Powering Brighter Tomorrow

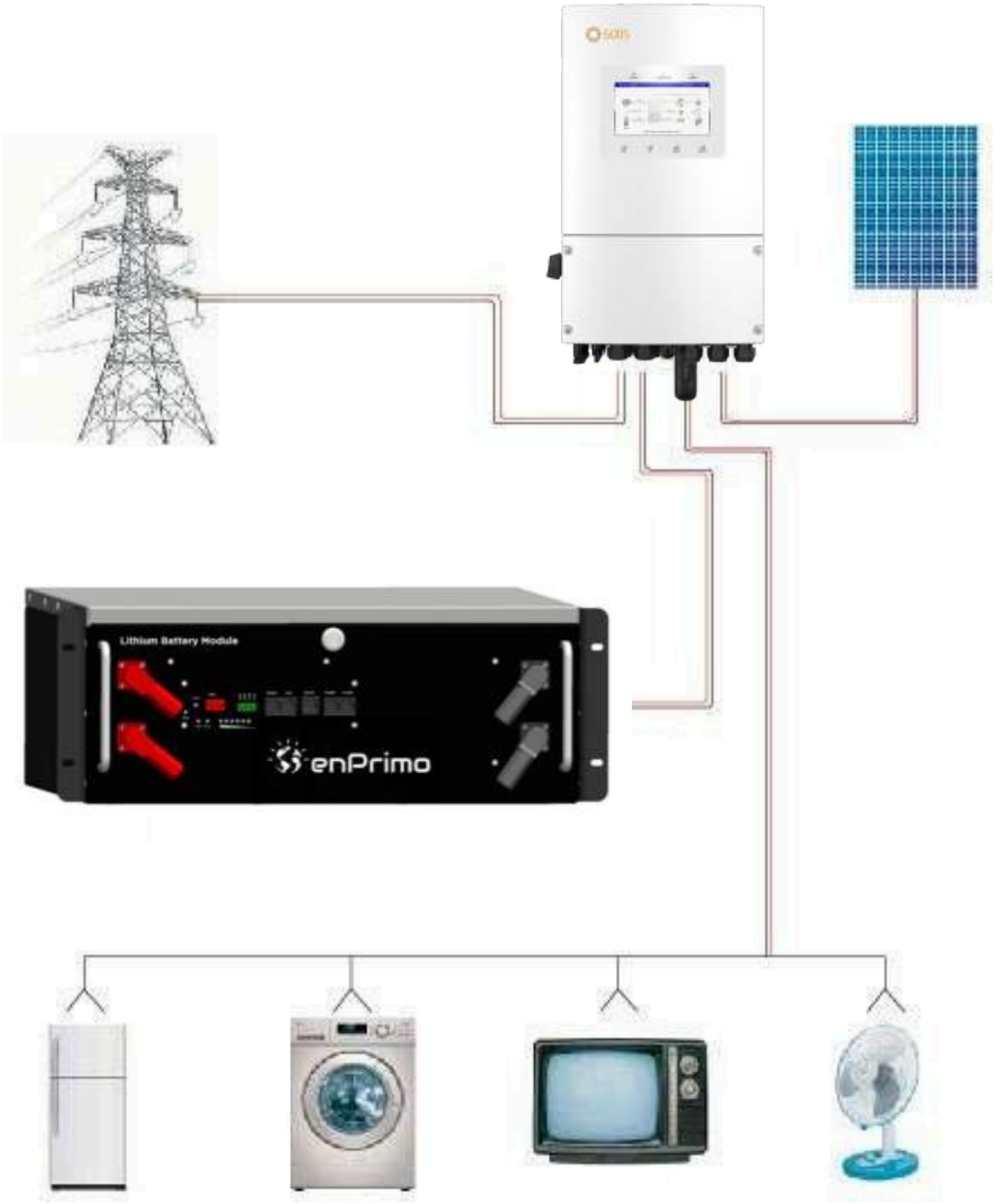
enPrimo

ENP10051-RME-LV

Energy Storage $LiFePO_4$ Battery
User Manual

MADE IN INDIA

Connection Diagram



Important safety instructions

Important safety instructions Please keep this manual for future reference. This manual contains all the safety, installation and operation instructions of The stack-type energy storage $LiFePO_4$ battery. Please read all instructions and precautions in the manual carefully before installation and use.

1. To avoid personal injury, users should have it disassembled by a professional installer.
   If you need repairs, please contact our company's professional maintenance personnel.
2. Do not install the energy storage $LiFePO_4$ battery in a place where children can touch.
3. Do not install the energy storage LiFePO4 battery in harsh environments such as damp, greasy, flammable, explosive, or dusty environments.
4. When the energy storage LiFePO4 battery is working, please do not open the box.
5. It is recommended to install a suitable fuse or circuit breaker externally.
6. After installation, check whether all line connections are tight to avoid the risk of heat accumulation due to a virtual connection.
7. Stack energy storage battery shall be charged with solar power or AC power supply, parallel connection with other AC power supply or different voltage and brand batteries is prohibited.

Contents

1. Safety Precautions

Reminding!

