

# A High Voltage Li-ion Battery System

## User Manual

LFP 9~30kWh/HV



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WUXI SUNKET NEW ENERGY TECHNOLOGY CO.,LTD V1.1

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# 1. Information on this Document

## 1.1. Validity

This document is valid for the Stacked high voltage lithium battery LFP9-30kWh/HV.

## 1.2. Target Group

The instructions in this document may only be performed by qualified persons who must have the following skills:

- Knowledge of how batteries work and are operated
- Knowledge of, and adherence to the locally applicable connection requirements, standards, and directives
- Knowledge of, and adherence to this document and the associated system documentation, including all safety instructions
- Training in dealing with the hazards associated with the installation and operation of electrical equipment and batteries
- Training in the installation and commissioning of electrical equipment

Failure to do so will make any manufacturer's warranty, guarantee or liability null, and void unless you can prove that the damage was not due to non-compliance.

## 1.3. Content and Structure of this Document


This document contains safety information and instructions, scope of delivery, system overview, installation, electrical connection, commissioning, decommissioning, expansion, troubleshooting, maintenance and storage, disposal, and technical data. Please finish reading this document before taking any actions on the battery system.

## 1.4. Declaration of Conformity

The battery system described in this document complies with the applicable CE/EMC directive. The certificate is available in the download area at [sunketpower.com](http://sunketpower.com).

## 1.5. Levels of Warning Messages

The following levels of warning messages may occur when handling the battery system.

 <b>DANGER</b>
Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
 <b>WARNING</b>
Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

**⚠ CAUTION**

Indicates a hazardous situation which, could result in minor or moderate injury.

**NOTICE**

Indicates a situation which, if not avoided, can result in property damage.

## 1.6 Symbols in the Document

**⚠ QUALIFIED PERSON**

Sections describing activities to be performed by qualified persons only.

## 1.7. Designation in the Document

Designation in this document	Complete designation
Battery system	LFP9-30kWh/HV
BCU	Battery Control Unit
BMS	Battery Management System
BMU	Battery Module Unit
SUNKET	WUXI SUNKET NEW ENERGY TECHNOLOGY CO.,LTD
SOC	State of Charge

## 2. Safety

### 2.1. Intended Use

The battery system is for residential and works with a photovoltaic system. It is a high voltage Li-ion battery storage system, with the control module on itself. It could be operated in on-grid, off-grid and backup modes with compatible inverters.

The battery system could be connected to the Internet through network cable for maintenance and firmware updating.

The battery system must only be used as stationary equipment.

The battery system is suitable for indoor and outdoor use under the conditions mentioned in Section 5.1.

The battery system must only be operated in connection with a compatible inverter.

The battery system is not suitable for supplying life-sustaining medical devices. Please ensure that no personal injury would lead due to the power outage of the battery system.

Alterations to the battery system, e.g., changes or modifications are not allowed unless the written permission of SUNKET is achieved. Unauthorized alterations will void the guarantee and warranty claims. SUNKET shall not be held liable for any damage caused by such changes.

The type label should always be attached to the battery system.

### 2.2. IMPORTANT SAFETY INSTRUCTIONS

The battery system has been designed and tested in accordance with international safety requirements. However, in order to prevent personal injury and property damage and ensure long-term operation of the battery system, please do read this section carefully and observe all safety information at all times.

#### 2.2.1. Battery Module Leakage

If the battery modules leak electrolytes, contact with the leaking liquid or gas should be avoided. The electrolyte is corrosive, and the contact may cause skin irritation and chemical burns. If one is exposed to the leaked substance, do these actions:

Inhalation: Evacuate the contaminated area, and seek medical help immediately.

Eye contact: Rinse eyes with flowing water for 15 minutes and seek medical help immediately.

Skin contact: Wash the affected area thoroughly with soap and water and seek medical help immediately.

Ingestion: Induce vomiting and seek medical help immediately.

## 2.2.2. Firefighting Measures

The battery modules may catch fire when it is put into the fire. In case of a fire, please make sure that an ABC or carbon dioxide extinguisher is nearby. Water cannot be used to extinguish the fire.

Full protective clothing and self-contained breathing apparatus are required for the fire fighters to extinguish the fire.

## 2.2.3. Battery Modules Handling and Storage Guide

- The battery modules and its components should be protected from damage when transporting and handling.
- Do not impact, pull, drag, or step on the battery modules.
- Do not insert unrelated objects into any part of the battery modules.
- Do not throw the battery module into a fire.
- Do not soak the battery modules in water or seawater.
- Do not expose to strong oxidizers.
- Do not short circuit the battery modules.
- The battery modules cannot be stored at high temperatures (more than 50°C or 122°F).
- The battery modules cannot be stored directly under the sun.
- The battery modules cannot be stored in a high humidity environment.
- Do not use the battery modules if it is defective, or appears cracked, broken or otherwise damaged, or fails to operate.
- Do not attempt to open, disassemble, repair, tamper with, or modify the battery modules. The battery modules are not user-serviceable.
- Do not use cleaning solvents to clean the battery modules.

## 2.2.4. Warning of Electric Shock

### DANGER

#### **Danger to life due to electric shock when live components or DC cables are touched**

The DC cables connected to an inverter may be live. Touching live DC cables results in death or serious injury due to electric shock.

