



Installation Guidance

B-BOX Pro 13.8

Rev 1.0_July.2017

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Installation Video Website: <http://www.byd.com/energy/b-box-25.htm>

1 Introduction

Thank you for choosing BYD products. We are committed to providing you with quality and reliable after sales service

To protect users and the product itself, please kindly read this manual carefully which provides detailed information for product features, structures, operating standards, maintenance and troubleshooting.

Note:

This manual can't be taken as basis of requirement for BYD.

BYD reserve the final explanation rights of this manual.

2 Information in this Guide

2.1 About this guide

This is the installation guide for the BYD Battery Box product - B-Box Pro 13.8. Users of this device or installers must refer to the installation guide to install and use the product correctly.

2.2 Target Group

This installation guide applies only to the BYD Battery Box product-B-Box Pro 13.8.

2.3 Additional Information

Specification of the product change without any notice to customers for the purpose of system improvement.

2.4 Symbols Used

Symbols meanings:



CAUTION:

CAUTION represents hazardous situations which can cause light injury, if ignored.



NOTICE:

NOTICE represents the situations which can cause damage to property, if ignored.



INFORMATION:

INFORMATION provides useful tips for optimum installation and operation of the product.

3 Safety

3.1 Warnings and Notification

Installation environment requirements: BYD B-Box Pro 13.8 is designed for household purposes. For installation, it must be installed in a location complying with IP20 regulation. If the Installation location does not comply with IP20, this may cause product failure and it will not be guaranteed for any related accident or damage.

3.2 Safety Guidelines



CAUTION:

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

All work 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/or 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-Boxes 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 accidental damage..

Ensure reliable grounding. Do not reverse the front panel.



CAUTION:

Due to high weight of BYD B-Box Pro 13.8, please use strong packaging and safety protection equipment during transportation, to ensure safety and avoid accidental damage.

4 Product Overview

4.1 Product Introduction

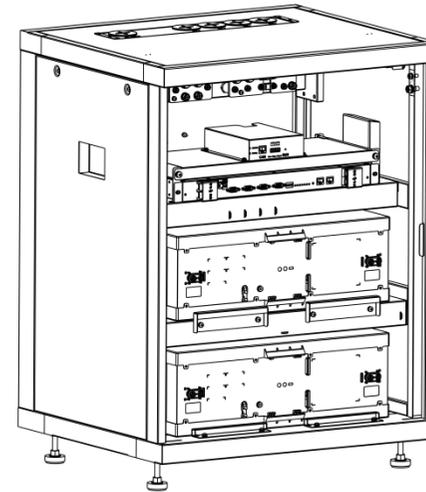
BYD Battery Box products B-Box Pro 13.8 as the energy storage parts can be used as off-grid & on-grid energy storage system.

It is recommended not to use this device for other than the purpose described in this guidance. The substitute use of this product, random change, and use of components other than sold or recommended by BYD will nullify the product guarantee. It also support parallel connection between B-Box Pro 13.8 with maximum number 32, the total capacity can reach 409kWh.

The system is ideal easy installation and maintenance.



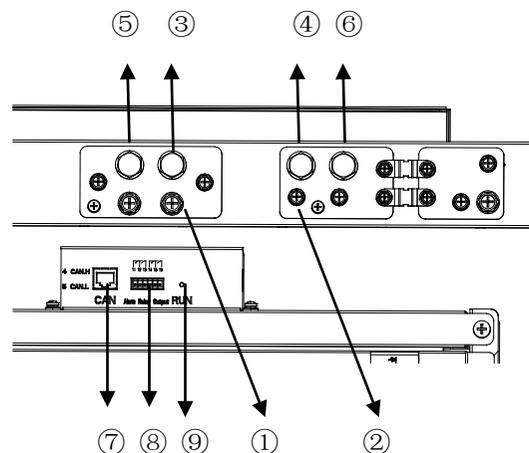
Overview of B-BOX



Internal view of B-BOX

4.2 Terminal introduction

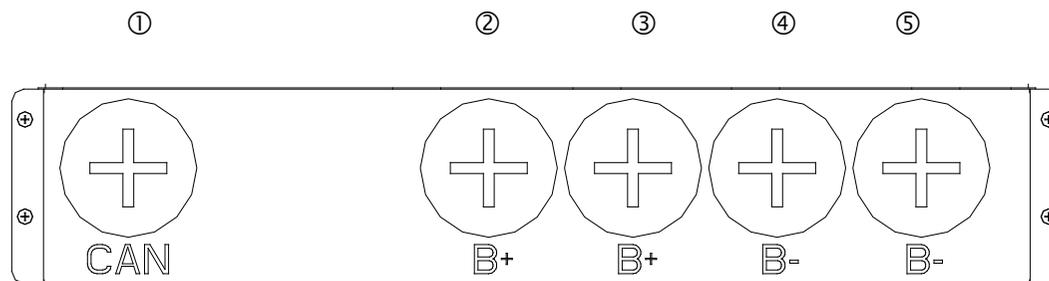
4.2.1 Cabinet internal terminal introduction



Terminal compare list

No.	Interface	Mark	Function
①	B+	/	Connect to battery in cabinet, each terminal can connect 1~2 battery
②	B-	/	Connect to battery in cabinet
③	P+	/	Connect to inverter
④	P-	/	Connect to inverter
⑤	P+	/	Connect to another B-BOX or Combiner box
⑥	P-	/	Connect to another B-BOX or Combiner box
⑦	CAN port RS485	CAN	Connect to inverter CAN port. Update sw
⑧	Dry contact		Dry contact application, output alarm info.
⑨	Run led	Run	Indicate the B-BOX running status

