ALPHA 5 PRO LiFePO$_4$ Battery

User Manual



MODEL: ALPHA 5 PRO

THIS MANUAL CONTAINS IMPORTANT SAFETY AND OPERATING INSTRUCTIONS FOR LiFePO$_4$ BATTERY. PLEASE READ THIS MANUAL AND FOLLOW THE INSTRUCTIONS EXACTLY.

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Safety Precautions

Before installing or using the battery, it is very important and necessary to read the user manual (placed in the package accessories) carefully. Failure to do so or to follow any instructions or warnings in this document may result in electric shock, serious injury or death, or damage to the battery rendering it unusable.

Follow these instructions and keep them near your lithium battery for future reference!

For more information about this product, please visit the official website: www.richsolar.com

Work on a lithium battery should be carried out by qualified personnel only.

1. General warnings

While working on the lithium battery, wear protective eyeglasses and clothing.

Any uncovered battery material such as electrolyte or powder on the skin or in the eyes must be flushed with plenty of clean water immediately. Then seek medical assistance. Spillages on clothing should be rinsed out with water.

Explosion and fire hazard. Terminals of the lithium battery are always active; therefore, do not place items or tools on the lithium battery. Avoid short circuits, too deep discharges and too high charge currents. Use insulated tools. Do not wear any metallic items such as watches, bracelets, etc. In case of fire, you must use a type D, foam, or CO_2 fire extinguisher.

Do not open or dismantle the battery. Electrolyte is very corrosive. In normal working conditions contact with the electrolyte is impossible. If the battery casing is damaged, do not touch the exposed electrolyte or powder.

Lithium batteries are heavy. If involved in an accident they can become a projectile! Ensure adequate and secure mounting and always use suitable handling equipment for transportation.



The charging device must be connected when the device is turned on, otherwise the battery damage may be caused.



Do not expose cable outside, all the battery terminals must be disconnected for maintenance.



Do not place at a children or pet touchable area.



Do not expose battery to flammable or harsh chemicals or vapors.



If the charging equipment fails, please turn off the equipment immediately until the charging equipment is removed.



Do not paint any part of battery; include any internal or external components.



Do not drop, deform, impact, cut or spearing with a sharp object.



When the equipment is stored for a long time, shut it down and perform a standard charge and discharge every 3 months.



Do not use a damaged battery.



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



Any foreign object is prohibited to insert into any part of battery.



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



Equipment installation should be more than 10 kilometers away from the seaside, and should be installed on the back of the sea breeze.



Users must follow the above precautions, or they will lose the warranty treaty.

2. Charge and discharge warnings

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

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

Do not connect battery with PV solar wiring directly.

If charged after the lithium battery was discharged below the “Discharge cut-off voltage”, or when the lithium battery is damaged or overcharged, the lithium battery can release a harmful mixture of gases such as phosphate.

The temperature range over which the battery can be charged is 0°C to 60°C (32°F to 140°F). Charging the battery at temperatures outside this range may cause severe damage to the battery or reduce battery life expectancy.

The temperature range over which the battery can be discharged is -20°C to 65°C(-4°F to 149°F). Discharging the battery at temperatures outside this range may cause severe damage to the battery or reduce battery life expectancy.

3. Transportation warnings

The battery must be transported in its original or equivalent package. If the battery is inside its package, use soft slings to avoid damage.

Do not stand below a battery when it is hoisted.

Never lift the battery at the terminals or the BMS communication cables, only lift the battery at the handles.

NOTE:

- Batteries are tested according to UN Handbook of Tests and Criteria, part III, sub section 38.3 (ST/SG/AC.10/11/Rev.5).
- For transport the batteries belong to the category UN3480, Class 9, Packaging Group II and have to be transported according to this regulation. This means that for land and sea transport (ADR, RID & amp; IMDG) they have to be packed according to packaging instruction P903 and for air transport (IATA) according to packaging instruction P965. The original packaging complies with these instructions.

4. Disposal of lithium batteries



Batteries marked with the recycling symbol must be processed via a recognized recycling agency. By agreement, they may be returned to the manufacturer.



Batteries must not be mixed with domestic or industrial waste.



Do not throw a battery into fire.

5. Before connecting

• After unpacking, please check product and packing list first, 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 off mode.
• Wiring must be correct, do not mistake the positive and negative cables, and ensure no short circuit with the external device.
• It is prohibited to connect the battery and AC power directly.
• The embedded BMS in the battery is designed for 51.2VDC, please **DO NOT** connect battery in series.
• Battery system must be well grounded and the resistance must be less than 4Ω.
• Make sure the grounding connection set correctly before operation.
• Please ensured the electrical parameters of battery system are compatible to related equipment.
• Keep the battery away from water and fire.

6. In using

• If the battery system needs to be moved or repaired, the power must be cut off and the battery is completely shutdown;
• It is prohibited to connect the battery with different type of battery;
• It is prohibited to put the batteries working with faulty or incompatible inverter;
• It is prohibited to disassemble the battery (QC tab 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 staffs from RICH SOLAR or authorized by RICH SOLAR. 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.

Introduction

Compact Series lithium iron phosphate battery is one of new energy storage products developed and produced by RICH SOLAR, it can be used to support reliable power for various types of equipment and systems. Compact Series is especially suitable for application scene of high power, limited installation space, and restricted load-bearing and long cycle life.
Compact Series has built-in BMS (battery management system), which can manage and monitor cells information including voltage, current and temperature. What's more, BMS can help extending cycle life by balancing cells during charging and discharging. Multiple batteries are allowed to be connected in parallel to expand capacity and power to meet the requirements of longer power supporting duration and higher power consumption.

