
7	PACKING LIST
7	INSTALLATION
9	FIRE SUPPRESSION
10	OPERATING MODES
13	COMMUNICATION
15	FUNCTION DESCRIPTION
18	WARRANTY
19	FREQUENTLY ASKED QUESTIONS



YOUR BATTERY



16.1kWh



SAFETY



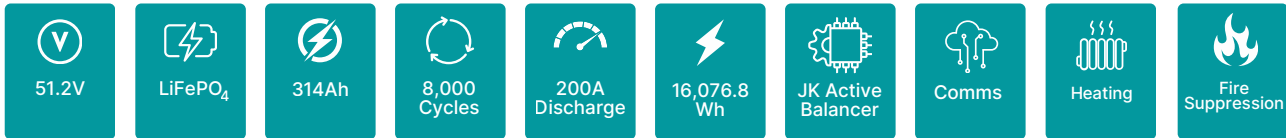
This unit is heavy

This unit tips the scales at a whopping 122.5KG, please ensure you have adequate lifting / manoeuvring equipment in place. Before setting it up, make sure children and furry friends are not nearby.

- Wear proper safety gear such as gloves and eye protection
- These batteries are HEAVY (122.5KG) - always get help to lift them
- Do not reverse polarity
- Do not connect with any batteries in series
- Ensure the system is properly grounded
- Always use insulated tools
- Do not work on battery with it turned on or with the grid turned on
- Do not connect battery to solar wiring directly
- Make sure all fasteners are properly torqued
- Ensure your chargers/inverters are appropriately programmed
- Use only on 48v nominal systems, do not connect with other batteries (such as 15S)
- Ensure the installation follows applicable local, national and all legal electric stipulations
- Installation should be done by a qualified and knowledgeable person
- Make sure proper cable sizes and overcurrent protection are utilised
- Ensure the system is installed in a location suitable for electronics
- Keep the battery within safe operational temperatures
- Do not put the battery in a hazardous, hot or flammable environment
- Install your equipment in a location where children and pets are not present
- Do not paint, or spray paint the battery
- If there are any electrical smells or excessive heat, use your breaker switch and contact your local fire station
- Only clean the battery with a dry cloth - do not use any liquids, spray cleaners, aerosols or any type of solvents.



SPECIFICATIONS



Specifications	
Rated Voltage (V)	51.2V
Maximum Charge (V)	57.6V
BMS	SEPLOS 200A
Nominal Capacity (Ah)	314Ah
Minimum Capacity (Ah)	314Ah
Maximum Charge Current (A)	200A
Total Wh	16,076.8
Maximum Discharge	200A
Discharge Cut-off Voltage	43.2V
Discharge Temperature	-20°C to 40°C
Charging Temperature	-10°C to 40°C
Storage Temperature	1 Month: -10°C ~ 35°C 3 Months: 25 ±2 °C
Relative Humidity	65% ~ 20%
Cell Configuration	16S1P
Cycle Life	8,000 @ 91% DOD
Communication Ports	CAN, RS485, RS232
Design Life	15 years
Weight	122.5kg
Active Balancer	2A
Preloaded Inverter Protocols	Compatible with multiple LV inverters, including Sunsynk, Solis, Victron and more.



