

USER MANUAL



All in One Lithium Battery Backup Solution

Inverter + Li-ion Battery

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1. About This Manual

1.1 Preface

Dear Customer:

Thank you for using the Energy Storage Inverter. We sincerely hope that our product can meet your needs. We also invite you to put forward more valuable suggestions on the product performance and function.

1.2 Content abstract





For users, the manual details the product information, installation instructions, operation, maintenance and troubleshooting. Before installing and debugging or running any equipment, the user must read and understand all the instructions contained in this manual and be familiar with the relevant safety symbols.

Readers need to have a certain degree of electrical theory, electrical wiring and professional mechanical knowledge. Before installing this product, please read this manual carefully and ensure that the relevant personnel can easily access and use it.

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1.3 Symbols

In order to ensure the safety of the user's personal and property when using the product, and to better use the product, the manual provides relevant information and highlights it with appropriate symbols. The following list of symbolic hints may be used in this manual, please read them carefully.

Symbols	Description
	Danger. Risk of potential hazard.
	Danger of high voltages. Danger to life due to high voltages in the Energy storage system
	Hot surface
	The Energy storage system should not be disposed together with the household waste.

2. Safety Instructions

2.1 Personnel Requirements

1. Only professional electricians or qualified personnel can operate the product.
2. Operators should be fully familiar with the structure and working principle of the whole energy storage system.
3. Operators should be fully familiar with this manual " Energy Storage Inverter User Manual"
4. Operators should be fully familiar with the relevant standards in the country/area where the project is located.

2.2 Safety Warning Operation

When installing, routine maintenance and overhaul of energy storage system, it is necessary to avoid incorrect operation or accidents when personnel are close to each other. Please observe the following:

1. In order to prevent mis-closing of the switch, a clear mark should be set up at the front and rear switches of the energy storage inverter.
2. Set up warning signs or safety cordons near the operation area.
3. After the completion of maintenance or overhaul, be sure to pull out the key of the cabinet door and keep it stored safely.

2.3 Device Identification Protection

1. A nameplate is installed inside the front door of the energy storage system.
2. The nameplate contains important parameter information related to the product. Removal or damage is strictly prohibited!

2.4 Grounding Requirements

1. When installing the device to be grounded, the protective grounding wire must be installed first; when removing the device, the protective grounding wire must be removed at last.
2. It is forbidden to destroy the grounding conductor.
3. It is forbidden to operate the device without a grounding conductor installed.
4. The device shall be permanently connected to the protective grounding wire. Before operating the device, electrical connection of the device shall be checked to ensure that the device is reliably grounded.

2. Safety Instructions

2.5 Installation Environment Requirements

1. Do not install or use this product in an environment where the temperature is lower than -10 °C or higher than 50 °C.
2. It should be installed in a dry and well-ventilated environment to ensure good heat dissipation performance.
3. The product can be installed at a maximum altitude of 2,000m.
4. The installation position should be away from the fire source.
5. The product should be installed and used away from children and animals.
6. The installation position should be far away from water sources, such as faucets, sewer pipes, and sprinklers, to avoid entering of water.
7. The device should be placed on a firm and flat supporting surface.
8. Do not place any inflammable or explosive items around the device.
9. When the device is running, do not block the ventilation vent or heat dissipation system to prevent fire caused by high temperature.

2.6 Electricity Safety Matters

Electrical safety

There is a high voltage inside the product! !

1. Do not touch terminals or conductors connected to power network circuits.
2. Attention should be paid to all instructions or safety instructions for connection to the power grid and to the warning signs on the products.
3. Observe the safety precautions listed in this manual and other relevant documents of the equipment.
4. Damaged equipment or system failure may cause electric shock or fire! !
5. Preliminary visual inspection before operation to check whether the equipment is damaged or there are other dangers.
6. Check the safety of other external equipment or circuit connections.
7. Confirm that the equipment is in a safe state before it can be operated.

2.7 Maintenance Or Overhaul Specifications

The following points should be noted when performing maintenance operation on equipment:

1. Ensure that the equipment is well grounded.
2. Any live parts must be covered with insulating materials.

2.8 Product Scrapping

1. When the energy storage system needs to be discarded, it can not be treated as conventional waste, we will accept this product as per W and there may be a handling fee.
2. Alternatively contact the local authorized professional recycling agency.

3. Product Introduction

3.1 Introduction of energy storage system

Energy Storage System (ESS) is a technology that captures and stores energy for later use. It plays a crucial role in managing the variability and intermittency of energy sources. ESS allows for the storage of excess energy generated during times of low demand or high renewable output and releases it when demand is high or when renewable sources are not actively producing.

