



B-Box Pro 13.8

User Manual

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Please contact BYD directly, if you have any further questions.

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1 General Information

1.1 About this manual

This user manual introduces the B-Box product information, user guidance, safety caution items and normal failure and actions. Users can contact the after sales service center if any abnormal failure or urgent issues occur.

1.2 Target Group

This user manual applied to the B-BOX Pro 13.8.

1.3 Intend usage

The B-BOX can be used in household energy storage applications, including on/off-grid system. The B-BOX works with different inverter brands and the user should refer to the configuration list of approved inverter brands recommended by BYD..

1.4 B-BOX and B-Plus definition

BYD battery box product B-Box Pro 13.8 is defined as follows:

B-Box: Battery Box

B-Plus13.8: Battery unit with nominal capacity of 13.8KWh can be installed inside the cabinet as an energy storage module.

B-Box 13.8: Battery nominal capacity is 13.8 KWh (Includes 1 set of B-Plus 13.8)

1.5 Identifying the Product

The Type Label describes the product identification, which is attached to the product. For safe usage, the user must be well-informed of the contents in the Type Label. The Type Label includes:

Product Name:

Product Type/Nominal Capacity:

Nominal Voltage:

Max Current Discharge & Charge:

Ambient Temperature Range:

2 Safety

2.1 Safety precaution

Warning, notice and caution

Users are kindly requested to use the battery which is supplied by BYD Lithium Battery Company Limited in strict accordance with the datasheet and remarks include at the end of this document.

BYD Lithium Battery Co., Ltd. will not guarantee or accept liability for a product installed and operated not in accordance to the guidance manual and resulting in an accident.



WARNING

Do not crush the battery and always dispose according to safety regulations (Do not dispose in fire or water).

Recharge Battery at least every 6 months (when in storage).

Once discharged, recharge battery within 7days. If there is no charging within 7days, please power off the battery and disconnect it from the system.

Do not expose to temperatures above 50°C, and keep out of direct sunlight.

Ensure secure grounding. Do not reverse the front panel.

Do not short, reverse polarity or connect in series.

Disconnect from power and load before maintenance.

May only be operated by qualified professionals.

Do not put one battery (without package) on another.

In the process of transportation and storage, the goods are not allowed be stacked at a height or layers above the specification.

B-BOX product only can be used in home energy storage application, and it is not allowed for life-sustaining medical devices and automotive application.



NOTICE

Inadvertent operation of damaged B-Box can lead to a dangerous situation that may result in serious injury due to electrical shock. B-Box can only be operated when it is technically faultless and in an operationally safe state.

Regularly check the B-Box for visible damage. Make sure that all safety equipment is freely accessible at all time. If B-Box is damaged, do not touch it.

Please contact BYD after service supplier if a significant event message displays on LCD or APP of inverter.



CAUTION

Li-ion battery inside. When disassembling the system, do not intentionally short the positive (+) and negative (-) terminals with metallic objects.

All works on system and electrical connections must be carried out by qualified personnel only. B-Box provides an emergency switch when for urgent situation.

A potentially hazard circumstance such as excessive heat or electrolyte mist may occur due to incorrect operation, damage or abuse. If the safety precautions and the warning messages described are not fully understood, or if you have any questions, please contact after service for guidance. The safety section may not include all regulations for your region.

Personnel working with B-Box must review applicable federal, state and local regulations as well as the industrial standards regarding this product.

When transport the system with package type, remove the battery from cabinet and transport them separately.

2.2 Safety guidelines for installation



CAUTION

Li-ion battery (energy storage unit) inside. When assembling the system, do not intentionally make a short connection between the positive (+) and negative (-) terminals of the battery box with a metallic object.

All works on the B-Box and electrical connections must be carried out by qualified personnel only. B-Box provides a safe source of electrical energy when operated as intended and as designed.

Potentially hazardous circumstances such as excessive heat or electrolyte mist may occur under improper operating conditions, damage, misuse and abuse. The following safety precautions and the warning messages described in this section must be observed. If any of the following precautions are not fully understood, or if you have any questions, contact customer service for guidance. The Safety Section may not include all regulations for your region; personnel working with B-Box must review applicable federal, state and local regulations as well as the industrial standards regarding this product.