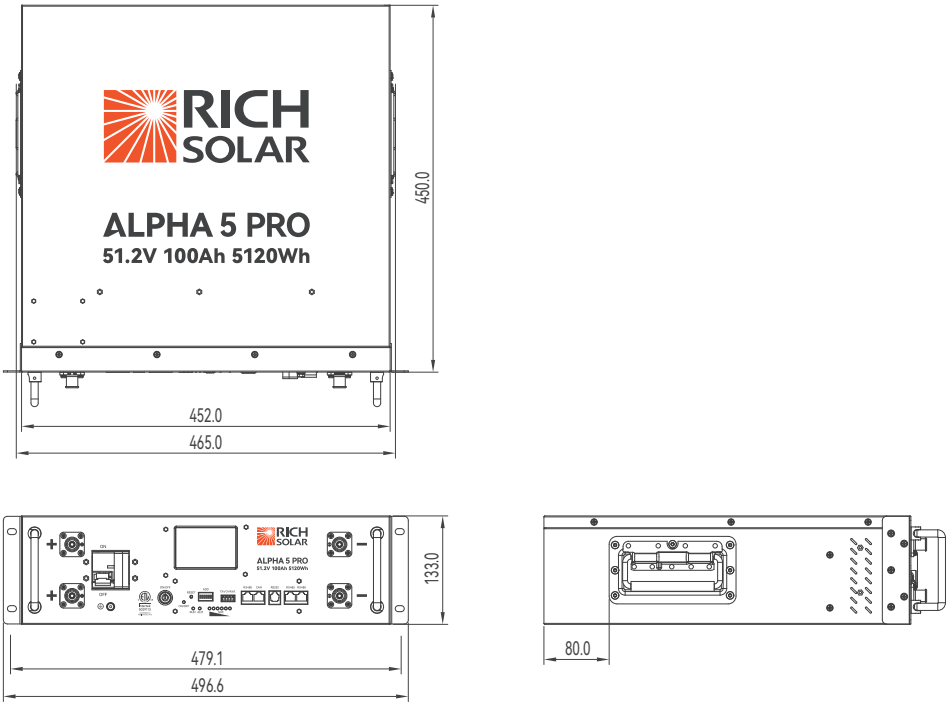
1. Lithium iron phosphate battery

The lithium iron phosphate battery ($LiFePO_4$ or LFP) is the safest of the mainstream lithium battery types. A single LFP cell has a nominal voltage of 3.2V. A 51.2V LFP battery consists of 16 cells connected in series.
LFP is the chemistry of choice for very demanding applications. Some of its features are:
• High energy density - More capacity with less weight and volume.
• High charge and discharge currents - Fast charge and discharges are possible.
• Flexible charge voltages.
The lithium iron phosphate battery is therefore the chemistry of choice for a range of very demanding applications.

2. Compact Series features

• Cathode material is made from $LiFePO_4$ with safety performance and long cycle life;
• Battery management system (BMS) has protection functions including over-discharge, over-charge, and over-current and high/low temperature;
• The system can automatically manage charge and discharge state and balance current and voltage of each cell;
• Adopted self-cooling mode rapidly reduced system entire noise;
• The module has less self-discharge, up to 3 months without charging it on shelf, no memory effect, excellent performance of shallow charge and discharge;
• The working temperature range is from -20℃ to 60℃ (-4°F to 140°F), the charging temperature range is from 0℃ to 60℃ (32°F to 140°F), and the discharging temperature range is from -20℃ to 65℃ (-4°F to 149°F). The battery offers excellent discharge performance and an extended cycle life.
• Equipped with monitoring LCD display, can provide basic data visualization, more convenient for users to observe the operation of the system.

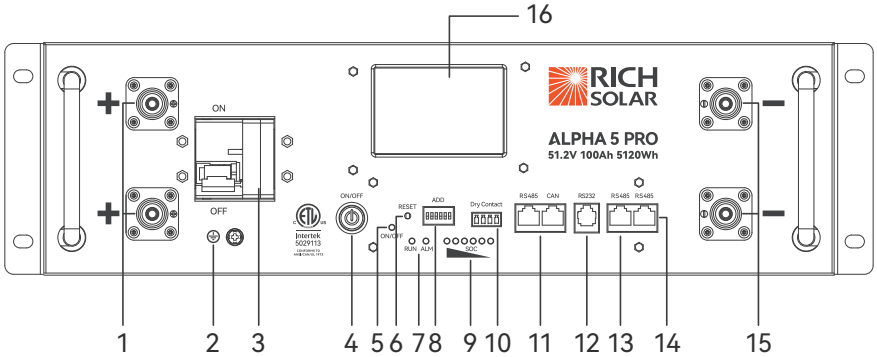
3. Specifications



Outline dimensional drawing

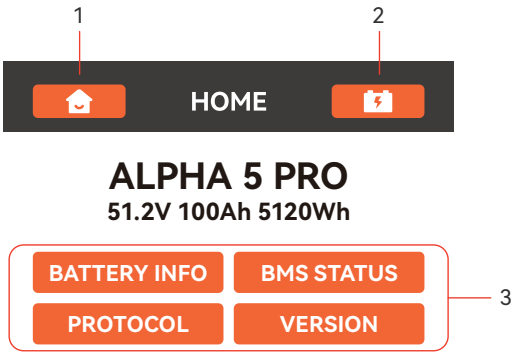
NO.	Items	Parameters
1	Cell Model	100Ah/3.2V
2	Combination Mode	16S1P
3	Nominal Capacity (Ah)	100
4	Nominal Energy (Wh)	5120
5	Initial Internal Resistance (mΩ)	<50
6	Rated Voltage (V)	51.2
7	Max. Charge Voltage (V)	57.6
8	Discharge Cut-off Voltage (V)	40
9	Charge Current (A)	20
10	Max. Charge Current (A)	100
11	Standard Discharge Current (A)	50
12	Max. Discharge Current (A)	100
13	Charge Temperature	0℃~60℃ (32°F~140°F)
14	Discharge Temperature	-20℃~65℃ (-4°F~149°F)
15	Shell Type	Sheet metal casing
16	Weight	45.8kg/100.9lb
17	Dimension	452*450*133mm/17.8*17.7*5.2in