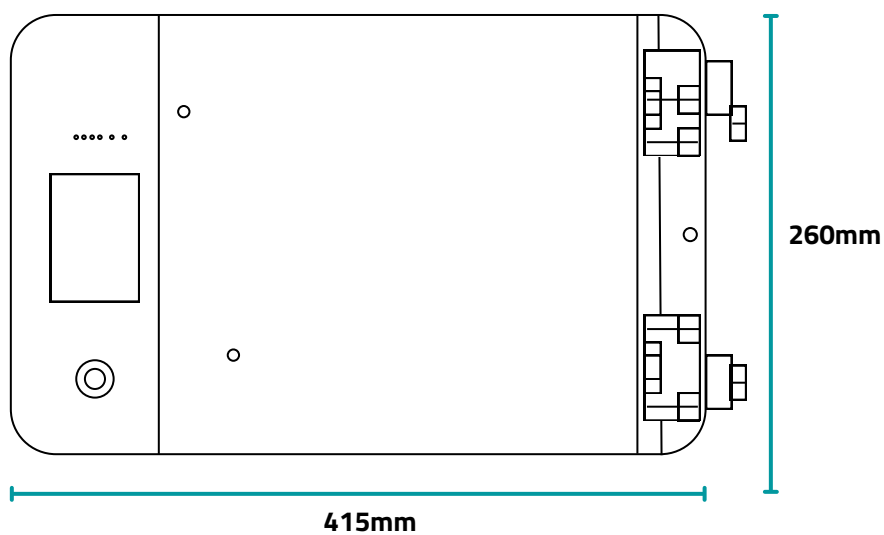
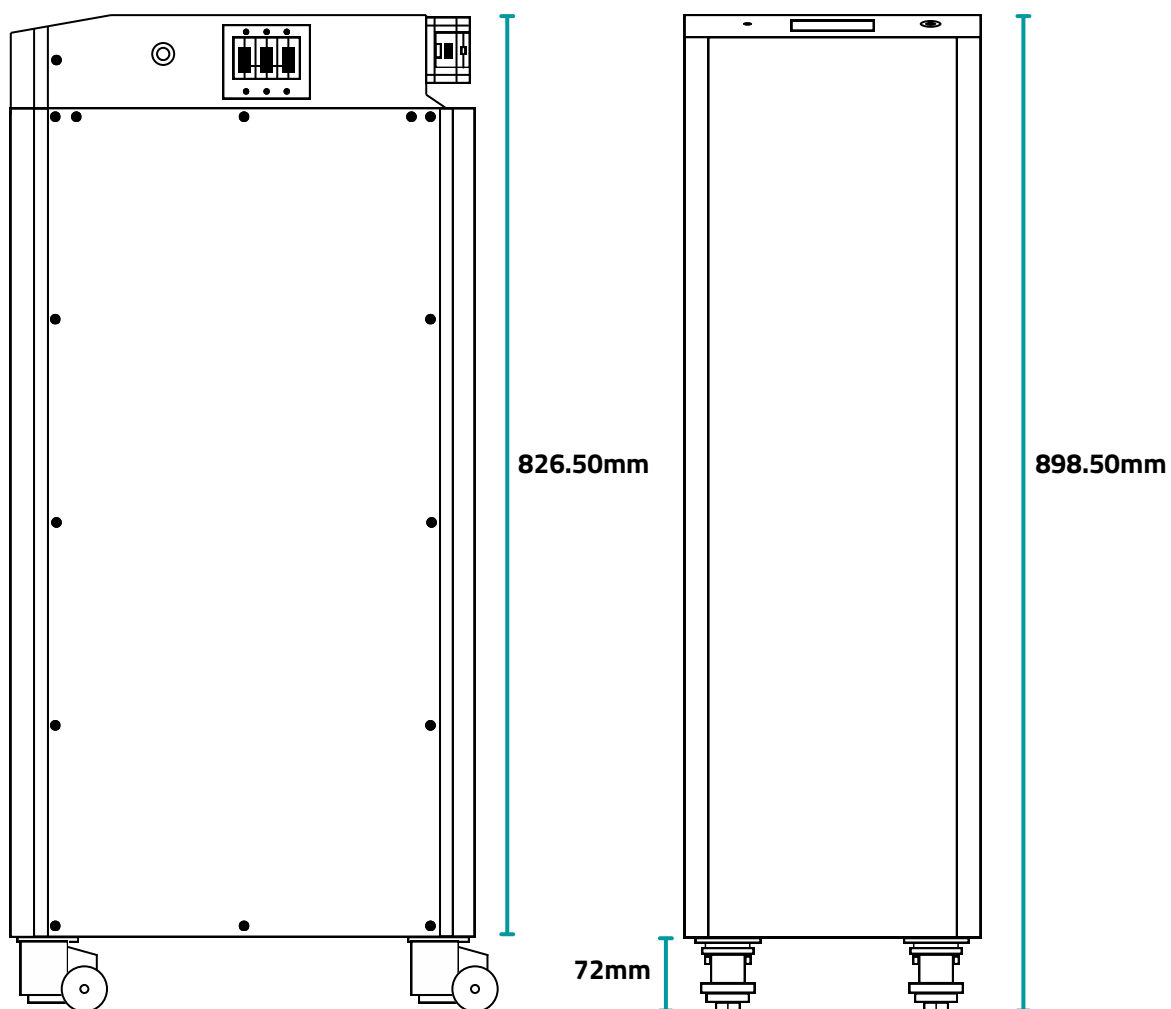
Built-In Fire Suppression Unit

