

BYD B-Box Premium

Webinar

IBC

February 2024



**BUILD YOUR
DREAMS**

**INNOVATIONS FOR
A BETTER LIFE**

Webinar Contents

- **About BYD**
- **Why choose BYD**
- **BYD battery range**
- **Technical Information**
- **Commissioning**
- **Troubleshooting**
- **Q&A**

Please post any questions you have in the question window, We will answer them either during or at the end of the webinar.

**BUILD YOUR
DREAMS**

**INNOVATIONS FOR
A BETTER LIFE**

ABOUT BYD



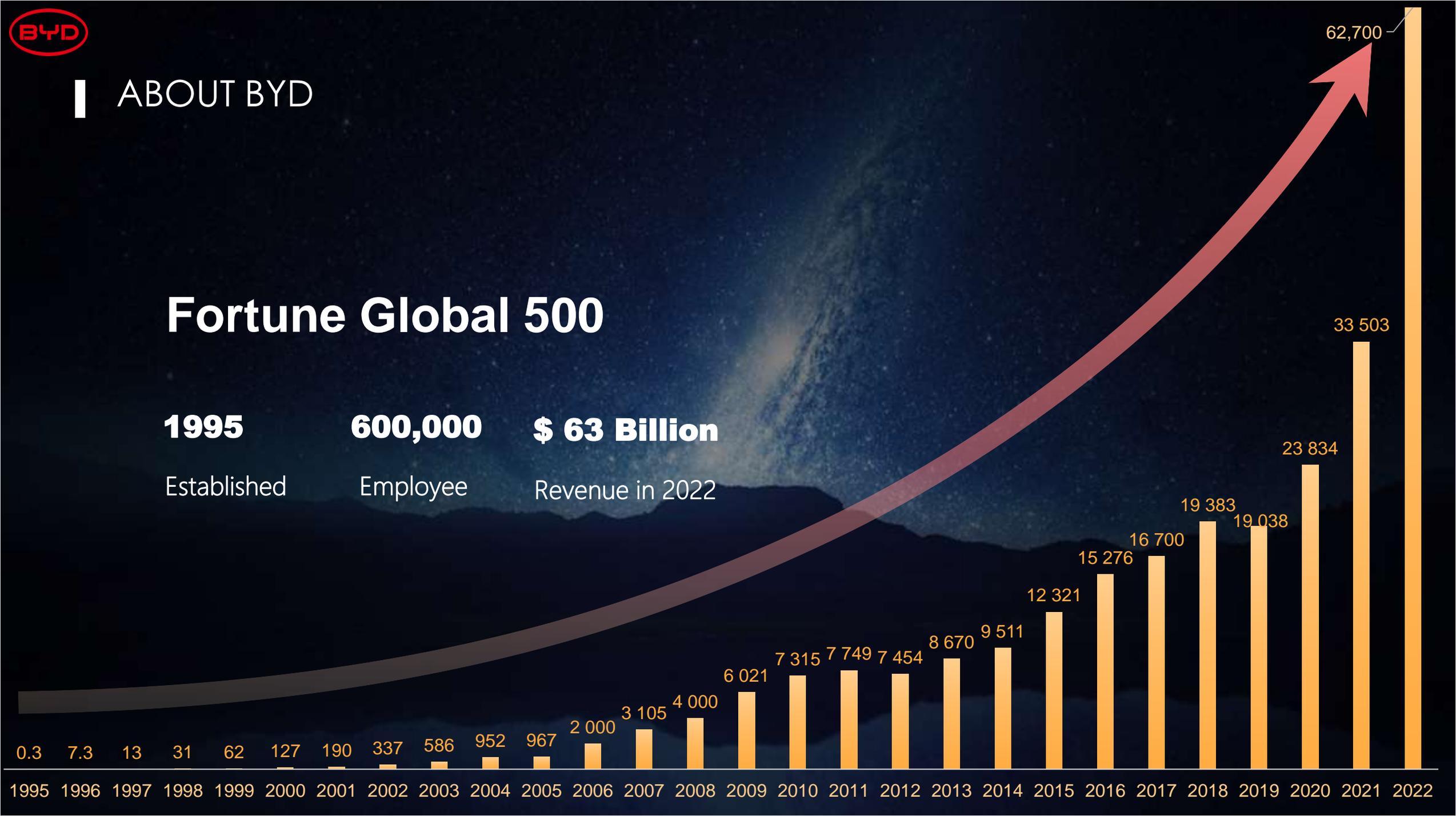




ABOUT BYD

Fortune Global 500

1995 **600,000** **\$ 63 Billion**
Established Employee Revenue in 2022





ABOUT BYD

Over 400 cities across 92 countries & regions in 6 continents

40+

Branch Offices

600+k

Employees



NORTH AMERICA

- Canada
- United States
- Mexico

CENTRAL & SOUTH AMERICA

- | | | | |
|----------|-----------|-----------|------------|
| Colombia | Chile | Cuba | Curacao |
| Ecuador | Panama | Bolivia | Jamaica |
| Peru | Argentina | Paraguay | Costa Rica |
| Brazil | Antigua | Bahamas | Dominican |
| Uruguay | Barbados | Guatemala | Republic |

EUROPE

- | | | |
|----------------|---------|----------|
| Netherlands | Norway | Portugal |
| United Kingdom | Denmark | France |
| Belgium | Germany | Sweden |
| Spain | Ireland | Finland |
| | Hungary | Romania |

ASIA PACIFIC

- Chinese Mainland
- Taiwan, China
- Hong Kong, China
- Macau, China
- Japan
- South Korea
- Philippines
- Indonesia
- Nepal
- India
- Thailand
- Laos
- Sri Lanka
- Malaysia
- Singapore
- Australia
- New Zealand
- French Polynesia
- ...

MIDDLE EAST & AFRICA

- | | |
|--------------|---------|
| South Africa | Jordan |
| Kenya | Egypt |
| Mauritius | Lebanon |
| Zimbabwe | Tunisia |
| Qatar | Bahrain |

*As of April, 2023

... ..



ABOUT BYD



Electronics



Since 1995



Auto



Since 2003



Renewable Energy



Since 2008



Rail Transit



Since 2016

BYD ELECTRONICS

- Top EMS Provider with One-Stop Service and Solutions
- The only company to provide a full series of structural components (metal, glass, ceramics, plastics, etc.) and complete product design and manufacturing

1/3 Structural parts of the total global Android smartphone market

1/5 Smartphones in the world feature BYD technology





BYD AUTO



Global NO. 1

NEV(BEV+PHEV) Sales in 2022



200,000 (in Sep. 2022)

First Auto Maker with Monthly NEV Sales Reaching

1.86 Million

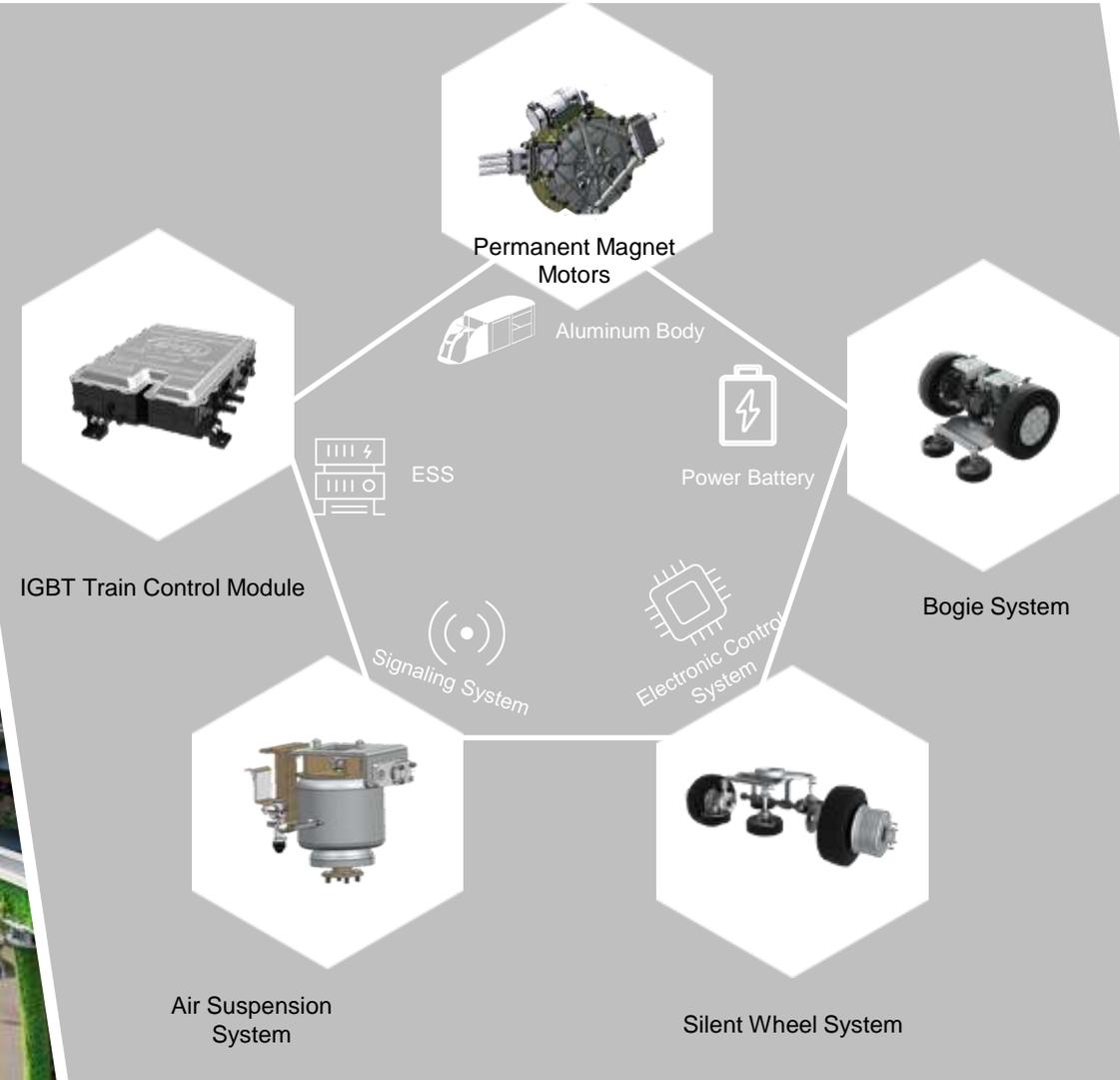
NEV Sales during 2022 with 152.5% YOY Growth Rate



BYD RAIL TRANSIT

With 100% independent IP and a full mastery of the entire industrial chain

BYD provides overall rail transit solutions, from design, vehicle bodies, track beams, communication systems, to intelligent operation and maintenance.



BYD RENEWABLE ENERGY

MOST POPULAR PV MODULE + ENERGY STORAGE SOLUTION

widely acclaimed in more than 30 countries and regions in 6 continents including the United States, Brazil, Germany, Japan, Australia, South Africa and others.

- Effectively reduces electricity costs
- Pioneering **PV + Storage + EPT*** model to greatly increase urban competence and environment

A variety range of energy storage products

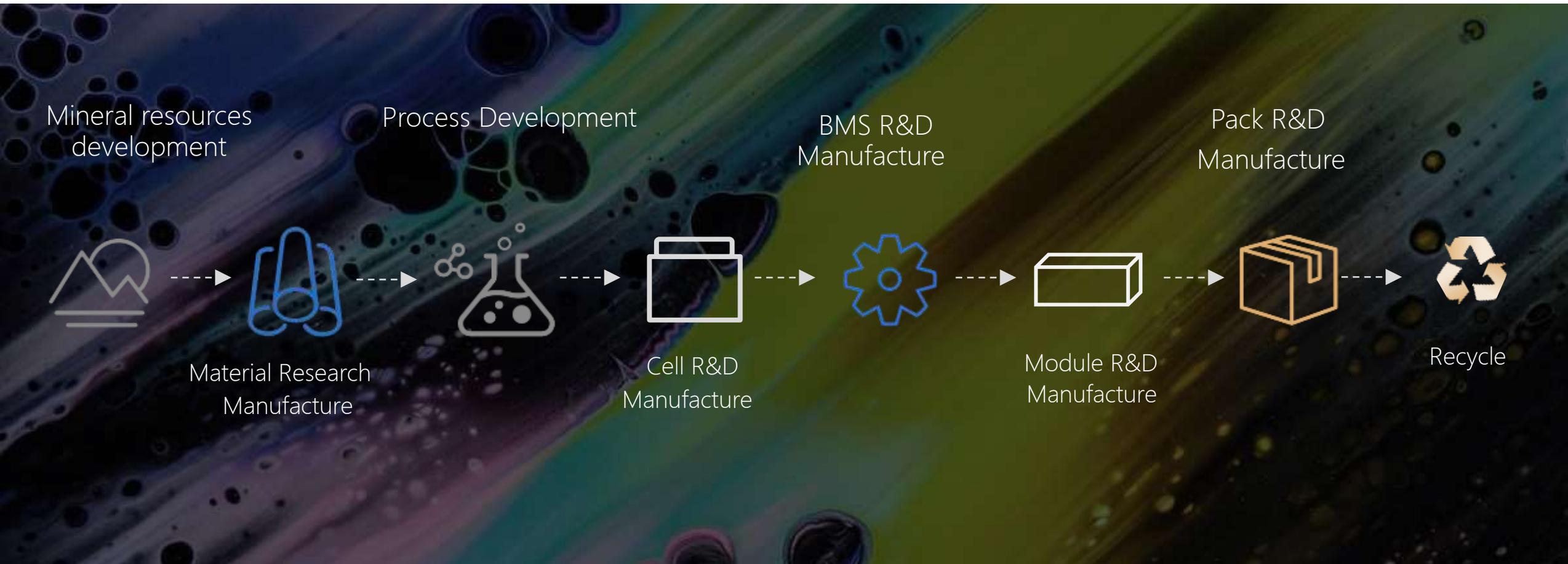


(Electrified Public Transportation)



ABOUT BYD BATTERY

END TO END INDUSTRY CHAIN LAYOUT



Group Recognition



UNITED NATIONS

United Nations
Energy Grant
"POWERING THE
FUTURE WE WANT"
Award
2013



Zayed Future Energy Prize
"LARGE CORPORATION"
Award
" LIFETIME ACHIEVEMENT"
Award
2014 - 2016



Fortune Magazine
"CHANGE THE WORLD"
List
Rank 3rd Worldwide
2019



TIME100
"MOST INFLUENTIAL
COMPANIES" List
" Scaling electric transport"
Category
2021



