



# Freedom Won LiTE 2 Commercial HV and HV+ Installation User Manual



This manual specifically covers the LiTE 2 Commercial HV and HV+ installation process. For a comprehensive overview of the other product range, visit the Freedom Won website.

## Update Record

Revision Number	Update Summary	Updated By	Date of Issue
1	Incorporated new model names and warranty to reflect guaranteed performance at 80% average DoD	Antony English	28 April 2020
2	HV and HV+ gateways	Jaco De Beer	
3	General Updates	W Skosana	21 November 2024

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# 1 Introduction

This manual provides information on the LiTE 2 Commercial HV and HV+ battery range, which offers high power output, robust architecture, and a competitive cost-performance ratio.

The LiTE 2 Commercial range includes two different voltage classes: HV and HV+. To achieve optimal performance and compatibility, it is crucial to choose a battery inverter that precisely matches the corresponding voltage class.

The range includes various voltage options and is compatible with Freedom Won HPS and ATESS inverters. The model number on the battery indicates the total energy storage capacity, and the second number represents the average energy to be withdrawn per cycle for optimal lithium cell life.

The battery range is fully assembled at the factory, except for models from 600HV to 800HV+, which require on-site assembly.

This manual assists the installer in successfully installing and commissioning Freedom Won LiTE 2 Commercial (HV and HV+) lithium iron phosphate energy storage batteries. It provides guidance on installation and integration with other equipment but does not cover technical details for integrating third-party equipment.

The manual also covers new features specific to LiTE 2 batteries, including remote monitoring through an Ethernet-based gateway, which enables remote setup, and troubleshooting procedures.

For additional information contact Freedom Won at [support@freedomwon.co.za](mailto:support@freedomwon.co.za).

## 2 Product Description

Freedom Won LiTE 2 technology is available in various standard sizes to meet all residential, commercial, and industrial applications, for a detailed overview please visit the Freedom Won website.

Freedom Won offers the following ranges in the LiFePO<sub>4</sub> technology:

1. LiTE 12V
2. LiTE Home and Business 52V
3. LiTE Home and Business HV
4. LiTE Marine
5. LiTE Mobility (golf carts, forklifts, etc)
6. LiTE Commercial
7. LiTE Industrial
8. megaTower Plus and megaTower Extra
9. eTower

### 2.1 Overview of the LiTE 2 Commercial Range

This manual covers the LiTE 2 Commercial HV and HV+ range from 100kWh up to 800kWh. For information on the other specific ranges, refer to the applicable manuals. The LiTE 2 Commercial range HV and HV+ offers high power output levels for the respective battery capacity with an extremely robust and advanced system architecture. Furthermore, the cost vs. performance of this range is market-leading.


The LiTE 2 Commercial HV and HV+ models have different nominal voltage levels to meet different requirements. The HV models typically operate at 512V and the HV+ models vary at higher voltage values.

### 2.2 Model Options and Compatibility

This range is provided in various voltage options to suit the most common inverter pairing, including the Freedom Won HPS and ATESS. Users must ensure that the battery voltage matches the inverter's requirements. Refer to Tables 1 and 2 for the HV and HV+ model options to suit the ATESS inverters. If you require specific technical information for models compatible with high DC voltage battery inverters from other brands, contact Freedom Won for assistance.

Refer to the image numbered labels in Figure 1. The model number denotes with the first number [1] the total energy storage capacity in kWh of each model. The second number [2] denotes the average amount of energy in kWh that should be withdrawn per cycle (on average) to optimise the life of the lithium cells. This equates to 80% of the total for each model i.e. 80% depth of discharge (DoD).

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 All Freedom Won LiTE 2 batteries offer a maximum of 90% DoD as standard.

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The range is designed with a tall and slim profile for standing on the floor against a wall with no rear access required to ensure a minimal floor area requirement. The unit comes equipped with aluminium feet that feature plastic pads on the underside as a standard feature.

The Ah capacity is provided in the tables for each model for easy reference. The grounding point, denoted by reference number [3], is identified by a yellow sticker surrounding it.

The maximum current for each model is governed by the rating of the built-in circuit breaker [11] and cables. The maximum current has a time limitation as indicated in the specification sheet. Some models are fan-cooled to manage temperature under heavy-duty operation.

Refer to the Freedom Won LiTE 2 Commercial 100/80 example (Labelling corresponds with the Legend Table below).



Figure 1: Freedom Won LiTE 2 Commercial 100/80 Example

## Legend Table

Number	Option
1	Gross Capacity
2	80% Capacity maximum recommended for daily cycling (max available is 90%)
3	Grounding Point
4	Ethernet connection port for remote monitoring
5	CAN Bus Sockets x 2 (RJ45)(one socket must contain a termination resistor if the end of the line)
6	Detachable Power Connectors or Glands for power cables
7	On Button
8	Off Button
9	Error Light
10	State of Charge Display
11	Breaker
12	Reset Button
13	Override Button

## 2.3 Compatibility with Inverters

The Commercial HV models typically operate at 512V, this is an ideal operating voltage for the ATESS HPS hybrid battery inverters (a common pairing). The HV+ models operate at 576V up to 800V depending on the model. This voltage range suits the ATESS PCS battery inverters and associated PBD250 DC Charge controllers.

The battery range is also compatible with the Freedom Won HPS range of inverters. From the HPS50 to HPS150 the HV range is compatible, for the HPS250 and HPS500, the HV+ models must be used.



This only applies to HPS inverters purchased from Freedom Won. Different voltage compatibility requirements may apply for HPS inverters sourced from other suppliers.

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## 2.4 Assembly and Installation

The Freedom Won LiTE 2 Commercial battery range is fully assembled at the Freedom Won factory except for models from 600HV+ up to 800HV+, these models are assembled on-site.

If a specific site presents logistical constraints about placing these models into position, selecting a smaller, more manageable model is necessary. If the smallest model presents handling challenges, you may request Freedom Won to assemble on-site at an additional cost.

The dimensions given in the specification sheets are for the principal outlines of the battery housing and exclude items that protrude such as the DC cable glands and the circuit breaker handle.

## 2.5 Cables and Connectors

The DC cables either exit the unit through glands or, other models have detachable power connectors to simplify installation and battery replacement. This is defined in Tables 1 and 2, also illustrated in Figure 1.

The DC cables per pole vary in size across these models. The correct cable lugs for connecting these leads to the inverter must be available during installation. If several inverters and charge controllers need to be connected to the battery it is advisable to install a DC connector box as a junction point to branch out to all the battery-connected equipment.



The cables provided are 4.5m long as standard and up to 10m long can be ordered at an extra cost.

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Refer to Figure 2 for an installation example of a LiTE 2 Commercial 400/320HV connected to a Freedom Won HPS inverter.



Figure 2: LiTE 2 Commercial 400/320 HV with HPS Inverter Example

## 2.6 Communication and Control

Two RJ45 sockets [5] are provided, one for connecting the CAN interface from the battery to the system controller or directly to the inverter depending on the brand, and another for connecting the battery to another battery or for a termination resistor (more detail later in the manual).

A third RJ45 socket [4] is used to connect the gateway to the internet or access the BMS through E-Connect.

During commissioning, Freedom Won must remotely load the required profile on behalf of the installer using the installer's Windows laptop, as each inverter brand utilises a unique CAN protocol.

Freedom Won LiTE 2 Commercial is also fitted with a State of Charge (SoC) display [10], which includes a red LED error indicator [9] and below it a "low power" indicator.

The ON button [7] and OFF button [8] are located beside the SoC display.

Models up to 230HV+ are supplied with permanently installed eye bolts. From the 300HV and 300HV+ up to the 500HV and 500HV+ the batteries are supplied with lifting straps. From the 700 HV+ upwards it will be an onsite build and lifting a populated casing is not required, if possible.