4. Equipment interface instruction



Interface definition

NO.	Name	Model	Remarks
1	Battery Positive	ESS-120A-25-B/S-OR-00	Orange
2	Grounding	/	/
3	Air Switch/Decoupling Device	NDB1-125/1_2_MX+OF	/
4	Switch	/	/
5	ON/OFF Switch Indicator Light	/	/
6	Reset	/	/
7	Run Alm	/	/
8	ADD (DIP Switch)	/	/
9	SOC (State Of Charge Indicator Light)	/	/
10	Dry Contact	/	/
11	RS485/CAN (PCs Communication Interface)	/	/
12	RS232 (PC Communication Interface)	/	/
13	RS485 Upload Parallel Communication	/	/
14	RS485 Download Parallel Communication	/	
15	Battery Negative	ESS-120A-25-B/S-BK-00	Black
16	LCD (Touch Panel)	/	



NO.	Name
1	Home
2	Battery status
3	Navigation bar

5. LED indication instructions

LED working status indication

State	Normal/ Alarm/ Protection	ON/OFF	RUN	ALM	L6	L5
		●	●	●	●	●
Shutdown	Sleep	Dark	Dark	Dark	Dark	Dark
Bide	Normal	Bright	Flashing1	Dark		
	Alarm	Bright	Flashing1	Flashing3		
Charge	Normal	Bright	Bright	Dark		
	Alarm	Bright	Bright	Flashing3		
	Overcharge Protection	Bright	Bright	Dark	Bright	Bright
	Temperature, Overcurrent, Fail-safe Protection	Bright	Dark	Bright	Dark	Dark
Discharge	Normal	Bright	Flashing3	Dark		
	Alarm	Bright	Flashing3	Flashing3		
	Undervoltage Protection	Bright	Dark	Dark	Dark	Dark
	Temperature, Overcurrent, Short circuit, Reverse polarity, Failure protection	Bright	Dark	Bright	Dark	Dark
Lapse		Dark	Dark	Bright	Dark	Dark

Capacity indication

State		Charge				
SOC indicator		L6	L5	L4	L3	L2
		●	●	●	●	●
SOC	0%~17%	Dark	Dark	Dark	Dark	Dark
	18%~33%	Dark	Dark	Dark	Dark	Flashing2
	34%~50%	Dark	Dark	Dark	Flashing2	Bright
	51%~66%	Dark	Dark	Flashing2	Bright	Bright
	67%~83%	Dark	Flashing2	Bright	Bright	Bright
	84%~100%	Flashing2	Bright	Bright	Bright	Bright
Running indicator ●		Bright				

SOC indicator LED				Remarks
L4	L3	L2	L1	
●	●	●	●	
Dark	Dark	Dark	Dark	Dark
As directed by the SOC				Standby state
				Module low voltage
As directed by the SOC (SOC indicates up to LED flashing 2)				The maximum battery LED flashes (flashes 2), and the ALM does not flash when the overcharge alarm is alarmed
Bright	Bright	Bright	Bright	If there is no mains power, the indicator light will turn to standby
Dark	Dark	Dark	Dark	Downtime status
As directed by the SOC				
Dark	Dark	Dark	Dark	Stop discharging
Dark	Dark	Dark	Dark	Stop discharging
Dark	Dark	Dark	Dark	Stop charging and discharging

	Discharge					
L1	L6	L5	L4	L3	L2	L1
●	●	●	●	●	●	●
Flashing2	Dark	Dark	Dark	Dark	Dark	Bright
Bright	Dark	Dark	Dark	Dark	Bright	Bright
Bright	Dark	Dark	Dark	Bright	Bright	Bright
Bright	Dark	Dark	Bright	Bright	Bright	Bright
Bright	Dark	Bright	Bright	Bright	Bright	Bright
Bright	Bright	Bright	Bright	Bright	Bright	Bright
	Flashing3					

LED flashing instructions

Flashing mode	Bright	Dark
Flashing1	0.25S	3.75S
Flashing2	0.5S	0.5S
Flashing3	0.5S	1.5S

Note: The LED indicator alarm can be enabled or disabled by the host computer, and the factory default is enabled.

Power switch

The power switch is a key self-locking switch, press to turn on, and the display will light up. When you need to shut down, press the switch again, the display will be off, the BMS will standby, and there will be no power output.

Display screen

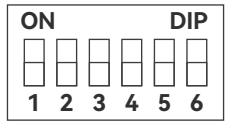
The interface can observe the operation status information SOC, battery voltage, alarm fault indication, charging and discharging status display and system status indication of the whole system.

Dry contact

Dry contact 1
PIN1 to PIN2: Normally open contact, closed during fault or protection.
Dry contact 2
PIN3 to PIN4: Normally open contact, closed during alarm status.

Address dial switch

ADD Switch: 6 ADD switches, “0”and “1”, refer to picture at right. The settings will be active only after restart the battery.
When the battery communicates with the inverter, the address of the battery pack must be set to 1, and the address of the parallel slave should be greater than 1.
When the battery pack is connected in parallel, cascading communication is required. Hardware address configuration is required for both the master Pack and the slave Pack, and the hardware address can be set by the dial switch on the board. The definition of the switch refers to the table below.

