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USER GUIDE

LiFePO4 Battery for Energy Storage System

Contents

1 ABOUT THIS MANUAL

1.1 Purpose

This manual describes the introduction,installation, operation and emergency situations of the battery bank. Please read this manual carefully before installations and operations. Keep this manual for future reference.

1.2 Scope

This manual provides safety and installation guidelines as well as information on tools and wiring.

1.3 Safety Instructions

WARNING: This chapter contains important safety and operating instructions. Read and keep this manual for future reference.

1.Before using the unit, read all instructions and cautionary markings on the unit, the batteries and all appropriate sections of this manual.
2. CAUTION –-- To reduce risk of injury,damage,even burst. please use it following using manual. In case of causing personal
3. Do not disassemble the battery. Take it to a qualified service center when service or repair is required. Incorrect re-assembly may result in a risk of fire.
4. To reduce risk of electric shock, disconnect all wirings before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.
5. CAUTION – Only qualified personnel can install this device with inverter.
6. For optimum operation of this battery, please follow required spec to select appropriate cable size.
7. Be very cautious when working with metal tools on or around batteries. A potential risk exists to drop a tool to spark or short circuit batteries or other electrical parts and could cause an explosion or fire.
8. Please strictly follow installation procedure.

1.4 Can be connected in parallel

1. The batteries can be connected in parallel. Series connection is not allowed. Use in upright position only.
2. The batteries are not allowed to connected with PWM controller for charging.

Special Attention: Due to the built-in protection board of the lithium battery pack is with over-discharge protection function, it is strongly recommended to stop using the load when the battery pack is over-discharged. The battery pack cannot be repeatedly activated for discharge. Therefore, when the battery pack is low power, please charge the battery as soon as possible when main power or solar energy is available.

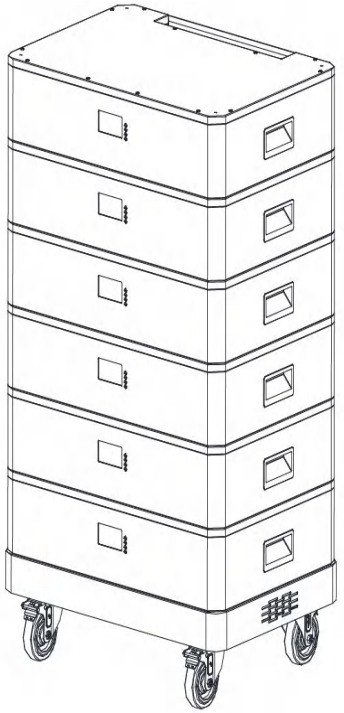
2. INTRODUCTION

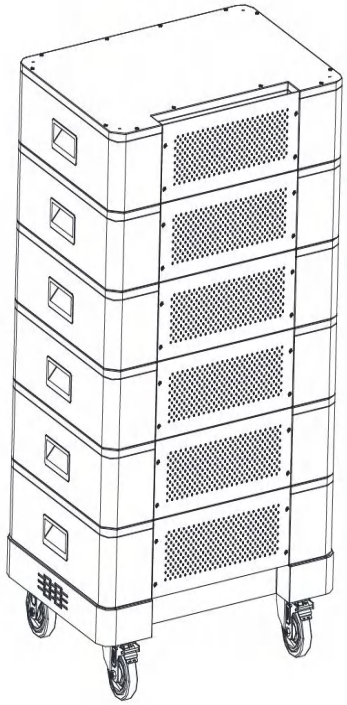
The battery main using for energy storage system. Built-in smart BMS to match various of hybrid inverters.