3.2 Product Description

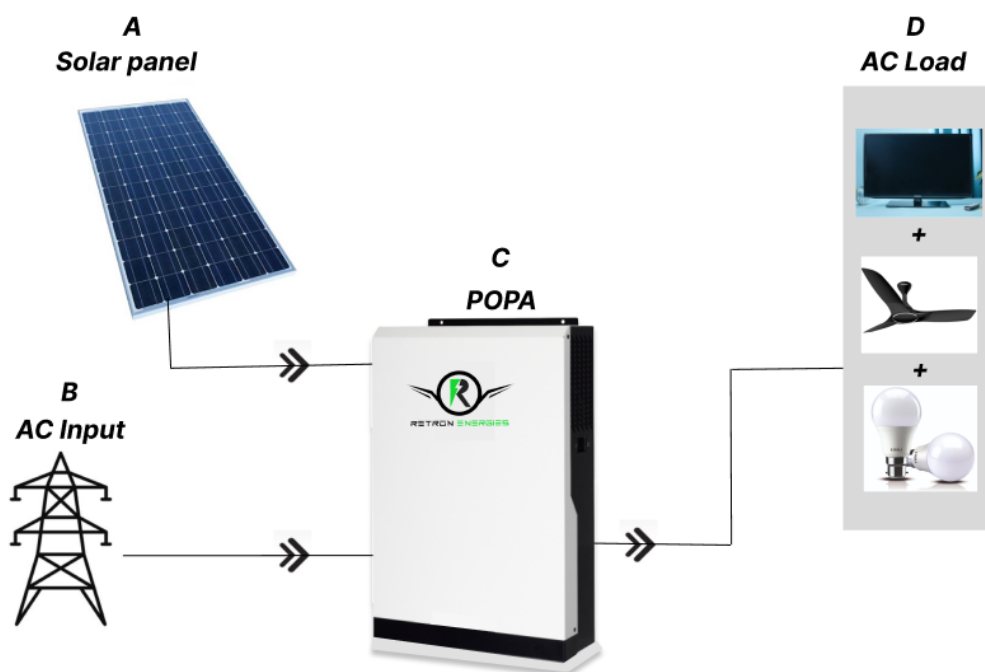


Fig-1

Name	Describe	Note
A	PV module	Monocrystalline, Polycrystalline
B	AC Input	230V Ac grid input
C	POPA	Inverter + Battery pack(LFP)
D	AC Load	Inductive, Resistiveness, Capacitive

3. Product Introduction

3.3 Product Appearance

The appearance and external components of the energy storage system are described as follows:

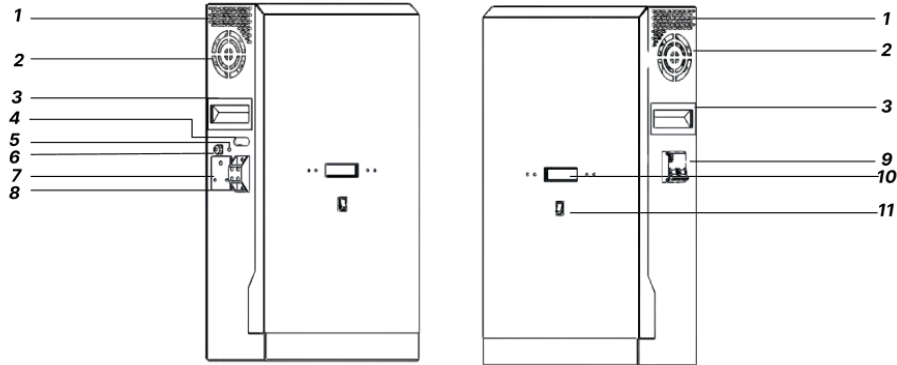


Figure-2

1. Mesh	2. Fan	3. Handle	4. Setting slot
5. Circuit Breaker	6. AC Input	7. AC Output	8. Solar Input
9. MCB	10. LCD Display	11. Switch	