Our ultra-thin, built-in aerosol unit stops fires the moment they start. When temperatures spike to 170°C, the system releases a fast-acting potassium aerosol that instantly disrupts the fire's chemical reaction. Result: rapid suppression, zero maintenance, and reliable protection for enclosed electrical spaces.





DIMENSIONS





PACKING LIST

We supply a pair of 1.5m positive and negative power cables with Amphenol connectors. For correct installation, always connect all negative conductors before the positive.

A 1.5m communication cable is included for RS485/CAN data exchange, along with a 1.8m PC cable for direct computer connection, system setup, and diagnostics.

These accessories allow the battery to integrate easily into both single-unit and multi-unit configurations.

1.5m Power Cable Harness	2PCS	
1.8m Host PC Cable	1PCS	
1.5m Communication	1PCS	

INSTALLATION

Power Cable Specification and Connection Requirements

The supplied 1.5m Positive and Negative power cables use M8 connectors and are designed for stable, reliable inter-battery power linking.

When installing:

- 1.Connect all Negative conductors first.
- 2.Connect Positive conductors only after all Negative connections are secure.

Communication Cables

- A 1.5m communication cable is provided for RS485/CAN data exchange between battery units and system components.
- A 1.8m PC cable enables direct connection to a computer for system configuration, monitoring, and diagnostics.

These allow the battery to be integrated in both standalone systems and parallel banks, without additional communication accessories.



INSTALLATION

Parallel Configuration and BMS Addressing

The Fogstar Energy 16.1kWh ECO utilises a BMS with automatic address allocation. No DIP switch configuration is required.

When connecting multiple batteries in parallel:

- Use a standard network cable between units.
- Follow this wiring sequence:
 - The first unit's RS485B connects to the second unit's RS485A.
 - The second unit's RS485B connects to the third unit's RS485A.
 - Continue this pattern for any additional units.
 - The first unit acts as the host, with its CAN/485 communication line connecting to the inverter.

All subsequent units operate as slaves within the communication chain.

Placement and Environmental Requirements

For safe installation and optimal performance, the following conditions must be met:

- Install the battery on a level, non-flammable surface, such as concrete.
- Do not place the unit on flammable building materials.
- Maintain an operational ambient temperature between 10°C and 30°C.
- Ensure a minimum clearance of 30cm around the battery for ventilation and service access.
- Avoid environments with **excessive** moisture, dust, vibration, or direct sunlight.

Installation Time

Additional system integration, including inverter connection, protection devices, and grid-related work, will vary according to installation design and site conditions.

Electrical Installation Responsibility

Fogstar is a battery manufacturer and supplier. Specific installation procedures, regulatory compliance, and any electrical work must be carried out by a qualified electrician.

The installer must ensure that all wiring, protection devices, terminations, and commissioning steps meet local electrical regulations and safety standards.



INSTALLATION

Installation Location

The Fogstar Energy 16.1Kw ECO is **not IP-rated** and is intended for installation in clean, dry, indoor environments only. The Product must be protected from water, moisture, condensation, excessive humidity, dust and other environmental contaminants at all times.

To maximise service life and performance, install the Product in a well-ventilated location, protected from prolonged direct sunlight, excessive heat and adverse environmental conditions. Suitable installation locations include purpose-built battery rooms, plant rooms, utility rooms or other dry technical spaces. Where multiple batteries are installed, adequate spacing and ventilation should be provided to allow unrestricted airflow around each unit.