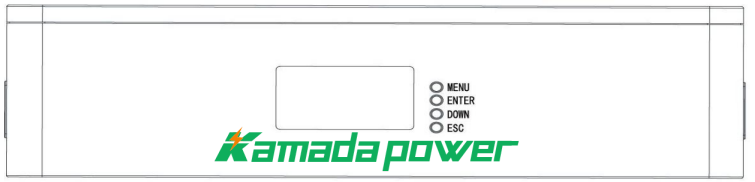
2.1 Features

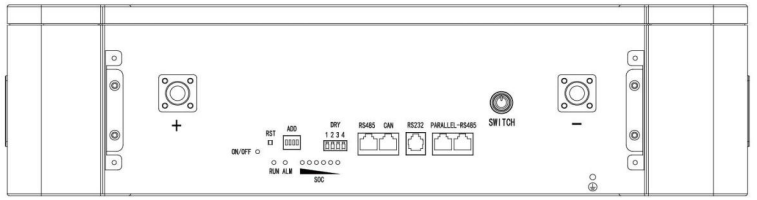
- LiFePO4 Battery
- Long warranty period:5 years
- Higher energy density, smaller volumn.
- Support connected in parallel mode for expansion.
- This battery pack is designed for energy storage systems.
- Battery management system(BMS): The battery packs built-in BMS monitors its operation and prevents the battery from operating outside design limitations.
- Expandability:This battery pack can be easily expanded by adding expansion battery packs in parallel connection.