3.4 Product Dimensions

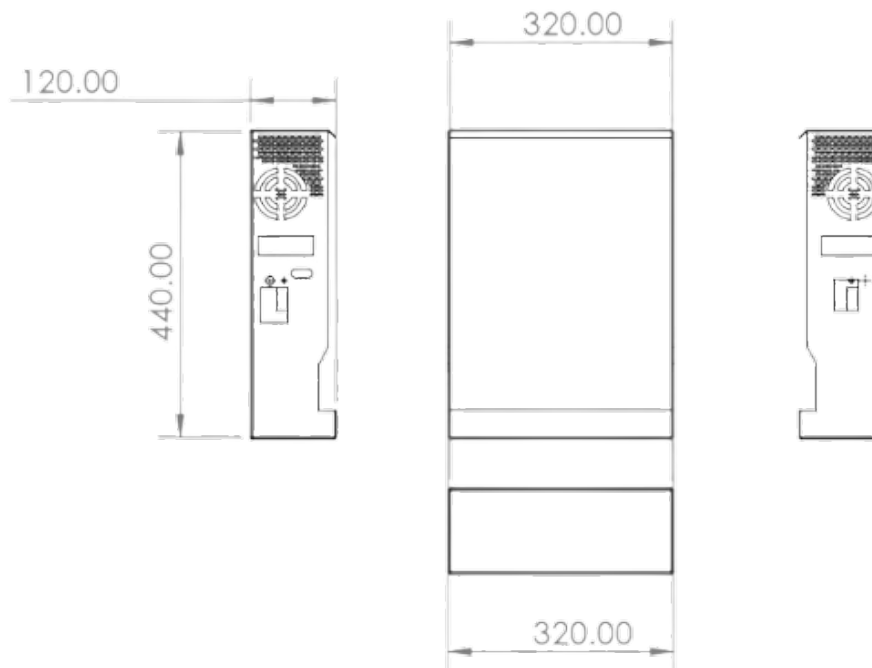


Figure-3 12V 60Ah Product dimensions

3. Product Introduction

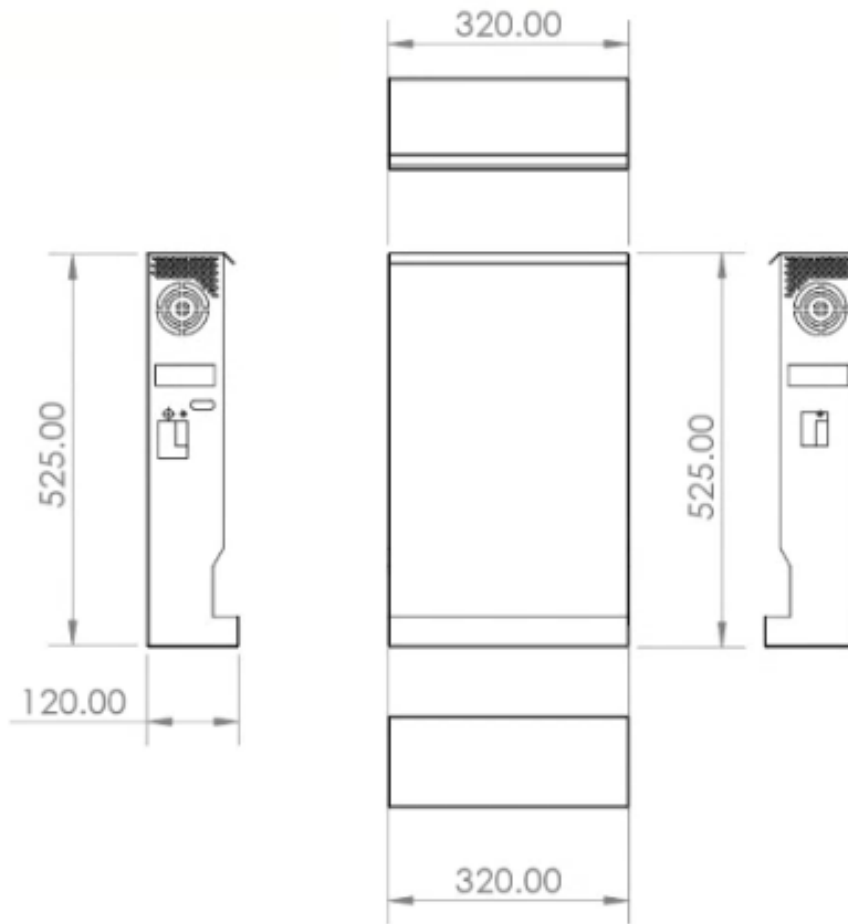


Figure-4 12V 100Ah Product dimensions

	12V 60Ah	12V 100Ah
Material	MS	MS
Weight	28.084kg	33.44kg
Dimensions	440*320*120 mm	525*320*120 mm
Cooling	Natural cooling	Natural Cooling
Applications	Indoor	Indoor

