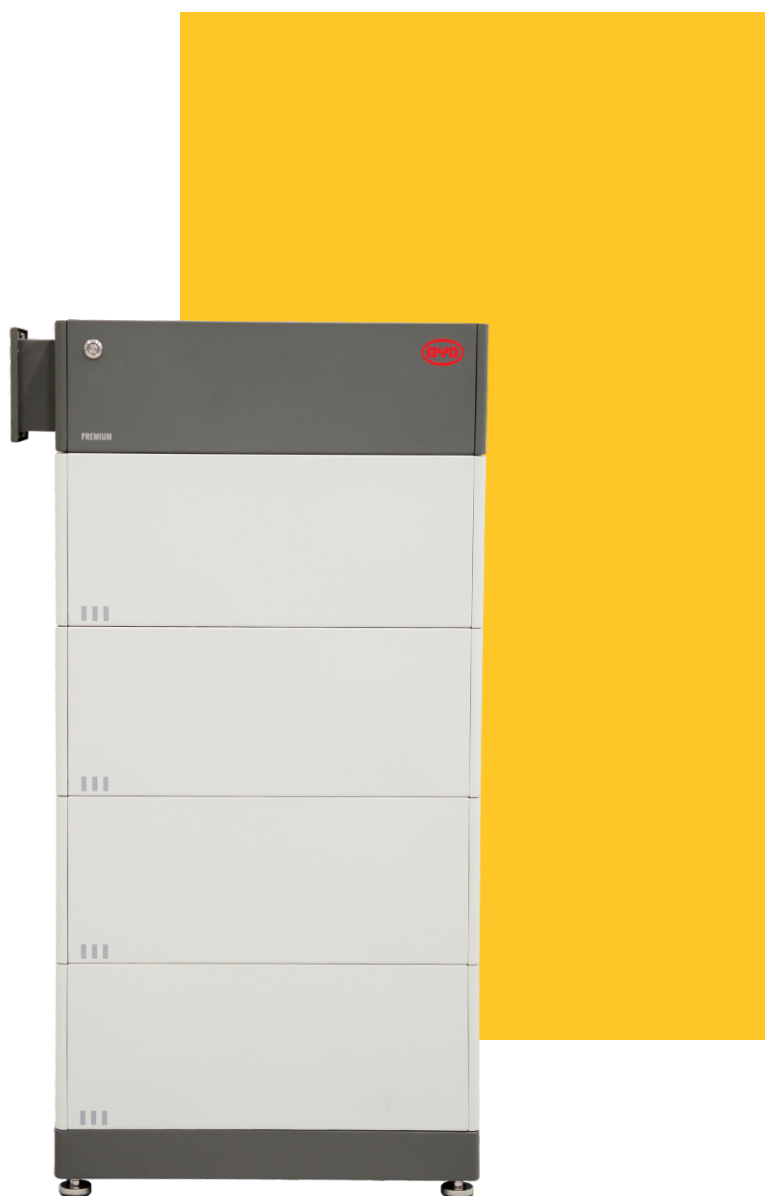




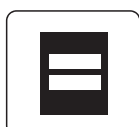
Battery-Box Premium

Operating Manual

HVL 12.0, 16.0, 20.0, 24.0, 28.0, 32.0
A High Voltage Battery System



BYD Energy LLC V1.1



Be Connect



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You can download the current Limited Warranty from the Internet at websites:

www.bydbatterybox.com

BYD Energy LLC

170 BYD Energy Road. Lancaster, CA 93535

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1. Information on this Document

1.1. Validity

This document is valid for the Battery-Box Premium HVL 12.0, 16.0, 20.0, 24.0, 28.0 and 32.0 from firmware version BMU 3.15 and BMS 3.20.

1.2. Target Group

The instructions in this document may only be performed by qualified persons who must have the following skills:

- Knowledge of how batteries work and are operated
- Knowledge of how an inverter works and is operated
- Knowledge of, and adherence to the locally applicable connection requirements, standards, and directives
- Knowledge of, and adherence to this document and the associated system documentation, including all safety instructions
- Training in dealing with the hazards associated with the installation and operation of electrical equipment and batteries
- Training in the installation and commissioning of electrical equipment

Failure to do so will make any manufacturer's warranty, guarantee or liability null, and void unless you can prove that the damage was not due to non-compliance.

1.3. Content and Structure of this Document

This document contains safety information and instructions, scope of delivery, system overview, installation, electrical connection, commissioning, decommissioning, expansion, troubleshooting, maintenance and storage, disposal, and technical data. Please finish reading this document before taking any actions on the battery system.


1.4. Declaration of Conformity

The battery system described in this document complies with the applicable FCC rules. The certificate is available in the download area at www.bydbatterybox.com.


1.5. Levels of Warning Messages

The following levels of warning messages may occur when handling the battery system.

 DANGER
Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
 WARNING
Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

 CAUTION
Indicates a hazardous situation which, could result in minor or moderate injury.
NOTICE
Indicates a situation which, if not avoided, can result in property damage.

1.6 Symbols in the Document

 QUALIFIED PERSON	Sections describing activities to be performed by qualified persons only.
---	---

1.7. Designation in the Document

Designation in this document	Complete designation
battery system	Battery-Box Premium HVL
BCU	Battery Control Unit
BIC	Battery Information Collector
BMS	Battery Management System
BMU	Battery Management Unit
BYD US	BYD Energy LLC
SOC	State of Charge

2. Safety

2.1. Intended Use

The battery system is for residential and works with a photovoltaic system. It is a high voltage Li-ion battery storage system, with the control module on itself. It could be operated in on-grid, off-grid and backup modes with compatible inverters.

The battery system could be connected to the Internet through network cable for maintenance and firmware updating.

The battery system must only be used as stationary equipment.

The battery system is suitable for indoor and outdoor use under the conditions mentioned in Section 5.1.

The battery system must only be operated in connection with a compatible inverter. The list (BYD Battery-Box Premium HVL Compatible Inverter List) of these inverters could be found at www.bydbatterybox.com.

The battery system is not suitable for supplying life-sustaining medical devices. Please ensure that no personal injury would lead due to the power outage of the battery system.

Alterations to the battery system, e.g., changes or modifications are not allowed unless the written permission of BYD US is achieved. Unauthorized alterations will void the guarantee and warranty claims. BYD US shall not be held liable for any damage caused by such changes.

The type label should always be attached to the battery system.

2.2. IMPORTANT SAFETY INSTRUCTIONS

The battery system has been designed and tested in accordance with international safety requirements. However, in order to prevent personal injury and property damage and ensure long-term operation of the battery system, please do read this section carefully and observe all safety information at all times.

2.2.1. Battery Module Leakage

If the battery modules leak electrolytes, contact with the leaking liquid or gas should be avoided. The electrolyte is corrosive, and the contact may cause skin irritation and chemical burns. If one is exposed to the leaked substance, do these actions:

Inhalation: Evacuate the contaminated area, and seek medical help immediately.

Eye contact: Rinse eyes with flowing water for 15 minutes and seek medical help immediately.

Skin contact: Wash the affected area thoroughly with soap and water and seek medical help immediately.

Ingestion: Induce vomiting and seek medical help immediately.

2.2.2. Firefighting Measures

The battery modules may catch fire when it is put into the fire. In case of a fire, please make sure that an ABC or carbon dioxide extinguisher is nearby. Water cannot be used to extinguish the fire.

Full protective clothing and self-contained breathing apparatus are required for the firefighters to extinguish the fire.

2.2.3. Battery Modules Handling and Storage Guide

- The battery modules and its components should be protected from damage when transporting and handling.
- Do not impact, pull, drag, or step on the battery modules.
- Do not insert unrelated objects into any part of the battery modules.
- Do not throw the battery module into a fire.
- Do not soak the battery modules in water or seawater.
- Do not expose to strong oxidizers.
- Do not short circuit the battery modules.
- The battery modules cannot be stored at high temperatures (more than 122 °F).
- The battery modules cannot be stored directly under the sun.
- The battery modules cannot be stored in a high humidity environment.
- Do not use the battery modules if it is defective, or appears cracked, broken or otherwise damaged, or fails to operate.
- Do not attempt to open, disassemble, repair, tamper with, or modify the battery modules. The battery modules are not user-serviceable.
- Do not use cleaning solvents to clean the battery modules.

2.2.4. Warning of Electric Shock

DANGER

Danger to life due to electric shock when live components or DC cables are touched

The DC cables connected to an inverter may be live. Touching live DC cables results in death or serious injury due to electric shock.

- Disconnect the battery system and inverter from voltage sources and make sure it cannot be reconnected before working on the device.
- Do not touch non-insulated parts or cables.
- Do not remove the terminal block with the connected DC conductors from the slot under load.
- Wear suitable personal protective equipment for all work on the battery system.
- Observe all safety information of the inverter manufacturer.

2.2.5. Warning of Overvoltages

DANGER

Danger to life due to electric shock in case of overvoltages and if surge protection is missing

Overvoltages (e. g. in the event of a flash of lightning) can be further conducted into the building and to other connected devices in the same network via the network cables or other data cables if there is no surge protection. Touching live parts and cables results in death or lethal injuries due to electric shock.

- Ensure that all devices in the same network and the inverter are integrated into the existing surge protection.
- When laying the network cables or other data cables outdoors, it must be ensured that a suitable surge protection device is provided at the transition point of the cable from the battery system or the inverter outdoors to the inside of a building.
- The Ethernet of the inveter is classified as "TNV.1" and offers protection against overvoltage of up to 1.5kV.