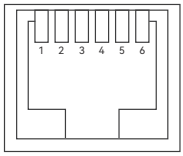
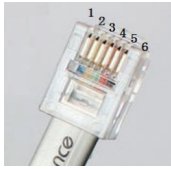


Address coding	Dial code switch position					
	#1	#2	#3	#4	#5	#6
0	OFF	OFF	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF	OFF	OFF
2	OFF	ON	OFF	OFF	OFF	OFF
3	ON	ON	OFF	OFF	OFF	OFF
4	OFF	OFF	ON	OFF	OFF	OFF
5	ON	OFF	ON	OFF	OFF	OFF
6	OFF	ON	ON	OFF	OFF	OFF
7	ON	ON	ON	OFF	OFF	OFF
8	OFF	OFF	OFF	ON	OFF	OFF
9	ON	OFF	OFF	ON	OFF	OFF
10	OFF	ON	OFF	ON	OFF	OFF
11	ON	ON	OFF	ON	OFF	OFF
12	OFF	OFF	ON	ON	OFF	OFF
13	ON	OFF	ON	ON	OFF	OFF
14	OFF	ON	ON	ON	OFF	OFF
15	ON	ON	ON	ON	OFF	OFF
16	OFF	OFF	OFF	OFF	ON	OFF
17	ON	OFF	OFF	OFF	ON	OFF
18	OFF	ON	OFF	OFF	ON	OFF
19	ON	ON	OFF	OFF	ON	OFF
20	OFF	OFF	ON	OFF	ON	OFF
21	ON	OFF	ON	OFF	ON	OFF
22	OFF	ON	ON	OFF	ON	OFF
23	ON	ON	ON	OFF	ON	OFF
24	OFF	OFF	OFF	ON	ON	OFF
25	ON	OFF	OFF	ON	ON	OFF
26	OFF	ON	OFF	ON	ON	OFF
27	ON	ON	OFF	ON	ON	OFF
28	OFF	OFF	ON	ON	ON	OFF
29	ON	OFF	ON	ON	ON	OFF
30	OFF	ON	ON	ON	ON	OFF

	#1	#2	#3	#4	#5	#6
31	ON	ON	ON	ON	ON	OFF
32	OFF	OFF	OFF	OFF	OFF	ON
33	ON	OFF	OFF	OFF	OFF	ON
34	OFF	ON	OFF	OFF	OFF	ON
35	ON	ON	OFF	OFF	OFF	ON
36	OFF	OFF	ON	OFF	OFF	ON
37	ON	OFF	ON	OFF	OFF	ON
38	OFF	ON	ON	OFF	OFF	ON
39	ON	ON	ON	OFF	OFF	ON
40	OFF	OFF	OFF	ON	OFF	ON
41	ON	OFF	OFF	ON	OFF	ON
42	OFF	ON	OFF	ON	OFF	ON
43	ON	ON	OFF	ON	OFF	ON
44	OFF	OFF	ON	ON	OFF	ON
45	ON	OFF	ON	ON	OFF	ON
46	OFF	ON	ON	ON	OFF	ON
47	ON	ON	ON	ON	OFF	ON
48	OFF	OFF	OFF	OFF	ON	ON
49	ON	OFF	OFF	OFF	ON	ON
50	OFF	ON	OFF	OFF	ON	ON
51	ON	ON	OFF	OFF	ON	ON
52	OFF	OFF	ON	OFF	ON	ON
53	ON	OFF	ON	OFF	ON	ON
54	OFF	ON	ON	OFF	ON	ON
55	ON	ON	ON	OFF	ON	ON
56	OFF	OFF	OFF	ON	ON	ON
57	ON	OFF	OFF	ON	ON	ON
58	OFF	ON	OFF	ON	ON	ON
59	ON	ON	OFF	ON	ON	ON
60	OFF	OFF	ON	ON	ON	ON
61	ON	OFF	ON	ON	ON	ON
62	OFF	ON	ON	ON	ON	ON
63	ON	ON	ON	ON	ON	ON

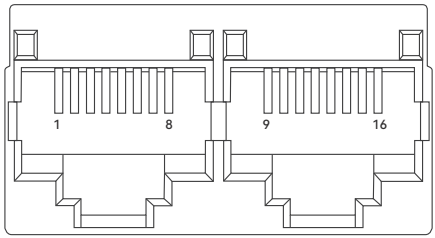
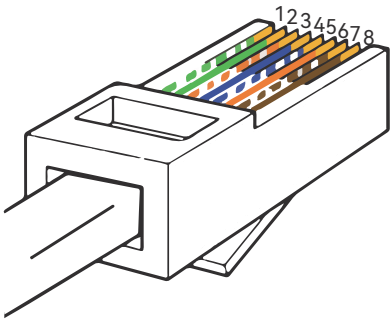
RS232 communication port

RS232 communication port: (RJ11 port) comply with RS232 protocol (baud rate: 9600), for manufacturers or professional engineers debugging or service.

Port definitions	RJ11 Pin	Function
 	1	NC
	2	NC
	3	RS232-TX
	4	RS232-RX
	5	RS232-GND
	6	NC

Multi-device parallel connection A and Multi-device parallel connection B

Multi-device parallel connection: The two RJ45 ports are the same. Comply with RS485 protocol (baud rate: 9600), used for parallel communication between batteries.

Port definitions	RJ45 Pin	Function
 	1	RS485-B
	2	RS485-A
	3	RS485-GND
	4	GND
	5	DN_OP
	6	RS485-GND
	7	RS485-A
	8	RS485-B
	9	RS485-B
	10	RS485-A
	11	RS485-GND
	12	GND
	13	UP_IN
	14	RS485-GND
	15	RS485-A
	16	RS485-B

Reset button

When the battery is in sleep mode, press the button for 3~6s and release, the battery will be activated, and the LED indicator will light up 0.5s from left to right, then the SOC of the battery will be displayed.