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

(2) If the battery is stored for a long time, it is required to be charged every six months.

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

(4) Do not install the product in an outdoor environment, or an environment outside the operation temperature or humidity range listed in the manual.

(5) Do not expose the cable outside.

(6) Do not connect the power terminal reversely.

(7) All the power terminals must be disconnected for maintenance.

(8) Please get in touch with the supplier within 24 hours if there is something abnormal.

(9) Do not use cleaning solvents to clean the battery.

(10) Do not expose the battery to flammable or harsh chemicals or vapours.

(11) Do not paint any part of the battery, including any internal or external components.

(12) Do not connect the battery with PV solar wiring directly.

(13) Any foreign object is prohibited from being inserted into any part of the battery.

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





1.1 Before Connecting

Warning ！ ！ ！

(1) After unpacking, please check the product and the packing list first. If the product is damaged or any parts are missing, please contact the local retailer.

(2) Before installation, be sure to cut off the grid power and make sure the 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 battery and AC power directly.

(5) Please ensure the electrical parameters of the battery system are compatible with related equipment.

(6) Keep the battery away from water and fire.

1.2 In Using

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

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

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

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

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

(6) Please do not open, repair or disassemble the battery except by a professional installer. We do not accept any consequences or related responsibility arising from violations of safety operations or of design, production, and equipment safety standards.

2.Basic information

2.1 Product overview

Stack-type energy storage batteries are mainly used for household power storage. At the same time, it is also suitable for LV internal energy storage, household energy storage, and temporary buildings. It adopts a high-performance, long-life lithium iron phosphate battery as the basic energy storage unit, combined with an advanced lithium-ion battery management system, industrial design for household products, and other technologies. Ensure that products are highly reliable and meet high industrialisation standards. Stack-type products can support external parallel use functions, greatly improving convenience through scientifically and rationally designed active heat dissipation. Stack-type energy storage battery improves the consistency of the internal temperature field, prolongs service life, and enables continuous high-current output.

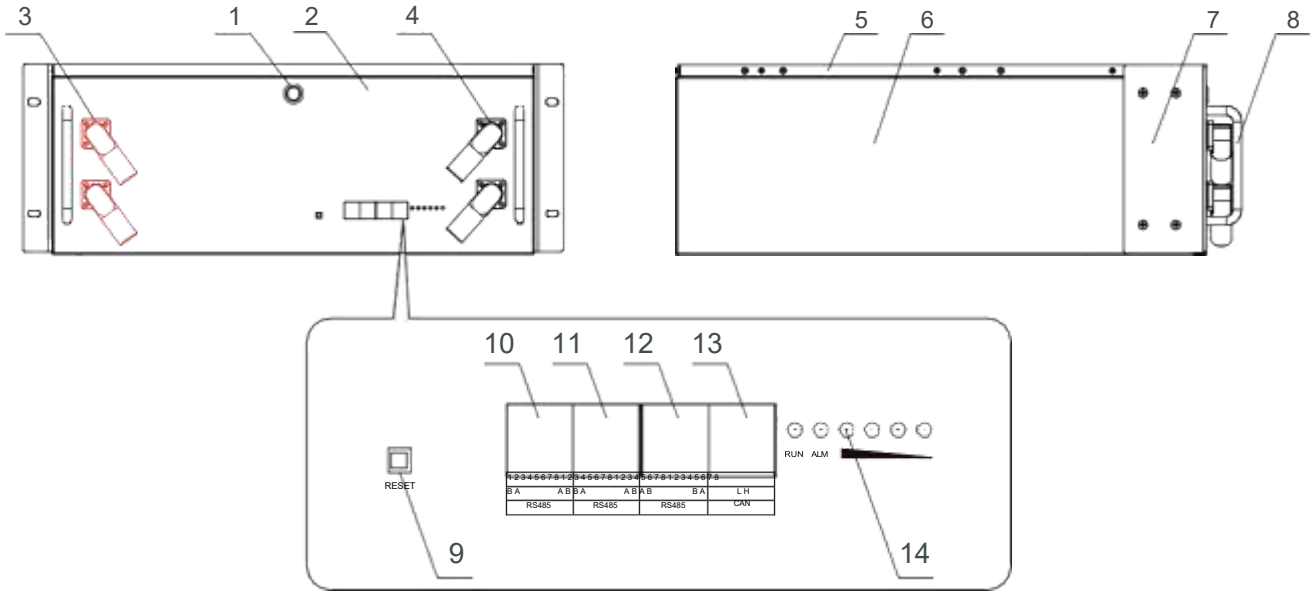
2.2 Features

- The battery adopts a high-performance lithium iron phosphate battery with high safety performance and long service life.
- External weak current switch reduces product power consumption and improves the safety of transportation and storage.
- With RS485/CAN communication function, it can easily communicate with the equipment.
- It has multiple protection functions to safeguard the power supply in all-round ways.
- The output is stable and can be connected to different loads within the voltage range.
- Support up to 3 groups of ENP10051-RME-LV used in parallel.

2.3 Function description

ENP10051-RME-LV is composed of 4 battery modules with stacking, as shown below.