2.2.6. Caution of Weight

CAUTION

Risk of injury due to weight of the battery module

Injuries may result if the battery module is lifted incorrectly or dropped while being transported or installed.

- Transport and lift the battery module carefully. Take the weight of the battery module into account.
- Wear suitable personal protective equipment for all work on the battery system.

2.2.7. Notice of Property Damage

NOTICE

Damage to the BCU due to sand, dust and moisture ingress

Sand, dust and moisture penetration can damage the BCU and impair its functionality.

- Only open the BCU if the humidity is within the thresholds and the environment is free of sand and dust.

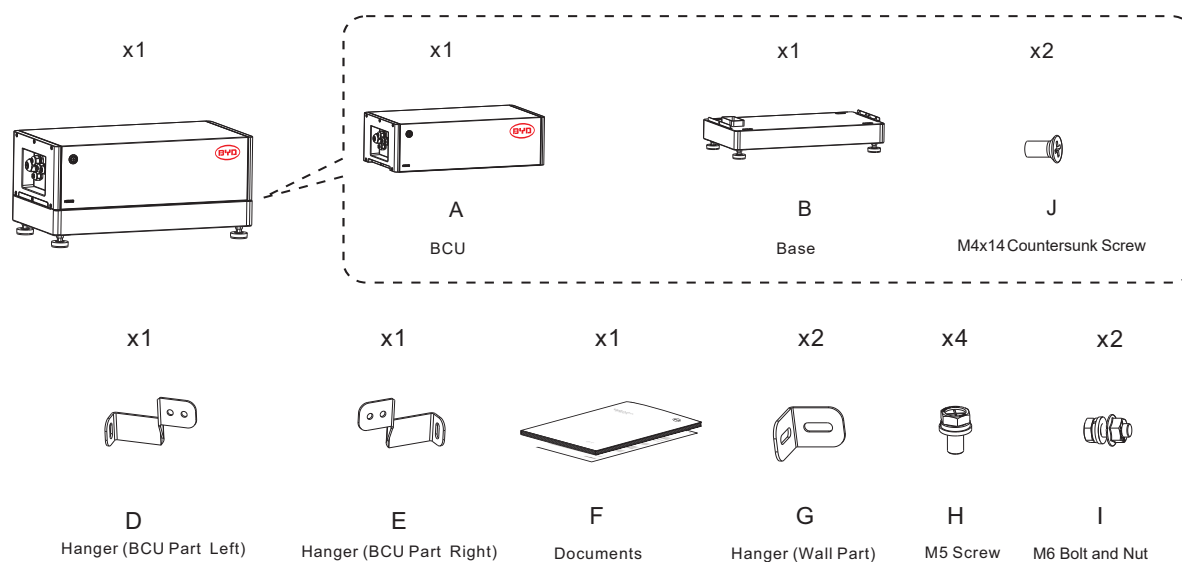
NOTICE

Damage to the battery system due to under voltages

- If the battery system doesn't start at all, please contact BYD local after-sales service within 48 hours. Otherwise, the battery could be permanently damaged.

3. Scope of Delivery

BCU and Base Package



Battery Module Package

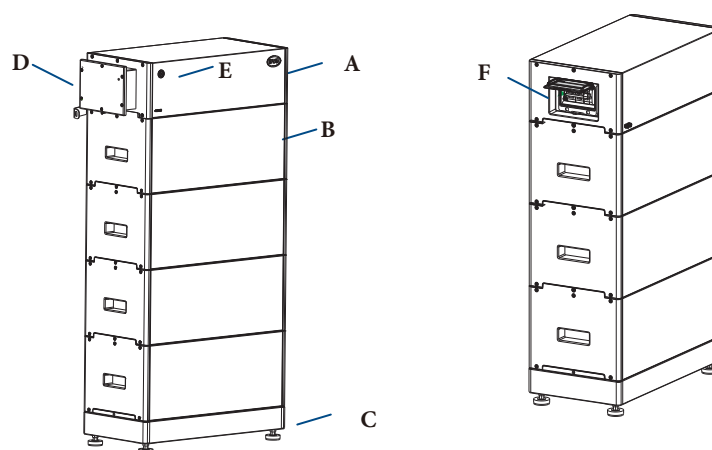


A	BCU
B	Base
C	Battery Module
D	Hanger (BCU Part Left)
E	Hanger (BCU Part Right)
F	Documents (Quick Start Guide , Compatible Inverter List, Packing List)
G	Hanger (wall part)
H	Screw to fix D/E on BCU
I	Screw to fix two types of hangers together
J	Screw to fix the connection between modules, base, and BCU.

4. Battery System Overview

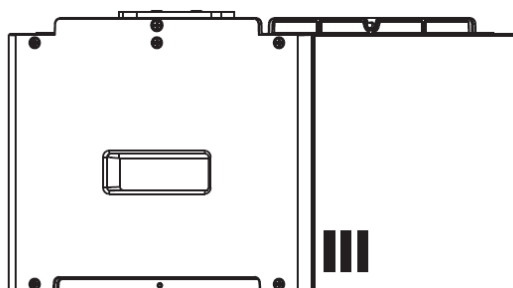
4.1. Battery System Description

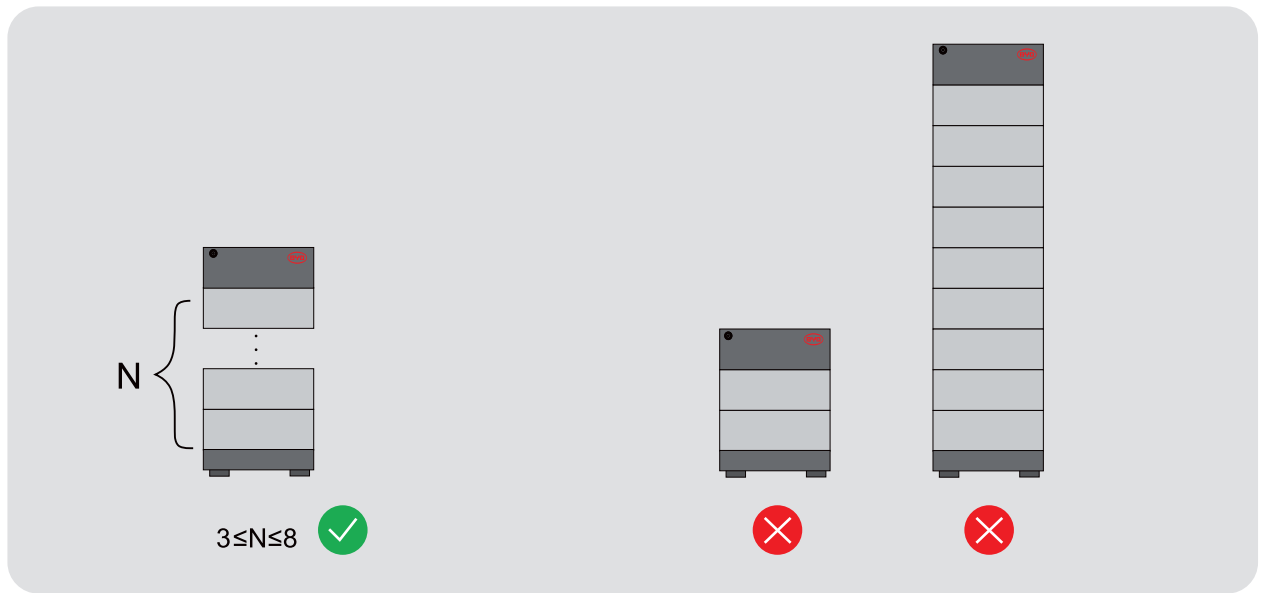
The Battery-Box Premium HVL is used as a connected battery for the intermediate storage of excess PV energy in an inverter system.



A	BCU
B	Battery Module
C	Base
D	Operating Panel
E	LED Button
F	Air Switch

There are three stripes printed on the module.





Three to eight modules could be stacked in one tower.

4.2. Interface

Be Connect

Be Connect is an app for Android and iOS system devices. You can download it from Google Play or App Store.

Minimum Android version 4.4 and iOS 10.0 are required for the proper operation of Be Connect.

With Be Connect, you can update the firmware of the battery system, configure it and get the real time data. More functions are under developing.

Be Connect Plus












Be Connect Plus is an app for laptops. You can download it from our website. It can only operate on the Windows system now.

With Be Connect, you can update the firmware of the battery system, configure it and read and download real time data and logs. More functions are under developing.

Be Connect Monitoring

The battery system is equipped with an Ethernet port as a standard. When your battery system is linked with the Internet, it will join our Be Connect Monitoring. Be Connect Monitoring is a platform for BYD to provide remote service to customers. It can diagnose your battery system, and update the firmware. It is highly recommended you to connect the battery system to the Internet to have a better service.

4.3. Symbols on the System

Symbol	Explanation
	Observe the documents Observe all documents supplied with the system.
	Grounding conductor This symbol indicates the position for connecting a grounding conductor.
	WEEE designation Do not dispose of the system together with the household waste but in accordance with the disposal regulations for electronic waste applicable at the installation site.
	FCC marking The system complies with the requirements of the applicable FCC Rules.
	This side up
	Handle with care
	Keep dry
	Keep the battery modules away from open flame or ignition sources
	Beware of electrical voltage
	Beware of a danger zone This symbol indicates that the system must be additionally grounded if additional grounding or equipotential bonding is required at the installation site.
	Keep the battery modules away from children



North America Listed Mark from SGS



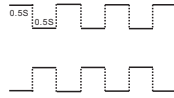
Do not short circuit

4.4. LED Signals

Flashing white and blue alternatively

White ☐ ON
OFF

Blue ☒ ON
OFF



The battery system is initiating.