FORTUNE
"WORLD' S LARGEST
CORPORATIONS" List
FORTUNE GLOBAL 500
2022



WHY BYD BATTERY-BOX



BYD BATTERY-BOX LINEUP

HVS/HVM



High Voltage S/M
5.1KWh ~ 66.3 kWh

LVS



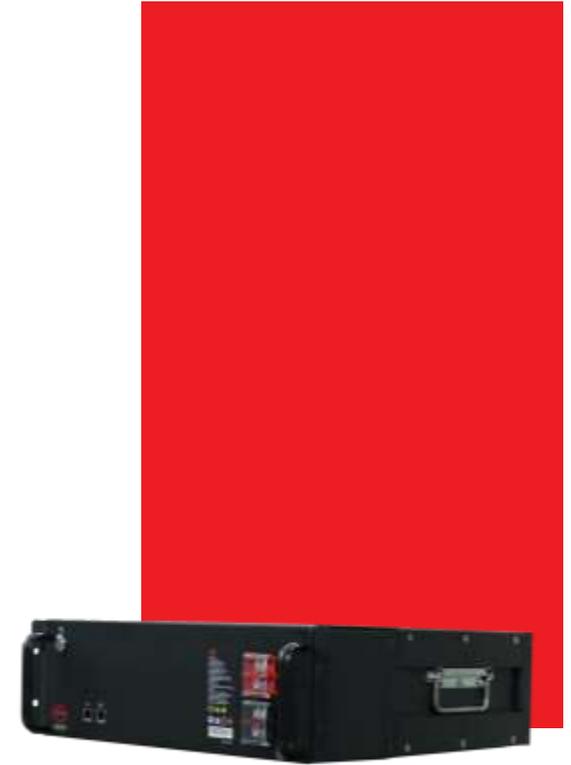
Low Voltage Small
4KWh ~ 256 kWh

LVL



Low Voltage Large
15.4KWh ~ 983 kWh

LV Flex Lite



Low Voltage Flex Lite
5KWh ~ 320 kWh

Usable Energy: 4Kwh ~ 983 Kwh

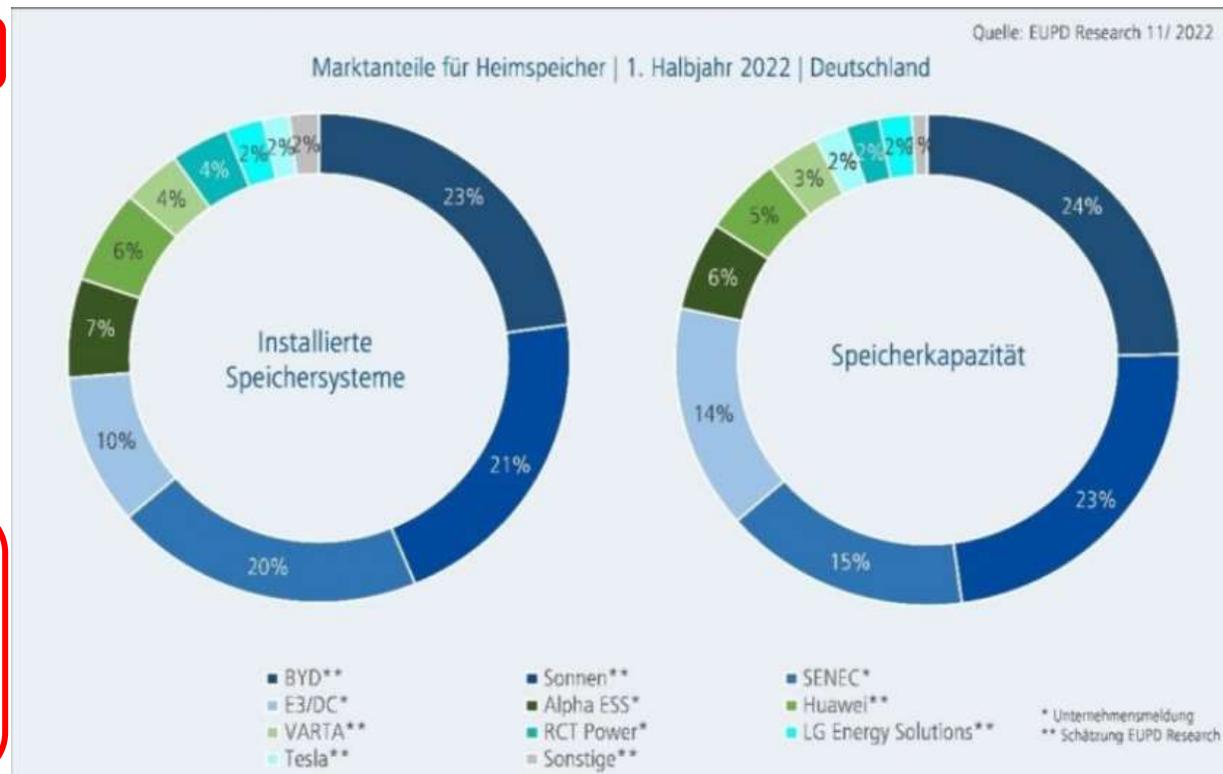
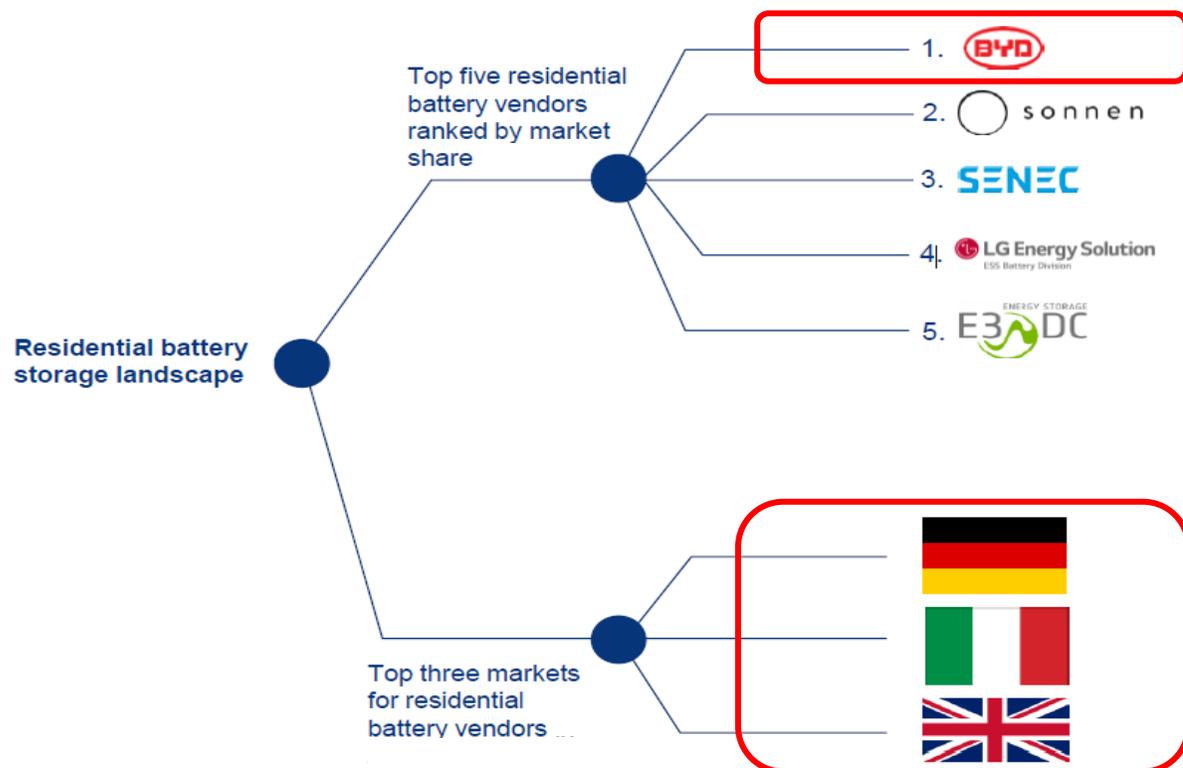
BYD BATTERY-BOX ACHIEVEMENT

BYD Leads the Market in **Germany, Italy, Britain & Europe**

Europe behind-the-meter energy storage market outlook

BYD leads the European residential battery segment

Solar-plus-storage packages are offered by most solar developers in Europe



BYD BATTERY-BOX ACHIEVEMENT

End User Top 1 Choice

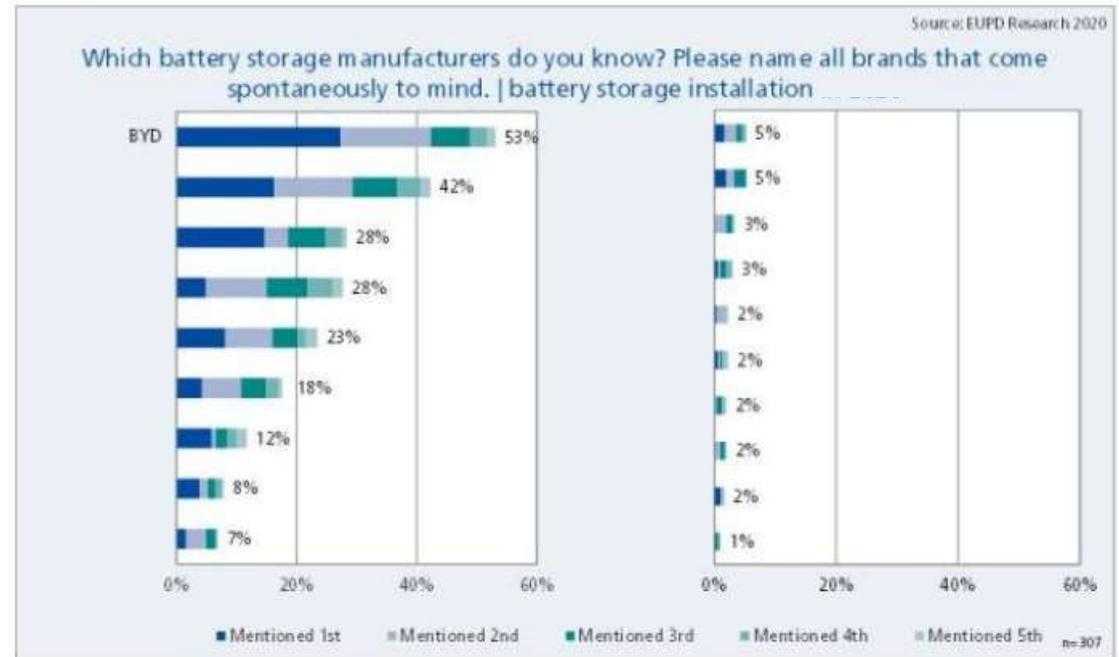
TOP 1 Brand Awareness

From EUPD Research, BYD is the most well known battery storage manufacturer among the battery systems owners

Source: EUPD Research

Battery storage – Unaided brand awareness (2/2)

BYD is the most well known battery storage manufacturer among the owners of battery storage systems installed

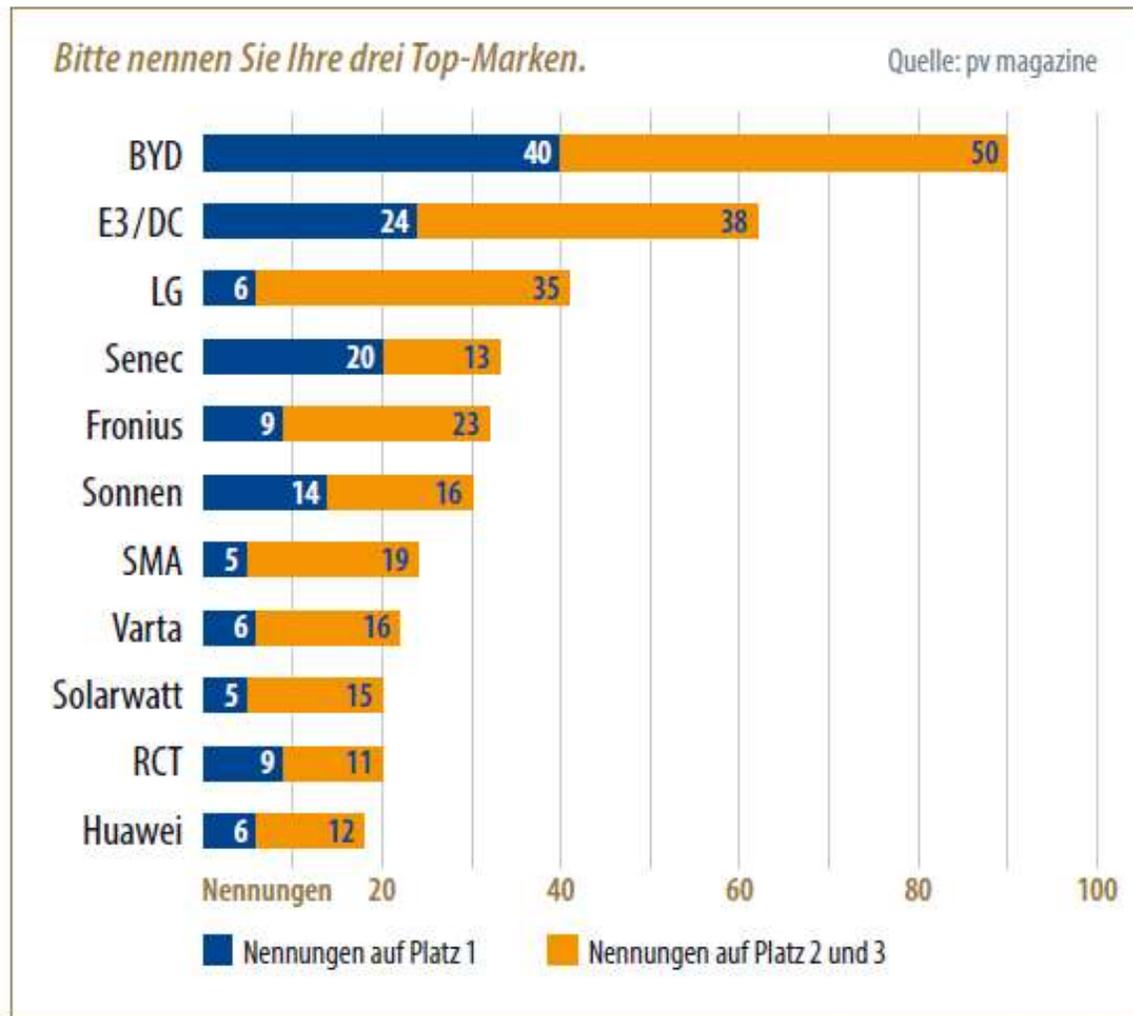


BYD BATTERY-BOX ACHIEVEMENT

Installer Favorite ESS Brand in Germany

TOP Choice
From Installer Partners

Source: PV magazine



Grafik 4: Nach den Gründen gefragt, rangieren „Kompatibilität mit verschiedenen Wechselrichtern“ und „gutes Gesamtkonzept“ vorn.

BYD BATTERY-BOX ACHIEVEMENT



BYD BATTERY-BOX ACHIEVEMENT

Energy Storage Inspection HTW BERLIN

6 Years at Top Rank



B5 ENERGY STORAGE
Inspektion 2023

KOSTAL PLENTICORE plus 10 and BYD Battery-Box Premium HVS 12.8

Battery connection	DC
Battery capacity	12.3 kWh
Discharge power	6.4 kW
PV output power	9.9 kW
Efficiency class	A

C1 ENERGY STORAGE
Inspektion 2023

Fronius Primo GEN24 6.0 Plus and BYD Battery-Box Premium HVS 7.7

Battery connection	DC
Battery capacity	7.4 kWh
Discharge power	5.8 kW
PV output power	6.1 kW
Efficiency class	A

C2 ENERGY STORAGE
Inspektion 2023

Fronius Symo GEN24 10.0 Plus and BYD Battery-Box Premium HVS 10.2

Battery connection	DC
Battery capacity	9.9 kWh
Discharge power	8.9 kW
PV output power	10.2 kW
Efficiency class	A

E1 ENERGY STORAGE
Inspektion 2023

KACO blueplanet 10.0 TL3 and BYD Battery-Box Premium HVS 10.2

Battery connection	DC
Battery capacity	9.7 kWh
Discharge power	10.0 kW
PV output power	10.1 kW
Efficiency class	A