2.4 One battery module



1	Switch	5	Welding parts of upper cover
2	Panel	6	Box
3	Red terminal	7	Box fixings
4	Black terminal	8	Box handle
9	Reset	12	RS485 communication
10	RS485 communication	13	CAN communication
11	RS485 communication	14	LED indicator

2.5 Stacking details

i. Take the battery pack out from carton.	
ii. Remove the mounting ear from both side of the battery.	
iii. Install the stacking component at four corners of the battery.	
iv. Remove the hook on the stacking component of the bottom battery of each stack.	
v. Put another battery on top of the previous module, and align the locating holes and connect the 4 lockers together.	
vi. The maximum number in each stack is 4 modules. vii. Finish the cable connection	

Note: Do not stack the batteries directly.

3. Installation Process

3.1 Installation steps

Before installation, please read this manual carefully and familiarize the installation steps.

(1) Be sure to leave a certain space around for heat dissipation during installation.

(2) Avoid direct sunlight and rainwater infiltration during outdoor installation to prevent battery damage.

(3) Do not place metal products near the place of the energy storage LiFePO4 battery installation to prevent short circuits.

(4) Virtual connection points and corroded wires may generate high heat, and the molten insulation layer will burn surrounding materials and even cause a fire. Therefore, it must be ensured that the connector has been tightened and the wires should be secured with cable ties to avoid loosening of the connector due to shaking during mobile applications.

(5) After the battery switch is turned off, there is still high voltage inside the energy storage case. Please do not open or touch the internal components, and an external short circuit is strictly prohibited.

(6) Please do not install it in a harsh environment where a large amount of damp, greasy, flammable and explosive dust gathers.

(7) It is forbidden to reverse the charging and discharging terminals of the battery; it is very easy to damage the battery or cause unpredictable risks.

(8) If an injury occurs during installation or use, please seek medical attention in time.

3.2 Installation connection

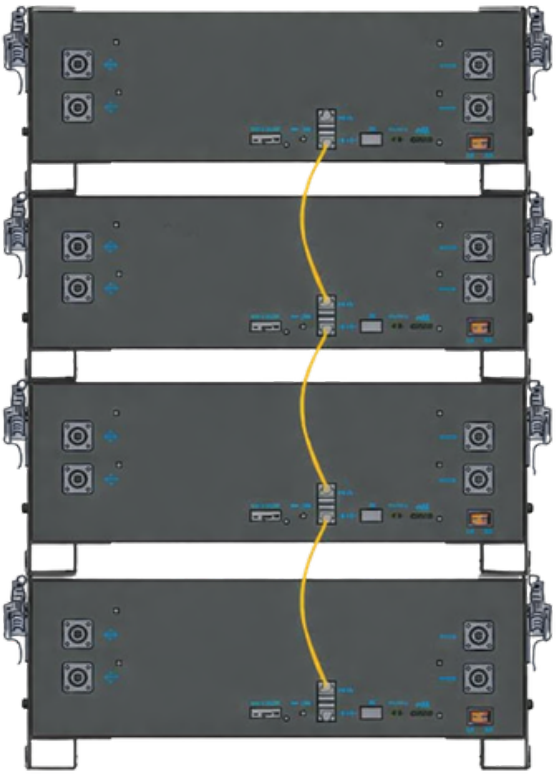
Installation and connection must comply with national and local electrical code requirements. According to the current situation, firstly, choose the corresponding wire or a wire with a larger wire diameter to avoid unnecessary troubles during use. Secondly, determine the installation location. Thirdly, when installing, please make sure to leave at least 200 mm of space at the air outlets on both sides of the energy storage battery to ensure natural convection heat dissipation.

3.3 Recommended external wiring diameter and switch selection.

Model	Recommended external wiring diameter	Battery continuous current isolator	Circuit breaker Model
ENP10051-RME-LV	25mm² /4AWG	100A	2P-125A

Note: The wiring diameter is for reference only. If the distance between the load and the battery is relatively long, use a larger wire to reduce the voltage and improve the system performance. The above wiring diameter and circuit breaker are only recommendations; please follow the actual choice of the appropriate wire diameter and circuit breaker according to the situation.