Solid white

White ☐ ON
OFF

Blue ☒ ON
OFF

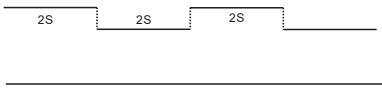


Idle (the battery system is neither charging nor discharging).

Flashing white slowly

White ☐ ON
OFF

Blue ☒ ON

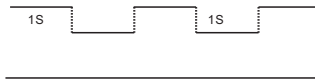


The battery system is charging.

Flashing white quickly

White ☐ ON
OFF

Blue ☒ ON
OFF

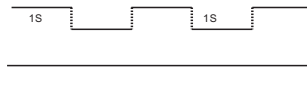


The battery system is discharging.

Flashing white and glowing blue

White ☐ ON
OFF

Blue ☒ ON
OFF

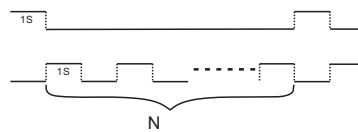


The battery system is discharging, and the SOC is below 15%.

Flashing white and blue

White ☐ ON
OFF

Blue ☒ ON
OFF



An error has occurred.

5. Installation

5.1. Requirements for Installation

5.1.1. Requirements for Installation Location

- a) A solid support surface must be available (e.g., concrete or masonry).
- b) The installation location must be inaccessible to children.
- c) The installation location must be suitable for the weight and dimensions of the battery system.
- d) The installation location must not be exposed to direct solar irradiation.
- e) The installation location must not be close to the fire.
- f) The altitude of the installation location should be less than 9843 ft.
- g) The ambient temperature should be between 14 to 122° F.
- h) The ambient humidity should be between 5-95%.



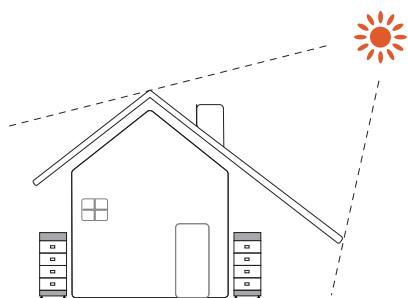
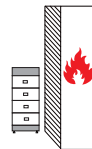
Max +50° C

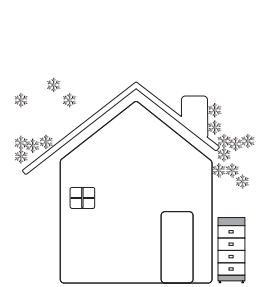
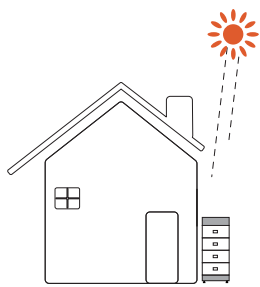


Min -10° C



RH. +5% ~ +95%





5.1.2. Tools

The tools in the following table could be needed during the installation.



Network Wire Clamp



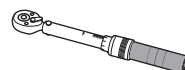
Pen



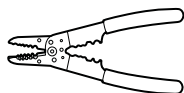
Phillips Screwdriver Bit



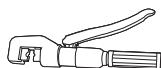
Flat-Head Screwdriver



Torque Wrench



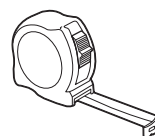
Wire Stripper



Crimping Plier



Wrench



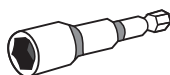
Tape Measure



Drill



Hair Dryer



Cylinder Screwdriver

5.1.3. Safety Gear

Wear the following safety gear when dealing with the battery system.



Insulated gloves

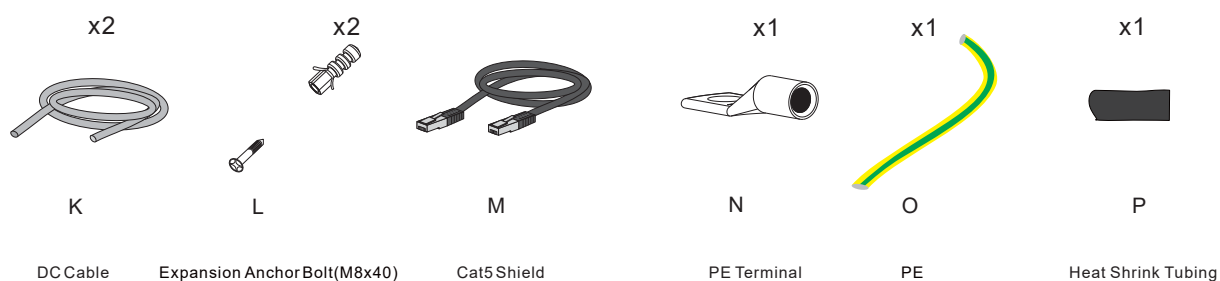


Safety goggles



Safety shoes

5.1.4. Additionally Required Installation Material



5.2. Installation

⚠ QUALIFIED PERSON

⚠ DANGER

Danger to life from electric shock due to live DC cables or connectors at the battery system
The DC cables connected to the battery system may be live. Touching the DC conductors or the live components leads to lethal electric shocks.

- Do not touch non-insulated cable ends.
- Ensure that the inveter is disconnected from all voltage sources.

⚠ CAUTION

Risk of injury due to weight of the battery module

Injuries may result if the battery module is lifted incorrectly or dropped while being transported or installed.

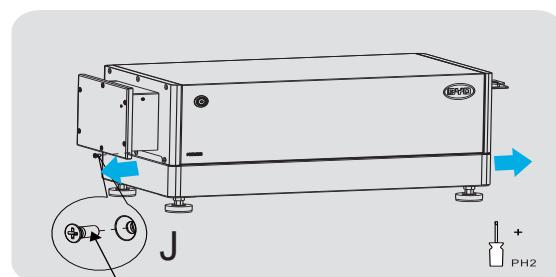
- Transport and lift the battery module carefully. Take the weight of the battery module into account.
- Wear suitable personal protective equipment for all work on the battery system.

Additionally required installation material (not included in the scope of delivery):

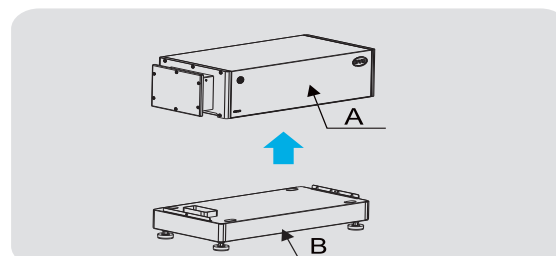
- Two screws suitable for the support surface (diameter: 8 mm (5/16 in))
- Where necessary, two screw anchors suitable for the support surface and the screws.

Procedure:

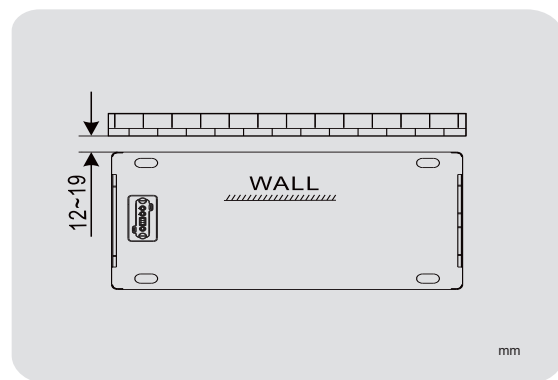
1. Take the BCU and base from the package out.
2. Loose the two screws with screwdriver PH2.



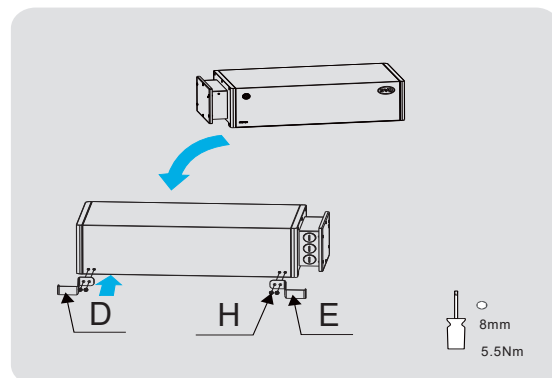
3. Take the BCU from the base.



4. Put the installed base and feet along the wall, and keep the distance of 12~19 mm (15/32 to 3/4 in) between the wall and the base.



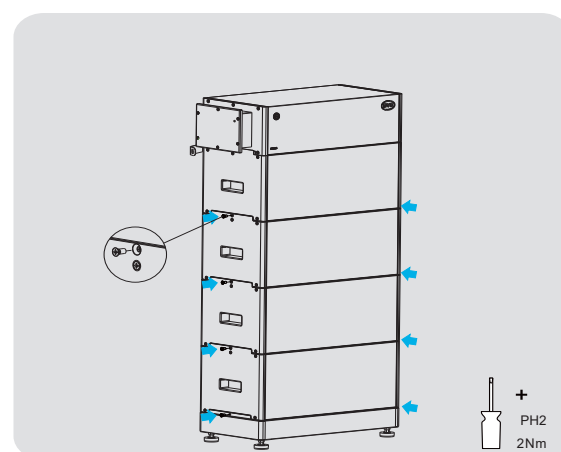
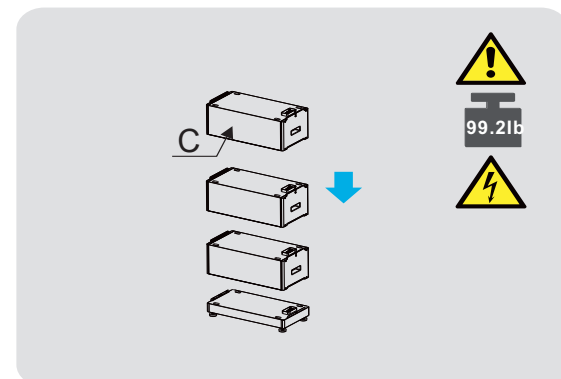
5. Take a battery module from the package out. Put one battery module on the base. Pay attention to the direction of the module. The blind-mating connectors on the battery module and the base should be on the same side.
6. Repeat the operations for other battery modules.
7. Install the hanger (BCU part) to the BCU. To do this, insert the screws (M5x 14) through the hole on the BCU using a cylinder screwdriver (8 mm (5/16 in)) and tighten them (torque: 5.5 Nm /48.68 lbf in).