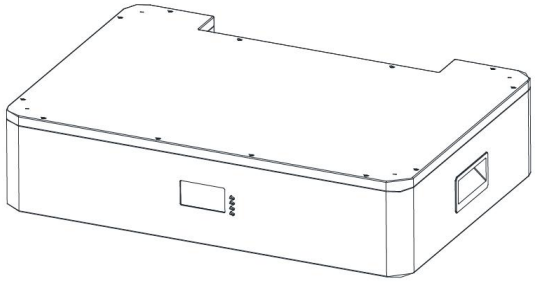
2.2 Product Over View

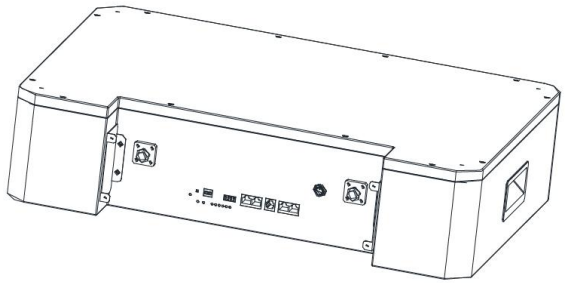










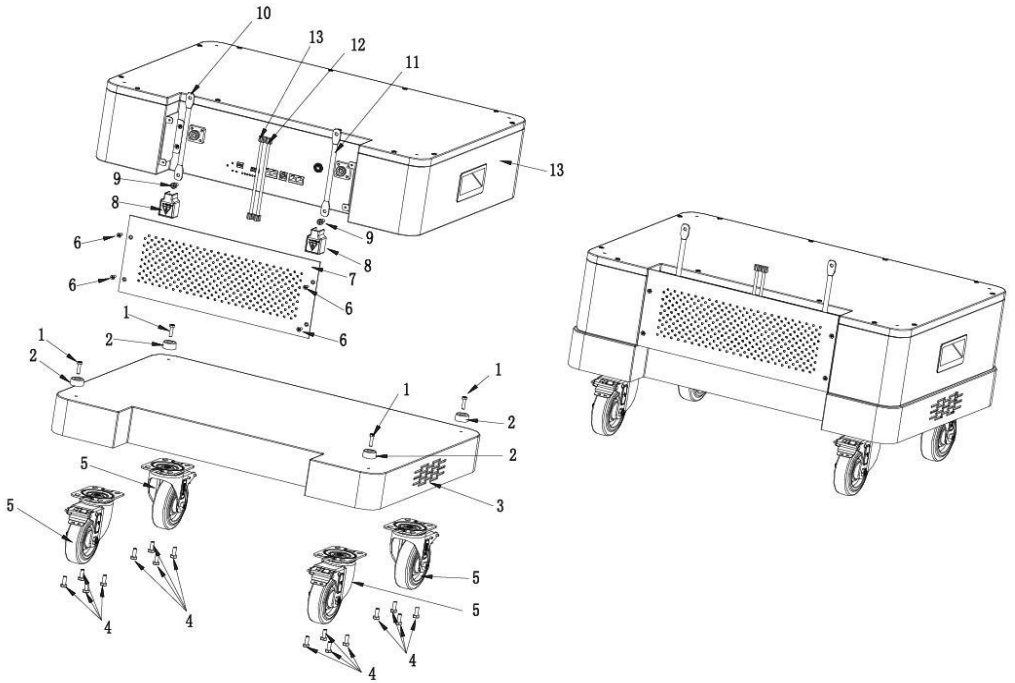


2.3 Specifications

Battery module						
Battery Model	LV 51.2V 100Ah					
Rated Battery Voltage	51.2V					
Rated Energy	5.12kWh					
Battery Type	LFP(LiFePO4)					
Weight	50KGS					
Dimensions (L*W*H)(mm)	651x454x154					
System parameters						
System Structure						
Number Of Batteries In Parallel	1	2	3	4	5	6-8
Battery Energy	5.12kWh	10.24kWh	15.36kWh	20.48kWh	25.6kWh	30.72kWh-40.96kWh
Max. Charging Current	90A @25℃					
Max. Discharging Current	100A @25℃					
Charging Temperature	0℃~45℃					
Discharging Temperature	-20℃~55℃					
Storage Temperature	-0℃~55℃					
Humidity	5%~95%					
Cooling Strategy	Fan					
Ingress Protection Rating	IP20					
Communication	WiFi/RS485/RS232/CAN(Optional)					
Weight	67KGS	117KGS	167KGS	217KGS	267KGS	317KGS-417KGS
Dimensions (L*W*H)(mm)	661*464*348	661*464*502	661*464*656	661*464*810	661*464*964	661*464*(1118~1426)
Warranty	5 Years Product Warranty, 10 Years Design Life Warranty					
CERTIFICATE						
Certificate	CE/UN38.3/MSDS					

3. INSTALLATION

3.1 Diagram of accessories



3.2 Description of accessories

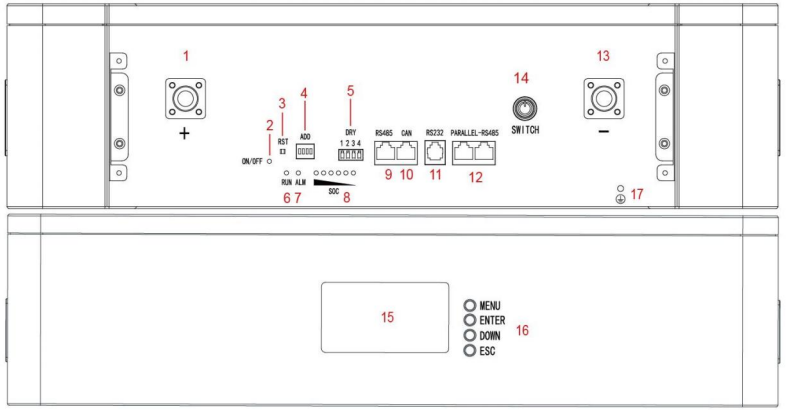
Schematic illustration of assembly instructions for a single battery			
1	Connecting buckle M5 screws	8	Terminal protection cover
2	Connecting buckle (black&round shape)	9	Terminal M6 screws
3	Base with wheels	10	Positive cable
4	Caster M6 screws	11	Negative cable
5	Casters	12	CAN communication line
6	Backplate M4 screws	13	RS485 communication line
7	Backplate		

3.3 Installation steps

Assembly sequence and method description	
1	Install the casters to the bottom of the base and lock the casters
2	Put the batteries on the base
3	Remove the terminal protection cover
4	Remove the backplate
5	Connect the positive cable to the battery positive terminal and then connect to the positive terminal of the inverter
6	Connect the negative cable to the negative terminalconnect to and then connect to the negative terminal of the inverter
7	Put the terminal protective cover on the positive and negative terminals of battery
8	Select CAN or RS485 communication port according to different inverters, and then connect the battery and inverter through the communication line
9	Press the SWITCH so that the battery level indicator and RUN light are green
10	Dial the ADD address switch to 1
11	Lock the backplate
(Pay attention to prevent short circuit of positive and negative wires)	

