Solavita

SWR

5.12 / 7.68 / 10.24 / 12.80
15.36 / 17.92 / 20.48 kWh

High Voltage Battery

User Manual

File version-202409-V1-EN Information might be subject to change without notice during product improving.

Contents

Statement of Law

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This product complies with the design requirements of environmental protection and personal safety.

The storage, use and disposal of the products shall be carried out in accordance with the product manual, relevant contract or relevant laws and regulations.

Customer scan check the related information on the website of Jiangsu Skyworth New Energy technology Co.,LTD. When the product or technology is updated.

Web URL:http://www.solavita-ess.com/

Please note that the product can be modified without prior notification.

Revision History

Revision NO.	Revision Date	Revision Reason
1.0	2024.08.20	First Published

1.Safety

Any work on the Batteries should be handled by authorized technicians and hence it is understood that the technicians should familiarize themselves with the contents of this manual before any maintenance or installation is carried out on the system.

Danger: Batteries deliver electric power, resulting in burns or a fire hazard when they are short circuited, or wrongly installed.

Danger: Lethal voltages are present in the battery terminals and cables. Severe injuries or death may occur if touch the cables and terminals.

Warning: DO NOT open or deform the battery module, otherwise the product will be out of warranty scope

Warning: Whenever working on the battery, wear suitable personal protective equipment (PPE) such as rubber gloves, rubber boots and goggles.

Warning: SWR system working temperature range -10℃~50℃; Optimum temperature:18℃~28℃. Out of the working temperature range may cause the battery system over / low temperature alarm or protection which further lead to the cycle life reduction as well as. It will affect the warranty terms as well.

Warning: For battery installation, the installer shall refer to NFPA70 or similar local installation standard for operation.

Caution: Improper settings or maintenance can permanently damage the battery.

Caution: Incorrect inverter parameters will lead to a further faulty/damage to battery.

Reminding

1) It is very important and necessary to read the user manual carefully (in the accessories) before installing or using battery. Failure to do so or to follow any of the instructions or warnings in this document can result in electrical shock, serious injury, or death, or can damage battery, potentially rendering it inoperable.

2) If the battery is stored for longtime, it is required to charge them every six months, and the SOC should be no less than 90%;

3) Battery needs to be recharged within 12 hours, after fully discharged;

4) Do not expose cable outside;

1.1 Before Connecting

Please check product and packing list first after unpacking, if product is damaged or lack of parts, please contact with the local retailer.

Before installation, make sure that the grid power is cut off and the battery is in the turned-off mode.

Do not mistake the positive and negative cables and ensure there are no short circuit connection to the external device.

It is prohibited to connect the battery to AC power directly.

Battery system must be well grounded and the resistance must be less than 1Ω.

Please ensured that the electrical parameters of battery system are compatible with related equipment.

Keep the battery away from water and fire.

1.2 In Using

If the battery system needs to be moved or repaired, the power must be cut off and ensure that the battery is completely turned off.

It is prohibited to connect the battery with different types of battery.

It is prohibited to connect the battery with inverters that is compatible or with faulty.

It is prohibited to disassemble the battery (to avoid warranty tab be removed or damaged).

In case of fire, only dry powder fire extinguisher can be used, liquid fire extinguishers are prohibited.

Please do not open, repair or disassemble the battery except Solavita staffs or authorized personnel.

We do not undertake any consequence or related responsibility which is caused by violation of safety operation or equipment safety standards.

1.3 Maintenance

Please read the user manual carefully (in the accessories).

If the battery is stored for a long time, it is required to charge them every six months, and the SOC should be no less than 90%.

Battery needs to be recharged within 12 hours, after fully discharged.

Do not expose cable outside.

All the battery terminals must be disconnected for maintenance.

Please contact the supplier within 24 hours if there is something abnormal.

The warranty claims are excluded for direct or indirect damage due to items above.