Do not attempt to lift a completely assembled battery, as this may pose a safety risk.

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An Ethernet gateway is fitted as standard to all LiTE 2 Commercial models [4], where an internet connection over Ethernet will be required to add the battery to the online portal.

## 2.7 LiTE 2 Commercial HV Range Overview

Refer to the Table below for a Freedom Won LiTE 2 Commercial HV Range Overview (to suit ATESS or similar inverters)

Table 1: LiTE 2 Commercial HV Range Overview

Model	100/80 HV	200/160 HV	300/240 HV	400/320 HV	500/400 HV
<b>Total Energy Capacity [kWh]</b>	100	200	300	400	500
<b>Energy, 80% DoD [kWh]</b>	80	160	240	320	400
<b>Energy, 90% DoD [kWh]</b>	90	180	270	360	450
<b>Current Capacity [Ah]</b>	200	400	600	800	1000
<b>Max / Cont. Discharge Current [A] 1</b>	300/250	432/360	720/600	840/700	840/700
<b>Max &amp; Cont. Charge Current [A]</b>	200	360	600	700	700
<b>Max / Cont. Discharge Power [kW] 1</b>	154/128	221/184	369/307	430/358	430/358
<b>Max &amp; Cont. Charge Power [kW]</b>	102	184	307	358	358
<b>Nominal Voltage [V]</b>	512	512	512	512	512
<b>Max/Min Operating Voltage [V]</b>	568/456	560/456	560/456	560/456	560/456
<b>Max. Inverter Cap. [kVA]</b>	120	200	300	400	400
<b>Short Circuit Current [kA]</b>	5	10	15	19	24
<b>Dimensions - Height X Width X Depth [mm] 2</b>	1405x1636x365	1403x1600x721	1460x2420x730	1460x2940x730	1450x3520x730
<b>Crated Dimensions - Height X Width X Depth [mm]</b>	1790x1600x575	1780x1555x815	2570x1575x815	3285x1584x848	3990x1575x835
<b>Total Weight [kg]</b>	800	1542	2370	3076	4400
<b>Crated Weight [kg]</b>	914	1664	2564	3300	On-Site Build
<b>DC Connection Cables (no. per electrode) [mm<sup>2</sup>] 3</b>	1x95mm <sup>2</sup> Helukabel NSGAF öU (Detachable Power Connector)	1 x 120mm <sup>2</sup> Helukabel NSGAF öU (Detachable Power Connector)	1 x 185mm <sup>2</sup> Helukabel NSGAF öU	1 x 185mm <sup>2</sup> PolyBraid	1 x 185mm <sup>2</sup> PolyBraid
<b>Round Trip Efficiency [%]</b>	96-97				
<b>Enclosure</b>	3mm thick Aluminium, powder coated, tamper proof, indoor use				
<b>Protection</b>	Shunt Trip Circuit Breaker sized to suit max current, can be tripped by BMS if critical fault, manual reset. Protection for overcurrent, cell under and over voltage, temperature, weak cell detection and other critical events.				
<b>Control Interface</b>	RJ45 Ethernet connection for diagnostics & troubleshooting through E Connect. RJ45 CAN Strictly for BMS & inverter communication.				
<b>Human Interface</b>	On and Off Buttons, State of Charge Display (0 to 100%), Error light, Error Reset Button, RJ45 Plug for Programming and data access with PC, main breaker.				
<b>On-board Management</b>	Full battery management system and internal trip protection				

<b>Battery Chemistry</b>	Lithium Iron Phosphate (LiFePO <sub>4</sub> )	
<b>Cell Form Factor</b>	Large Format heavy-duty prismatic cells of 200Ah each and 3.2V nominal voltage, fully sealed in aluminium casing with laser welded electrode connections.	
<b>Battery Cooling</b>	Natural Convection (heat generation is negligible inside the battery)	Fan and Louver Cooling Solution
<b>Suitable Ambient Temp [°C]</b> <b>4</b>	0°C to +35°C	
<b>Extreme Operating Temp [°C]</b> <b>4</b>	-20°C to +60°C	
<b>Remote Monitoring</b>	Real-time data logging and remote monitoring over Ethernet. Internet connection required	
<b>Warranty</b> <b>5</b>	Standard Warranty: 10 years (or 6000 cycles) 80% DoD, 0.5C Max Discharge, 0.25C Max Charge, Max 25°C	
<b>Service Life - Cycles &amp; Years</b> <b>5</b>	> 16 years (>6000 cycles) expected life at 80% DoD per cycle	
<b>Primary Note</b>	<b>The LiTE 2 Commercial high voltage range is available in two variants, namely the HV and HV+. The HV models are suitable for the ATESS HPS range of hybrid battery inverters and the HV+ is suitable for the PCS range of battery inverters and associated PBD DC</b>	
<b>1</b>	The maximum values given apply to both charge and discharge. For systems requiring more power, two or more batteries must be installed in parallel. Max current duration 5min every 10min. 1.5 x Max overload can be handled for 5 seconds. Current limits are rated for 10°C to 25°C battery temperature. De-rating will apply outside this temperature range.	
<b>2</b>	Excluding protrusions.	
<b>3</b>	Battery power connection cables 4.0m long as standard, power cable Red = Positive, Black = Negative, conductors in table refer to one electrode i.e. per positive and negative connections. Up to 8m long available at extra cost (must be specified in order). Note that the battery power connection cables exit the battery on the right-hand side near the floor on all the LiTE 2 Commercial HV and HV+ models. This is to suit the bottom entry of the floor-standing ATESS inverters. A cable trench is recommended for routing this cable along with all the other cables going to and from the inverter (a cable tray is an alternative).	
<b>4</b>	Charging below 0°C not permitted. Extended time above 35°C not recommended for optimal battery life.	
<b>5</b>	Refer to the Freedom Won Warranty document for further details.	

Refer to the Table below for the Freedom Won LiTE 2 Commercial HV+ Range Overview (to suit ATESS and similar inverters).

Table 2: LiTE 2 Commercial HV+ Range Overview

Model	230/184 HV +	300/240 HV +	400/320 HV +	500/400 HV +	700/560 HV+	800/640 HV+
<b>Total Energy Capacity [kWh]</b>	230	300	400	500	700	800
<b>Energy, 80% DoD [kWh]</b>	184	240	320	400	560	640
<b>Energy, 90% DoD [kWh]</b>	207	270	360	450	630	720
<b>Current Capacity [Ah]</b>	400	400	600	800	1000	1200
<b>Max &amp; Cont. Charge Current [A]</b>	300	300	600	700	700	700