4. OPERATION

4.1 Function introduction



No.	Name	Function Description
1	Power Positive Terminal	Power positive output, two terminals with the same positive terminal is a parallel output
2	ON/OFF Indicator	The indicator light is on to indicate that the battery is on
3	RST Button (Electronic)	1. You can turn on and off the battery, the default is automatically turned on when the power switch is turned on, long press for 3 seconds, when the power indicator is flashing, release to automatically turn off the battery output 2. After battery troubleshooting, if the ALM indicator is still on, press the RST button for 3-5 seconds, when the power indicator is flashing, release the ALM indicator to turn off
4	ADD Address Switch	When connecting batteries in parallel by dialing the code Address identification of different batteries (see attached page for dialing rules)
5	DRY Communication Interface	DRY output terminal Dry contact 1-PIN1 to PIN2: Normally open, closed when fault protection; Dry contact 2-PIN3 to PIN4: Normally open, alarm closed when low battery
6	RUN Indicator	The indicator light is on to indicate that the battery is functioning normally

7	ALM Indicator	The indicator light is on to indicate a battery alarm or fault
8	6 Power Indicators	Different power levels show different number of indicators
9	CAN Communication Interface	Connection to CAN port of inverter
10	RS485 Communication Interface	Connection to RS485 port of inverter
11	RS232 Communication Interface	Testing and modifying battery parameters
12	RS485 Communication Interface	1.Testing battery performance 2.When multiple batteries are used in parallel, it acts as a communication connection port between batterie
13	Power Negative Terminal	Power negative output, two terminals with negative terminal is parallel output
14	Power Switch(Mechanical)	Turn on and off the battery
15	Display	Display all basic parameters of the battery
16	4 Display Buttons	MENU ENTER DOWN ESC
17	GND	Prevent electric shock accidents caused by touching the live electrical casing

4.2 Communication introduction

RS232

BMS can communicate with the upper computer through RS232 interface, so that the upper computer can monitor all kinds of battery information,including battery voltage, current, temperature, status and batteryproduction information, etc. The default baud rate is 9600bps.

CAN

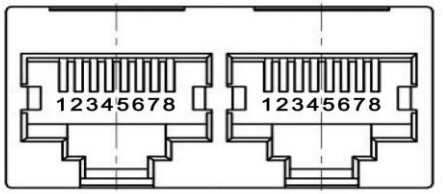
CAN communication, the default communication rate is 500K.

RS485

With dual RS485 interfaces, you can view PACK information, and the default baud rate is 9600bps.If you need to communicate with the monitoring device through RS485, the monitoring device is the host, polling data according to the address , The address setting range is 1~15.

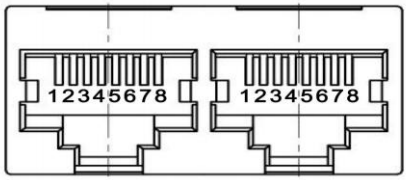
4.3 Interface definition

Communication Interface Diagram

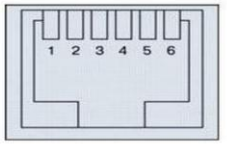


CAN and RS485 interface

Dry contact



Parallel communication port



RS232 communication port

Electrical Interface Definition

RS232--Adopt 6P6C vertical RJ11 socket	
RJ11 pin	Definition description
2	NC
3	TX (veneer)
4	RX (veneer)
5	GND

CAN-- adopts 8P8C vertical RJ45 socket		RS485-- 8P8C vertical RJ45 socket	
RJ45 pin	specifies	RJ45 pin	specifies
1、2、3、6、8	NC	1、8	RS485-B1
5	CANL	2、7	RS485-A1
4	CANH	3、6	GND
7	GND	4、5	NC

CAN and RS485 interface

RS485-- 8P8C vertical RJ45 socket		RS485-- 8P8C vertical RJ45 socket	
RJ45 pin	specifies	RJ45 pin	specifies
1、8	RS485-B	1、8	RS485-B
2、7	RS485-A	2、7	RS485-A
3、6	GND	3、6	GND
4、5	NC	4、5	NC

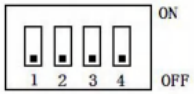
Parallel communication port

Once the batteries are connected well, simply press On/Off button to enable the output of the battery pack.