WHY BYD BATTERY-BOX

HIGH SAFETY



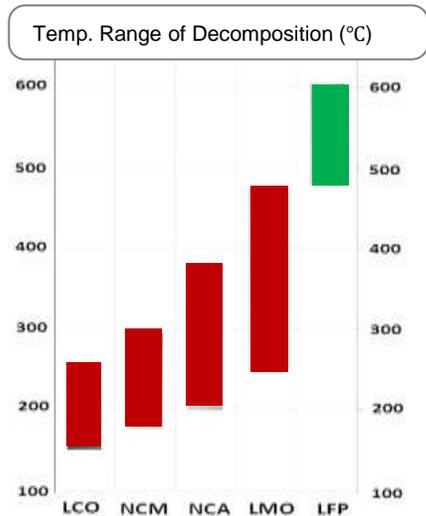
HIGH RELIABILITY



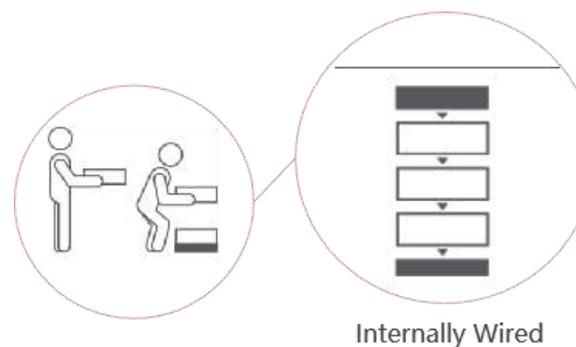
HIGH FLEXIBILITY



HIGH USABILITY



600,000+
Installation Experience



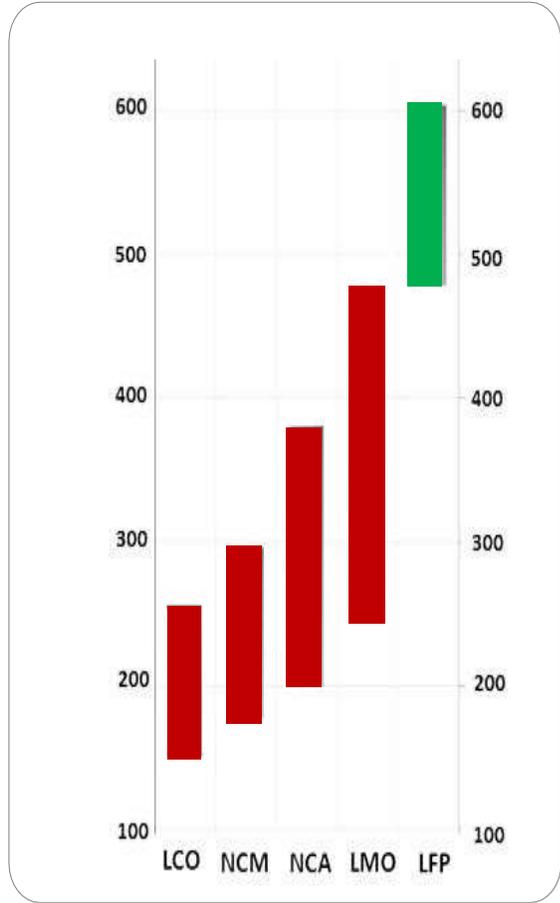
HIGH SAFETY



SAFEST BATTERY CHEMISTRY LFP-LITHIUM IRON PHOSPHATE

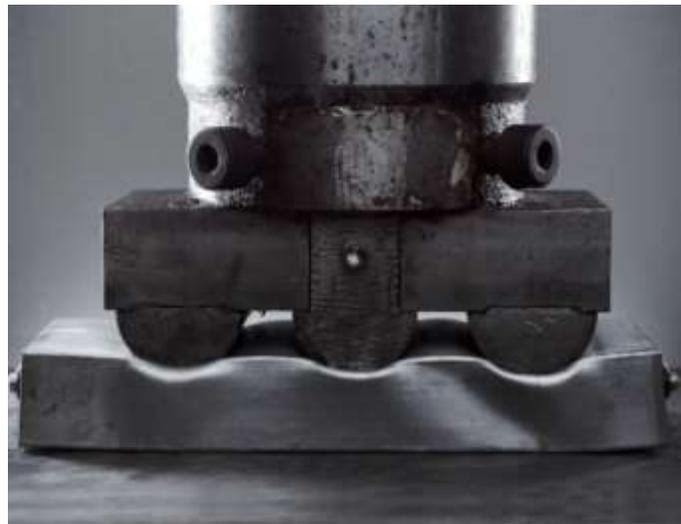
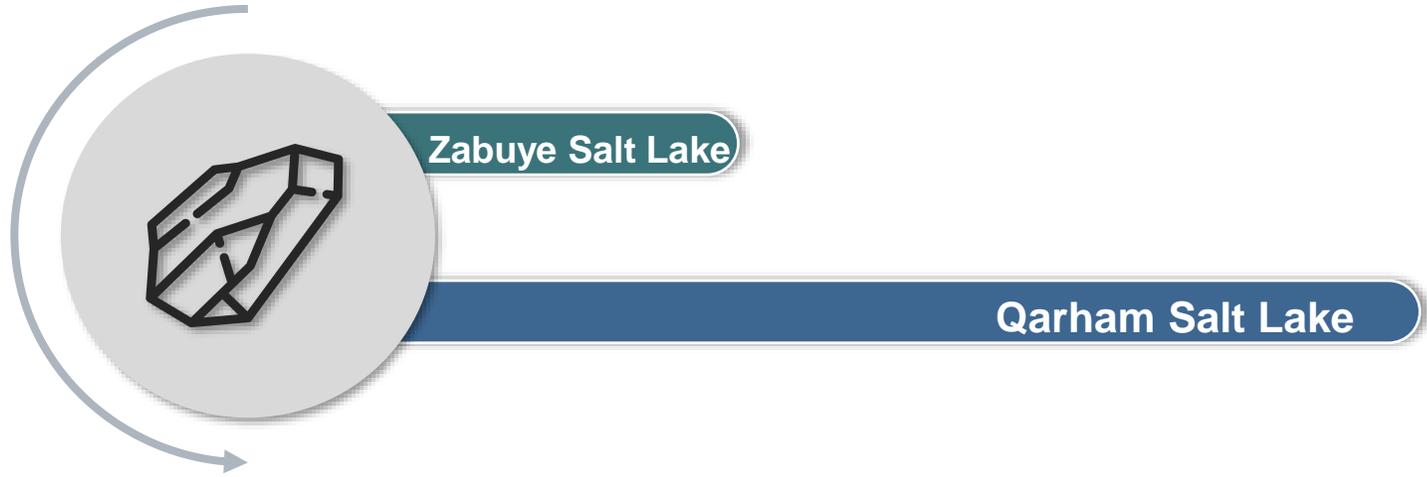
Cobalt Free

LFP performs the highest safety behavior



Temp. Range of Decomposition (°C)

BYD BATTERY STRENGTH



HIGH RELIABILITY

600,000+

Installation Experience

20+ Years

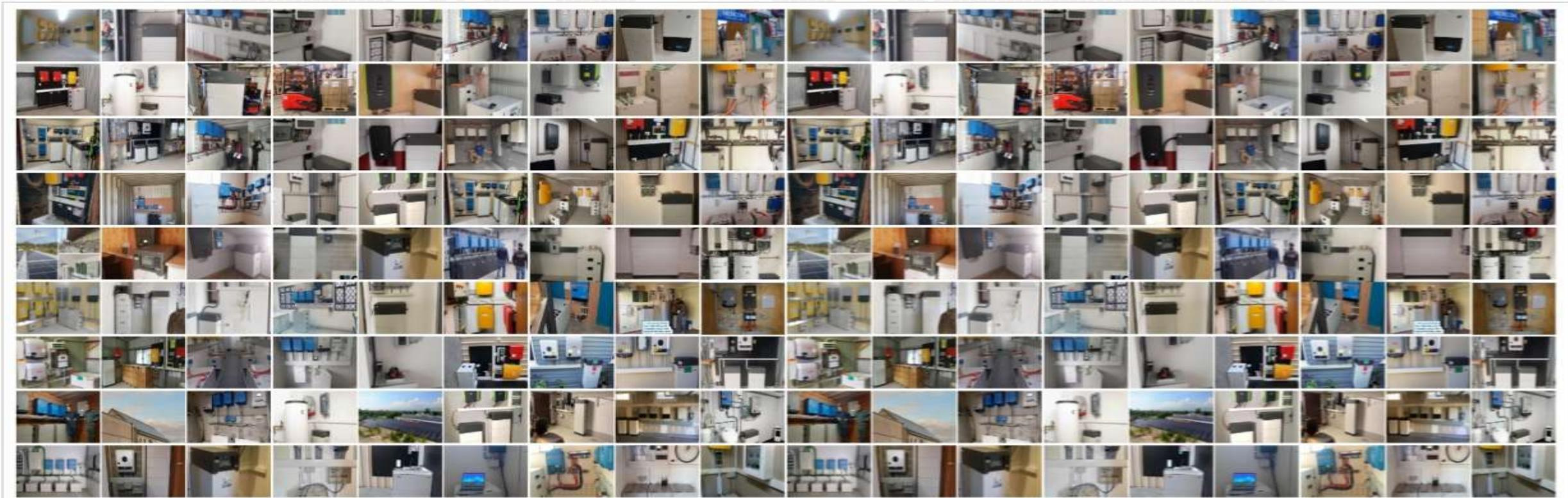
Tracking Record

100+

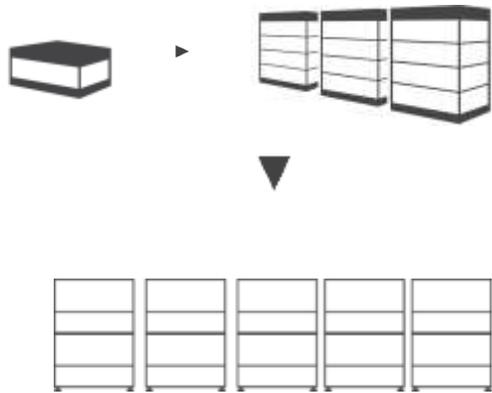
Countries with Footprints

0

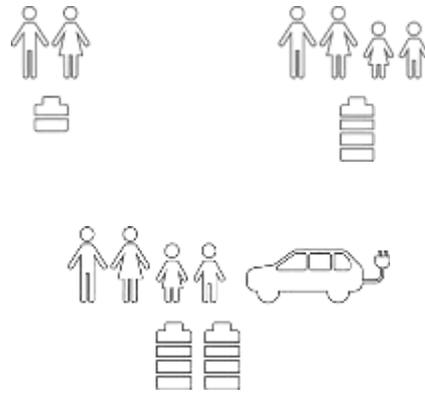
Fire Accident



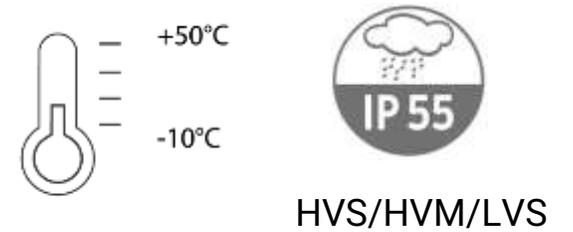
HIGH FLEXIBILITY



Flexible from 4 to 983kWh



Extend at Any Time



Flexible in the Location

HIGH USABILITY

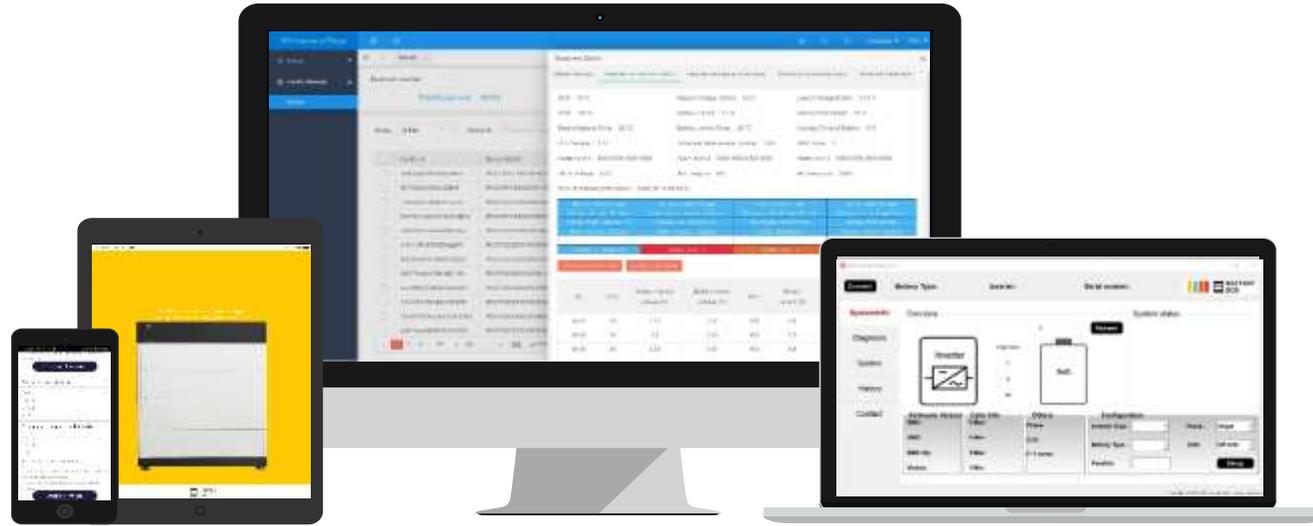
GLOBAL HIGH COMPATIBILITY WITH INVERTERS

WIDE RANGE APPLICATIONS



- On Grid Self Consumption,
- On Grid + Back Up,
- Off Grid, Micro Grid.
- 1&3 Phase... etc.

Service Tool—Be Connect Plus



Mobile App(BC) Be Connect

For Android / Apple systems; cell phones and pad also available.



Remote monitoring system(BCM)

Be Connect Monitoring

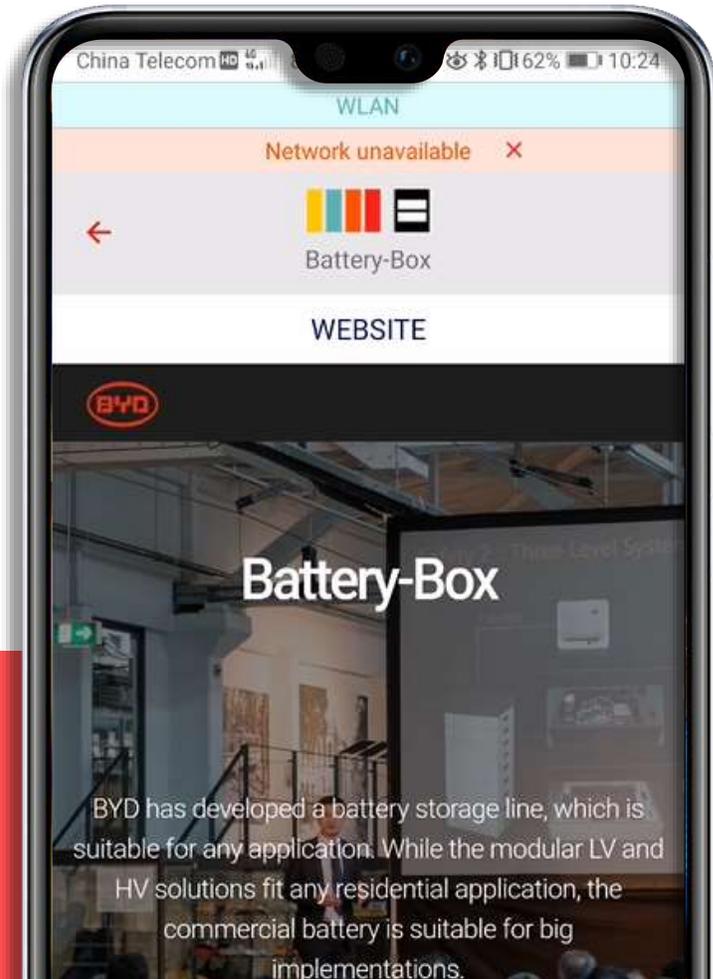
Remote monitoring and statistical analysis



PC Offline Application(BCP) Be Connect Plus

Mainly serves offline systems with more functions.

Service Tool—Be Connect 2.0



New App Be Connect 2.0

Be Connect 2.0

Battery-Box New Mobile App with easier user interface, real time data displaying, event recording and more smart functions.





BYD BATTERY-BOX FAMILY



BYD premium battery range available in SA



HVS / HVM



LVS



LVL



Flex Lite



BYD premium battery range: Tower design Improvements

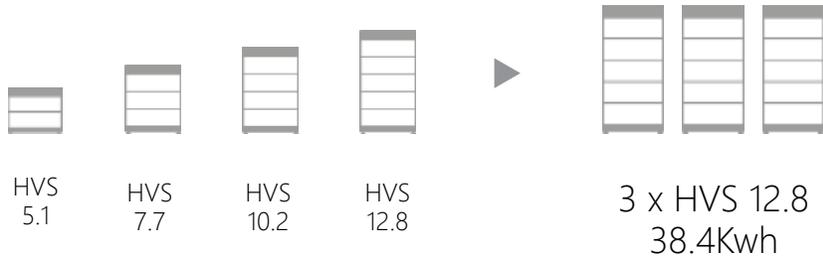
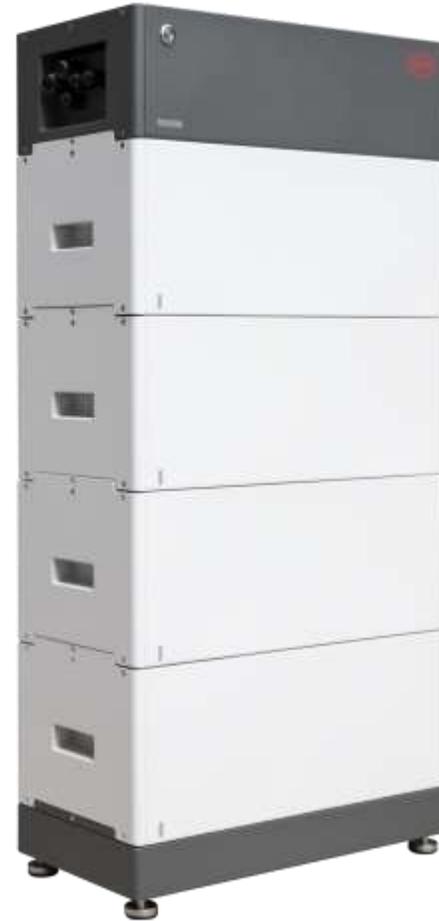


HV SERIES

HVM



HVS



➤ **Min. 2 x module, Max. 5 x modules per tower**

➤ **Max. 38.4kWh (15 modules) in parallel**



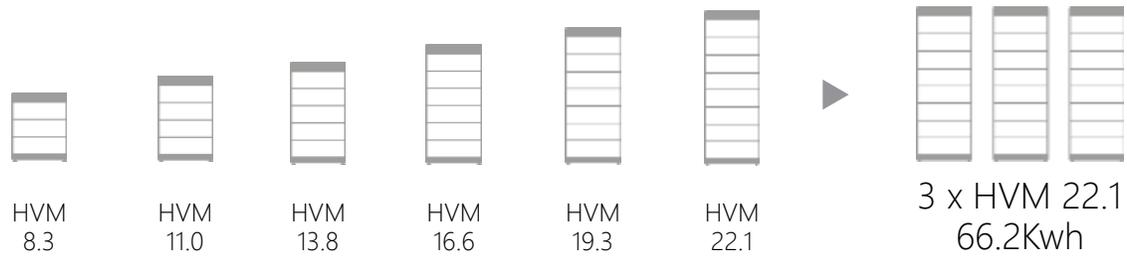
Difference between the Low Voltage and High High Voltage series

	LVS 4	LVS 8	LVS 12	LVS 16
Battery Module	LVS (4 kWh, 51.2 V, 45 kg)			
Number of Modules	1	2	3	4
Usable Energy	4 kWh	8 kWh	12 kWh	16 kWh
Max Cont. Output Current	65 A	130 A	195 A	250 A
Nominal Voltage	51.2 VDC	51.2 VDC	51.2 VDC	51.2 VDC

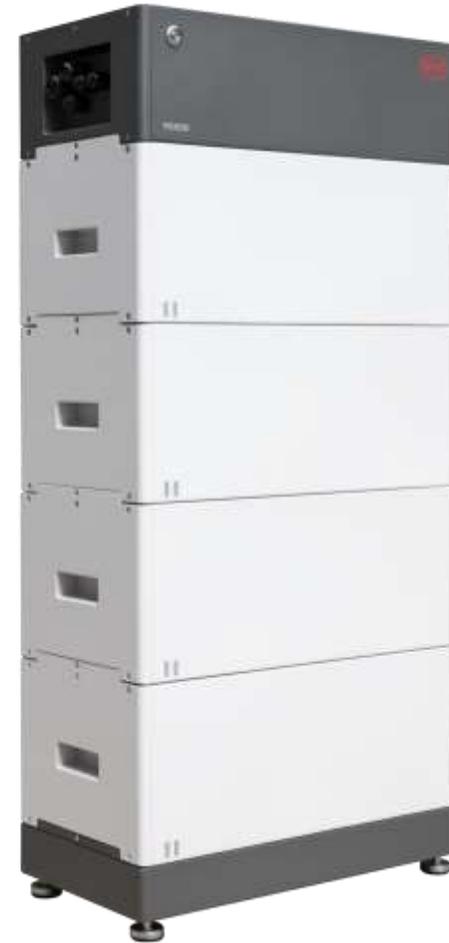
	HVS 5.1	HVS 7.7	HVS 10.2	HVS 12.8
Battery Module	HVS (2.56 kWh, 102.4 V, 38 kg)			
Number of Modules	2	3	4	5
Usable Energy	5.12 kWh	7.68 kWh	10.24 kWh	12.8 kWh
Max Cont. Output Current	25 A	25 A	25 A	25 A
Nominal Voltage	204 VDC	307 VDC	409 VDC	512 VDC

