PUSUNG-W 51.2V 100Ah

LIFEPO4 BATTERY PACK USER MANUAL

Please read this manual carefully before operating

and retain it for future reference.

This manual introduces SUTEN-W designed by SEPLOS Technology. Please read this manual before installation of the battery module and follow the instruction carefully during the assembly. Any confusion, please contact SEPLOS Technology immediately for advice and clarification.

CONTENT

1. Safety Precautions

This section describes the safety information that must be observed when working with battery packs. To prevent any damages, or personal injury, and to ensure the performance of the battery packs, please read this section carefully and observe the safety precautions at all times.

1.1 Precautions

- It is very important and necessary to read the user manual carefully before installing or using the product. 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, and could damage the battery, or potentially rendering it inoperable.
- If the battery pack is stored for long time, it is required to charge them every six months, and the SOC should be no less than 90%.
- Please recharged the battery pack within 12 hours, after fully discharged.
- All the battery pack terminals must be disconnected before any maintenance.
- Do not use cleaning solvents to clean battery pack.
- Do not expose battery pack to flammable or harsh chemicals, or corrosive gases or liquids.
- Do not paint any part of battery pack, include any internal or external components.
- Do not expose the battery pack to direct sunlight for extended periods of time.
- Do not connect battery pack with PV solar wiring directly.
- Do not insert any foreign object into any part of the battery pack.

1.2 Warning

- Do not touch the battery pack with wet hands.
- Do not crush, drop or puncture the battery pack.

- Always dispose of the battery pack according to local safety regulations.
- Store and recharge the battery pack in a manner in accordance with this user manual.
- Ensure reliable grounding.
- Do not reverse the polarity when installing.
- Do not short circuit the terminals, remove all jewelry items that could cause a short circuit before installation and handling.
- Disconnect battery from power or loads, and then power off battery before installation and maintenance.
- The battery packs should be not stacked more than specified numbers.
- Continued operation of a damaged battery pack can result in dangerous situation.

2. Introduction

SUTEN-W

SUTEN-W lithium iron phosphate battery pack is a household wall mounted renewable energy storage battery pack developed and produced by SEPLOS Technology. It is a low-voltage DC battery system with an operating voltage of 48V, and works with a low voltage inverter to realize the goal of energy storage for home application.

SUTEN-W battery pack supports parallel connection to expand capacity, which can meet various capacity requirements. It has built-in battery management system(BMS), which can manage and monitor the pack and cells information including voltage, current and temperature. What's more, BMS can balance cells charging and discharging to extend cycle life.

2.1 Features

- SUTEN-W comes with a LCD display for pack voltage, capacity and temperature monitoring.
- The battery cell used inside, is 16 pieces of 3.2V 100Ah aluminum case prismatic cell.
- Battery cell is made from lithium iron phosphate (LiFePO4) with safety performance and longer cycle life.
- Special designed plastic cell holder, holding 8 cells in series, and composes a battery module, and two modules in series, then connected with BMS, composes the wall-mounted type battery pack.
- BMS has over-discharge, over-charge, over-current, high and low temperature warning and protection functions.
- BMS monitors charge and discharge state, and balance current and voltage of each cell.
- BMS comes with upper computer system for real-time cell and pack voltage, current, temperature, and battery status monitoring and recording.
- Flexible configuration, max. 15 packs can be connected in parallel for expanding capacity and power with 8 DIP switches.
- Working temperature range is from - 10℃~50℃ (Charging 0℃~50℃; discharging - 10℃~50℃) with excellent discharge performance and cycle life.
- Pre-programmed with multi-protocols, and works with multi-brands of inverters.

2.2 Specifications

Basic Parameters	SUTEN
Nominal Voltage (V)	51.2V
Nominal Capacity (Ah)	100Ah @0.5C discharge current 25±2℃
Rated Capacity (Ah)	98-105Ah @0.5C discharge current 25±2℃ 41.6V - 57.6V
Nominal Power (Wh)	5.12KWh
Dimension (mm)	565*450*180mm
Weight (Kg)	53±5KG
Discharge Cut-off Voltage (V)	43.2V/2.7V
Charge Voltage (V)	57.6V/3.65V
Continuously Charging Method	Charge at constant current 50A until total voltage reaches 57.6V or 3.65V/cell, which is sooner.
Standard Discharge Method	Discharge at constant current 50A until total voltage reaches 43.2V or 2.7V/cell, which is sooner.
Communication Interface	CAN,RS485
Configuration	2*1P8S
Working Temperature	0~50℃(Charge)
	-10~50℃(Discharge)
	-20~55℃(Storage)
Cell chemistry	Lithium iron phosphate (LiFePO4)
Cycle life	≥80% capacity state after 6000 cycles at 0.5C, 25℃, 80% DOD EOL80%
IP level	IP 20
Humidity	10% - 85%
Certificates	TUV,CE, MSDS, UN38.3

2.2.1 BMS Parameters and Settings

	Bits	Default	Level	Conditions		Release	Response		Remark
				conditions	duration		Response	BMS	
Byte 1	Bit 0	Pack over voltage	2	Pack voltage ＞57.6v	1s	1. Pack voltage ＜ 56.0V 2. Remaining capacity ≤ 96%SOC 3. Individual cell voltage decrease to over voltage recovery value (Neither 2 conditions will get the default released.)	Pack over voltage warning No charging mark	Charging MOSFET will be turned off	The charging status will not report to the first class warning
			1	Pack voltage ＞56V	3s	Pack voltage ＜ 54.4V	Warning	Warning	
	Bit 1	Pack under voltage	2	Pack voltage ＜43.2V	1s	Pack voltage ＞ 46.0V Charging current ≥1A	Pack under voltage warning No discharging mark	If the inverter do not response after 1 seconds, the discharging MOSFET will be cut off	
			1		3s	Pack voltage ＞ 48.0V	Warning	Warning	
	Bit 2	High SOC	2	-	--	--	--	--	
		Low SOC	2	SOC＜5%	1S	SOC＞5%	Low SOC warning No charging mark		
			1	SOC＜10%	3S	SOC＞10%	Warning	Warning	
	Bit 3	Charging over current	3	Charging current ≥ 100A	1s	When charging current ≤100A Discharge	Charging over current warning	Charging MOSFET will be cut off	