The Product must not be installed:

- Outdoors or in exposed environments.
- In locations where water ingress, flooding or standing water may occur.
- In rooms intended for sleeping.
- Within escape routes, stairways, corridors or other means of escape.
- In lofts, roof spaces or other confined spaces with inadequate ventilation.
- Adjacent to stored flammable materials or fuel storage.
- Near sources of excessive heat, naked flames or other ignition sources.
- In environments containing corrosive chemicals, salt spray or excessive airborne contamination.
- In prolonged direct sunlight or locations where excessive solar heat may occur.

When installed within a domestic dwelling, the installation should be designed and carried out in accordance with applicable national regulations and recognised industry guidance, including PAS 63100 and BS 7671 where applicable. Particular consideration should be given to installation location, ventilation, fire detection, accessibility for maintenance and protection against mechanical damage.

Environmental Conditions

The Product should not be exposed to prolonged direct sunlight or excessive ambient temperatures. Elevated temperatures may increase the internal temperature of the battery and cause the Battery Management System (BMS) to temporarily limit or suspend charging and/or discharging as a protective measure. This is a normal protective function and operation will automatically resume once the battery temperature returns to an acceptable operating range.



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OPERATING MODES

Charging mode

When the BMS detects a connected charger and the external charge voltage exceeds the internal battery voltage by more than 0.5 V, the charging MOSFET is enabled. Once the charging current rises above the minimum effective threshold, the system enters Charging Mode. In Charging Mode, both the charge and discharge MOSFETs remain closed.

Discharging mode

The BMS enters Discharge Mode when a load is detected and the discharge current exceeds the effective discharge threshold.

Standby mode

If neither charging nor discharging conditions are met, the BMS switches to Standby Mode.

Shutdown mode

The BMS enters Shutdown Mode after 48 hours in normal standby, or when undervoltage protection, key shutdown, or an external switch shutdown is triggered.

Wake-up conditions for Shutdown mode

Charging activation / 48V Voltage activation / Power button Activation

LED Indicator Sequence

The BMS uses four (4) SOC LEDs, one (1) ALARM LED, and one (1) RUN LED to indicate system status. The SOC LEDs display battery capacity during charging and discharging. The ALARM LED signals protection events or abnormal conditions, and the RUN LED indicates normal operation. LED states such as solid, flashing, or off are used to represent operating status and fault conditions.

					
SOC				ALARM	RUN



OPERATING MODES

Capacity Indicator

Status		Charge				Discharge			
Capacity Indicator		L4 ●	L3 ●	L2 ●	L1 ●	L4 ●	L3 ●	L2 ●	L1 ●
	0~25%	OFF	OFF	OFF	BLINK	OFF	OFF	OFF	GREEN
	25~50%	OFF	OFF	BLINK	GREEN	OFF	OFF	GREEN	GREEN
	50~75%	OFF	BLINK	GREEN	GREEN	OFF	GREEN	GREEN	GREEN
	≥75%	BLINK	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN
Running indicator light ●		Green				Flash			

LED Flashing Modes

Flashing Mode	On Time	Off Time
Flash 1	0.25s	3.75s
Flash 2	0.5s	0.5s
Flash 3	0.5s	1.5s



OPERATING MODES

Status Indicator

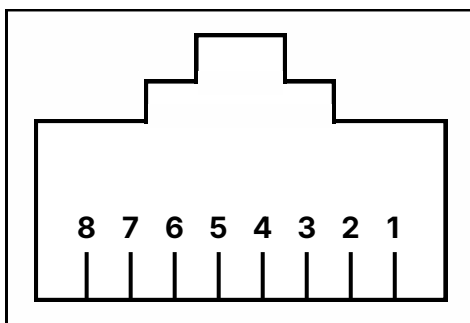
System Status	Running Status	RUN	ALM	SOC				Description
								