3. Product Introduction

3.5 LCD Display panel

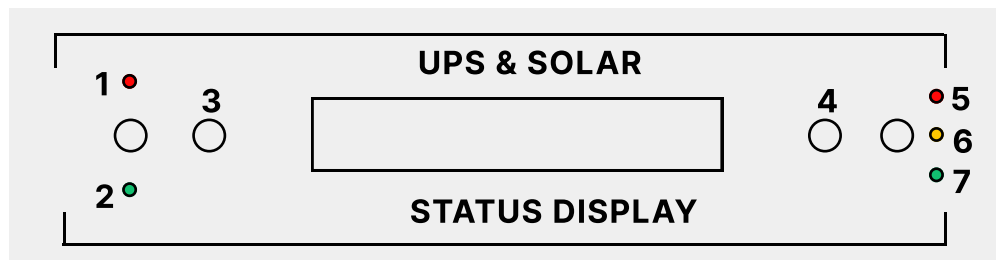


Fig-5 LCD Display

s.no	Description
1	Load ON Mains
2	Load ON Battery
3	Over Load
4	Low Battery
5	ON mains
6	ON Both
7	ON Solar

3.6 Product Features

- 1. Power Output:** 600 - 1000VA inverter capacity.
- 2. Long-lasting LFP Battery:** LFP batteries offer a lifespan of 5,000-7,000 cycles, significantly longer than traditional lead-acid batteries. They also have excellent safety characteristics and are more environmentally friendly.
- 3. Hybrid Functionality:** Seamlessly switch between grid power, solar power, and battery power to ensure continuous energy supply even during grid outages.
- 4. PWM solar Charger:** Pulse width module a built-in solar charger controller.
- 5. Multiple Operation Modes:** Choose from various modes like grid-tied, off-grid, and backup power to optimize energy usage based on your needs.
- 6. Smart Monitoring System:** Monitor energy consumption, battery health, and system performance in real-time through a user-friendly interface.
- 7. Safety Features:** Built-in protections against overcharge, over-discharge, over-current, and short circuits for safe and reliable operation.
- 8. Modular Design:** Scalable system allows you to add additional battery modules as your energy needs grow.
- 9. Warranty:** Enjoy peace of mind with a comprehensive warranty on both the inverter and battery pack.