• When the battery is active, press the button for 3~6s and release, the battery will enter sleep mode, the LED indicator will light up 0.5s from right to left, and then all the indicators will go off.

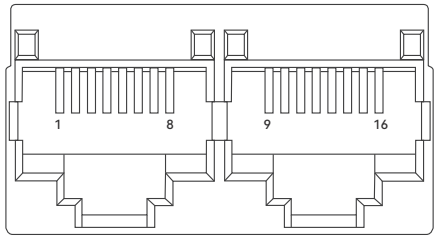
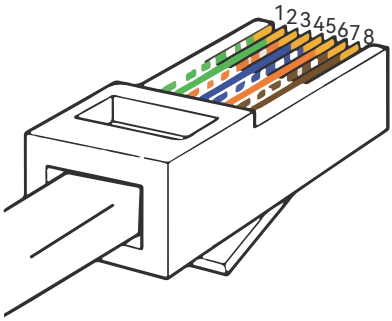
• When the battery is in the active state, press the button for 6~10s and then release, the battery parameters are restored to factory settings, and all LED lights are on for 1.5s.

NOTE:

If there are other batteries in the output state in parallel application scenario, the current battery cannot be set to sleep through the reset button at this time, because it will be charged and awakened by other batteries with normal output.

CAN/RS485 communication port

CAN/RS485 communication port: (RJ45 port) follow CAN protocol and RS485 protocol, for output batteries information, the battery uses this interface to communicate with external inverters, PCs and other devices.

Port definitions	RJ45 Pin	Function
 	1	NC (No connect)
	2	GND
	3	NC (No connect)
	4	CANH
	5	CANL
	6	NC (No connect)
	7	NC (No connect)
	8	NC (No connect)
	9	RS485-B
	10	RS485-A
	11	GND
	12	NC (No connect)
	13	NC (No connect)
	14	GND
	15	RS485-A
	16	RS485-B

Battery positive and negative

Battery positive and negative: there are two pairs of terminals with same function, one connect to equipment, the other paralleling another battery module for capacity expansion. For each single module, each terminal can achieve charging and discharging function. For power cables use waterproof connectors. It must keep pressing this Lock Button while pulling out the power plug.



6. Sleep and wake up

Sleep

When any of the following conditions is met, the battery enters the low-power mode:

1) Undervoltage protection is not released within 30 seconds.

2) Press the reset button for 3~6 seconds and then release the button.

NOTE:

If there are other batteries in the output state in parallel application scenario, the current battery cannot be set to sleep through the reset button at this time, because it will be charged and awakened by other batteries with normal output.

3) The lowest cell voltage is lower than the sleep voltage, and the duration reaches the sleep delay time (while meeting the requirements of no communication, no protection, no equilibrium, and no current).

4) Standby mode lasts for more than 24 hours (no communication, no charge and discharge, no mains power).

5) The tool connected to the host computer is forcibly closed.

Before entering sleep, make sure no charger is connected, otherwise it will not be able to enter low-power mode.

Wake up

When the system is in the low-power mode and any of the following conditions is satisfied, the system will exit the low-power mode and enter the normal operation mode:

1) Connect the charger, and the output voltage of the charger must be greater than 48V.

2) Press the reset button for 3~6 seconds and release the button.

3) Connect the communication line and turn on the host computer (if enters sleep mode due to over-release protection, and this method cannot wake up the battery).

NOTE:

After battery over-discharge protection, it enters the low-power mode, wakes up at a regular time every 4 hours, and starts open switch to charging or discharging. If it can be charged, it will exit the sleep mode and enter the normal charging state.

7. Automatic parallel

With automatic parallel function; When the battery (address > 1) is powered on, the charging and discharging switch that does not enter the parallel machine is disconnected. When the voltage difference between the slave battery and master battery is less than the condition of "the minimum voltage difference between the slave and the master", the master sends the command to the slave. After the slave receives the command from the master, the charge and discharge switch will be connected and the slave is integrated into the master system to complete the parallel operation.

8. Heating function

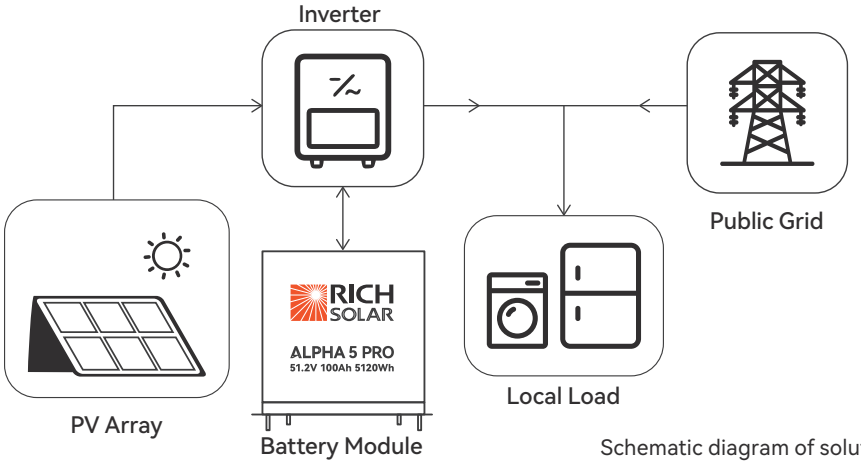
When it's active: If the battery's charging protection system detects low temperatures, the heating function automatically turns on, but only when there is charging current present. The battery cannot use its own internal power to activate the heater.
When it turns off: Once the temperature rises above the set threshold, the heating function will automatically turn off.
There is a heater inside the battery. The heater is controlled by a BMS, allowing the battery to be charged at low temperatures.

