



B-Box Pro 12.8

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 applies to the B-BOX 12.8.

1.3 Intended 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 manufacturers recommended by BYD.

1.4 B-BOX and B-Plus definition

BYD battery box product B-Box12.8 is defined as follows:

B-Box: Battery Box

B-Plus12.8: Battery unit with nominal capacity of 12.8KWh can be installed inside the cabinet as an energy storage module.

B-Box 12.8: Battery nominal capacity is 12.8 KWh (Includes 1 set of B-Plus 12.8)

1.5 Identifying the product

The type label describes the product identification information, which is attached to the product. For safe usage, the user must become familiar with the information on the type label. The type label displays:

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 supplied by BYD Lithium Battery Company Limited in strict accordance with the datasheet and remarks included 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.



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 7 days.

Do not expose to temperatures above 55°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.

Storage according to related standard.

Do not put one battery on top of another when unpackaged.

In the process of transportation and storage, the goods are not allowed to be stacked in layers or at a height greater than specified.

When increasing the battery capacity, users should first power off the battery and other power inputs.

B-BOX products can only be used in home energy storage applications, and their use is not allowed for life-sustaining medical devices and automotive applications.



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 to be used for urgent situations.

A potentially hazardous 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 sales service for guidance. The safety section may not include all regulations for your region.

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

When transporting the system packaged as a bundle, remove the battery from the 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-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.

CAUTION:

Due to the heavy weight of BYD B-Box 12.8, please use strong packaging and safety protection equipment during transportation, to ensure safety and avoid accidental damage.

3 Technical parameters

B-Box Pro 12.8	
Battery type	Lithium Iron phosphate battery
Battery module	B-Plus12.8
Nominal battery energy	12.8
Output power (KW)	Max 12.0
Usable battery energy (KWh)(0.2C charge & discharge at @+25°C) (KWh)	12.2
Nominal voltage (V)	51.2
Ambient temperature Range (°C)	-10~+50
Communication	RS485/CAN
Cabinet net dimensions(W*D*H mm)(Without ground feet)	650* 550* 800
Net Weight (Kg)	175
IP level	IP20

When B-BOX works in different temperatures, the charge and discharge current will be adjusted automatically. For detailed parameter settings, please refer to the table below:

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 changing from one temperature range to another.

2.N=B-Plus12.8 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-Plus12.8 battery group quantity

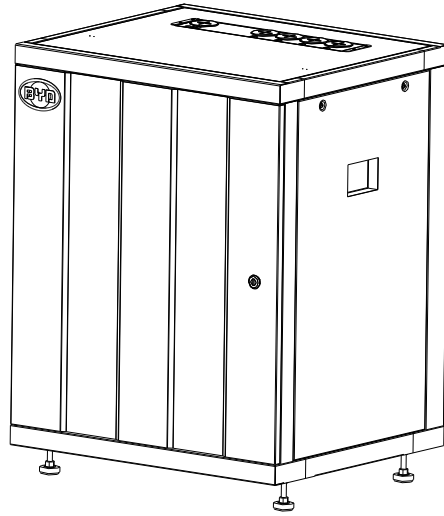
4 Technical terms explanation

No.	Terms	Comment
1	Discharge	Battery output power for load
2	Charge	Battery power supply (such as DC charger)
3	Fully charged	Battery has been fully 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 is broken and unit needs replacement
13	Alarm	Battery will stop charging or discharging immediately
14	Protect	Battery stops charging or discharging (e.g. cell is over voltaged). Operation can resume at a later stage.