3. Product Introduction

3.7 Mode of Operation

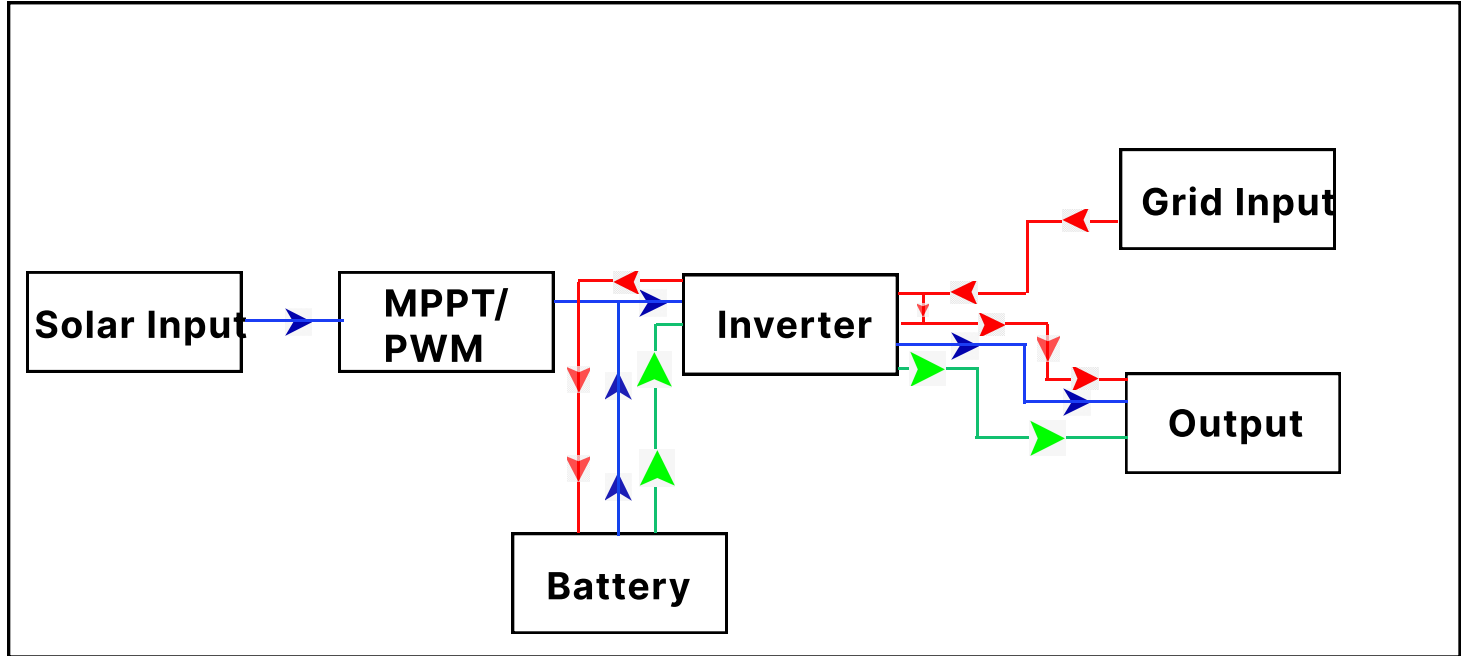


Fig-6

- Normal
- When solar & battery insufficient
- When solar & grid unavailable

3.8 Summary of testing

Summary of testing							
Model/Type : POPA AIS850							
Capacity/va : 850Va							
Rated Power : 630W							
Input Voltage : 220 Volt AC ±2% (230/240V AC selectable)							
Frequency : 50hz							
Cycles	Test		Voltage(V)		Current (A)	Capacity (Ah)	Efficiency
			Before test	After Test			
	Discharge	(Semco)	13.29V	10.57V	10A	98.02Ah	98.02%
Cycle 2	Charge	(Inverter)	11.33V	14.12V	9.66A	103.82Ah	103.82%
	Discharge	(Semco)	13.28V	10.85V	10A	95.03Ah	95.03%
Cycle 3	Charge	(Inverter)	11.81V	14.14V	9.44A	97.03Ah	97.03%
	Discharge	(Inverter)	13.33V	11.1V	23.35A	91.49Ah	91.49%
Cycle 4	Charge	(Inverter)	13.48V	14.11V	9.69A	70.66Ah	70.66%
	Discharge	(Inverter)	13.23V	10.85V	34.29A	77.07Ah	77.07%
Cycle 5	Charge	(Inverter)	12.77V	13.98V	9.51A	92.84Ah	92.84%
	Discharge	(Inverter)	12.2V	11.22V	45.38A	98.85Ah	98.85%

3. Product Introduction

3.9 Technical Parameter Table

USER SELECTION MODE		UPS Mode	INVERTER Mode	
Input	Voltage Range	Acceptable Voltage Range	175 - 270 Vac	
		Low Voltage Cutoff	180±5Vac	
		Low Voltage Recovery	190±5Vac	
		High Voltage Cutoff	265±5Vac	
		High Voltage Recovery	255±5Vac	
		Frequency	50Hz Nominal (47-53 Hz Range)	
Output	Voltage Regulation On Mains	Same as Mains input		
	Voltage Regulation in Battery mode	220V AC Nominal +/-2%(230/240V AC selectable)		
	Freq. Reg	Mains Mode	Same as Mains input	
		Battery Mode	50Hz ±0.1HZ	
	Wave Form	Pure Sine Wave		
Efficiency	≥82%(12VDC); ≥85%(24/48VDC)			
Protection	Overload	For 100% Load - Buzzer Indication, 101% above Load Trips and Retry for		
	Output Short Circuit	Circuit Breaker On Mains, Shutdown on Inverter		
	Battery Reverse Protection	Fuse / MCB		
	Low Battery	Load Disconnection		
	Thermal Shutdown	Below 0°C and Above 90°C		
	Lightning/Surge	Protected up to 4KV Surge		
	Solar Reverse	A blocking Diode is provided to prevent reverse flow of the current		
Shared Charging	On priority, it will charge from solar only as long as it is giving sufficient current. When Solar Current drops to below set point, then shared charging is activated and the balance current it will be charged from Grid.			
Priority	Grid Priority	In this Mode it will charge the battery from Solar + Grid in Sharing Grid charging starts only when Solar Current is less than set value It will shift to battery mode if the battery is full from solar i.e 14.4VDC for 12V system.		
LED Display	Mains ON - RED, Charging On Mains - RED, Charging On Solar - GREEN, Dual -YELLOW Inverter - GREEN, Battery low - YELLOW/RED , Overload/Short Circuit - YELLOW/GREEN			
Environmental	Operating Temperature	0 - 45°C		
	Relative Humidity	0 - 95%		
Change OverTime	<20ms			

