



BYD Battery-Box Pro User Manual

Battery-Box Pro 13.8

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1 General Information

1.1 Validity

This user manual applies to the Battery-Box Pro 13.8.

1.2 Application

This user manual introduces the Battery-Box product information, using guidance, safety, common issues and actions.

The Battery-Box Pro 13.8 is an energy storage unit that can be used in ON-grid system or Off-grid system.

The product is suitable for indoor use only.

1.3 Intended use

The Battery-Box is not suitable for supplying life-sustaining medical devices. A power outage must not lead to personal injury.

Use this product only in accordance with the information provided in the enclosed documentation and with the locally applicable standards and directives. Any other application may cause personal injury or property damage.

The illustrations in this manual meant only to help explain system configuration concepts, includes using guidance, safety caution and normal failure and actions.

Alterations to the product, e.g. changes or modifications, are only permitted with the express written permission of BYD. Unauthorized alterations will void warranty claims. BYD shall not be held liable for any damage caused by such changes. Any use of the product other than that described in the Intended use section does not qualify as appropriate. The enclosed documentation is an integral part of this product. Keep the documentation in a convenient place for future reference and observe all instructions contained therein. The type label must be attached to the product.

Battery-Box Pro series products must work with compatible inverters, which are listed in the BYD Battery-Box Pro 13.8 Compatible Inverter List.

Please contact BYD or local after service providers within one week once the user decides to cease using their Battery-Box products.

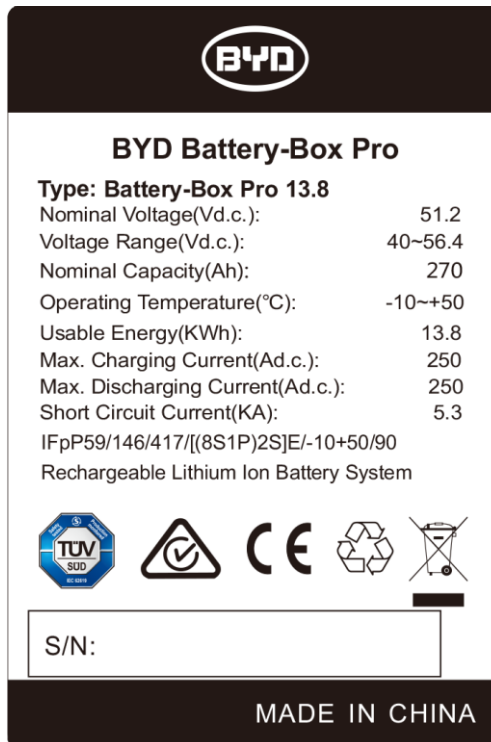
The Battery-Box products can be installed at altitude of up to 2000m above the Mean Sea Level.

1.4 Battery-Box definition

Battery-Box Pro 13.8 is the name of Battery Box system with the usable energy of 13.8kWh.

1.5 Identifying the product

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



2 Safety

This section contains safety information that must be observed at all times when working on or with batteries by professionals. To prevent personal injury or property damage and to ensure long-term operation of the batteries, read this section carefully and observe all safety information at all times.



Environmental requirement

- Do not expose the battery to temperature above 50°C.
- Do not install or use the battery near any heat sources.
- Do not install or use the battery in wet locations, such as bathroom.
- Do not expose them to moisture or liquids.
- Do not expose the battery to corrosive gases or liquids.
- Do not expose the battery to direct sunlight for extended periods of time.
- Place battery in secure location away from children and animals.
- Do not allow the battery power terminals to touch conductive objects such as wires.
- Do not dispose of batteries in a fire, which may explode.

Operating requirement

- Do not touch the battery pack with wet hands.
- Do not crush, drop or puncture the battery.
- Always dispose of the batteries according to local safety regulations.
- Store and recharge battery in a manner in accordance with this user manual.
- Ensure reliable grounding.