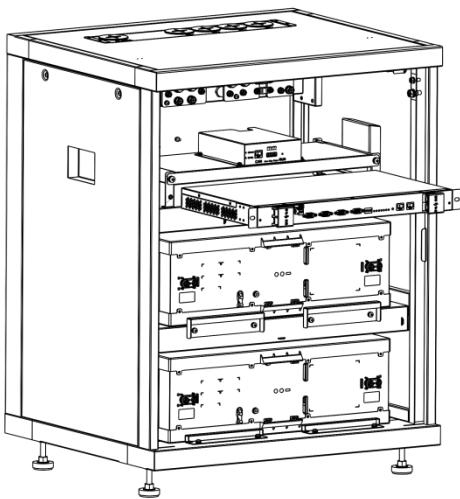
5 Product overview

5.1 B-BOX System brief introduction

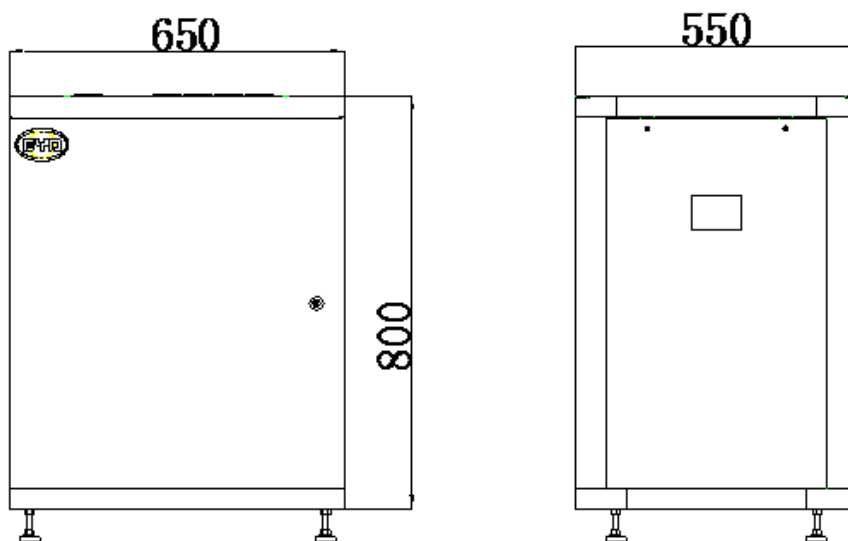
B-Box is the short name for battery box, the energy storage part in the electric power system of a household, and the B-box carries BYD's lithium batteries offering excellent performance. There are 2 pcs batteries modules in each box, and the box supports parallel connection to expand capacity from 12.8KWh to 409KWh, which can meet various capacity requirement for customers.



External drawing



Internal drawing



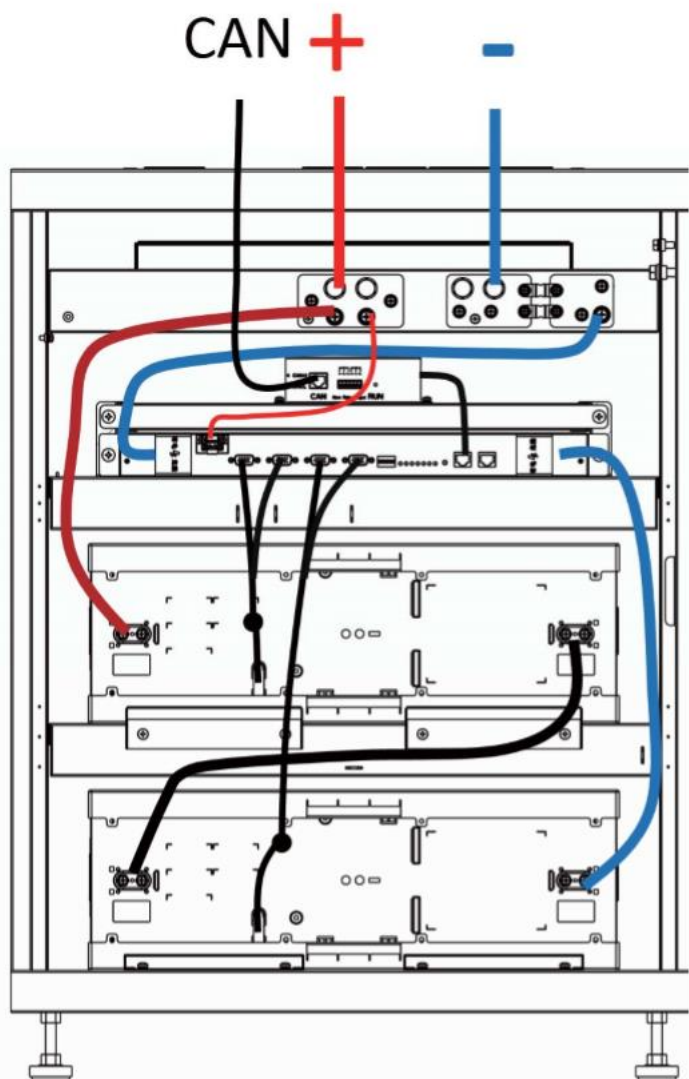
Structure dimension drawing

5.2 B-BOX configuration table

No.	Component	Name	Description
1	Cabinet	B-Box Cabinet	The Cabinet is used to house the B-Plus 12.8 and provide DC output (Each cabinet can install max 1 set of B-Plus12.8)
2	Battery	B-Plus12.8	Battery module with 51.2V 250Ah, BYD's P/N is: 4S-T.
3	BMS	BMS48250	Battery management system. Manages 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 the battery management unit installed in the cabinet; its function is to manage the battery's charge and discharge, collect information from the battery and report to the inverter.