3. Product Introduction

3.10 Battery Specifications

Product model	POPA AIS850
Rated voltage	12.8V
Rated capacity	100Ah
Rated energy	1.2kw
Battery Type	LifePO4
Charge Cut off Voltage	14.4V
Discharge Cut-off Voltage	10V
Charge/Discharge Rate	1C/2C Rate
Operating Temperature	1C/2C Rate
Max. Peak Current	50A
Communication interfaces	CAN/RS485/USB
Charging temperature range	0 ~ 45°C
Discharging temperature range	-10 ~ 45°C
Cooling method	Natural cooling
Operation Environment	Indoor

3. Product Introduction

3.11 Load Chart

Model	600W (800VA)				
Options	Watts	A	B	C	D
Computers	60W	0	0	0	1
Printer (Laser)	250W	0	0	0	1
TV LCD (26")	200W	0	0	1	0
Tube Light	40W	3	0	3	3
Fan	80W	4	0	2	1
CFL	15W	7	36	4	2

Parameter	Specifications	
	Mains	Solar
Battery Bulk Current	10A	30A
Battery Boost Current	8A	21A
Battery Float Current	8A	5A
Battery Bulk Voltage	14.4V	14.4V
Battery Boost Voltage	14.4V	14.4V
Battery Float Voltage	13.2V	13.2V

4. System Maintenance

4.1 Battery Storage and Maintenance

1. When being stored, the batteries shall be placed correctly in accordance with the marks on the packing case. Do not put them upside down or on the side.
2. When stacking up the battery packing cases, the stacking requirements on the outer package shall be met.
3. The batteries should be handled with care, and damage to batteries should be strictly prohibited.

Battery Storage Requirements

1. Ambient temperature: -10°C to 55°C , recommended storage temperature: 20°C to 30°C .
2. Relative humidity: 5%RH-80%RH.
3. Dry, well ventilated, and clean.
4. The corrosive organic solvents, gases and other substances shall be kept away.
5. Exposing to direct sunlight shall be avoided.
6. The distance from the heat source should not be less than two meters.
7. The warehouse keeper shall make monthly statistics on the battery storage, and regularly inform the planning link of the battery inventory. If any battery has been stored for nearly 15 months (-10°C to 25°C), 9 months (25°C to 35°C), or 6 months (35°C to 55°C), recharging shall be arranged in time.
8. When the stored batteries are going to be delivered, the first-in first-out principle should be followed.
9. After the battery is produced and tested, it shall be recharged to at least 50% SOC before being stored. If the device will not be used for a long period of time, discharge the battery to 45% to 60% of the battery capacity and disconnect the battery output to avoid the battery runs out;
10. Do not touch the battery pack with wet hands.
11. Do not squeeze, drop, or pierce the battery.
12. The battery should always be disposed in accordance with local safety regulations.
13. The battery should be stored and recharged in accordance with this User's Manual.
14. Do not reverse polarity of the battery when storing or transporting the batteries, the batteries shall not be stacked up without protective packaging, and the number of stacked packed batteries should not exceed the number specified on the packaging.

4. System Maintenance

4.2 Requirements for Charging of Battery

1. The batteries to be stored for a long period of time (unused, for more than 3 months) must be kept in a dry and cool place. The storage voltage is 51V~53V. The batteries should be stored in a clean environment of $23 \pm 2^{\circ}\text{C}$ and humidity of 45%~75%. If the battery will be shelved and not used for a long period of time, it should be recharged every 3 months to ensure that the battery voltage is within the above range.
2. As for batteries and long-term storage, routine maintenance is required. Please charge the battery to 40% SOC at a current of 0.2C according to the requirements in the table below.

Ambient temperature for	Relative humidity for	Storage Time	SOC
<-10°C	/	Prohibited	/
-10~25°C	5%~70%	≤12 months	30%≤SOC≤60%
25~35°C		≤6 months	
35~45°C		≤3 months	
>45°C	/	Prohibited	/

4.3 Device Cleaning

1. It is recommended to clean and maintain the product from time to time. When cleaning, the dust and stains on the product shall be removed with a piece of soft dry cloth or vacuum cleaner. The product shall not be cleaned with organic solvents, corrosive liquids and other cleaning products.

5. Installation

5.1 Installation Location Selection & Fix Mount Frame

Determine the installation position, put the installation auxiliary board in the proper position, and mark the place where the holes need to be punched. Make the convex side outward and fix the mounting frame. As it is represented in figure 7.