- The charging circuit of inverter shall be DVC A, and the output circuit needs to be isolated from high voltage bus.
- The cabinet and battery modules shall be transported separately to reduce the risk of damage caused by drop, vibration, topple, etc.
- Do not short circuit the terminals, remove all metal objects including watches and rings that could product a short circuit before installation, replacement and maintenance.
- The battery shall be repaired, replaced or maintained by skilled personal recognized. (Skilled personnel recognized is a trained and qualified electrician or installer defined in installation guidance).
- Do not reverse the polarity.
- Do not stack up batteries without protective package, when store or handle batteries.
- Do not open, mutilate or disassemble the battery, the released electrolyte, which may be toxic, is harmful to the skin and eyes.
- Disconnect the charging source prior to connecting or disconnecting battery terminals, for instance, disconnect battery from power/load and then power off battery before installation and maintenance.
- Packaged batteries should not be stacked more than specified number stipulated on the package.
- Do not lay tools or metal parts on top of batteries.
- Do not use damaged, failed or deformed batteries, which may reach temperatures that exceed the burn thresholds for touchable surfaces. Continued operation of damaged battery may result in dangerous situation and cause severe injury due to electrical shock.

3 Technical Data

Model	Battery-Box Pro 13.8
Battery type	Lithium Ion Battery
Battery module	2 modules
Usable energy ^[1] [kWh]	13.8
Max output power [kW]	12.8
Peak output power [kW]	13.3, 60s
Round-trip efficiency	≥95.3% (Under test condition [1])
Nominal voltage [Vd.c]	51.2
Operating voltage range [Vd.c]	43.2~56.4
Communication	RS485 / CAN
Dimension [W × H × D, mm]	650 × 800 × 550
Net weight [kg]	181
Enclosure protection rating	IP20
Ambient temperature range ^[2] [°C]	-10 ~ +50
Certification & safety standard	TUV(IEC62619) / CE / RCM / UN38.3
Scalability	Max. 32 systems in parallel
Compatible inverters	Please refer to the Battery-Box Compatible inverter list

[1]. Test conditions: 100% DOD, 0.2C charge & discharge @ +25°C

[2]. -10°C~12°C will be derating

* System Usable Energy may be variant with different inverter brands

Note: The maximum operating voltage of the rechargeable lithium-ion battery system is less than 60Vd.c

When Battery-Box works in different temperatures, the current of charge and discharge will be adjusted automatically, battery will permit lower current when operating temperature gets lower. Please refer to below table for the detail parameters setting:

Parameter setting of charging current at different temperatures	
Operating temp. (°C)	Normal current(Ad.c)
-10~2	15*N
2~12	42.5*N
12~50	175*N

Remark:

1. Effective time is 2mins when changing from one temperature range to another.
2. N= battery quantity

Parameter setting of discharging current at different temperatures	
Operating temp. (°C)	Normal current(Ad.c)
-10~50	125~250*N

Remark: N= battery quantity

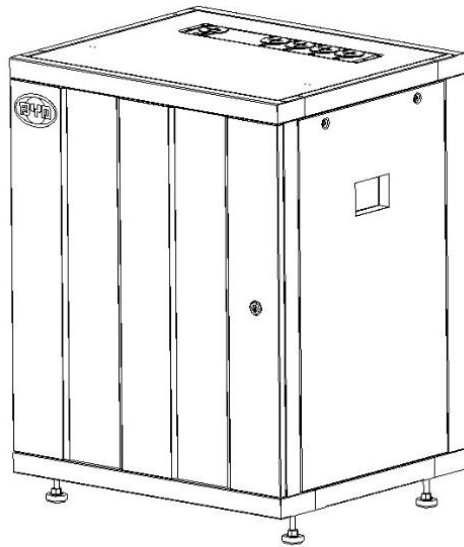
4 Technical Terms

No.	Term	Comment
1	Discharge	Battery output power for load
2	Charge	To put electricity into battery by 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 unit needs to be replaced
13	Alarm	Battery will stop charging or discharging immediately
14	Protect	Battery stops charging or discharging (e.g. cell is overvoltage). Operation can resume at a later stage.
15	Over discharged	Battery module or batteries overvoltage, need to be recharged timely