Heat the Opening Temperature	≤41°F
Heating Opening Conditions	Charge
Heating Closing Conditions	Disconnect the charger or Temperature ≥59°F
Heating Power	150W

(Temperature refers to the temperature detected by the internal temperature probe of the battery, not the ambient temperature.)

Guide to Safely Handling Lithium Batteries

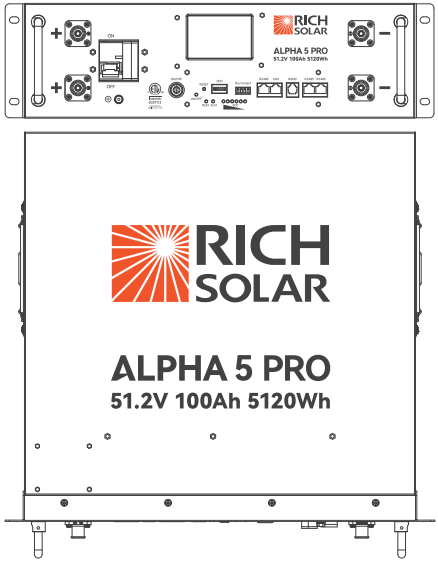
1. Schematic diagram of solution



Schematic diagram of solution

2. Familiar with batteries

Be careful when opening the battery pack. The battery is heavy. Don't lift it by its terminals. The weight of the battery can be found in the chapter "specifications".
The battery terminals are located on both sides behind the battery. The polarity is shown on both sides. The positive terminal is represented by "+" and the negative terminal by "–".



Front view of Compact Series Battery

3. Precautions before installation

Before installation, be sure to read Chapter 1: Safety Precautions, which is related to the operation Safety for installation personnel.

4. Tools

The following tools are required for installation:



Wire cutter



Cable crimper



Screwdriver

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.

5. Safety gear

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



Insulated gloves



Safety goggles



Safety shoes

Installation

1. Package Items

Unpacking and check the packing list:

(1) Connector

Each battery will be equipped with a positive connector and a negative connector, the two connectors are not connected to the cable, and user can wired according to the actual application needs.



Positive connector



Negative connector

Model	Nominal voltage (VDC)	Cable specification	
		AWG	mm²
Compact Series	51.2VDC	4	25

NOTE:

Safety and compliance with regulations require the installation of independent DC overload protector or disconnecting device between battery and inverter. Even if disconnecting devices are not required in some applications, overload protection is still required. Refer to the table above for typical amperes as the required fuse or circuit breaker standard.

Warning! All wiring must be performed by professionals. It is very important to connect the battery with proper cable for the safe and efficient operation of the system. To reduce the risk, use the correct cable and terminal sizes recommended below.

(2)Packing list

ITEM	Name	Specifications	Unit	QTY	Remark
1	ALPHA 5 PRO	51.2V100Ah	Set	1	
2	Positive Battery Parallel Cable	Two end elbow plug ESP-120A-25-RD-00_ UL10269_4AWG_Cable_L=8.66in_Orange	PCS	1	
3	Negative Battery Parallel Cable	Two end elbow plug ESP-120A-25-BK-00_ UL10269_4AWG_Cable_L=8.66in_Black	PCS	1	
4	Grounding Wire	Two end riveted RNB5.5-5 wiring nose_ UL3173_10AWG_Yellow/Green_L=59.06in	PCS	1	
5	RICH SOLAR NOVA Series Communication Cable	Connects Battery to RICH SOLAR NOVA Series Inverters L=59.06in_Blue	PCS	1	
6	Communication Cable	Connects Battery to Other Brand Inverters L=59.06in_Grey, For PCs	PCS	1	
7	Parallel Communication Cable	Connects Battery to Battery L=9.84in_Black	PCS	1	
8	Mounting Screws	SUS304_M5x12_triple combination machine tooth screw	PCS	6	
9	User Manual	ALPHA 5 PRO Manual	PCS	1	
10	Communication Protocol	/	PCS	1	
11	App Operation Guide	/	PCS	1	

2. Installation location

Make sure that the installation location meets the following conditions:

- The area is completely waterproof.
- The floor is flat and level.
- There are no flammable or explosive materials.
- The ambient temperature is within the range from 0°C to 50°C (32°F to 122°F).
- The temperature and humidity is maintained at a constant level.
- There is minimal dust and dirt in the area.
- The distance from heat source is more than 2 meters.
- The distance from air outlet of inverter is more than 0.5 meters.
- Do not install outside directly.
- Do not cover or wrap the battery case or cabinet.
- Do not place at a children or pet touchable area.
- The installation area shall avoid of direct sunlight.
- There is no mandatory ventilation requirements for battery module, but avoid of installation in confined area. The installation area shall avoid of high salinity, humidity or temperature.
- A DC isolator is recommended to be add on the power circuit between inverter and battery, recommended rating at 120A per set of external power cable.

⚠ CAUTION

If the ambient temperature is outside the operating range, the battery pack stops operating to protect itself. The optimal temperature range for the battery pack to operate is 0°C to 50°C (32°F to 122°F). Frequent exposure to harsh temperatures may deteriorate the performance and life of the battery pack.

3. Installation

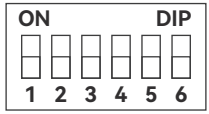
Selection of installation position:

1. The Compact Series shall be mounted on a solid surface suitable for the size and weight of the inverter.
2. The ambient temperature should be lower than 55 ℃ (131°F).
3. The Compact Series should installed indoor.
4. Compact Series should be installed at eye level for easy maintenance.
5. The product label on the Compact Series should be clearly visible after installation.
6. Leave enough space around Compact Series.