Installation personnel cannot wear watches, etc., to avoid short circuit and accidental damage.



CAUTION

Due to heavy weight of BYD B-Box Pro 13.8, please use strong package and safety protection during transportation, and make sure to the safety to avoid accidental damage

3 Technical parameters

B-Box Pro 13.8	
Battery Type	Lithium Iron phosphate battery
Battery module	B-Plus13.8
Nominal Battery Energy	13.8
Output power(KW)	Max 12.8
Nominal voltage(V)	51.2
Ambient Temperature Range(°C)	-10~+50
Communication	RS485/CAN
Cabinet Net Dimension(W*D*H mm)(Without ground feet)	650* 550* 800
Net Weight (Kg)	175
IP level	IP20

When B-BOX works in different temperatures, charge and discharge current will be adjusted automatically, detail parameters setting please refer to below table:

Parameter setting of charge current in various temperature

Protect temp./Resume temp.(°C)	Normal current(A)
-7~2	0.06C*N
2~12	0.12C*N
12~50	0.7C*N

Remark:

1. Effective time is 2mins when change from one temperature range to another.)

2. N=B-Plus13.8 battery group quantity

Discharge current control with temperature

Protect temp./Resume temp.(°C)	Normal current(A)
-20~50/(-15-50)	0.7C*N

Remark:

1. N= B-Plus13.8 battery group quantity

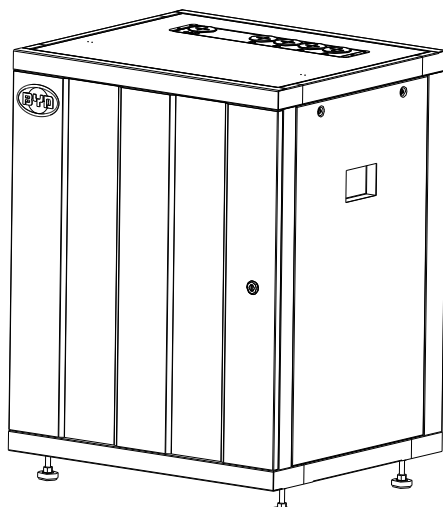
4 Technical noun explanation

No.	Terms	comment
1	Discharge	Battery output power for load
2	Charge	Battery power supply(such as DC charger)
3	Full charged	Battery had been full charged, SOC is 100%.
4	Idle	Battery is on status of neither charge nor discharge and has not been fully charged.
5	Shutdown mode	Power off
6	SOC	State of Charge
7	SW	Software
8	HW	Hardware
9	Battery voltage	The voltage between B+/B-
10	Pack voltage	The voltage between P+/P-
11	Cell voltage	Single cell voltage
12	Failure	Battery or BMS are broken, and need to change new unit
13	Alarm	Battery will stop charge or discharge immediately
14	Protect	Battery stops charging or discharging (e.g. cell is over voltage), it is resumable.
15	Over discharged	Battery module or batteries overvoltage, need recharge the battery timely.