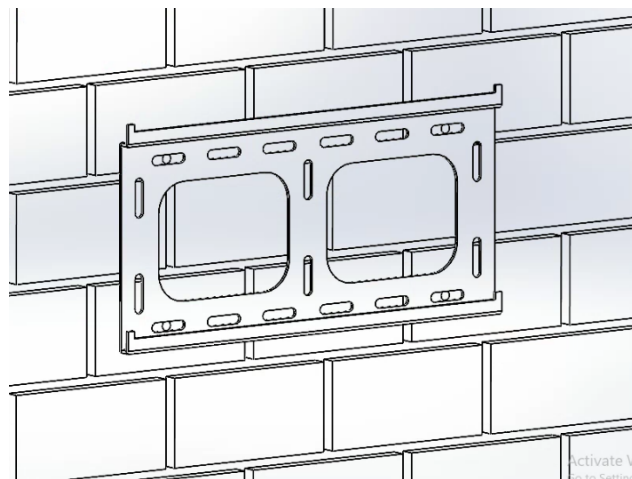


Fig-7 Installation of fix mount frame

5.2 Install Energy storage system(inverter + battery pack)

Keep the pack balanced, and then slowly hang the pack on the frame through the match screws. As it is represented in figure 8.

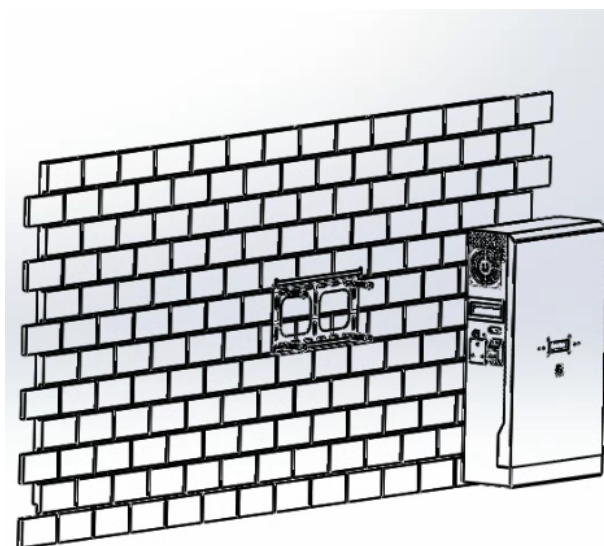


Fig-8 Mounting of energy storage system

5. Installation

In figure 9, represents the bracket view and side view of the Energy storage system after installation.