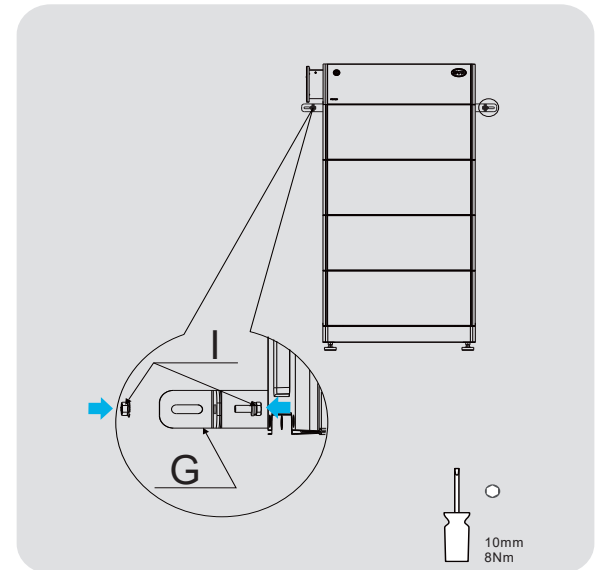
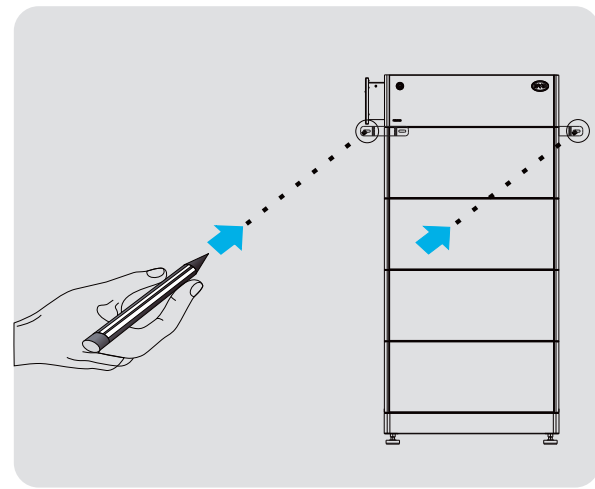
8. Put the BCU on top of the battery modules.

Recommend to connect cables on the BCU first when five or more than five battery modules are needed to be installed.

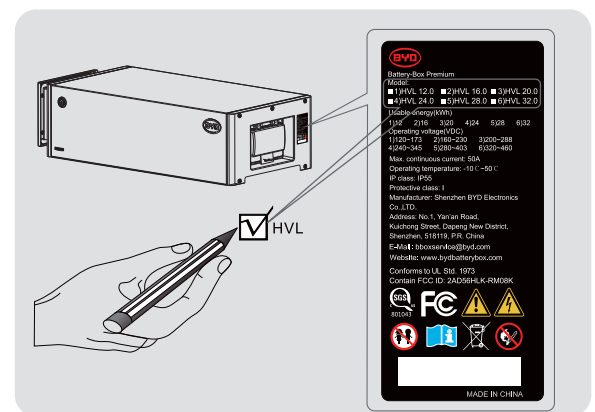
9. Fix the connection between the battery module and the base, and between battery modules. To do this, insert the screws (M4x 14) through the holes on them, using a Phillips screwdriver (PH2) and tighten them (torque: 2 Nm/17.7 lbf·in).



10. Hold the hanger (wall part) where it intends to be mounted on the wall and mark the position of the drill holes. Please pay attention that there may be power cables or other supply lines (e.g., gas or water) routed in the wall. Ensure that no lines are laid in the wall, which could be damaged when drilling holes.
11. Set the hanger aside and drill the marked holes.
12. Insert screw anchors into the drill holes if the support surface requires them.
13. Secure the hanger using screws (recommended M8x40).
14. Fix the two hangers (wall part and BCU part) with M6X16 bolts and nuts, using a cylinder screwdriver (10 mm (25/64 in)) to tighten it (torque: 8 Nm/ 71 lbf in).



15. Mark the product type.



NOTICE

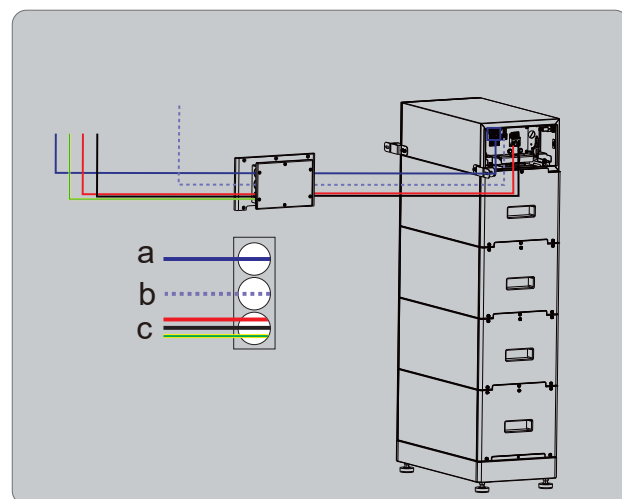
Damage to the battery system due to under voltages

- If the battery is installed, it should be set into operation within a month, or checked regularly, otherwise there might be damage to the batteries.

6. Electrical Connection

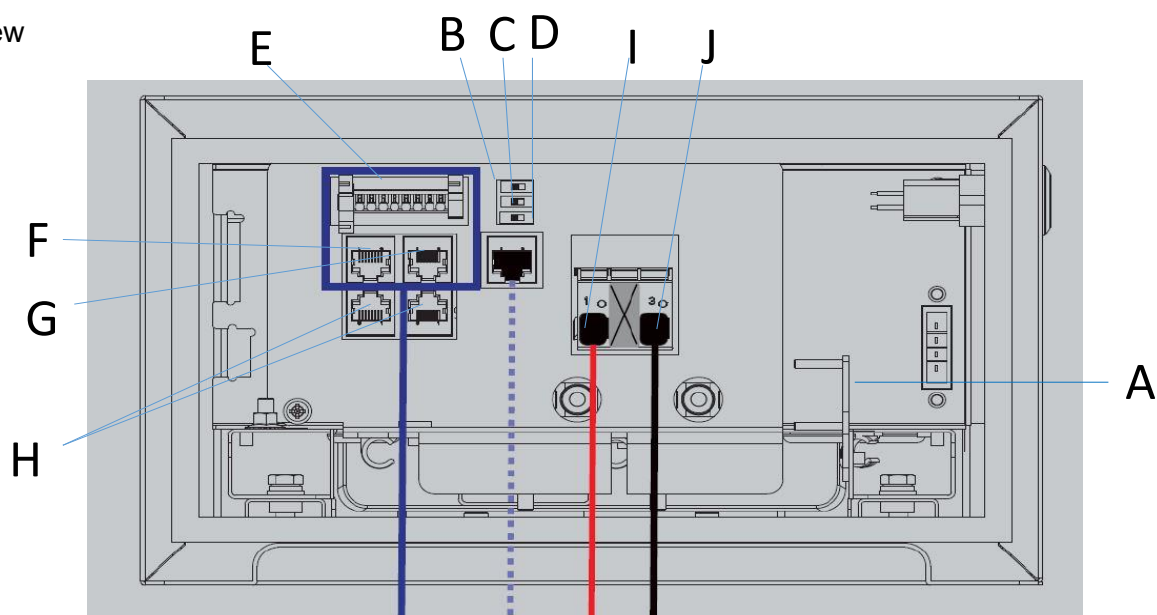
6.1. Overview of the Connection Area

Exterior view



a	Recommended for communication cable connection with an inverter
b	Recommended for Ethernet cable connection with a router
c	Recommended for power cable and PE connection