<b>Max/Cont. Discharge Current [A] 1</b>	360/300	360/300	840/700	840/700	840/700	840/700
<b>Max &amp; Cont. Charge Power [kW]</b>	173	221	407	457	502	461
<b>Max/Cont. Discharge Power [kW] 1</b>	207/173	265/221	570/475	548/457	602/502	554/461
<b>Nominal Voltage [V]</b>	576	736	678	653	717	660
<b>Max/Min Operating Voltage [V]</b>	639/513	817/655	753/604	724/581	795/638	738/593
<b>Max Inverter Cap. [kVA]</b>	230	300	400	500	630	500
<b>Short Circuit Current [kA]</b>	10	10	15	19	24	29
<b>Dimensions - Height X Width X Depth [mm] 2</b>	1388x2300x540	1460x2410x730	1576x2870x730	1406x3850x750	1410x4880x730	1395x5580x730
<b>Crated Dimensions - Height X Width X Depth [mm]</b>	2485x1575x630	2645x1575x815	3105x1695x835	3990x1575x835	On-site Build	
<b>Total Weight [kg]</b>	1 718	2 238	3 098	3 918	6 180	7 000
<b>Crated Weight [kg]</b>	1 882	2 426	3 332	4 198	On-site Build	
<b>DC Connection (no. per electrode) [mm<sup>2</sup>] 3</b>	1 x 120mm <sup>2</sup> Helukabel NSGAF öU (Detachable Power Connector)	1 x 185mm <sup>2</sup> Helukabel NSGAF öU	1 x 185mm <sup>2</sup> Polybraid	1 x 185mm <sup>2</sup> Polybraid	1 x 185mm <sup>2</sup> Polybraid	1 x 185mm <sup>2</sup> Polybraid
<b>Round Trip Efficiency [%]</b>	96-97					
<b>Enclosure</b>	3mm thick Aluminium, powder coated, tamper proof, indoor use					
<b>Protection</b>	Shunt Trip Circuit Breaker sized to suit max current, can be tripped by BMS if critical fault, manual reset. Protection for overcurrent, cell under and over voltage, temperature, weak cell detection and other critical events					
<b>Control Interface</b>	RJ45 Ethernet connection for diagnostics & troubleshooting through E Connect. RJ45 CAN Strictly for BMS & inverter communication.					
<b>Human Interface</b>	On and Off Buttons, State of Charge Display (0 to 100%), Error light, Error Reset Button, RJ45 for Programming and data access with PC, main breaker.					
<b>On-board Management</b>	Full battery management system and internal trip protection					
<b>Battery Chemistry</b>	Lithium Iron Phosphate (LiFePO <sub>4</sub> )					
<b>Cell Form Factor</b>	Large Format heavy-duty prismatic cells of 200Ah each and 3.2V nominal voltage, laser welded electrode connections					
<b>Battery Cooling</b>	Natural convection	Forced Cooling	Air	Fan and louver cooling solution		
<b>Suitable Ambient Temp [°C] 4</b>	0°C to +35°C					
<b>Extreme Operating Temp [°C] 4</b>	-20°C to +60°C					
<b>Remote Monitoring</b>	Real-time data logging and remote monitoring over Ethernet. Internet connection required					
<b>Warranty 5</b>	Standard Warranty: 10 years (or 6000 cycles) 80% DoD, 0.5C Max Discharge, 0.25C Max Charge, Max 25°C					

<b>Service Life 5</b>	>16 years (>6000 cycles) expected life at 80% DoD per cycle.
<b>Primary Note</b>	<b>The LiTE 2 Commercial high voltage range is available in two variants, namely the HV and HV+. The HV models are suitable for the ATESS HPS range of hybrid battery inverters and the HV+ is suitable for the PCS range of battery inverters and associated PBD DC charge controllers. The 230/184HV+ model is suitable for both the HPS and PCS ranges. Note that integration with other inverter brands is feasible – please contact Freedom Won for assistance.</b>
<b>1</b>	The maximum values given apply to both charge and discharge. For systems requiring more power, two or more batteries must be installed in parallel. Max current duration 5min every 10min. 1.5 x Max overload can be handled for 5 seconds. Current limits are rated for 10°C to 25°C battery temperature. De-rating will apply outside this temperature range.
<b>2</b>	Excluding protrusions.
<b>3</b>	Battery power connection cables 4.0m long as standard, power cable Red = Positive, Black = Negative, conductors in table refer to one electrode i.e. per positive and negative connections. Up to 8m long available at extra cost (must be specified in order). Note that the battery power connection cables exit the battery on the right-hand side near the floor on all the LiTE 2 Commercial HV and HV+ models. This is to suit the bottom entry of the floor standing ATESS inverters. A cable trench is recommended for routing this cable along with all the other cables going to and from the inverter (a cable tray is an alternative).
<b>4</b>	Charging below 0°C not permitted. Extended time above 35°C not recommended for optimal battery life.
<b>5</b>	See the Freedom Won Warranty document for further details.

## 3 Packaging, Site Requirements, and Safe Handling

### 3.1 Packaging

The Freedom Won LiTE 2 units are packaged in protective foam layering and fastened into a wooden crate with feet, which allows lifting with a forklift or a pallet jack. For detailed packaging dimensions refer to Table 1 and Table 2. For a complete packing list of each model enquire with Freedom Won.

### 3.2 Site Requirements

All batteries from 100HV to 500HV+ are fully assembled before delivery. The 600HV to 800HV+ casing and cells are shipped separately for assembly on-site.

- The door to the plant room must be adequately sized in width and height for entry of the casing. A minimum door opening of 2.3m high x 1.6m wide is recommended.
- A minimum roof or ceiling height of 2.4m is recommended to accommodate the top exit power cables and related cable tray design.
- The floor of the plant room should be level, power-floated concrete, preferably painted with floor epoxy or sealed with cement sealer. An adequate manoeuvring area inside the plant room is required for positioning the casing through the door into the final position.

- For models assembled on-site from 100HV up to 500HV+ are assembled from the front through an access hatch. The access hatch is then bolted shut. A clearance of 750mm is required in front of the battery installation to allow for future maintenance and repair access.
- Models assembled on-site from 600HV to 800HV+ require 750mm clearance in front of the battery to ensure easy cell fitting.

### 3.3 Containerised Solutions

All LiTE 2 Commercial models are available with a complete installation in a shipping container directly from the factory. These systems are pre-commissioned at Freedom Won's factory and can be paired with the necessary battery inverters supplied and installed by Freedom Won.

### 3.4 Mounting Options

- Smaller batteries (100HV and below) are mounted at the top with mounting brackets and bottom on the feet.
- Larger batteries (200HV and above) are mounted on the feet with brackets fixed on the container floor.

### 3.5 Lifting and Handling

Specialised equipment is required for lifting factory-assembled Commercial units into position. A high-up crane truck or a forklift is required for offloading. For lifting the battery upright, a crane or forklift can be used if there is sufficient height clearance, otherwise a mobile gantry crane can be used. If there is sufficient height clearance, a crane or forklift can lift the battery upright; otherwise, a mobile gantry crane can be used. Refer to the image below for a lifting example.



Figure 3: Lifting and Handling Example



### Handling and Lifting Precautions

- Handle the Freedom Won LiTE 2 carefully when lifting and manoeuvring. It should remain either lying flat on its back or vertically upright (it must not be placed upside down or on its front face).
- If manoeuvring through a doorway too low for upright handling is unavoidable, the battery can be positioned on its long side (while still inside the crate). Special packaging inside the crate is required for this procedure, and Freedom Won must be notified of this requirement before collection.
- Take care not to knock any of the protruding items against obstacles during handling, such as the DC cabling and plugs and the circuit breaker handle.
- Take care not to scratch the LiTE 2 during handling. Packaging foam should be used to protect the paint when being handled on a trolley or pallet jack.
- Always ensure that lifting equipment and slings are adequately rated for the lifting weight.

## 3.6 Accessories

Freedom Won offers the following accessories.

Table 3: List of Accessories

Item	Description
------	-------------

120 Ohm Termination Resistor – RJ45	Use for plugging into the second CAN port for an end-of-line Battery (usually these are supplied with CAN-enabled inverters and hence it is generally not necessary to purchase from Freedom Won.
CAN adapter	Alternative connection to BMS if Gateway and Ethernet port are not working correctly

## 4 Safety Precautions

This section highlights users' safety procedures to prevent damage to the Freedom Won LiTE 2 Commercial (HV and HV+) equipment.

### 4.1 Operator Safety Requirements

To operate or assemble the LiTE 2 Commercial (HV and HV+) safely and effectively, personnel must:



#### **WARNING Important Safety Precautions**

- Be familiar with the energy storage system's structure and working principle.
- Read and understand this user manual.
- Be aware of relevant local standards and regulations.
- The operators must thoroughly understand wiring, electrical theory, and assembling principles. Failure to meet these requirements may result in serious injury, equipment damage, or system malfunction.
- Complete the risk assessment sheet.



