



B-Box Pro 2.5~10.0

User Manual

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1 General Information

1.1 About this manual

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

1.2 Target Group

This user manual is applied for the B-BOX 2.5, B-BOX 5.0, B-BOX 7.5, and B-BOX 10.0.

1.3 Intend usage

The B-BOX can be used in household energy storage application, includes on/off-grid system. When B-BOX works with different inverter, user should refer to the configuration list with the approved inverters brands which are suggested by BYD.

1.4 B-BOX and B-Plus definition

BYD battery box products B-Box2.5~B-Box10.0 are defined as below:

B-Box: Battery Box

B-Plus2.5: battery unit with nominal capacity is 2.56KWh, will be installed inside the cabinet as an energy storage module.

B-Box2.5: Battery nominal capacity is 2.56 KWh (Includes 1pcs B-Plus2.5)

B-Box 5.0: Battery nominal capacity is 5.12 KWh (Includes 2pcs of B-Plus2.5)

B-Box 7.5: Battery nominal capacity is 7.68 KWh (Includes 3pcs of B-Plus2.5)

B-Box 10.0: Battery nominal capacity is 10.24 KWh (Includes 4pcs of B-Plus2.5)

1.5 Identifying the Product

The Type Label describes the product identification, which is attached on 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:

Rated output voltage:

Rated current:

Operation temperature range:

Serial Number (P/N No.):

Caution:

Certification marks:

2 Safety

2.1 Safety precaution

Warning, notice and caution

Users are kindly requested to use the battery which is delivered from 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 the use of this data sheet outside of any accident.

WARNING

Do not crush, 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

Do not expose to temperatures above 55°C, and keep out of direct sunlight.

Ensure reliable 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.

Storage according to related standard.

Do not put one battery on another when unpackaged.

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

When Increase the battery, should power off the battery and other power input first.

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. Only can operate B-Box when it is technically faultless and in an operationally safe stat.

Regularly check the B-Box for visible damage. Making 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, abuse. 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 locale.

Personnel working with B-Box must review applicable federal, state and local regulations as well as the industry 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 condition 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 locale; personnel working with B-Box must review applicable federal, state and local regulations as well as the industry standards regarding this product.

Installation personnel cannot wear watches, etc., to avoid short circuit and man-made damage.

 **CAUTION:**

Due to heavy weight of BYD B-Box 2.5~10.0, please use strong package and do safety protection during transportation, and make sure to the safety to avoid man-made damage.

3 Technical parameters

	B-Box Pro 2.5	B-Box Pro 5.0	B-Box Pro 7.5	B-Box Pro 10.0
Battery Type	Lithium Iron phosphate battery			
Battery module	B-Plus2.5			
Nominal Battery Energy	2.56	5.12	7.68	10.24
Output power(KW)	Max 2.5	Max 5.0	Max 7.5	Max 10.0
Usable battery energy(KWh)(0.2C charge & discharge at @+25°C)(KWh)	2.45	4.90	7.35	9.80
Nominal voltage(V)	51.2			
Operating Voltage Range(V)	43.2~56.4			
Ambient Temperature Range(°C)	-10~+50			
Communication	RS485/CAN			
Cabinet Net Dimension(W*D*H mm)(Without ground feet)	600* 510* 883			
Net Weight(Kg)	79	113	146	180
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-Plus2.5 battery quantity	
Discharge current control with temperature	
Protect temp./Resume temp.(°C)	Normal current(A)
-20~50/(-15~50)	0.7~1C*N
Remark: 1.N= B-Plus2.5 U battery 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 had not full 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	When battery stops charging or discharging (e.g. cell is over voltage), it is resumable.

5 Product overview

5.1 B-BOX System Brief introduction

B-Box is the short name of battery box, the energy storage part in the electric power system is household, and the B-box carries BYD's lithium battery with excellent performance. There are 1/2/3/4 pcs batteries modules in each box, and the box support parallel connection to expand capacity from 2.5KWh to 80KWh, which can meet various capacity requirement for customers.