- Disconnect the battery system and inverter from voltage sources and make sure it cannot be reconnected before working on the device.
- Do not touch non-insulated parts or cables.
- Do not remove the terminal block with the connected DC conductors from the slot under load.
- Wear suitable personal protective equipment for all work on the battery system.
- Observe all safety information of the inverter manufacturer.

## 2.2.5. Warning of Overvoltages

### DANGER

#### **Danger to life due to electric shock in case of overvoltages and if surge protection is missing**

Overvoltages (e. g. in the event of a flash of lightning) can be further conducted into the building and to other connected devices in the same network via the network cables or other data cables if there is no surge protection. Touching live parts and cables results in death or lethal injuries due to electric shock.

- Ensure that all devices in the same network and the inverter are integrated into the existing surge protection.
- When laying the network cables or other data cables outdoors, it must be ensured that a suitable surge protection device is provided at the transition point of the cable from the battery system or the inverter outdoors to the inside of a building.
- The Ethernet of the inverter is classified as "TNV. 1" and offers protection against overvoltage of up to 1.5kV.

## 2.2.6. Caution of Weight

### CAUTION

#### **Risk of injury due to weight of the battery module**

Injuries may result if the battery module is lifted incorrectly or dropped while being transported or installed.

- Transport and lift the battery module carefully. Take the weight of the battery module into account.
- Wear suitable personal protective equipment for all work on the battery system.



## 2.2.7. Notice of Property Damage

### NOTICE

#### **Damage to the BCU due to sand, dust and moisture ingress**

Sand, dust and moisture penetration can damage the BCU and impair its functionality.

- Only open the BCU if the humidity is within the thresholds and the environment is free of sand and dust.

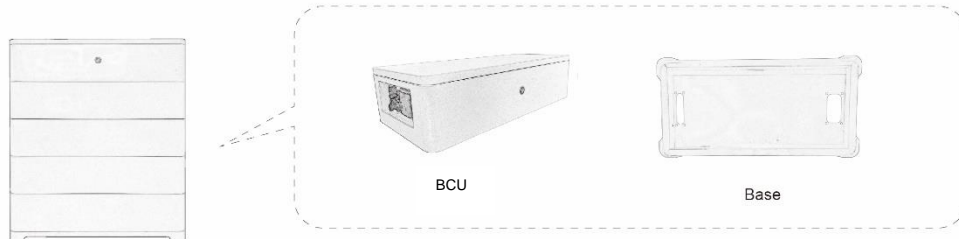
### NOTICE

#### **Damage to the battery system due to under voltages**

- If the battery system doesn't start at all, please contact SUNKET local after-sales service within 48 hours. Otherwise, the battery could be permanently damaged.

### 3. Scope of Delivery

#### BCU and Base Package



Grounding Cable  
(Length: 80cm)



(+) Power Cable  
(Length: 150cm)



(-) Power Cable  
(Length: 150cm)



Communication Cable  
(Length: 150cm)



Rubber Ring  
(Model: SC10-8)



User Manual

#### Battery Module Package

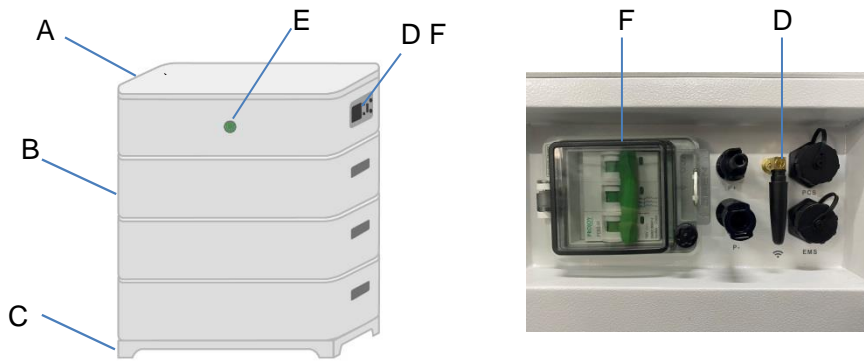


Battery Module x 1

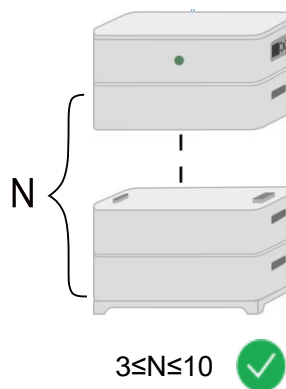
# 4. Battery System Overview

## 4.1. Battery System Description

The LFP9-30kWh is used as a connected battery for the intermediate storage of excess PV energy in an inverter system.














A	BCU
B	Battery Module Unit
C	Base
D	WIFI Module
E	LED Button
F	Air Switch



Three to ten modules could be stacked in one tower.