3.4 Communication Cable connection.



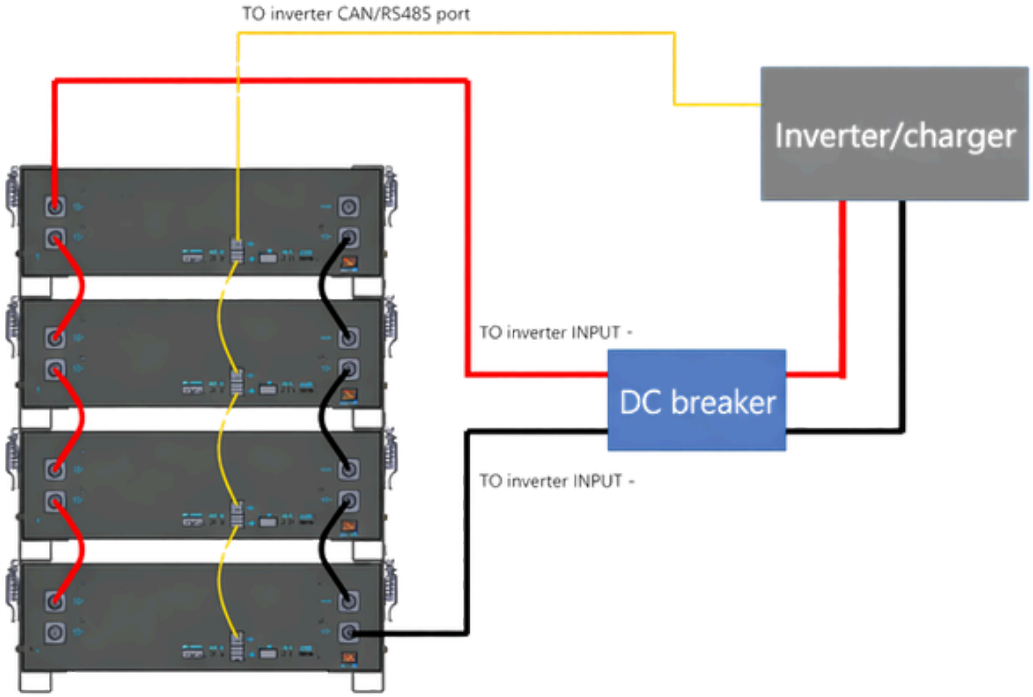
3.5 Necessary Installation Tools

 Multimeter + Current clamp	 Insulated Screwdriver Set	 Insulated Allen Key Set from 2 mm to 8 mm	 Drill+Hammer
 Electrician Scissors	 Insulated Torque Wrench Set	 Lifting Strap + Mechanical Lifter	 RS232/USB +Screw Terminal (insulated)

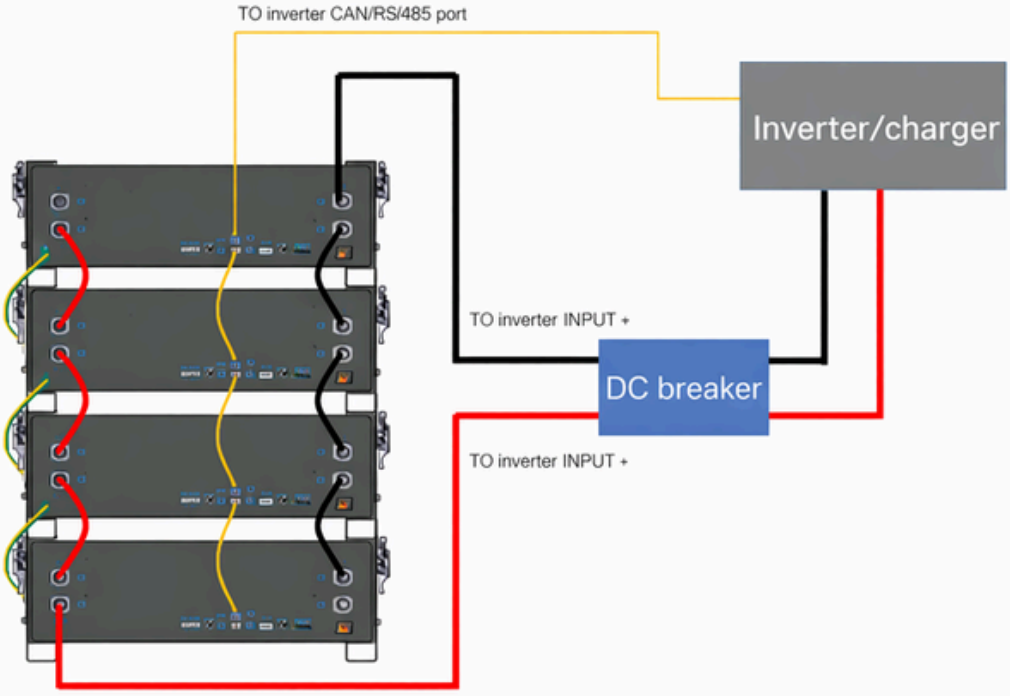
3.6 Personal Protective Equipment +1000 Vdc Insulated Tools