#### **WARNING Safe and Handling Precautions**

To safely handle the LiTE 2 Commercial (HV and HV+) equipment, follow these precautions.

- When using a forklift to move the equipment box, it's important to ensure that the centre of gravity is evenly balanced between the two forks. This ensures optimal stability and control.
- When moving larger sized equipment ensure that your view is not obstructed. It is recommended to arrange for assistance from additional personnel.



**DANGER Warning Signs and Nameplates**

To ensure safe operation, follow labelling guidelines.

- Do not remove or damage warning signs containing critical safety information.
  - The nameplate inside the front door contains essential product parameters. Do not remove or damage it.
  - Ensure the equipment label always remains clear and readable. If the label is damaged or blurred, replace it immediately.
- 



**DANGER Electrical Safety Precautions**

To ensure safe operation, avoid touching live components, inspect equipment before use, and observe electrostatic protection rules.

- Do not touch terminals or conductors connected to power network circuits.
  - Inspect equipment for damage or hazards before operating.
- 



**DANGER Environmental and Space Requirements**

It is crucial to select an installation location that meets the following requirements to ensure an efficient installation of the LiTE 2 Commercial (HV and HV+).

- Select an installation location free from electromagnetic radiation, oil mist, corrosive or flammable gases, metal powder, dust, oil, water, or other foreign objects that could interfere with the inverter's operation.
- Ensure that the selected location does not have wood or other flammable materials near the battery, as they can pose a fire hazard.
- Verify that the installation area is clear of radioactive or harmful gases and liquids that could compromise the LiTE 2 Commercial (HV and HV+) performance or pose a risk to human safety.
- Avoid opening in rainy or wet weather.

- For best performance, install the LiTE 2 Commercial (HV and HV+) indoors in a well-ventilated area.
  - Keep the LiTE 2 Commercial (HV and HV+) away from areas with high humidity, high temperatures, or exposure to corrosive gases. These elements can negatively impact performance and lifespan.
  - Ensure that the grounding cable in the power distribution room is properly grounded. The resistance in a dry environment should be less than 4  $\Omega$ .
  - The LiTE 2 Commercial (HV and HV+) installation surface must have sufficient bearing capacity.
- 



**DANGER Personal Protective Equipment (PPE)**

- Failure to wear required PPE may result in serious injury or death, wear protective gear (insulating gloves, shoes, etc.).
- 



**DANGER Other Considerations**

Take necessary precautions when maintaining or repairing equipment:

- Ensure emergency rescue facilities are available at remote installation sites.
  - Implement all necessary measures to ensure personnel and equipment safety.
  - Ensure energy storage LiTE 2 Commercial (HV and HV+) operations meet national/regional standards.
  - This manual does not cover all possible situations. For any concerns contact us.
- 

## 5 LiTE 2 Commercial Installation

### 5.1 Power Cables

Connecting Freedom Won LiTE 2 Commercial to the battery inverter is a simple process. The first step is to connect the positive and negative cables to the inverter terminals or DC busbar if applicable using the applicable lugs (not supplied).



## **Danger**

The LiTE 2 Commercial HV and HV+ range operates at potentially lethal voltages. Hence, the battery cables and connections must be treated with the utmost respect – before connecting the positive and negative cables to the inverter, ensure that the main battery circuit breaker is switched off. This will ensure no short circuits between the loose ends of the cables and will also avoid electric shock from the battery during installation.

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There are two different types of power cable supplied with the battery range, type one is a detachable power connector that can be released when required. Type two is a permanent power cable installation entering the battery through glands.

### Identify Cable Colours and Terminals

1. The positive cable is red, and the negative cable is black.
2. Confirm the cable colours by checking the + and – signs on the battery casing beside the respective cables.

### Attach Crimp Plugs to Cable Ends

1. Attach crimp plugs to the ends of the cables, ensuring that the correct terminal size is used.
2. Match the lug size to the size of the cable.

### Verify Cable Size and Quantity

1. Refer to Tables 1 and 2 to confirm the cable size and quantity fitted to each Freedom Won LiTE 2 model as standard.
2. The standard cable length is based on the inverter standing on the floor or mounted on the wall adjacent to the Freedom Won LiTE 2 battery.
3. Ensure that the cable run is less than 3m.



The standard cable length is 4m, with longer cables available on request up to 8m. The inverter must always be on the right-hand side of the battery or opposite the battery with overhead cable routing.

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Longer runs must be assessed, and larger cables or busbars considered, for extending the Freedom Won LiTE 2 DC connection to minimise voltage variation between the battery and the other DC-connected equipment. Cable runs on-site must make use of the same cable type and size as supplied by the battery. For details on the cable size and type refer to Tables 1 and 2. In some instances, multiple cable lengths are used instead of using a larger cable to ensure easier routing and bending of cables in trunking.

Refer to the image below for the LiTE 2 detachable power connectors example.



Figure 4: Detachable Power Connectors Example

### Cable Routing and Connection

1. Route the cables through trunking or on a cable tray to the inverter.
2. Connect the positive and negative cables to the respective terminals on the inverter.
3. Use the inverter terminals as a junction point to link the charge controller(s) to the DC Bus.
4. If there are too many inverters and/or charge controllers to connect to the DC bus using the inverter terminals, install a DC connector box or enclosed busbar.
5. If multiple cables per pole are fitted, route them separately to separate equipment (inverters and charge controllers).
6. Ensure that any one of the cable pairs will not be overloaded.
7. Connect the cables for each pole to the battery.



The installer must consider the Short Circuit Current (SCC) when designing the busbar layout and other switchgear, particularly when connecting multiple batteries in parallel. The SCC rating can be found in the datasheet.

## 5.2 Grounding Instructions

For correct operation and safety, it is crucial to ground the LiTE 2 Commercial HV and HV+ frame correctly. Failure to do so may lead to communication issues and compromise the system's performance. Also, ensure that the inverter is grounded correctly.

Correct grounding is vital as it provides a safe path for stray or excess electrical current, and it reduces the risk of electrical shock caused by unexpected voltage build-up. A grounding sticker is provided on the battery, indicating the correct grounding point, as illustrated in the figure below.



Figure 5: Grounding Point Example

When grounding the frame, it is recommended to use a grounding cable with a minimum cross-sectional area of 16mm<sup>2</sup>, which must be connected to a correct earthing point.

### 5.3 Control Interface CAN

For controlling external devices, you will need to connect the CAN Bus control wiring that allows the Battery Management System inside the Freedom Won LiTE 2 to control and interface with these devices.

1. Use a CAT5e or CAT6 ethernet cable to connect the Battery Management System (BMS) inside the Freedom Won LiTE 2 to external devices.
2. Connect the ethernet cable to the RJ45 plug on the battery.
3. Ensure the external device (e.g., inverter or charge controller) is equipped with a CAN interface and a suitable method for connecting the CAN wires.
4. Program the Freedom Won LiTE 2 BMS with a CAN messaging profile specifically developed for the inverter or charge controller being used.
5. Refer to Table 4 for the pin configuration on the battery plug end to ensure the correct connection.
6. Connect the two required wires, CAN High and CAN Low, to enable communication between the BMS and external devices.

Refer to Table 4 for colour coding and pin configuration for the battery CAN Bus control cable.

Table 4: Colour Coding and Pin Configuration for Battery CAN Bus Control Cable

RJ45 Pin No.	Standard Ethernet Cable Colour	Wire Function
Pin 1 to 6		Not Connected
Pin 7	Brown/White	CAN High
Pin 8	Brown	CAN Low



There is no ground pin provided on the battery for the CAN Bus.