							No charging mark		
		Charging current limiting	2	Charging current≥95A	1s	When charging current ≤95A Discharge	When the charging current limiting functions, if the charging current is higher than 95A, the charging current will limited to 10A for 5 minutes, when the detecting current is lower than 95A, it will back to normal charging status, but if the BMS detects the charging current is higher than 95A for the second time, it will charging with 10A until the 100% charged.		
	Bit 4	Discharge over current	3	Discharge current ＞ 100A	1s	Discharge current ≤100A Power off	Discharge over current warning No discharge mark	If the inverter do not response after 1 second, the discharge MOSFET will be cut off	
			1	Discharge current＞95A	3s	Discharge current ≤90A	Warning	warning	
Byte 2	Bit 5	Charging over temperature	2	Max temperature ＞54℃	1s	Max temperature ＜50℃	Ask for a charging current of 0A No charging mark	If the inverter do not response after 1 second, the charge MOSFET will be cut off	
			1	Max temperature ＞50℃	3s	Max temperature ＜45℃	Warning	Half of the charging current	
	Bit 6	Charging low temperature	2	Min temperature ＜ 0 ℃	1s	Min temperature ＞ 5 ℃ Or charging termination	Ask for a charging current of 0A	If the inverter do not response	

							No charging mark	after 1 second, the charge MOSFET will be cut off	
			1	Min temperature ＜ 2 ℃	2s	Min temperature ＞ 4 ℃	Warning	Warning	
	Bit 7	Discharge over temperature	2	Max temperature ＞54 ℃	1s	Max temperature ＜50 ℃	Discharge over temperature warning No charging mark	If the inverter do not response after 1 second, the discharge MOSFET will be cut off	
			1	Max temperature ＞50 ℃	3s	Max temperature ＜45 ℃	Warning	Warning	
	Bit 8	Discharge low temperature	2	Min temperature ＜- 10 ℃	1s	Min temperature ＞ 0 ℃	Low temperature warning No discharge mark	If the inverter do not response after 1 second, the discharge MOSFET will be cut off	
			1	Min temperature ＜- 5 ℃	3s	Min temperature ＞ 0 ℃	Warning	Prompt	
	Bit 9	Individual cell over voltage	2	Individual cell voltage ＞ 3.65V	1s	1. Max individual cell voltage ＜3.5V 2. Remaining capacity ≤96% 3. Discharge current ≥1A Either 2 conditions	Ask for a charging current of 0A No charging mark	The charging MOSFET will cut off	

						would recover charging			
			1	Individual cell voltage ＞ 3.50V	3s	Max individual cell voltage ＞3.50V	Warning	Warning	The charging status will not report to the first class warning
	Bit 10	Individual cell under voltage during charging	3	Individual cell voltage ＜ 1.50V	1s	Individual cell voltage ＞1.50V	Ask for a charging current of 0A No charging mark	If the inverter do not response after 1 second, the discharge MOSFET will be cut off	
	Bit 11	Individual cell under voltage during dischargin g	2	Individual cell voltage ＜ 2.70V	3s	Min individual cell voltage ＜2.90V Charging current ⩾1A	Warning	Prompt	
	Bit 12	Individual cell voltage inconsis tency	2	Voltage difference ＞ 500mv	3s	Voltage difference ＜300mv	Stop charge and discharge	If the voltage difference sustained for 3 seconds, the charging and dischargin g MOSFET will be cut off	
			1	Voltage difference ＞ 300mv	5s	Voltage difference ＜250mv	Voltage difference warning	Prompt	
Byt e 3	Bit 13	Ambient over	2	Temperature ＞60℃	1s	Temperature ＜ 55 ℃	Ambient temperatu	If the inverter	

		temperature					re over temperature warning No charging and discharging mark	do not response after 2 seconds, the charging and discharging MOSFET will be cut off	
			1	Temperature ＞50℃	3s	Temperature ＜ 47 ℃	Warning	Prompt	
	Bit 14	Ambient under temperature	2	Temperature ＞- 10℃	1s	Temperature ＜ 0 ℃	Ambient temperature under temperature warning No charging and discharging mark	If the inverter do not response after 2 seconds, the charging and discharging MOSFET will be cut off	
			1	Temperature ＞0 ℃	3s	Temperature ＜ 3 ℃	Warning	Prompt	
Byte 4	Bit 15	PCB over Temperature	2	Temperature ＞10℃	1s	Temperature ＜ 0 ℃	PCB temperature over temperature warning No charging and discharging mark	If the inverter do not response after 2 seconds, the charging and discharging MOSFET will be cut off	
			1	Temperature ＞0 ℃	3s	Temperature ＜ 3 ℃	Warning	Prompt	
		PCB under	2	Temperature	1s	Temperature ＜	PCB	If the	

		Temperature		＞100℃		85 ℃	temperature under temperature warning No charging and discharging mark	inverter do not response after 2 seconds, the charging and discharging MOSFET will be cut off	
			1	Temperature ＞90℃	3s	Temperature ＜ 85 ℃	Warning	Prompt	
Byte 5	Bit 16	Short circuit protection	Short circuit protection time delay			50- 120us	Short circuit warning No charging mark	Charging and discharging MOSFET will be cut off	
			Short circuit lock times			5 times	Short circuit lock release conditions: default disappear or charging		
			Short circuit recovery			default disappear or charging			
Byte 6	Bit 17	Cell balancing	Cell balancing start conditions		Equalization start voltage		3350mv		
					Voltage difference		30mv		
					Equalization stop voltage difference		20mv		
			Cell balancing start temperature range		Equalization temperature limitation		According to the ambient temperature range		
					Equalization high temperature prohibition		50℃		
					Equalization low temperature prohibition		0 ℃		