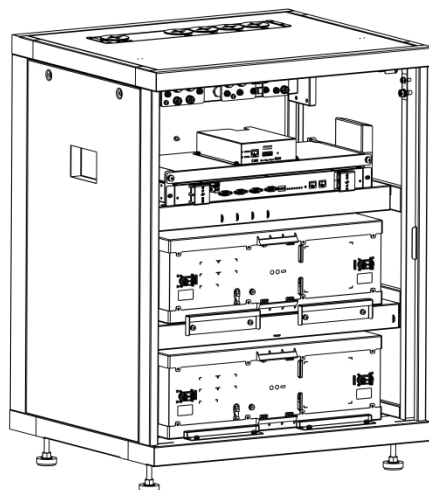
5 Product overview

5.1 B-BOX System brief introduction

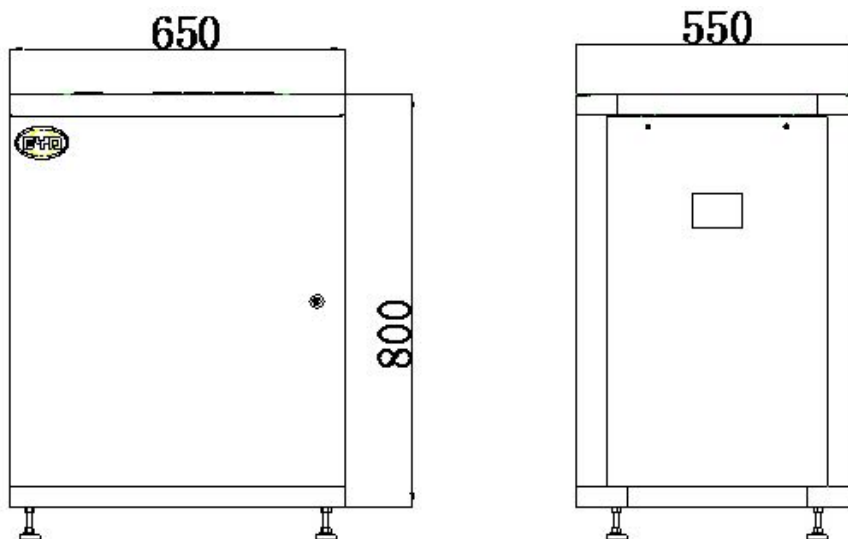
B-Box is the short name for battery box, the energy storage part in the electric power system of a household, and the B-box carries BYD's lithium batteries offering excellent performance. There are 2 pcs battery modules in each box, and the box supports parallel connection to expand capacity from 13.8KWh to 409KWh, which can meet various capacity requirements for customers.



External drawing



Internal drawing



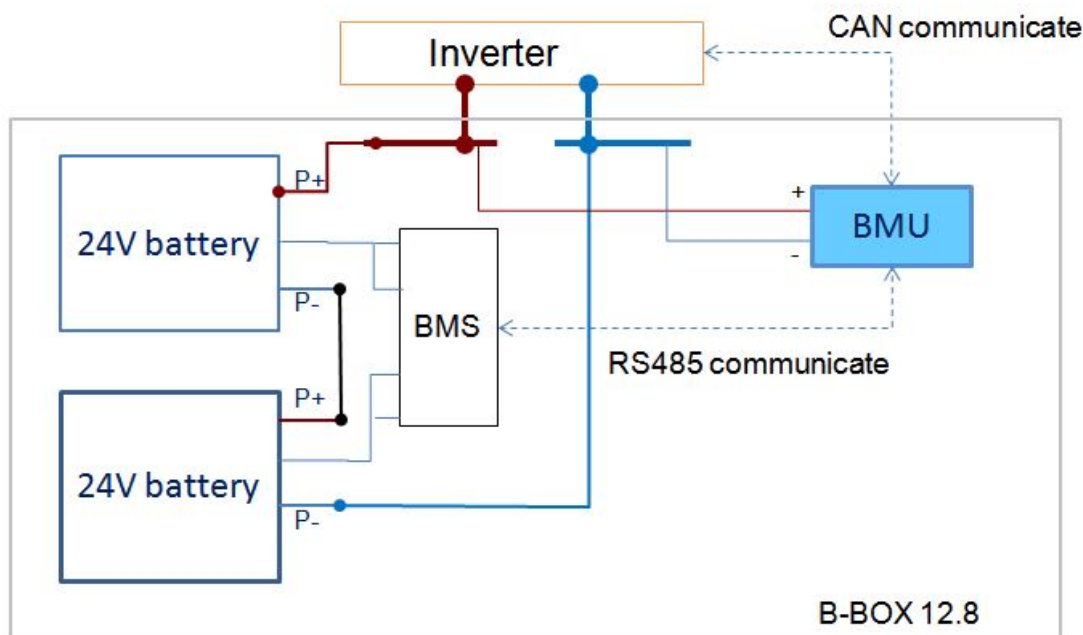
Structure dimension drawing

5.2 B-BOX configuration table

No.	Component	Name	Description
1	Cabinet	B-Box Cabinet	The Cabinet is used to install the B-Plus 13.8 and provide DC output(Each cabinet can install max 1set of B-Plus13.8)
2	Battery	B-Plus13.8	Battery modules with 51.2V 270Ah, BYD's P/N is: 8S-T.
3	BMS	BMS48250	Battery management system. Manage battery and sends battery information to BMU.
4	BMU	BMU	Battery management unit. Provides communication with external equipment.