### 5.3.1 CAN Bus Control – Detailed Description

CAN is a widely used communication protocol in systems that involve multiple devices needing to report their status or send commands to others on the same network. The LiTE 2-unit BMS can transmit messages and commands using the CAN protocol to provide information to, and more importantly, control external devices. CAN offers significant versatility and enables simple installation, requiring only two wires for communication: CAN High and CAN Low.

For an inverter or charge controller to be controlled through CAN, it must first be equipped with a CAN interface and a suitable method for connecting the CAN wires. The LiTE 2 unit's Battery Management System (BMS) must be programmed with a CAN messaging profile tailored to the specific inverter or charge controller being used. This profile must be developed individually for each inverter model or model range. Freedom Won has developed CAN profiles for most common inverter brands on the market, details are available in the Freedom Won Inverter Compatibility Guide.

Freedom Won welcomes requests to develop BMS CAN profiles for additional inverters that are equipped with a CAN interface for BMS integration.

The CAN interface can provide the following functionality to compatible devices:

- Charge Current Limit of all LiTE 2 units connected
- Discharge Current Limit of all LiTE 2 units connected
- Actual State of Charge (minimum of all LiTE 2 units connected)
- Actual Battery Temperature (highest of all LiTE 2 units connected)
- Actual Voltage
- Actual Current (total of all LiTE 2 units connected)
- Maximum real-time charge voltage setpoint
- Battery Name
- Highest Cell Voltage of all LiTE 2 units connected
- Lowest Cell Voltage of all LiTE 2 units connected

- Firmware Version
- Ah capacity of all LiTE 2 units connected
- Advanced communication between all connected LiTE 2 units

The CAN 2.0 Part A and Part B standard uses the SAE J1939 standard in the LiTE 2 unit. It is necessary to install a 120Ω resistor on each end of the CAN cable (splices do not require a resistor). Most devices operating on CAN have two plugs to connect in and then out again on the CAN Bus. The first and the last device in the chain must have a termination resistor plugged into the spare (second) plug. The LiTE 2-unit resistor plugs are available from the inverter manufacturer and Freedom Won. Where one LiTE 2 unit is installed or where it is the end-of-line CAN device, the LiTE 2 unit must be fitted with a termination resistor.

The LiTE 2 unit is supplied with a termination resistor as standard. Other devices must be equipped with the correct termination resistor for that specific brand, as the pin configuration may differ from the battery plug. The third-party device manuals must be referenced for all details regarding connecting the CAN interface. Most brands use 500kbps. If 250kbps is required, it is available on LiTE 2 units with a specific profile loaded, which must be requested when ordering the unit or can be loaded during commissioning by your distributor for Freedom Won technical support.

If you did not purchase a CAN Bus cable to suit your inverter you can make your own according to Table 5. Fig 6 provides the standard colour coding for an ethernet cable. If your inverter brand is not listed here refer to the online compatibility guide.

## 5.3.2 CAN Interface Configuration and Termination Requirements

### 5.3.2.1 Termination Resistors

Most devices operating on CAN have two plugs to connect in and out again on the common CAN Bus. The first and last device in the chain must have a termination resistor plugged into the spare (second) plug.

### 5.3.2.2 Termination Resistor Installation

- For devices with two CAN plugs (e.g., SMA, Imeon, Solax, and Victron), a termination resistor must be plugged into the spare plug on the first and last device in the chain.
- For devices with a separate CAN terminal block (e.g., ATESS), an internal resistor is fitted into the device.
- All Freedom Won LiTE 2 models have two CAN plugs for parallel configurations and allow the fitment of termination resistors on end-of-line units.
- When a single LiTE 2 is installed or is the end-of-line CAN device, a termination resistor must be fitted by plugging an RJ45 resistor into the second RJ45 socket on the battery.

### 5.3.2.3 Resistor Compatibility

- The resistor fitted to the battery must be the item manufactured by Victron, also available from Freedom Won.
- Termination resistors provided by other inverter brands (e.g., SMA) will not work for the battery end termination, only for the inverter end.
- These resistors are not supplied as standard with the battery and should be included in the order with Freedom Won.
- For Victron systems, the Victron Colour Control or Venus is supplied with 2 x termination resistors.
- For parallel LiTE 2 configurations installed on inverter systems where these resistors are not supplied, it is necessary to purchase two from Freedom Won.

### 5.3.2.4 CAN Bus Cable and Speed Requirements

Most brands use 500kbps. If 250kbps is required, it is available on the LiTE 2 with a specific profile loaded and should be requested in the order.

This can, however, be changed at any stage by updating the profile using a PC.

If you didn't purchase a CAN Bus cable for your inverter, you can use the details in Table 4. Figure 6 provides the standard colour coding for an Ethernet cable (note that there are other variations, so double-check this). Refer to Figure 6 for Pin Configuration for standard RJ45 plug.

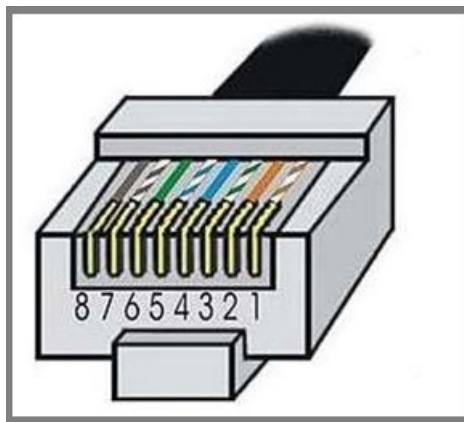


Figure 6: RJ45 Plug.

Refer to the Pin Configuration Table below for the CAN Bus Control Cable for various supported inverters.

Table 5: Pin Configuration for CAN Bus Control Cable

Wire Function	Standard LiTE 2 and Victron	SMA Sunny Island	Ingeteam, ATESS	Imeon	Solax	Goodwe	Sofar

CAN Low	Pin 8 (brown)	Pin 5 (blue/ white)	Labelled on inverter	Pin 2 (orange)	Pin 1 (orange/ white)	Pin 5 (blue/ white)	Pin 2 (orange)
CAN High	Pin 7 (brown/ white)	Pin 4 (blue)		Pin 1 (orange/ white)	Pin 2 (orange)	Pin 4 (blue)	Pin 1 (orange/ white)
		Bridge Pin 3 and Pin 6 on the Inverter end or cable with a 120Ω resistor					

If your inverter is not listed in the table, visit our website to download the compatibility guide for more information. Figure 7 provides a diagram showing how to connect a CAN cable between a Freedom Won battery and an inverter.