2. System Introduce

2.1 Product Introduce

SWR is a high voltage battery storage system based on lithium iron phosphate battery, which is one of the new energy storage products developed and produced by solavita. It can be used to support reliable power for various types of equipment and systems. SWR enabled multiple strings` parallel operation feature, which provides tremendous flexibility in system design and configuration. SWR is especially suitable for those application scenes which required high power output, limited installation space, restricted load-bearing and long cycle life.

2.2 Product Properties

The whole module is non-toxic, non-polluting and environment-friendly;

Anode material is made from LiFePO4 with high security and long cycle life;

Battery management system (BMS) has protection functions including over-discharge, over-charge, over-current and high/low temperature;

The system can automatically manage charging and discharging state and balance current and voltage of each cell;

Flexible configuration, multiple battery modules can be in series for expanding voltage and capacity.

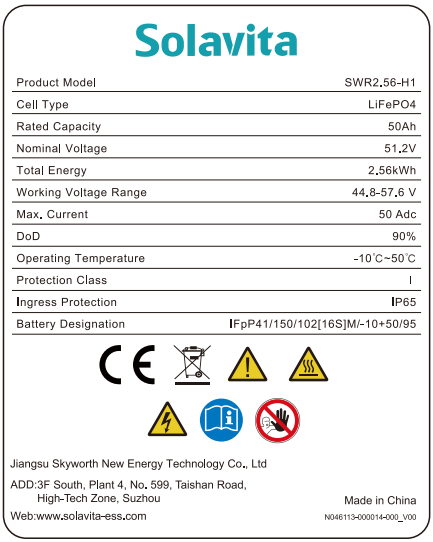
Adopted self-cooling mode rapidly can rapidly reduce system noise;

The module has less self-consumption, does not need be charged up to 6 months; no memory effect, excellent performance of shallow charging and discharging;

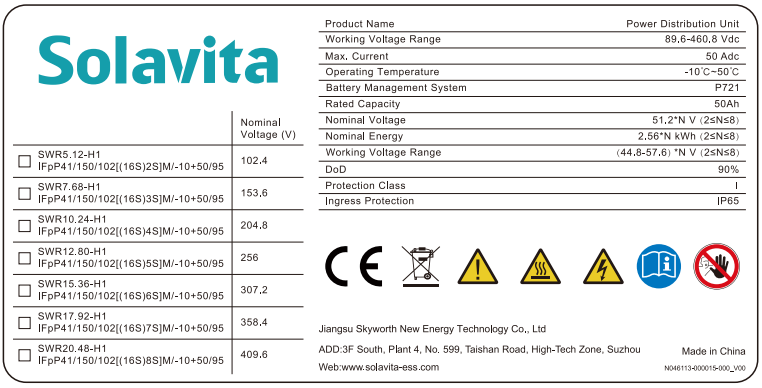
Working temperature range is from -10 ℃ to 50 ℃, with excellent discharging performance and cycle life;

Small size and light weight' standard module is easy for installation and maintenance;