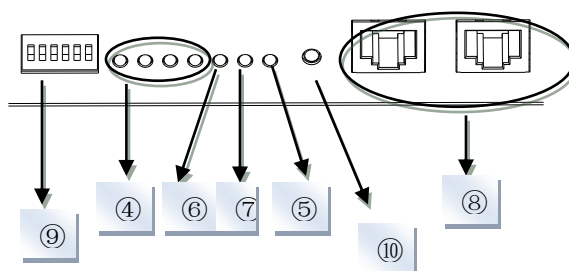
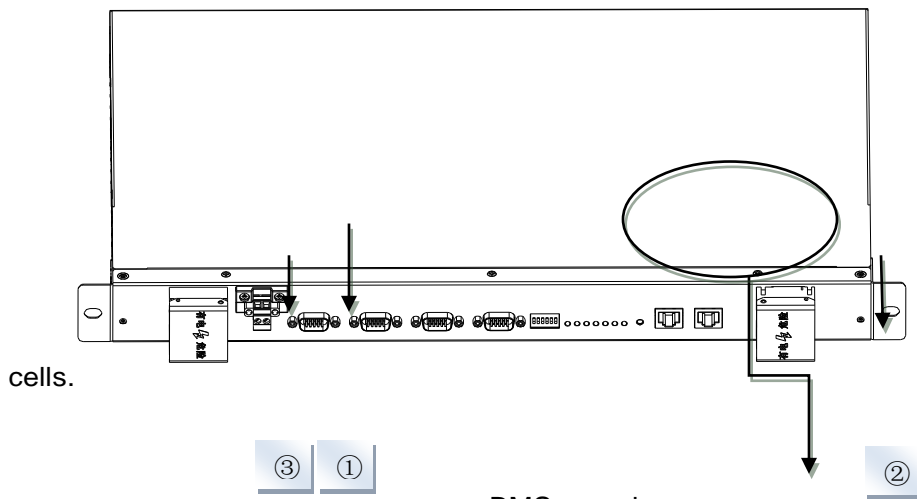
Main functions:

- ✓ CAN /RS485 communication with inverter
- ✓ RS485 communication with battery/BMS
- ✓ Dry contact terminal
- ✓ Other communication interfaces for maintenance
- ✓ Charge and discharge management



5.5 General introduction of BMS48250

B-Plus is the commercial name of BYD's U3A1-50P-A backup battery with 51.2V & 50Ah which is designed for energy storage applications. The B-Plus 12.8 is an integrated battery which consists of shell, BMS and



Display and communication interface

No.	Interface	Mark	Function
-----	-----------	------	----------

①	B+	B+	Connects battery's 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 charge of battery
⑤	RUN LED	RUN	Indicates the Plus system is running
⑥	ERR LED	ERR ADDR	Indicates error status
⑦	Alarm LED	Alarm	Indicates alarm status
⑧	RJ45 terminal	RS232/RS485	Communication ports
⑨	Address	ADDR	When parallel connection, address needs setting
⑩	Reset	RESET	Battery activity 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	%	non-condensing
4	Absolute humidity	0.26		25	g/m ³	
5	Elevation	-	2000	-	m	
6	IP level				20	

5.7 BMS address switch introduction

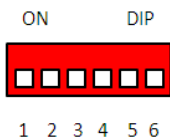
After finishing the battery installation, installers should setup the battery address through the "ADDR" switch.

"ADDR" switch introduction:

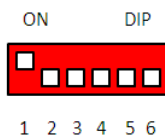
Function: Communication between battery and BMU. The BMU will communicate with external equipment when using CAN communication.

DIP switch definition:

There are 6 bit switches, keeping the switch down it means "0", turn up the switch to "ON" means "1".