HV SERIES

HVS



HVM



➤ **Min. 3 x module, Max. 8 x modules per tower**

➤ **Max. 66.2kWh (24 modules) in parallel**

Some inverters compatible with the BYD HV SERIES



LV SERIES

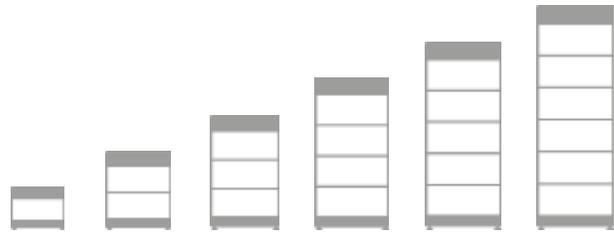
LVL



LVS



LV Flex Lite



LVS 4.0 LVS 8.0 LVS 12.0 LVS 16.0 LVS 20.0 LVS 24.0



16 x LVS 16.0

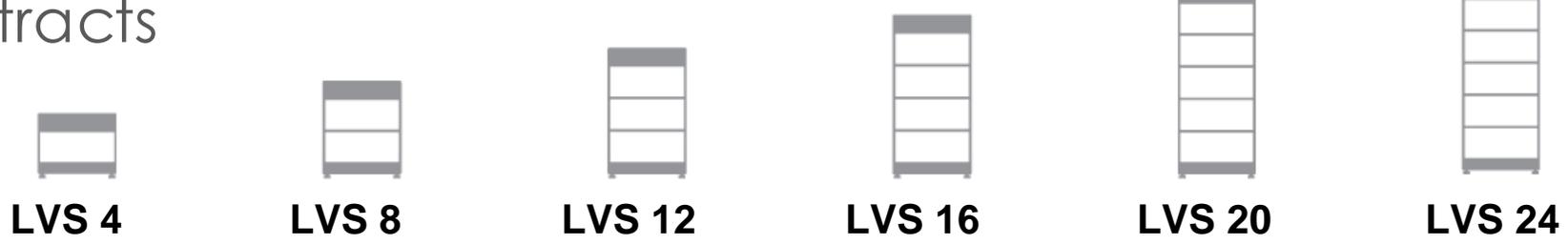
➤ **Min. 1 x module, Max. 6 x modules per tower**

➤ **Max. 4 modules per tower when parallel;**

➤ **Max. 256kWh (64 modules) in parallel**



LVS datasheet extracts



	LVS 4	LVS 8	LVS 12	LVS 16	LVS 20	LVS 24
Battery Module	LVS (4 kWh, 51.2 V, 42 kg)					
Number of Modules	1	2	3	4	5	6
Usable Energy [1]	4 kWh	8 kWh	12 kWh	16 kWh	20 kWh	24 kWh
Max Cont. Output Current [2]	65 A (0.83 C)	130 A (0.83 C)	195 A (0.83 C)	250 A (0.83 C)	250 A	250 A
Peak Output Current [2]	90 A, 5 s	180 A, 5 s	270 A, 5 s	360 A, 5 s	360 A, 5 s	360 A, 5 s
Dimensions (H/W/D)	457 mm	690 mm	923 mm	1156 mm	1389 mm	1622 mm
	640 mm	640 mm	640 mm	640 mm	640 mm	640 mm
	298 mm	298 mm	298 mm	298 mm	298 mm	298 mm
Weight	52 kg	94 kg	136 kg	178 kg	220 kg	262 kg
Scalability	Max. 64 Modules in Parallel (256 kWh) (only 4 modules per tower when towers are in parallel)					
Requires PDU and external BMU	One PDU per tower and One BMU per Battery Bank					

[1] DC Usable Energy, Test conditions: 100% DOD, 0.2C charge & discharge at + 25 . System usable Energy may vary with different inverter brands

[2] Charge/discharge derating will occur between -10 °C and +5 °C



LV SERIES

LV Flex Lite



LVL



LVS



➤ **Max. 983kWh (64 modules) in parallel**

LVL datasheet extracts



LVL 15.4

Number of modules	2
Usable Energy [1]	15.36 kW
Max Cont. Output Current [2]	250 A (0.83 C)
Nominal Voltage	51.2 VDC
Dimensions (H/W/D)	500 mm
	650 mm
	575 mm
Weight	164 kg
Scalability	Max. 64 in Parallel (986 kWh)
Requires external BMU	YES (one per battery bank)

[1] DC Usable Energy, Test conditions: 100% DOD, 0.2C charge & discharge at + 25 . System usable Energy may vary with different inverter brands

[2] Charge/discharge derating will occur between -10 °C and +5 °C



LV SERIES

LVS



LVL



LV Flex Lite



LV Flex Lite
5.0



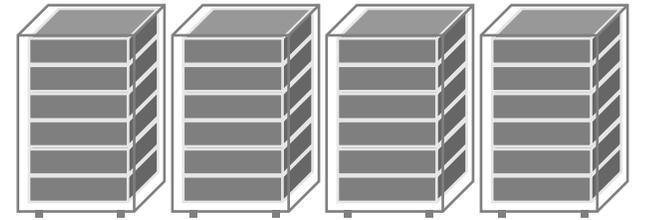
LV Flex Lite
10.0



LV Flex Lite
15.0

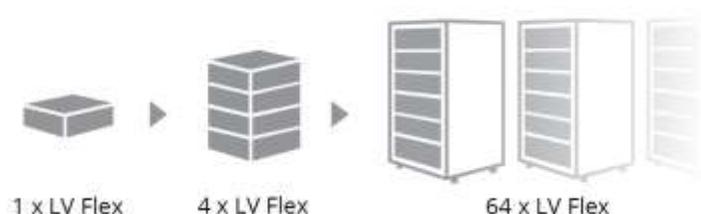


LV Flex Lite
20.0



➤ **Max. 320kWh (64 modules) in parallel**

BYD Flex Lite Specifications



Specification

Usable Energy	5.0 kWh
Max Cont. Output Current	70A (3.58kW) 0.7C
Peak Output Current	105 A, 5 s
Dimensions (H/W/D)	132*482*521mm
Weight	47KG
Nominal Voltage	51.2 V
Operating Voltage	43.2-57.6 V
Operating Temperature	-10 °C to +50°C
Battery Cell Technology	Lithium Iron Phosphate (cobalt-free)
Communication	CAN
Enclosure Protection Rating	IP20
Round-trip Efficiency	≥95%
Scalability	Max. 64 in Parallel (320kWh)
Certification	IEC62619 / CE / CEC / UN38.3/EN62040
Applications	ON Grid / ON Grid + Backup / OFF Grid

LV FLEX LITE

Highly Flexible for Installations

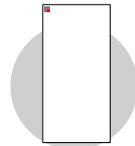
Standing
Horizontally



Standing
Vertically



Customer DIY
Cabinet
Rack-
mounted



Commercial



Residential



More...

BYD Precision C2P (Cell-to-pack) Design

Doubled Capacity, Smaller Volume, Longer Lifespan



Battery-Box Pro 2.5

VS



Battery-Box Flex Lite 5.0

Some of the COMPATIBLE INVERTERS for LVS and LVL and Flex Lite

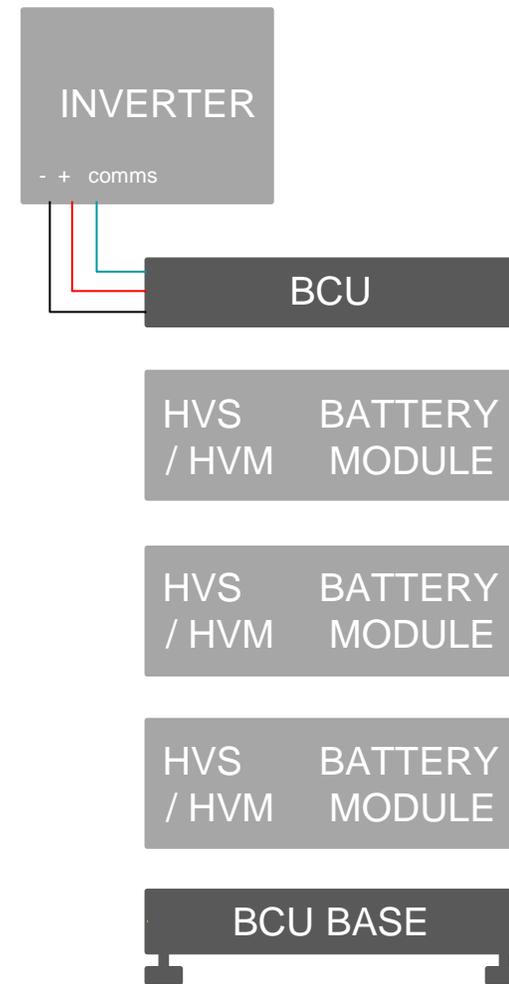
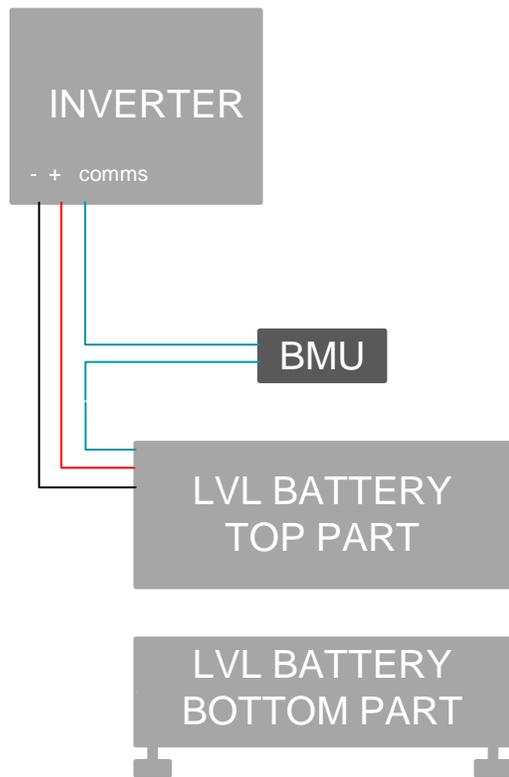
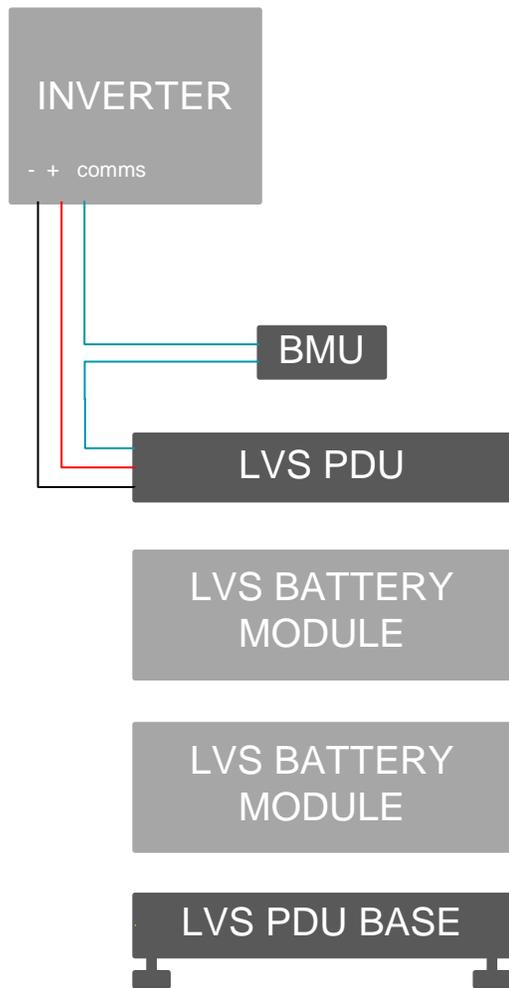


More compatible inverters are listed on the bydbatterybox.com/downloads website





BYD premium battery range available in SA : Components





BYD BATTERY-BOX LV FLEX LITE

- Perfect Battery for Bespoke Projects and Integrated Systems.
- Scalable from 5 kWh to 320 kWh via Max 64 parallels.
- Capable of High-Powered Emergency-Backup and On/Off-Grid Function.

FLEX LITE

FLEXIBLE



- **Flexible for Installations**
Horizontal or vertical, rack-mounted and customer DIY cabinet



- **Flexible for More Scenarios**
Lithium Iron Phosphate battery cell adjusts to wider operating temperature



- **Flexible for Your Need**
Off-grid/on-grid and residential or commercial operation

LARGE



- **Doubled Capacity**
Smaller size and doubled usable energy
*Compared with the Battery-Box Pro 2.5



- **Maximum Capacity (320kWh)**
Connect up to 64 modules in parallel on one BMU to reach capacities from 5 ~ 320 kWh

EXTRAORDINARY



- **C2P Technology**
Cell-to-pack design provides higher capacity, smaller volume, and longer lifespan



- **Highest Industry Standard**
IEC62619 / CE / CEC / UN38.3 / IEC62040 certification



Advantages of BYD batteries

■ 100% usable energy

The usable energy of a BYD battery is the same as the nameplate energy

You have bought the whole battery, you can use the whole battery

■ A BYD warranty covers the whole battery

A BYD warranty covers the whole battery (the cells and the BMS) for the same period

Short circuit and reverse polarity protection

Who can spot what is wrong with this picture ?



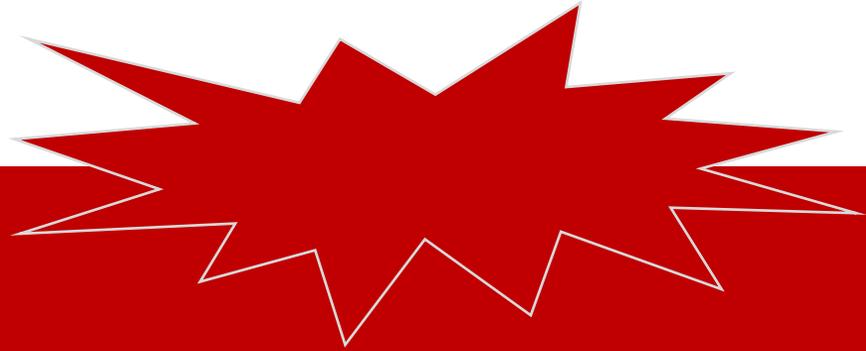
Short circuit and reverse polarity protection

Who can spot what is wrong with this picture ?

Please make sure all the fuses are closed between the BYD battery and the inverters and accessories before the batteries turn on.