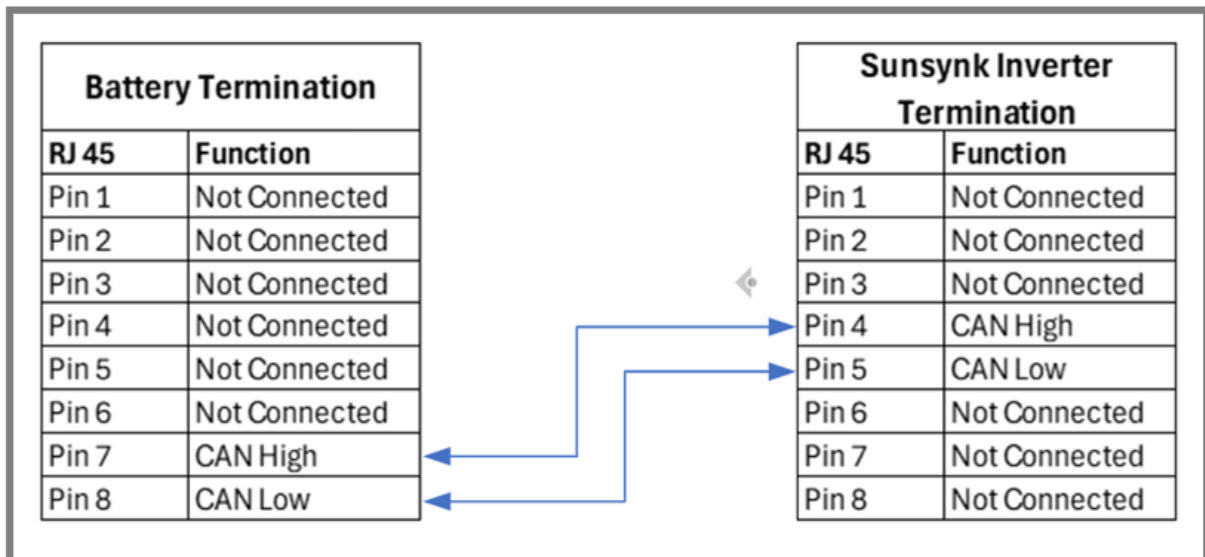


Figure 7: Pin CAN Cable Termination Example

## 5.4 Parallel Configurations

You can connect multiple LiTE 2 units of the same model size in parallel. However, it's generally more cost-effective to purchase a single, larger LiTE 2 model rather than connecting multiple smaller units. Connecting units in parallel is best reserved for situations where future expansion is anticipated, but financial constraints prevent purchasing a larger model upfront that meets expected future requirements.

The LiTE 2 batteries feature automatic configuration. When switched on, the first battery becomes the "master" unit. Any additional batteries turned on afterward will automatically assign themselves unique addresses and assume the role of "slaves." Up to 20 units can be connected in parallel. To ensure proper communication, all LiTE 2 units must be connected to the CAN Bus using a standard LAN cable.

When using the CAN Bus to control the inverter(s) and charge controller(s), the CAN Bus from any battery can be connected directly to the inverter or the system controller, depending on the product brand. The LiTE 2 is equipped with two RJ45 sockets (refer to Figure 8). On the last unit in the cable connection line, one socket is used for an end-of-line (termination) resistor, with the second RJ45 being used to connect to the next device, whether it be another battery, an inverter, a solar charge controller, or a system controller. On a unit connected to the communication line, both sockets are used to connect to other equipment. This connection method is referred to as a "daisy chain".

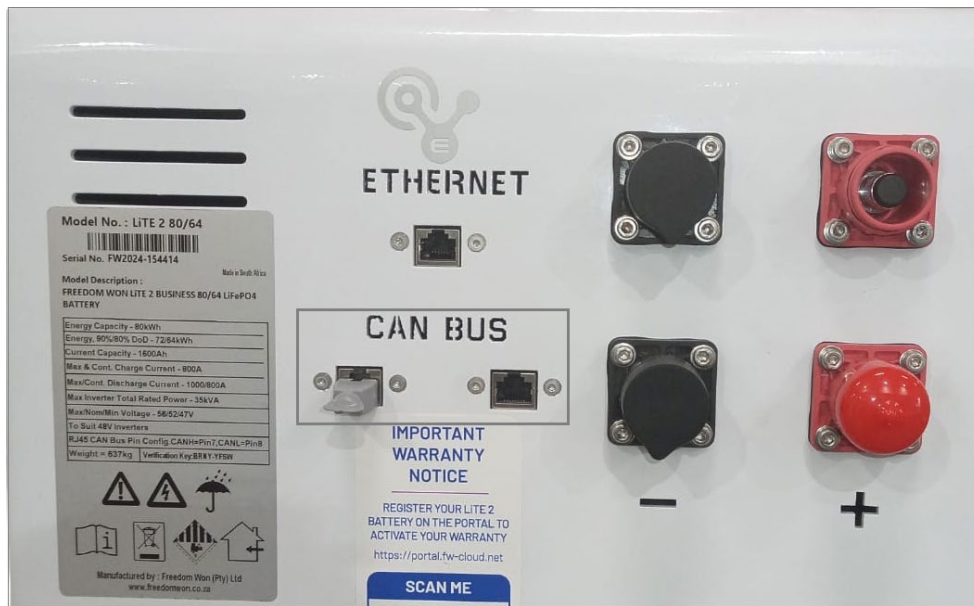


Figure 8: RJ45 Sockets

Figure 9 illustrates a typical parallel setup with multiple batteries and an inverter.

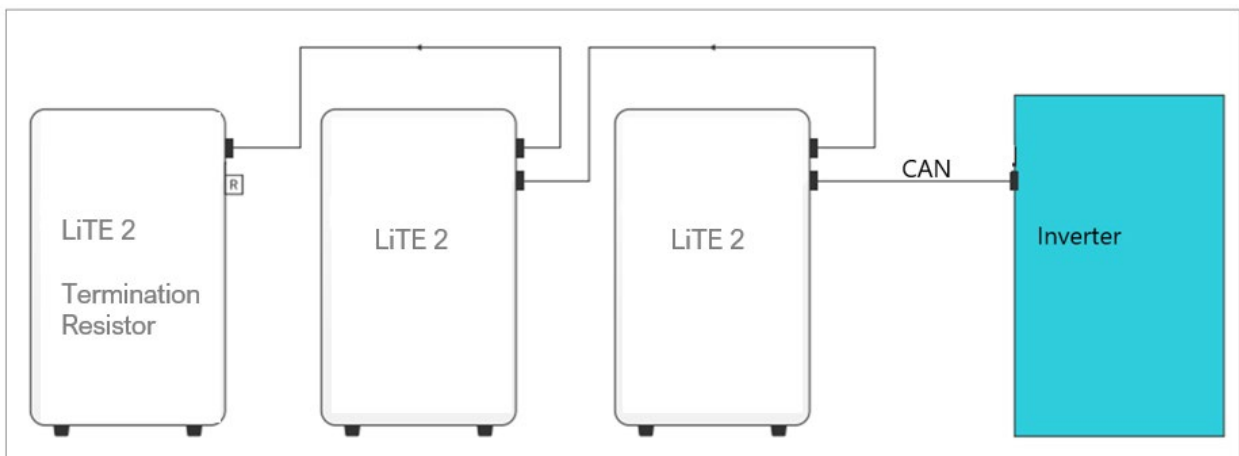


Figure 9: CAN Bus Parallel Connection Example

If the master LiTE 2 unit trips, one of the slaves will take over as the master automatically, without any interruption of service.

Freedom Won offers a fair trade-in on LiTE 2 units on the purchase of new units, which is an option for somebody wishing to expand their battery capacity instead

of installing parallel units. Please request more details from Freedom Won if this is your upgrade preference.

New units can be placed in parallel with old units up to about 4 years or 1 500 cycles, after which it is preferable to trade in for a new larger unit.

## 6 Programming the LiTE 2 unit

The BMS can be programmed with a PC through the Ethernet port using E-Connect and a standard Ethernet cable. Once the PC is connected to the BMS it is possible to set up the profile on the BMS and load new firmware. The computer must have the correct utility software installed.

It is also possible to program the profile on the battery remotely through the Freedom Won Portal.

Programming of the BMS is intended only as a function to be performed by Freedom Won and approved distributors and installers. The manual on how to operate the BMS along with the utility is available from Freedom Won. Write access to the BMS profile is password protected; however, users and owners may request read-only access.

### 6.1 Voltage Settings

If the BMS cannot control external devices via CAN Bus, conservative voltage settings are recommended to prevent outlying cells from reaching their voltage limits. A lower pack voltage for charging and a higher voltage for discharge allow for a greater spread in cell voltage values without exceeding limits. The BMS will balance out excessive cell voltage spreads using cell tap wires and internal circuitry.