Interior View



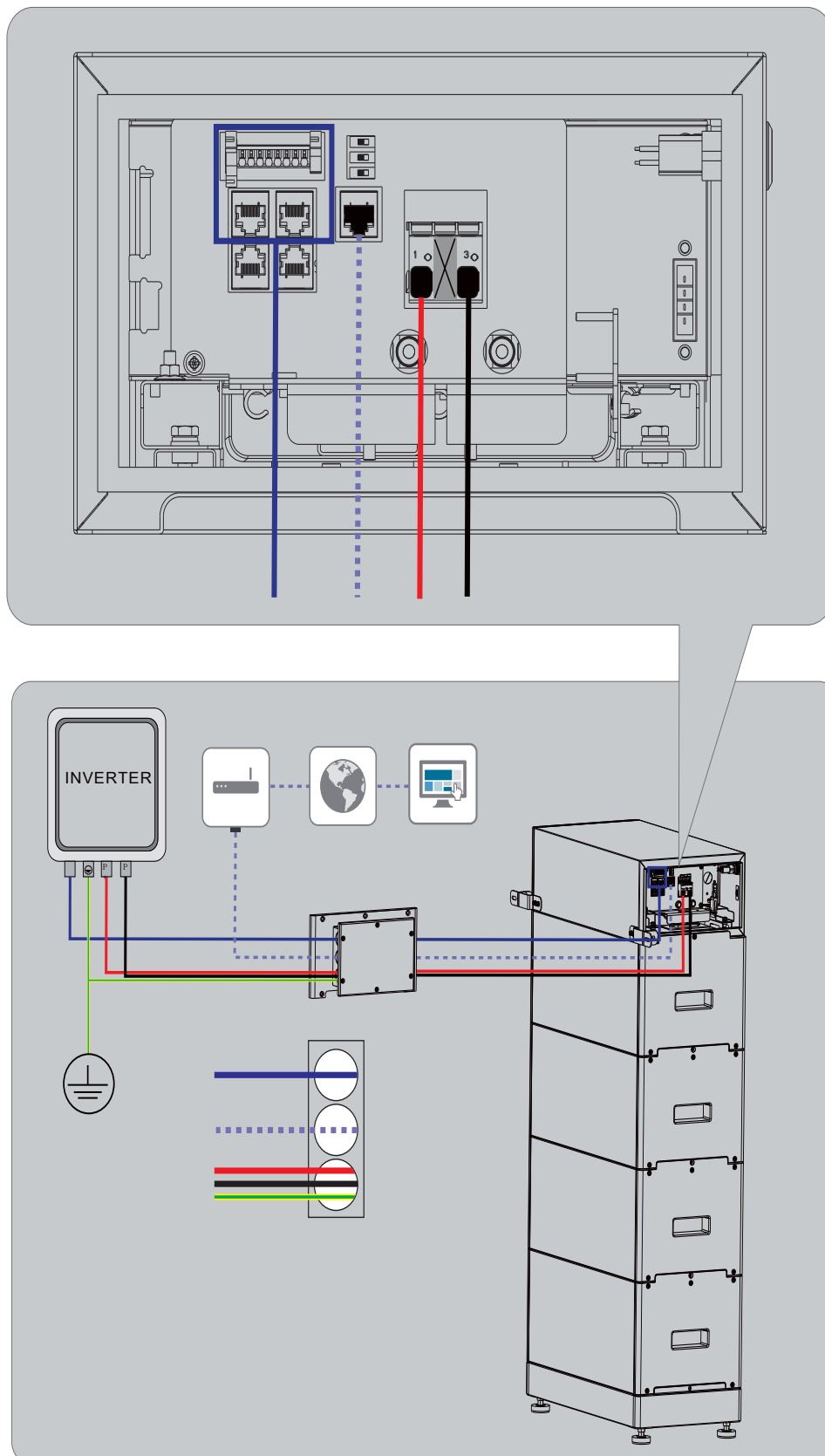
A	Panel open sensor
B	Dip switch for the CAN protocol circuit with inverter
C	Dip switch for the RS485 protocol circuit with inverter
D	Dip switch reserved for parallel connection
E	8 pin terminal blocks for connecting an inverter's data cable. (CAN or RS485 protocol)
F	RJ45 port for connecting an inverter's data cable. (CAN protocol)

G	RJ 45 port for connecting an inverter`s data cable. (RS485 protocol)
H	Reserved for parallel connection
I	DC+ to inverter
J	DC- to inverter

The connection to Ethernet cable is recommended, not compulsory.

There are different methods to connect inverter with the battery system. You can choose the suitable one for you.

6.2. Connection Diagram



6.3. PE and DC Cables Connection

⚠ QUALIFIED PERSON

⚠ DANGER

Danger to life from electric shock due to live DC cables or connectors at the battery system

The DC cables connected to the battery system may be live. Touching the DC conductors or the live components leads to lethal electric shocks.

- Ensure that all the inverters is disconnected from all voltage sources.
- Do not touch non-insulated cable ends.

Additionally required mounting material (not included in the scope of delivery):

- a) Rigid Conduit (3/4" conduit size punch)
- b) Grounding cable (with terminal) cross-section, 10 mm²/17 AWG. Recommend terminal size, 5 mm (13/64 in).
- c) Two DC power cables

DC cable Requirement

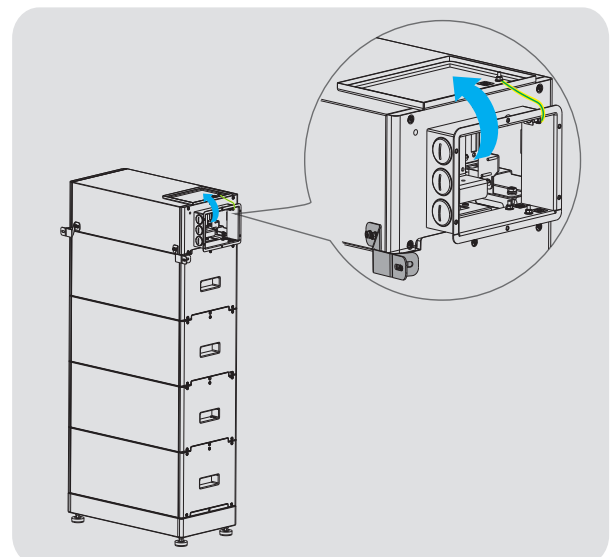
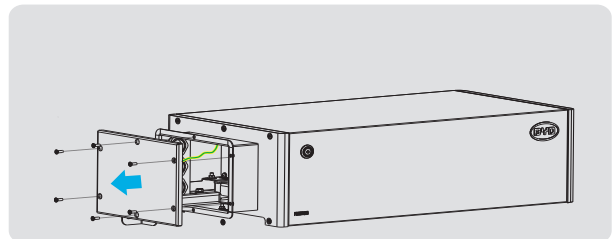
- Conductor cross-section: 6 mm² (9 AWG)-16 mm² (5 AWG). The diameter of the cable should be between 4 mm (5/32 in) to 9 mm (23/64 in). Follow the requirements of the inverter manufacturer.
- Insulation stripping length: 16-18mm (41/64-45/64 in)
- Maximum cable length: 8m (5/16 in)

Procedure:

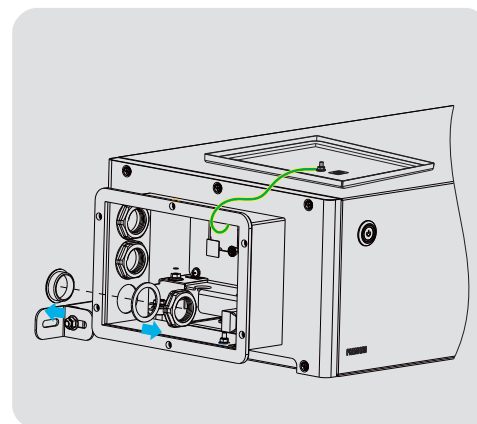
1. Make sure the air switch of BCU is off.
2. Take off the Operating Panel of BCU, with a Phillips screwdriver PH 2.

Attention: Bonding wire connected to this access panel internally. Take care when removing the access panel.

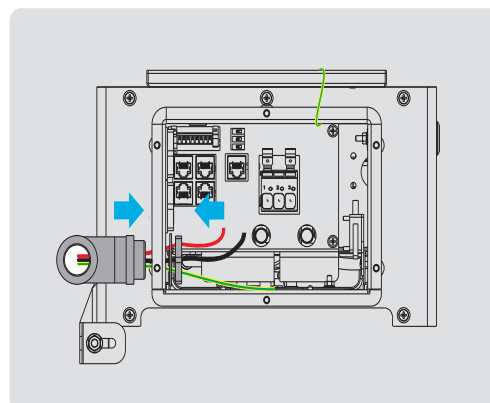
3. Put the operating panel on the BCU.



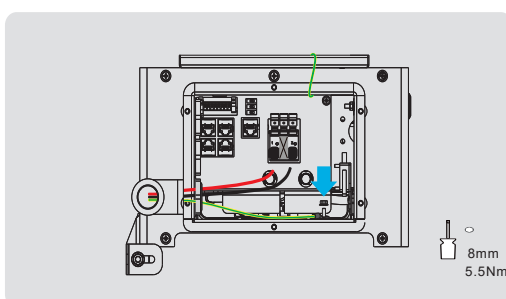
4. Remove the original plastic cover from the bottom hole.



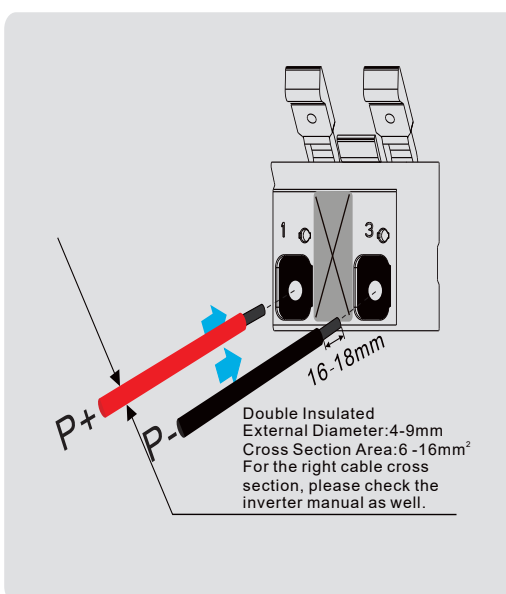
5. Lead the cables through the conduit, and fix it on the BCU.



