APS5000

51.2V LITHIUM-ION BATTERY ELECTRICAL INSTRUCTION

Rechargeable Lithium-ion APS5000 battery Operation Manual

Information Version: V1.1

This manual introduces APS5000 from AESON POWER. Please read this manual before using and follow the instruction carefully during the installation process. Any confusion, please contact AESON POWER for advice and clarification.

CATALOGUE

1. Attention

	Caution! Warning! Reminding. Safety related information. Risk of APS5000 battery system failure or life cycle reduces.
	**ATTENTION:**Do not reverse connect the positive and negative port.
	**ATTENTION:**Do not place near open flame.
	**ATTENTION:**Do not place at the children or pet touchable area.
	**ATTENTION:** The APS5000 battery terminals must be disconnected before commencing any work on the APS5000 battery.
	Warning Fire. Do not place near flammable material
	Read the product and operation manual before operating the APS5000 battery system!
	At end of life, these batteries must be disposed of properly by a certified professional company.
	**ATTENTION:** Always wear Individual protection devices, use insulated tools and follow the safety plan of this manual.

ATTENTION

Do not open the APS5000 battery cover for any reason.

Opening the APS5000 battery is a prohibited and potentially dangerous operation.

When the APS5000 battery is working, **don't** short the APS5000 battery terminals as this may cause fire or explosion.

Do not use charging devices, connectors, fuses, switches not approved by AESON POWER.The APS5000 battery and its connections such as cables, switches, fuses, bus bars etc. they must be inspected, cleaned, tightened every three months or whenever necessary also in consideration of the environmental conditions and/or stress of use of the system.

2. Preface

Thank you for choosing our product. We will provide you with a high-quality product as well as reliable after-sale service. To protect against harm to both personnel and product, please read this manual carefully.

This manual provides detailed information on operation, maintenance and troubleshooting of the product, as well as health and safety advice.

3. Declaration

The AESON POWER holds the right of final explanation of any content in this manual.

The APS5000 battery Capacity is intended to be 5. 12kWh in the range 100-0% of the BMS. The capacity is not constant at every cycle and may vary based on many factors, the energy degradation is not constant over the time or cycles and is heavily affected by the temperature, C-Rate and DoD (Depth of Discharge). First 500 cycles are typically affected by higher decrease in capacity compared to the following cycles.

Before buying this product read the warranty terms available on our website. Always check the latest technical data on our web site as might be changed.

If this manual Is not clear to you, do not buy or install the APS5000 battery, ask for technical meeting writing to info@aesonpower.com.au.

The performance Limited Warranty Documents sets the parameters to obtain the best performances from the APS5000 battery based on the Standard test Condition used by AESON POWER.

Any additional details about this APS5000 battery, its BMS and the compatibility with the inverters can be requested by writing to info@aesonpower.com.au.

This APS5000 battery and its accessories are intended to be installed, maintained and supervised only by expert and qualified installers.

The evaluation of the product is an important and necessary phase and must precede the purchase, it is recommended to evaluate the latest data sheets made available on www.aesonpower.com.au website or request a copy directly from info@aesonpower.com.au. email.

Our products and manuals are mainly dedicated to installers and technical experts in the sector with specific qualification for electrical installations.

The manual, the system certification and the test certificate "first ignition" of the entire system performed according to the National Standards of your country, must be delivered to the end user after adequate training on the use and maintenance of the APS5000 battery and the system in general.

These batteries are intended to be marketed to be integrated into more complex systems installed only by professional operators.

After reading the manual in full, we hope that you can buy our products.

Before buying, please carefully evaluate the technical characteristics with the data provided on our website or by requesting the updated version of the APS5000 battery model currently in production.

Datasheets may be subject to change for market or industrial needs, therefore datasheets present on third-party websites or otherwise distributed in the past may not be updated and in any case correct. Get the latest official versions from info@aesonpower.com.au.

The pre-purchase evaluation is an important phase and for this reason it must be conducted carefully and perhaps with the help of qualified and experienced technicians if your knowledge on the subject is not sufficient.

AESON POWER batteries are developed for domestic and industrial applications and can only be installed and maintained by experienced and qualified personnel, they are not produced for direct sale to individuals.

ESS (Energy Storage Systems) batteries for domestic applications are designed to maximize self-consumption of energy from renewable sources. The use for backup systems, or for UPS systems, is possible within the charge/discharge current limitations of the ESS.

This manual provides detailed information on the operation, maintenance and troubleshooting of the product, as well as health and safety advice; the information contained in this manual may not be sufficient to cover specific applications, so if

your specific case is not mentioned, please do not purchase our batteries until every technical and safety aspect of your specific application has been clarified. You can request technical support from info@aesonpower.com.au.

AESON POWER offer two types of warranty on its products, the Manufacturing defects also called functional warranty and the performance warranty. More information can be found in this manual and on the specific warranty document available for each APS5000 battery model.

Our company is not responsible for APS5000 battery damage, personal injury, property damage, or other consequences caused by the following reasons:

Earthquakes, floods, volcanic eruptions, mudslides, lightning strikes, fires, wars, armed conflicts, typhoons, hurricanes, tornadoes, extreme weather, and other majeure factors;

Failure to follow the instructions in the user manual or direct advice from our company during operation, including but not limited to the following situations:

Due to the inability of the on-site equipment operating environment or external power parameters to meet the environmental requirements for normal operation, including but not limited to the actual operating temperature of the APS5000 battery being too high or too low, unstable power grid conditions, frequent power outages, etc.

APS5000 battery drop, improper operation or connection.

Overdischarge caused by delayed acceptance or power on after APS5000 battery installation; APS5000 battery operation parameter setting error.

Without prior permission from our company, mixing different types of batteries, including but not limited to: mixing with other brands of batteries, mixing with batteries with different rated capacities, mixing with old batteries, etc.

Without prior permission from our company, mixing different types of batteries, including but not limited to: mixing with other brands of batteries, mixing with batteries with different rated capacities, etc.

Frequent over discharge caused by improper APS5000 battery maintenance.

Changing the APS5000 battery usage scenario without prior permission from our company;

Not following the instructions in the user manual for APS5000 battery maintenance, including but not limited to: not regularly checking whether the APS5000 battery terminal screws are tightened, etc.

Not following the instructions in the user manual for APS5000 battery transportation, storage, or charging.

Failure to follow our company's guidance during APS5000 battery relocation or re- installation. The APS5000 battery has exceeded the warranty period. Batteries that exceed their warranty period pose certain safety hazards and are not recommended for continued use.

Recycling treatment

Please dispose of waste batteries in accordance with local laws and regulations, and do not dispose of batteries as household waste. Improper disposal of batteries may lead to environmental pollution or explosions.

If the APS5000 battery leaks or is damaged, please contact technical support or APS5000 battery recycling company for disposal.

When the APS5000 battery exceeds its service life and is unusable, please contact the APS5000 battery recycling company for disposal.

Avoid exposing waste batteries to high temperatures or direct sunlight.

Avoid exposing waste batteries to high humidity or corrosive environments.

Defective batteries are prohibited from being reused. It is necessary to contact the APS5000 battery recycling company for disposal as soon as possible to avoid causing environmental pollution.

4. System Design By Expert Technicians

Systems Design is the process of defining the architecture, components, modules, interfaces, and load data for a system to meet specified requirements.

For a solar system these components are the photovoltaic modules, the inverter / charge controller and the batteries as well as the different interfaces of these components.

These systems must be integrated with each other in accordance with their respective technical rules and must be compatible with each other.

The design must take into account the functional guarantees and performance guarantees in order to guarantee the end customer full satisfaction of the product he will use.

For safety reasons, if the APS5000 battery does not operate at the temperatures, currents and DOD specified in the performance guarantee requirements, it must be inspected with appropriate frequency according to the conditions of use applied.

AESON POWER bases guarantees and safety according to the standard conditions of use described above, heavier uses and at sub-optimal temperatures will have direct effects on the premature aging of the APS5000 battery and with it the intrinsic safety.

5. APS5000 Battery Operation

There are several factors that affect the operation of the APS5000 battery that could impact its ability to deliver capacity and life expectancy.

Storage

APS5000 battery Module shall be stored in original packaging, in a clean, level, dry, cool location indoors.

Recommended storage temperature is 77°F / 25°C, but different storage range are acceptable: range of 14°F to +32°F / -10°C to +0°C: inspection* and recharge** every three months required. range of 32°F to +86°F / +0°C to +30°C: inspection* and recharge** every six months required.

range of 86°F to +113°F / +30°C to +45°C: inspection* and recharge** every three months required.

(NOTE: max charging current is 0. 1C at a temperature not lower than 15°C).

Max SOC for sea shipping is now 30% as per the recent changes of the UN 38.3 regulation.

*Inspection parameters – identify the State of Charge (SOC), look for alarms and address them accordingly, look for physical damage to the APS5000 battery Module.

**Charge at 0. 1C up to 50% SOC and then discharge to the limit of SOC allowed by the local regulations. Suggested SOC 30%~50% when stored on land.

If shipped by sea, you must refer to the UN38.3 standard; if by road, refer to the local codes.

Operation Temperature and Thresholds

Many chemical reactions are affected by temperature and this is also true for the reaction that occurs in a AESON POWER storage APS5000 battery. The chemical reaction of a lithium ion is slowed down by the lowering of the temperature of the electrolyte contained in the APS5000 battery, which results in a lower capacity and a higher rate of long- term performance decay in direct proportion to the departure from the optimal temperature prescribed by AESON POWER.

A new APS5000 battery providing 100% of the nominal capacity at 25°C (77°F) will provide only about 75% of the nominal capacity at 10°C.

At temperatures below -7°C(+19.4°F) the BMS will only allow 0.05C of charge current only for emergency circumstances; at temperatures below -10°C(14°F) charging is prohibited.

These thresholds do not mean that the APS5000 battery warranty also applies under such conditions, although permitted by the BMS. The logic of the BMS

does not coincide with the prescribes and thresholds must be from those customers who intend to benefiting from the performance guarantees.

The respect or not of the performance warranty thresholds to benefit the performance guarantees is up to the end customer, while the limitations inherent in the APS5000 battery safety thresholds are set by the BMS as extreme values.

The warranty conditions (Functional and Performance) are well described in the document "Limited Warranty" and must be read before purchasing the product.

Most APS5000 battery capacity/life issues can be traced to improper charging. Improper charging settings may lead to an overcharging or undercharging condition, any wrong charging process will affect the life of the APS5000 battery or its ability to retain energy. The lower the C-Rate of the charging/discharging process the more the APS5000 battery will benefit from long term performance.

Depth of Discharge (DoD)

Depth of discharge is a function of design. The deeper the discharge per cycle, the shorter the life of the APS5000 battery. A cycle is a discharge and its subsequent recharge regardless of depth of discharge, it considers the energy IN and OUT.

The lower the DOD value, the higher the APS5000 battery longevity and the capacity retention over the time.

The depth of discharge is a function that is implemented through the setting of the hybrid inverter, compatible with AESON POWER. The deeper the discharge, (e.g. DoD 100% means completely draining the APS5000 battery), the shorter the APS5000 battery life over its estimated lifetime.

A cycle is a discharge and its subsequent recharge regardless of the depth of discharge.

The number of cycles and the specific DoD will affect the expected life in years that the APS5000 battery/APS5000 battery system will provide before replacement.

To maximize the remaining capacity over the useful life of the APS5000 battery, it is recommended to set the DoD of the inverter to the value of that will not exceed 90% , this will help the State Of Health (SoH) for longer period of time.

The capacity of the APS5000 battery is not constant at every cycle and may vary based on many factors, the energy degradation is not constant over the time or cycles and is heavily affected by the temperature, C-Rate and DoD (depth of Discharge).

Typically, the decrease in capacity every 500 cycles conducted as per the STC is set to be in the range -2~3% however the First 500 cycles are typically affected by higher decrease in capacity compared to the following cycles. After 5000 cycles the residual capacity shall be 70% (if the APS5000 battery is correctly used within the recommended values and maintained over years.