## 4.2. Symbols on the System

Symbol	Explanation
	Observe the documents Observe all documents supplied with the system.
	Grounding conductor This symbol indicates the position for connecting a grounding conductor.
	WEEE designation Do not dispose of the system together with the household waste but in accordance with the disposal regulations for electronic waste applicable at the installation site.
	This side up
	Handle with care
	Keep dry
	Keep the battery modules away from open flame or ignition sources
	Beware of electrical voltage
	Beware of a danger zone This symbol indicates that the system must be additionally grounded if additional grounding or equipotential bonding is required at the installation site.
	Keep the battery modules away from children
	Do not short circuit



## RECHARGEABLE LITHIUM BATTERY

Single Module Energy	2.88kWh	Single Module Voltage	45~65.7Vd.c
Nominal voltage of single module	57.6Vd.c	Max. Charge Current	25A
Maximum charging voltage of module	65.7Vd.c	Max. Discharge Current	50A
Battery Pack Capacity	50Ah	Temperature of charge	0°C~60°C
Temperature of discharge	-30°C~60°C	Maximum number of stacks	10
Protective class	I	IP rating	IP54



## RECHARGEABLE LI-ION BATTERY SYSTEM

System Model	Normal Voltagee	Operating Voltagee	Rated Capacitye	Product Model
LFP 9kWh/HV	172.8Vdc	135-197.1Vdc	8.64kWh	LFpP21/115/105/[(2P18S)*3S]M/-20+45/95
LFP 12kWh/HV	230.4Vdc	180-262.8Vdc	11.52kWh	LFpP21/115/105/[(2P18S)*4S]M/-20+45/95
LFP 15kWh/HV	288Vdc	225-328.5Vdc	14.40kWh	LFpP21/115/105/[(2P18S)*5S]M/-20+45/95
LFP 18kWh/HV	345.6Vdc	270-394.2Vdc	17.28kWh	LFpP21/115/105/[(2P18S)*6S]M/-20+45/95
LFP 21kWh/HV	403.2Vdc	315-459.9Vdc	20.16kWh	LFpP21/115/105/[(2P18S)*7S]M/-20+45/95
LFP 24kWh/HV	460.6Vdc	360-525.6Vdc	23.04kWh	LFpP21/115/105/[(2P18S)*8S]M/-20+45/95
LFP 27kWh/HV	518.4Vdc	405-591.3Vdc	25.92kWh	LFpP21/115/105/[(2P18S)*9S]M/-20+45/95
LFP 30kWh/HV	576Vdc	450-657Vdc	28.80kWh	LFpP21/115/105/[(2P18S)*10S]M/-20+45/95
Rate Energye	50Ah	Charging Temperaturee	0-50 °C	
Max.Charge/Discharge Currente	25/50A	Discharging Temperaturee	-20-50 °C	
Maximum number of stacks	10	IP rating	IP54	
Protective class	I			



### RECHARGEABLE LI-ION BATTERY SYSTEM LFP3000/HV



- Do not disassemble the battery pack.
- Do not immerse the battery pack in water.
- Do not short-circuit the battery.
- Do not leave the battery near by fire.
- The battery should be disposed by qualified recycling agent.



### 4.3. LED Signals

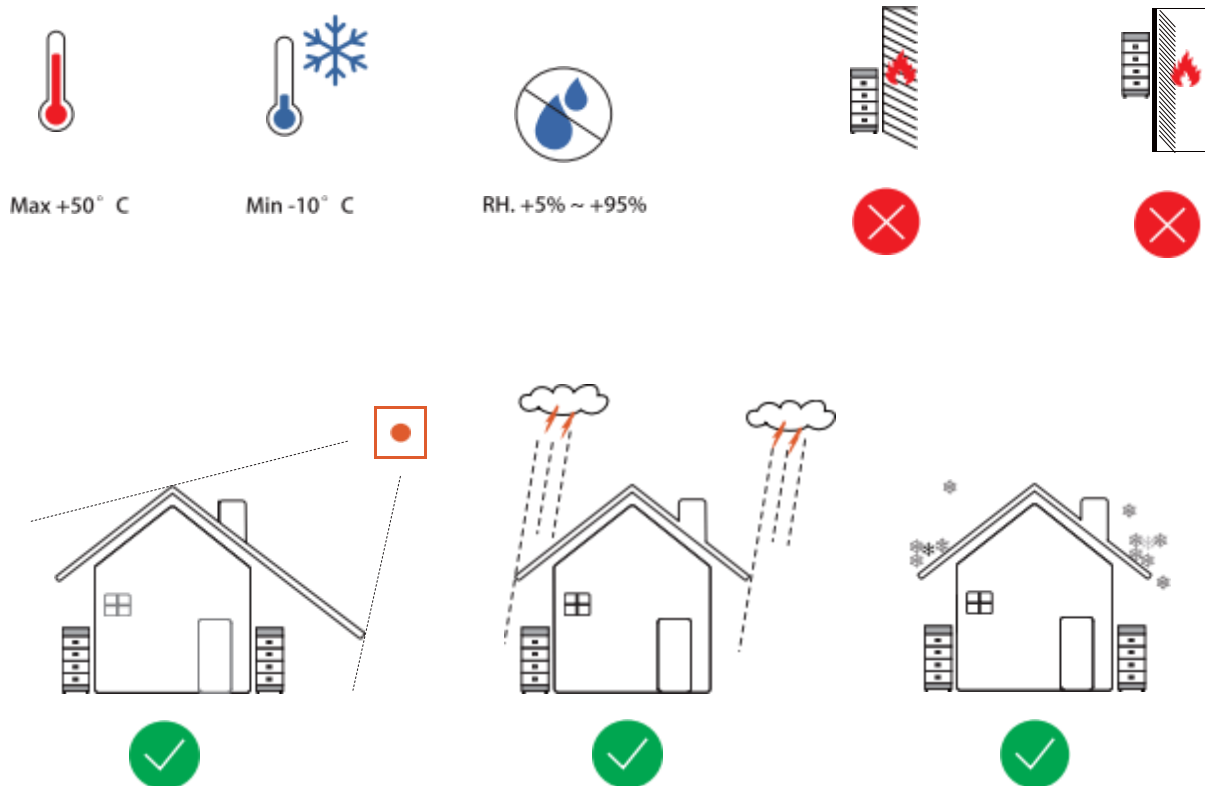
The red light is always on	$0 < \text{SOC} < 30\%$
The green light is always on	$30\% \leq \text{SOC} < 60\%$
The yellow light is always on	$60\% \leq \text{SOC} < 100\%$
The yellow light flashing	Alarm
The red light flashing	Fault