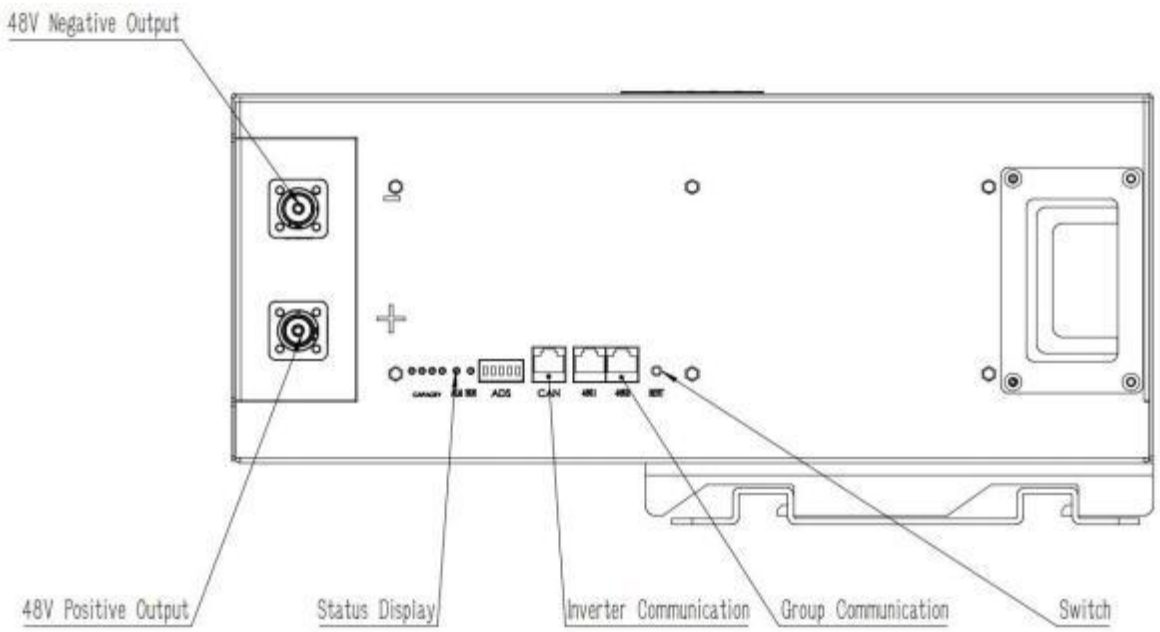
2.2.2 Recommended Continuously Discharge Current

Temperature	SOC 0% - 20%	SOC 20% - 40%	SOC 40% - 80%	SOC 80% - 100%
- 10 - 0℃	10A	10A	50A	50A
0 - 7℃	15A	50A	60A	80A
7 - 15℃	20A	40A	70A	90A
15 - 25℃	30A	70A	100A	100A
25 - 45℃	30A	70A	100A	100A
45 - 50℃	10A	30A	40A	50A
50 - 55℃	5A	15A	20A	30A

2.2.3 Recommended Continuously Charge Current

Temperature	SOC 0% - 20%	SOC 20% - 40%	SOC 40% - 80%	SOC 80% - 100%
- 10 - 0℃	10A	10A	8A	5A
0 - 7℃	20A	20A	15A	10A
7 - 15℃	50A	50A	40A	20A
15 - 25℃	80A	80A	60A	30A
25 - 45℃	100A	100A	60A	30A
45 - 50℃	80A	80A	50A	20A
50 - 55℃	50A	50A	40A	15A

2.3 Interfaces



LCD Screen

LCD screen displays the battery pack, and the individual cell voltage, capacity, temperature information by clicking the 'confirm', 'exit', 'up' and 'down' button besides.

RESET

Reset button: to start the battery pack, hold the button for 2s to turn on battery pack.

RS485

RS485 communication interface: RJ45 port, follow RS485 protocol. For transmitting battery pack information between paralleled packs. The first 4 DIP switches (#1, #2, #3, #4) are used for identifying packs' information on software.

CAN

CAN 5 communication interface: follow CAN BUS protocol, for output pack information to inverter. One pack should be assigned as master pack. And the last 4 DIP switches (#5, #6, #7, #8) to tell how many slave packs are followed. The firs DIP switches are used for identifying slave packs.

ADS

ADS Switch : To setup battery address for identification, and make the communicate between

batteries, battery to inverter.

NOTE: There are 8 bit DIP switches, keep the switch on down side means 'OFF', turn up the switch to top side means 'ON'.

ALARM

ALARM light: red LED flash to show the battery alarm status. And red light to show the battery in protection status of abnormal temperature, over-current, or short-circuit.

RUN

Working light: green LED to show the battery working status. Details as follows,

Battery status	Operating Mode	RUN	ALM	LED Light				Remark
		●	●	●	●	●	●	
Power off	Standby	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Standby	Normal	Solid Green	OFF	According to battery SOC status				Standby mode
Charge Mode	Normal	Solid Green	OFF	According to battery SOC status				
	Over current warnings	Solid Green	Blink type 2					
	Over voltage protection	Blink type 1	OFF	OFF	OFF	OFF	OFF	
	Temperature, over current protection	Blink type 2	OFF	OFF	OFF	OFF	OFF	
Discharge Mode	Normal	Blink type 3	OFF	According to battery SOC status				
	Warning	Blink type 3	Blink type 3					
	Over current, temperature, short- circuit protection	OFF	Solid Red	OFF	OFF	OFF	OFF	Termination of discharge
	Under voltage protection	OFF	OFF	OFF	OFF	OFF	OFF	Termination of discharge

CAPACITY

SOC light: 4 green LED lights to show the capacity status of battery pack. Each LED represents 25% the capacity.