When BYD batteries turn on, they test the DC bus for short circuits and reverse polarity protection. If there are any reverse polarity connections or shorts, the batteries will not change from a “precharge” state, to an “on state” and give an error. Once the wiring issues are corrected, the battery will turn on, and there is a very low change of any damage on the inverters / wires





FD-LV.5.0 IS Coming

FD-LV5.0

2023



FD-LV5.0

Compact

Affordable

Scalable



5kWh



4x5kWh



32x5kWh

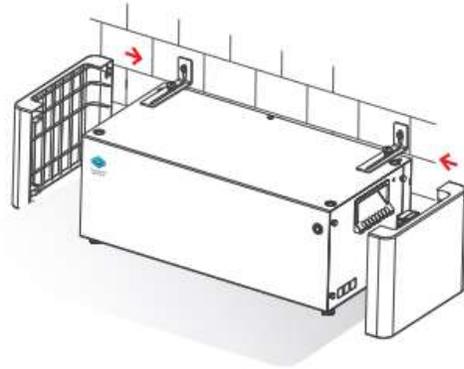
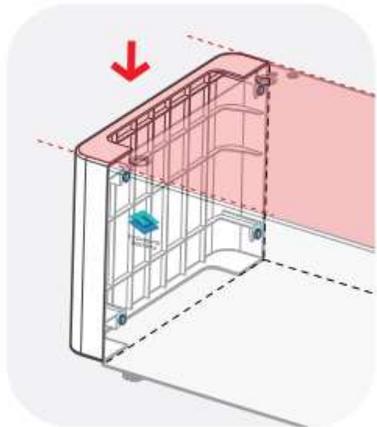
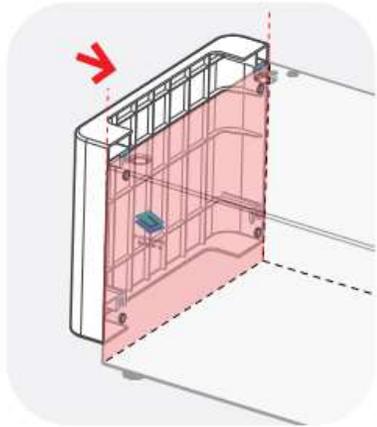
FD-LV5.0



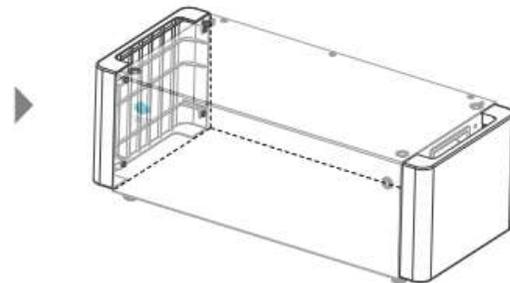
Technical Data

Usable Energy [1]	5kWh
Max. Charge and Discharge Current [2]	70A
Peak Charge and Discharge Current	200A, 10s
Dimension (H/W/D)	195mm x 595mm x 255mm
Weight	42±2kg
Nominal Voltage	51.2V
Operating Voltage	40 ~ 57.6V
Charge Cut-Off Voltage	57.6V
Discharge Cut-Off Voltage	40V
Scalability	Max. 32 in Parallel (160kWh)
Installation Mode	Floor installation
Communication	CAN / RS485
Round-trip Efficiency	≥95%
Applications	On Grid / On Grid + Backup / Off Grid
Operating Temperature	Charge 0~50°C & Discharge -20~50°C
Protection Class	IP20
Storage Humidity	5%~95%
Altitude	< 4000m
Certification	CE / IEC62619 / UN38.3
Compatible Inverter	Solis/ Deye / Victron/ Megarevo

FD-LV5.0



Battery Module



Tower(1~4 modules)



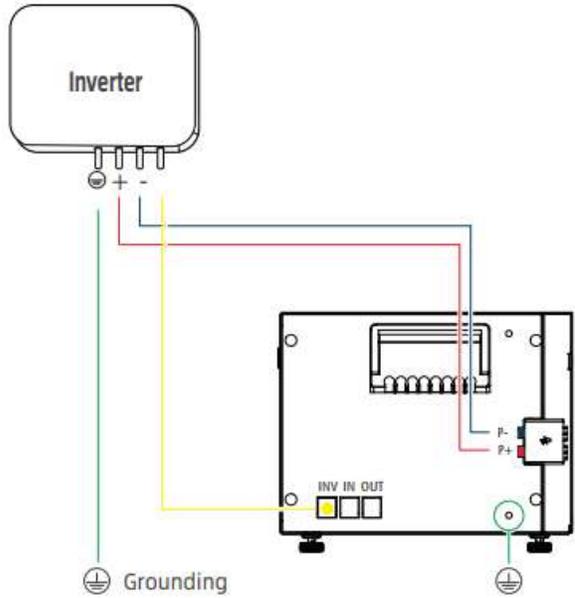
Floor Installation



Space-Saving

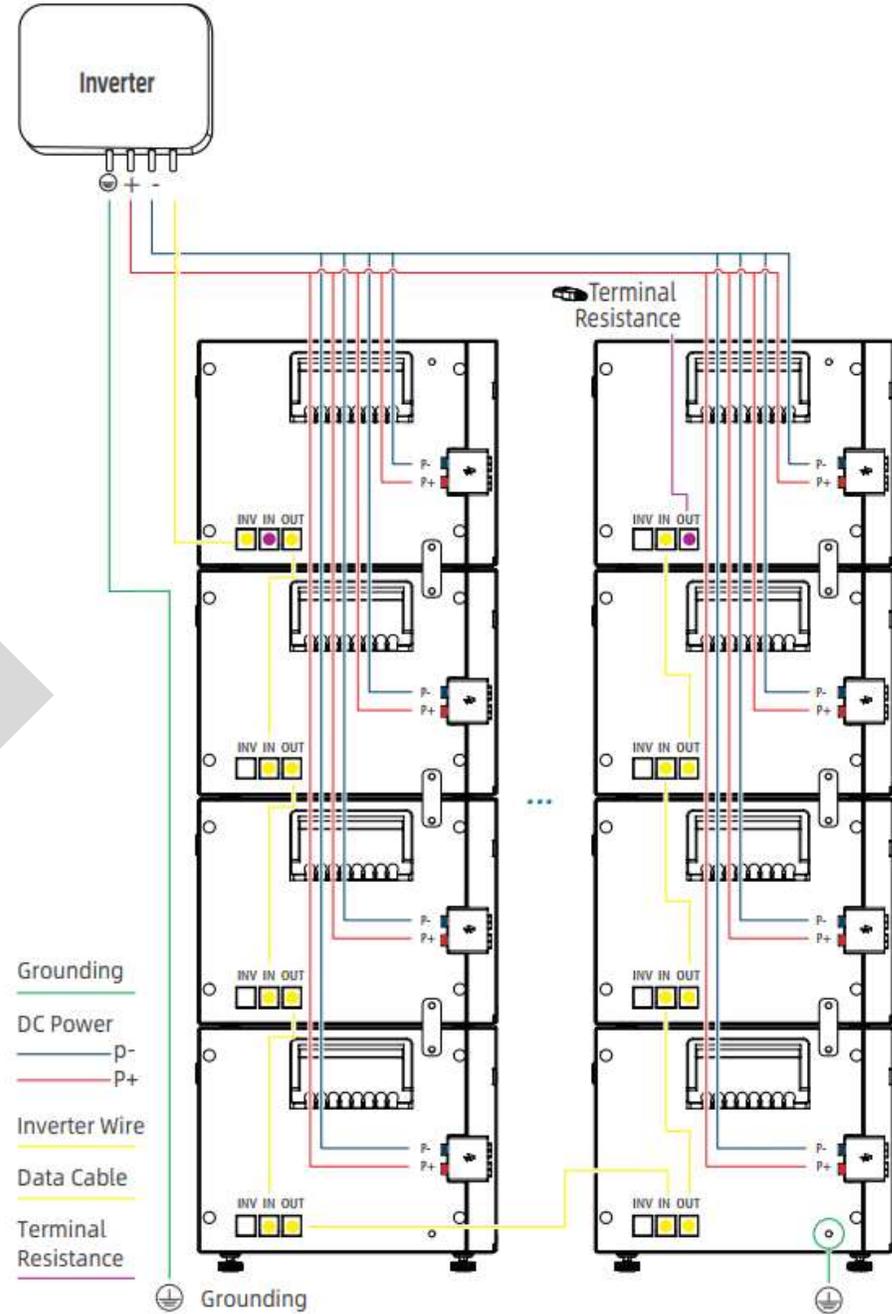
FD-LV5.0

Connection

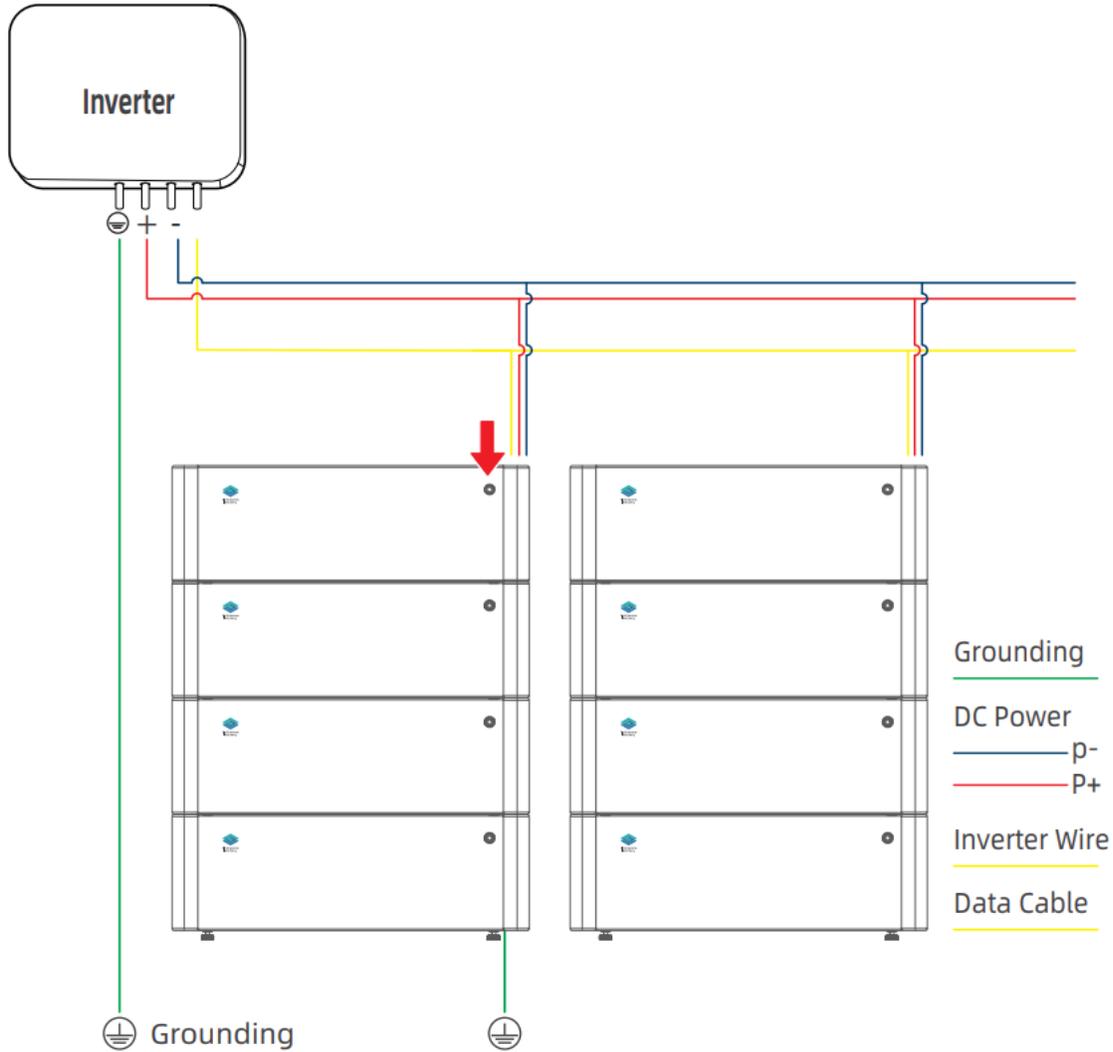


Extension

- Grounding
- DC Power
 - P-
 - P+
- Inverter Wire
- Data Cable
- Terminal Resistance

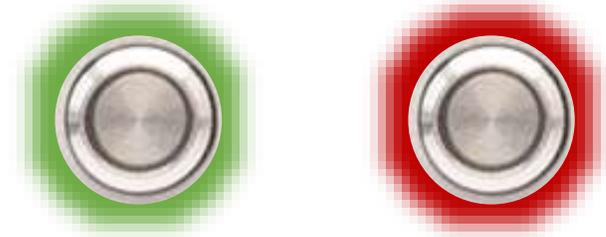


FD-LV5.0



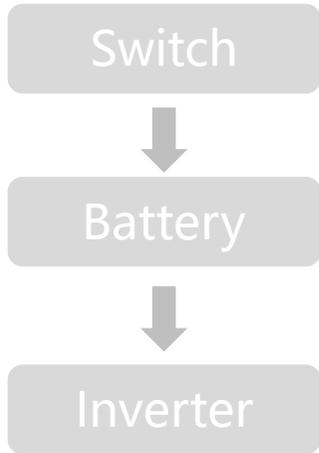
Configuration Automatically

LED Signal Code

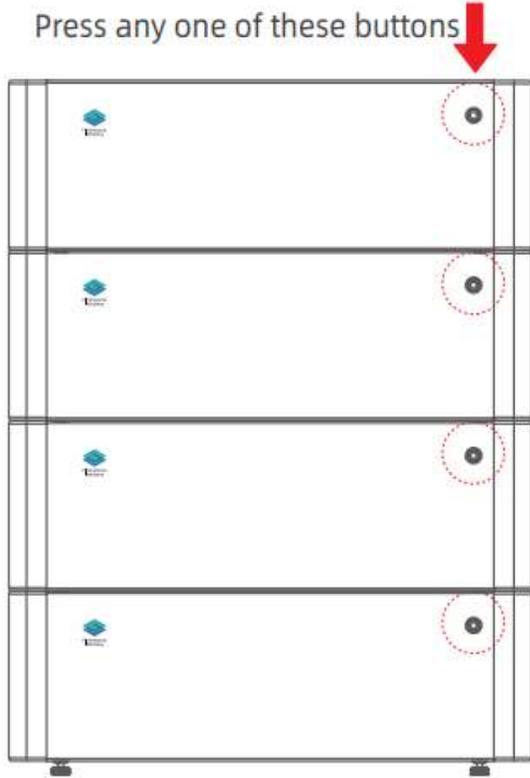


FD-LV5.0

Switch On



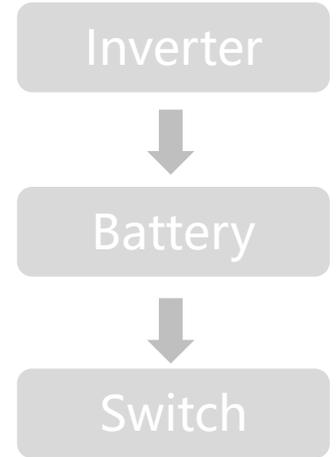
Tower(1~4 Modules)
Press any one of these buttons



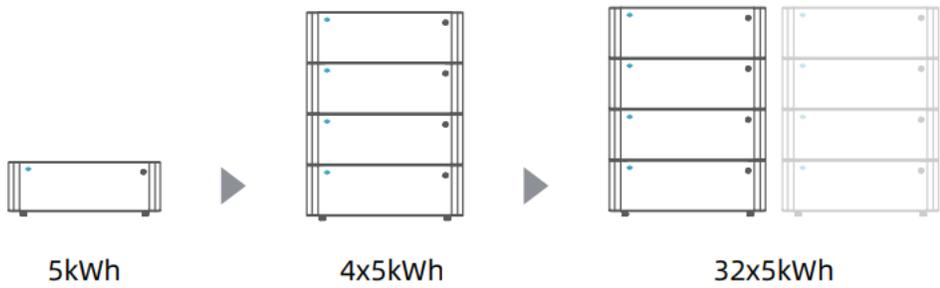
Multiple Towers(2~8 Towers)



Switch Off



FD-LV 5.0

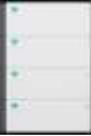


More FD Series will be available soon

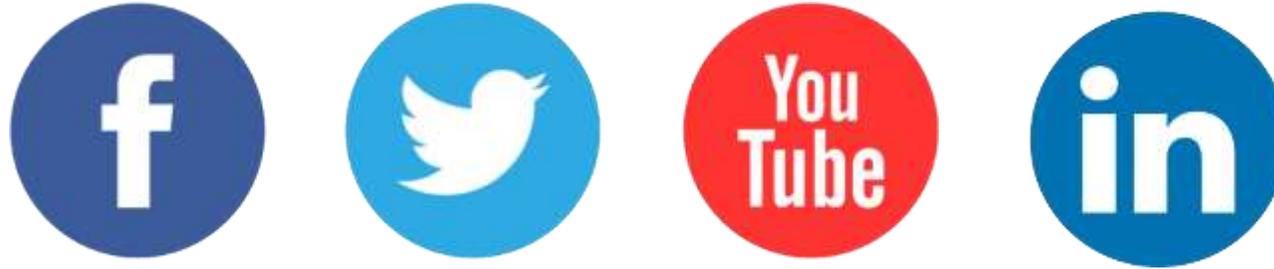


More inverters are under test

BYD+FD SERIES

BYD	<p>HVS (204-512V)</p>  <p>HVS 5.1 7.7 10.2 HVS 12.8</p> <p>▶ 3 x HVS 12.8 = 38.4kWh</p>	<p>IP55 Outdoors</p>  <p>+50°C -10°C</p> 
	<p>HVM (153-409V)</p>  <p>HVM 8.3 11.0 13.8 16.6 19.3 HVM 22.1</p> <p>▶ 3 x HVM 22.1 = 66.2kWh</p>	
	<p>LVS (51.2V)</p>  <p>LVS 4.0 8.0 12.0 16.0 20.0 LVS 24.0</p> <p>▶ 16 x LVS 16.0 = 256kWh</p>	
	<p>LVL (51.2V)</p>  <p>LVL 15.4</p> <p>▶ 64 x LVL 15.4 = 983 kWh</p>	
	<p>LV Flex Lite (51.2V)</p>  <p>LV Flex Lite 5.0</p> <p>▶ 64 x LV Flex Lite 5.0 = 320 kWh</p>	
FD	<p>FD-LV5 (51.2V)</p>  <p>FD-LV 5.0 10.0 15.0 FD-LV 20.0</p> <p>▶ 8x FD-LV 20.0 = 160 kWh</p>	<p>IP20 Indoors</p>  <p>-10°C-50°C -20°C-50°C</p>

Social Media



<https://www.linkedin.com/company/byd-battery-box>

https://twitter.com/BYD_BatteryBox

<https://www.facebook.com/BatteryBoxBYD>

Installation Video: <https://www.youtube.com/watch?v=sLJKRbH3f90>

<https://www.facebook.com/afriplusenergy>



Manuals and resources

Manuals and resources

Please see <https://bydbatterybox.com/downloads>

HVS&HVM	LVS	LVS Lite	LV Flex	LV Flex Lite
TECHNICAL INFORMATION				
SERVICE GUIDELINE				
OPERATING MANUAL				
DATASHEET	DATASHEET	DATASHEET	DATASHEET	DATASHEET
LIMITED WARRANTY				
QUICK START GUIDE	QUICK START GUIDE	CERTIFICATE	QUICK START GUIDE	QUICK START GUIDE
CERTIFICATE	CERTIFICATE		CERTIFICATE	

Manuals and resources

Please see <https://bydbatterybox.com/downloads>

LVL	HVL	Commercial	LV BMU	General Product Files
TECHNICAL INFORMATION	TECHNICAL INFORMATION	TECHNICAL INFORMATION	INSTRUCTION MANUAL	APP USE INSTRUCTION
SERVICE GUIDELINE	SERVICE GUIDELINE	DATASHEET		CALCULATOR
OPERATING MANUAL	OPERATING MANUAL	LIMITED WARRANTY		BE CONNECT PLUS
DATASHEET	DATASHEET	CERTIFICATE		Be Connect Plus V2.0.9
LIMITED WARRANTY	LIMITED WARRANTY			COMBINER BOX
QUICK START GUIDE	QUICK START GUIDE			
CERTIFICATE	CERTIFICATE			



Minimum battery bank sizing

Minimum battery bank sizing

The purpose of minimum battery sizing is to ensure that the battery bank does not enter an “overcurrent” state. There are 2 main causes of battery overcurrent

Cause 1, large electrical loads on the output of the inverters

- High constant loads
- Electrical motors with high inrush currents (e.g water pumps especially with no VSDs)
- Capacitive loads with high inrush currents
- Can be managed

Cause 2, high quantities of power flowing from the inverter to the grid at the moment of grid failure / Load shedding

- Generally dependent on the size of the inverter, and the stiffness of the grid
- Occurs in the window between the grid failing and the inverter disconnecting from the grid.
- Difficult to manage

Minimum battery bank sizing

BATTERY-BOX LV FLEX LITE MINIMUM CONFIGURATION LIST – V1.4

Compatible Inverter (1- / 3-phase)		Minimum Configuration for Single Phase			Minimum Configuration for Three Phase		
		On Grid	On Grid with Full Backup Power	Off Grid Inrush Use	On Grid	On Grid with Full Backup Power	Off Grid Inrush Use
GoodWe	GW3648D-ES	≥2	≥3	≥3	—	—	—
	GW5048D-ES	≥2	≥2	≥2	—	—	—
	GW3048-EM	≥1	≥1	≥1	—	—	—
	GW3648-EM	≥1	≥1	≥1	—	—	—
	GW5048-EM	≥1	≥1	≥1	—	—	—
	GW3600S-BP	≥2	≥2	≥2	—	—	—
	GW5000S-BP	≥2	≥2	≥2	—	—	—
Battery firmware: BMU ≥ V1.22, BMS ≥ V1.13; Inverter firmware ≥ V11.							