# 5. Installation

## 5.1. Requirements for Installation

### 5.1.1. Requirements for Installation Location

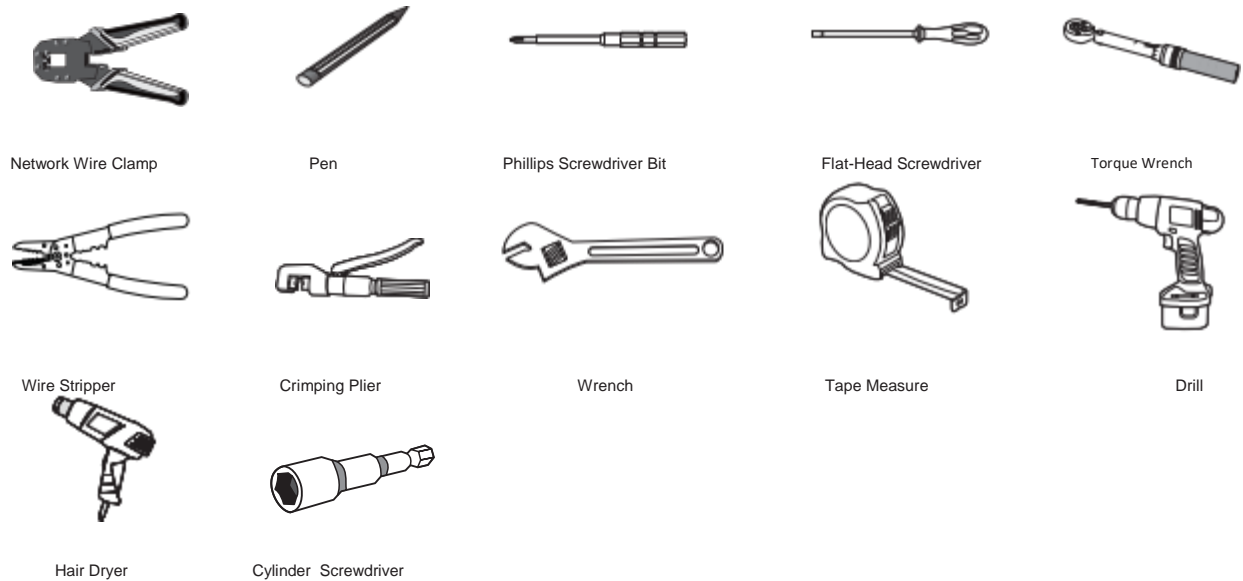
- a) A solid support surface must be available (e.g., concrete or masonry).
- b) The installation location must be inaccessible to children.
- c) The installation location must be suitable for the weight and dimensions of the battery system.
- d) The installation location must not be exposed to direct solar irradiation.
- e) The installation location must not be close to the fire.
- f) The altitude of the installation location should be less than 9843 ft.
- g) The ambient temperature should be between -10 to 50°C or 14 to 122°F.
- h) The ambient humidity should be between 5-95%.





### 5.1.2. Tools

The tools in the following table could be needed during the installation.



### 5.1.3. Safety Gear

Wear the following safety gear when dealing with the battery system.



## 5.2. Installation

### QUALIFIED PERSON

### DANGER

**Danger to life from electric shock due to live DC cables or connectors at the battery system**  
The DC cables connected to the battery system may be live. Touching the DC conductors or the live components leads to lethal electric shocks.

- Do not touch non-insulated cable ends.
- Ensure that the inverter is disconnected from all voltage sources.

### CAUTION

**Risk of injury due to weight of the battery module**

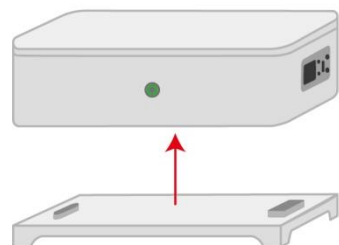
Injuries may result if the battery module is lifted incorrectly or dropped while being transported or installed.

- Transport and lift the battery module carefully. Take the weight of the battery module into account.
- Wear suitable personal protective equipment for all work on the battery system.