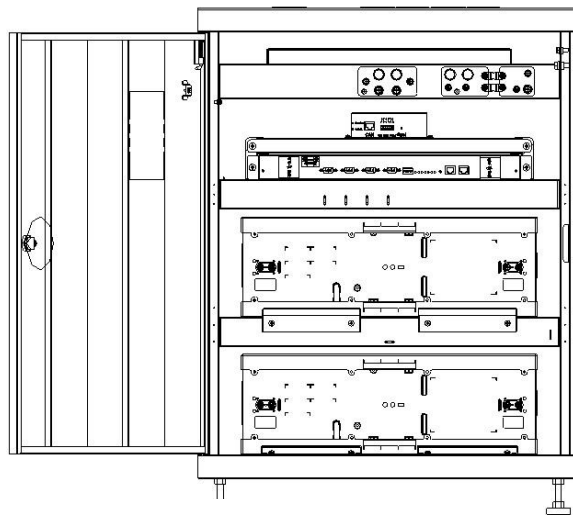
5 Product Overview

5.1 Brief introduction of Battery-Box system

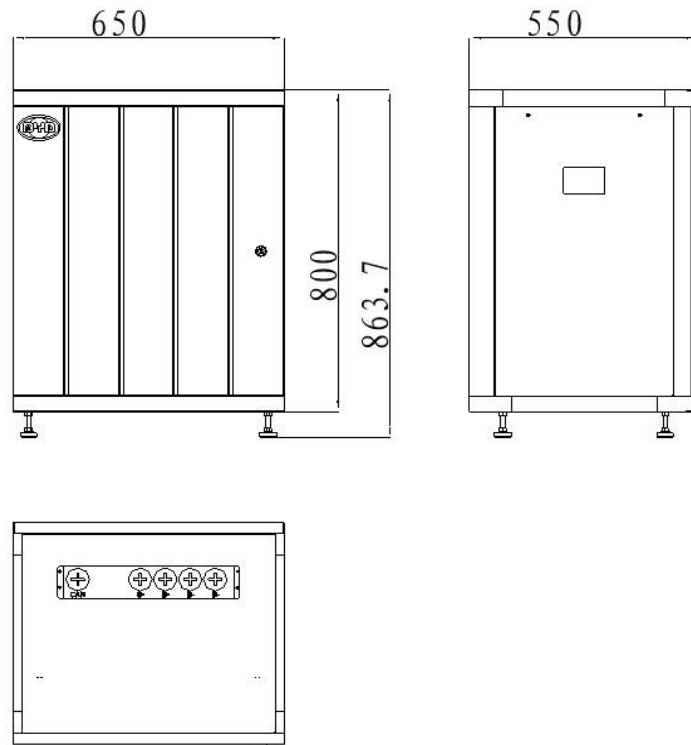
The Battery-Box energy storage system combined with high-performance BYD lithium battery, consists of cabinet, battery, BMS and BMU. Each set of the storage system includes 2 battery modules connected in series, and up to 32 Battery-Box 13.8 energy storage system can be connected in parallel.



External drawing



Internal drawing



Structure dimension drawing

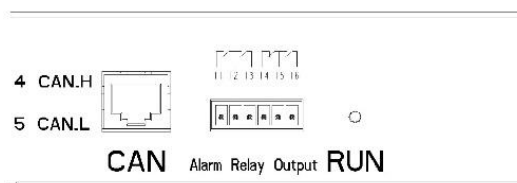
5.2 Configuration table

No.	Component	Name	Description
1	Cabinet	Battery Box Cabinet	The cabinet is used to accommodate these 2 modules and provide DC input and output.
2	Battery	Battery module	Battery module with 51.2V 270Ah, BYD' s P/N is: GBSSB
3	BMU	BMU	Battery management unit. It communicates with external equipment.
4	BMS	BMS	Battery module management unit and communicates with BMU

5.3 Introduction of BMU

BMU, the battery management unit installed inside the cabinet, communicates with BMS and external equipment.