4. Parallel Installation

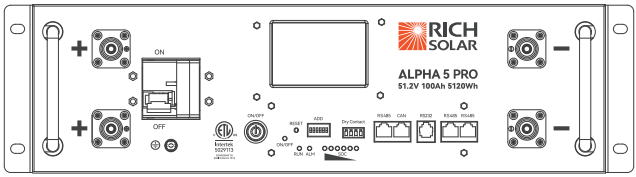
A. Connect the whole system to the cable
(1) When you connect the system, make sure that the system is turned off.

(2) The module with the dialing switch of 1 is the master battery module, and the other modules are the slave battery module (one master battery module can be configured with up to 30 slave battery modules). The inverter must communicate with the battery module with the master battery module.



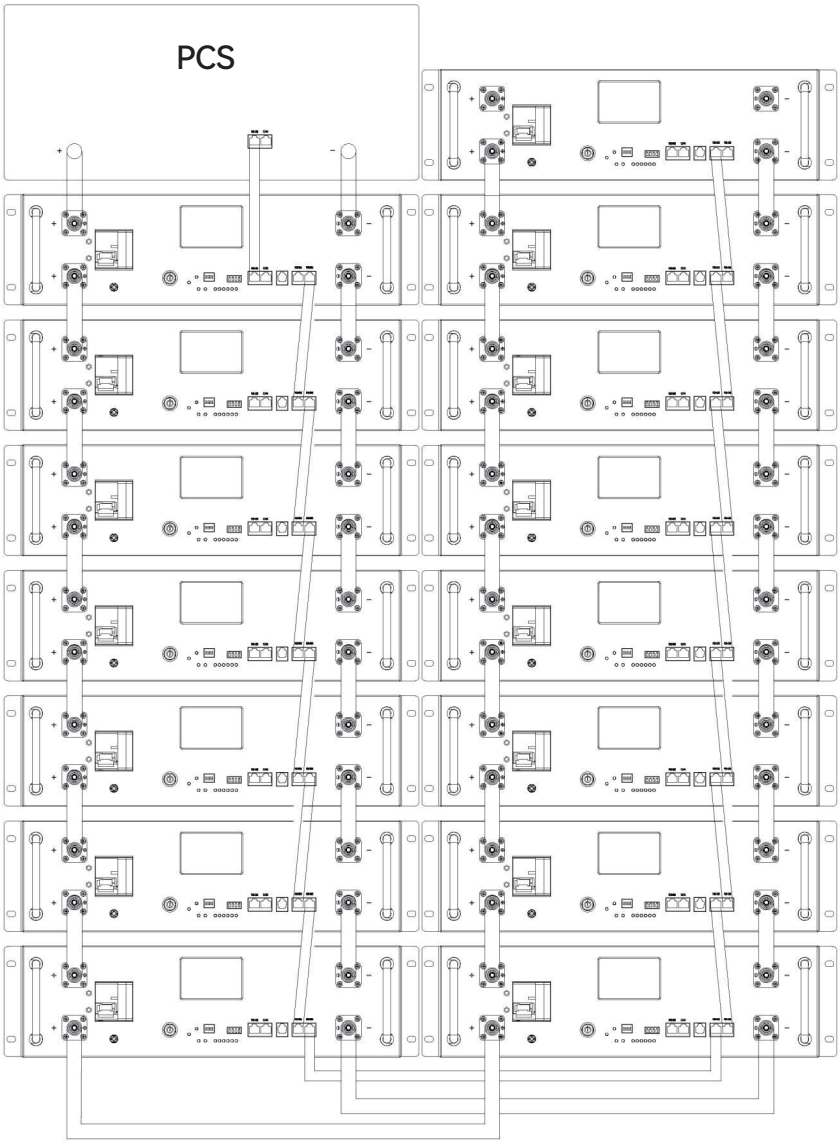
(3) Connect the slave's Parallel Port 1 to the host's Parallel Port 2 using the parallel cable. Then connect the positive terminal of the slave to the positive terminal of the host, and the negative terminal of the slave to the negative terminal of the host. Finally, connect the host's communication cable to the inverter.

B. Power on, double check all the power cable and communication cable.
(1) Press the power switch and the system will boot on the battery system:



(2) After powering on, the whole system will be merged automatically.

NOTE:
During the final installation of the product, the equipment needs to be disconnected manually to avoid damage caused by operation.



NOTE:

To avoid current pulse of the inverter add on the battery bank. Shall start inverter first or switch on breaker between battery and inverter after all connected batteries turned on.

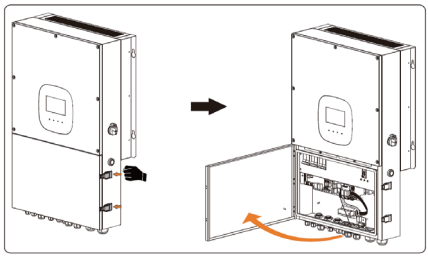
- Between battery bank and inverter should install breaker to protect system safety.
- All the installation and operation must follow local electric standard.
- The parallel battery wires harness should be same length and same spefication, and the main bus wire should have sufficient current carrying capacity.

5. Connect to the Inverter

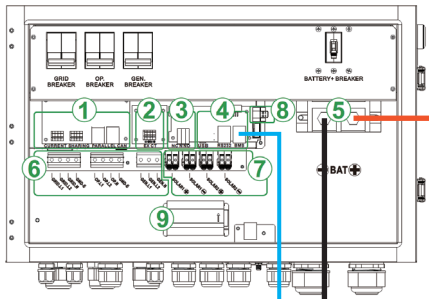
RICH SOLAR NOVA 12K: INSTALLATION INSTRUCTIONS
Refer to the image below as a guide.