1. Take the BCU and base from the package out.

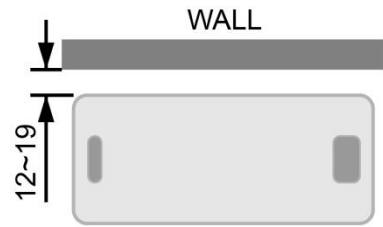


2. Take the BCU from the base.

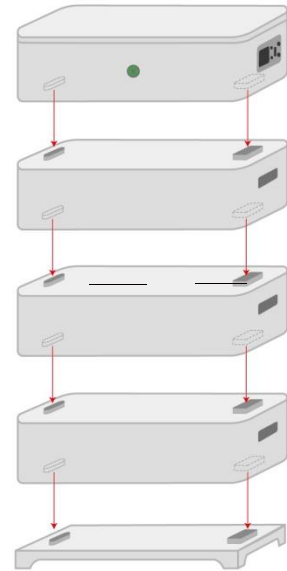




- Put the installed base and feet along the wall, and keep the distance of 12~19 mm (15/32 to 3/4 in) between the wall and the base.



- Take a battery module from the package out. Put one battery module on the base. Pay attention to the direction of the module. The blind-mating connectors on the battery module and the base should be on the same side.



- Repeat the operations for other battery modules.



- Make sure the ports of each module are firmly fixe

## NOTICE

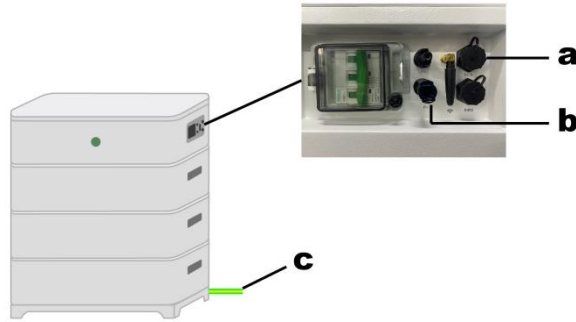
### Damage to the battery system due to under voltages

- If the battery is installed, it should be set into operation within a month, or checked regularly, otherwise there might be damage to the batteries.