Configuration list

5.3 B-BOX System diagram



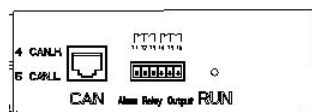
System diagram

5.4 General introduction of BMU

BMU is battery management unit which integrated in the cabinet, its function is to manage the battery's charge and discharge, select information from battery and report to inverter.

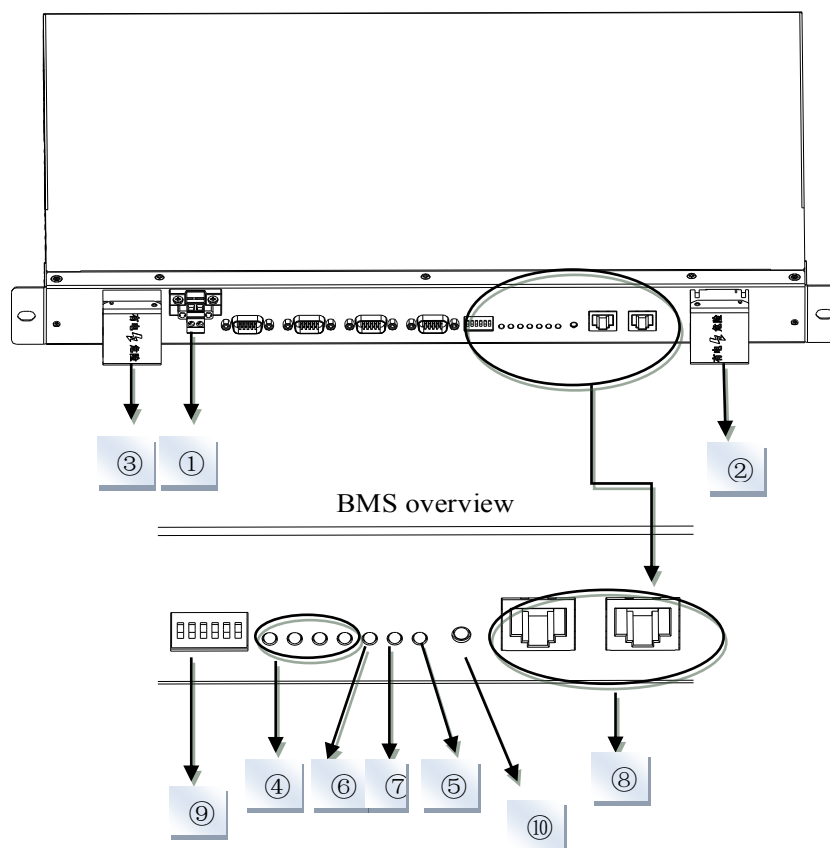
Main functions:

- ✓ CAN /RS485 communicate with inverter
- ✓ RS485 communicate with battery/BMS
- ✓ Dry contact terminal
- ✓ Other Communication interface for maintenance
- ✓ Charge and discharge management



5.5 General introduction of BMS48250

BMS is the name of battery management system which is designed for BYD lithium battery management.



No.	Interface	Mark	Function
①	B+	B+	Connects battery positive cable to power the BMS
②	B-	B-	Positive terminal of BMS
③	P-	P-	Negative terminal of BMS
④	SOC LED	SOC	Indicates state of capacity of battery
⑤	RUN LED	RUN	Indicates the Plus is running status
⑥	ERR LED	ERR ADDR	Indicates error status
⑦	Alarm LED	Alarm	Indicates alarm status
⑧	RJ45 terminal	RS485	Communication ports
⑨	Address	ADDR	When parallel connection, address needs setting.
⑩	Reset (ON/OFF)	Reset (ON/OFF)	Activating battery when no external power add on battery.