4.2.2 Cable outlet of cabinet

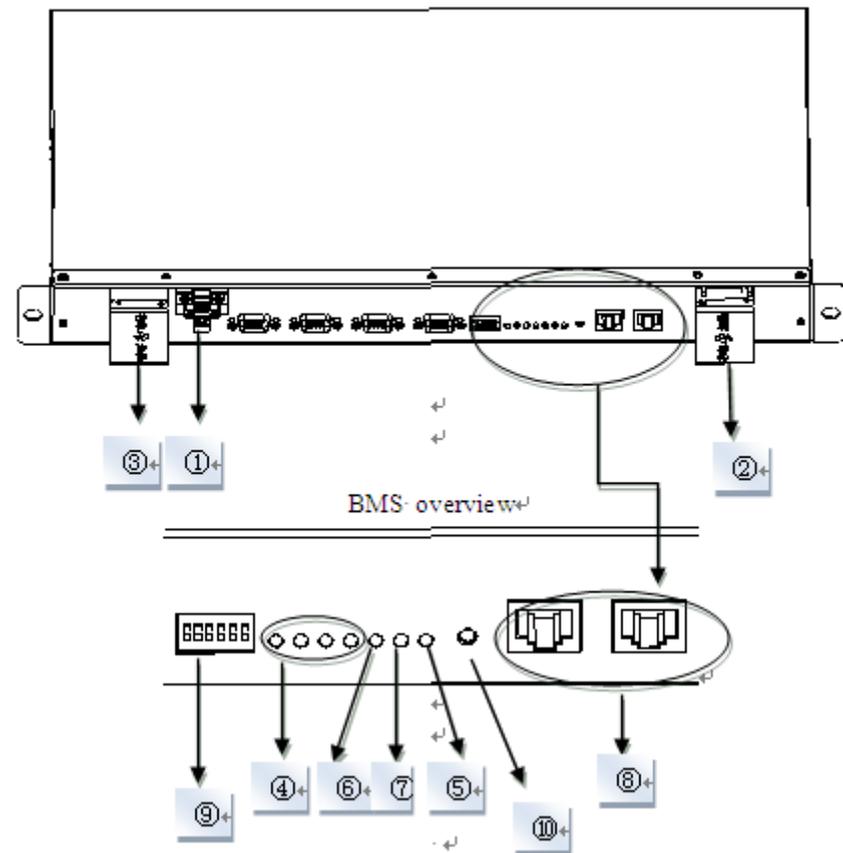


Top through-holes

Compare list of through-holes:

No.	Interface	Mark	Function
①	CAN	CAN	CAN communication cable
②	B+	B+	Positive cable from another B-BOX
③	B+	B+	Positive cable from inverter
④	B-	B-	Negative cable from inverter
⑤	B-	B-	Negative cable from another B-BOX

4.2.3 BMS interface and terminal introduction



No.	Interface	Mark	Function
①	B+	B+	Connect 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	Indicate State of capacity of battery
⑤	RUN LED	RUN	Indicate the Battery is in running status
⑥	ERR LED	ERR ADDR	Indicate error status
⑦	Alarm LED	Alarm	Indicate alarm status
⑧	RJ45 terminal	RS232/RS485	Communication ports
⑨	Address	ADDR	When parallel connection, needs setting address.
⑩	Reset(ON/OFF)	RESET(ON/OFF)	Activating battery when no external power add to battery.

4.3 Identifying the Product

The Type Label describes the product identity and is attached on the product. For safe use, 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:

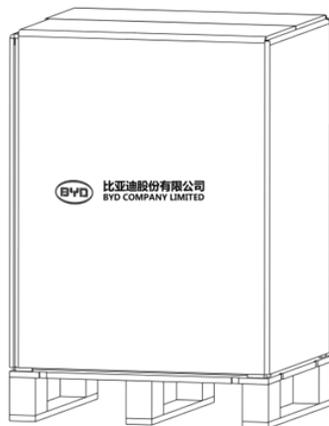
5 System Installation

5.1 Installation notice

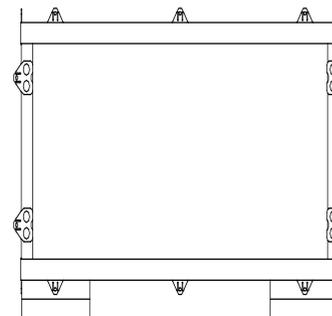
- a) Battery installation location should be away from heat and sparks. The safety distance should be more than 0.5m.
- b) Battery connection cables should be as short as possible, to prevent excessive line voltage drop.
- c) Batteries with different capacity, different P/N or different manufacturers are not allowed for connection.
- d) Before connecting the battery, the battery positive and negative poles need to be carefully checked as well, to ensure correct installation.
- e) The mounting floor should be flat.

5.2 Package information and system configuration list

The cabinet and battery are packaged separately with cartons, the components are supplied with the cabinet or battery package. Before installation, installer should read the system configuration list.



B-BOX Cabinet



B-Plus13.8

5.2.1 Configuration list

Please install B-BOX Pro 13.8 according to the following table.

Basic configuration list

Type	B-BOX Pro 13.8
B-BOX cabinet	1
B-Plus 13.8	1 package (2 battery modules)
User manual	1
Brown cable	1
Black cable	1
Blue cable	2
Signal cable	4

5.3 Installation Tools

Installation tools list



Cross screwdriver

M3~M10



Flat tip screwdriver

M3~M6



Sockets spanner



Diagonal cutters



Adjustable wrench



Knife

5.4 Personal protective equipment



Insulated gloves



Safety shoes

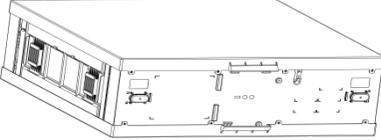
5.5 Part list

5.5.1 Part list of cabinet

No.	Item Description	Qty	Purpose	Picture
1	Anchor bolt	4	To allow distance from cabinet to ground.	
2	Brown cable	1		
3	Black cable	1		
4	User Manual	1	System information, operating instructions and warranty items.	\
5	Installation Manual	1	System installation guide	\

Remark: This part list is only for single system cabinet.