Status	Charge				Discharge			
Capacity indicator	●L4	●L3	●L2	●L1	●L4	●L3	●L2	●L1
0-25%	OFF	OFF	OFF	Blink	OFF	OFF	OFF	Solid Green
25%-50%	OFF	OFF	Blink	Solid Green	OFF	OFF	Solid Green	Solid Green
50%-75%	OFF	Blink	Solid Green	Solid Green	OFF	Solid Green	Solid Green	Solid Green
>75%	Blink	Solid Green	Solid Green	Solid Green	Solid Green	Solid Green	Solid Green	Solid Green
Operating indicator	Solid Green				Blink			

P+/P-

Power terminals: two pairs of power terminals with the same function, one connect to equipment, and the other one parallel to other battery pack for capacity expanding. For a single pack, both terminals can achieve charging and discharging functions.

Power cable uses 6.0mm power plug with lock button. And can be full rotation.



2.4 Cell Features

2.4.1 Specifications

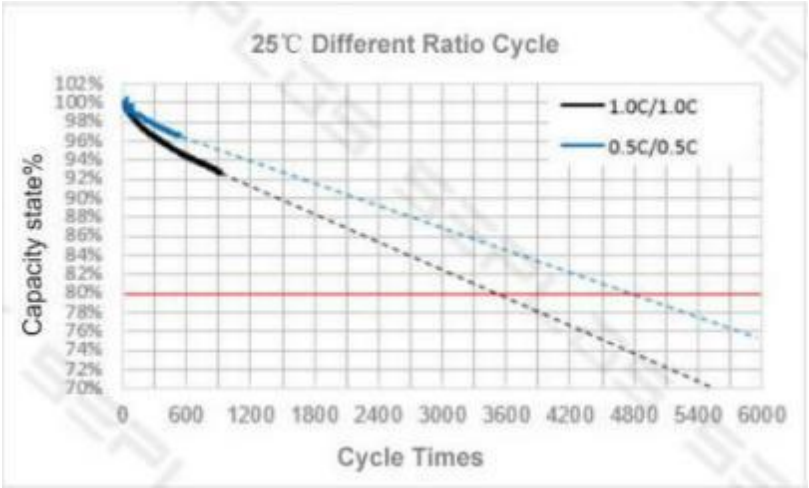
SEPLOS 3.2V 100Ah lithium iron phosphate (LiFePO4) aluminum case prismatic rechargeable battery cell.

Nominal Voltage	3.2V
Nominal Capacity	100Ah
Weight	≤2.25Kg
Self-discharge Rate	≤3.5% per month
Initial Internal Resistance (1KHz)	≤0.35mΩ

Refer to the cell specification for more detailed information.

SEPLOS Technology applies high quality Grade A cells inside the battery box. And did the following designs to prolong the battery pack cycle life.

- Judging by the current testing report below, if the battery pack charging and discharging at 0.2C, the battery pack could reach a cycle life of 6000 times or more at the remaining capacity of 80% capacity state at 25℃ room temperature, 100%DOD.



- The real capacity of each single cell is 105Ah.
- The module inside comes with 16 cells in parallel. And the default setting of BMS pack discharge end voltage is for 15 cells in series.

2.5 Advanced Battery Management System (BMS)

The BMS is applied to monitor current, voltage, temperature, protection against over-charge, over-discharge, over-current, over-temperature, under-temperature and short circuit. The BMS provides cell balancing and current limitation during charging process to ensure a reliable safety and performance.

2.5.1 BMS Functions

- Over charge protection
- Over discharge protection
- Over current protection
- Cell balancing
- Temperature protection
- CAN and RS485 communication

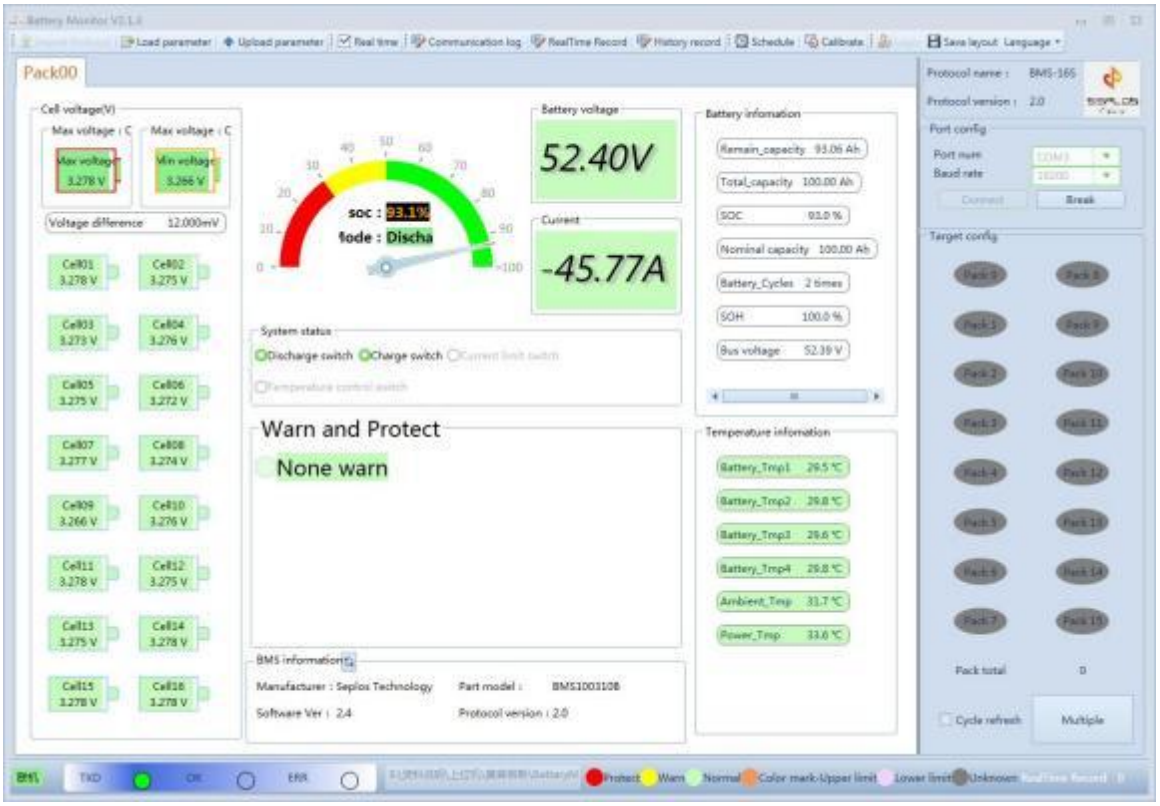
Refer to the BMS specification for the detailed information