WARNING: When the battery 3.4 is in the off state, connect all the wires between the inverter and the battery, turn on the circuit breaker (serial number 3) first, and then turn on the battery switch (serial number 4)

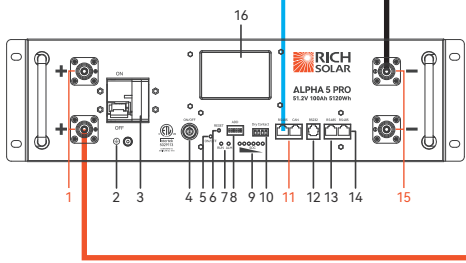
1. Open the lower cover of NOVA 12K.
2. Connect the two ends of the communication line to the inverter BMS interface (serial number 4) and the RS485 interface of the battery (serial number 11) correspondingly.
3. Connect the two ends of the output line to the positive and negative poles of the inverter (serial number 5) and the positive and negative ports of the battery (serial numbers 1 and 15) correspondingly.



NOVA 12K
INVERTER



ALPHA 5 PRO
BATTERY



Inverter Brand	Communication Protocol	
	RS485	CAN
RICH SOLAR	√	√
PYLON	√	√
GROWATT	√	√
VICTRON ENERGY	/	√
SOL-ARK	/	√
EG4 (LUXPOWER)	√(LUXPOWER V03)	√
SCHNEIDER	√	√
GOODWE	/	√
SOLIS	/	√
SENERGY	/	√
SMA	/	√
MEGAREVO	/	√

TIPS: The default password to connect to the inverter: 123456



Troubleshooting Steps

Preliminary determination steps

Meaning of the failure	Possible causes of failure
Charge overcurrent protection	During the charging process, the charging current is too large, causing the system to turn on the charging overcurrent protection, such as the charging current of the charger, or the power supply current of the inverter is greater than the maximum charge current threshold set by the system itself.
Discharge overcurrent protection	During the discharge process, the discharge current is too large, causing the system to turn on the discharge overcurrent protection. For example, the discharge current of the load is greater than the maximum discharge current threshold set by the system itself.
Low ambient temperature protection	When the ambient temperature is too high or too low, the system will automatically detect and activate the high and low temperature protection. At this time, the product environment will be changed to 0 ℃ to 55 ℃ (32℉ to 131℉)and can be used normally.
High ambient temperature protection	
Parallel failure protection	1. Check whether the module is running properly. Connect the upper computer to monitor data. Check whether there are no alarms and no protection information. 2. Check whether the DIP switches of battery modules in the system are set in sequence (No duplicate address exists or the address is not set). 3. Whether the voltage difference between the main voltage and any other module is less than 0.5V.
The communication between the screen and the device is lost	1. Check whether the display program is wrong. 2. Check whether the display screen is faulty. 3. Check whether the wiring harness is faulty. 4. Check whether the motherboard is faulty.

NOTE:
If the above form does not help you, please contact the after-sales service for assistance.

Storage, Transportation and Emergency Handling

1. Storage

Recharge and maintain the battery pack regularly every three months to ensure the battery is in the best condition.

2. Transportation

Battery packs need to be packed before they can be shipped. During transportation, they should be protected against severe impact, extrusion, direct sunlight and rain.

3. Emergency situations

Leaking batteries

If the 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. Inhalation: Evacuate the contaminated area, and seek medical attention.

Contact with eyes: Rinse eyes with flowing water for 15 minutes, and seek medical attention.

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

Ingestion: Induce vomiting, and seek medical attention.

Fire

NO WATER! Only dry powder fire extinguisher can be used; if possible, move the battery pack to a safe area before it catches fire.

Wet batteries

If the battery pack is wet or submerged in water, do not let people access it, and then contact RICH SOLAR or an authorized dealer for technical support.

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 battery pack seems to be damaged, pack it in its original container, and then return it to RICH SOLAR or an authorized dealer.

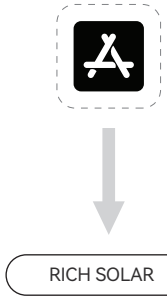
NOTE:

- Damaged batteries may leak electrolyte or produce flammable gas.
- In case a damaged battery needs recycling, it shall follow the local recycling regulation, and using the best available techniques to achieve a relevant recycling efficiency.
- Any further questions, please contact RICH SOLAR: support@richsolar.com

APP QUICK-START GUIDE

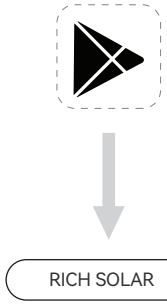
DOWNLOAD THE APP

1. iOS users can search for “RICH SOLAR” in the App Store or scan the QR code below to download the app.

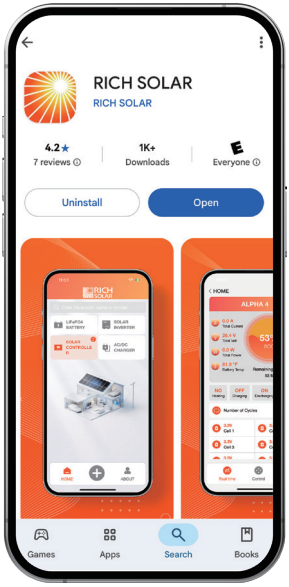


Scan the QR Code

2. Android users can search for “RICH SOLAR” in the Google Play Store or scan the QR code below to download the app.



Scan the QR Code



- After installation, open the RICH SOLAR App and allow Bluetooth access when prompted.
- If the app fails to find the device, ensure the device is on and your phone's Bluetooth is enabled. Then reopen the app or restart your phone’s Bluetooth and search again.

APP TUTORIAL VIDEO

Scan the QR code to watch the app tutorial video

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V1.0