4.4 Switch ON / OFF

Dial Switch

When PACK is used in parallel, different PACK can be distinguished by setting the address of ADD switch on BATTERY, and it is necessary to avoid setting the address to be the same.For the definition of BMS ADD switch, refer tothe following table.



Address	Dial code 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

4.5 ON / OFF or SOC Led (Mode or SOC)

LED instructions

Table 1 LED Working status indication

State	Normal / Alarm / Protection	ON/ OFF	RUN	ALM	SOC Indication LEDs						Instructions
		●	●	●	●	●	●	●	●	●	
Power Off	Sleep	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	All off
Standby	Normal	ON	flash1	OFF	Indication by SOC						Standby
	Alarm	ON	flash1	Flash3							Cell low voltage
Charge	Normal	ON	ON	OFF	Indication by SOC (The top SOC Led Flash 2)						Maximum power LED flash(flash 2),ALM does not flash for over-charge warning
	Alarm	ON	ON	Flash3							
	Over Charge Protection	ON	ON	OFF	ON	ON	ON	ON	ON	ON	If no mains supply, LED as standby
	Temperature. Over-current Fault Protection	ON	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	Close charge
Discharge	Normal	ON	Flash3	OFF	Indication by SOC						
	Alarm	ON	Flash3	Flash3							
	Under Discharge Protection	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Close discharge
	Temperature. Over-current. Short Circuit Fault Protection	ON	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	Close discharge
Fault		OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	Close charge Close discharge

Table 2 Capacity indication

State		Charge						Discharge					
Capacity indicator light		L6 ●	L5 ●	L4 ●	L3 ●	L2 ●	L1 ●	L6 ●	L5 ●	L4 ●	L3 ●	L2 ●	L1 ●
electricity (%)	0～16.6%	OFF	OFF	OFF	OFF	OFF	flash2	OFF	OFF	OFF	OFF	OFF	ON
	16.6～33.2%	OFF	OFF	OFF	OFF	flash2	ON	OFF	OFF	OFF	OFF	ON	ON
	33.2～49.8%	OFF	OFF	OFF	flash2	ON	ON	OFF	OFF	OFF	ON	ON	ON
	49.8～66.4%	OFF	OFF	flash2	ON	ON	ON	OFF	OFF	ON	ON	ON	ON
	66.4～83.0%	OFF	flash2	ON	ON	ON	ON	OFF	ON	ON	ON	ON	ON
	83.0~100%	flash2	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
Running light ●		ON						flash(flash 3)					