Power Off	Sleep	Off	OFF	OFF	OFF	OFF	OFF	All Indicators Off
Standby	Normal	Flashing	OFF	OFF	OFF	OFF	OFF	Standby Mode
Charging	Normal	Solid On	OFF	According to the Capacity Indicator				Normal charging state
	Over Current Alarm	Solid On	Flash Mode 2	According to the Capacity Indicator				Overcurrent protection active
	Overvoltage Protection	Flash Mode 1	OFF	OFF	OFF	OFF	OFF	Overvoltage protection active
	Temperature or overcurrent protection	Flash Mode 1	OFF	OFF	OFF	OFF	OFF	Temperature or overcurrent protection active
Discharging	Normal	Flash Mode 3	OFF	According to the capacity indicator				Normal discharging state
	Alarm	Flash Mode 3	Flash Mode 3					Alarm active
	Temperature, overcurrent, or short circuit protection	OFF	Solid on	OFF	OFF	OFF	OFF	Protection active. Forced sleep after 48 hours without activity.
	Undervoltage protection	OFF	OFF	OFF	OFF	OFF	OFF	Undervoltage protection active. Discharge disabled.



COMMUNICATION

The BMS communication interface is defined according to the communication requirements of the connected inverter. Different inverter brands may use communication ports with pin definitions that do not match the standard BMS layout. In these cases, a custom communication cable is required. Incorrect cable wiring can cause communication errors or unexpected system behaviour. In most applications, a standard network cable can be used, provided the wiring matches the required pinout.

CAN/RS485

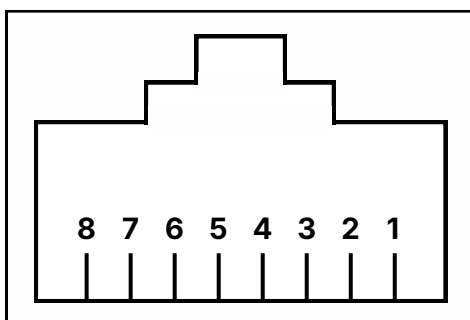


CAN/RS485

Pin	Description
1, 8	RS485-B
2, 7	RS485-A
4	CAN-H
5	CAN-L
3, 6	GND

Internal Communications: Select the appropriate RS485 port for BMS internal communication. The internal communication link operates at a baud rate of 19200, meaning data is transmitted at 19,200 bits per second. Both communicating devices must use the same baud rate for stable communication.

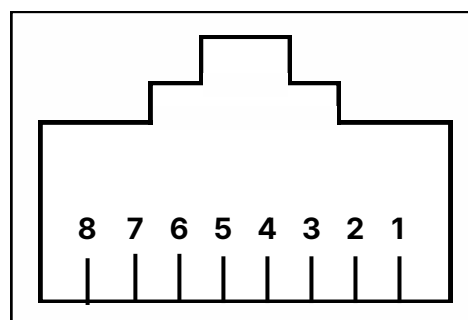
RS485A



RS485A

Pin	Description
1, 8	RS485-B
2, 7	RS485-A
3	Master Enable Pin
4	Auto Address Pin 2
5	GND
6	GND