4.Parallel structure diagram

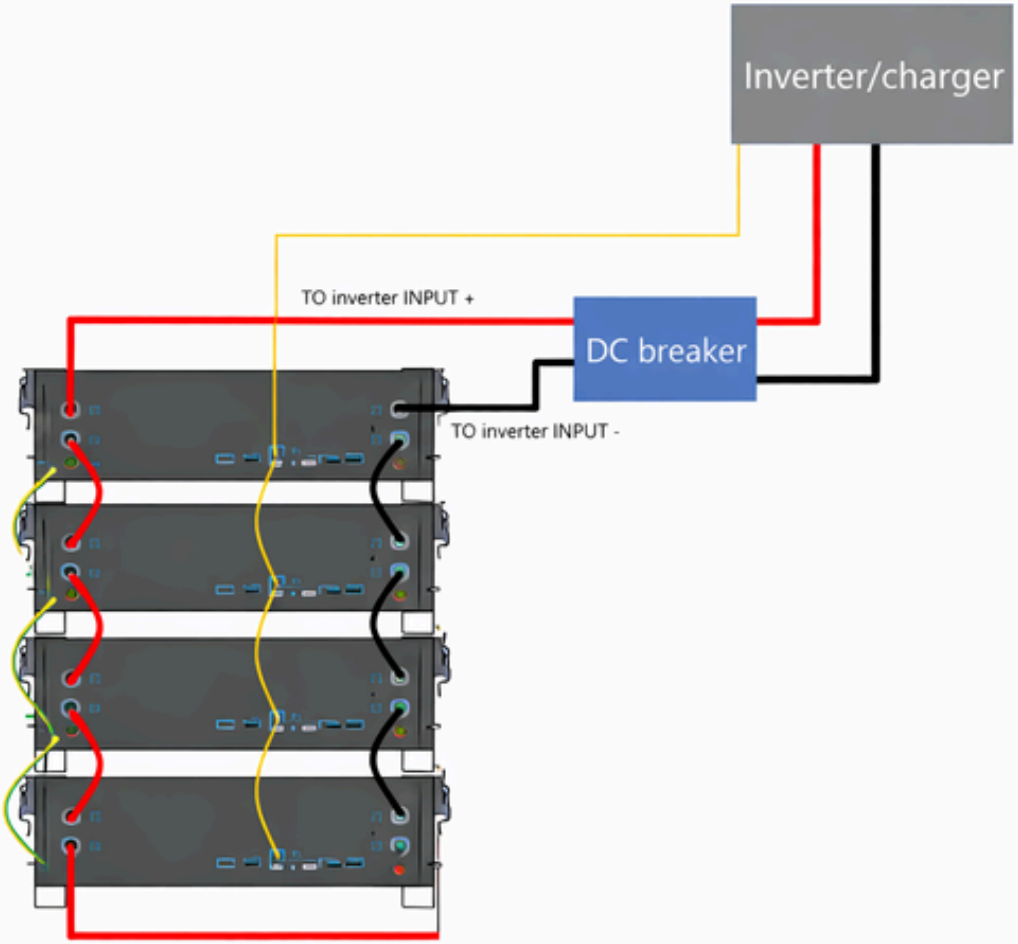
Wiring diagram allowed:



Wiring diagram allowed:



Wiring diagram not allowed:



Note: 1. When the battery pack is used in parallel, the BMS automatic coding can encode the host to wake up the slave, and the slave can automatically wake up after the host wakes up.

2.There are strict sequence requirements for battery power-on, connecting the PACK in order from low to high, all connecting wires can only be loaded or charged after installation, and need to be charged or activated by pressing a button after powering on. When dismantling, unplug the charger or load first, and disassemble the PACK from the top to the bottom in turn.

4.1 Recommended setting data of the inverter:

Battery model	**$LiFePO_4$/Lithium battery**
Model	ENP10051-RME-LV
Discharge cut-off voltage	50 V
Over-discharge recovery	51 V
Normal charging voltage	58 V
Surge charging voltage	60 V
Overvoltage protection	58.4 V
Overvoltage recovery	56 V
Discharge cut-off SOC	10%

5. LED instructions

Table 1 LED working status indication

state	normal/warning/ protect	RUN	ALM	Battery indicator LED				illustrate
		●	●	●	●	●	●	
shutdown	hibernate	extinguish	extinguish	extinguish	extinguish	extinguish	extinguish	annihilate
Standby	normal	flash 1	extinguish	According to the battery indicator				standby mode
	alert	flash 1	flash 3					Module low voltage
Charge	normal	Always bright	extinguish	According to the battery indicator (battery indication maximum LED flashes 2)				Maximum battery LED flashes Move (flashing 2), overcharge warning ALM does not flash during alarm
	alert	Always bright	flash 3					
	Overcharge protection	Always bright	extinguish	Always bright	Always bright	Always bright	Always bright	If there is no utility power, indicate Light goes to standby
	temperature, overcurrent, Failsafe	extinguish	Always bright	extinguish	extinguish	extinguish	extinguish	stop charging
discharge	normal	flash 3	extinguish	According to the battery indicator				stop charging
	alert	flash 3	flash 3					
	Undervoltage protection	extinguish	extinguish	extinguish	extinguish	extinguish	extinguish	stop charging
	temperature, overcurrent, short circuit, Reverse connection, failsafe	extinguish	Always bright	extinguish	extinguish	extinguish	extinguish	stop charging
invalid		extinguish	Always bright	extinguish	extinguish	extinguish	extinguish	Stop charging and discharging

Table 2: Description of capacity indication

state		Charge				discharge			
capacity indicator		L4 ●	L3 ●	L2 ●	L1 ●	L4 ●	L3 ●	L2 ●	L1 ●
Battery (%)	0~25%	extinguish	extinguish	extinguish	extinguish	extinguish	extinguish	extinguish	constant
	25~50%	extinguish	flash 2	flash 2	constant	extinguish	extinguish	constant	constant
	50~75%	flash 2	flash 2	constant	constant	extinguish	constant	constant	constant
	75~100%	flash 2	constant	constant	constant	constant	constant	constant	constant
Running lights ●		constant				Blink (blink 3)			

Table 3 LED flashing description

flashing method	Bright	extinguish
flash 1	0.25S	3.75S
flash 2	0.5S	0.5S
flash 3	0.5S	1.5S

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

Button description and hibernation

1.Button description

(1) Press the button switch for 1~2s, and the PACK will be powered on; When paralleling, the boot interval between the two PACKs should be less than 30s.