Minimum battery bank sizing

BATTERY-BOX LV FLEX LITE MINIMUM CONFIGURATION LIST – V1.1

Compatible Inverter (1- / 3-phase)		Minimum Configuration for Single Phase			Minimum Configuration for Three Phase		
		On Grid	On Grid with Full Backup Power	Off Grid Inrush Use	On Grid	On Grid with Full Backup Power	Off Grid Inrush Use
SMA	SI 4.4M	≥1	≥2	≥2	≥4	≥6	≥6
	SI 6.0H	≥2	≥3	≥3	≥5	≥9	≥9
	SI 8.0H	≥2	≥4	≥4	≥6	≥12	≥12
	Battery firmware: BMU ≥ V1.22, BMS ≥ V1.13; Inverter firmware ≥ V1.3.1.R.						
Victron	MultiPlus 48/500/6	≥1	≥1	≥1	≥1	≥1	≥1
	MultiPlus 48/800/9	≥1	≥1	≥1	≥1	≥1	≥1
	MultiPlus 48/1200/13	≥1	≥1	≥1	≥1	≥2	≥2
	MultiPlus 48/1600/20	≥1	≥1	≥1	≥1	≥2	≥2
	MultiPlus 48/2000/25	≥1	≥1	≥1	≥1	≥3	≥3
	MultiPlus 48/2000/25-50 120V	≥1	≥1	≥1	≥1	≥3	≥3
	Multiplus 48/3000/35	≥1	≥2	≥2	≥1	≥4	≥4
	Multiplus 48/5000/70	≥1	≥3	≥3	≥2	≥6	≥6
	Multiplus II (GX) 48/3000/35-32	≥1	≥2	≥2	≥1	≥4	≥4
	Multiplus II (GX) 48/5000/70-50	≥1	≥2	≥2	≥2	≥6	≥6
	Multiplus II 120V 48/3000/35-50	≥1	≥2	≥2	≥1	≥4	≥4
	Multiplus II 48/8000/110-100	≥1	≥4	≥4	≥3	≥10	≥10
	Multiplus II 48/10000/140-100	≥1	≥4	≥4	≥3	≥12	≥12
	Quattro 48/3000/35-50/50 120V	≥1	≥2	≥2	≥1	≥4	≥4
	Quattro 48/5000/75-100/100 120V	≥1	≥3	≥3	≥2	≥6	≥6
	Quattro 48/10000/140- 100/100 120V	≥1	≥5	≥5	≥3	≥13	≥13
	Quattro 48/5000/70-100/100	≥1	≥3	≥3	≥2	≥7	≥7
	Quattro 48/8000/110-100/100	≥1	≥4	≥4	≥2	≥10	≥10
	Quattro 48/10000/140- 100/100	≥1	≥5	≥5	≥3	≥13	≥13
	Quattro 48/15000/200- 100/100	≥2	≥6	≥6	≥4	≥16	≥16

Minimum battery bank sizing

Battery Modules Required - Premium LV Flex 5.0

Phases	Single Phase	Three Phase	Single Phase	Three Phase
Inverter/Charger	On-Grid	On-Grid	Off-grid	Off-grid
Multiplus 48/500 & 48/800	1	1	1	1
Multiplus 48/1200 & 48/1600	1	2	1	2
Multiplus 48/2000	1	2	1	3
Multiplus & Multiplus II & MP-II GX 48/3000/35	1	3	2	4
Multiplus & Multiplus II & MP-II GX 48/5000/70	2	5	3	6
Inverter RS & Multi RS 48/6000	2	-	3	-
Quattro 48/5000/70-100/100	2	5	3	6
Quattro 48/8000/110-100/100	3	8	4	10
Quattro 48/10000/140- 100/100	4	10	5	13
Quattro 48/15000/200- 100/100	5	14	6	16
EasySolar & EasySolar-II 48/3000/35-50 MPPT150/70	1	3	2	4
EasySolar 48/5000/70-100 MPPT150/100	2	5	2	6



BYD installation

Installation tips

Clothing

- It is advisable to wear antistatic shoes and non static clothes
- It is advisable to wear non slip shoes, Ideally Safety Boots
- It is advised not to wear any metal objects / watches / bracelets / necklaces / Zips / Rings
- Always wear the appropriate PPE

General

- Please refer to the quick install guide, or the user manual for instructions on how to install your battery
- Always have a clear working area, you don't want to trip while carrying a battery
- Always make sure the Battery Bank is off / dead when installing
- Please keep the Cardboard box the battery was delivered in until the system is running
- When crimping lugs / ferrules to wires, always pull on the lug to ensure there is a good connection, also check that there is no insulation interfering with the connection

Installation tips

General

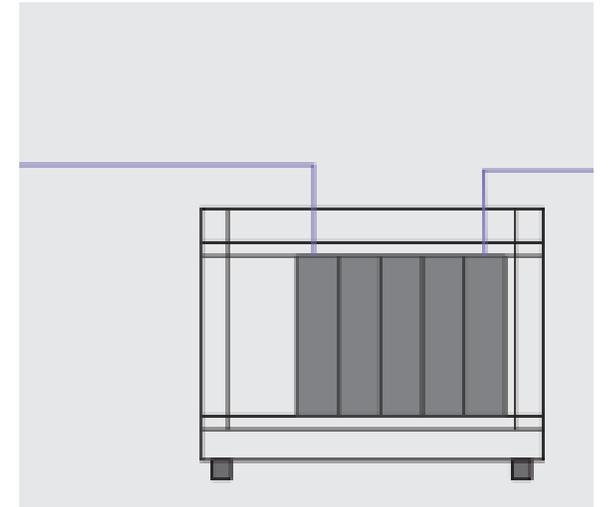
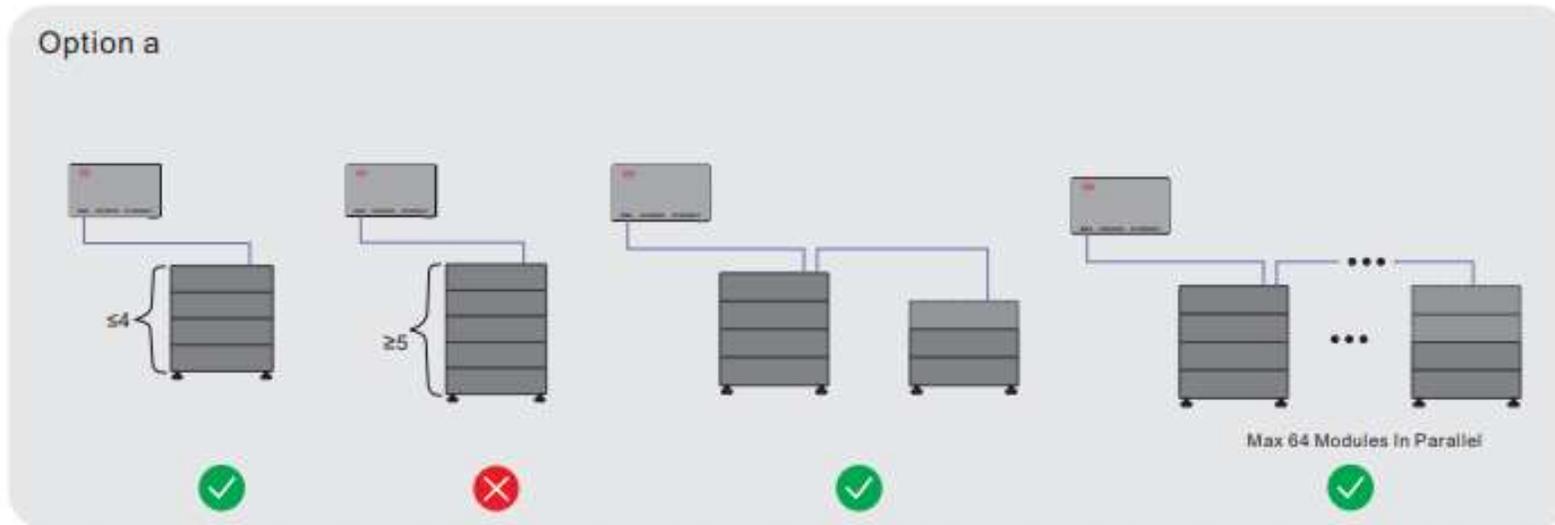
- **Upon opening the battery, please ensure the battery is in good condition (physically), please look for mechanical and water damage. If there is any, please take lots of photos of the battery and the box and note the serial number and report the issue with your supplier**
- **Upon Opening the battery, please ensure all the parts that are required are present**
- **Always lift the batteries in a safe manner (especially the LVL)**
- **DO NOT short circuit the battery bank. Lithium batteries have a very low internal resistance and can deliver >10kA or even >100KA, depending on the system**
- **Please use an official “Victron type A CANBUS” cable for Victron systems**
- **Every BYD LVL, LVS and Flex lite battery bank needs 1 x BMU**
- **Please ensure the Battery and BMU have a good Earth Connection**
- **It is recommended to connect the BYD battery (BMU or BCU) to the internet**

Installation tips Flex Lite

Freestanding Flex Lite

The max tower height is 4 Flex Lite, the number of batteries in a tower do not have to match other towers.

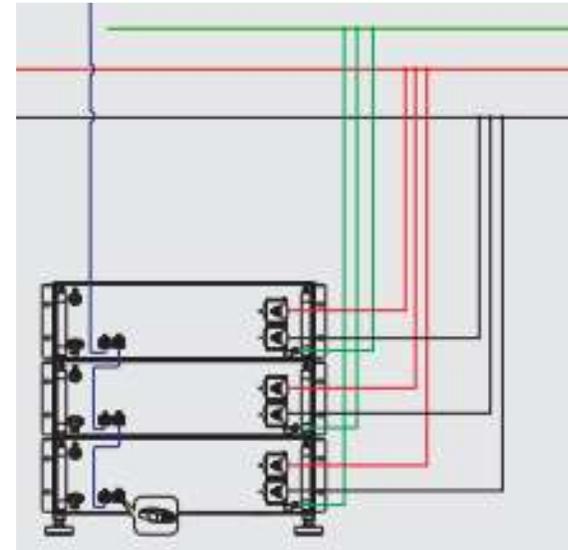
The battery can be installed Vertically



Installation tips Flex Lite

Battery Connections

- For most battery banks, busbars are recommended
- The wires between the Flex Lite and the busbar can be between 16 to 25mmsqr. Please ensure the fuse between the battery bank and the inverter is closed before turning on the battery bank
- Lack of a good earth connection can interfere with the comms between the BMU and the batteries
- Daisy Chaining the power connections (e.g pylontech) is **NOT ADVISED** (due to the high currents that the batteries can provide)



Installation tips - Cabinets vs Freestanding



***A Freestanding tower of Flex Lite requires on set of feet**

Installation tips – Cabinet Specs

BYD Flex lite cabinet Specs

- H 800
- W 600
- D 600
- Weight 35kg
- Capacity 4 Flex lite modules
- All wires between the internal Busbar and the Flex lite modules are prewired





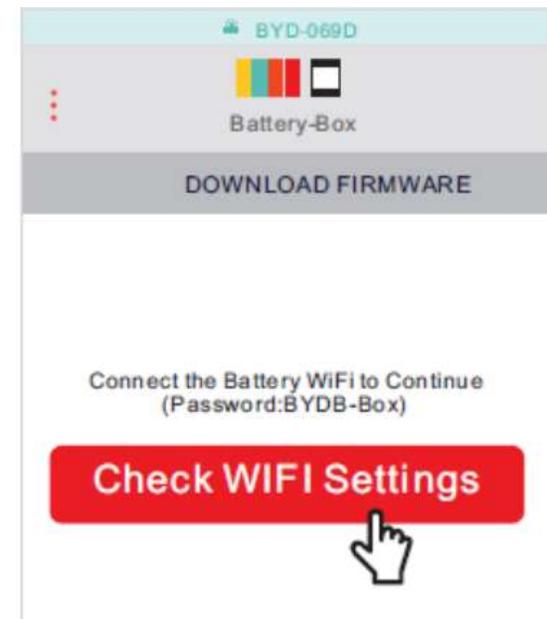
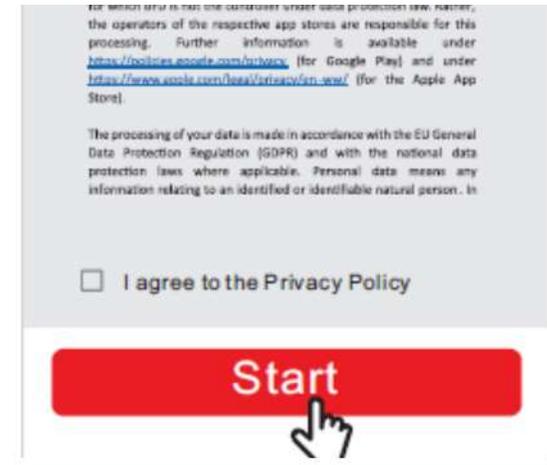
Commissioning - BYD

■ Commissioning – BYD turn on procedure

- **Please ensure all the fuses between the battery and inverter are closed before turning on the battery (please DO NOT close fuses between the battery and the inverter after the battery has been turned on)**
- **Please ensure the AC supply to the inverter is off, the Inverter is off, and the Solar is off before turning on the battery bank. The battery will not turn on if there is voltage on the DC bus**
- **To turn on the battery bank, press the button on the 1st battery (battery connected to the BMU) for 5 seconds**
- **To turn off the battery bank, press the button on the BMU for 5 seconds**
- **The BYD battery bank will not give voltage out until it is configured correctly**
- **Please ensure the BMU and batteries have a good earth connection**
- **If the BYD battery wifi is off, please hold the BMU button for 2-2.5 seconds (not longer or the batteries will turn off) and wait 15-30 seconds**

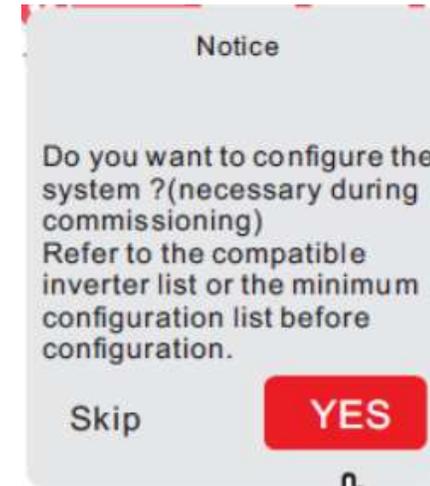
Commissioning – BYD (Android or Apple)

1. Download “Be Connect” from Google Play or App Store. The battery system generally works best with the latest version firmware to operate. So please make sure you either have downloaded the latest firmware in your device (cell phone, Ipad, etc.), or your device could access the Internet during configuration
2. Tick the box in front of “I agree to the Privacy Policy”, and then press the “Start” button.
3. The app will check the firmware and download if needed if Internet is available. If there is no Internet available, you can press “Skip” to skip the firmware check. It is highly recommended to download the latest firmware
4. After the firmware downloaded, press the button “Check WIFI Settings” to connect the battery WIFI, which begins with “BYD-”, and the full name could be found at the BMU labels. The password is “BYDB-Box”