If a cell voltage reaches its limit, the BMS will intervene by:

- Switching off a contactor on the AC in, AC out, or PV DC input
- Shutting down the main breaker on the battery

To minimize these occurrences, set voltages to:

- Minimum (cut off): 3V
- Low Battery Voltage Warning (if applicable): 3.18V
- Max Charge Voltage: 3.468V

### 6.2 Inverter Settings

A voltage can be set on the inverter to determine when grid power takes over from the battery, based on desired minimum battery State of Charge (SoC) and daily cycling depth. The recommended voltage for forcing the inverter back to grid power in a self-consumption setup is set on the Inverter, allowing the system to work in SOC percentages for transitioning between off-grid and on-grid modes.

## 6.3 Recommendations

1. Keep the system in battery-first mode for a month to allow the battery to balance out.
2. Avoid setting up charging voltages in the inverter.
3. For systems with an interface between the battery and the rest of the system, use SoC for controlling charge and discharge algorithms, as voltage-based control is only an approximation.

## 7 Startup and Shutdown

### 7.1 Start up the BMS

1. Press the "ON" button to switch on the BMS inside the battery.
2. Verify that the SoC display is operational and the SoC level is visible.
3. Check that the error light is not illuminated. If it is, contact Freedom Won.

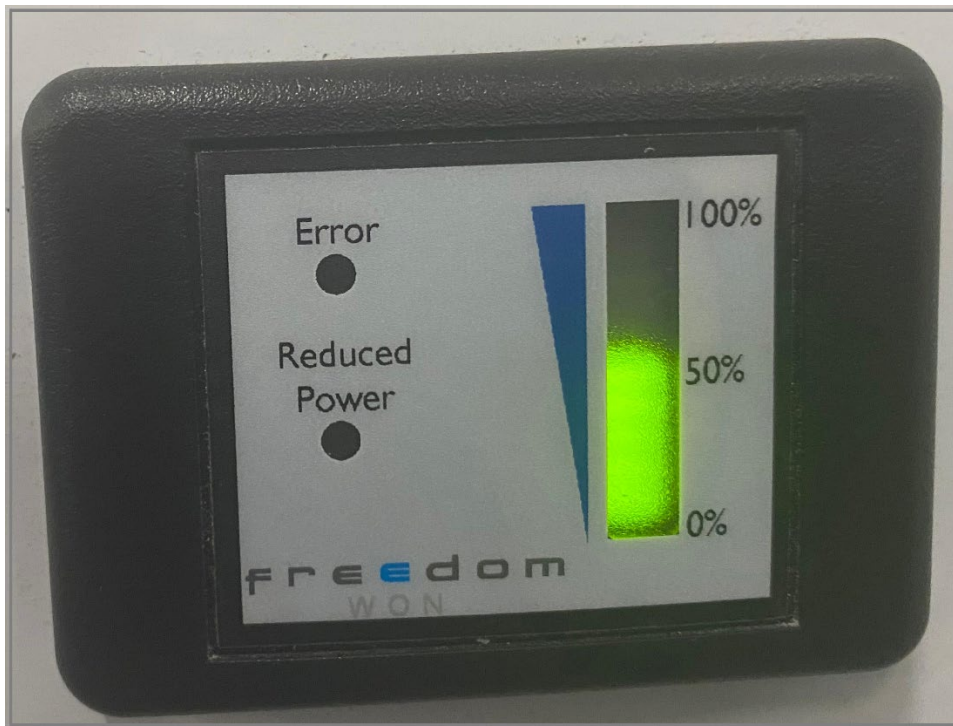


Figure 10: SOC Display



If the Reduced Power light is illuminated, it should extinguish after a few hours of operation.

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### 7.2 Switch On the Main Breaker

1. Ensure the DC cables are securely connected to their proper locations.
2. Verify that the rest of the system is ready to receive battery voltage.

3. Push the main breaker upwards to switch it on.



Some inverters may experience a large inrush current when switching on the DC supply, which may trip the battery breaker. If this occurs, immediately push down the breaker handle to reset it and attempt a second switch-on.

If the breaker trips again, it is likely due to a BMS error, and Freedom Won should be contacted for assistance.

## 7.3 Switching Off the LiTE 2

1. To switch off the DC output, pull down the circuit breaker.



Figure 11: Circuit Breaker

2. To switch off the power to the BMS, press the "OFF" button next to the "ON" button. This will also trip the breaker if it is still on.
3. The LiTE 2 must be fully switched off when not in use to prevent self-discharge.



Figure 12: "ON" and "OFF" Buttons

## 7.4 Restarting the LiTE 2 after a Low Voltage Trip

If the battery has been allowed to discharge to the critical low cut-out voltage the battery will trip the circuit breaker and switch itself off internally. This situation will only occur in the event of a malfunction of the charging system such as a generator that failed to start at the required time. In systems without a generator, the battery can be drawn critically low if the solar charging system does not function correctly.

To restart the battery, follow the following steps:

1. Switch off the AC output breaker in the inverter(s) to isolate the loads.
2. Ensure that there is either AC grid/generator power active on the AC input of the inverter(s) or if this is not available ensure the solar charge controllers are active.  
Note: For systems with only PV inverters and no generator this exercise becomes more involved – further discussion on this scenario below.
3. Press and hold the battery "Override" (OVRD) and "On" buttons at the same time.  
Note: the "Override" button prevents the breaker from tripping and hence must never be pressed for more than is necessary to get the system to begin charging.
4. Switch on the circuit breaker.
5. Observe whether current begins to flow into the battery by referencing the system controller interface. There may be a delay of up to 20 seconds before the charge current begins to flow. Ensure that during this delay period, the discharge current is only what is required to satisfy the inverter standby power.
6. Once a charge current is observed, ensure that the LiTE 2 error is not illuminated if you press the "Reset" button to extinguish it.
7. Then wait until the pack voltage rises to the correct level before releasing the "Override" and "On" buttons.

8. If the breaker trips and the battery Switches Off, try pressing the "ON" button for 3 seconds. If the battery still switches off, try steps 2-7 again. If the battery still refuses contact Freedom Won for assistance.

If there is no AC input source for the inverters, and when only PV inverters are installed, it is necessary to activate the inverters from their standby mode, which is induced by the battery. To achieve this, one possible method is to disconnect the CAN Bus cable from the battery. If this approach is unsuccessful, an alternative solution is to connect a PC to the battery to re-enable the inverters, allowing them to utilise the PV inverters for battery charging. If this issue is not resolved, it is recommended to contact Freedom Won for further assistance.

## 8 Warranty and Repair

The LiTE 2 unit is sealed with a temper-proof warranty seal. It may not be opened by anyone other than Freedom Won and installers or repairers that have been explicitly approved by Freedom Won. The warranty on the unit will be void if the seal is damaged or missing.

If the LiTE 2 unit indicates an internal problem, contact Freedom Won or the installer. Freedom Won will arrange for it to be inspected and repaired.

The warranty does not cover damage to the control wiring caused by excessive current draw or any damage resulting from lightning strikes. Damage to the battery housing, and external and internal fittings, resulting from physical impact, such as being dropped or colliding with other objects, is excluded from warranty coverage.

The standard warranty period is 10 years or 6,000 cycles at an average of 80% DoD, whichever should first occur. The battery is required to provide at least 60% of its new capacity at the end of this period or cycle count. The BMS records the number of cycles used. If you suspect that your LiTE 2 unit is delivering substantially below its minimum performance, please contact Freedom Won for an investigation. If the unit is found to be underperforming, it will be serviced such that the minimum performance guarantee is again restored. Freedom Won may arrange at their discretion for on-site service or request delivery of the unit to Freedom Won for servicing at our facility. This will be mostly determined by the geographic location, ease of access for removal of the unit, and size of the unit. Note that the warranty does not cover shipping and transport costs.