5.5.2 Part list of B-Plus 13.8

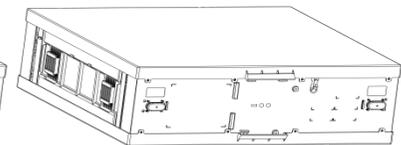
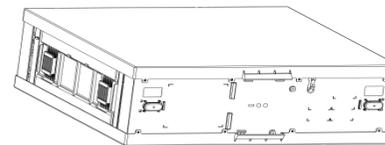
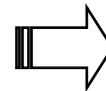
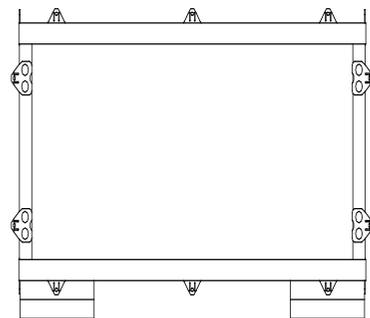
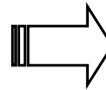
No.	Item Description	Qty	Purpose	Picture
1	Battery module	2	Installed into cabinet	

Remark: This part list is only for one B-BOX Pro 13.8..

5.6 Installation

5.6.1 Open the package

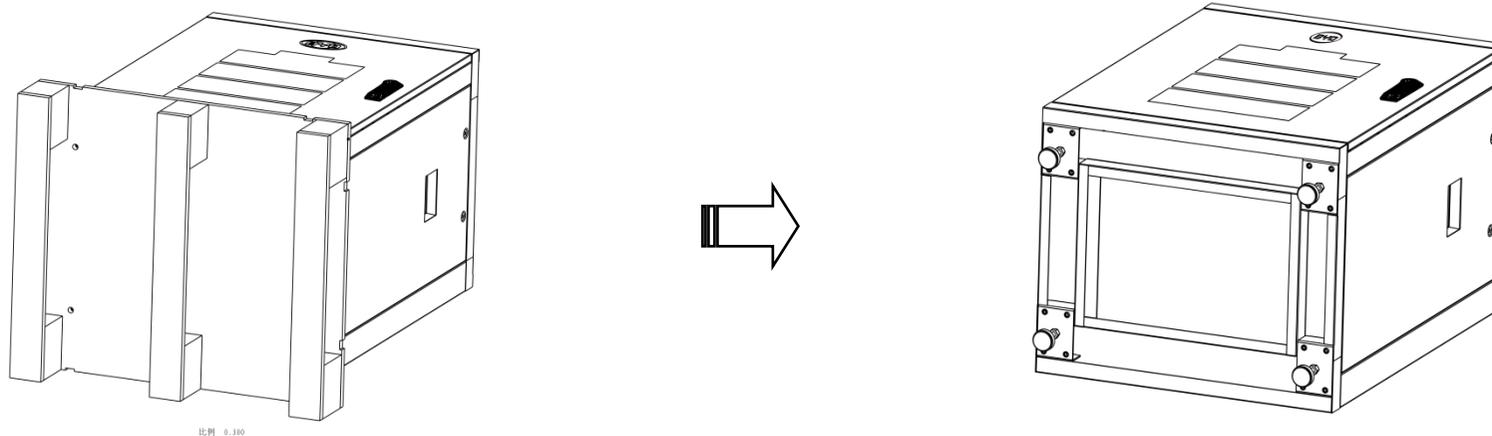
Tools: Knife



5.6.2 Disassemble the pallet

- a) Lay down the cabinet, in order to prevent scratching the cabinet, please use some protection on the ground.
- b) Take away the four screws which installed on the basis of the pallet.
- c) Take away the pallet.

Tools: Adjustable Spanner



- d) Take the battery out of the wooden case, and put the two battery modules a certain distance from the cabinet.

5.6.3 Anchor bolt installation

Install the 4pcs anchor bolts into the four holes at bottom of cabinet.

Tools: Adjustable Spanner. Fixed torque: $10\pm 1\text{Nm}$

- i. Install the anchor bolt, turn the anchor bolt to the certain height;
- ii. Using Spanner to turn the second screw to lock the anchor bolt;
- iii. Move the first screw to the cabinet bottom closely;

5.6.4 Battery installation

Tools: Cross screwdriver

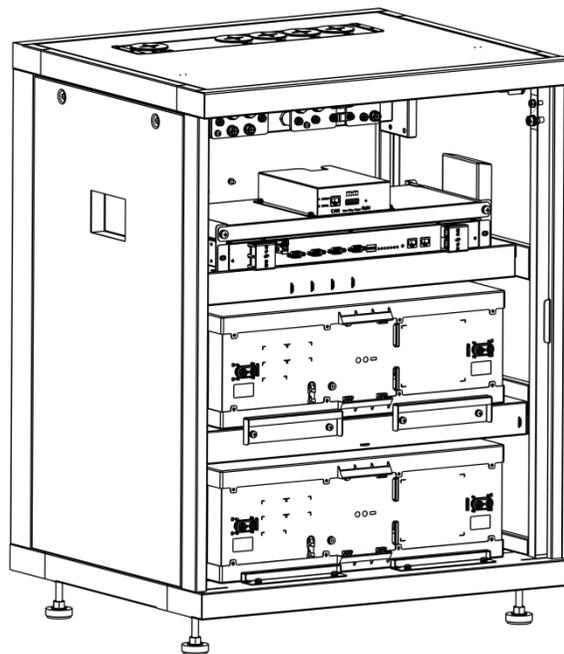
Install steps:

- iv. Move the cabinet to the installation location, prepare to install battery.
- v. Open the door; take away the part bag from the battery storey.
- vi. Disassemble the dam-board from cabinet.
- vii. Pull the battery module into cabinet.