2.3 Symbol Definition



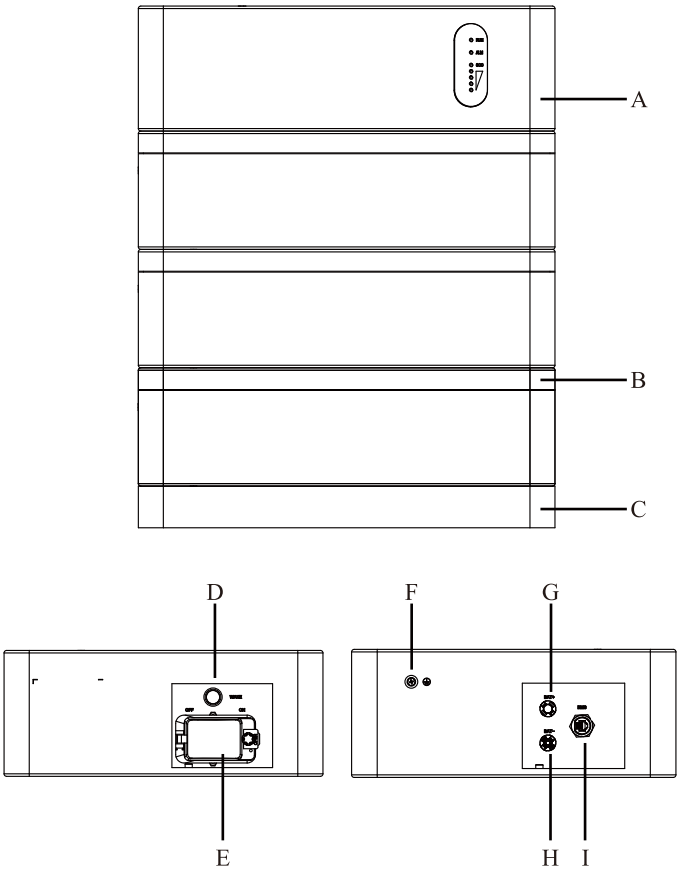
Battery Energy Storage System Nameplate



Battery Module Label

CE	The product complies with the requirements of the applicable EU directives.
	The scrapped battery cannot be put into the garbage directly can and must be recycled by professional personnel or institutes.
	Be careful with your actions and be aware of the dangers.
	When the device is running, the surface temperature of the shell is high.
	Battery voltage is higher than safe voltage. Be careful of electric shock.
	Read the user manual before using.
	Touch the shell carefully to prevent burns.

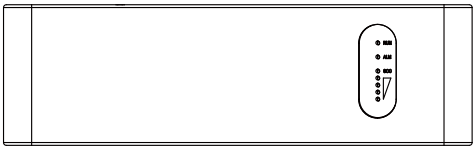
2.4 Terminal Introduction



NO.	Description
A	Battery Control Unit
B	Battery Module
C	Battery Base

D	Start Button
E	Power Switch
F	Grounding port
G	BAT+
H	BAT-
I	BMS Communication

2.5 LED Indicator Definition



RUN:Green,long lighting when the battery is running.
ALM:Red, bright if equipment failure or protected.
SOC:Green,,show the battery level.

LED indicators instructions

SOC:

LED SOC	LED5	LED4	LED3	LED2	LED1
(90% ~ 100%)	1	1	1	1	1
(80% ~ 90%)	Flash2	1	1	1	1
(70% ~ 80%)	0	1	1	1	1
(60% ~ 70%)	0	Flash2	1	1	1
(50% ~ 60%)	0	0	1	1	1
(40% ~ 50%)	0	0	Flash2	1	1
(30% ~ 40%)	0	0	0	1	1
(20% ~ 30%)	0	0	0	Flash2	1
(10% ~ 20%)	0	0	0	0	1
(5% ~ 0%)	0	0	0	0	Flash2
(0% ~ 5%)	0	0	0	0	0

Fault list:

NO.	Fault	RUN	ALM	LED5	LED4	LED3	LED2	LED1
1	Battery failure	0	1	1	0	0	0	0
2	Relay adhesion failure	0	1	0	1	0	0	0
3	The relay is normally on	0	1	0	0	1	0	0
4	Over voltage protect	0	1	0	0	0	1	0
5	Temperature sensor fault	Flash2	1	0	0	0	0	1
6	Voltage sensor fault	Flash2	1	1	1	0	0	0
7	Total battery high	0	1	1	0	1	0	0
8	Total battery low	0	1	1	0	0	1	0
9	Discharge overcurrent	0	1	1	0	0	0	1
10	charge overcurrent	0	1	0	1	1	0	0
11	Single temperature difference fault	0	1	0	1	0	1	0
12	Unit differential pressure fault	0	1	0	1	0	0	1
13	The cell is faulty at high temperature	Flash2	1	0	0	1	1	0
14	The cell is faulty at low temperature	Flash2	1	0	0	1	0	1
15	The high voltage of the battery is faulty	Flash2	1	0	0	0	1	1
16	The low voltage of the battery is faulty	Flash2	1	1	1	1	0	0
17	Precharge failure	0	1	1	1	0	1	0
18	Current anomaly	0	1	1	1	0	0	1
19	Total pressure differential fault	0	1	0	1	1	1	0
20	Security function exception	0	1	0	1	1	0	1
21	BMS Initialization fault	0	1	0	1	1	1	1
22	Internal bus exception	Flash2	1	1	1	1	1	0
23	BMIC abnormal		1	0	1	1	1	1
24	Shutdown circuit exception	0	1	1	1	1	1	1
25	Low voltage power supply undervoltage voltage	0	Flash2	1	0	0	0	0
26	Low-voltage power supply overvoltage	0	Flash2	0	1	0	0	0
27	Thermal runaway fault	Flash2	Flash2	0	0	1	0	0
28	Insulation leakage fault	0	Flash2	0	0	0	1	0