(2) Press the button switch for more than 5s, and the PACK will be powered off. When paralleling, you only need to press one PACK button switch for more than 5s, and the rest will be turned on normally.

(3) After the voltage under-voltage protection and under-voltage protection are powered off, press 5 times continuously within 10s to force activation. When paralleling, only one PACK needs to be operated, and the rest are also activated normally

2. Dormancy

When any of the following conditions are met, the system enters low-power mode:

(1) The single or overall over-discharge protection has not been lifted within 30 seconds.

(2) Press the button (3~6s) and release the button.

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

(4) Standby time is more than 24 hours (no communication, no charge and discharge, no mains).

(5) Force shutdown through the host computer software.

Before going to sleep, make sure that the input is not connected to an external voltage; you will not be able to enter the low-power mode.

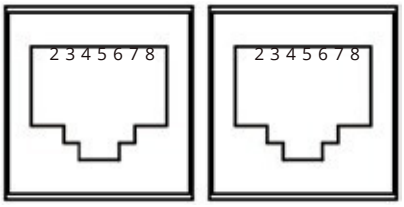
6. BMS communication settings

When the load (such as an inverter) needs to communicate with the battery, in order to establish normal communication with the load, the BMS needs to set the following settings for each brand. The RS485 communication protocols of inverters are different, but there are several RS485 communication protocols inside the inverter to match the battery. When using, you can directly select the communication protocol code in the inverter for matching. If you have other problems, please consult the supplier.

Battery BMS interface pin foot definition as shown in the following figure

When the battery is used in parallel, the BMS can distinguish the PACK through automatic coding, and the definition of the master-slave address refers to the "Communication Address Selection Description"; The "RS485/CAN" battery pack can communicate with the inverter through this interface. "RS485/RS485" is used in the battery pack for parallel use and monitoring software, and the master pack is connected to the slave through this interface to communicate.

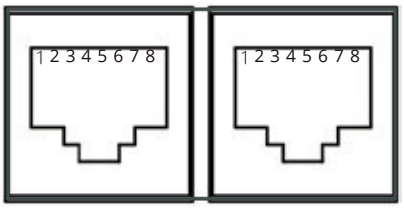
External interfaces



RS485 RS485

The battery communication interface adopts 8P8C RJ45 socket.			
RS485		PRS485	
PIN	Definition	PIN	Definition
1、8	RS485-B	1、8 2	RS485-B
2、7	RS485-A	7、	RS485-A

Internal interfaces



RS485 CAN

The battery communication interface adopts 8P8C RJ45 socket.			
RS485		CAN	
PIN	Definition	PIN	Definition
1、8	RS485-A1	4	CAN-L
2、7	RS485-B1	5	CAN-H

6.2 Communication Instructions

6.2.1 CAN Communication

CAN communication, baud rate 500K.

6.2.2 RS485 communication

With the RS-485 interface, you can view PACK information. The default baud rate is 9600bps. If you need to communicate with the monitoring device through RS485, the monitoring device is the host, and the data is polled according to the address.

6.2.3 Features

(1) It has 16 channels of single voltage, overall voltage detection, overcharge, overdischarge alarm, and protection functions. The quiescent voltage sampling accuracy can reach ≤10mV at room temperature.

(2) It has the functions of charging and discharging current detection, charging and discharging overcurrent alarm and protection. The charging current is displayed as positive, the discharge current is displayed as negative, and the current sampling accuracy can reach ≤2% @FS at room temperature. Reserved charge and discharge current detection, charge and discharge overcurrent alarm and protection functions. The charging current is displayed as positive, the discharge current is displayed as negative, and the current sampling accuracy can reach ≤2% @FS at room temperature.

(3) It has 4 cell temperature detection, cell high and low temperature alarm and protection functions. The temperature sampling accuracy can reach ≤2°C at room temperature.

(4) It has the function of short circuit protection.

(5) It has a charge equalization function.

(6) Cell capacity estimation is supported. The full charge capacity, current capacity, and design capacity of the battery pack can be set by the host computer, and the capacity can be automatically updated after a complete charge and discharge cycle.

(7) Support the software control function of the host computer, and the protection parameters, such as overcharge, overdischarge, charge and discharge overcurrent, overtemperature, under temperature, capacity, sleep, balance, and other parameters can be easily set through the host computer software.

(8) It has RS485, CAN communication interface.

(9) It has a variety of sleep and wake-up methods.

(10) Supports integrated 10A charging current limit.

(11) It has the functions of a reset switch, automatic coding and so on.