Note:

- ✓ Each layer can only install one battery module. Installers should install the batteries from the bottom layer to the top layer.
- ✓ Should keep the labels side facing upwards.

Pull the battery into cabinet

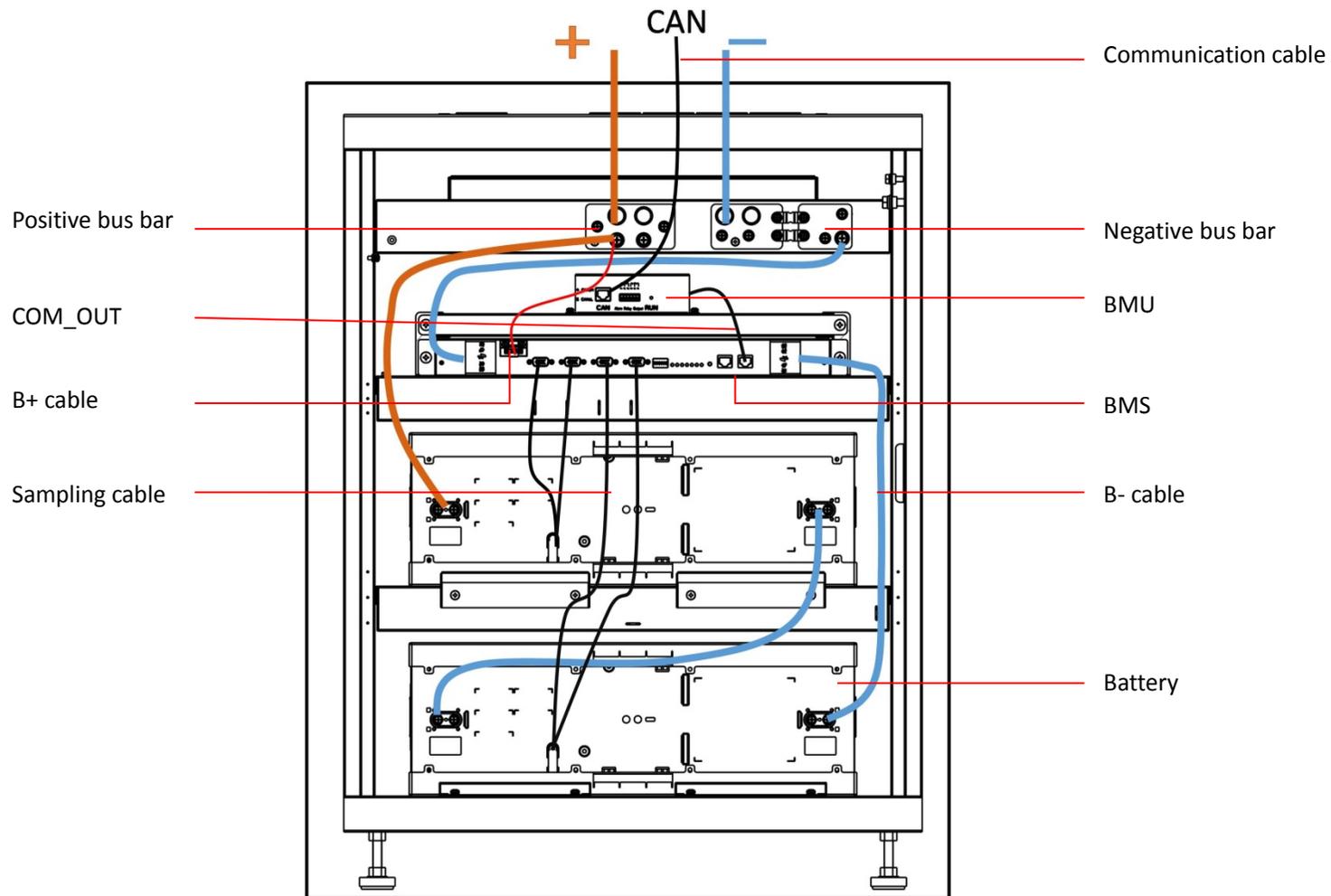


5.6.5 System cables connection

Connect cables refer to below figure.



- ✓ The battery can only in series connection.
- ✓ Do not short connect, reverse polarity connect, and always take care of insulation.



a) Connect the negative cable (Black cable from cabinet) to the “P-” of battery.

Tools: Cross screwdriver, fixed torque: $20\pm 2\text{kgf.cm}$

b) Connect the positive cable (Red cable from cabinet) to the “P+” of battery.

Tools: Cross screwdriver, fixed torque: $20\pm 2\text{kgf.cm}$

c) Sampling cable connection

Connect the sampling cable terminal of battery and BMS

Note: Check the sampling terminals are firmly installed.

d) BMS B+ connection

Operator only needs to connect the positive cable lead from P+ DC BUS to “B+” terminal on BMS.