Before buying this product read the warranty terms available on our website.

The functional guarantee indicates the maximum DoD up to 100% because both the logic and the APS5000 battery hardware have been verified and tested to be achieved (each inverter protocol might have different requirements and the 100% DoD could not be achieved as per the agreement between the inverter manufacturer and AESON POWER.

Performance guarantee sets the maximum value of DoD % (to be set in the inverter) must not exceed the value of 90% at 25°C 0.5C without prejudice to the previous requirements.

C-Rate

Value of the Current used to charge and discharge the APS5000 battery is expressed in C (1C = 100A, 0, 1C= 10A in case of the APS5000 100Ah APS5000 battery).

Charge/Discharge

Most capacity/APS5000 battery life issues can be traced back to improper charging also due to improper installation. Improper charging settings can lead to an overload condition or excessive discharge or current out of range for temperature condition and SOC%. AESON POWER guarantees only batteries connected via BMS CAN/RS485 line to the compatible inverter (see compatibility list on www.aesonpower.com.au) and used according to the warranty requirements published on the site.

CAN or RS485/BMS communication is essential both for reasons of active and passive safety and to be able to conduct all active control interactions with the inverter.

The BMS has dynamic algorithms that vary according to current or previous conditions stored during the discharge or stand by charging phases.

Modern inverters / charge controllers are equipped with CAN or RS485 / BMS interface and no special settings are required to charge and discharge the APS5000 battery, except for the setting of the charge / discharge power and the DoD% (if the customer wants to comply with the STC requirements he must read and comply with the warranty conditions defined STC and set them on the inverter).

The maintenance at optimal temperature instead must be guaranteed by the technical room and air conditioning equipment installed in it, the inverter is not able to interact with the settings in reference to the temperature of the environment in which it is installed, also because inverter and APS5000 battery could be in different environments exposed to different environmental factors.

Guarantee (Functional Guarantee manufacturing defects) and Performance Guarantee

Although the BMS of the APS5000 battery allows a wide range of use in terms of both temperature and charging currents, this should not be interpreted as an implicit authorization to use the APS5000 battery at these levels with reference to the performance guarantee.

For the purposes of the performance guarantee, it is mandatory that the APS5000 battery is used within the range of temperature and current, charge/discharge current and depth of discharge indicated in the warranty and also reported in these paragraphs. Any other use, even if permitted by BMS thresholds, is not covered by a performance guarantee.

Manufacturing Warranty

Although the BMS of the APS5000 battery allows a wide range of use, both in terms of temperature and charging currents, and DOD this should not be construed as an implicit authorization to use the APS5000 battery at these levels.

For the purposes of the Performance Warranty, it is mandatory that the APS5000 battery is used within the range of temperature and charge/discharge current, and Depth of Discharge indicated in the Performance Warranty. See Limited Warranty Document.

Performances Warranties

It is an additional Warranty and only apply to batteries connected via BMS line to an approved inverter, the working parameter of the APS5000 battery must remain within the performance warranty terms.

Any other use, even if permitted by the BMS ranges, is not covered by the Performance Warranty. See Limited Warranty Document available on the web site www.aesonpower.com.au

6. Safety Precautions

 Reminding

1) It is important and necessary to read the user manual carefully before installing or using APS5000 battery.
2) If the APS5000 battery is stored for long time, it is required to charge every six months, and the SOC should be no less than 90%.
3) After the battery is fully discharged, charge it immediately.
4) Do not install the product in outdoor environment, or an environment out of the operation temperature or humidity range listed in manual.
5) Do not expose cable outside.
6) Do not connect power terminal reversely.
7) Please contact the supplier within 24 hours if there is something abnormal.
8) Do not use cleaning solvents to clean APS5000 battery.
9) Do not expose APS5000 battery to flammable or harsh chemicals or vapors.
10) Do not paint any part of APS5000 battery, include any internal or external components.
11) Do not connect APS5000 battery with PV solar wiring directly.
12) Any foreign object is prohibited to insert into any part of APS5000 battery.
13) The warranty claims are excluded for direct or indirect damage due to items above.
14) Individuals are prohibited from opening batteries without permission. If there is a fault that needs to be repaired, please contact the manufacturer or supplier for professional repair.

6.1 Before Connecting

Warning

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

2) Before installation, be sure to cut off the grid power and make sure the APS5000 battery is in the turned-off mode.

3) Wiring must be correct, do not mistake the positive and negative cables, and ensure no short circuit with the external device.

4) It is prohibited to connect the APS5000 battery and AC power directly.

5) The embedded BMS in the APS5000 battery is designed for 48VDC, please DO NOT connect APS5000 battery in series.

6) APS5000 battery must connect to ground and the resistance must be less than 0.1Ω.

7) Please ensured the electrical parameters of APS5000 battery system are compatible to related equipment.

8) Keep the APS5000 battery away from water and fire.

6.2 In Using

1) If the APS5000 battery system needs to be moved or repaired, the power must be cut off and the APS5000 battery is completely shut down.

2) It is prohibited to connect the APS5000 battery with different type of APS5000 battery.

3) It is prohibited to connect batteries with faulty or incompatible inverter

4) It is prohibited to disassemble the APS5000 battery (QC tab removed or damaged).

5) In case of fire, dry powder fire extinguisher or vast amount of water can be used.

6) Please do not open, repair or disassemble the APS5000 battery except staffs from AESON POWER or authorized by AESON POWER. We do not undertake any consequences or related responsibility which because of violation of safety operation or violating of design, production and equipment safety standards.

7. Introduction

APS5000 lithium iron phosphate APS5000 battery is the new energy storage products developed and produced by AESON, it can be used to support reliable high power for various types of equipment and systems.

7.1 Features

1) With Wi-Fi function, which supports remote fault diagnosis and the OTA upgrade function.

2) Integrated Smart APS5000 battery Manage System (BMS) with high energy density.

3) Intelligent monitoring, telemetry, remote communication, and control via RS485.

4) LED indication for module status and alarms, fast charge capability and capacity.

5) Support upgrade APS5000 battery module from upper controller via CAN or RS485 communication.

6) The module is non-toxic, non-pollution and environmentally friendly.

7) Cathode material is made from LiFePO4 with safety performance and long cycle life.

8) APS5000 battery management system (BMS)has protection functions including over- discharge, over-charge, over-current and high/low temperature.

9) The system can automatically manage charge and discharge state and balance voltage of each cell.

10) Flexible configuration, multiple APS5000 battery modules can be in parallel for expanding capacity and power.

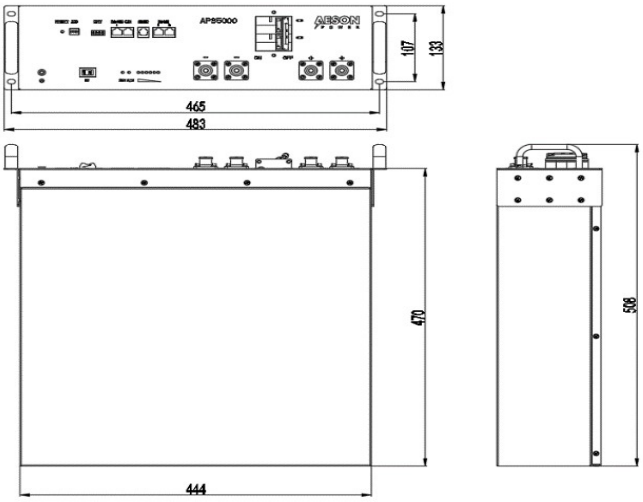
11) Adopted self-cooling mode rapidly reduced system entire noise.

12) The module has less self-discharge, up to 6 months without charging it on shelf, no memory effect, excellent performance of shallow charge and discharge.

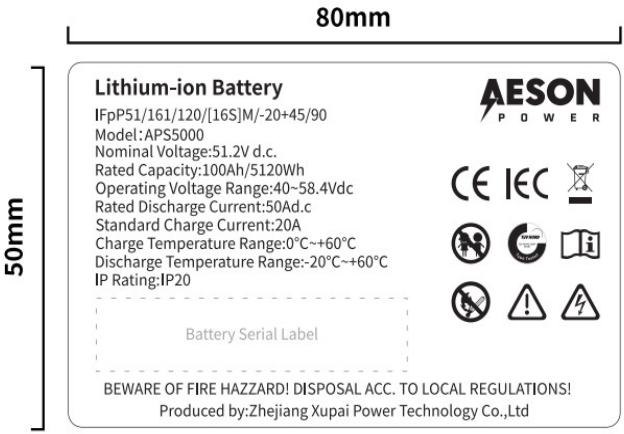
13) Small size and light weight, standard of 19-inch embedded designed module is comfortable for installation and maintenance.

14) The internal wire is wrapped with insulating rubber.The internal APS5000 battery are separated by epoxy board insulation and cannot be reached from outside.The lid above the APS5000 battery is covered with an epoxy plate inside.All external interfaces are wrapped by insulation.

7.2 Specification



Nameplate Information



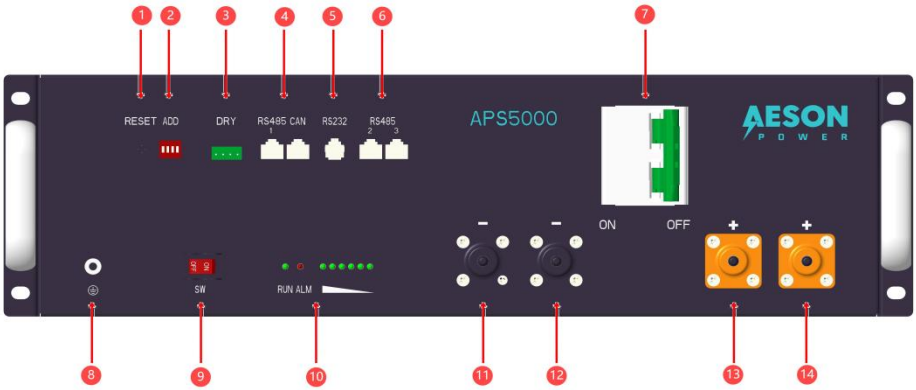
Item	Parameters	Note
Nominal Voltage (VDC)	51.2	
Nominal Energy (Wh)	5120	
Charge & Discharge efficiency	>98%	@25℃ 0.5C Charge; 0.5C Discharge;
Dimension (mm)	481 x 508 x 133	
Weight (Kg)	45	±1
Discharge Voltage (VDC)	40	
Charge Voltage (VDC)	58.4	
Standard Charge Current (A) *	20	
Rated Discharge Current （A） *	50	d.c
Max. continuous Charge/Discharge Current (A) *	100	
Communication	RS485, CAN	
Configuration (max. in 1 APS5000 battery group)	16pcs	
Working Temperature(°C)	0°C ~60°C	Charge
	-20°C ~60°C	Discharge
Shelf Temperature (°C)	-20°C~45°C	
Short current/duration time	<2000A/1ms	
Cooling type	Natural	
Breaker	YES	
Protective class	I	
IP rating of enclosure	IP20	
Humidity	5% ~ 95%(RH) No Condensation	
Altitude(m)	≤2000	
Certification	IEC/ CE / UL / UN38.3	
Design life (year)	15+ (25°C /77°F)	
Cycle Life (cycle) **	≥6,000	25℃ DOD80%
		0.5C/0.5C charge/discharge
Reference standards	IEC62619, IEC62040, IEC61000-6-2, IEC61000 -6-3, UN38.3 MSDS	

*The recommended and max. continuous operation current is for a APS5000 battery cell temperature within 10~40°C to consider, out of such temp. range will cause a derating on operation current.

** Cycle Life is defined based on specific operation conditions, for more details please check with AESON POWER service team.