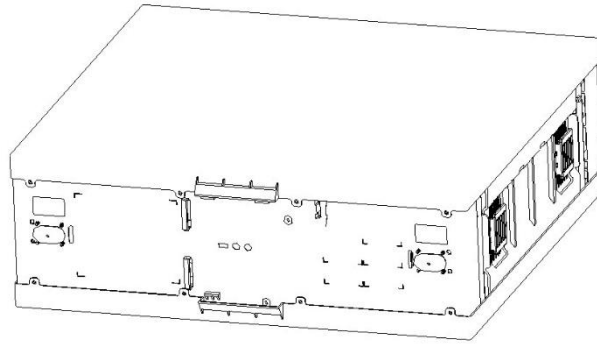
Main functions:



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

5.4 Introduction of Battery-Box 13.8 module

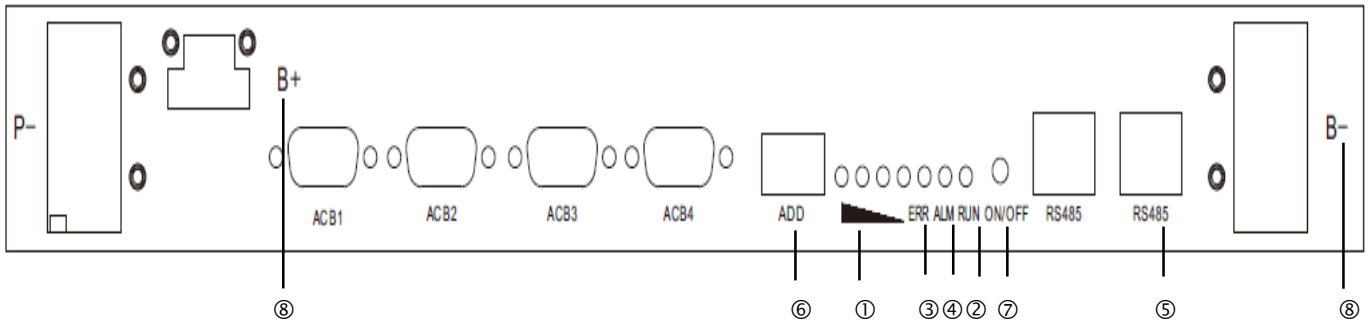
Battery-Box Pro 13.8 includes two battery modules, one battery modules is 25.6V/270Ah, and the batteries are in series connection.



Module overview

5.5 Introduction of BMS

BMS, the battery management system, communicates with BMU. It collects information from battery and manages battery charging and discharging to ensure normal operation for the battery system.



Display and communication interface

No.	Interface	Mark	
①	SOC LED	SOC	Indicate current SOC of battery
②	RUN LED	RUN	Indicate that the Battery is in 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	Address needs to be set, if they are connected in parallel.
⑦	ON/OFF	ON/OFF	Power on/power off manually
⑧	Test terminal	B- B+	Measure battery voltage when testing.

5.6 Operating environment

Operating environment parameters

No.	Item	Min.	Typical	Max.	Unit	Remark
1	Discharging temperature	-10	25	50	°C	

2	Charging temperature	-10	25	50	°C
3	Relative humidity	5		95	%
4	Absolute humidity	0.26		25	g/m ³
5	Elevation	-	2000	-	m
6	Enclosure			IP20	
7	Pollution			PD2	
8	Voltage category			II	

6 Cleaning and Maintenance

6.1 Cleaning



CAUTION:

Please power off the system before cleaning the Battery-Box Pro 13.8

The Battery-Box system is recommended to be cleaned periodically. If the enclosure gets dirty, please use a soft, dry brush or a soot blower to remove the dust. Liquids such as solvents, abrasives or corrosive liquids are not allowed to clean the enclosure.

6.2 Maintenance

6.2.1 Recharge requirement for batteries in normal storage

Batteries should be stored in position with the temperature range of $-20^{\circ}\text{C} \sim +45^{\circ}\text{C}$, and maintained regularly according to the following table with 0.5C current for 1 hour after a long time of storage.

Recharge conditions for batteries in normal storage

Storage environment temperature	Relative humidity of storage environment	Storage time	SOC
Below -20°C	/	Avoid	/
$-20 \sim 25^{\circ}\text{C}$	5%~85%	≤ 12 months	$30\% \leq \text{SOC} \leq 60\%$
$25 \sim 35^{\circ}\text{C}$	5%~85%	≤ 6 months	$30\% \leq \text{SOC} \leq 60\%$
$35 \sim 45^{\circ}\text{C}$	5%~85%	≤ 3 months	$30\% \leq \text{SOC} \leq 60\%$
Above 45°C	/	Avoid	/

6.2.2 Recharge requirement for over discharged batteries

Please recharge the over discharged batteries in time as per the following table, otherwise the over discharged ones will be damaged.