2.5.2 BMS Upper Computer System

Battery pack can be remotely monitored with SEPLOS BATTERYMONITOR software. With this software, battery voltage, cell voltage of single cell and pack, SOC status, cell temperature, voltage differences can be monitoring in real time. Through history record, battery status can be checked afterwards.

Note: Download the software installation file at Google drive with this link :

https://drive.google.com/drive/folders/10pxgNLHovcDZRVGrCZsSkfecBrRw-AdW?usp=sharing



2.5.3 Compatible Inverters

To make sure that the battery module works perfectly, it would be better to use the compatible inverters listed below. SUTEN battery module compatible with CANBUS protocol.

Pre-programmed CAN Protocol list:

- Goodwe-V1.5
- Pylon-V1.3

- Growatt-V1.05
- Victron CANBUS_PROTOCOL
- LUXPOWER_CAN Protocol
- Sofar_REV5
- SMA_EN_10

Communicate inverters list (CAN Protocol):

- ✓ Goodwe
- ✓ Growatt (Growatt inverter comes with both CAN and RS485 protocol models. Please confirm before purchase.)
- ✓ Victron
- ✓ Voltronic (Voltronic inverter comes with RS485 protocol only. Please confirm with your sales representative before purchase.)
- ✓ Phocos (Phocos inverter comes with RS485 protocol only. Please confirm with your sales representative before purchase.)
- ✓ LUXPOWER
- ✓ Sofar
- ✓ DEYE
- ✓ Sermatec
- ✓ RENAC
- ✓ TBB POWER
- ✓ SOLIS
- ✓ SMA
- ✓ FoxESS

Inverter Settings:

Battery information would be synchronized to the inverter through CAN communication. If the inverter do not support CAN communication, the following parameters need to be modified before connecting with battery system.

Charging Settings:

Parameter	Setting
Battery type	Lithium
Charge curve	Fixed
Absorption voltage	57.6V
Float voltage	55V
Absorption time	1Hr

Note:

1. Make sure to double check the float voltage after completing Assistants, and if necessary set it back to 55.0V.

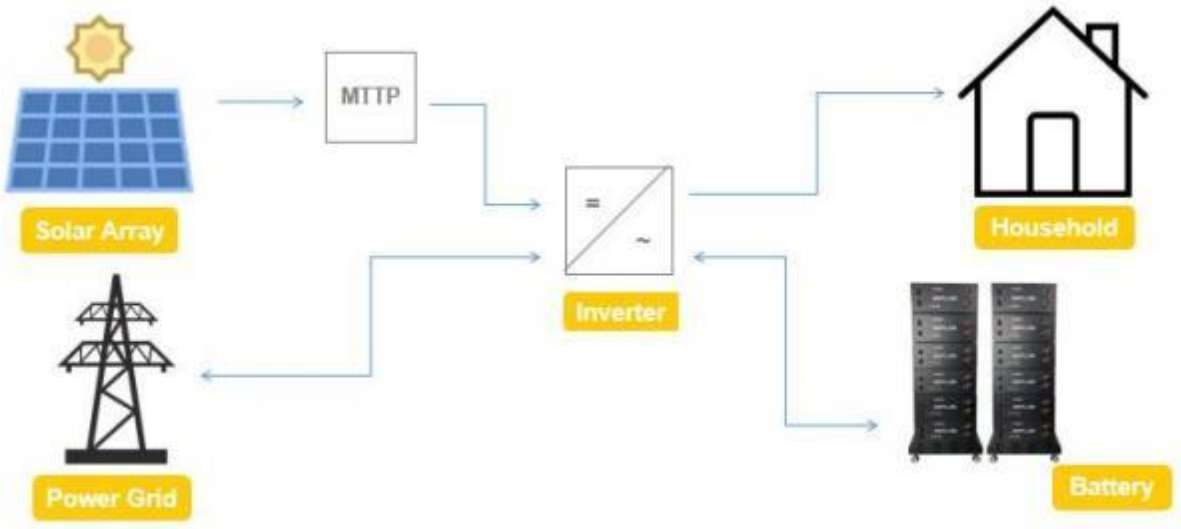
2. For off-grid use, ignore the 'BMS assistant required' warning.

Inverter Settings

Parameter	Setting
DC input low shut-down	43V
DC input low restart	47V
DC input low pre-alarm*	47V

3. Installation

3.1 Application



4. List

4.1 Packing list

Item	Description	Quantity	Picture
1	PUSUNG- R Battery Pack 5.12KWh	1 PCS	
2	Parallel cable with plus orange and black 500mm	1 SET	
3	RJ45 cable, yellow 300mm	1 PCS	
4	Ground cable, M6 screw hole 190mm	1 PCS	
5	Packing list	1 PCS	/

4.2 Optional Accessories

Note: The following accessories list is not included in the package. Please contact your sales representative to order in you need.