NOTE:

0:OFF; 1:Light; Flash2:1S light/1s off

Product specification

System Performance Parameter

Model	SWR5.12-H1	SWR7.68-H1	SWR10.24K-H1	SWR12.8K-H1	SWR15.36K-H1	SWR017.92K-H1	SWR20.48K-H1
Cell Technology	LFP	LFP	LFP	LFP	LFP	LFP	LFP
Total Storing Energy [kWh]	5.12	7.68	10.24	12.8	15.36	17.92	20.48
Recommended Depth of Discharge (DOD)	90%	90%	90%	90%	90%	90%	90%
Usable energy(90%DOD) [Kwh]	4.61	6.91	9.21	11.52	13.824	16.128	18.432
Rated Voltage [V]	102.4	153.6	204.8	256	307.2	358.4	409.6
Operating Voltage Range [V]	80-116.8	120-175.2	160-233.6	200-350.4	320-467.2	360-525.6	400-584
Battery roundtrip efficiency	＞95%	＞95%	＞95%	＞95%	＞95%	＞95%	＞95%
Battery Module Quantity	2	3	4	5	6	7	8
Installation	Indoor (Stacked)						
Dimensions (W*D*H) [mm]	500*380*484	500*380*626	500*380*768	500*380*910	500*380*1052	500*380*1194	500*380*1336

Weight (kg)	68.4	96.8	125.2	153.6	182	210.4	238.8
Protection Class	IP65						
Operation Temperature (℃)	-10~50						
Storage Temperature (℃)	-20~50						
Altitude (m)	<2000						
Cooling Concept	Natural Cooling						
Humidity	5%~ 85%						

Battery Module

Module Name	SWR2.56-H1
Cell Technology	LFP
Battery Module Energy (kWh)	2.56
Battery Module Voltage (Vdc)	51.2
Battery Module Capacity (Ah)	50
Battery Module Cell Quantity (pcs)	16
Battery Cell Power (Wh)	160
Battery Cell Voltage (Vdc)	3.2
Battery Cell Capacity (Ah)	50

3. Installation and Configuration

3.1 Environmental Requirement

3.1.1 Cleaning

Before installation and system power on, the dust and iron scurf must be removed to keep a clean environment.

The system cannot be installed in desert area without an enclosure to prevent from sand.

Danger: Battery module has active DC power at terminal all the time), must be careful to handle the modules.

3.1.2 Ventilation

SWR system working temperature range: -10~50℃ ; Optimum temperature: 18℃~28℃.

There is no mandatory ventilation requirements for battery module,but please avoid of installation in confined area.The aeration shall avoid of high salinity, humidity or temperature.

Caution:SWR system is IP65 design. But please avoid frost or direct sunlight. Out of the working temperature range will cause the battery system over / low temperature alarm or protection which further lead to the cycle life reduction. According to the environment, the cooling system or heating system should be installed if it is necessary.

3.1.3 Fire-extinguisher System

It must be equipped with fire-extinguisher system for safety purpose.