External drawing



Internal drawing



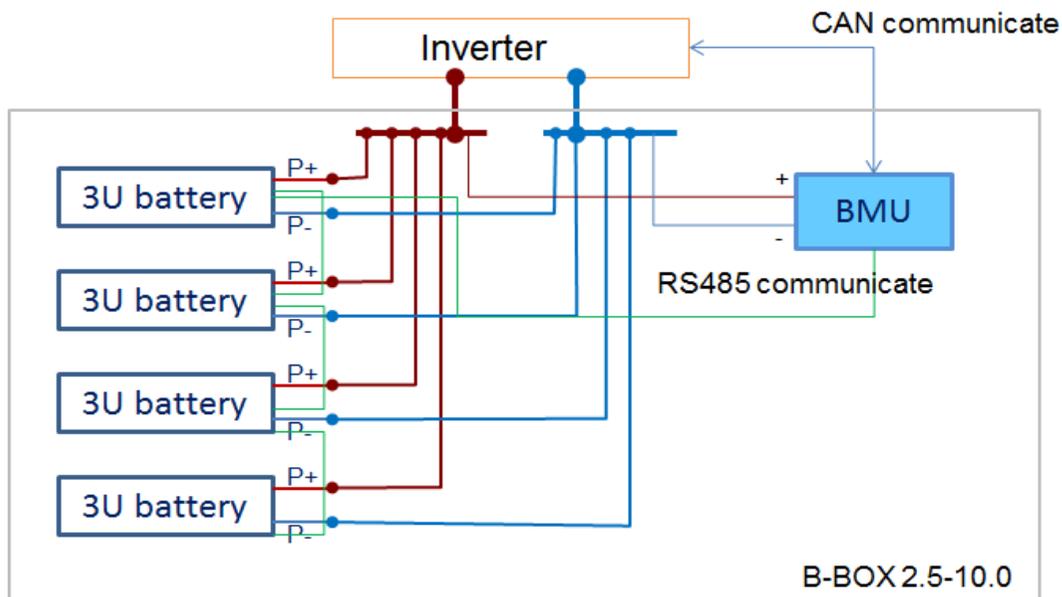
Structure dimension drawing

5.2 B-BOX configuration table

No.	Component	Name	Description
1	Cabinet	B-Box Cabinet	The Cabinet is used to install the B-Plus 2.5 inside and provide DC output(Each cabinet can install max 4pcs B-Plus2.5)
2	Battery	B-Plus2.5	Battery module with 51.2V50Ah, BYD's P/N is: U3A1-50P-A.
3	BMU	BMU	Battery management unit. Provide communication with external equipment.

Table 1 configuration list

5.3 B-BOX System diagram



System diagram

5.4 General introduction of BMU

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

Main function:

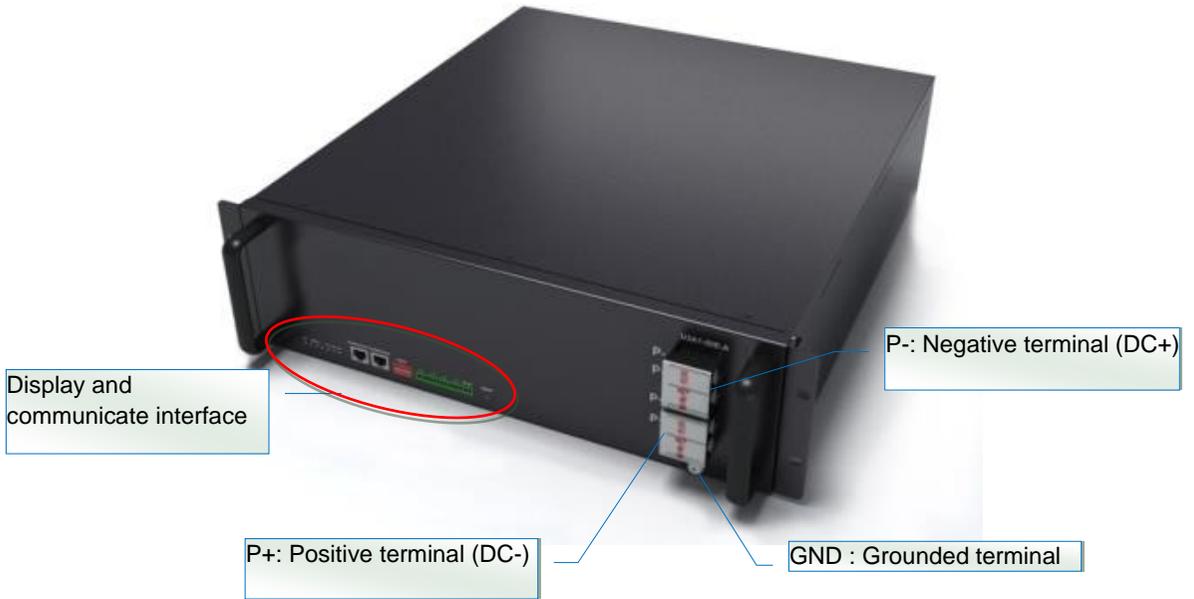
- ✓ CAN /RS485 communicate with inverter
- ✓ RS485 communicate with battery/BMS
- ✓ Dry contact terminal
- ✓ Other Communication interface for maintenance
- ✓ Charge and discharge management