RS485B



RS485B

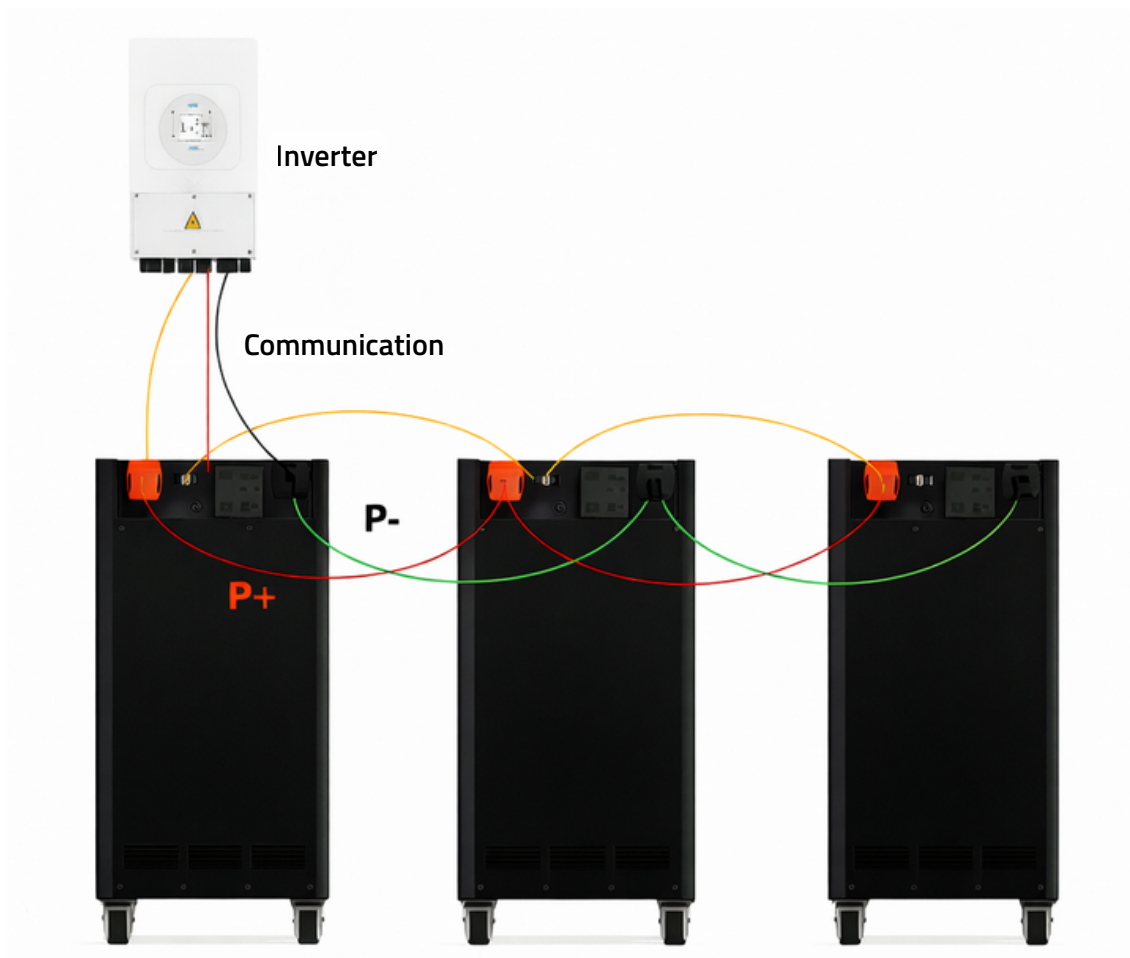
Pin	Description
1, 8	RS485-B
2, 7	RS485-A
3	GND
4	Auto Address Pin 1
5	GND
6	Slave Enabled Pin



COMMUNICATION

Parallel Communication Wiring

The BMS supports automatic address assignment, so no DIP switch configuration is required. Use standard network cables for parallel communication. Connect RS485-B of the first unit to RS485-A of the second unit, RS485-B of the second unit to RS485-A of the third unit, and so on. The first unit acts as the host and connects to the inverter CAN/RS485 port. All other units operate as slave units. Refer to page 3 for the battery layout and port location diagram.



Before connecting it should be completely disconnected and powered-down.

Battery Placement Requirements

Maintain a minimum spacing of 30cm between batteries when installing. Ensure all battery modules are placed securely and remain in the shutdown state before connecting communication cables.

PC Communication Connection

For monitoring or configuration, the BMS can be connected to a computer using a USB-to-RS485 adapter. Connect RS485-B to T/R+ and RS485-A to T/R-. Recommended adapter models include UT-890 and UT-891A.

FUNCTION DESCRIPTION

Battery Protection and Monitoring Functions

The Battery Management System (BMS) continuously monitors cell voltage, pack voltage, current flow, and temperature to protect the battery from abnormal operating conditions. These protection mechanisms are active by default unless otherwise stated and are designed to prevent damage, ensure operational safety, and extend battery service life.

Cell Voltage Monitoring, Alarms, and Protection

Single-Cell Voltage Alarms: The BMS monitors the voltage of each individual cell and provides early warning alarms before protection thresholds are reached. These alarms act as advance indicators and do not immediately interrupt charging or discharging.

A single-cell high voltage alarm is triggered when any individual cell reaches 3.50V. The alarm condition is cleared automatically once the affected cell voltage drops to 3.40V.