7.3 Equipment interface instruction

APS5000 Front Panel



1. RESET--Long press 3~6 seconds to hibernate or activate BMS; Long press 6~10 seconds to reset BMS

2. ADD——DIP switches and it needs to avoid the address set to the same. (See Figure 1 below)

3. DRY——Dry contactor which is used to turn on or turn off low voltage or low current signals, commonly used in input end of sensors, buttons, switches and other equipment (see Figure 2 below)

4. RS485① and CAN——This interface is used to communicate with the inverter, when this battery is the host, it can summarize the slave data and communicate with the inverter.

CAN default baud rate 500K, RS485 default baud rate 9600bps.

5. RS232——This interface communicates with the upper computer to monitor various information of the battery, including the main protocol settings. RS232 baud rate default 9600bps.

6. RS485② and RS485③——Internal communication interface between batteries, mainly used for parallel operation and can also be used to communicate with the upper computer to monitor various information of the battery. However, it is not possible to set the protocol settings. RS485 baud rate default 9600bps.

7. Breaker——Separate switches for battery power input and output, which need to be turned on before charging and discharging after the BMS works.

Parameter: type C, rated voltage 160V/DC, rated current 125A, Icu: 10kA.

Standard reference: IEC60947-2.

8. Earthing——For battery earthing

9. SW——BMS switch, turn on the BMS to start working. After there is no abnormality, then turn on the breaker.

10. Running and Alarm ——LED indicators .

11. Negative connector①——Negative of power input/output①

12. Negative connector②——Negative of power input/output②

13. Positive connector①——Positive of power input/output①

14. Positive connector②——Positive of power input/output②

Reminding

When breaker released for protection, check the root cause of current surge and cable connection between APS5000 battery and inverter first. Then try to connect again.

Power Switch :

ON: working condition.

OFF: power off. For storage or shipping.

RUN :Green LED flashing or lighting to show the APS5000 battery running status.

Alarm (ALM) :

Red LED flashing to show the APS5000 battery has alarm; lighting to show the APS5000 battery is under protection.

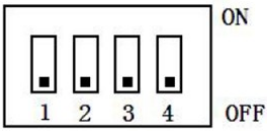
SOC :

LED shows the APS5000 battery's current capacity.

Dip Switch (ADD)

Dual RS485 interface, can view PACK information, default baud rate is 9600bps. To communicate with the monitoring device through RS485, the monitoring device serves as the host and sets the address range from 2 to 15 based on address polling data.

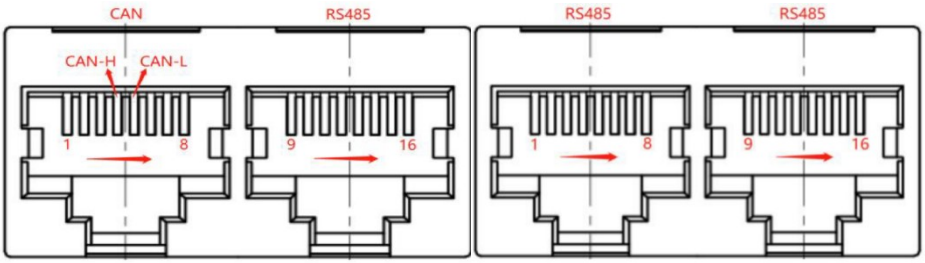
When PACK is used in parallel, different PACK can be distinguished by setting the address through the DIP switch on the BMS, to avoid setting the address to be the same, The definition of BMS DIP switch refers to the table below. In parallel mode, the default DIP address is 1 for the host.



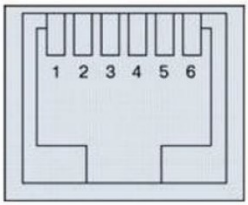
Adress	DIP switch position			
	#1	#2	#3	#4
0	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
12	OFF	OFF	ON	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
15	ON	ON	ON	ON

Console :

For manufacturer or professional engineer to debug or service.



Parallel COM RS485



RS232

DRA

RS485/CAN Interface Definition:

CAN-8PC RJ45 SOCKET		RS485-8PC CERTICAL SOCKET	
RJ45 PIN	DEFINED DECLARATION	RJ45 PIN	DEFINED DECLARATION
1、3、6、7、8	NC	9、16	RS485-B1
4	CAN-H	10、15	RS485-A1
5	CAN-L	11、14	GND
2	GND	12、13	NC

RS485/CAN is the interface for communication with external energy storage inverters. CAN communication interface, with a default baud rate of 500K, used for communication with inverters. When this APS5000 battery is the host, it can summarize slave data and communicate with inverters.

RS485 interface, with a default baud rate of 9600bps, is used for communication with inverters. When this APS5000 battery is the host, it can summarize slave data and communicate with inverters.

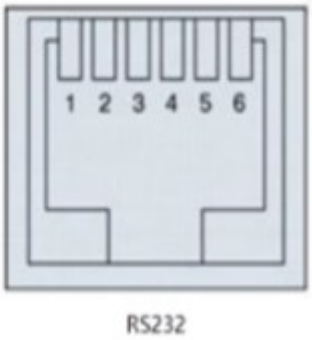
Parallel communication RS485:

RS485-8PC CERTICAL SOCKET		RS485-8PC CERTICAL SOCKET	
RJ45 PIN	DEFINED DECLARATION	RJ45 PIN	DEFINED DECLARATION
1、8	RS485-B	9、16	RS485-B
2、7	RS485-A	10、15	RS485-A
3、6	GND	11、14	GND
4、5	NC	12、13	NC

Dual RS485 interface, can view PACK information, default baud rate is 9600bps. To communicate with the monitoring device through RS485, the monitoring device serves as the host and sets the address range from 2 to 15 based on address polling data.

RS232 Communication Interface Definition:

RS232-6P6C vertical RJ11 socket	
RJ11 PIN	Defined Declaration
1、2、6	NC
3	TX
4	RX
5	GND



BMS can communicate with the upper computer through the RS232 interface, allowing for monitoring of various APS5000 battery information, including APS5000 battery voltage, current, temperature, status, and production information. The default baud rate is 9600bps.

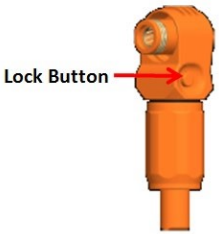
Power Terminals

One end of the power harness is a special connection terminal for connecting the APS5000 battery， the terminal brand is Phoenix and the model is ES-BPC-C-16-25-OG- CONNECTOR;

The other end is used to connect the device load,The connection terminal depends on the device.

Power cable wiring harness size is 4 AWG cable， Wire harness crimping using manual hydraulic pliers.

For power cables uses self-locked connectors. must keep pressing this Lock Button while pulling out the power plug.



ES-BPC-C-16-25-OG-CONNECTOR/***Phoenix***

LED Status Indicators

status	Normal, alarm, or Protection	RUN	ALM	Battery Level Indicator LED						explain
				L6	L5	L4	L3	L2	L1	
		●	●	●	●	●	●	●	●	
Power Off	Dormancy	light off	light off	light off	light off	light off	light off	light off	light off	all light off
idle mode	normal	flash 1	light off	According to battery indicator						standby mode
	Alarm	flash 1	flash 3							Low voltage mode
Charge	normal	light on	light off	According to the power indicator (The highest battery indicator LED flashes 2)						The highest battery LED flashes (flashing 2), and the ALM does not flash when there is an overcharge alarm
	Alarm	light on	闪3							
	overcharge protection	light on	light off	light on	light on	light on	light on	light on	light on	standby mode
	Temperature, overcurrent, failure protection	light off	light on	light off	light off	light off	light off	light off	light off	Stop charging
Discharge	normal	flash 3	light off	According to battery indicator						/
	Alarm	flash 3	flash 3							
	undervoltage protection	light off	light off	light off	light off	light off	light off	light off	light off	Stop discharging
	Temperature, overcurrent, failure protection	light off	light on	light off	light off	light off	light off	light off	light off	Stop discharging
Fault		light off	light on	light off	light off	light off	light off	light off	light off	Stop charging and discharge

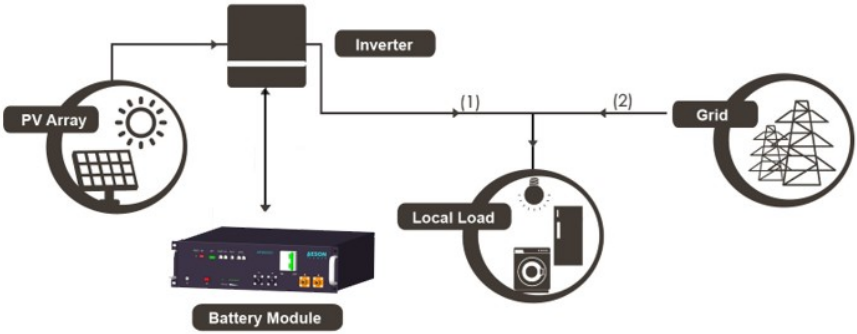
status		charging						discharging					
power Indication		L6●	L5●	L4●	L3●	L2●	L1●	L6●	L5●	L4●	L3●	L2●	L1●
Battery SOC (%)	0 ~ 17%	light off	light off	light off	light off	light off	**flash 2**	light off	light off	light off	light off	light off	light on
	18 ~ 33%	light off	light off	light off	light off	**flash 2**	light on	light off	light off	light off	light off	light on	light on
	34 ~ 50%	light off	light off	light off	**flash 2**	light on	light on	light off	light off	light off	light on	light on	light on
	51 ~ 66%	light off	light off	**flash 2**	light on	light on	light on	light off	light off	light on	light on	light on	light on
	67 ~ 83%	light off	**flash 2**	light on	light on	light on	light on	light off	light on	light on	light on	light on	light on
	84 ~ 100%	**flash 2**	light on	light on	light on	light on	light on	light on	light on	light on	light on	light on	light on
running indicator light●		light on						flash 3					

BMS basic function

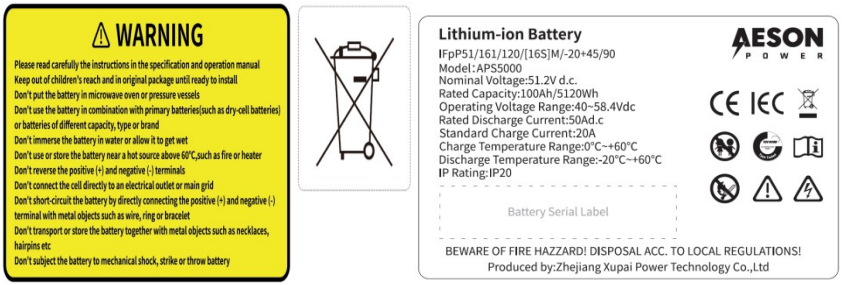
Protection and alarm	Management and monitor
Charge/Discharge End	Cells Balance
Charge Over Voltage	Charge/Discharge Current Limit
Discharge Under Voltage	Capacity Retention Calculate
Charge/Discharge Over Current	
High/Low Temperature(cell/BMS)	
Short Circuit	

8. Safe handling of lithium batteries guide

8.1 Schematic diagram of solution



8.2 Label



8.3 Tools

C Wire cutter

Crimping modular pliers

Screwdriver

Drill + Hammer

Multimeter + Current clamp

Insulated Torque Wrench Set

Hand hydraulic tongs

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 of the available tools, except their tips, with electrical tape.

8.4 Safety Gear

It is recommended to wear the following safety gear when dealing with the APS5000 battery.

Insulation glove

Safety goggles

Safety shoes

9. Installation Guide

Installation condition

Make sure that the installation location meets the following conditions:

1) The area is completely waterproof.
2) The floor is flat and level.
3) There are no flammable or explosive materials.
4) The ambient temperature is within the range from 0°C to 50°C.
5) The temperature and humidity are maintained at a constant level.
6) There is minimal dust and dirt in the area.
7) The distance from heat source is more than 2 meters.

8) The distance from air outlet of electrical component is more than 0.5 meters.

9) The installation areas shall avoid of direct sunlight.