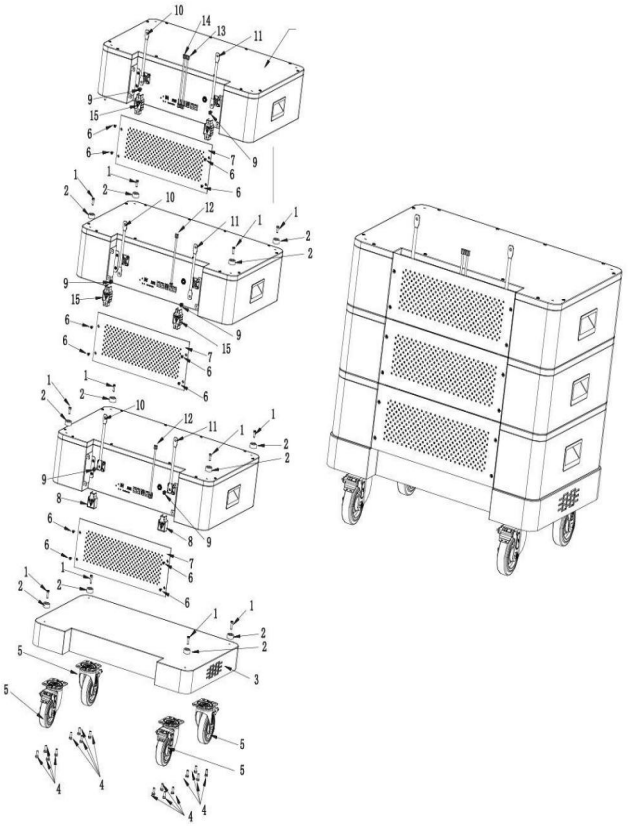
Table 3 LED Flash description

Flashing way	ON	OFF
FLASH 1	0.25S	3.75S
FLASH 2	0.5S	0.5S
FLASH 3	0.5S	1.5S

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

4.6 Connection for Parallel Mode

1. The ADD address of this battery wired with the inverter is 1, other batteries dial the corresponding address according to the dial code address rule
2. Continuous current 100A. 6AWG or 4AWG wire is recommended for the power cord



Schematic illustration of assembly instructions for multiple batteries			
1	Connecting buckle M5 screws	9	Terminal M6 screws
2	Connecting buckle (black&round shape)	10	Parallel positive lines
3	Base with wheels	11	Parallel negative line
4	Caster M6 screws	12	Parallel communication line
5	Casters	13	CAN communication line
6	Backplate M4 screws	14	RS485 communication line
7	Backplate	15	Terminal protective cover with two openings
8	Terminal protection cover		

Assembly sequence and method description	
1	Install the casters to the bottom of the base and lock the casters
2	Install the connecting buckle on top of each battery
3	Put the batteries on the base and then stack in turn (Up to 8 batteries can be stacked)
4	Remove the terminal protection cover
5	Remove the backplate
6	Connect the parallel positive cable
7	Connect the parallel negative cable
8	Connect the parallel communication line
9	Connect the positive output cable of the top battery with the inverter
10	Connect the negative output cable of the top battery with the inverter
11	Put the terminal protective cover on the positive and negative terminals of batteries
12	Press the SWITCH so that the battery level indicator and RUN light are green
13	Dial the ADD address switch to 1 for the 1st battery, dial 2 for the 2nd battery and dial 1 and 2 for the 3rd battery, see the dialing rules in the manual for details methods(4.4)
14	Lock the backplates

5. EMERGENCY SITUATIONS

KMD cannot guarantee battery absolute safety.

5.1 Fire

In case of fires, make sure that the following equipment is available near the system.

- SCBA (self-contained breathing apparatus) and protective gear in compliance with the Directive on Personal Protective Equipment 89/686/EEC.
- NOVEC 1230, FM-200, or dioxide extinguisher

Batteries may explode when heated above 130°C. KEEP FAR AWAY from the battery if it catches fire.

5.2 Leaking Batteries

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

- Inhalation: Evacuate the contaminated area, and seek medical attention.
- Contact with eyes: Rinse eyes with running water for 5 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.

5.3 Wet Batteries

If the battery pack is wet or submerged in water, do not let people access it, and contact your supplier for help.

Damaged Batteries

Damaged batteries are not fit for use and are dangerous and must be handled with the utmost care. It may leak electrolyte or produce flammable gas. If the battery pack seems to be damaged, pack it in its original container, and then return it to your supplier.

5.4 Warranty

Products that are operated strictly in accordance with the user manual are covered by the warranty. Any violation of this manual may void the warranty.

Limitation of Liability

Any product damage or property loss caused by the following conditions, KMD does not assume any director indirect liability.

- Product modified, design changed or parts replaced.
- Changed, or attempted repairs and erasing of series number or seals;
- System design and installation are not in compliance with standards and regulations;
- The product has been improperly stored in end user's premises;
- Transport damage (including painting scratch caused by movement inside packaging during shipping). A claim should be made directly to shipping or insurance company.