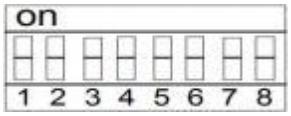
1	Adapter	RS485 to USB adapter	optional	
2	Cable	Pack to inverter power cable 1500cm, positive and negative other length cables optional	optional	
		System to computer RJ45 cable 1500cm	optional	

5. Appendix

5.1 RS485 DIP address setup demonstration.

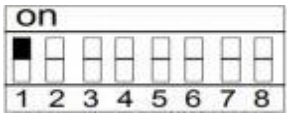
Single pack : No need to set DIP address.

PUSUNG

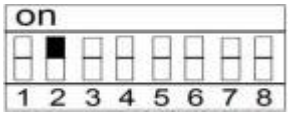


Multiple PUSUNG packs in parallel :

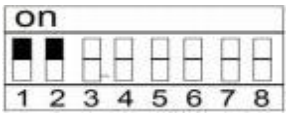
PUSUNG **1**



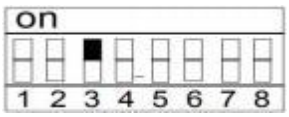
PUSUNG **2**



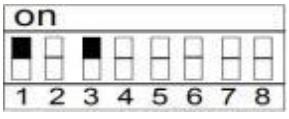
PUSUNG **3**



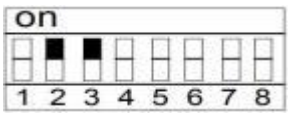
PUSUNG **4**



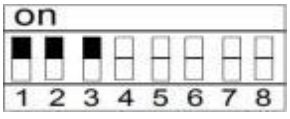