10) There are no mandatory ventilation requirements for APS5000 battery module, but please avoid of installation in confined area. The aeration shall avoid of high salinity, humidity or temperature.

Caution

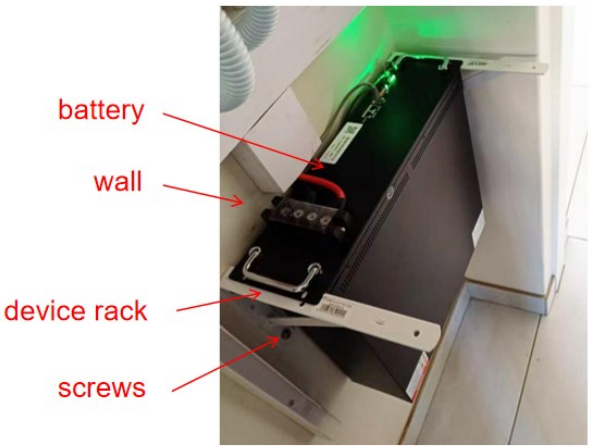
If the ambient temperature is out of the operating range, the APS5000 battery stops operating to protect itself. The best ambient temperature for APS5000 battery pack to use is 10°C to 40°C. Frequent exposure to harsh temperatures may deteriorate the performance and life of the APS5000 battery.

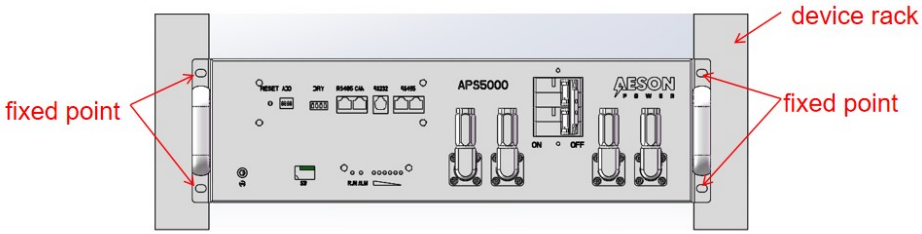
Installation Steps

1. The single APS5000 battery can work independently.
The installation procedure and diagram are as follows.

STEP1 Drill holes in the wall and fasten the device rack to the wall with screws.

STEP2 Install the APS5000 battery on the device rack through the fixed point.





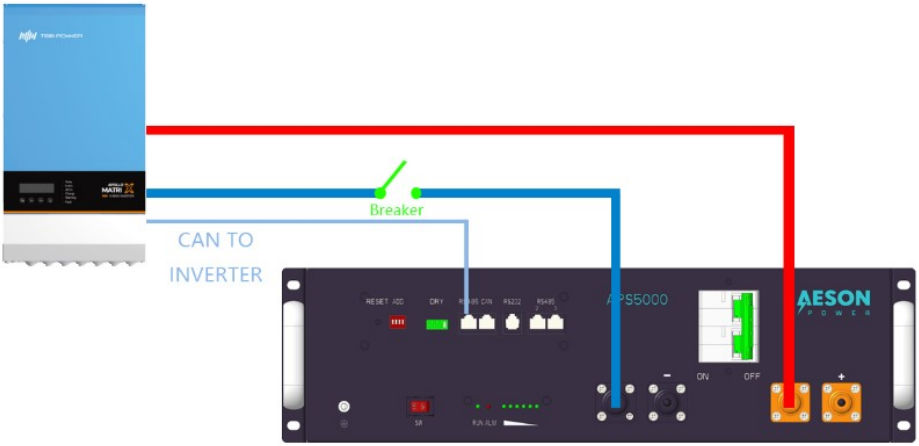
2. Make sure that the APS5000 battery SW switch and breaker are off.

3. Check that the APS5000 battery is not distorted, damaged, or dented.

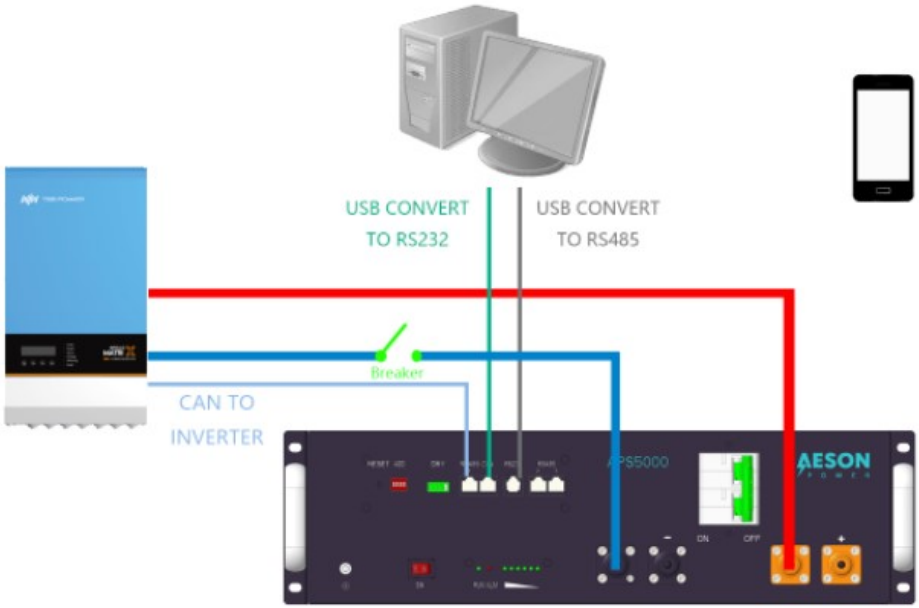
4. According to the dimensions specified in the BAT+ and BAT- of the inverters, use copper nose hydraulic pliers to fix the applicable M6 / M8 / M10 copper nose to one end of the 4 AWG specification to connect the inverter. At the other end, the ES-BPC-C-16-25-OG-CONNECTOR Phoenix terminal is fixed for connecting the APS5000, which is a self-locking button type.

5. The power cable is fixed to the inverter BAT+ and BAT- respectively according to the positive and negative poles by using a socket tool of suitable size, and the battery end is directly buckled ES-BPC-C-16-25-OG-CONNECTOR / Phoenix.

6. Connect the APS5000 to the inverter with an 8-core network cable with RJ45 connector.The APS5000 communication interface is a CAN port and the other RS485 port is reserved.The communication interface of the inverter is CAN port for BMS of Li-ion battery.



7. Turn on SW switch,use RS232/RS485 communication tool or phone APP to connect APS5000.Make sure there is no breakdown in APS5000.



8. After confirming that the inverter and other equipment can work properly, turn on the APS5000 breaker,the battery can start working can start working.

Note:

1) After the APS5000 battery module powered on, the soft-start function takes 3sec to active. After soft-starts APS5000 battery ready to output high power

For External cable kits:

NOTE: Power connector and communication cables connect to inverter belongs to an External Cable Kit, NOT include in APS5000 battery carton box. They are in another extra small box. If there is anything missed, please contact dealer. Installation personnel need to process external power cables themselves (2 AWG, peak current capacity 250A, constant 200A) and communication cable for each energy storage system.For the external cables, the length shall less than 3 meters. The PIN pin definitions for energy storage inverters and APS5000 battery systems can be found in Chapter 7.3.

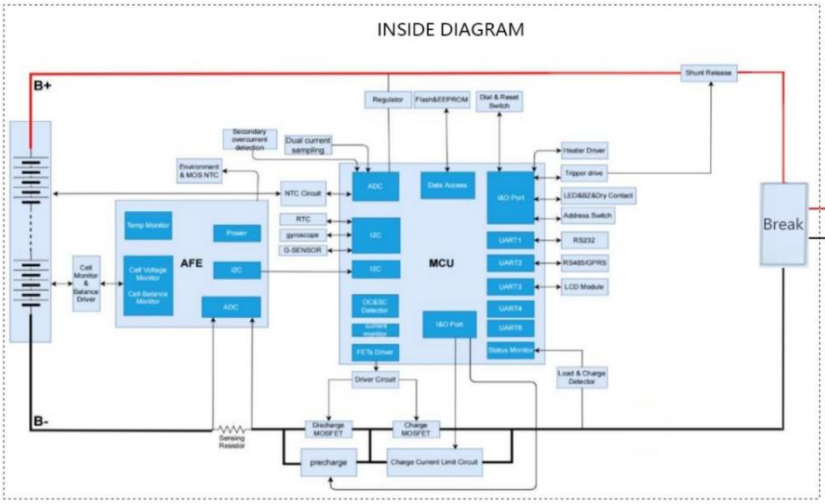
Caution

1) follow local electric safety and installation policy, a suitable disconnection device between APS5000 battery system and inverter could be required.
2) all the installation and operation must follow local electric standard.

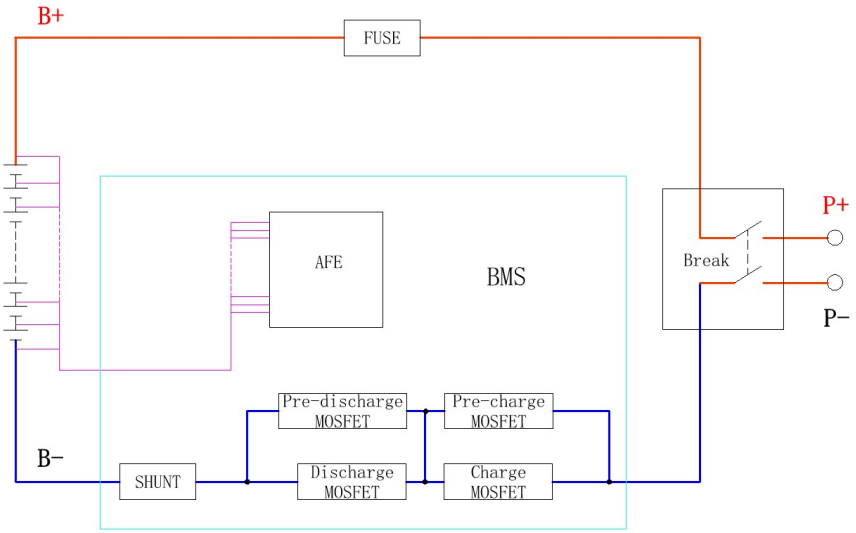
Suitable disconnection device

It is recommended to have a disconnection device for protection between APS5000 battery system and inverter:

1) The rated voltage shall ≥60V DC. Do NOT use AC breaker.
2) The rated current shall match with system design: shall consider:the maximum DC current on inverter side.
3) If using breaker, the type shall be type C (recommended) or type D.
4) The APS5000 battery supply comes with its own DC breaker.



Internal block Diagram A



Internal block Diagram B

Internal schematic Diagram for Breaker

Power off

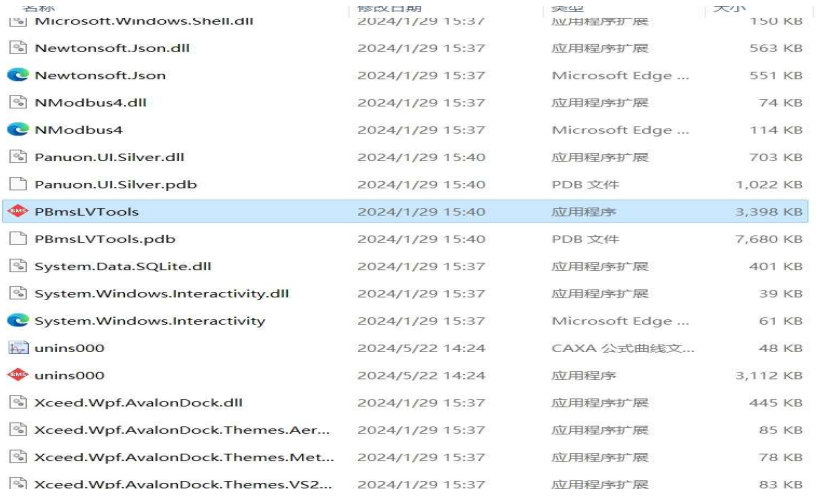
1) Turn external power source off.
2) Press red SW switch of master APS5000 battery. Then all batteries will off.
3) Switch Power switch OFF.
4) Switch APS5000 Breaker OFF .
5) Switch OFF the disconnection device between APS5000 battery system and inverter, if available.