6. Loosen the nut on the grounding post, put the PE terminal through it, and fix the nut again with a cylinder screwdriver 8 mm (5/16 in), and tighten it (torque, 4 Nm/ 35.4 lbf · in).



7. Push the terminal lever up.
8. Insert each conductor into the corresponding terminal point.
9. Pull the terminal lever down.
10. Ensure that the terminal points are allocated to the correct conductors.
11. Ensure that the conductors are plugged completely into the terminal points up to their insulation.



6.4. The Data Cable Connection to Inverter

6.4.1. Connection Options

The connection options with different inverters could be read in the Appendix.

6.4.2. Connecting the Data Cable of the Inverter

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Additionally required mounting material (not included in the scope of delivery):

- a) One data cable
- b) Rigid Conduit (3/4" conduit size punch)

Data cable requirements:

The cable length and quality affect the quality of the signal. Observe the following cable requirements.

Cable category: Cat5, Cat5e or higher

Plug type: Metal shielded RJ45 of Cat5, Cat5e or higher

Shielding: Yes

UV-resistant for outdoor use

Straight-through wired cables

Maximum cable length: 10 m/ 32.8 ft.

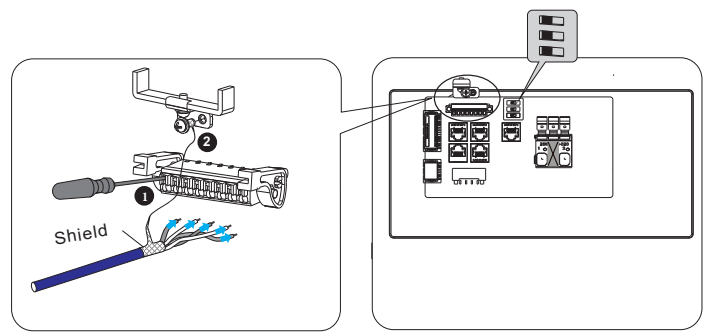
For connection with some inverters, if the data cable goes together with the power cable, it should be 22 AWG, 600V insulated.

Procedure:

1. Remove the original plastic cover from the top hole.
2. Lead the data cable through the conduit, and fix it on the BCU.
3. Plug the cable to RJ45 port or to the 8 pin terminal block.
4. Swipe the corresponding dip switch (CAN Inver or RS485 Inver) to the ACT. position.
(Choosing CAN Inver or RS485 Inver depends on the protocol that the inverter adapted to communicate with the battery system.)

The method to plug the data cable into the 8 pin terminal block:

1. Strip the communication cable 50 mm (2 in).
2. Trim the cable shield to a length of 10 mm (25/64 in) and fold it over the cable sheath.
3. Strip the insulation on the insulated conductors each by 6 mm (15/64). The CAN L and CAN H (or 485a and 485b) must be a twisted pair.



4. If necessary, trim unused insulated conductors flush with the cable sheath or fold it over the cable sheath.

5. Press the button with a flat-head screwdriver, as shown in the drawing.

6. Plug the conductors into the 8 pin terminal blocks. Pay attention to the assignment of the terminal block and communication connection on the inverter.

Make sure that the conductors are plugged into the terminal points tightly by pulling slightly on the conductors.

7. Ground the shielding to the screw above.

6.5. Connecting the Network Cables

DANGER

Danger to life due to electric shock in case of overvoltages and if surge protection is missing

Overvoltages (e. g. in the event of a flash of lightning) can be further conducted into the building and to other connected devices in the same network via the network cables or other data cables if there is no surge protection. Touching live parts and cables results in death or lethal injuries due to electric shock.

- Ensure that all devices in the same network and the battery are integrated into the existing surge protection.
- When laying the network cables or other data cables outdoors, it must be ensured that a suitable surge protection device is provided at the transition point of the cable from the system or the inverter outdoors to the inside of a building.
- The Ethernet interface of the inveter is classified as "TNV-1" and offers protection against overvoltage of up to 1.5 kV.

The connection to the Internet is not mandatory, but recommended.

Additionally required material (not included in the scope of delivery):

- a) One data cable

b) Rigid Conduit (3/4" conduit size punch)

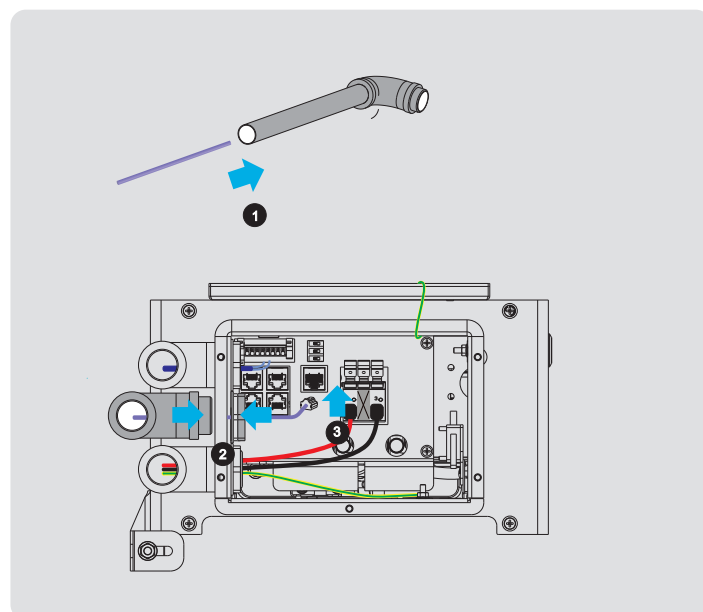
Data cable requirements:

The cable length and quality affect the quality of the signal. Observe the following cable requirements.

- Cable category: Cat5, Cat5e or higher
- Plug type: Metal Shielded RJ45 of Cat5, Cat5e or higher
- Shielding : Yes
- UV-resistant for outdoor use
- Straight- through wired cables
- Maximum cable length: 10 m/ 32.8 ft.

Procedure:

1. Remove the original plastic cover from the middle hole.
2. Lead the data cable through the conduit, and fix it on the BCU.
3. Plug the cable to the corresponding RJ45 port.



6.6. Close up Procedure:

Fix the Operating Panel. To do this, insert the screws (M4x 14) through the holes on them, using a Phillips screwdriver (PH2) and tighten it (torque: 2 Nm/ 17.7 lbf in).

Please note that if the panel is not closed, the battery cannot be turned on.

7. Commissioning

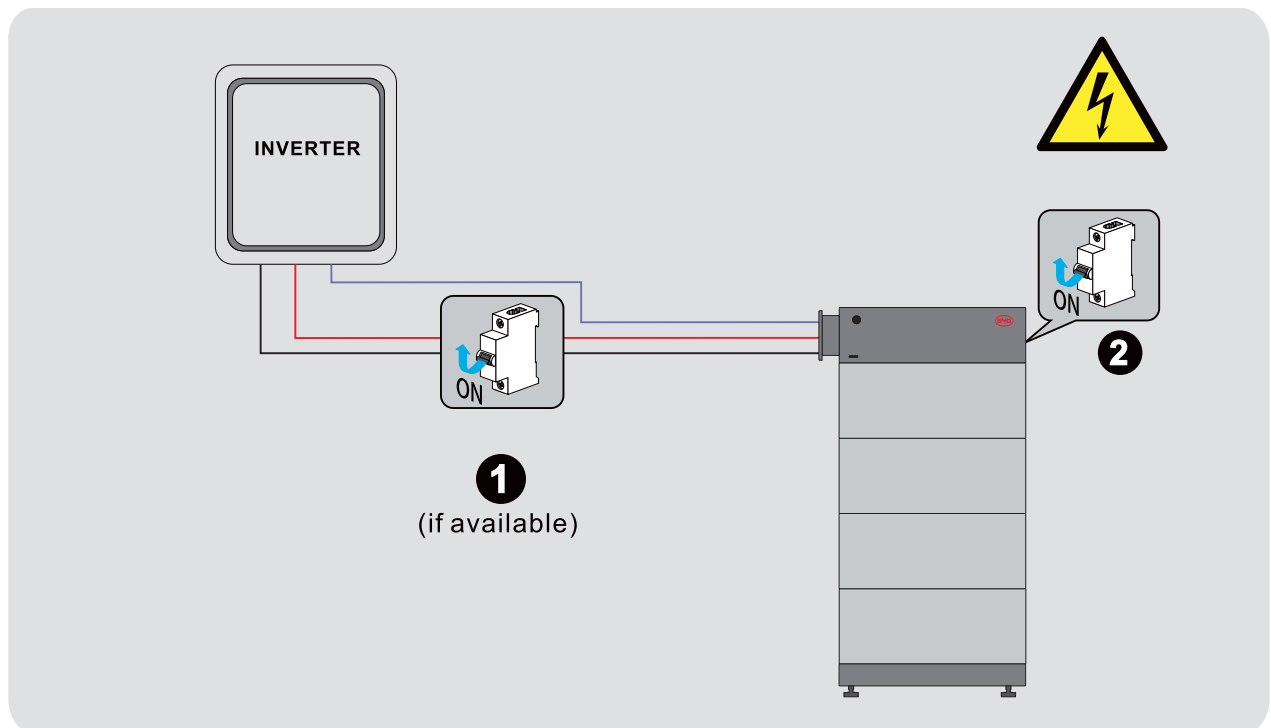
7.1. Switch on the Battery System

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Requirements:

- The power cable connection between the battery system and the inverter is switched off.
- The inverter must be correctly mounted.
- All cables must be correctly connected.
- The Operating Panel is well fixed.