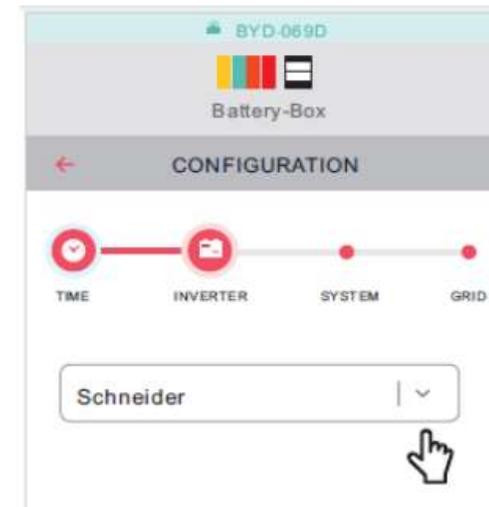


Commissioning – BYD (Android or Apple)

5. Choose “Yes” to configure the battery system.
And then press the “Next”



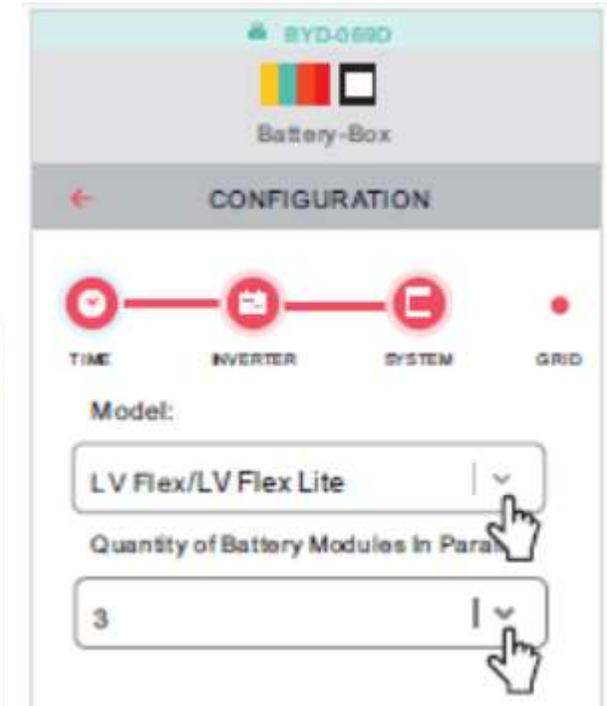
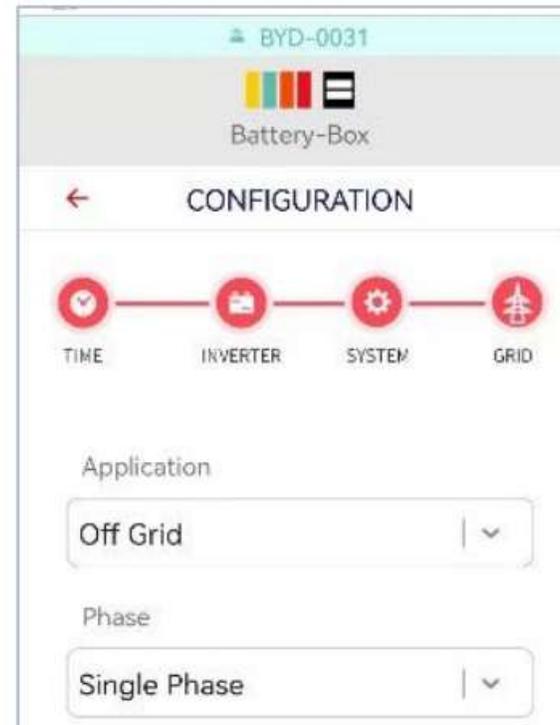
6. Choose the inverter brand that the battery system is operated together



Commissioning – BYD (Android or Apple)

7. Choose the model of BYD battery and then choose the number of battery modules installed (This step is critical for a functioning battery bank) (please refer to installation manual for HVS / HVM)
When expanding HVS / HVM battery banks please make sure the existing modules are the same voltage as the new modules. If this is not an option, please make sure the existing HVS / HVM battery bank is at 30% SOC

8. Choose the Application and Phase options according to the actual application



Commissioning – BYD (Android or Apple)

9. Check the summary of the configuration information, tick the sentence, and press the button “Next”

Please remove and charge voltage limits on the inverter system to ensure the batteries can balance properly (On Victron systems, setting the Charge Voltage limit in DVCC on the GX will help with Victron “high Voltage warnings” but it interferes with the cell balancing

Please note that the SOC of the battery may not be accurate before a full charge or discharge after the configuration. If expanding a battery bank, or installing a new bank, please charge the bank to 100% for 2hrs after installation

Please keep the Battery on for 15 - 20 minutes while the firmware updates. The Batteries may require to be turned off and back on after commissioning and updating firmware



The screenshot shows a mobile application interface for BYD configuration. At the top, it displays 'BYD-069D' and 'LV Flex P020T020Z2010120785'. Below this is a 'CONFIGURATION' section with the following details:

Time:	Jul-16, 2021 13:23
Inverter:	Schneider
Model:	LV Flex
Quantity of Battery Modules In Parallel:	3
Application:	On Grid
Phase:	Single Phase

At the bottom, there is a red checkmark icon followed by the text: 'Configuration was done according to BYD Battery-Box Configuration/ Compatible Inverter List and Operating Manual.' Below this is a large red button labeled 'Next' with a hand cursor icon pointing to it.

Commissioning – BYD (Android or Apple)

10. Summery page

After the commissioning pages, there will be a summery page. You will be able to see the battery bank SOC, battery bank output voltage, min and max cell voltage for the battery bank, min and max cell temp for the battery bank

You can also see, for each battery module, the battery module voltage, the min and max battery module cell voltage, and the min and max battery module cell temperature

At the top of the page, you can also see any errors the battery bank currently has

STATUS		
BMU		
SOC	Battery Voltage	Output Voltage
100 %	56.6 V	56.6 V
Current	Max Cell Voltage	Min Cell Voltage
0.0 A	3.56 V	3.51 V
Max Cell Temp	Min Cell Temp	
20 °C	20 °C	
BMS 1		
Battery Voltage	Output Voltage	Current
56.6 V	56.6 V	0.0 A
Max Cell Voltage	Module* With Max Cell Volt	Min Cell Voltage
3.56 V	2	3.51 V
Module* With Min Cell Volt	Max Cell Temp	Module* With Max Cell Temp
1	20 °C	1
Min Cell Temp	Module* With Min Cell Temp	* : Starting From Bottom
20 °C	1	



Troubleshooting

Contact Details

Afriplus Energy are the official service partners for BYD in the Southern Africa Region



Whatsapp and Cellphone –

Ivan +27 71 671 2950 (tech support)

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Khan +27 83 375 5486

Email

ivan@afriplusenergy.co.za (tech support)

Email

support@afriplusenergy.co.za (tech support)

Email

khan@afriplusenergy.co.za

Troubleshooting – Check list

Please note, these are abbreviated steps, for the full guide please see the service guideline

- Safely turn inverter AC input off, inverter off, solar off, and BYD batteries off
- check all the earth connections from the battery, (please use the earth connection points on the battery) from the batteries to the main earth for loose / bad connections
- check BMU and batteries are connected to the same earth with a multimeter, check battery earth connects to main earth with multimeter
- check the comms cables are secure, wiggle comms cables gently at the comm ports to check if the comms port is damaged (Flex lite only)
- check all power cables are secure and crimped properly, and connect to the correct connections
- check all fuses between the battery and the inverters are closed BEFORE turning on the batteries, please DO NOT close fuses between the battery and the inverter after the battery has been turned on

Troubleshooting – Check list

Please note, these are abbreviated steps, for the full guide please see the service guideline

- check comms cable between the BMU and the inverter system is correct
- ensure the BMU has the latest firmware
- wait 20 minutes after commissioning to allow the firmware to load onto the BMU and batteries
- turn BYD batteries off (hold button on the BMU for 5 seconds) then wait 10 seconds and turn BYD batteries on (hold button on the battery with comms connection to BMU for 5 seconds)
- wait 5 minutes
- ensure the inverter is configured correctly
- on a Victron system, under DVCC, disable the manual "Charge Voltage Limit"

Troubleshooting – steps to test one battery in isolation

Please note, these are abbreviated steps, for the full guide please see the service guideline

- 1. Turn on 1 x battery that is disconnected from all other connection (power, comms, earth, termination resistor)**
 - 1.1 Does the battery turn on (sigh of life), if no contact service**
- 2. Turn on a battery + BMU that is disconnected from all other connectors and recommission BMU**
 - 2.1 Does the BMU light come on, if no, change cable between BMU and Battery**
 - 2.2 Does the BMU light come on, if no, check ports (BMS on BMU, IN on battery)**
 - 2.3 Does the BMU light come on, if no, replace BMU**
 - 2.4 Does the BMU light come on, if no, change battery, if still no, contact service**
- 3. Upload firmware to the BMU, recommission BMU for 1 x battery. Leave for 30 min, restart battery bank**
 - 3.1 Does Battery firmware version show on app, if no, change cable between BMU and Battery**
 - 3.2 If no Battery firmware shows contact service**

Troubleshooting – Battery error codes

4. **Error Codes on the battery.** The battery will flash blue if there is an issue, the number of blue flashes will be the error code. the error code 1X where X is the number of blue flashes, one blue flash is 101. The BMU and the Battery have their own error codes

LED light on battery

Blue LED is flashing once	DC cable connection incorrect
Blue LED is flashing two times	MOS faulty
Blue LED is flashing three times	BIC (battery information collector) communication failed
Blue LED is flashing four times	Battery sensor faulty
Blue LED is flashing five times	Volt sensor faulty
Blue LED is flashing six times	Current sensor faulty
Blue LED is flashing seven times	Battery faulty
Blue LED is flashing eight times	Precharge failed
Blue LED is flashing nine times	BIC balance failed
Blue LED is flashing ten times	Temperature sensor on battery control unit faulty
Blue LED is flashing eleven times	BMS and BMU communication failure

Troubleshooting – Battery error codes

1 x Blue Flash (EC 101) **Short circuit / DC reverse connection.**

8 x Blue Flash (EC 108) **Precharge failure**

isolate the batteries from the battery bank, check for shorts on DC bus. if the problem persists, take on one battery and completely isolate it (DC cables, earth, comms) connect the BMU and recommission. if a battery gives this error code when completely isolated from all DC cables, as a single battery, please contact support

2 x Blue Flash (EC 102) **MOS Faulty**

3 x Blue Flash (EC 103) **BIC module Faulty**

4 x Blue Flash (EC 104) **Battery sensor Faulty**

5 x Blue Flash (EC 105) **Volt Sensor Faulty**

6 x Blue Flash (EC 106) **Current Sensor Faulty**

7 x Blue Flash (EC 107) **Battery Faulty**

9 x Blue Flash (EC 109) **BIC balance fail**

10 x Blue Flash (EC 110) **Temperature sensor on battery control unit faulty**

if a battery gives these error codes (2-7 blue flashes, 9-10 Blue flashes) when completely isolated from all DC / comms / earth cables (connect the BMU). Please replace the cable between the BMU and the Battery, and replace the BMU as a single battery, please contact support

11 x Blue Flash (EC 111) **BMS and BMU communication failure**

test battery in isolation, get logs with BCP. if a battery gives these error codes after replacing the cable between the BMU and the Battery, and replacing the BMU, as a single battery, please contact support

Troubleshooting – BMU error codes

5. **Error Codes on the BMU.** The BMU will flash blue if there is an issue, the number of blue flashes will be the error code. the error code 1X where X is the number of blue flashes, one blue flash is 101. The BMU and the Battery have their own error codes

LED light on BMU

Blue LED is flashing one time.	System initiating failed
Blue LED is flashing two times.	Address distribution failed
Blue LED is flashing three times.	Precharge failed
Blue LED is flashing for four times.	BMS failure
Blue LED is flashing five times.	BMS and BMU communication failed
Blue LED is flashing six times.	Communication with an inverter failed
Blue LED is flashing seven times.	Configuration not correct

Troubleshooting – BMU error codes

1 x Blue Flash

System initialization failed.

isolate the batteries from the battery bank, check for shorts on DC bus. if the problem persists, take on one battery and completely isolate it (DC cables, earth, comms) connect the BMU and recommission. if a battery gives this error code when completely isolated from all DC cables, as a single battery, please download logs with BCP, please contact support

2 x Blue Flash

Address distribution failed

most probably the incorrect number of modules were selected when commissioning the BMU, or there is a communications error between the batteries, or some batteries are not communicating with the BMU

3 x Blue Flash

Precharge failed (see battery error 8 blue flashes EC 108)

4 x Blue Flash

BMS failure (See battery error codes EC 102 – EC 113)

test battery in isolation, get logs with BCP, contact service if no improvement

5 x Blue Flash

BMS and BMU communication failed

test battery in isolation, get logs with BCP. if a battery gives these error codes after replacing the cable between the BMU and the Battery, and replacing the BMU, as a single battery, please contact support

6 x Blue Flash

Communication with an inverter failed

check cable between BMU and inverter / GX device is connected with the correct side connected on the battery and the inverter / GX. It could be a faulty cable, faulty CANBUS on the inverter / GX, or a faulty BMU

7 x Blue Flash

Configuration not correct

most probably the wrong battery type selected

Troubleshooting - Be Connect Plus

Please download Be Connect Plus at <https://bydbatterybox.com/downloads> general product files

1) Be Connect Download and Extract

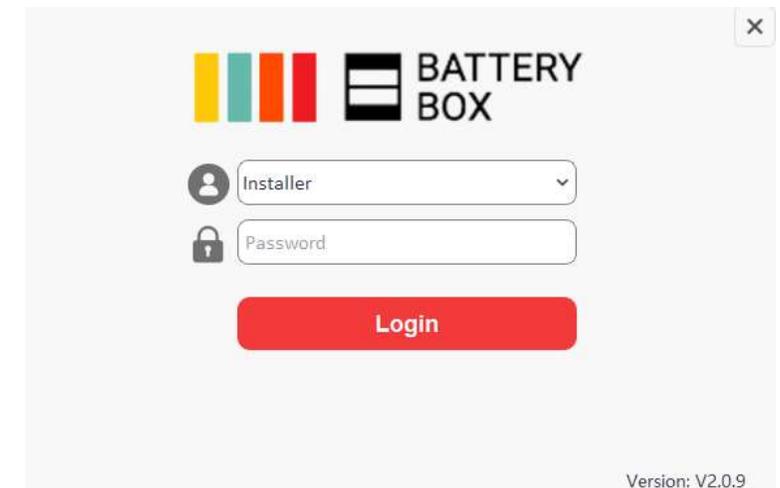
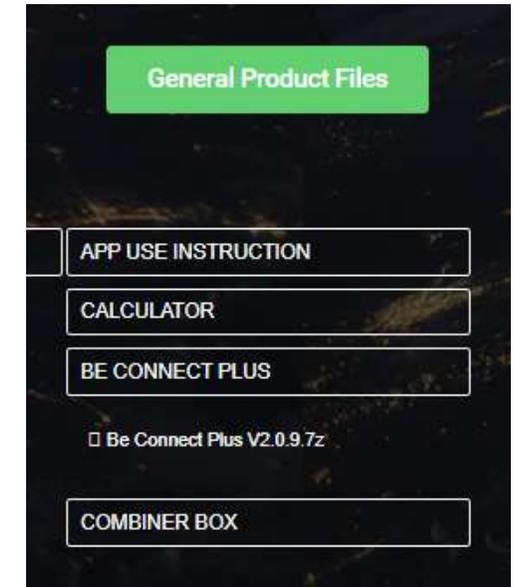
1.1) Download the “Be Connect Plus” Zip file from the server, and unzip the file