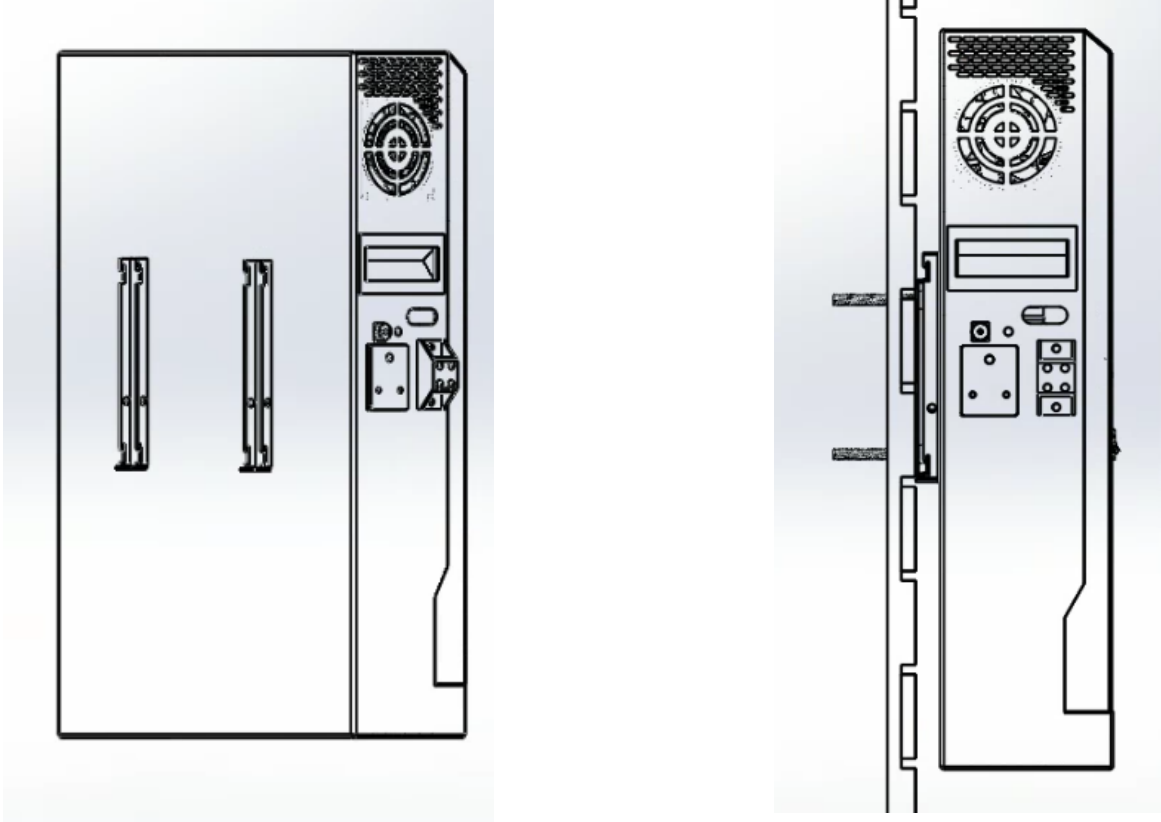


Fig-9 Bracket view and side view of energy storage system

6. Test Run

6.1 Pre-Boot Check

Before commissioning, a thorough inspection of the installation of the equipment should be carried out, especially to check whether the DC and AC voltages meet the requirements of the inverter, as well as whether the polarity and phase sequence are correct.

Check that all connections have met the requirements of the relevant standards and specifications. And whether the system is well grounded. Grounding resistance is of great importance to the safety of the whole system. It must be determined that the grounding resistance meets the requirements before the first trial operation.

Step 1: Check the inverter

1. The inverter needs to be checked before it is turned on.
2. Check the installation and wiring of the inverter.
3. Ensure that all AC and DC circuit breakers are disconnected.

Step 2: Check AC side voltage

1. Check whether the three phases of the inverter are connected correctly to the three phases of the power grid.
2. Check whether the phase voltage and line voltage are within the predetermined range and record the voltage value.
3. If possible, measure the total harmonic distortion (THD) and view the curve. If the distortion is serious, the inverter may not work.

Step 3: Check DC side voltage

1. The DC side should be connected to the inverter from the battery pack to ensure that the input polarity of each battery pack is correct.
2. The PV side should be connected to the inverter from the PV to ensure that the input polarity of each PV group is correct.

7. Trouble Shooting

Trouble Shooting and Solutions		
Abnormal phenomena	Solution	
Inverter	Overheated	1.Please check whether the inverter is placed next to the heat source. Whether the fan port of the inverter has a shelter an the fan is working.
	Overload	1.Reduce load
	Battery overdischarge	1.The battery capacity is small and please reduce load. 2.Battery aging. Please replace battery. 3.Weather. Extended charging time.
	Output short circuit	1.Checking circuit if it is due to overload. Please reduce the electrical load and restart the machine.
	Mains is not charged	1.Check for mains input. 2.Please select AC priority option for working mode in the menu and choose PV +AC for charging mode.
	No AC output	1.The system is in standby mode. Please restart. 2.The system is in alarm protection state. Please release the alarm.
Controller	PV is not charging	1.Whether the operating voltage of the photovoltaic module within the operating range of the MPPT controller. 2.Check if the voltage displayed on the PV system screen is accurate or not . 3.check whether the photovoltaic input switch of the controller is disconnected or not.
	No curve display	1.Check whether the time on the controller screen coincides with the time in the location.

8. Quality Assurance

If the product fails during the quality assurance period, our company will provide free maintenance services or replace new products.

Evidence

During quality guarantee, our company requires customer shows purchase invoice and date of the products. At the same time, logo on the products should be clear and distinct, or we have the right not to provide quality guarantee.

Conditions

Substandard products after replacement should be handled by our company.

1. Customer should leave reasonable maintenance time to repair the failure equipment.

Responsibility Immunities

Our company have the right not to provide quality guarantee on the conditions below:




1. The whole machine or components have exceeded free guarantee period.
2. Transportation damage.
3. Incorrect installation, modification or use.
4. Operated beyond very harsh environment illustrated in this manual.
5. Machine failure or damage caused by maintain, change or disassemble by non-our company services.
6. Damages caused by abnormal natural environment.
7. Product failure caused by situations above, if customer requires maintenance service, we can provide paid maintenance service after our company service institution judgments.



Thank You



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