Procedure:



1. Switch on the air switch between the battery and inverter if there is any.
2. Open the plastic cover on the right side of the BCU.
3. Push up the air switch from the Off position to On.
4. The LED starts to flash (0.5 s white, 0.5 s blue). Then it turns to flash white and blue alternatively in 1s. That flashes are normal, and the commissioning could be proceeded.
5. If it is failed to switch on the battery system, check if all the electrical connection is correct.

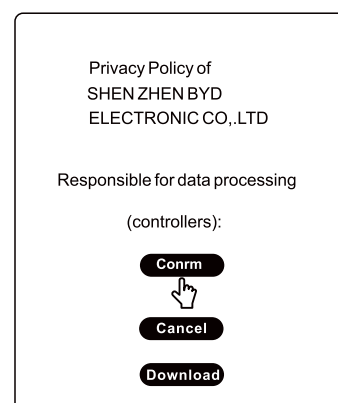
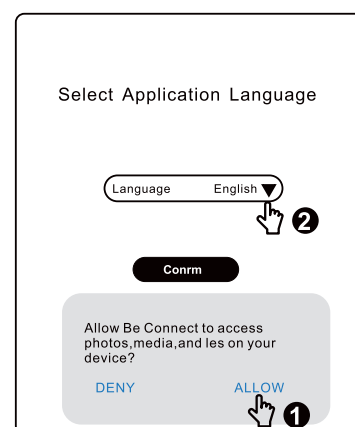
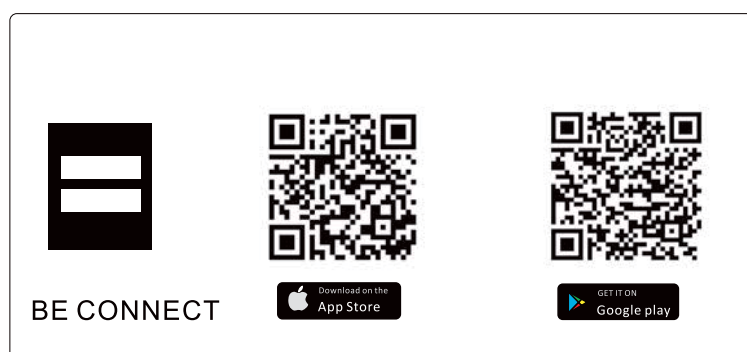
6. If the electrical connection is correct, but the battery system is still unable to switch on, contact our local after-sale service within 48 hours.

7.2. Configure the Battery System

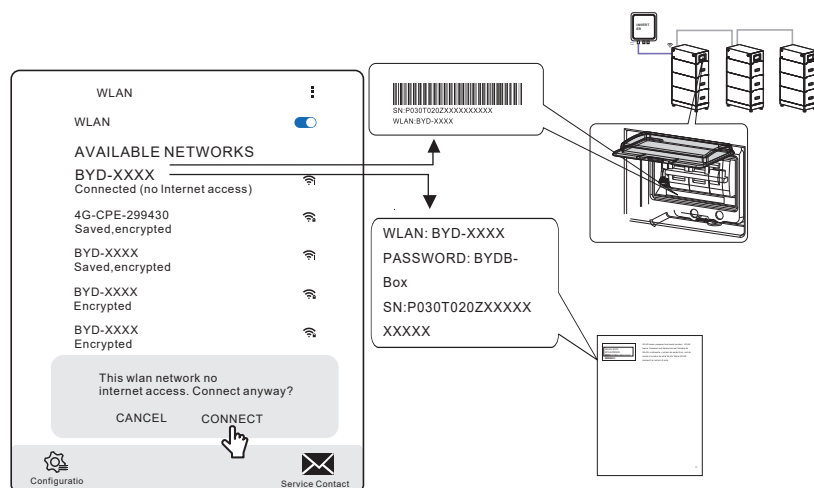
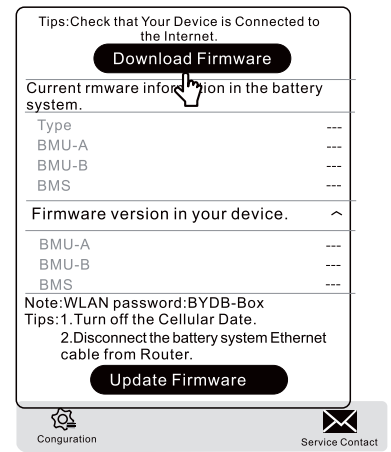
QUALIFIED PERSON

Procedure:

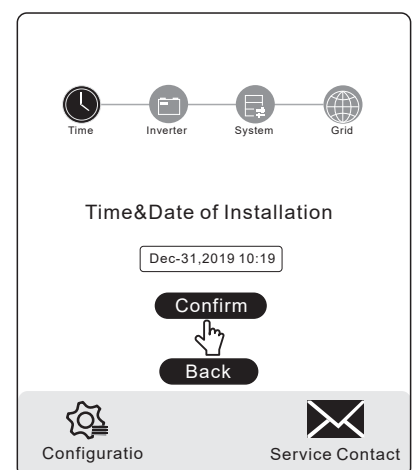
1. Download Be Connect from Google Play or App Store. The battery system requires the latest version firmware to operate. So please make sure you either have downloaded the latest firmware in your device (cell phone, Ipad, etc.), or your device could access the Internet during configuration.
2. Allow Be Connect to access photos, media, and files on your device (this is for Android system), and choose the language. Currently, there are six languages available, English, Chinese, German, Spanish, French, and Italian.
3. Click anywhere of the Welcome Page to pass through.
4. Read the privacy policy and click the Confirm button to go to the next page. You can also download the full PDF document by clicking the Download button, which requires the Internet available on your device.



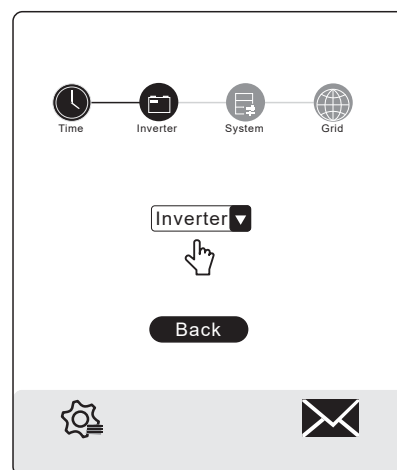
5. On the firmware update page, click the Download Firmware button to download the latest version firmware into your device. If your device cannot access the Internet, you can use the firmware stored in your device.
6. Connect the WLAN of the battery system. You can identify the WLAN by reading the label on BCU and the label on the last page of the Quick Start Guide. All the WLAN shares the common password (BYDB-Box). Turning off the Cellular Data and disconnecting the battery system Ethernet cable at the router side will be good for the WLAN connection between the battery system and your device.
7. Click the Update Firmware button to update. If the firmware in your device is a lower version than the one in the battery system, then you need to download the latest version firmware to continue.



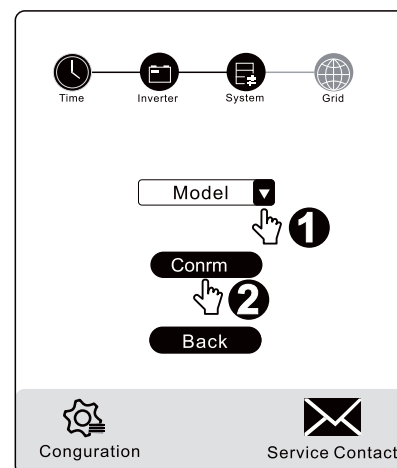
8. On the configuration page, click Confirm to set time.



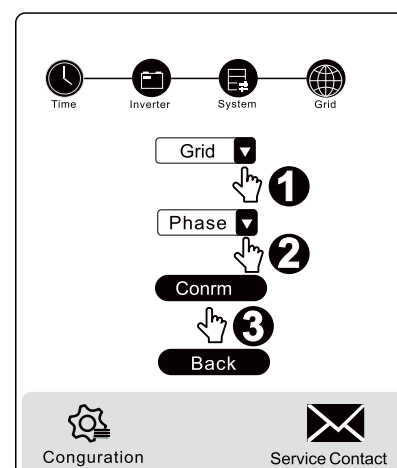
9. Choose an inverter brand.



10. Choose the battery system model, HVL. And then, set how many battery modules in the tower.



11. Choose the Grid and Phase options according to the actual application.



12. Check the summary of the configuration information, tick the sentence, and click Submit.

If there is a prompt or Submit button is grey, wait a moment and check the WLAN connection.

There will be a prompt "Succeeded" when the configuration is completed.

Restart the Be Connect if it was stuck somewhere.

Please note that the SOC of the battery may not be accurate before a full charge or discharge after the configuration.