1.2) Unzip the downloaded file

1.3) run the “Be Connect Plus” executable, and log into the program,

Account : Installer

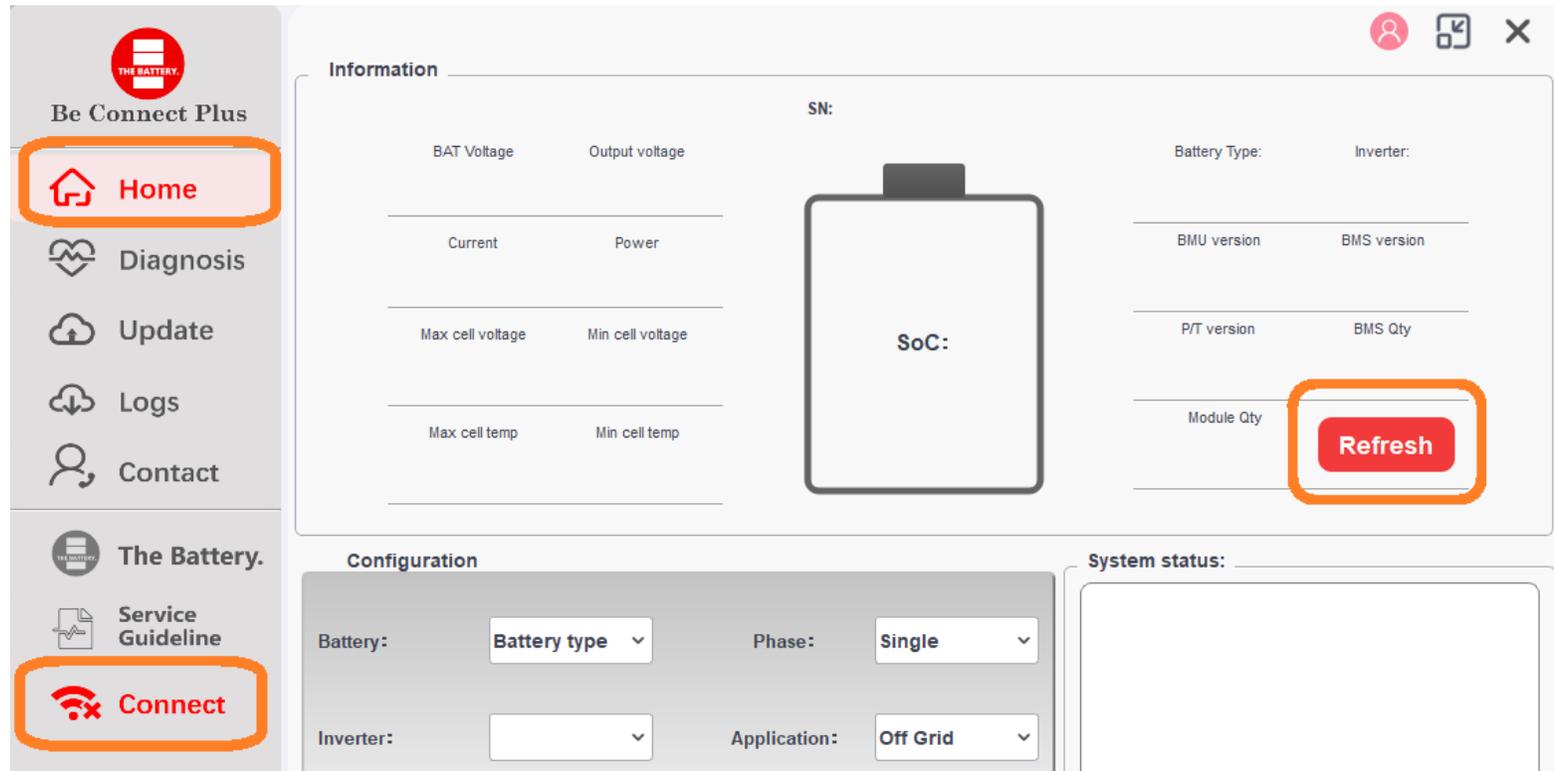
Password : BYDB-Box



Troubleshooting - Be Connect Plus

1.3) Connect your laptop to the wifi which begins with “BYD-” and the full name could be found at the BMU labels. The password is “BYDB-Box”

1.4) Connect and refresh - On the home tab, click “Connect”, then click “Refresh”



Troubleshooting - Be Connect Plus

1.5) Battery system status – the battery system status can be found in the bottom right corner. If it is abnormal, please take a screenshot and send it to your BYD service partner

The screenshot displays the Be Connect Plus interface. On the left is a sidebar with navigation options: Home, Diagnosis, Update, Logs, Contact, The Battery., Service Guideline, and Connect. The main content area is divided into three sections:

- Information:** A central panel with a battery icon labeled "SoC:". To its left are fields for BAT Voltage, Output voltage, Current, Power, Max cell voltage, Min cell voltage, Max cell temp, and Min cell temp. To its right are fields for Battery Type, Inverter, BMU version, BMS version, P/T version, BMS Qty, and Module Qty, along with a red "Refresh" button.
- Configuration:** A panel with dropdown menus for Battery type, Phase (set to Single), Inverter, and Application (set to Off Grid), and a text input for Qty of Parallel. A red "Setup" button is located at the bottom right of this panel.
- System status:** A large empty box in the bottom right corner, outlined in orange, which is the area of interest for troubleshooting.

At the bottom left of the interface, the version number "Version: V2.0.9" is displayed.

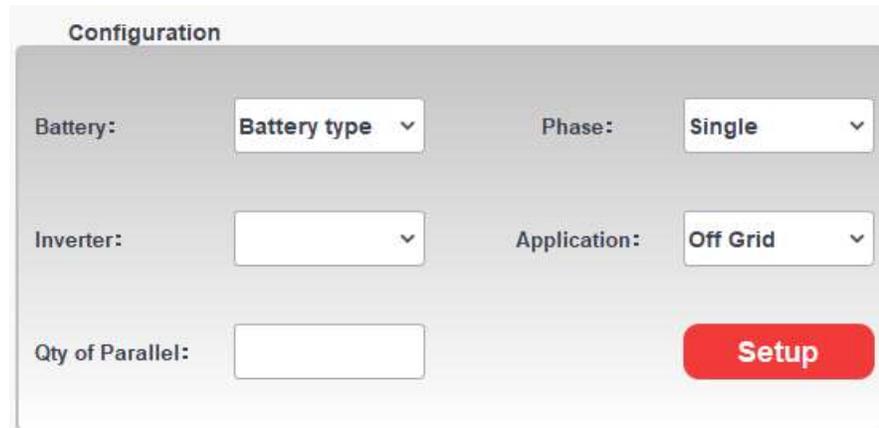
Troubleshooting - Be Connect Plus

It is possible to configure the BYD battery bank through Be Connect Plus

2) Configuration

2.1) In the section "SystemInfo" you can do the configuration (Inverter type, Phase, Module Quantity, Grid), then click on "Setup" to save it. The configuration is done.

Note: To refresh, close tool and then reopen it again. Then you can check if the settings have been saved correctly.



The screenshot shows a dialog box titled "Configuration" with the following fields and controls:

- Battery:** A dropdown menu with "Battery type" selected.
- Phase:** A dropdown menu with "Single" selected.
- Inverter:** An empty dropdown menu.
- Application:** A dropdown menu with "Off Grid" selected.
- Qty of Parallel:** An empty text input field.
- Setup:** A red button with white text.

Troubleshooting - Be Connect Plus

It is possible to update the Firmware on the BYD battery bank through Be Connect Plus (optional)

3.1) Update Tab - connect to your data wifi / connection. Click on “Download” to download the latest FW. BCP will then check if there are newer versions on the server and download it then locally on your laptop. *Note: Internet connection necessary for this step.*

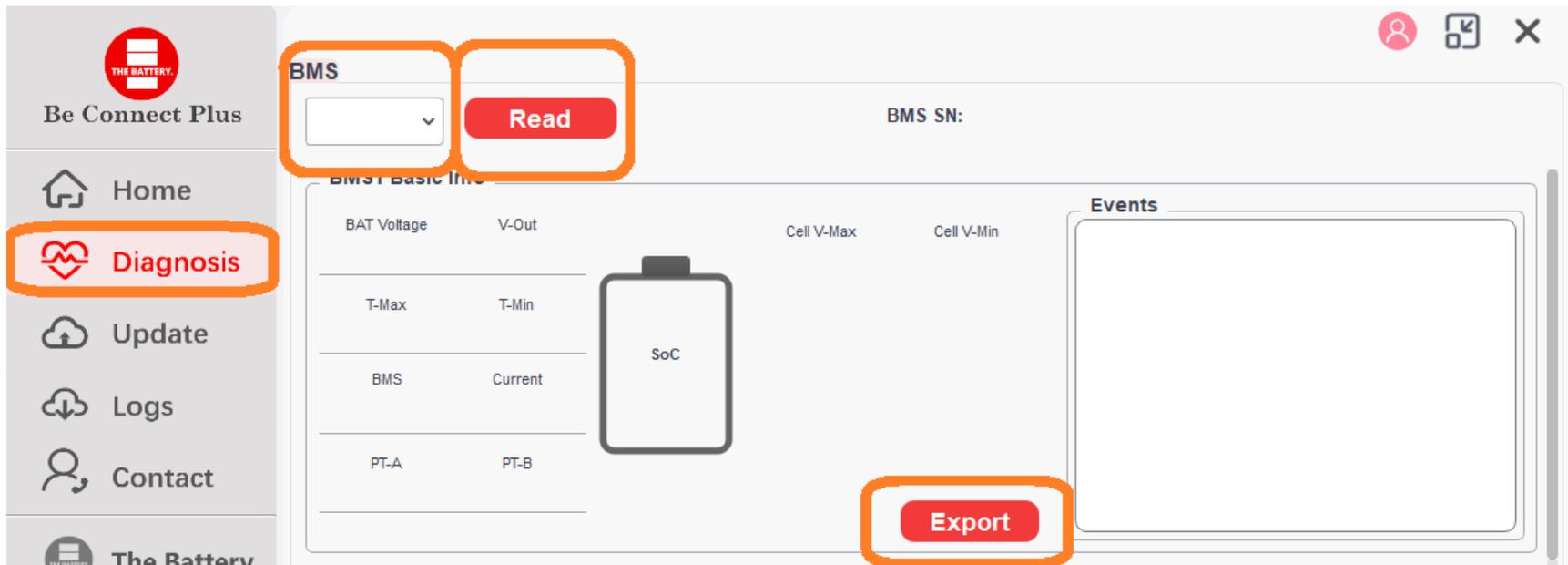
3.2) connect to your battery wifi, on the home page click connect and refresh (steps 1.3 and 1.4)- Click on “Start” to upload the firmware to the laptop to the BMU. Please wait 15-20 minutes for the BMU to send the firmware to the battery modules



Troubleshooting - Be Connect Plus

4) **Cell voltages** - connect to your battery wifi, on the home page click connect and refresh (steps 1.3 and 1.4) Generally speaking, you will only need do read the cell voltages if there is an issue. Please see the “service guideline” online at <https://bydbatterybox.com/downloads> for more info

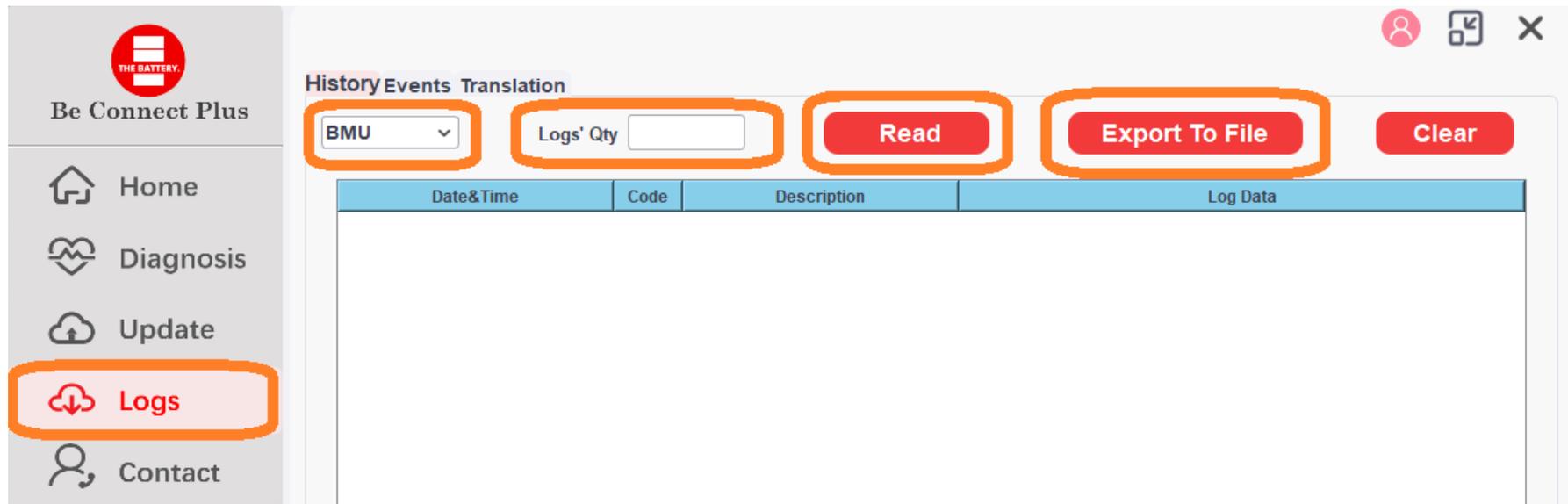
4.1) The cell voltages can be read and saved on the “Diagnosis” tab, select the battery, click “Read” then click “Export”



Troubleshooting - Be Connect Plus

5) **Logs**- connect to your battery wifi, on the home page click connect and refresh (steps 1.3 and 5.1) Generally speaking, you will only need do read the logs if there is an issue. Please see the “service guideline” online at <https://bydbatterybox.com/downloads> for more info

5.2) The logs can be read and saved on the “Logs” tab, select the battery, select “BMU” for the BMU logs and “BMS-X” for the logs of battery number X, battery number 1 is connected to the BMU, select the desired number of logs (500 – 1000 is generally a good quantity), click “Read” then click “Export” to save the log file. Please repeat for each BMU and Battery



The screenshot shows the Be Connect Plus web interface. On the left sidebar, the 'Logs' menu item is highlighted with an orange box. The main content area is titled 'History Events Translation' and features a control panel with the following elements highlighted in orange:

- A dropdown menu set to 'BMU'.
- An input field labeled 'Logs' Qty'.
- A red 'Read' button.
- A red 'Export To File' button.
- A red 'Clear' button.

Below the control panel is a table with the following headers:

Date&Time	Code	Description	Log Data
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Troubleshooting - Be Connect cellphone logs

6) Getting logs off a BYD battery system with the cellphone app

It is generally better to get the logs off the BYD batteries with the windows laptop app “Be Connect Plus” however, if that is not an option, the logs can be retrieved via the cell phone app “Be Connect”

On the summery page of the Be Connect page (see Commissioning – BYD (Android or Apple) section 10) click on the 3 dots on the top left, then click on the “Upload Logs” this will upload the logs from the BMU up onto the BYD server. Please record the BMU or BCU serial number, then please send the BMU or BCU serial number to support@afriplusenergy.co.za and ivanbh@afriplusenergy.co.za with a request for the logs on the BYD battery system that is having issues



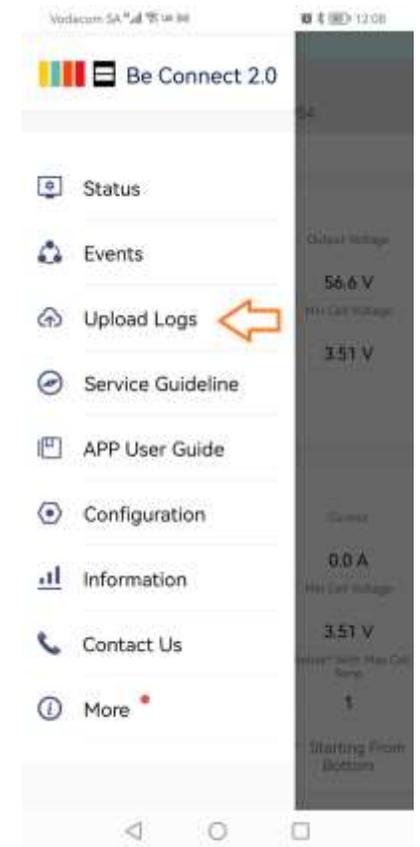
Voicemail SA *all *all *all *all 12:08

BYD-C475
LVL P011T041Z2302031954

STATUS

BMU		
SOC	Battery Voltage	Output Voltage
100 %	56.6 V	56.6 V
Current	Max Cell Voltage	Min Cell Voltage
0.0 A	3.56 V	3.51 V
Max Cell Temp	Min Cell Temp	
20 °C	20 °C	

BMS 1		
Battery Voltage	Output Voltage	Current
56.6 V	56.6 V	0.0 A
Max Cell Voltage	Module* With Max Cell Volt	Min Cell Voltage
3.56 V	2	3.51 V
Module* With Min Cell Volt	Max Cell Temp	Module* With Max Cell Temp
1	20 °C	1
Min Cell Temp	Module* With Min Cell Temp	* - Starting From Bottom
20 °C	1	



Voicemail SA *all *all *all *all 12:08

Be Connect 2.0

- Status
- Events
- Upload Logs
- Service Guideline
- APP User Guide
- Configuration
- Information
- Contact Us
- More

Output Voltage: 56.6 V
Min Cell Voltage: 3.51 V
Current: 0.0 A
Max Cell Voltage: 3.51 V
Min Cell Temp: 20 °C
Starting From Bottom: 1

■ Troubleshooting – BYD remote monitoring

7) **BYD remote monitoring** – the ability for installers to remotely download BYD logs from BYD battery banks is currently being rolled out. Training will be offered to interpret the logs so the installer can see the reason the batteries tripped / had errors, and can do their own troubleshooting. BYD remote battery monitoring and logs for the installers will be available soon



Current issues

Current issues

Sunsynk issues

- The current issue is that there is a minor firmware issue that gets pushed through to the Sunsynk, and the inverter either does not send a CANBUS signal back to the battery or it sends the signal at the wrong baud rate. The BYD battery does not receive a signal from the inverter and turns off after 15 minutes. A firmware update, factory reset and reprogram fixes the issue

Victron MPPT– BYD issues

- The current issue is that there is a delay in the Victron MPPT power control. It is a very rare issue. If you have a BYD battery that trips during the day, on a system with solar, please share the site with me on VRM (ivanbh@afriplusenergy.co.za) A BYD firmware update will be publicly available after the first week of November 2023 to resolve the issue



Feedback

Feedback

If you would like to give feedback on this presentation, please go to

<https://forms.gle/WcR17FMdi4td2vhYA>

If you fill in the form, you will be able to receive notifications of firmware updates, firmware bug fixes, upcoming training, etc





THANKS