# 6. Electrical Connection

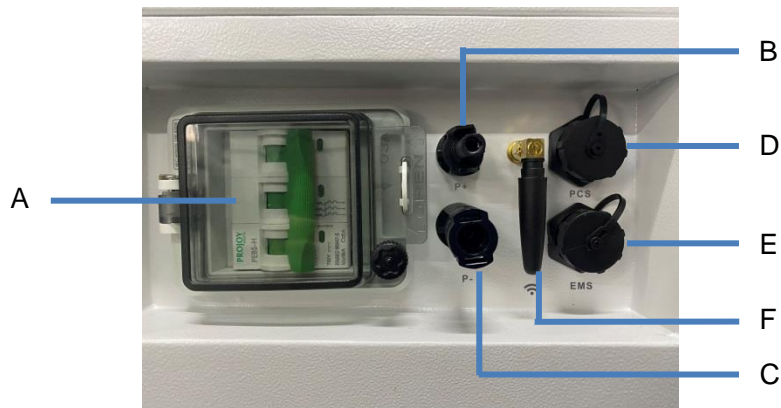
## 6.1. Overview of the Connection Area

Exterior view



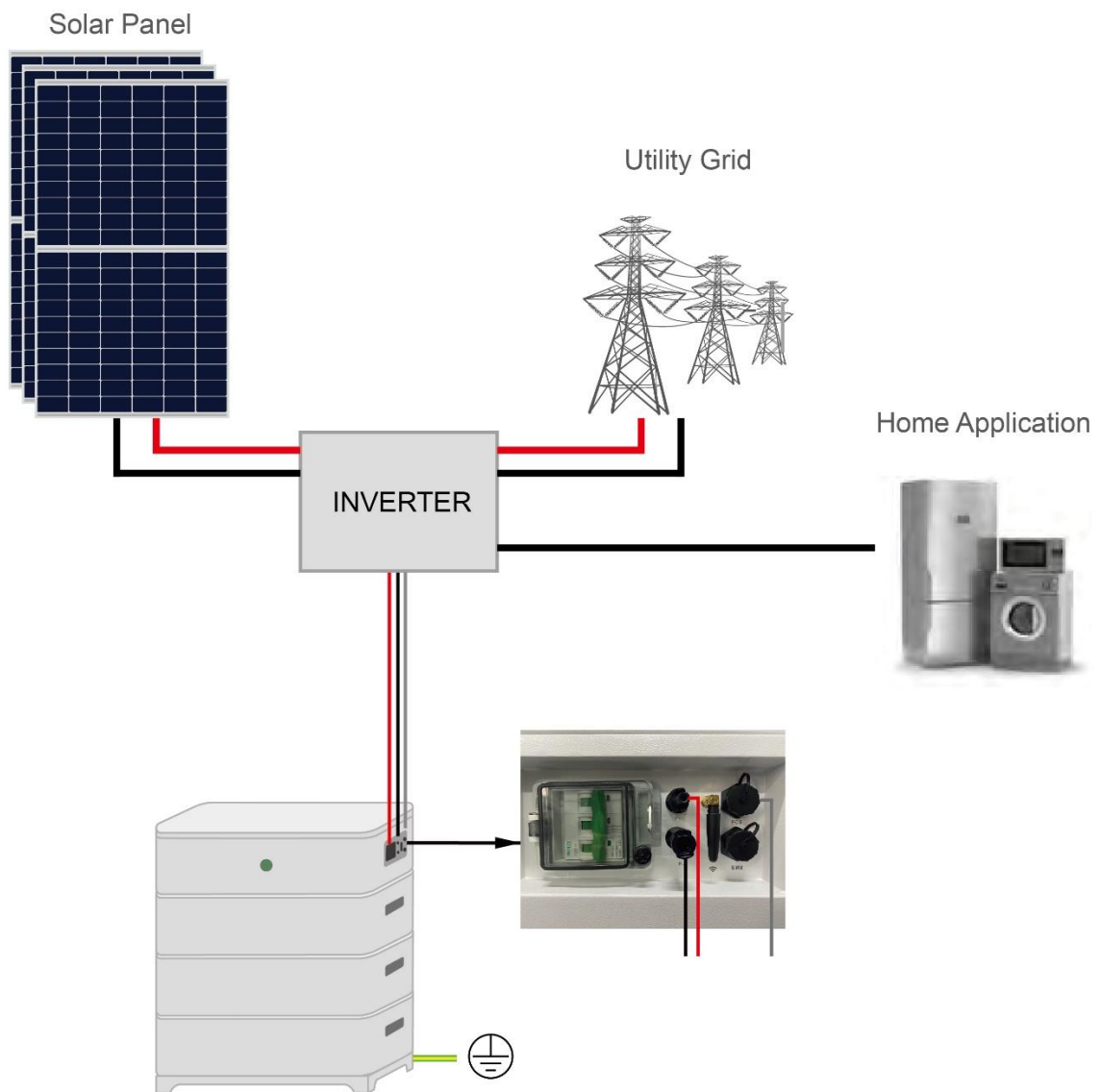
a	PCS CAN communication between battery and inverter
b	power cable connection between battery and inverter
c	Terminal connect to ground

Interior View



A	Air switch
B	DC+ to inverter
C	DC- to inverter
D	Communication with battery
E	Communication with computer
F	WIFI Module

## 6.2. Connection Diagram



## 6.3. PE DC and Communication Cables Connection

### ⚠ QUALIFIED PERSON

### ⚠ DANGER

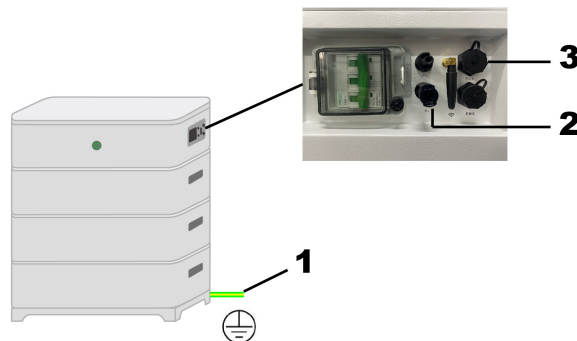
**Danger to life from electric shock due to live DC cables or connectors at the battery system**

The DC cables connected to the battery system may be live. Touching the DC conductors or the live components leads to lethal electric shocks.

- Ensure that all the inverters is disconnected from all voltage sources.
- Do not touch non-insulated cable ends.

Procedure:

- 1.A After the battery is installed, connect the ground wire to the ground with screws on positive and negative terminals
- 2.I Insert the DC connector into the side of the BCU. Make sure that the poles are connected correctly
3. Unscrew the cover of the PCS port on the side of the BCU and plug it into the cable that communicates with the inverter



## 6.4. The Data Cable Connection to Inverter

### **⚠ QUALIFIED PERSON**

Data cable requirements:

The cable length and quality affect the quality of the signal. Observe the following cable requirements.

Cable category: Cat5, Cat5e or higher

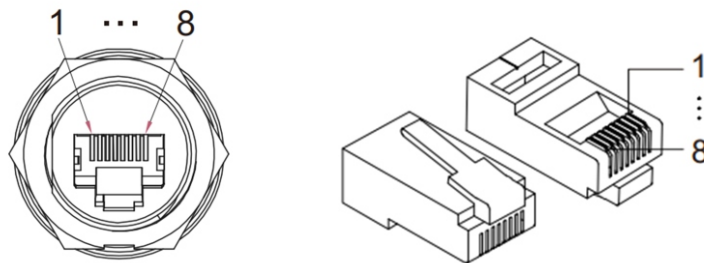
Plug type: Metal shielded RJ45 of Cat5, Cat5e or higher

Shielding: Yes

UV-resistant for outdoor use

Straight-through wired cables

Maximum cable length: 10 m/ 32.8 ft



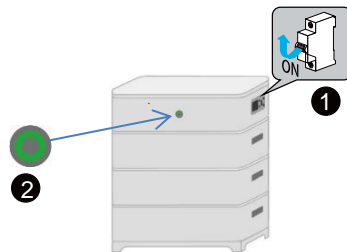
No.	BCU	Color
1	RS485_A	White orange
2	RS485_B	Orange
3	/	White green
4	CAN_H	Blue
5	CAN_L	White blue
6	/	Green
7	/	White brown
8	/	Brown