(12) It has an LCD interface (optional), charging current limit, buzzer, LED and other functions.

(13) Online upgrades are supported.

Note: The battery default protocol is Pylon.

6.3 Inverter Compatibility List

Inverter Brand	Model	Battery Protocol Selection	Battery Modules
Growatt	LV ALL	Pylon	15
SRNE	LV ALL	Pylon	15
Voltronic power	LV ALL	Pylon	15
Goodwe	LV ALL	Pylon	15
Deye	LV ALL	Pylon	15
Luxpower	LV ALL	Pylon	15
Megarevo	LV ALL	Pylon	15
SAKO	LV ALL	Pylon	15
Sorotec	LV ALL	Pylon	15
SMK Solar	LV ALL	Pylon	15
Inhenergy	LV ALL	Pylon	15
MUST	LV ALL	Pylon	15
SUNGROW	LV ALL	Pylon	15
Afore	LV ALL	Pylon	15
Solis	LV ALL	Pylon	15
Felicity	LV ALL	Pylon	15
Frecon	LV ALL	Pylon	15

6.4 Low Voltage Battery to Inverter CAN Terminal Pin Out

LOW VOLTAGE INVERTER CAN /BMS				
 RJ45	CAN TERMINAL	Inverter Terminal Type	Inverter SIDE (PIN Number)	Battery SIDE RJ45 (PIN Number)
Goodwe	CAN- H	RJ45	4	4
	CAN- L		5	5
Deye	CAN- H	RJ45	4	4
	CAN- L		5	5
Luxpower	CAN- H	RJ45	4	4
	CAN- L		3	5
Megarevo	CAN- H	RJ45	4	4
	CAN- L		5	5
Sorotec	CAN- H	RJ45	3	4
	CAN- L		5	5
Inhenergy	CAN- H	RJ45	4	4
	CAN- L		5	5
MUST	CAN- H	RJ45	6	4
	CAN- L		5	5
SUNGROW	CAN- H	RJ45	4	4
	CAN- L		5	5
Afore	CAN- H	RJ45	4	4
	CAN- L		5	5
Felicity	CANL1	RJ45	7	5
	CANH1		8	4

6.5 Low Voltage Battery to Inverter RS485 Terminal Pin Out

LOW VOLTAGE INVERTER RS485				
 RJ45	RS485 TERMINAL	Inverter Terminal Type	Inverter SIDE (PIN Number)	Battery SIDE RJ45 (PIN Number)
Growatt	RS485-B	RJ45	1	1, 8
	RS485-A		2	2, 7
SRNE	RS485-B	RJ45	8	1, 8
	RS485-A		7	2, 7
Voltronic power	RS485-B	RJ45	3	1, 8
	RS485-A		5	2, 7
SAKO	RS485-B	RJ45	3	1, 8
	RS485-A		5	2, 7
Frecon	RS485-B	RJ45	1	1, 8
	RS485-A		2	2, 7
SMK Solar	RS485-B	RJ45	1	1, 8
	RS485-A		2	2, 7
Solis	RS485-B	RJ45	1	1, 8
	RS485-A		2	2, 7

INFORMATION

Regarding the communication between the battery and the inverter, the battery side needs to maintain the original configuration, but inverters of different brands and models may have different communication pins. If in doubt, refer to the inverter manual.

7.Technical parameter list

Product number	ENP10051-RME-LV
Array Mode	16S
Nominal Capacity (Ah)	100
Nominal Energy (KWh)	5.12
Nominal Voltage (V)	51.2
Charge Voltage (V)	58.4
Discharge Cut-off Voltage (V)	42
Standard Charging Current (A)	50
Max.Continuous Charging Current (A)	70
Max.Continuous discharging Current	100
Cycle Life	6000 Cycles @80% DOD @25°C @0.2C/0.2C
Communication Mode	RS485/CAN
Operating Temp	Charging: 0~60°C; Discharging: -10°C~60°C
Size (L×W×H) mm	520x495x175
Weight (Kg)	≈44
Gross weight (Kg	≈46

Note: The dimensions are the product's appearance dimensions. If any changes in the products are made, they will be adjusted by the manufacturer.