The fire system needs to be regularly checked to be in normal condition. Refer to the using and maintenance requirements please follow local fire equipment guidance.

3.1.4 Grounding System

Before the battery installation must make sure the grounding point of the basement is stable and reliable. If the battery system is installed in an independent equipment cabin (e.g. container), must make sure the grounding of the cabin is stable and reliable.

The resistance of the grounding system must $\leq 1\Omega$.

3.1.5 Clearance

Minimum clearance to heat source is more than 2 meters.

Minimum clearance to battery module(rack) is more than 0.3 meters.

3.2 Handling and Placement

Warning: The battery pile’s power terminals are high voltage DC. It must be installed in a restricted access area;

Warning: SWR is a high voltage DC system, operated by qualified and authorized personnel only.

3.2.1 Handling and placement of the battery module

Single battery module is 28.5kg. If without handling tools must have more than 2 men to handling with it.

3.2.2 Handling and placement of the base

The base is light, single person can handle with it.

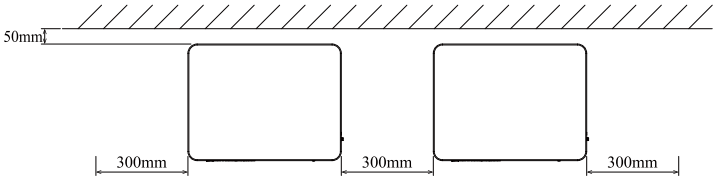
3.2.3 Selection of installation sites

A. SWR system working temperature range:-10℃~50℃; Optimum temperature: 18℃~28℃. Do not place the battery system in direct sun light. It is suggested to build sunshade equipment. In cold area the heating system is required.

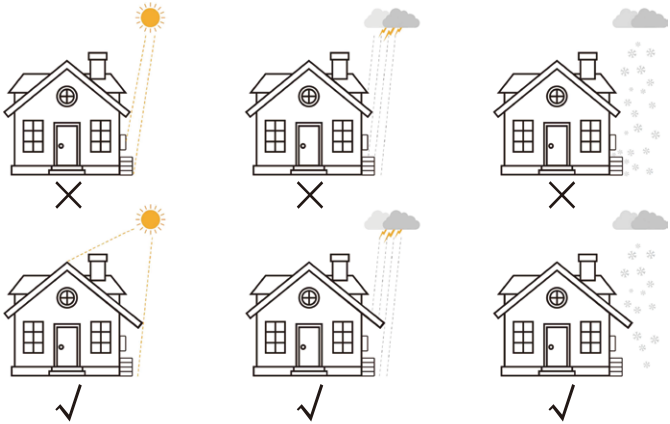
B. SWR system must not be immersed in water. Cannot be placed the battery base in rain or other water sources. As a suggestion, the base's height shall >300mm above the ground.

C. The base's weight capacity should support the weight of whole battery system (130~300kg).

D. SWR system bust be installed on fixed ground.



The Minimum Clearance Diagram

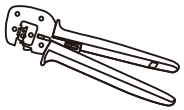
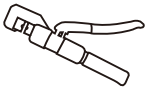
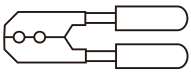
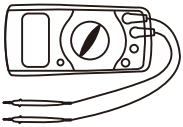
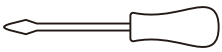
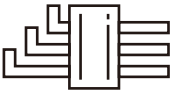


Installation Location Precautions

3.3 Installation

3.3.1 Tools

The following tools are required to install the battery pack:

		
Crimping tool	Wire Stripper	Network cable crimper
		
Multimeter	Phillips Screwdriver	Hex key

Note:

Use properly insulated tools to prevent accidental electric shock or short circuits.

If insulated tools are not available, cover the entire exposed metal surfaces with available.

Insulated alternatives, except their tips, with electrical tape.

3.3.2 Safety Gear

It is recommended to wear the following safety gear when dealing with the battery pack.