A single-cell low voltage alarm is triggered when any individual cell reaches 2.90V. The alarm condition is cleared automatically once the affected cell voltage rises to 3.00V.

Single-Cell Overvoltage Protection: If any individual cell reaches the overvoltage protection threshold of **3.65V**, the BMS disables charging to prevent cell damage.

Charging is restored only when **all recovery conditions are met simultaneously**. These recovery conditions are as follows:

- The affected cell voltage falls to 3.40V
- The remaining battery capacity is lower than 96%
- A discharge current greater than 1A is detected

Single-Cell Undervoltage Protection: Single-cell undervoltage protection activates when any individual cell voltage falls to 2.70V. When this occurs, the BMS disables discharge output and the system enters a protective shutdown state.

After undervoltage protection is triggered, the device shuts down while maintaining communication for approximately 1 minute. Recovery occurs when the cell voltage rises to 2.90V and a charging current greater than 1A is detected.

Pack (Total) Voltage Monitoring and Protection

Total Pack Voltage Alarms: The BMS monitors total pack voltage and provides warning alarms before protection thresholds are reached.

- A total pack high voltage alarm is triggered at 52.5V and clears once voltage drops to 50.6V.
- A total pack low voltage alarm is triggered at 43.5V and clears once voltage rises to 45.0V.

These alarms provide advance indication and do not immediately stop system operation.

Total Pack Overvoltage Protection: Total pack overvoltage protection activates when the battery voltage reaches 54.0V. When triggered, charging is disabled to protect the battery system.

Charging resumes only when all recovery conditions are met. Recovery occurs once pack voltage drops to 47.4V, the remaining capacity is lower than 96%, and a discharge current greater than 1A is detected.

Total Pack Undervoltage Protection: Total pack undervoltage protection activates when pack voltage falls to 39.0V. When triggered, the BMS disables discharge and enters shutdown mode.

After undervoltage protection, the system shuts down and maintains communication for approximately 1 minute. Recovery occurs when pack voltage rises to 43.1V and a charging current greater than 1A is detected.

Temperature Monitoring and Protection

Battery Cell Temperature Charging Protection: Charging is restricted based on cell temperature conditions to prevent damage.

- A charging high temperature alarm is triggered at 50°C and clears at 47°C. Charging over-temperature protection activates at 55°C and clears at 50°C.
- A charging low temperature alarm is triggered at 2°C and clears at 5°C. Charging under-temperature protection activates at -10°C and clears at 0°C.

Battery Core Temperature Discharge Protection: The BMS monitors battery core temperature during discharge.

- A discharge high temperature alarm is triggered at 52°C and clears at 47°C.
- Discharge over-temperature protection activates at 55°C and clears at 50°C.
- A discharge low temperature alarm is triggered at -10°C and clears at 3°C.
- Discharge under-temperature protection activates at -15°C and clears at 0°C.

Ambient Temperature Protection: The ambient temperature sensor monitors the surrounding environment.

- An ambient high temperature alarm is triggered at 50°C and clears at 47°C.
- Ambient over-temperature protection activates at 60°C and clears at 55°C.
- An ambient low temperature alarm is triggered at 0°C and clears at 3°C.
- Ambient under-temperature protection activates at -10°C and clears at 0°C.

Power Temperature Protection: Power component temperature is monitored independently.

- A power high temperature alarm is triggered at 90°C and clears at 85°C.
- Power over-temperature protection activates at 100°C and clears at 85°C.

Charging Current Limiting and Overcurrent Protection

Charging Current Limiting: The BMS supports both active and passive current limiting. When enabled, current limiting activates when charging current exceeds 10A. After current limiting is activated, the system rechecks the current limit status after 5 minutes.

Charging Overcurrent Alarm and Protection: A charging overcurrent alarm is triggered at 200A and clears at 195A.

- Charging overcurrent protection activates at 210A with a delay of 10 seconds.
- Charging resumes immediately or automatically after 60 seconds once conditions return to normal.

Discharge Overcurrent Protection

A discharge overcurrent alarm is triggered at -205A and clears at -203A.