PUSUNG **5**



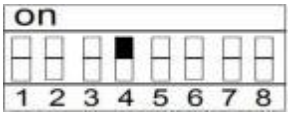
PUSUNG **6**



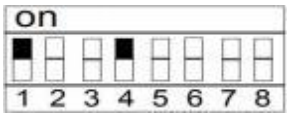
PUSUNG **7**



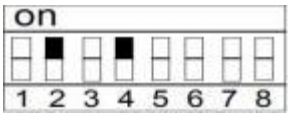
PUSUNG **8**



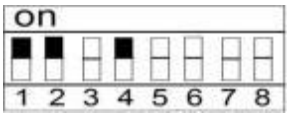
PUSUNG **9**



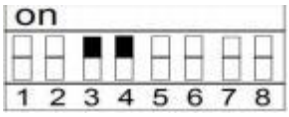
PUSUNG **10**



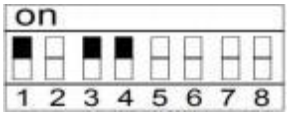
PUSUNG **11**



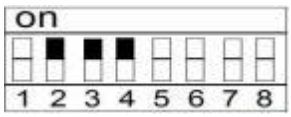
PUSUNG **12**



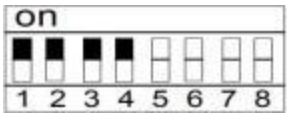
PUSUNG **13**



PUSUNG **14**

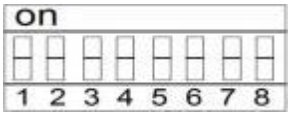


PUSUNG 15

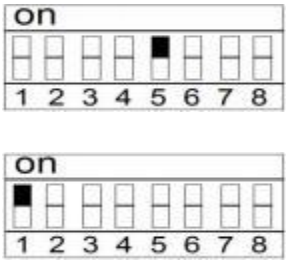


5.2 CAN BUS DIP address setup demonstration.

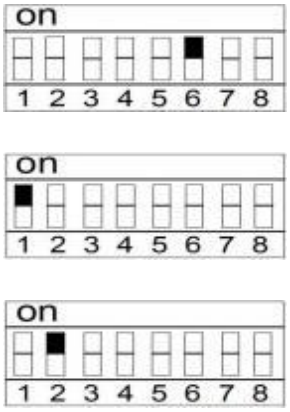
1 Pack



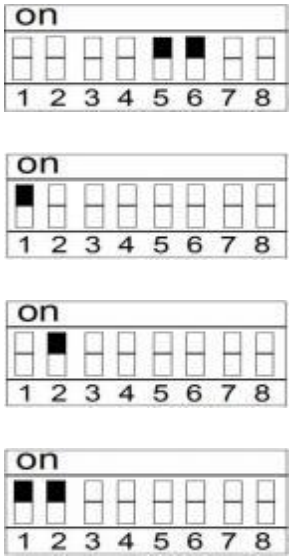