For more detailed warranty information please refer to the warranty on the Freedom Won website.



This warranty applies to LiTE 2 units sold after 1 April 2024. For LiTE2 units sold prior contact Freedom.

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## 8.1 Surge Protection

It is recommended to install surge protection on any storage solution purchased from Freedom Won to safeguard the battery and Battery Management System (BMS) from voltage spikes.



The warranty does not cover damage caused by surges or lightning strikes.

Below is an example of a surge protection product that can be used for this purpose, the part number for this product is MIM-NID. Similar surge protection devices that offer comparable protection and performance levels to the Mimosa device are also acceptable.



Figure 13: Mimosa Surge Arrestor (Network Interface Device)

## 8.2 Expected Product Life

LiTE 2 models are designed for optimal life cycle cost, LiTE 2 models are expected to operate for about 16 years in a daily cycling scenario for more than 6000 cycles. The defined end of life in this instance occurs when the battery capacity falls to 60% of the new capacity.

LiTE 2 models are expected to operate for about 16 years in a daily cycling scenario for more than cycles with an average of 80% DoD. To ensure optimal product lifetime it is essential to cycle the battery regularly. Battery degradation is worse if kept at full charge for long periods

For applications where the cost per kWh delivered by the battery during its lifetime is of

prime importance (i.e. maximum return on investment) we recommend that the battery be sized for an average cycle discharge of 50–60% DoD. In a daily cycling scenario such as for optimal solar self-consumption and off grid systems the expected service life is then 20 years or more than 7500 cycles. The defined end of life in this instance occurs when the battery capacity falls to 60% of the new

## 9 Troubleshooting Guide

For most issues with the Freedom LiTE, refer to the troubleshooting Table below for solutions. If the issues persist after referring to Table 6, contact your authorised Freedom Won supplier for further assistance.

Table 6: Troubleshooting Guide (Applicable to units with On and OFF buttons)

No	Issue	Cause/Solution
1	The Freedom Won LiTE 2 Commercial has no voltage on the main output cables.	<ol style="list-style-type: none"> <li>1. Check that the main breaker switch is activated.</li> <li>2. Note that this switch should only be turned on after you have confirmed the completion of the installation and ensured that there are no DC or control wires that could potentially short-circuit or contact the ground or other wires.</li> <li>3. Ensure that you are prepared to receive AC voltage on the inverter output before activating this breaker.</li> <li>4. Confirm that the Battery Management System (BMS) has been energised by pressing the "ON" button for 3 seconds, as indicated by the illumination of the lights on the State of Charge (SoC) display.</li> <li>5. Ensure if the battery has detachable connectors that they are fully seated.</li> </ol>
2	The BMS SoC display does not illuminate after pressing the ON button.	<p>First, switch off the AC output breaker to prevent the inverter from supplying loads from the battery. Investigate the following potential causes:</p> <ol style="list-style-type: none"> <li>1. Error light on the BMS: Check if the red error light is illuminated on the SOC display when the ON button is held. <ul style="list-style-type: none"> <li>• Reset the error by pressing the RESET button for approximately 2 seconds while holding the ON button. This should clear the error and allow the BMS to remain operational after releasing the ON button.</li> </ul> </li> <li>2. Critically low battery level: Disconnect all potential loads from the battery and switch off the inverter(s). Then, activate the BMS. If it fails to stay on contact Freedom Won further instructions.</li> <li>3. Critically high voltage level: Allow the battery to rest for an hour, which should enable the cell levels to</li> </ol>

		<p>decrease to acceptable levels, allowing the BMS to be switched on again.</p> <ol style="list-style-type: none"> <li>4. Ensure the Emergency Stop button is released if installed.</li> <li>5. If the BMS still fails to activate, contact Freedom Won or an Authorised Distributor for assistance.</li> </ol>
3	The main breaker switch keeps tripping each time I attempt to switch it on.	<p>There are several potential causes:</p> <ol style="list-style-type: none"> <li>1. The Battery Management System has not been switched on. The ON button must be pressed for 3 seconds. On release the SoC Display must remain illuminated.</li> <li>2. High inrush current on certain inverters – First preference is to pre-charge the DC bus by switching on the solar charge controllers if present and in the daytime. If this is not possible switch on the AC feed into the inverter and switch on the inverter. Some inverter makes will then pre charge the DC bus. If this is also not possible (off-grid with no generator), try to close the breaker twice in quick succession – the second attempt must be within a second, before the inverter capacitors discharge again. This reduces the inrush current on the second closing attempt. If this does not work after the second attempt investigate the other options.</li> <li>3. Short circuit on the DC Bus or faulty inverter or MPPT causing high currents.</li> <li>4. In a system with multiple LiTE 2s in parallel the reason could be that the battery you are trying to switch on is at a different voltage to the others – the voltages must be similar (within 2V of each other) on all batteries when switching them onto a common DC bus.</li> </ol> <p>If none of the above solves the problem, you will need to contact Freedom Won or your authorised installer for assistance with this issue.</p> <p>It will be necessary to establish the reason for the error before continuing with the normal operation of the system.</p> <p>Note! Repeated unnecessary tripping will damage the breaker.</p>
4	The main battery breaker is switched off to prevent discharge of the battery, but the SOC display lights are still on.	The BMS and SoC display receive power directly from the battery and therefore the "OFF" Button must be pressed to switch off the internal electronics.

5	The inverter will not come on even though the inverter switch is "ON".	<p>The enable command may not be coming from the BMS or may not be properly connected to the inverter or the inverter may not be properly configured to deal with the enable command.</p> <p>If you are running on a CAN Bus control with a compatible inverter and you are not observing the correct enable response from the inverter check that the CAN High and CAN Low wires are connected properly (ensure that you have the High and Low the right way around and that you have connected the two end of line 120 Ohm resistors in the applicable places. If this is not the problem, then you need to confirm that you have the right CAN profile programmed onto the BMS for the inverter in use (baud rate or CAN messages may be for another inverter brand) or that you have configured the inverter or system controller correctly. Contact Freedom Won or your Authorised Distributor for assistance</p>
6	The charger will not come on even though there is power on the AC input of the inverter and the charger is activated in the inverter settings	<p>The battery might be full. Try discharging the battery for a while and observe if the charger then comes on. If not, then the fault-finding process is similar to the above.</p>
7	The Freedom Won LiTE 2 error light keeps illuminating after each reset	<p>If the battery voltage is within limits this should not ordinarily occur. Contact Freedom Won or an approved installer for assistance with determining the problem. If the main breaker does not trip it is not a critical error, and you may continue using the battery while you make contact for assistance.</p>
8	The pack voltage is within limits, but the main breaker still trips seemingly at random	<p>This could be caused by many things but is most likely because the current draw is exceeding the battery current limit setting.</p> <p>Measure the current with a tong tester while drawing your maximum typical load to determine if you are exceeding the rated current for the respective Freedom Won LiTE 2 model.</p> <p>If it is not the current causing the trip it could be a weak cell, faulty breaker, or extreme temperature of the surroundings. All are unlikely but can happen. If the problem persists, contact Freedom Won.</p>

## 10 List of Abbreviations

A - Ampere

UPS - Uninterruptible Power Supply

DoD - Depth of Discharge

SoC - State of Charge

kWh - Kilowatt Hour

KvA - Kilo-Volt-Amperes

LED - Light-Emitting Diode

BMS - Battery Management System

RJ - Registered Jack

RS - Recommended Standard

PSCC - Prospective Short Circuit Current

PE - Protective Earth

DC - Direct Current

USB - Universal Serial Bus

CAN - Controller Area Network

SCC - Solar Charge Controller

V - Voltage

AC - Alternating Current

MPPT - Maximum Power Point Tracking

CB - Circuit Breaker

GX - Gateway eXtreme