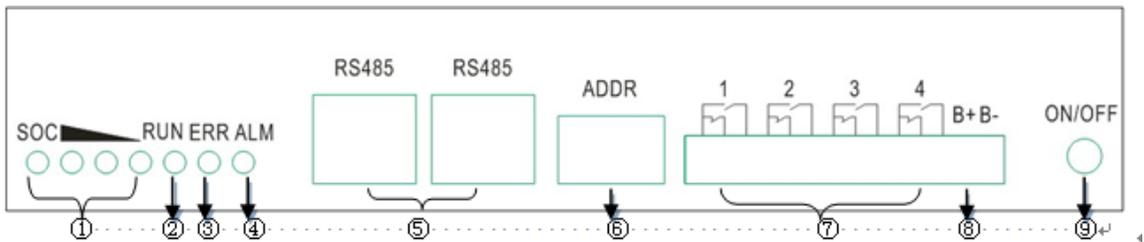
5.5 General introduction of B-Plus 2.5

5.5.1 B-Plus 2.5 brief introduction

B-Plus is the commercial name of BYD U3A1-50P-A backup battery with 51.2V & 50Ah which is designed for energy storage application. B-Plus 2.5 is an integrated battery which consists of shell, BMS and cells.



B-Plus 2.5 overview
Display and communicate interface



Display and communicate interface

No.	Interface	Mark	Function
①	SOC LED	SOC	Indicate State of capacity of battery
②	RUN LED	RUN	Indicate the Plus is running status
③	ERR LED	ERR ADDR	Indicate error status
④	ALM LED	Alarm	Indicate alarm status
⑤	RJ45 terminal	RS485	Communication ports
⑥	Address	ADDR	When parallel connection, need setting address.
⑦	Alarm relay output	1.2.3.4	Not using
⑧	Test terminal	B- B+	Measure battery voltage when testing.
⑨	ON/OFF	ON/OFF	Activity battery when no external power add on battery.

5.6 Operating environment

Table 5 Operating environment parameters

No.	Item	Requirement			Unit	Remark
		Min.	Typical	Max.		
1	Discharging temperature	-10	25	50	°C	
2	Charging temperature	-10	25	50	°C	
3	Humidity	5		95	%	non-condensing
4	Elevation	-	2000	-	m	
5	IP level	20				

5.7 B-Plus 2.5 address switch introduction

After finished the battery installation, installer should setup battery address by "ADDR" switch.
"ADDR" switch introduction:

Function: Communicate between battery and BMU, BMU will communicate with external equipment when use 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".

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 **Appendix1**.

Notice: Make sure of the highest address of BMS connecting to BMU which communication with inverter.

6 Cleaning and maintenance

6.1 Cleaning



CAUTION:

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

The B-BOX system is recommended to be cleaned periodically. 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

The B-BOX should be installed in position with the temperature range of $-10^{\circ}\text{C}\sim+50^{\circ}\text{C}$. And the humidity is less than 80%. The load-bearing of battery's package is less than 300Kg. So don't let more than 7 modules in stack.

The capacity of module before delivery is 70%(35AH). So after long time storage the module need do maintenance. Charge battery with 0.1C (5A) for 5 hours 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	/

When SOC is less than 1%,. The module will be damaged after several days if do not charge the module in time,

Storage parameters under different storage conditions-2

Storage environment temperature	Storage time
$-20\sim 25^{\circ}\text{C}$	≤ 15 days
$25\sim 45^{\circ}\text{C}$	≤ 7 days

7 Dispose special situation

7.1 Battery over discharged maintenance

When battery over discharge which may cause by black out, continuously rainy day, etc, the battery can provide limited energy, user 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 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-Plus 2.5	Cabinets
SI 3.0M	≥1	≥1
SI 4.4M	≥1	≥1
SI 6.0H	≥1	≥1
SI 8.0H	≥1	≥1
Remark: Maximum B-Plus quantity is 32,Cabinet quantity is 8.		
3 Phase on Grid		
Inverter Type	B-Plus 2.5	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-Plus 2.5	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-Plus 2.5	Cabinets
SI 3.0M	≥8	≥2

SI 4.4M	≥8	≥2
SI 6.0H	≥12	≥3
SI 8.0H	≥12	≥3
Remark: Maximum B-Plus quantity is 32,Cabinet quantity is 8.		