## 7. Operation

### 7.1. Switch on the Battery System

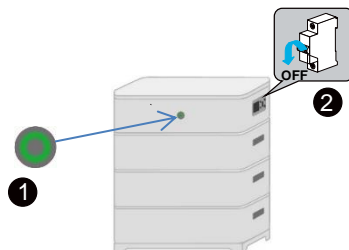
To make sure the battery system can work well with the inverter, please follow the right procedure to start them. The procedure is: 1) Turn on the air switch on the side of the BCU; 2) Press the power switch on the front of the BCU.



### 7.2. Switch off the Battery System

The procedure to switch off the battery system is: 1) Press the power switch back; 2) Turn off the air switch on the side of the BCU.

The correct way to turn off the battery system is to press the LED button on the BCU (the light goes out) instead of pulling down the air switch of the BCU.



### 7.3. Safety Design

The battery system cannot be turned on when the Operating Panel is removed.

The system will switch off automatically if there is no communication with an inverter for 3 minutes during commissioning.

## 8. Decommissioning

### QUALIFIED PERSON

To decommission the inverter completion of its service life, proceed as described in this Section.

### CAUTION

#### **Risk of injury due to weight of product**

Injuries may result if the product is lifted incorrectly or dropped while being transported or attaching it to or removing it from the wall mounting bracket.

- . Transport and lift the product carefully. Take the weight of the product into account.
- . Wear suitable personal protective equipment for all work on the product.

### DANGER

#### **Danger to life from electric shock due to live DC cables at the battery system.**

The DC cables connected to the battery system may be live. Touching the DC conductors or the live components leads to lethal electric shocks.

- . Do not touch non-insulated cable ends.
- . Ensure that the inverter is disconnected from all the voltage sources.

Procedure:

1. Shut off the inverter.
2. Switch off the battery system.
3. Switch off the breaker between the inverter and the battery system if there is any.
4. Press the LED switch of the BCU to turn off the battery.
5. Open the air switch cover on the side of the BCU and turn off the air switch.
6. Remove the DC cables and communications cables that connect the battery to the inverter
7. Take the BCU from battery modules and battery modules from the base.

If the battery system is to be stored or shipped, pack the system. Use the original packaging or packaging that is suitable for the weight and dimensions of the system.

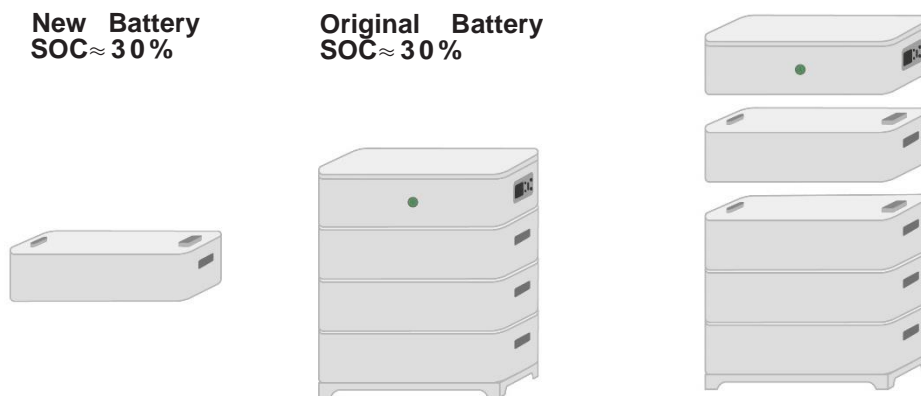
Dispose of the battery system in accordance with the locally applicable disposal regulations for electronic waste.

## 9. Extension

The SOC of the existing system and the module to be added should be similar before the module adding on the existing system.

Procedure:

1. Charge or discharge the existing system to an SOC of around 30%. Note: New modules have an SOC of around 30%
2. Shut off the inverter.
3. Switch off the battery system.
4. Switch off the breaker between the inverter and the battery system if there is any.
5. Take the BCU off .
6. Add the new module on top of other battery modules.
7. Put BCU back on top of the new battery module .
8. Configure the battery system.
9. Start the inverter.





## 10. Troubleshooting

Please also see the LFP9-30kWh/HV Service Guideline and Checklist for troubleshooting. The latest version is available at our website [sunketpower.com](http://sunketpower.com)

### 10.1. Battery System Behavior under Fault Conditions

If the yellow or red light is blinking, it indicates that the battery is faulty. You can use your mobile phone to connect to the battery WIFI to check the specific error and rectify it

#### NOTICE

##### **Damage to the battery system due to under voltages**

- . If the battery system doesn't start at all, please contact SUNKET local after-sales service within 48 hours. Otherwise, the battery could be permanently damaged.

# 11.Maintenance and Storage

## Cleaning

It is recommended that the battery system be cleaned periodically. If the enclosure is dirty, please use a soft, dry brush or a dust collector to remove the dust. Liquids such as solvents, abrasives, or corrosive liquids should not be used to clean the enclosure.