		
Safety shoes	Safety goggles	Insulated gloves

3.4 Unpacking Inspection

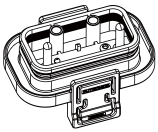
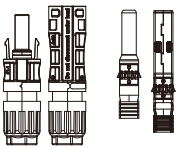
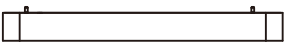
When the battery system arrives at the installation site, loading and unloading should be performed according to the rules and regulations, to prevent from being exposed under sunlight. Battery should not be installed in locations under direct sunlight. Please refer to P13 Installation location precautions.

Before unpacking, the total number of packages shall be counted according to the shipping list attached to each package, and the case should be checked for good condition.

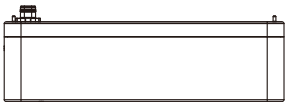
In the process of unpacking, handle carefully and protect the surface coating of the object.

After opening the package, the installer should read the technical documents, verify the list, ensure that the objects are complete and intact according to the configuration table and packing list, and if there is damage to the internal packaging, it should be checked and recorded in detail.

3.5 Packing List

Battery Controller		
		
Battery Controller(PDU)	Short cap	Battery connectors*2
		
Battery Base	3M black external communication cable	Case setting screw*2
		
3M DC+ red external power cable	3M DC- black external power cable	Warranty card

		
Product Manual		

Battery Module		
		
Battery Module	Case setting screw*2	

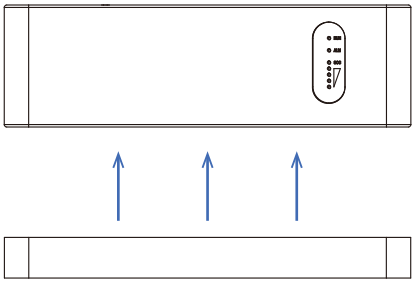
4. Equipment Installation

Installation preparation

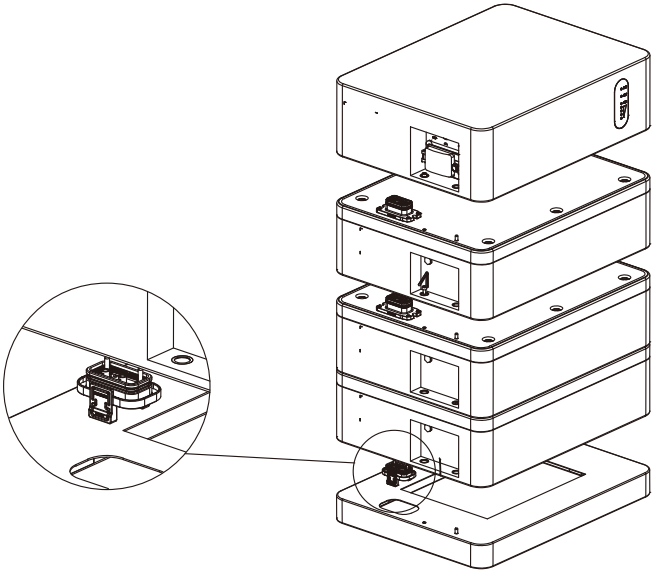
1. Make sure that the environment meets all technical requirement.
2. Prepare equipment and tools for installation.
3. Confirm that the DC breaker is in the OFF state to ensure that it is no live.

4.1 Mechanical Installation

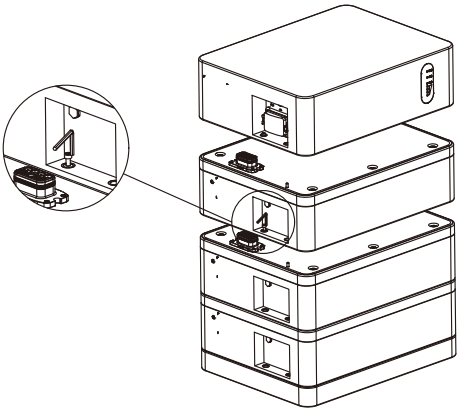
1.Determine base placement, Ensure that the base is horizontal.
2.Separate the PDU from the battery base.