5.6 Operating environment

Operating environment parameters

No.	Item	Requirement			Unit	Remark
		Min.	Typical	Max.		
1	Discharging temperature	-20	25	55	°C	
2	Charging temperature	-10	25	50	°C	
3	Relative humidity	5		95	%	
4	Absolute humidity	0.26		25	g/m3	
5	Elevation	-	2000	-	m	
6	IP level				20	

5.7 BMS address switch introduction

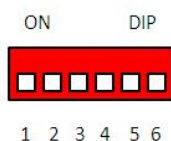
After finished the battery installation, installer should setup battery address through “ADDR” switch.

“ADDR” switch introduction:

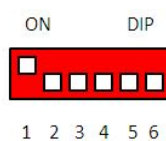
Function: Communication between battery and BMU, BMU will communicate with external equipment using CAN communication.

Each DIP switch definition:

There are 6 bit switches, keep the switch on down side means “0”, turn up the switch to “ON” means “1”.

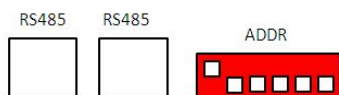


Address: 000000



Address: 100000

For example: when two battery in using, “ADDR” setting:



No.1 battery address: 100000



No.2 battery address: 010000

Please refer to the configuration list in Appendix 1.

Notice: Make sure that the highest address of BMS connecting to BMU when communicating with inverter.

6 Cleaning and maintenance

6.1 Cleaning



CAUTION:

When user needs to clean the B-BOX, please power off the system firstly.

Periodic cleaning is recommended for the B-BOX system. If the enclosure is in a dirty condition, please use a soft and dry brush or a vacuum to remove the dirt.

Do not use liquids such as solvents, abrasives or corrosive liquids in the enclosures.

6.2 Maintenance

6.2.1 Recharge requirement at normal storage

The B-BOX should be installed in a position with the temperature range of $-10^{\circ}\text{C} \sim +50^{\circ}\text{C}$. The load-bearing of battery's package is less than 280Kg, so stack more than 2 package is not allowed. When the battery stored for a long time, need a regular maintenance according to the following table. Charge the battery with current of 0.1C (25A) for 1 hour when maintenance.

Storage parameters under different storage conditions-1

Storage environment temperature	Relative humidity of storage environment	Storage time	SOC
Below -20°C	/	prohibit	/
$-20 \sim 25^{\circ}\text{C}$	5%~70%	≤ 12 months	$30\% \leq \text{SOC} \leq 60\%$
$25 \sim 35^{\circ}\text{C}$	5%~70%	≤ 6 months	$30\% \leq \text{SOC} \leq 60\%$
$35 \sim 45^{\circ}\text{C}$	5%~70%	≤ 3 months	$30\% \leq \text{SOC} \leq 60\%$
Above 45°C	/	prohibit	/

6.2.2 Recharge requirement when over discharge during storage

When in storage, if the module is over discharged, the module will be damaged after several days if the module has not been charged in time.

Storage parameters under different storage conditions-2

Storage environment temperature	Storage time
-20~25℃	≤15 days
25~45℃	≤7 days

7 Dispose special situations

7.1 Battery over discharged maintenance

When battery over discharged that caused by black out, continuously rainy day, etc, the battery will still provide limited energy, users should pay attention to the backup time of the battery.

7.2 Force Majeure

Catastrophic accidents, including lightning, floods, earthquakes, fires and other disasters, can bring unpredictable damage to the whole system.

8 B-BOX configuration list with different inverter

8.1 B-BOX configuration list with SMA sunny island-On/Off grid

1 Phase on Grid

Inverter Type	B-Box 13.8	Cabinets
SI 3.0M	≥ 1	≥ 1
SI 4.4M	≥ 1	≥ 1
SI 6.0H	≥ 1	≥ 1
SI 8.0H	≥ 1	≥ 1

Remark: Maximum B-Box 13.8 quantity is 32.