10. Software instructions

10.1 Install the RS232 driver

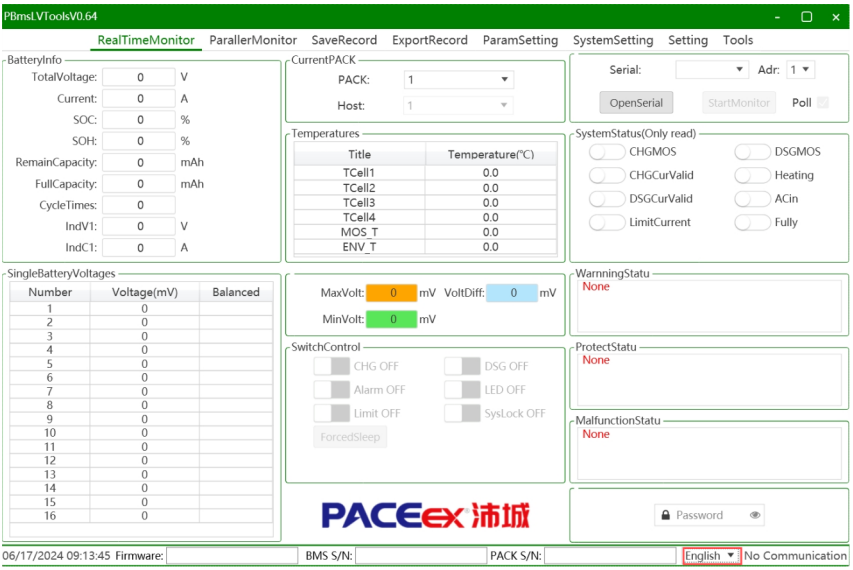
10.2 Unzip the host software package

10.3 After unzip, find and open the software PBmsLVTools in the folder

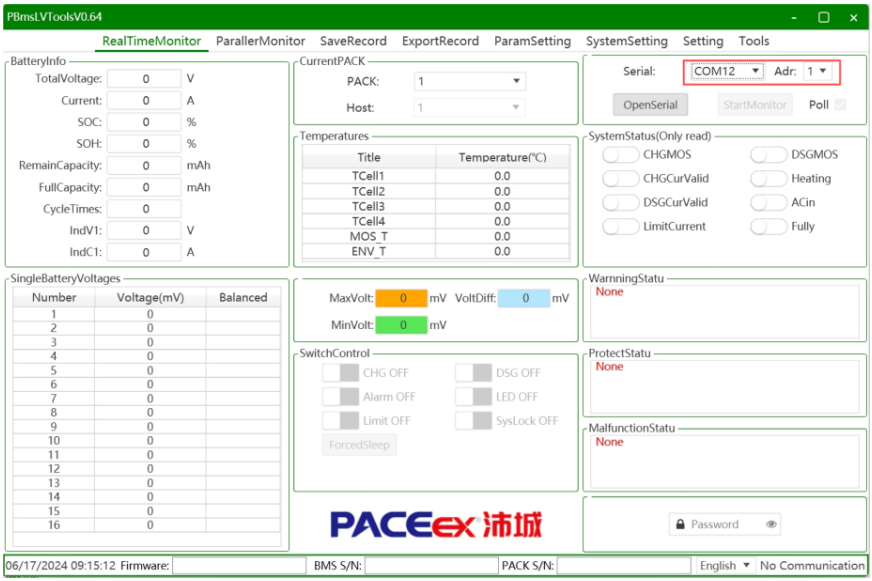


名称	修改日期	类型	大小
Microsoft.Windows.Shell.dll	2024/1/29 15:37	应用程序扩展	150 KB
Newtonsoft.Json.dll	2024/1/29 15:37	应用程序扩展	563 KB
Newtonsoft.Json	2024/1/29 15:37	Microsoft Edge ...	551 KB
NModbus4.dll	2024/1/29 15:37	应用程序扩展	74 KB
NModbus4	2024/1/29 15:37	Microsoft Edge ...	114 KB
Panuon.UI.Silver.dll	2024/1/29 15:40	应用程序扩展	703 KB
Panuon.UI.Silver.pdb	2024/1/29 15:40	PDB 文件	1,022 KB
PBmsLVTools	2024/1/29 15:40	应用程序	3,398 KB
PBmsLVTools.pdb	2024/1/29 15:40	PDB 文件	7,680 KB
System.Data.SQLite.dll	2024/1/29 15:37	应用程序扩展	401 KB
System.Windows.Interactivity.dll	2024/1/29 15:37	应用程序扩展	39 KB
System.Windows.Interactivity	2024/1/29 15:37	Microsoft Edge ...	61 KB
unins000	2024/5/22 14:24	CAXA 公式曲线文...	48 KB
unins000	2024/5/22 14:24	应用程序	3,112 KB
Xceed.Wpf.AvalonDock.dll	2024/1/29 15:37	应用程序扩展	445 KB
Xceed.Wpf.AvalonDock.Themes.Aer...	2024/1/29 15:37	应用程序扩展	85 KB
Xceed.Wpf.AvalonDock.Themes.Met...	2024/1/29 15:37	应用程序扩展	78 KB
Xceed.Wpf.AvalonDock.Themes.VS2...	2024/1/29 15:37	应用程序扩展	83 KB

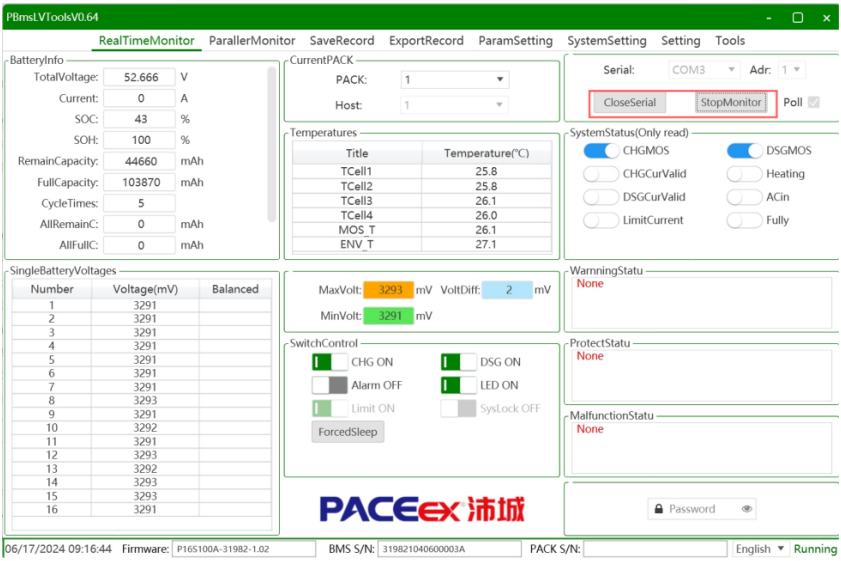
10.4 The main page of the host software



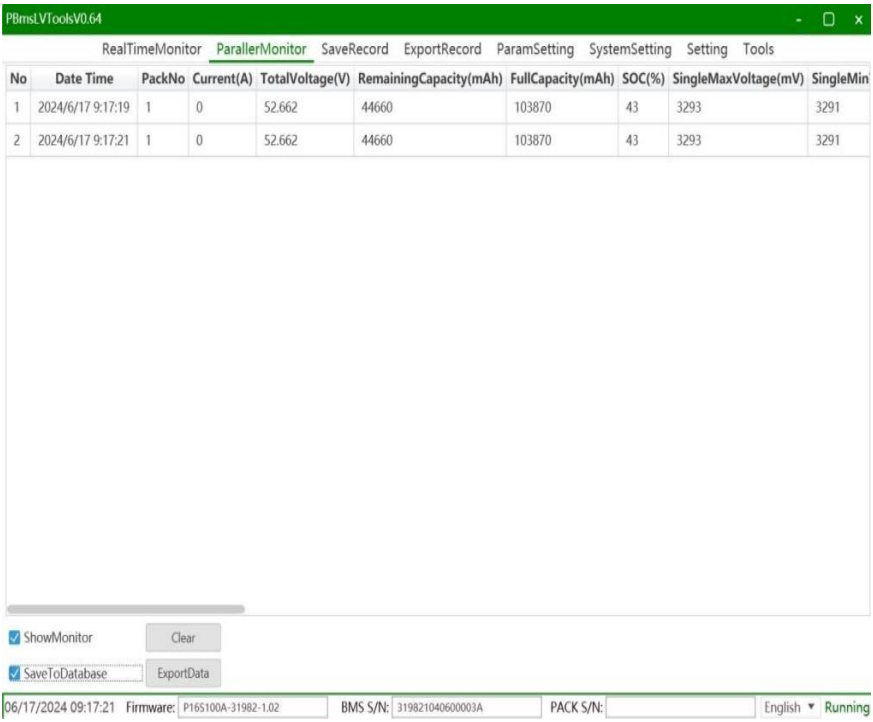
10.5 **Connect the APS5000 battery to the computer using an RS232 communication box,Check the COM port and address information, Adr. Consistent with the DIP switch address of the monitored APS5000 battery.**



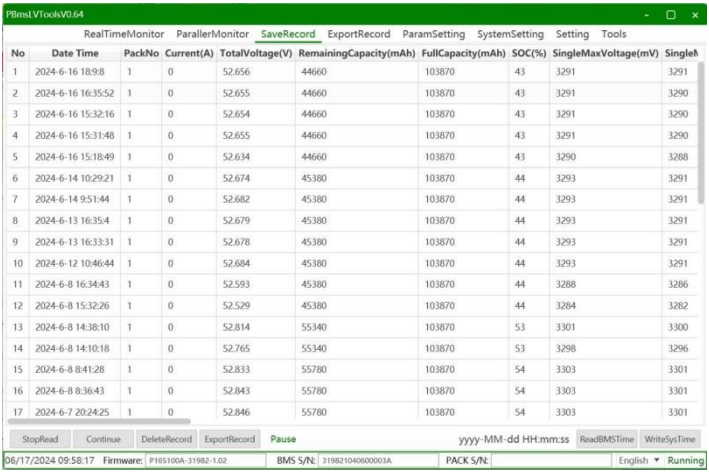
10.6 **First open the serial port ,then start the monitoring. If to view parallel information, select the POLL option.**



10.7 **ParellerMonitor monitors data in real time and supports export. Select ShowMonitor to display the current data, SaveToDatabase to save data, and ExportDate to export the current data.(The current data store has a capacity limit. If the capacity exceeds the limit, old data will be overwrite!)**