8.Maintenance and conservation

Item	Problem description	Possible causes	Solution
1	The battery cannot be turned on normally, and there is no response when pressing the button.	1.The button is damaged or the button cable is disconnected; 2. BMS damaged; 3.The battery is seriously over-discharged.	1. Check whether the button is normal; 2. Check whether the voltage of the battery pack is normal; 3. If the voltage of the battery pack is too low, you need to use a constant current power supply or a lithium battery charger to charge the battery until the low voltage protection is released.
2	The BMS immediately enters the protection state after pressing the switch.	1. Battery pack voltage is abnormal; 2. Abnormal temperature; 3. External load mismatch.	1 .Check whether the voltage of the battery pack itself is consistent; 2. Check whether the BMS voltage collection is abnormal; 3. Confirm whether the ambient temperature exceeds the BMS temperature preset value and whether the temperature probe is damaged; 4. Determine whether the load power and voltage match the battery.
3	The communication fault occurs when the load is inverter	1.Communication line connection error (improper pin connection or poor contact); 2.Communication protocol does not match the inverter; 3.Communication mode does not match; 4.Communication address mismatch; 5.Signal interference.	1.Check whether each pin of the communication line has continuity. 2.Check whether the corresponding pins are connected correctly. 3.Check whether the contact part of the communication cable connection terminal is oxidized. 4.Confirm whether the inverter has selected the matching protocol. 5.Confirm whether the correct communication method is selected, such as CAN, RS485, or other communication methods. 6.Confirm whether the inverter needs to select a communication address, and verify whether the battery communication address is correct. 7.Confirm whether there are any high-frequency interference sources in the battery usage environment.
4	The output is suddenly disconnected during use	1. The battery voltage is too low, triggering BMS protection; 2. BMS protection caused by excessive load power or short circuit at the output end.	1. Check whether the battery voltage is within the normal range. If the voltage is low, charge the battery; 2. Adjust the load power to match; short circuit: disconnect the load or restart the battery.
5	SOC does not match actual value	1. SOC cumulative error during charging and discharging; 2. SOC is not calibrated; 3. The internal battery parametersof BMS have changed.	1. Calibrate the SOC, discharge to battery protection and then charge to 100% of the battery to complete the calibration; 2. After the parameters related to the internal battery capacity of the BMS change, the SOC needs to be re-estimated and a power calibration needs to be performed.
6	In order to protect your rights and interests, after you purchase our products, if you encounter problems with the installation and use of the product, you can contact the supplier, and we will provide you with after-sales service as soon as possible.		

In order to maintain the best and long-term performance, the following items are recommended to be inspected twice a year.

1.Confirm that the surrounding air flow will not be blocked, and remove any dirt and debris from the cooling hole.

2.Check all exposed wires, shabby and damaged, please place or repair them if necessary.

3.If it is not used for a long time, it is recommended to charge it every three months.

Danger of electric shock! Make sure that the power supply has been disconnected during the above operations, and then carry out the corresponding inspection and operation.

Warranty Card and Warranty Condition

Product Information

Battery Model

Serial No.

Purchase Date

Dealer/Installer

Commissioning Date

Seal of Dealer/Installer

End User Information

Customer Name

Phone Number

Email

Detailed Address

1. Purpose

The primary purpose of this warranty letter is to clearly define the matters related to the warranty policy of the products.

2. Warranty Condition

2.1 Limitation of Warranty Scope

enPrimo liability under this Warranty Letter shall be limited to replacement, repair, refund and compensation. Replaced or repaired Products shall be warranted for the remainder of the original Term of Performance Warranty. In any event, the replacement shall not justify the renewal of the Term of Performance Warranty.

2.2 Exclusion of Warranty

Damage to the Products resulting from any of the following activities is NOT covered by this Limited Warranty:
Improper transportation, storage, installation or wiring by Buyer. Modification, alteration, disassembly, repair or replacement by someone other than personnel certified by enPrimo. Noncompliance with enPrimo's official installation manual. External influences, including unusual physical or electrical stress (power failure surges, inrush current, lightning, flood fire, accidental breakage, etc.) Use of an incompatible inverter, rectifier or PCS.

2.3 Warranty Claim

In general, serial number(S/N） must be provided in order to claim warranty. Please store the original purchasing invoice/ installation documents or receipts carefully. Customers need to present it for a warranty claim if required. Buyer shall contact the supplier directly for any warranty claims in order to avoid additional problems with the products.
Note:Products are unavailable to protect themselves from the self-discharge in the condition of shutdown mode. So please charge the batteries to 80% every 3-6 months.

3. Performance Warranty (Standard)

enPrimo warrants and represents that the Product retains at least a cycle life of 6000 Times @80% DOD, 25˚C, 0.2C charge and discharge with 80% DOD. Standard for 5-year warranty with 6000 cycle @80% DOD, 25˚C, 0.2 °C. The ambient temperature during the operation of the Products shall not fall below 0°C or exceed 60°C

Capacity measurement condition

Ambient temperature: 77 ~ 86°F (25 ~ 30°C) Initial battery temperature from BMS: 77 ~ 86°F (25 ~ 30°C) Charging/discharging method - 0.2C charge & discharge with 80% DOD Current and voltage measurement at battery DC side

4. Out of Warranty Policy

If damage to the products is not caused by the seller, the buyer shall provide charged service, including all expenses such as material cost, labour cost, warehouse cost, transportation cost, customs duties, analysis cost, management cost, corporate profits, disposal expense (if necessary) and so on.

5. Warranty Guarantee

For the goods that have passed the acceptance inspection, if the relevant documents are not complete, the brand does not conform to the requirements, and there are quality problems before your company puts them into use, enPrimo promises to return the goods unconditionally and supply qualified goods within the time specified by your company.

When the products had issues after installation,

A. Please contact us immediately, and our sales and engineering teams will support you to help you solve the issue.

B. If the battery is confirmed non-repairable even after repair within warranty, we will replace it for you within 1 month.

6.Claim Payment Policy

Claims under this Warranty must be made by notifying the supplier from whom the Product was purchased.