Tools: Flat tip screwdriver, Fixed torque: $2.5\pm 0.5\text{kgf.cm}$

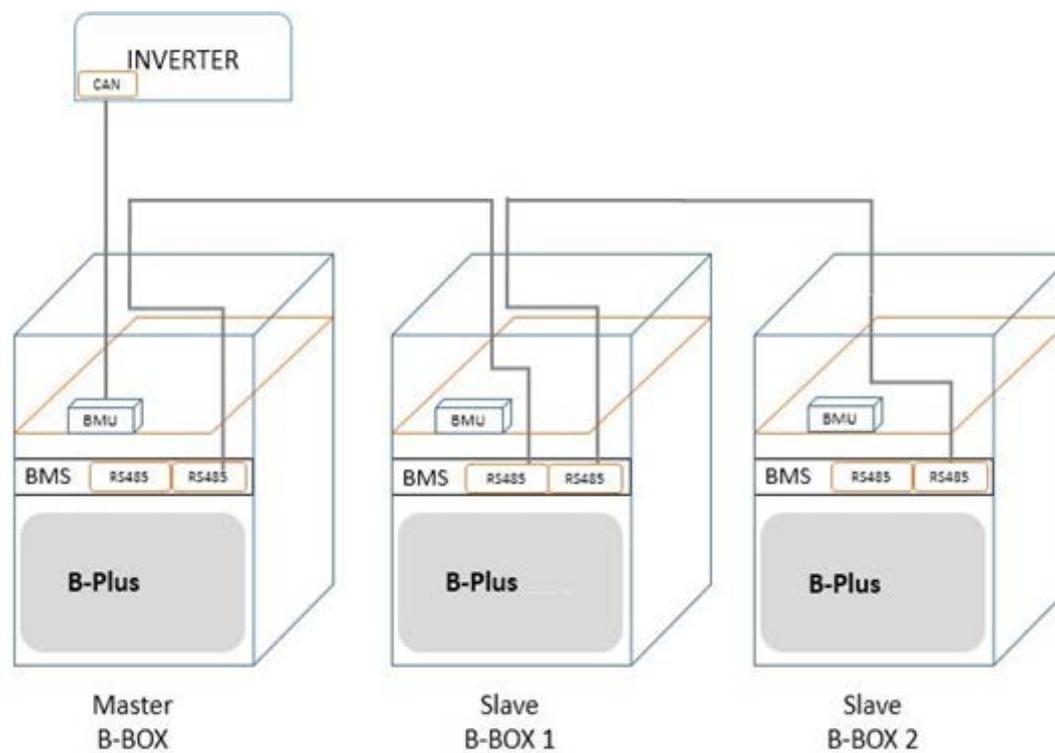
5.7 Additional cabinets installation

When users need more than one cabinet to install, should repeat above operating steps. Then establish parallel connections between cabinets.