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

1 Phase on Grid		
Inverter Type	B-Plus 2.5	Cabinets
4.6kW	≥1 ¹	≥1
1 Phase off Grid		
Inverter Type	B-Plus 2.5	Cabinets
4.6kW	≥2	≥1
Remark: Maximum B-Plus quantity is 32,Cabinet quantity is 8.		

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

1 Phase on Grid		
Inverter Type	B-Plus 2.5	Cabinets
2.5kW	≥1	≥1
Remark: Maximum B-Plus quantity is 32, Cabinet quantity is 8.		

8.4 B-BOX configuration list with Victron Multiplus/Multigrid-On/Off grid

1 Phase on Grid		
Inverter Type	B-Plus 2.5	Cabinets
3KVA	≥1	≥1
5KVA	≥1	≥1

¹This configuration is only for self consumption application.

1 Phase off Grid		
Inverter Type	B-Plus 2.5	Cabinets
3KVA	≥3	≥1
5KVA	≥5	≥2
3 Phase on Grid		
Inverter Type	B-Plus 2.5	Cabinets
3KVA	≥3	≥1
5KVA	≥4	≥1
3 Phase off Grid		
Inverter Type	B-Plus 2.5	Cabinets
3KVA	≥8	≥2
5KVA	≥12	≥3

8.5 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

9 Normal issues and solutions

9.1 Normal alarm and solution display on SMA sunny island SRC

SMA SRC	Reason	Solution
F221	External Alarm-Invalid Bat Type	Reset battery type to "Li" on SRC.
F920(XA01General)	1.All the batteries are failed to communicate at the same time; 2.BMU and battery are failed to RS485communicate;	1.Inspect whether the RS485 communicate cable has been connected correctly and reliability; 2.Inspect DIP switch setting according to the setting of DIP switch guidance in user manual; 3.Change BMU in cabinet;
F930(XA11Short)	External Alarm - Short circuit	1.Power off; 2.Inspect short connection of cable between P+&P-; 3.If short connection is confirmed, please reconnect cable correctly; 4.restart battery;
F952	External Alarm –Ext BMS Timeout	1.Check the CAN communication, make sure connect well. 2.Change BMU.
W936(XW01General)	External Warning - General	1.Inspect whether the RS485 communicate cable has been connected correctly and reliability; 2.Inspect the setting of DIP switch according to the Address setting guidance;
W937(XW02DcHiVolt)	External Warning - Battery High Voltage	Normal alarm and no need to deal with;
W938(XW03DcLoVolt)	External Warning - Battery Low Voltage	Normal alarm and no need to deal with;
W939(XW04DcHiTmp)	External Warning - Battery High Temp	Normal alarm and no need to deal with;
W940(XW05DcLoTmp)	External Warning - Battery Low Temp	Normal alarm and no need to deal with;
W941(XW06DcHiTmpC)	External Warning - Battery High Temp Charge	Normal alarm and no need to deal with;
W942(XW07DcLoTmpC)	External Warning - Battery Low Temp Charge	Normal alarm and no need to deal with;
W943(XW08DcHiCur)	External Warning - Battery High Current	Normal alarm and no need to deal with;

W944(XW09DcHiChgCur)	External Warning - Battery High Current Charge	Normal alarm and do not need to deal with;
W953	External Warning –Ext BMS Timeout	1.Check the CAN communication, to make sure connect well. 2.Change BMU.

9.2 Normal alarm and solution display on B-Plus 2.5

	B-Plus display info	Reason	Solution
LED	Yellow led(Alarm) blinks for 0.5Hz , other led are on off continuously;	Battery is power off abnormally;	1.Press "on/off" button for 2-3 sec until battery can work normal; 2.If yellow blinks continuously, the battery needs to be changed;
	Yellow led (Alarm), Yellow led on and buzzing with 4 times.	The battery needs to be protected or external connection is incorrect;	1.Power off the battery; 2.Inspect short/reverse connection of cable between P+&P-; 3.If short/reverse connection is confirmed, please reconnect cable correctly; 4.restart battery;
	The merry-go-round	No communication with BMU	1. Check the cables between BMU and batteries; 2. Confirm the connection is reliable or not
Buzzer	Buzzing for 4 times	Short/reverse connection ;	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;

9.3 Normal alarm and solution display on BMU

	Status(display interval 2S)	Definition
LED	Blinks 1 time	Inverter not connected
	Blinks 2 time	Battery not connected
	Blinks 3 time	Battery disconnect
	Blinks 4 time	Battery failure

10 Warranty

BYD provides warranty 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 after service in time, after installation, please login your B-BOX information in our after service operator web:

For technical problems or inquiries for usage, please contact our installation 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:

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