Recharge condition for over discharged batteries

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

7 Compatible Inverter List

To make sure that the system can be operated normally, please use BYD compatible inverters and select battery quantity correctly, according to the BYD Battery-Box Pro 13.8 Compatible Inverter List.


8 Common Issues and Solutions

8.1 Alarm indicated on the BMU and solution

LED of the BMU	Possible cause	Solution
Flash 1 time	Inverter and BMU communication failure	Step1. Check whether the CAN communication cable has been connected correctly and tightly ; Step2. If the connection is incorrect, please reconnect the cable correctly; if the connection is correct and reliable, then replace the BMU ;
Flash 2 times	Battery not found	Check the connection between BMU and first battery.
Flash 3 times	One or some batteries are disconnected	1. Check RS485 cable and battery address 2. If the connection and the address are correct, please contact the after service provider
Flash 4 times	Any battery failure	Check battery led status. If the red led is on and buzzer alarms, please contact the after service provider to replace the battery.

8.2 Alarm display on BMS and solution

Alarm indicated by flashing LED

Info Battery displayed	Flashing	Possible cause	Solution
Only yellow led is ON 	0.5Hz	Battery was powered off abnormally;	Press ON/OFF button for 2-3 seconds to restart the battery, If the battery cannot be recovered, contact the after service provider immediately;
Flow led flashes and alternates with capacity led	10s per cycle	Communication connection timeout	Step1.Check the communication wire/cable Step2.Check battery address
NO.1/3 led and No.2/4 led flashing alternately	/	Update status	If the firmware is not updated, then reset the battery.

Alarm indicated by flashing yellow Led

Fault phenomenon	Flashing	Possible causes	Solution
1.Yellow led (Alarm) is always on	1time	Under voltage (BAT or CELL)	Contact the after service provider
	2times	Over charge	Contact the after service provider

2 Press on/off button for 1S and release, then hear short buzzer 3. The green Led (RUN) is always on, and yellow led (ALM) flash at different times, which indicates that battery is in alarm status.	3times	Low temperature charge over-current	Contact the after service provider
	4times	Charge short circuit	Contact the after service provider
	5times	Discharge short circuit	Contact the after service provider
	6times	Parallel short circuit	Contact the after service provider
	7times	Discharge over-current protection	Contact the after service provider
	8times	High temperature protection	Contact the after service provider
	9times	Low temperature protection	Contact the after service provider
	10times	PACK over voltage protection	Contact the after service provider

Alarm status indicated by flashing red led

Fault phenomenon	Flashing	Possible cause	Solution
1.Red led (Err) is always on 2. Press the on/off button press the for1S and released, then buzzer sounds shortly 3. Green led (RUN) is always on, and red led (ERR) is flashing, which shows the alarm status.	1time	Voltage sensor failure	Replace the battery
	2times	Temperature sensor failure	Replace the battery
	3times	Charging circuit failure	Replace the battery
	4times	Discharge circuit failure	Replace the battery
	5times	Batteries failure	Replace the battery
	6times	Communication failure	Replace the battery

Failures indicated by buzzer

Fault phenomenon	Beep	Possible cause	Solution
The buzzer sounds with different times at a 15 seconds interval.	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	Replace the battery
	2times	Voltage sensor failure、 Temperature sensor failure	Replace the battery
	1time	Charging/Discharge circuit failure	Replace the battery

8.3 Common issues displayed on inverter and solution

User also can check the battery' s running, warning and alarm information from App or LED panel of inverter.

8.4 Emergency

Please cut off the power supply and turn off the battery in emergency.

9 Warranty

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

1. Please contact our local service provider for technical support & after service.
2. Please download the Warranty Letter via following website:

Australia customer: www.alppower.com.au

European customer: www.eft-systems.de

Latin America customer: en.byd.com

Contact Information

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