5.7.1 Communication cable connection drawing

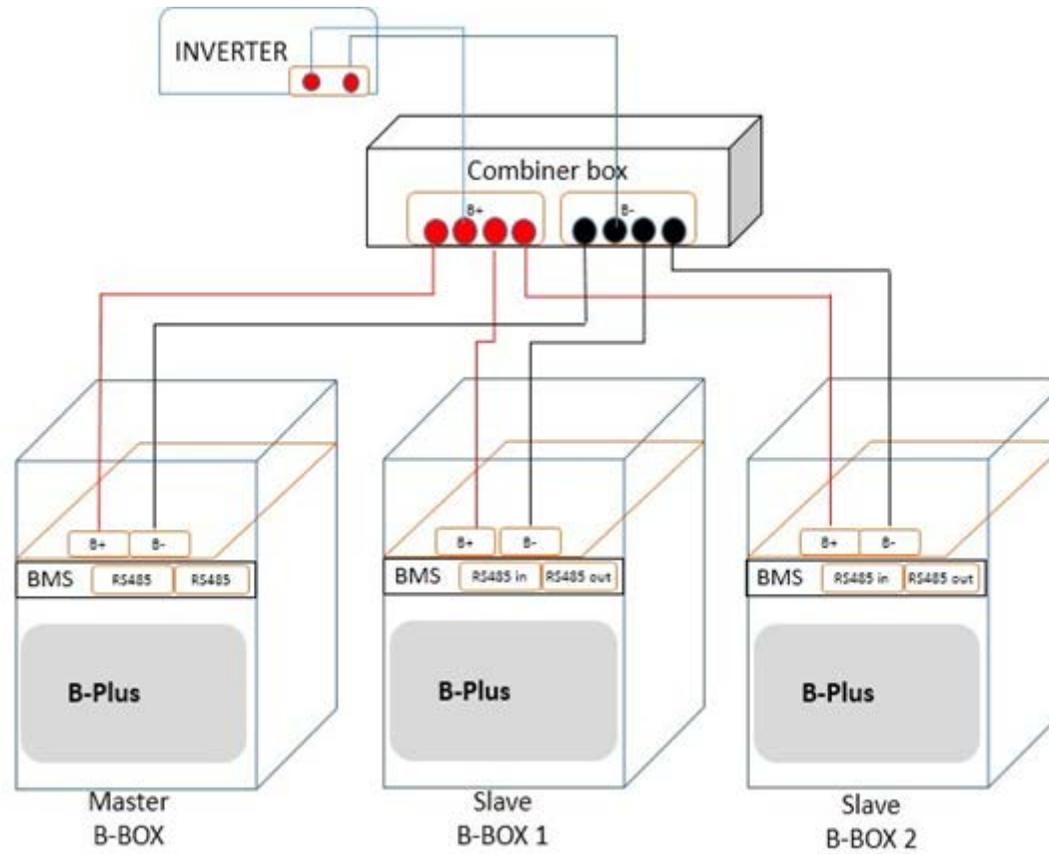
RJ45 PIN define

	B-BOX	SMA	GOODWE	SOLAX	VICTRON
CAN H	4	4	4	1	7
CAN L	5	5	5	2	8

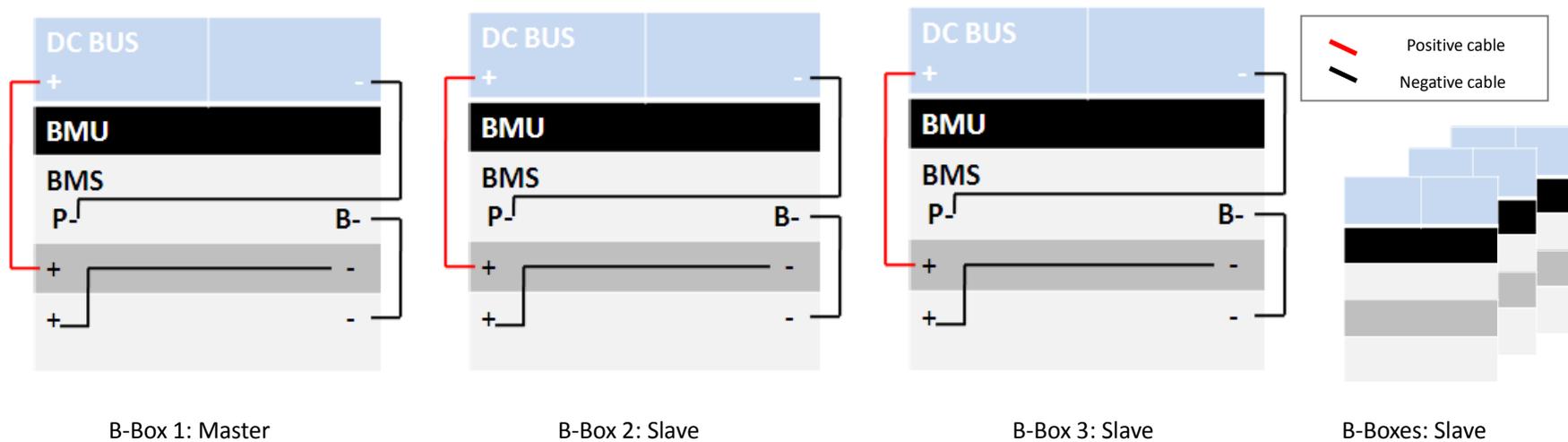


5.7.2 Power cable connection between B-BOX and inverter (with combiner box)

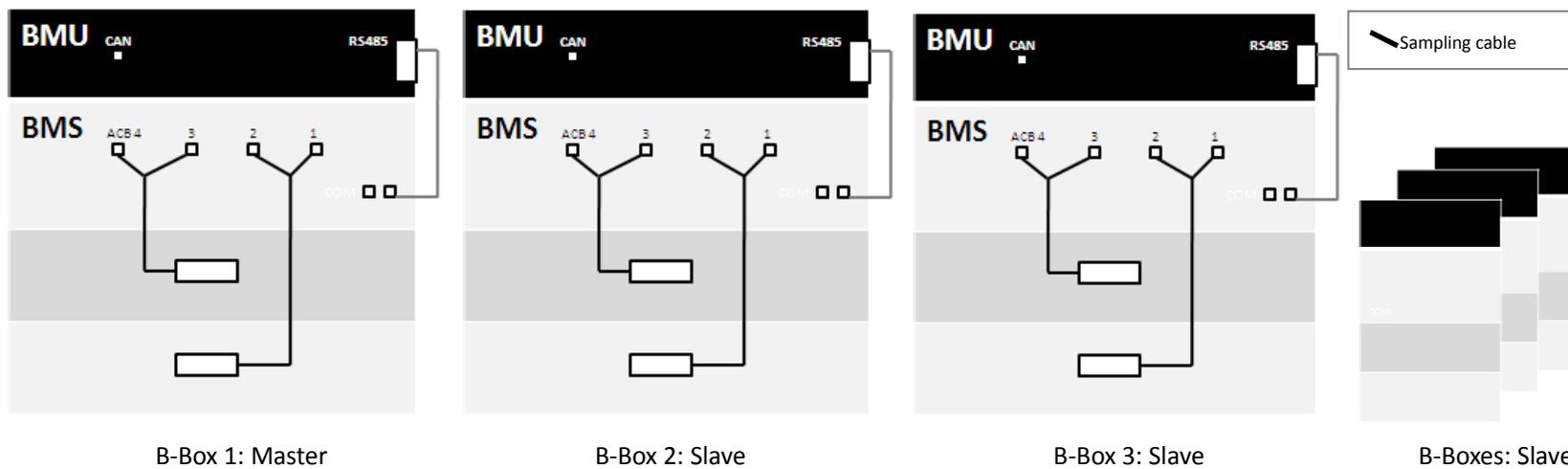
Note: Each rack's negative cable needs to use the belt, and cables between each cabinet and inverter should have the same length. Be careful not to reverse connection.



5.7.3 Power cable connection



5.7.4 Sampling cable connection



5.8 BMS address set up

After installation, installer should setup BMS address through “ADDR” switch.

“ADDR” switch introduction:

Function: For communicate between battery and BMU, BMU will communication with external equipment when 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:



For more information on address setting, please consult the configuration list in Appendix1.

Note: Make sure that the highest address of BMS connects to BMU communicating with inverter.

6 Starting system

Notice: Before activating the system, operators should check the cable connection strictly till make sure of the cable connection is tight, and check the batteries address had been setup correctly.