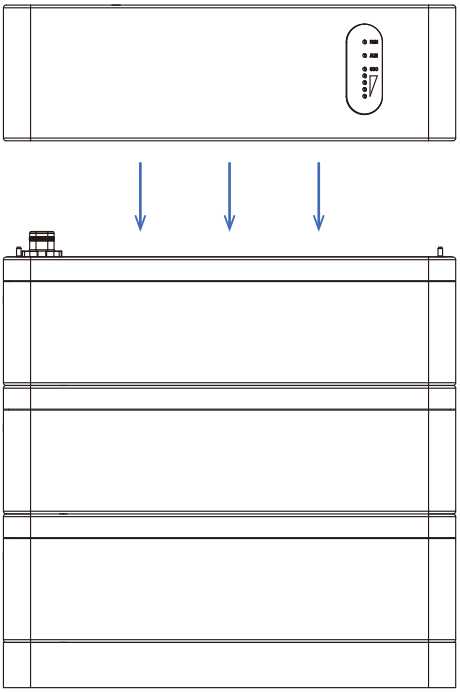
3.Insert the Short cap into the bottom battery pack, then place the battery with the shorting cover on top of the base.



4.Tighten the screws to lock the battery module before installing next batterymodule. Please install the battery modules one by one(maximum of eight battery modules can be installed).



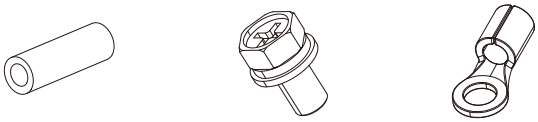
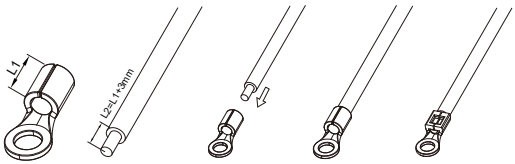
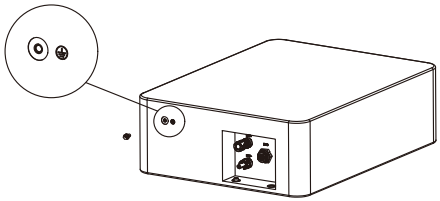
5.Place PDU on battery module and Tighten the screws to lock the battery module.



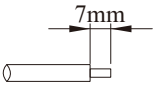
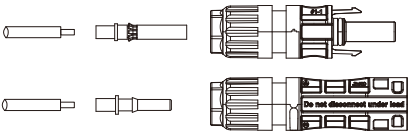
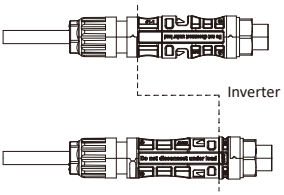
4.2 Electrical Installation

4.2.1. Ground Connection

Connect PE line from Battery Controller to ground

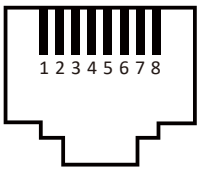
Procedure	
Step 1	Prepare a one-core cable (4~6 mm²), and then find the ground terminal in the accessories.  one-core cable (4~6 mm²) Phillips screw OT terminal
Step 2	Strip the grounding cable insulation(length＂L2), insert the stripped cable into the ring terminal, and then clamp it. 
Step 3	Find the ground connection port on the Battery Controller, and screw the ground wire on the PDU. 