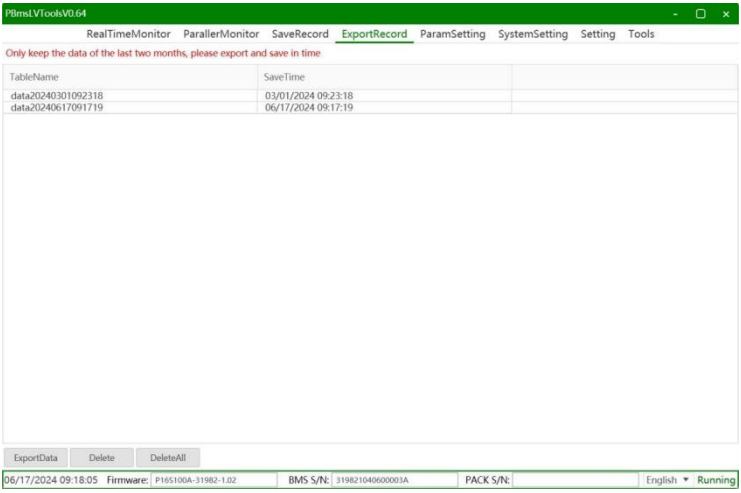


10.8 SaveRecord supports reading BMS stored data and BMS time calibration.

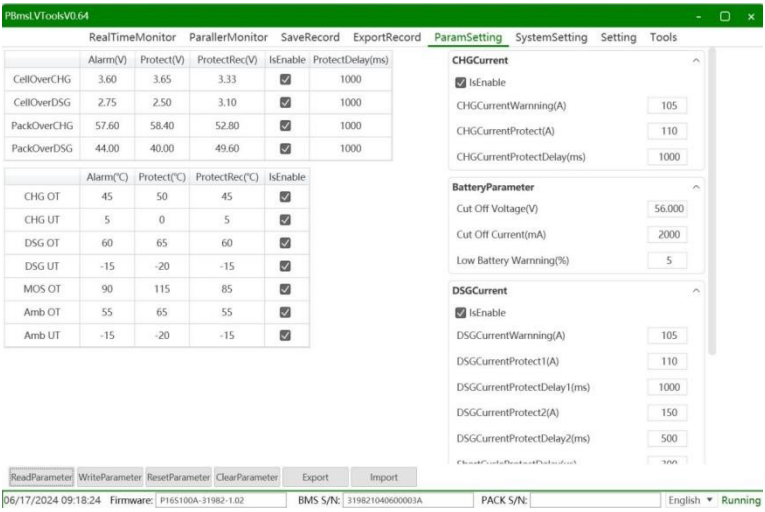


No	Date Time	PackNo	Current(A)	TotalVoltage(V)	RemainingCapacity(mAh)	FullCapacity(mAh)	SOC(%)	SingleMaxVoltage(mV)	SingleM
1	2024-6-16 18:9:8	1	0	52.656	44660	103870	43	3291	3291
2	2024-6-16 16:35:52	1	0	52.655	44660	103870	43	3291	3290
3	2024-6-16 15:32:16	1	0	52.654	44660	103870	43	3291	3290
4	2024-6-16 15:31:48	1	0	52.655	44660	103870	43	3291	3290
5	2024-6-16 15:18:49	1	0	52.634	44660	103870	43	3290	3288
6	2024-6-14 10:29:21	1	0	52.674	45380	103870	44	3293	3291
7	2024-6-14 9:51:44	1	0	52.682	45380	103870	44	3293	3291
8	2024-6-13 16:35:4	1	0	52.679	45380	103870	44	3293	3291
9	2024-6-13 16:33:31	1	0	52.678	45380	103870	44	3293	3291
10	2024-6-12 10:46:44	1	0	52.684	45380	103870	44	3293	3291
11	2024-6-8 16:34:43	1	0	52.593	45380	103870	44	3288	3286
12	2024-6-8 15:32:26	1	0	52.529	45380	103870	44	3284	3282
13	2024-6-8 14:38:10	1	0	52.814	55340	103870	53	3301	3300
14	2024-6-8 14:10:18	1	0	52.765	55340	103870	53	3298	3296
15	2024-6-8 8:41:28	1	0	52.833	55780	103870	54	3303	3301
16	2024-6-8 8:36:43	1	0	52.843	55780	103870	54	3303	3301
17	2024-6-7 20:24:25	1	0	52.846	55780	103870	54	3303	3301

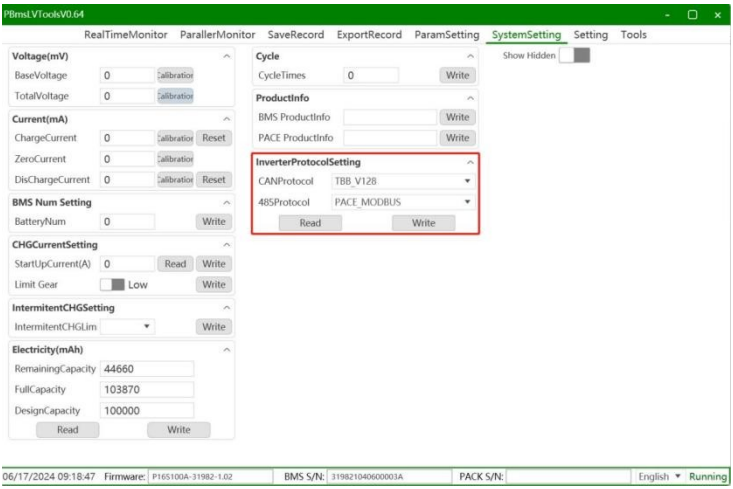
10.9 ExportRecord can view the history of the ExportData operation and choose to export the BMS stored data.



10.10 Parameter Settings You can read and set related parameters.



10.11 System Settings can set system parameters and protocol information.Select the corresponding CAN protocol and RS485 protocol.

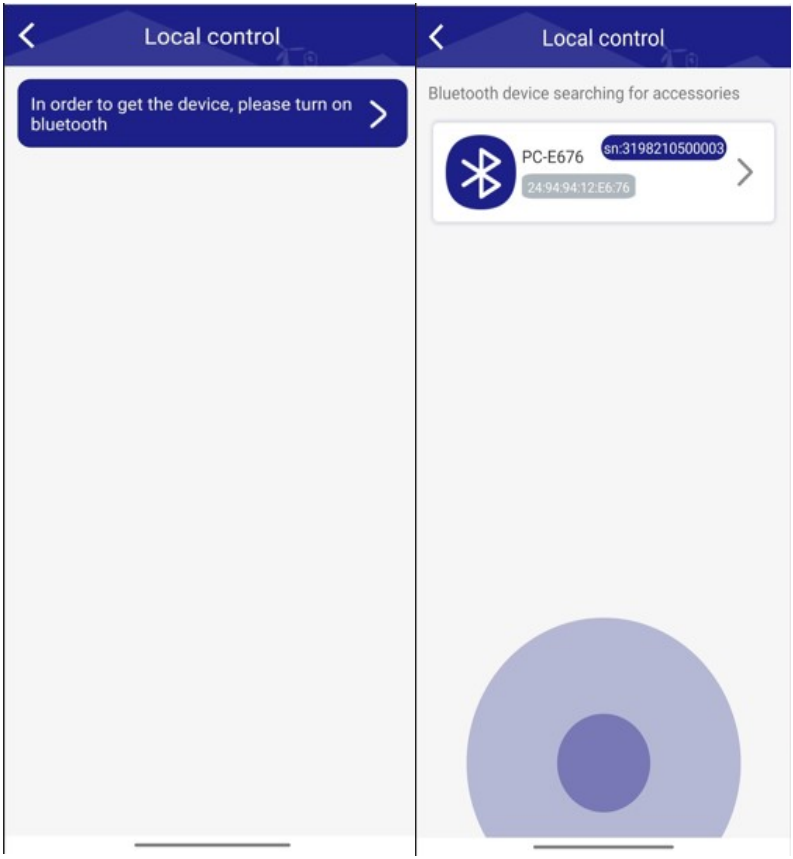


11. Bluetooth WIFI software installation and use instructions

11.1 **unzip software package PaceEX_1.0.52,then Import the apk program in the package to your Android phone.For IOS phones, please search and download the PACEEX BMS software in the Apple Store.**
(Some Android phones may have a protector that changes the file suffix. You can use the Android phone or third-party file management software to modify the file suffix, make sure that the suffix is ' .apk ')

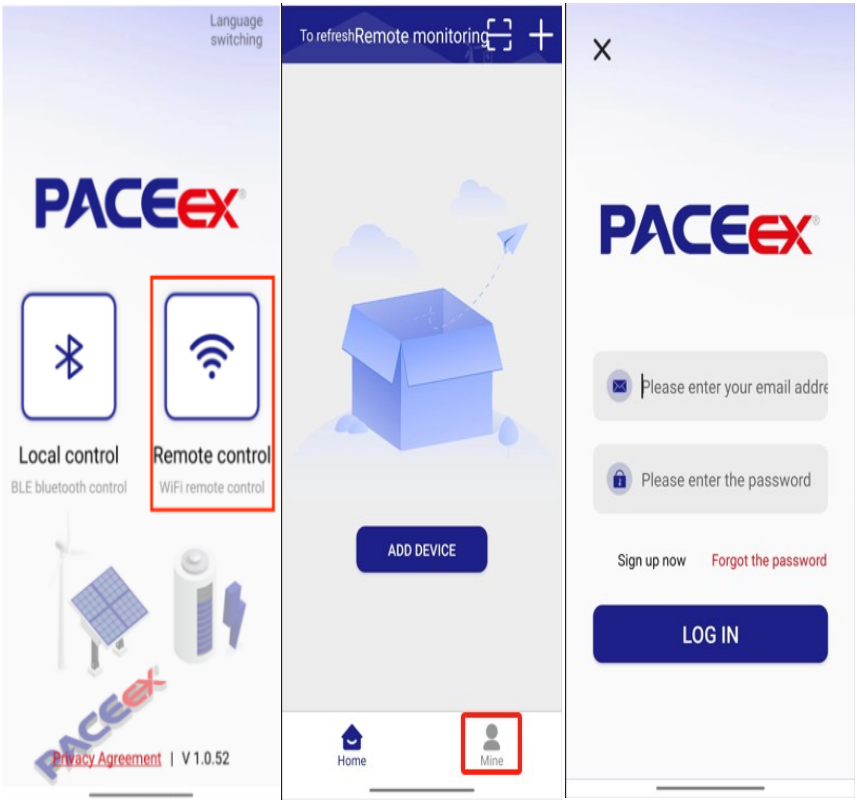
11.2 **The mobile phone software opens the interface.The LOCAL CONTROL is the local Bluetooth connection, and the remote control is the WIFI connection.**
Select Bluetooth connection first.

11.3 **Check that the APS5000 battery SW switch is ON. Turn on the Bluetooth switch of the phone.Select and click the APS5000 battery pack with the corresponding SN code.**



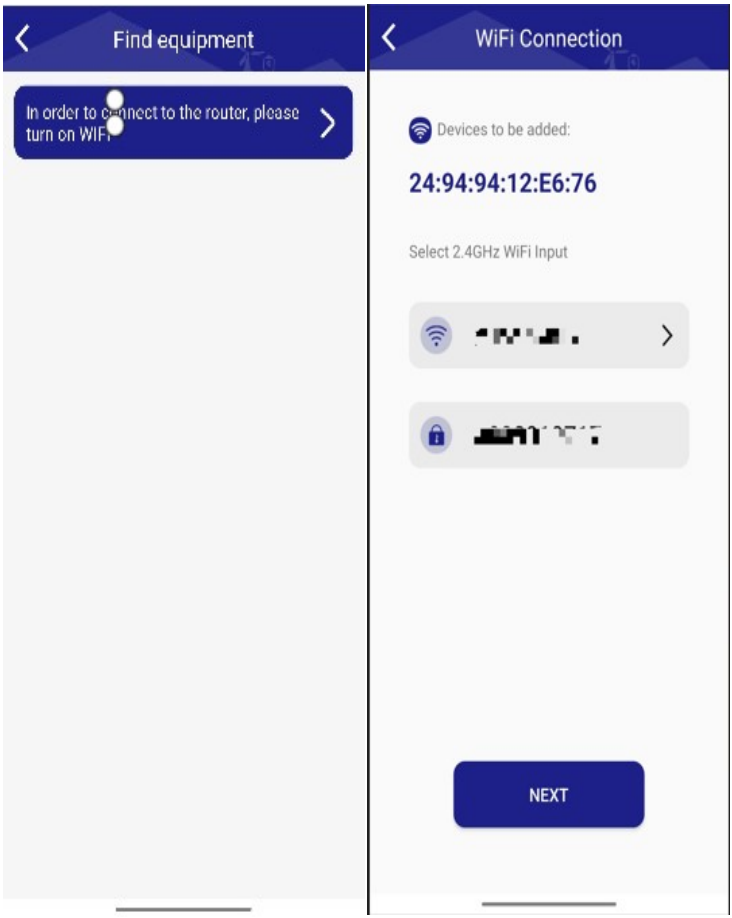
11.4 APS5000 battery information.