Discharge overcurrent protection activates at -210A with a delay of 10 seconds. Recovery occurs immediately or automatically after 60 seconds.

Transient Overcurrent Protection: Transient overcurrent protection activates at -300A with a delay of 30ms. Charging or discharging resumes immediately or automatically after 60 seconds.

If transient overcurrent occurs continuously and exceeds the lock threshold, the system enters a lock state. The overcurrent lock activates after 5 occurrences and can be released by connecting a charger.

Short Circuit Protection

Output short circuit protection is enabled by default and is not configurable. When a short circuit is detected, output is immediately disabled.

Recovery occurs immediately or automatically after 60 seconds. If continuous short circuits exceed the lock threshold, the system enters a lock state. The lock activates after 5 occurrences and can be released by connecting a charger.

Cell Balancing Function

Cell balancing operates during standby, charging, and floating charge states.

- Balancing starts when cell voltage reaches 3.350V and the voltage difference exceeds 30mV.
- Balancing ends when the voltage difference falls to 20mV.

Balancing is permitted only within defined temperature limits. Balancing is prohibited when cell temperature exceeds 50°C or falls below 0°C.

FUNCTION DESCRIPTION

Battery Capacity Management

The battery rated capacity is set to 314Ah. Remaining capacity is estimated based on cell voltage.

A remaining capacity warning is triggered at 10%. Remaining capacity protection activates at 2%, at which point output is disabled.

Control, Power Management, and Auxiliary Functions

Reset Button Functions: When the BMS is in sleep mode, pressing the reset button for 1 second activates the system and returns it to normal operation. When the BMS is active or in standby mode, pressing the reset button for 3 seconds places the system into sleep mode.

Pre-Charge Function: The pre-charge function is enabled with a default delay of 2000ms and can be set between 0 and 5000ms.

BMS Power Consumption Management: The maximum standby time is 48 hours when no charger is present and no effective discharge current is detected.

Low Temperature Cell Heating: Cell heating is disabled by default. Heating activates when cell temperature reaches 0°C and clears at 10°C. Heating occurs only when a charger is connected and does not operate during standby or discharge.

External Switch and Display: An external switch can be used to turn the BMS on or off while in standby mode. The LCD screen provides simplified monitoring of cell voltage, temperature, current, and system status.

WARRANTY

The Fogstar Energy 16.1kWh ECO battery comes with a 6-year warranty and 10-year customer support, covering BMS failure, cell failure, temperature sensors, charging/discharging faults, and internal corrosion. Excludes misuse, tampering, incompatible systems, or accidental damage.

Reporting an Issue

If you experience a problem with your Fogstar unit, please contact our Customer Services team first so we can help resolve it quickly and efficiently. Please send any images or screenshots, along with a description of the issue, to:
customerservice@fogstar.co.uk.



FAQ'S

How many batteries can I connect together?

You can connect up to 16 units in parallel.

What are the dimensions of the 16.1kWh Battery?

415 (L) x 260 (W) x 898.5 (H) mm

Do I need to configure DIP switches?

The Fogstar Energy 16.1kWh ECO utilises a BMS with automatic address allocation. No DIP switch configuration is required.

Does the battery need to be powered off before connecting?

Yes. All batteries must remain in the shutdown state before connecting communication or power cables.

What does each LED mean on the battery?

The BMS uses four SOC LEDs, one ALARM LED, and one RUN LED to display operating status, capacity, and protection events. LED behaviour (solid, off, or flashing) indicates charging, discharging, standby, or fault conditions. Please refer to pages 11 and 12 for the full LED indicator guide.

Can these batteries work with other inverter brands?

Yes. The BMS seamlessly integrates with a wide range of popular inverters, containing pre-loaded protocols for popular LV inverter brands including but not limited to LuxPower, Sunsynk, Solis, Victron and more.

Can I mix different battery capacities or models in the same system?

No. Only identical battery models with the same capacity and BMS configuration should be connected in parallel.

What is the warranty period?

This battery includes a 6-year warranty, along with 10 years of ongoing support. For full warranty terms and conditions, please refer to the Fogstar website.

FOGSTARENERGY