6.1 System activating procedures when B-BOX connects to SMA Sunny Island

(1) Start B-BOX;

Press the “Reset (ON/OFF)” button on front panel of BMS;

Tips: Press “ON/OFF” button one second will start battery, according to the number of inverters in the following table, press the button as fast as possible within 8 seconds to activate the batteries.

	Inverter:1~2PCS	Inverter:3~4PCS	Inverter:5~7PCS	Inverter:8~9PCS
The amount of battery	1	2	3	4

Once started, the LED lights of BMS will be in different status according battery status as below:

LED status when normal start

Item	LED	Status
1	Run	Green More than one is green.
2	SOC	Slow blink is charging and Fast blink is discharging. The merry-go-round means no communication.
3	ERROR	OFF
4	Alarm	OFF

Status(display interval 2S)	Definition
------------------------------------	-------------------

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LED(BMU)	Blinks 1 time	Inverter not connected
	Blinks 2 time	Battery not connected
	Blinks 3 time	Battery disconnect
	Blinks 4 time	Battery failure

Remark:

Slow blink: Indicator light is on and off every 1s (0.5Hz).

Fast blink: indicator light is on and off every 0.25s (2HZ)

SOC status and indicate

Item	Status	Indicate
1	Four lights are all normally on	Capacity is 100%-75% (including)
2	The last three lights are normally on	Capacity is 74%-50% (including)
3	The last two lights are normally on	Capacity is 49%-25% (including)
4	The last one light is normally on	Capacity is 24%-1% (including)

(2) Switching on the Sunny Island;

Procedure:

- For systems with one Sunny Island, press the "On" button on the Sunny Island.

The inverter LED on each Sunny Island inverter is glowing orange and this means the inverter is on standby.

(3) Starting the inverter;

Procedure:

- Press the start-stop button on the Sunny Island and hold it until an acoustic signal sounds. or Press and hold the button on the Sunny Remote Control until an acoustic signal sounds.

The inverter LED on each Sunny Island is glowing green.

(4) Set up battery parameters on SRC of inverter;

Please refer to the "Battery Parameter setting" table in Appendix 1.

Remark: If the battery capacity is more than or equal to 270AH, according to the BOX13.8 parameter settings

(5) System is running.

6.2 System activating procedures when B-BOX connects to GOODWE inverter

(1) Download the APP on user's cellphone and open the home page;

(2) Start B-BOX;

Press the "Reset(ON/OFF)" button on front panel of BMS;

Tips: Press one second will start the battery;

Once started, the LED lights of BMS will be in different status according battery status as below:

LED status when normal start

Item	LED	Status
1	Run	Green
		More than one is green.
2	SOC	Slow blink is charging and Fast blink is discharging. The ferry-go-round means no communication.
3	ERROR	OFF
4	Alarm	OFF

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

Remark:

Slow blink: Indicator light is on and off every 1s (0.5Hz).

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4	The last one light is normally on	Capacity is 24%-1% (including)

(3)Go to the home page of APP, enter into the Battery Setting page, select "BYD B-BOX 13.8" battery, then select "NEXT" until the last page, at last select "Start".

Remark: If the installed capacity is more than or equal to 13.8KWh, choose "BYD B-BOX 13.8" as the product model on the App

(4)System is running.

6.3 System activating procedures when B-BOX connect to Solax inverter

(1) Start B-BOX;

Press the “Reset(ON/OFF)” button on front panel of BMS;

Tips: Press one second can start B-Plus;

Once started, the LED lights of BMS will be in different status according battery status as below:

LED status when normal start

Item	LED	Status
1	Run	Green
		More than one is green.
2	SOC	Slow blink is charging and Fast blink is discharging. The flash in order means no communication.
3	ERROR	OFF
4	Alarm	OFF

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

Remark:

Slow blink: Indicator light is on and off every 1s (0.5Hz).

Fast blink: indicator light is on and off every 0.25s(2HZ)

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2	The last three lights are normally on	Capacity is 74%-50% (including)
3	The last two lights are normally on	Capacity is 49%-25% (including)
4	The last one light is normally on	Capacity is 24%-1% (including)

(2) Activate inverter

(3) Go to the home page of APP, and enter into Charger Setting page, select “Battery Type Lithium”, then select “Min Capacity” setting 20%, at last select “Battery awoken”, choosing “YES”. Complete battery parameter settings.

(4) System is running;

6.4 System activity procedures when B-BOX connect to Victron inverter

- (1) Start inverter
- (2) Set the battery DOD at a minimum of 5% on-grid; Set the battery DOD at a minimum of 10% off-grid.
- (3) Start B-BOX;

Press the “Reset(ON/OFF)” button on front panel of BMS;

Tips: Press “ON/OFF” button one second will start battery, according to the number of inverters in the following table, press the button as fast as possible within 8 seconds to activate the batteries.

	Inverter:1~2PCS	Inverter:3~4PCS	Inverter:5~7PCS	Inverter:8~9PCS
The amount of battery	1	2	3	4

Once started, the LED lights of BMS will be in different status according battery status as below:

LED status when normal start

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Remark:

Slow blink: Indicator light is on and off every 1s (0.5Hz).

Fast blink: indicator light is on and off every 0.25s(2HZ)

SOC status and indicate

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1	Four lights are all normally on	Capacity is 100%-75% (including)
2	The last three lights are normally on	Capacity is 74%-50% (including)
3	The last two lights are normally on	Capacity is 49%-25% (including)
4	The last one light is normally on	Capacity is 24%-1% (including)

(4)System is running.

7 Stopping the system

Notice:

1. Before stopping the system, power off the system according to the following order:

AC Load=>PV=>Inverter=>Battery

2. After stopping the system, please check below items:

Confirm all the batteries are powered OFF.

All the LEDs are OFF.