11.5 **Return to select wifi connection, you need to register an account using email.**

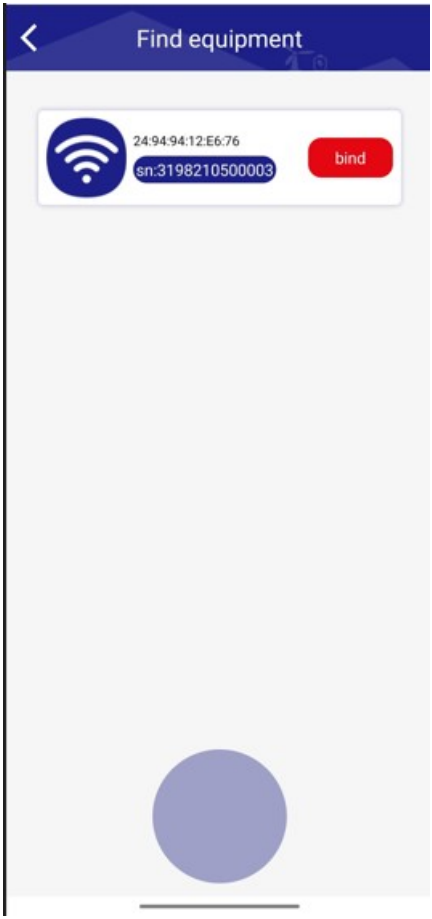


11.6 **After registering and logging in to your account, click Add Device.**

11.7 **Turn on your phone's wifi and connect to wifi.**



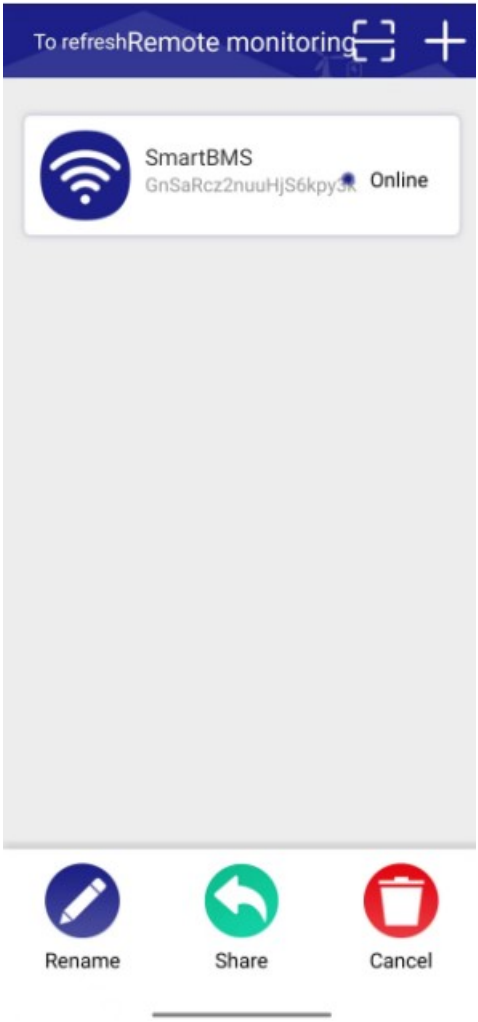
11.8 **Select and click the APS5000 battery pack with the corresponding SN code.After the APS5000 battery is bound to wifi, Bluetooth may not be connected, and other mobile phone accounts cannot be bound to the APS5000 battery.**



11.9 APS5000 battery information.

Advise to use the local wifi network to connect the APS5000 battery pack.

11.10 **Press and hold the APS5000 battery pop-up option to rename, share, or delete the APS5000 battery.**

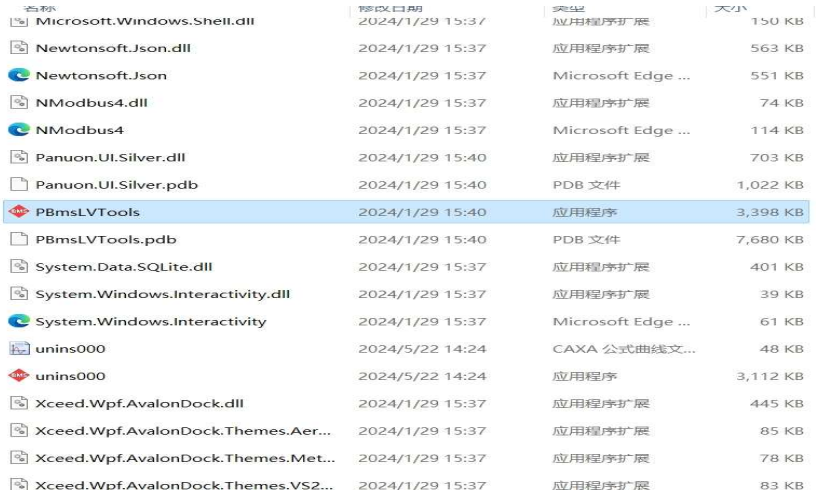


12. APS5000 Software upgrade Description

12.1 Install the RS232 driver

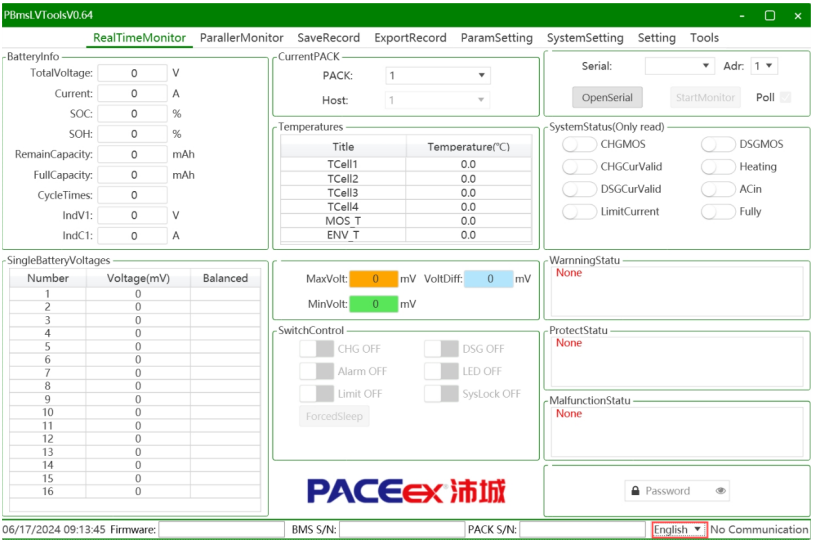
12.2 Unzip the host software package

12.3 After unzip, find and open the software PBmsLVTools in the folder

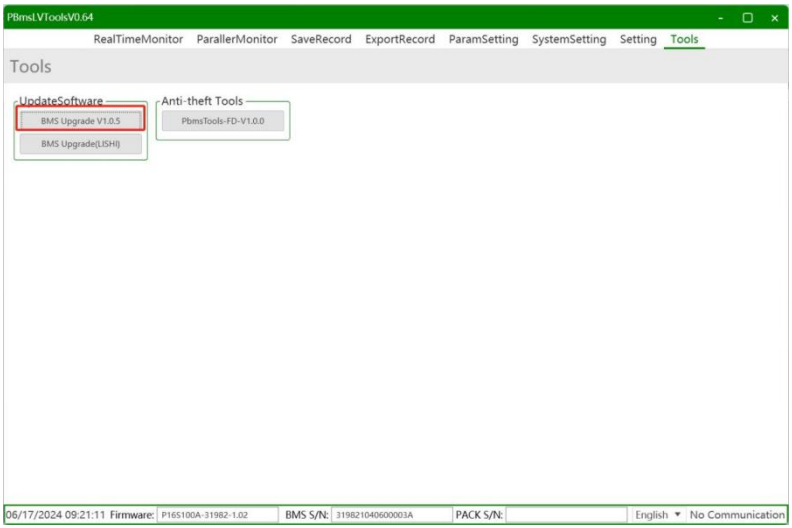


名称	修改日期	类型	大小
Microsoft.Windows.Shell.dll	2024/1/29 15:37	应用程序扩展	150 KB
Newtonsoft.Json.dll	2024/1/29 15:37	应用程序扩展	563 KB
Newtonsoft.Json	2024/1/29 15:37	Microsoft Edge ...	551 KB
NModbus4.dll	2024/1/29 15:37	应用程序扩展	74 KB
NModbus4	2024/1/29 15:37	Microsoft Edge ...	114 KB
Panuon.UI.Silver.dll	2024/1/29 15:40	应用程序扩展	703 KB
Panuon.UI.Silver.pdb	2024/1/29 15:40	PDB 文件	1,022 KB
PBmsLVTools	2024/1/29 15:40	应用程序	3,398 KB
PBmsLVTools.pdb	2024/1/29 15:40	PDB 文件	7,680 KB
System.Data.SQLite.dll	2024/1/29 15:37	应用程序扩展	401 KB
System.Windows.Interactivity.dll	2024/1/29 15:37	应用程序扩展	39 KB
System.Windows.Interactivity	2024/1/29 15:37	Microsoft Edge ...	61 KB
unins000	2024/5/22 14:24	CAXA 公式曲线文...	48 KB
unins000	2024/5/22 14:24	应用程序	3,112 KB
Xceed.Wpf.AvalonDock.dll	2024/1/29 15:37	应用程序扩展	445 KB
Xceed.Wpf.AvalonDock.Themes.Aer...	2024/1/29 15:37	应用程序扩展	85 KB
Xceed.Wpf.AvalonDock.Themes.Met...	2024/1/29 15:37	应用程序扩展	78 KB
Xceed.Wpf.AvalonDock.Themes.VS2...	2024/1/29 15:37	应用程序扩展	83 KB

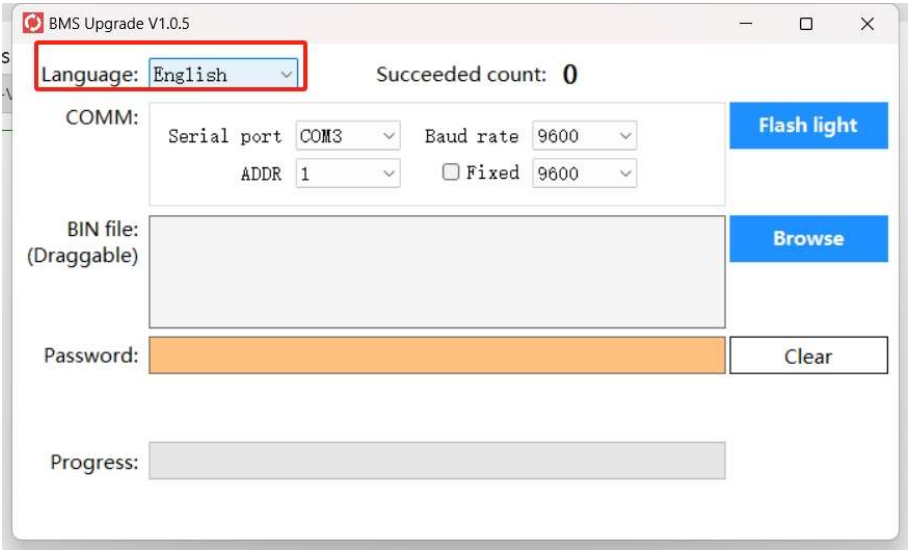
12.4 **Check that the serial port switch of the host software is turned off.**