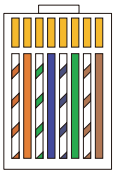
4.2.2. Electrical Connection

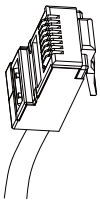
Procedure	
Step 1	Prepare a 6 mm² BAT cable, and trim 7mm of insulation from the wire end. 
Step 2	Separate the DC connector (battery) as below. 
Step 3	Insert the stripped cable into the pin contact, ensuring all conductor strands are fully enclosed within the pin contact.
Step 4	Use a crimping tool to crimp the pin contact. Place the pin contact with the stripped cable into the appropriate slot of the crimping tool and crimp it securely.
Step 5	Insert the pin contact through the cable nut to secure it into the back of the male or female plug. A “click” sound or tactile feedback indicates that the pin contact is properly seated. 
Step6	Insert the battery terminals into the BAT+ and BAT- ports on the battery controller.
Unlock	Unlock the DC connector. Use the specified wrench tool. When separating the DC + connector, push the tool down from the top. When separating the DC - connector, push the tool down from the bottom. Separate the connectors by hand.

4.2.3. Communication Connection

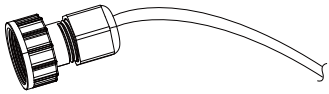
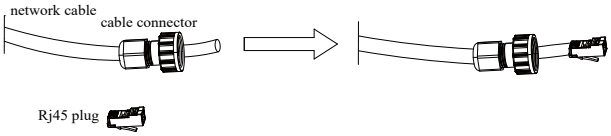
The BMS (Battery Management System) communication interface is used for CAN communication between the hybrid inverter and the lithium battery BMS.If this wire is poor, the communication between the hybrid inverter and BMS will not work properly. The stable SOC value displayed on the hybrid inverter home page is a good performance of communication.







Pin / Port	1	2	3	4	5	6	7	8
BMS	5V	/	GND	/	CANL	/	CANH	/

Procedure	
Step 1	Prepare a standard network cable and cable connector, then insert the network cable through the cable connector. 
Step 2	Crimp the cable with a RJ45 plug which is inside of the cable connector. 
Step 3	Insert the communication cable into the RJ45 connector. Lock the connector by turning clockwise.

5.Start Up

If all of the items mentioned above have been met then proceed as follows to comission and start-up the battery for the first time:

1. Turn the circuit breaker on the PDU to the "ON" position.

2. Press the WAKE button .

3. Wait for the status LED to turn blue,and the battery will enter into working mode.

4.Check whether the battery indicator of the inverter is on. Start inverter according to inverter start-up procedure.

5. Commission the inverter according to the inverter commissioning procedure using the Solavita Cloud App.

6. Read the battery status information using the Solavita Cloud App and confirm that the BESS is communicating with the inverter, observe the LED's on the BESS to determine the current status.

6.Battery Maintenance

⚠	**DANGER**
The maintenance of battery only can be operated by professional and authorized person. You need turn off the battery system firstly when you do some maintenance items.	

Voltage Inspection:

[Periodical Maintenance] Check the voltage of battery system through the monitoring software. Check whether the system voltage is normal or not. For example: Check whether single cell' voltage is out of rated range.

Voltage Inspection:

[Periodical Maintenance] Check the SOC of battery system through the monitoring software. Check whether the SOC of battery string is normal or not.

Cables Inspection:

[Periodical Maintenance] Visually inspect all the cables of battery system. Check whether the cables have been broken, aging and loose or not.

Balancing:

[Periodical Maintenance] The battery system will become unbalanced if has not been charged fully for a long time. Solution: Preform the balancing maintenance (fully charged) every 3 month. Generally this maintenance progress needs to be completed when external devices such as the monitoring software and battery and inverter are in good communication.

Output Relay Inspection:

[Periodical Maintenance] Under low load condition (low current), control the output relay OFF and ON to hear whether the relay has click voice, which means that this relay can off and on normally.

7.Storage Recommendations

For long-term storage (more than 3 months), the battery cells should be stored in the environment: temperature range of -20~50℃, relative humidity <65% and contains non-corrosive gas.

The battery module should be placed dry, clean and well ventilated environment and the SOC should be no less than 90%.

It is recommended to activate the battery system (discharge and charge) every 3 months, and the longest duration of storage without charge and discharge cannot exceed 6 months.

⚠	**CAUTION**
The cycle life of the battery will have relative heavy reduction if not follow the above instructions to store the battery for a long term.	

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