2 in Parallel



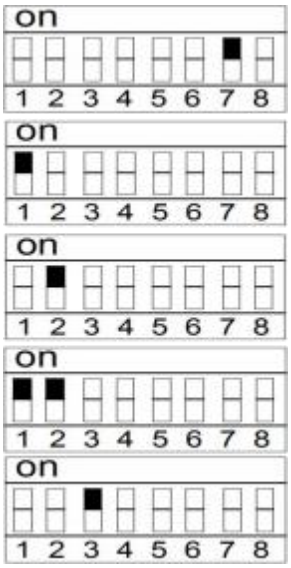
3 in Parallel



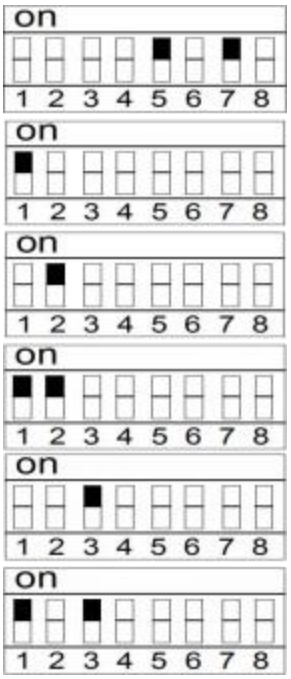
4 in Parallel



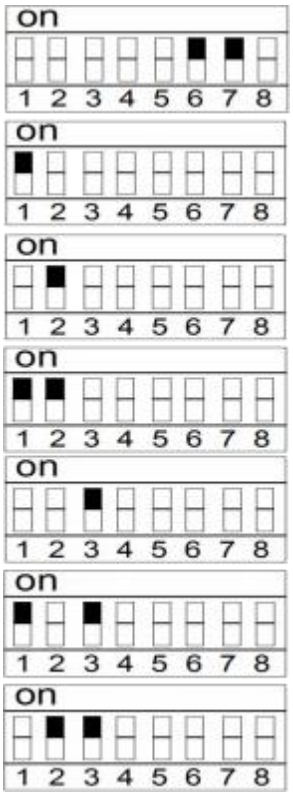
5 in Parallel



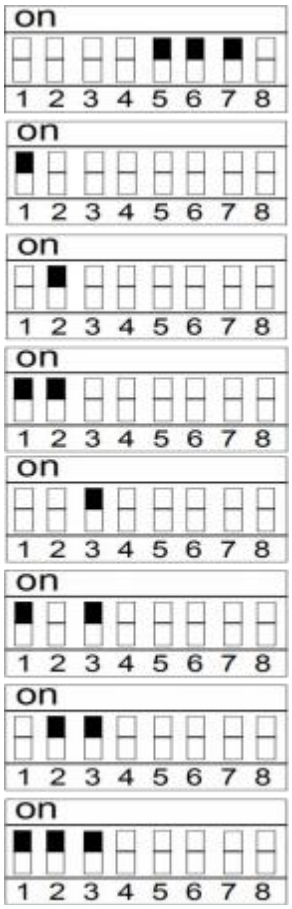
6 in Parallel



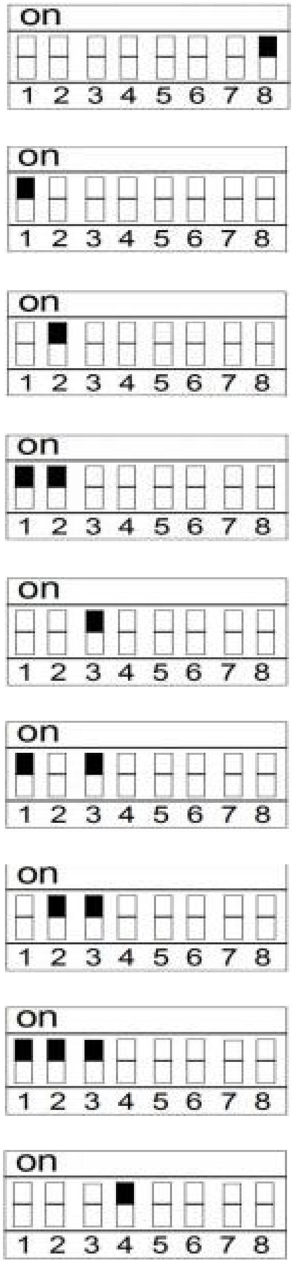
7 in Parallel



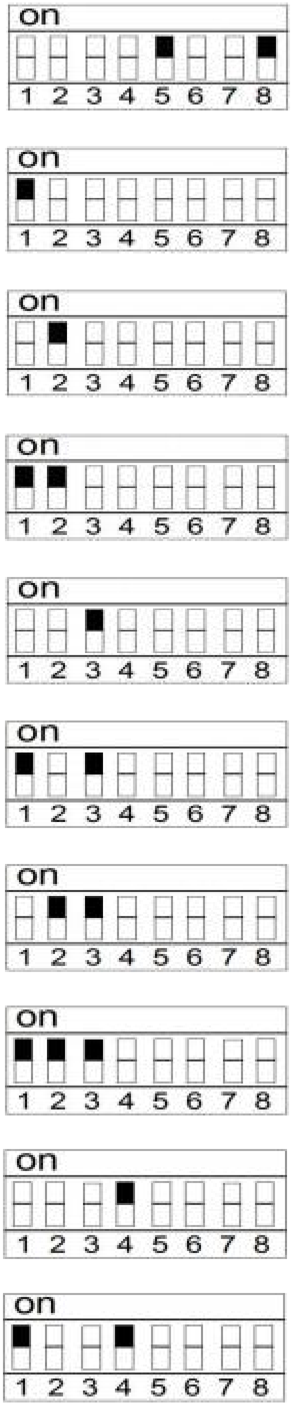
8 in Parallel



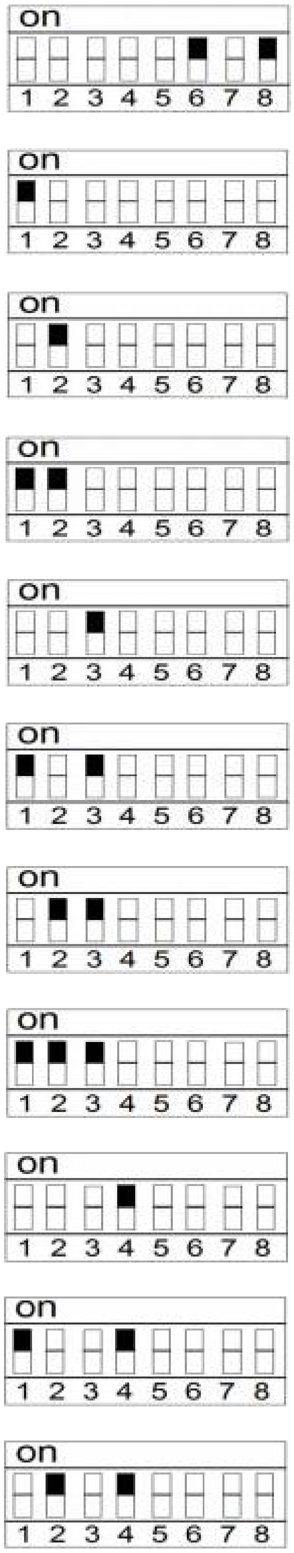
9 in Parallel



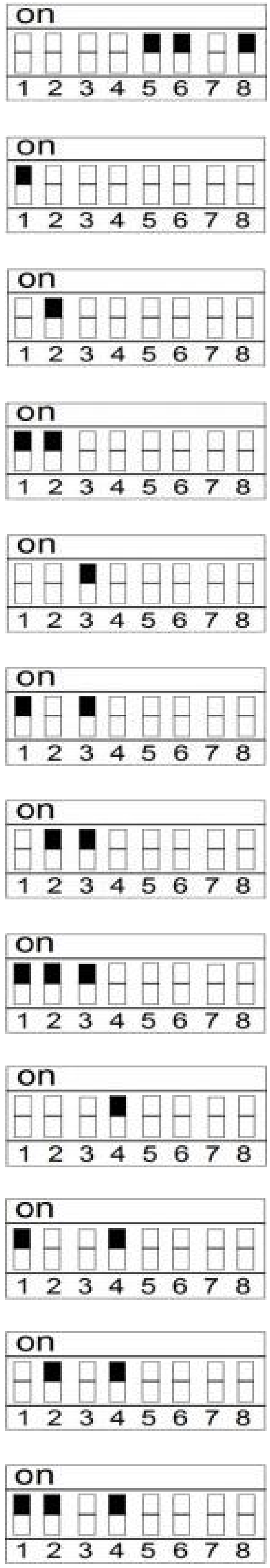
10 in Parallel



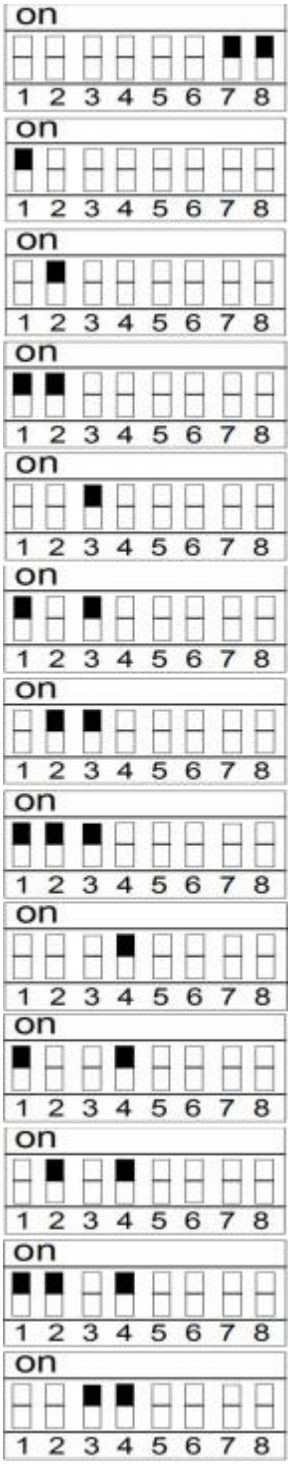
11 in Parallel



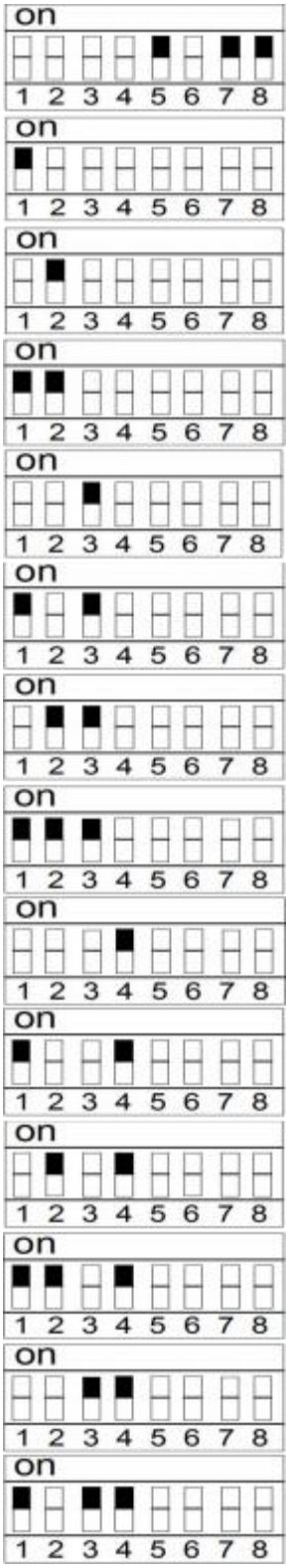
12 in Parallel



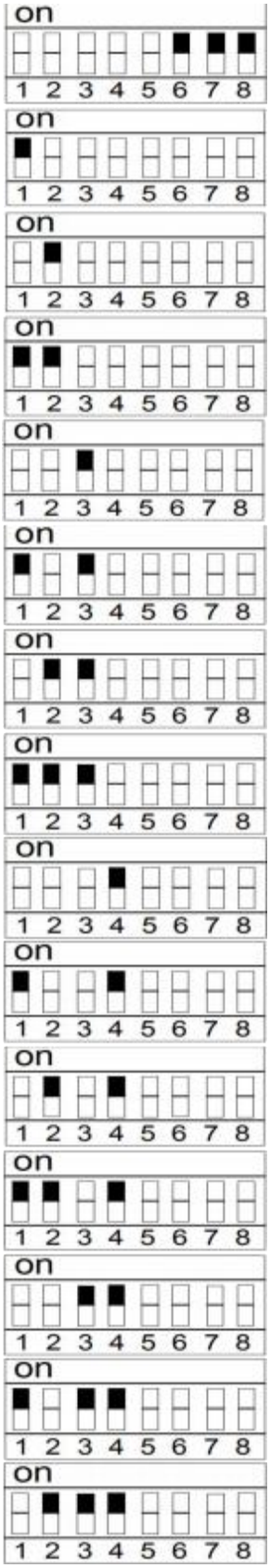
13 in Parallel



14 in Parallel



15 in Parallel



16 in Parallel