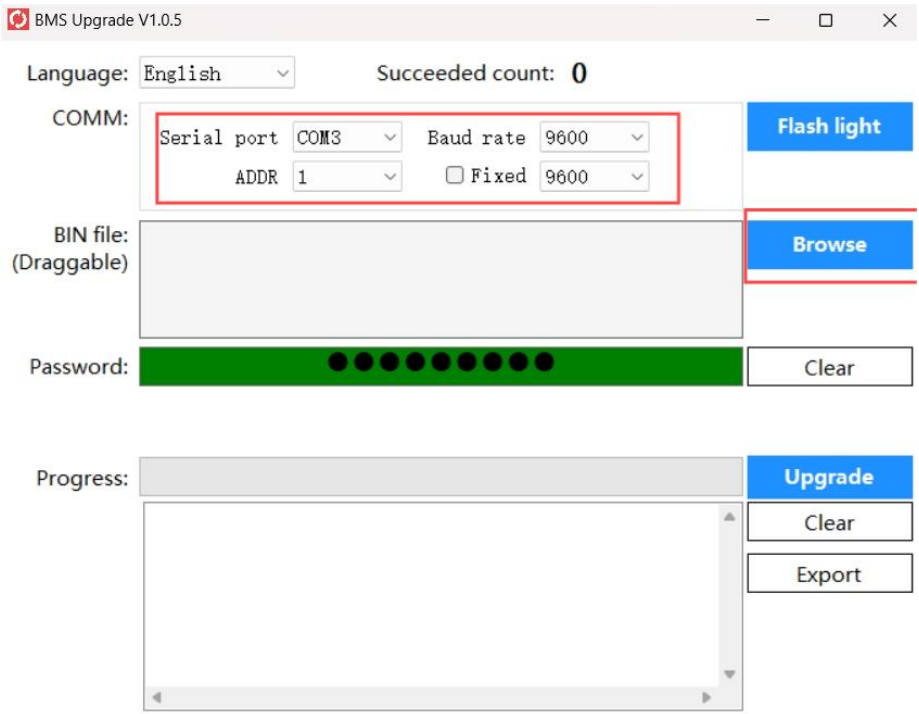
12.5 **Click on the Tools note.Click to open BMS upgrade V1.0.5.**



12.6 **Select English as the language.**

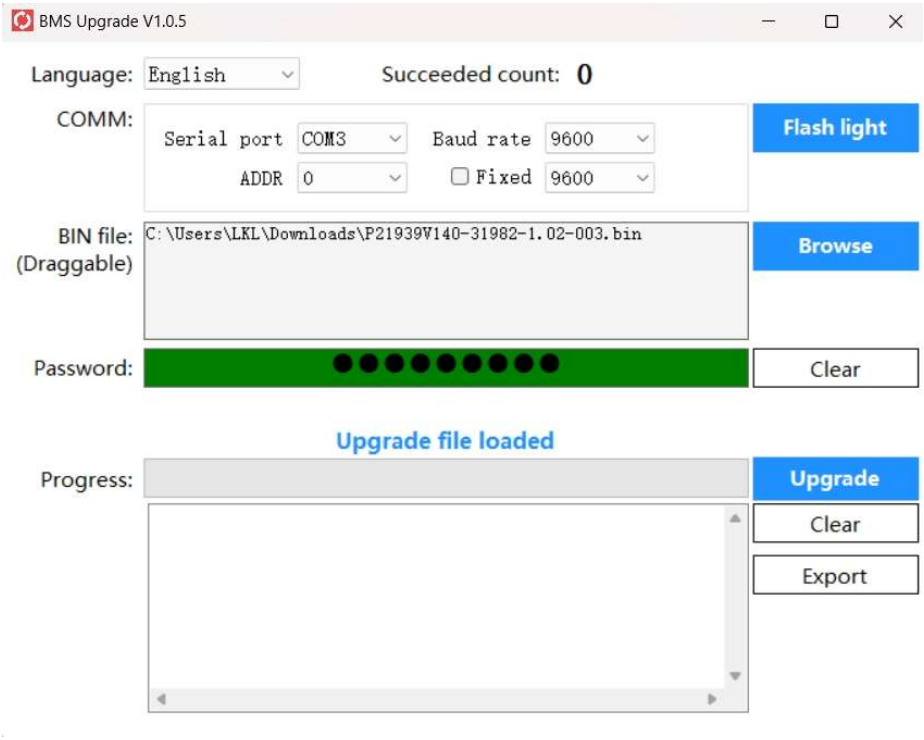


12.7 **Connect the APS5000 battery to the computer using an RS232 communication box,Check the COM port and address information,Consistent with the DIP switch address of the monitored APS5000 battery.The baud rate is 9600.Then click browse to query the local upgrade package.**

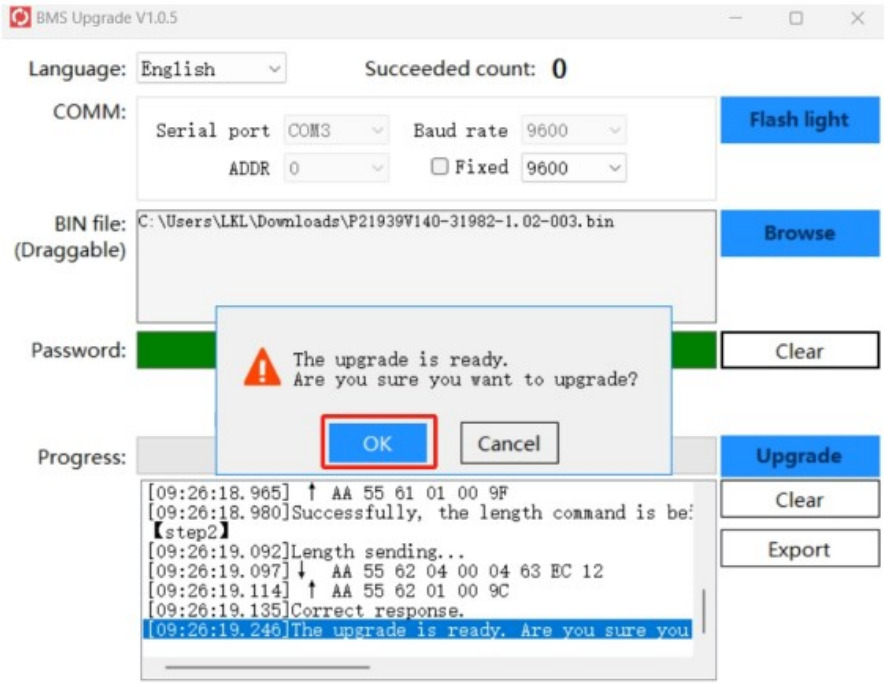


12.8 Local upgrade package

12.9 Select the upgrade package, click OK, enter the upgrade password in the password box, and click Upgrade.(Please contact us for upgrade password.)



12.10 **After the upgrade package is correct, click OK to start the upgrade. Do not power off or interrupt communication during the upgrade.**



13. Trouble shooting

13.1 Communication related problem

Unable to communicate with inverter on compatible list.

Possible conditions:

1) Check if the communication mode of the energy storage inverter is the same between RS485/CAN and APS5000

2) CAN: pin. Try connects the CAN-H, L, GND only and do not connect other pins to inverter. Using the correct cable.

13.2 Functional related problem

1) Whether the APS5000 battery can be turned on or not.

2) If APS5000 battery is turned on, check the red light is off, flashing or lighting.

3) If the red light is off, check whether the APS5000 battery can be charged/discharged or not.

Possible conditions:

1) APS5000 battery cannot turn on, switch ON and press the red SW the lights are all no lighting or flashing.

a) Capacity too low, or module over discharged.

solution: use a charge or inverter to provide 48-57V voltage. If APS5000 battery can start, then keep charge the module and use monitor tools to check the APS5000 battery log.

If APS5000 battery terminal voltage is ≤48 Vdc, please use ≤0.05C to slowly charge the module to avoid affect to SOH. If APS5000 battery terminal voltage is >48Vdc, it can use ≤0.5C to charge.

If APS5000 battery cannot start, turn off APS5000 battery and repair.

2) The APS5000 battery can turn on, but red light is lighting, and cannot charge or discharge. If the red light is lighting, that means system is abnormal, please check values as following

a) Temperature: Above 60°C or under -10°C, the APS5000 battery could not work.

Solution: to move APS5000 battery to the normal operating temperature range between 0°C and 50°C.

b) Current: If current exceeds 100A, APS5000 battery protection will turn on.

Solution: Check whether current is too large or not, if it is, change the settings on power supply side.

c) High Voltage: If charging voltage above 58.4V, APS5000 battery protection will turn on. Solution: Check whether voltage is too high or not, if it is, to change the settings on power supply side. And discharge the module.

d) Low Voltage: When the APS5000 battery discharges to 40V or less, APS5000 battery protection will turn on.

Solution: Charge the APS5000 battery till the red light turns off.

e) Cell voltage high. The module voltage is lower than 57V, SOC LED does not all on. When discharge the module protection disappear.

Solution: keep charge the module by 56-58V or keep the system cycle. The BMS can balance the cell during cycling.

3) Unable to charge and discharge with red LED on. The temperature is 0~50 degree. Use charger to charge, not possible. Use load to discharge, not possible.

4) Under permanent protection. The single cell voltage has been higher than 3.65 or lower than 2 or temperature higher than 80 degrees. Solution: Switch off the module and contact your local distributor for repair.

5) Unable to charge and discharge without red LED on. The temperature is 0~50 degree. Use charger to charge, not possible. Use load to discharge, not possible.

6) Fuse broken.

Solution: Switch off the module and contact your local distributor for repair.

7） After switch On, the module turns on directly BMS failure.

Solution: Switch off the module and contact your local distributor.

Excluding the points above, if the faulty still cannot be located, turn off APS5000 battery and contact your local distributor.

14. Emergency Situations

14.1 Leaking Batteries

If the APS5000 battery pack leaks electrolyte, avoid contact with the leaking liquid or gas. If one is exposed to the leaked substance, immediately perform the actions described below.

a) Inhalation: Evacuate the contaminated area and seek medical attention.

b) Contact with eyes: Rinse eyes with flowing water for 15 minutes and seek medical attention as soon as possible.

c) Contact with skin: Wash the affected area thoroughly with soap and water and seek medical attention.

Ingestion: Induce vomiting and seek medical attention.

14.2 Fire

If detect the APS5000 battery cell is catching fire, firstly cut off the external power source. Then use vast of water for suppression. After fire suppressed, soaking APS5000 battery within water and contact Pylontech or an authorized dealer. If detect the cabling or other components (not APS5000 battery cell) is catching fire. Firstly, cut off the external power source. Then use dry powder fire or carbon dioxide extinguisher for suppression.

14.3 Wet Batteries

If the APS5000 battery pack is wet or submerged in water, do not let people access it, and then contact AESON POWER or an authorized dealer for technical support. Cut off all power switch on inverter side.

14.4 Damaged Batteries

Damaged batteries are dangerous and must be handled with the utmost care. They are not fit for use and may pose a danger to people or property. If the APS5000 battery pack seems to be damaged, pack it in its original container, and then return it to AESON POWER or an authorized dealer.

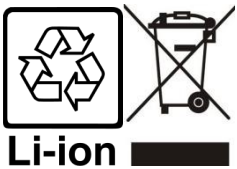
 Caution

Damaged batteries may leak electrolyte or produce flammable gas.

15. Remarks

Recycle and disposal.

In case a APS5000 battery (normal condition or damaged) needs disposal or needs recycling, it shall follow the local recycling regulation and using the best available techniques to achieve a relevant recycling efficiency.



Storage, Maintenance and Expansion

1) Disconnect the power supply when the battery is in maintenance or not in use to reduce power loss.

2) Before the APS5000 battery stored, it's suggested charged to 40% SOC.

When the storage time reaches 6 months,the APS5000 battery should full-discharge

And full-charged once.Then start using or continue to store.

3) Every year after installation. The connection of power connector, grounding point, power cable and screw are suggested to be checked. Make sure there is no loose, no broken, no corrosion at connection point. Check the installation environment such as dust, water, insect etc. make sure it is suitable for IP20 APS5000 battery system.

Aeson Power Pty Ltd

Phone: +61 03 9545 5993

Email: info@aesonpower.com.au

Addres: 63-67 Smeaton Ave Dandenong South VIC 3175