## Maintenance

The battery module should be stored in an environment with a temperature range between -10 to 50 °C or 14 to 122 °F, and charged regularly according to the table below with no more than 0.5 C (A C- rate is a measure of the rate at which a battery is discharged relative to its maximum capacity. ) to the SOC of 40% after a long time of storage.

Storage environment temperature	Relative humidity of the storage environment	Storage time	SOC
Below -10°C (14 °F)	/	Not allowed	/
-10~25°C (14~77°F)	5%~70%	≤ 12 months	25%≤SOC≤60%
25~35°C (77~95°F)	5%~70%	≤ 6 months	25%≤SOC≤60%
35~50°C (95~122°F)	5%~70%	≤ 3 months	25%≤SOC≤60%
Above 50°C (122°F)	/	Not allowed	/

### NOTICE

#### Damage to the battery system due to under voltages

If the battery system doesn't start at all, please contact SUNKET local after-sales service within 48 hours. Otherwise, the battery could be permanently damaged.

## 12. Disposal of the Battery System

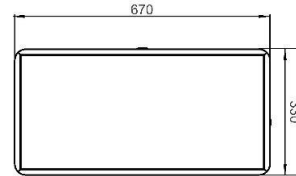
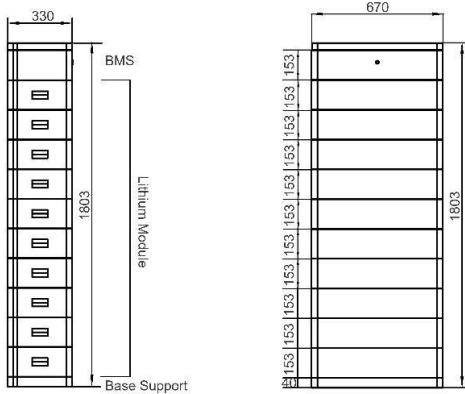
Disposal of the system must comply with the local applicable disposal regulations for electronic waste and used batteries.

- Do not dispose of the battery system with your household waste.
- Avoid exposing the batteries to high temperatures or direct sunlight.
- Avoid exposing the batteries to high humidity or corrosive atmospheres.
- For more information, please contact SUNKET

# 13. Technical Data



LFP 3000 / HV  
57.6V 50Ah



Min Capacity: 3 Lithium Modules & BMS  
Max Capacity: 10 Lithium Modules & BMS

### Electrical Characteristics

Module Type	LFP 9kWh/HV	LFP 12kWh/HV	LFP 15kWh/HV	LFP 18kWh/HV	LFP 21kWh/HV	LFP 24kWh/HV	LFP 27kWh/HV	LFP 30kWh/HV
Usable Energy*	8.64kWh	11.52kWh	14.40kWh	17.28kWh	20.16kWh	23.04kWh	25.92kWh	28.80kWh
Battery Module	LFP 3000 / HV : 57.6V 50Ah							
Number of Modules	3	4	5	6	7	8	9	10
Nominal Voltage	172.8V	230.4V	288V	345.6V	403.2V	460.8V	518.4V	576V
Operating Voltage Ranges	135-197.1V	180-262.8V	225-328.5V	270-394.2V	315-459.9V	360-525.6V	405-591.3V	450-657V
Nominal Dis-/Charge Current	25 / 50A							
Max. Charge Voltage	197.1V	262.8V	328.5V	394.2V	459.9V	525.6V	591.3V	657V
Weight	102kg	131kg	160kg	189kg	218kg	247kg	276kg	305kg
Dimension(mm)	670*330*697	670*330*855	670*330*1013	670*330*1171	670*330*1329	670*330*1487	670*330*1645	670*330*1803
Safety	CE, UN38.3, IEC62619, IEC63056, IEC62477							

Max. recommended DOD	90%
Operating Condition	Indoor or outdoor
Operating Charge Temperature	0~55 °C
Operating Discharge Temperature	-20~55 °C
Humidity	0~95% (No condensed water)
Pollution Degree	3
Over Voltage Category	II
Cooling Type	Natural cooling
Case Material	Metal+Plastic
IP Rating	IP 54
Protective Class	I
Warranty	10 years
Life Span	>15 years
Communication	CAN/WIFI
Protection Mode	Triple hardware protection
Battery Protection	Over-current/Over-voltage/Short-circuit/Under-voltage
Hazardous Material Classification	9

### Cooperation Partners



[1] DC Usable Energy, Test conditions: 100% DOD, 0.2C charge & discharge at 25°C (77°F). System Usable Energy may vary with different inverter brands .

[2] Charge derating will occur between -10°C (14°F) and 5°C (41°F).

[3] Condition apply. Refer to SUNKET LFP9-30kWh/HV Limited Warranty.

## 14.Contact Information

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SUNKET Service

[info@sunket.cn](mailto:info@sunket.cn)

Telephone: +86-510-68005868

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SUNKET Global Service

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[sunketpower.com](http://sunketpower.com)

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Social media link

<https://www.facebook.com/SunketSolarPanelSystem>

<https://www.linkedin.com/company/sunket>

<https://youtube.com/channel/UCqaW18yz1cT93WRMxy6ulfA>