3 Phase on Grid

Inverter Type	B-Box 13.8	Cabinets
SI 3.0M	≥ 3	≥ 1
SI 4.4M	≥ 4	≥ 1
SI 6.0H	≥ 4	≥ 1
SI 8.0H	≥ 4	≥ 1

1 Phase off Grid

Inverter Type	B-Box 13.8	Cabinets
SI 3.0M	≥ 3	≥ 1
SI 4.4M	≥ 3	≥ 1
SI 6.0H	≥ 5	≥ 2
SI 8.0H	≥ 5	≥ 2

3 Phase off Grid

Inverter Type	B-Box 13.8	Cabinets
SI 3.0M	≥ 8	≥ 2
SI 4.4M	≥ 8	≥ 2
SI 6.0H	≥ 12	≥ 3
SI 8.0H	≥ 12	≥ 3

Remark: Maximum B-Box 13.8 quantity is 32.

8.2 B-BOX configuration list with GOODWE ES-On/Off grid

1 Phase on Grid		
Inverter Type	B-Plus 2.5	Cabinets
3.6kW	≥1①	≥1
4.6kW	≥1①	≥1

1 Phase off Grid		
Inverter Type	B-Plus 2.5	Cabinets
3.6kW	≥2	≥1
4.6kW	≥2	≥1

Remark: Maximum B-Box 13.8 quantity is 32

①This configuration is only for self-consumption application

8.3 B-BOX configuration list with GOODWE BP-On grid

1 Phase on Grid	
Inverter Type	B-Box 13.8
2.5kW	≥1

Remark: Maximum B-Box 13.8 quantity is 32

8.4 B-BOX configuration list with Solax -On grid

1 Phase on Grid		
Inverter Type	B-Plus 2.5	Cabinet
SK-SU 3000	≥1	≥1
SK-SU 3700	≥1	≥1
S K-SU 5000	≥1	≥1

8.5 B-BOX configuration list with Victron Quattro- On/Off grid

1 Phase on Grid	
Inverter Type	B-BOX13.8
5KVA	≥1
8KVA	≥1

10KVA	≥ 1
-------	----------

15KVA	≥ 1
-------	----------

1 Phase off Grid

Inverter Type	B-BOX13.8
---------------	-----------

5KVA	≥ 1
------	----------

8KVA	≥ 2
------	----------

10KVA	≥ 2
-------	----------

15KVA	≥ 3
-------	----------

3 Phase on Grid

Inverter Type	B-BOX13.8
---------------	-----------

5KVA	≥ 1
------	----------

8KVA	≥ 2
------	----------

10KVA	≥ 2
-------	----------

15KVA	≥ 3
-------	----------

3 Phase off Grid

Inverter Type	B-BOX13.8
---------------	-----------

5KVA	≥ 3
------	----------

8KVA	≥ 5
------	----------

10KVA

≥6

15KVA

≥7

9 Normal issues and solutions

9.1 Normal alarm displayed on the SRC of SMA sunny island and the solution

SMA SRC	Reason	Solution
F221	External Alarm-Invalid Bat Type	Reset battery type to "Li" on SRC.
F920(XA01General)	1.The battery has failed to communicate with the BMU; 2.RS485 communication between the BMU and the battery is failed;	1.Inspect whether the RS485 communication cable has been connected correctly and securely. 2.Inspect DIP switch settings according to the setting of DIP switch guidance in user manual; 3.Change BMU in cabinet;
F921(XA02DcHiVolt)	External Alarm - Battery High Voltage	
F922(XA03DcLoVolt)	External Alarm - Battery Low Voltage	If the red led of the BMS is on, please contact the service provider to change the battery. If not, check the system settings according to the guide.
F923(XA04DcHiTmp)	External Alarm - Battery High Temp	
F924(XA05DcLoTmp)	External Alarm - Battery Low Temp	
F925(XA06DcHiTmpC)	External Alarm - Battery High Temp Charge	
F926(XA07DcLoTmpC)	External Alarm - Battery Low Temp Charge	
F927(XA08DcHiCur)	External Alarm - Battery High Current Discharge	
F928(XA09DcHiChgCur)	External Alarm - Battery High Current Charge	