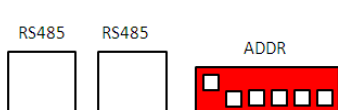


Address: 000000

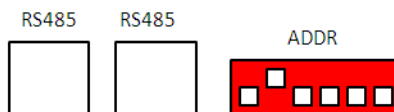


Address: 100000

For example: when two battery are used, “ADDR” setting is:



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 possible between BMS connection and the BMU when communicating with the inverter.

6 Cleaning and maintenance

6.1 Cleaning

CAUTION:

When users need to clean the B-BOX, please switch 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

The B-BOX should be installed in a position with a temperature range of $-10^{\circ}\text{C}\sim+50^{\circ}\text{C}$ and where the humidity is less than 80%.The load-bearing of the battery’s packaging is less than 300Kg, so stacking more than 7 modules is not recommended.

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	$30\% \leq \text{SOC} \leq 60\%$

25~35°C	5%~70%	≤6 months	30%≤SOC≤60%
35~45°C	5%~70%	≤3 months	30%≤SOC≤60%
Above 45°C	/	prohibit	/

When SOC is less than 1%, the module will be damaged after several days if it's not charged in time.

Storage parameters under different storage conditions-2

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

7 Resolve special situations

7.1 Battery over discharged maintenance

7.1 Battery over discharged maintenance

In the case of power cuts, continuous rainy days etc, the battery may over-discharge. It will still provide limited energy, but users should pay attention to the backup time of the battery.

7.2 Force Majeure

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

8 BOX CONFIGURATION LIST with different inverters

8.1 B-BOX configuration list with SMA Sunny Island-On/Off grid

1 Phase on Grid		
Inverter Type	B-Box 12.8	Cabinets
SI 3.0M	≥1	≥1
SI 4.4M	≥1	≥1
SI 6.0H	≥1	≥1
SI 8.0H	≥1	≥1

Remark: Maximum B-Box12.8 quantity is 32.

3 Phase on Grid

Inverter Type	B-Box 12.8	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 12.8	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 12.8	Cabinets
SI 3.0M	≥8	≥2
SI 4.4M	≥8	≥2
SI 6.0H	≥12	≥3
SI 8.0H	≥12	≥3

Remark: Maximum B-Box12.8 quantity is 32.

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

1 Phase on Grid

Inverter Type	B-Box 12.8
4.6kW	≥11

1 Phase off Grid

Inverter Type	B-Box 12.8
4.6kW	≥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-Box 12.8
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¹ This configuration is only for self consumption applications.

2.5kW

≥1

Remark: Maximum B-Plus quantity is 32, Cabinet quantity is 8.

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

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 fail to communicate at the same time 2.BMU and battery fail to communicate via RS485	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
F930(XA11Short)	External Alarm - Short circuit	1.Power off; 2.Inspect short connection of cable between P+ and 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 it is connected properly 2.Change BMU

W936(XW01General)	External Warning - General	1.Inspect whether the RS485 communication 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 further action required
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 to make sure it is connected properly 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 LEDs are on/off continuously	Battery is switched off abnormally	1. Press "on/off" button for 2-3 secs until battery can work normally 2. If yellow blinks continuously, the battery needs to be changed

	Yellow LEDs (Alarm) are on and buzzing 4 times	The battery needs to be protected or external connection is incorrect;	<ol style="list-style-type: none"> 1.Power off the battery; 2.Inspect short/reverse connection of cable between P+ and P- 3.If short/reverse connection is confirmed, please reconnect cable correctly 4.Restart battery
	The merry-go-round	No communication with BMU	<ol style="list-style-type: none"> 1. Check the cables between BMU and batteries 2. Confirm the connection is reliable or not
Buzzer	Buzzing for 4 times	Short/reverse connection	<ol style="list-style-type: none"> 1.Power off 2.Inspect short/reverse connection of cable between P+ and 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 warranties only when the product is installed and used according to the description of user manual / installation manual / warranty letter.

11 Login in after sales service web

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

For technical problems or enquiries for use, please contact our installation company.

The following information is required for timely customer service.

Product type
Serial number
Connected PV module type and number
Optional equipment

Any problems, please contact us on the addresses below:

Contact us:

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BYD LITHIUM BATTERY Co.,LTD

Customer Service Mailbox: eubatterygrp@byd.com

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