Inverter has powered off.

8 Normal alarm and solution for first installation

8.1 Normal alarm and solution display on SMA sunny island SRC

SMA SRC	Reason	Solution
F221	External Alarm-Invalid Bat Type	1. Reset battery type to "Li" on SRC.
F920(XA01General)	1.All the batteries have failed to communicate at the same time; 2.BMU and battery are failed to RS485communicate;	1.Inspect whether the RS485 communicate cable had been connected correctly and reliably; 2.Inspect DIP switch setting according to the DIP switch setting table 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 is connected properly. 2. Change BMU.
W936(XW01General)	External Warning - General	1.Inspect whether the RS485 communicate cable had been connected correctly and safely; 2.Inspect DIP switch setting according to the Address setting table;
W937(XW02DcHiVolt)	External Warning - Battery High Voltage	Normal alarm and no further action required;

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W938(XW03DcLoVolt)	External Warning - Battery Low Voltage	Normal alarm and no further action required;
W939(XW04DcHiTmp)	External Warning - Battery High Temp	Normal alarm and no further action required;
W940(XW05DcLoTmp)	External Warning - Battery Low Temp	Normal alarm and no further action required;
W941(XW06DcHiTmpC)	External Warning - Battery High Temp Charge	Normal alarm and no further action required;
W942(XW07DcLoTmpC)	External Warning - Battery Low Temp Charge	Normal alarm and no further action required;
W943(XW08DcHiCur)	External Warning - Battery High Current	Normal alarm and no further action required;
W944(XW09DcHiChgCur)	External Warning - Battery High Current Charge	Normal alarm and no further action required;
W953	External Warning – Ext BMS Timeout	1. Check the CAN communication is connected properly. 2. Change BMU.

8.2 Normal alarm and solution display on BMS

	B-Plus display info	Reason	Solution
LED	Yellow LED(Alarm) blinks for 0.5Hz, other LEDs are on off continuously;	Battery power off abnormal;	1.Press "RESET(ON/OFF)" button for 2-3 secs until battery can work normal; 2.If yellow blink continuously, battery needs replacing;
	Yellow LED (Alarm), Yellow LED on and buzzing with 4 times.	Protected or external connection 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;
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;

Appendix 1

Battery address setting list (from 1~32 batteries):

Battery No.	Address	Battery No.	Address
1	100000	17	100010
2	010000	18	010010
3	110000	19	110010
4	001000	20	001010
5	101000	21	101010
6	011000	22	011010
7	111000	23	111010
8	000100	24	000110
9	100100	25	100110
10	010100	26	010110
11	110100	27	110110
12	001100	28	001110
13	101100	29	101110
14	011100	30	011110
15	111100	31	111110
16	000010	32	000001

Appendix 2

SMA charger min capacity:

Parameter setup for B-BOX13.8

Charging the battery - Usage through battery backup system without increased self-consumption

Parameters	Setup value
003.07Batt Typ	Li Lon_Ext-BMS
003.10Batt Cpynom	270
262.01ProtResSOC	3
262.02BatResSOC	6

Charging the battery - Usage through battery backup system with increased self-consumption

Parameters	Setup value
003.07Batt Typ	Li Lon_Ext-BMS
003.10Batt Cpynom	270
261.01SlfCsmplncEna	Enable
261.03Saisonenable	Yes
262.01ProtResSOC	3
262.02BatResSOC	4
262.03BUREsSOC	0
262.04PVResSOC	4
262.05MinSlfCsmplSOC	85

Charging the battery - Usage through system for increased self-consumption without a battery backup grid

Parameters	Setup value
003.07Batt Typ	Li Lon_Ext-BMS
003.10Batt Cpynom	270
261.01SlfCsmplncEna	Enable
261.03Saisonenable	Yes
262.01ProtResSOC	3
262.02BatResSOC	4

262.04PVResSOC	4
262.03BUREsSOC	0
262.05MinSlfCsmplSOC	85

Parameter setup for B-BOX in off-grid**Protection for the Battery**

Parameters	Recommended Value
223.05 BatPro1Soc	12%
223.06 BatPro2Soc	12%
223.07 BatPro3Soc	3%

Gen Autostart Control

Parameters	Recommended Value
235.03 GnSocTm1Str	17%
235.04 GnSocTm1Stp	35%

Parameter setup for B-BOX13.8**Charging the battery - Usage through battery backup system without increased self-consumption**

Parameters	Setup value
003.07Batt Typ	Li Lon_Ext-BMS
003.10Batt Cpynom	270
262.01ProtResSOC	3
262.02BatResSOC	9

Charging the battery - Usage through battery backup system with increased self-consumption

Parameters	Setup value
003.07Batt Typ	Li Lon_Ext-BMS
003.10Batt Cpynom	270
261.01SlfCsmpIncEna	Enable
261.03Saisonenable	Yes
262.01ProtResSOC	3
262.02BatResSOC	6
262.03BuresSOC	0
262.04PVResSOC	6
262.05MinSlfCsmpSOC	80

Charging the battery - Usage through system for increased self-consumption without a battery backup grid

Parameters	Setup value
003.07Batt Typ	Li Lon_Ext-BMS
003.10Batt Cpynom	270
261.01SlfCsmpIncEna	Enable
261.03Saisonenable	Yes
262.01ProtResSOC	3
262.02BatResSOC	6
262.04PVResSOC	6
262.03BuresSOC	0
262.05MinSlfCsmpSOC	80

Appendix 3

Solax charger min capacity:

Product	Min capacity
B-BOX 2.5	20%
B-BOX 5.0	15%
B-BOX 7.5	15%
B-BOX 10.0	10%
B-BOX 13.8	10%