F930(XA11Short)	External Alarm - Short circuit	1.Power off; 2.Inspect if there is short connection of cable between P+&P-; 3.If short connection is confirmed, please reconnect cable correctly; 4.Restart battery;
F931(XA12Bms)	External Alarm - BMS internal	If the red led of the BMS is on, please contact the service provider to change the battery. If not, check the system settings according to the guide.
F932(XA13CellBal)	External Alarm - Cell imbalance	
F952	External Alarm -Ext BMS Timeout	1.Inspect whether the CAN communication cable has been connected correctly and securely; 2.Change BMU in cabinet;

9.2 Normal alarm displayed on the APP of GOODWE and the solution

APP of GOODWE	Reason	Solution
BMS status: Battery communication fail	Inverter and BMU communication failure	1.Inspect whether the CAN communication cable has been connected correctly and securely 2.Change BMU in cabinet;

9.3 Normal alarm displayed on the screen of Solax and the solution

Screen of Solax	Reason	Solution
BMS LOST	Inverter and BMU communication failure	1.Inspect whether the CAN communication cable has been connected correctly and securely 2.Change BMU in cabinet;

9.4 Normal alarm display on the BMU of B-BOX and the solution

LED of the BMU	Reason	Solution
Flash 1 time	Inverter and BMU communication failure	1. Inspect whether the CAN communication cable has been connected correctly and securely 2. Change BMU in cabinet;
Flash 2 times	Battery not found	Check if the BMU and first battery connected correctly and securely
Flash 3 times	Cell parts not found	Check for battery capacity lights in the form of the Lantern show, check the corresponding battery lines of communication, and the address is set correctly.
Flash 4 times	Any battery failure	Check if the battery light is lighting, if so, please contact your Installer to replace the battery.

9.5 Normal alarm display on BMS and solution

	B-Plus display info	Reason	Solution
LED	Yellow led(Alarm) blinks for 0.5Hz, other led is off ;	Battery has powered off abnormally;	Press ON/OFF button for 2-3 seconds to restart the battery, If the battery cannot be resumed, contact the service provider;
	Flashing Lantern (lantern and alternate capacity display, 10S cycle)	Communication connection timeout	Check the communication cable
	1/3 and 2/4 flashing	Updating status	If you are not updating the firmware, reset the battery.
	Yellow led (Alarm) is normally on	1time Under voltage (BAT or CELL)	Automatically resume
	1. press on/off button 1S release, hear a short buzzer sound; 2.run lights stay lit, ALM by flashing lights, showing alarm code;	2times Over charge	Automatically resume
		3times Low temperature charge over-current	Automatically resume
		4times Charge short circuit	Automatically resume
		5times Discharge short circuit	Automatically resume
		6times Parallel short circuit	Automatically resume
		7times Discharge over-current protection	Automatically resume
		8times High temperature protection	Automatically resume
		9times Low temperature protection	Automatically resume
		10times PACK over voltage protection	Automatically resume

	Red led (Err) is normally on	1time	Voltage sensor failure	Change the battery
		2times	Temperature sensor failure	Change the battery
	1) press the on/off button press for 1S, release, hear short buzzer sound;	3times	Charging circuit failure	Change the battery
		4times	Discharge circuit failure	Change the battery
	2) run LED is lighting, ERR by flashing lights, showing alarm code;	5times	Batteries failure	Change the battery
		6times	536 communication failure	Change the battery
Buzzer	15S for the cycle, each time the buzzer number of successive rings	4times	Reverse, short circuit	1.Power off; 2.Inspect short/reverse connection of cable between P+&P-; 3.If short/reverse connection is confirmed, please reconnect cable correctly; 4.Restart battery;
		3times	Batteries failure	Change the battery
		2times	Voltage sensor failure、 Temperature sensor failure	Change the battery
		1time	Charging/Discharge circuit failure	Change the battery

10 Warranty

BYD provides warranty only when the product is installed and used according to the description of user manual / installation manual / warranty letter.

11 Login in after service web

In order to get prompt after service after installation, please login your B-BOX information in our after service online portal:

For technical problems or inquiries for use, please contact our service company.

The following information is required for timely customer service.

Product type

Serial Number

Connected PV module type and number

Option equipment

Any problems please contact us by below address:

Contact us:

China

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