7.3. Switch on and Commission the Inverter

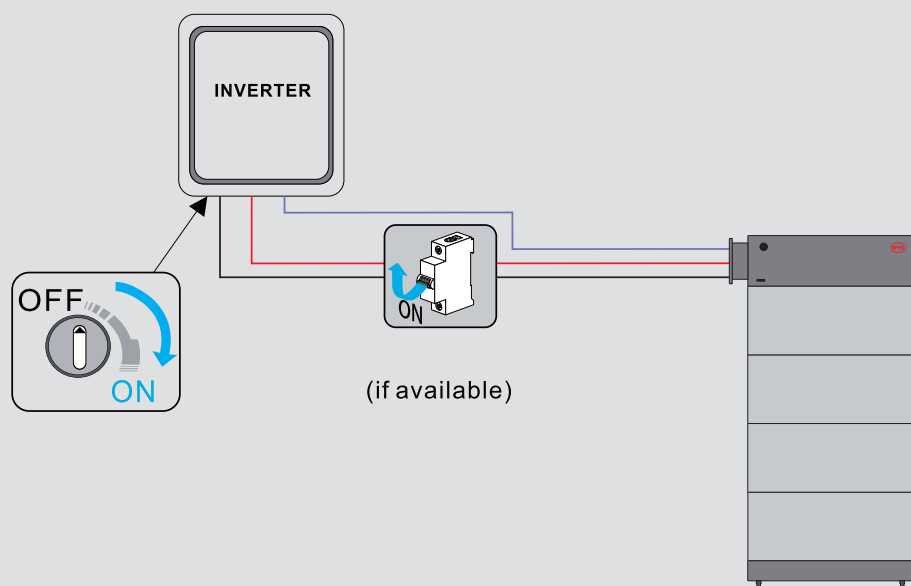
⚠ QUALIFIED PERSON

Procedure:

1. Mount and connect the inverter according to the inverter manufacturer's instruction.
2. Commission and configure the inverter according to the inverter manufacturer's instruction.

If the battery information could be read correctly, it means the connection between the battery system and the inverter is all right. Normally, the LED of the battery will also turn to white then, and the battery system is ready to work.

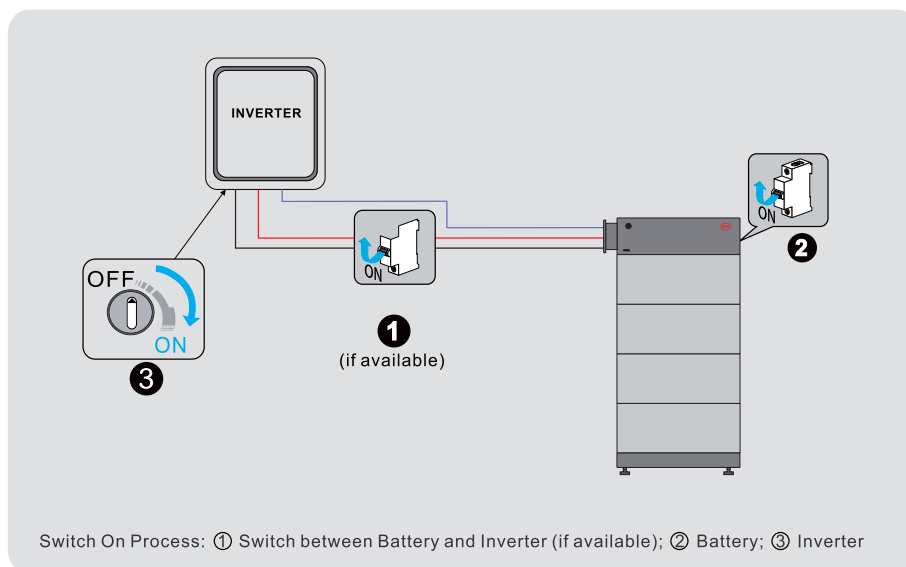
If LED of BCU still flashes blue, and/or there are some battery errors shown at the inverter, go to the Trouble Shooting Chapter of this manual.



8. Operation

8.1. Switch on the Battery System

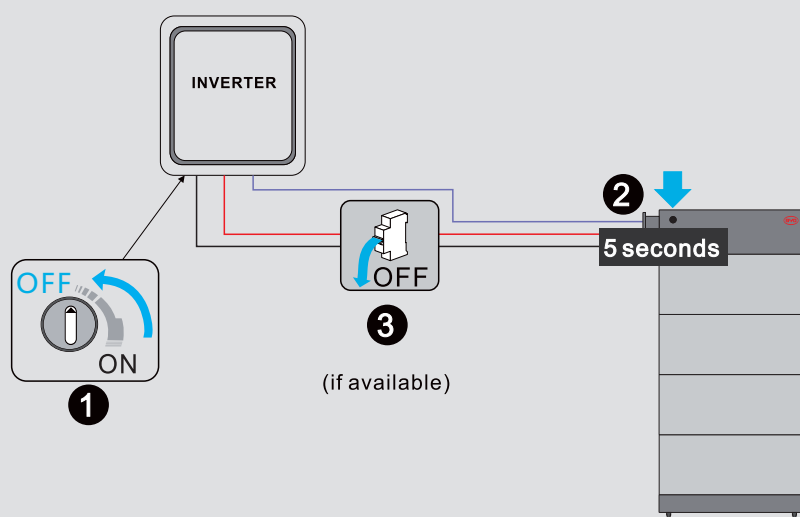
To make sure the battery system can work well with the inverter, please follow the right procedure to start them. The procedure is: 1) turn on the switch between the inverter and battery if there is any; 2) switch on the battery system; 3) switch on the inverter.



8.2. Switch off the Battery System

The procedure to switch off the battery system is: 1) switch off the inverter; 2) switch off the battery; 3) switch off the air switch between the battery and the inverter if there is any.

The correct way to switch off the battery system is to press the LED Button for 5 seconds on the BCU, but not to pull down the air switch of BCU.



8.3. Safety Design

The battery system cannot be turned on when the Operating Panel is removed.

The system will switch off automatically if there is no communication with an inverter for 30 minutes during commissioning.

8.4. WLAN Activation

The WLAN of the battery will turn off automatically after the battery is switched on for 5 hours.

Press the LED button for around 1 second when the battery is on, the WLAN could be activated again.

8.5. Black Start Function

The battery system could support the black start function of compatible inverters. The ways to trigger this function are different when the battery systems are operated with different inverters.

9. Decommissioning

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To decommission the inveter completion of its service life, proceed as described in this Section.

CAUTION

Risk of injury due to weight of product

Injuries may result if the product is lifted incorrectly or dropped while being transported or attaching it to or removing it from the wall mounting bracket.

- Transport and lift the product carefully. Take the weight of the product into account.
- Wear suitable personal protective equipment for all work on the product.

DANGER

Danger to life from electric shock due to live DC cables at the battery system.

The DC cables connected to the battery system may be live. Touching the DC conductors or the live components leads to lethal electric shocks.

- Do not touch non-insulated cable ends.
- Ensure that the inveter is disconnected from all the voltage sources.

Procedure:

1. Shut off the inverter.
2. Switch off the battery system.
3. Switch off the breaker between the inverter and the battery system if there is any.
4. Loose the screws on Operation Panel, and put the Operation Panel on the top of the BCU.
5. Remove all cables and conduits from the battery system.
6. Loosen the screws on hangers between BCU and the wall. And then take off the hangers.
7. Install the plastic covers of the holes on the Operation Panel.
8. Fix the Operation Panel on the BCU.
9. Take the BCU from battery modules and battery modules from the base.

Before lifting the battery module, ensure that the screws on both sides of them are removed.

10. Remove the hangers (BCU part).

If the battery system is to be stored or shipped, pack the system. Use the original packaging or packaging that is suitable for the weight and dimensions of the system.

Dispose of the battery system in accordance with the locally applicable disposal regulations for electronic waste.

10. Extension

The SOC of the existing system and the module to be added should be similar before the module adding on the existing system.

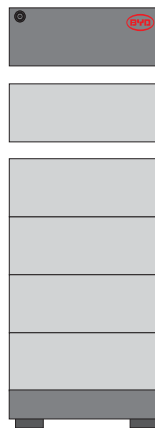
Procedure:

1. Charge or discharge the existing system to an SOC of around 30%. Note: New modules have an SOC of around 30%
2. Shut off the inverter.
3. Switch off the battery system.
4. Switch off the breaker between the inverter and the battery system if there is any.
5. Take the BCU off.
6. Add the new module on top of other battery modules.
7. Put BCU back on top of the new battery module.
8. Configure the battery system.
9. Start the inverter.

New Battery
SOC≈30%



Original Battery
SOC≈30%



Be Connect

11. Troubleshooting

Please also see the Battery-Box Premium HVL Service Guideline and Checklist for troubleshooting. The latest version is available at our website www.bydbatterybox.com.

11.1. Battery System Behavior under Fault Conditions

If blue LED flashes, and the interval time between two flashes is 1 second, which means an error happened. (When the system is initiating, the white light and blue light flash alternatively every 0.5s. That is not an error.)

The detailed designation for errors of each LED lights could be read in 11.2.

Please note that if the communication with the inverter is not established, the blue light may flash three or eleven times. So when it happens, check the communication with the inverter first.

Except the LED light, we can also get the faulty messages of the battery through the remote server. Information read through the remote server will be greater to identify the faulty than reading lights. So highly recommend to connect the battery system to the Internet.

You can also read the real time error and historical logs with the help of Be Connect Plus. (refer to 4.2 of this document)

NOTICE

Damage to the battery system due to under voltages

- If the battery system doesn't start at all, please contact BYD local after-sales service within 48 hours. Otherwise, the battery could be permanently damaged.

11.2. LED Light Designation for Errors

Blue LED is flashing once	DC cable connection incorrect
Blue LED is flashing twice	Precharge transistor or relay Faulty
Blue LED is flashing three times	BIC (battery information collector) communication failed
Blue LED is flashing four times	Fault Temperature sensor
Blue LED is flashing five times	Fault voltage sensor
Blue LED is flashing six times	Fault current sensor
Blue LED is flashing seven times	Faulty battery module
Blue LED is flashing eight times	Precharge failed
Blue LED is flashing nine times	BIC balancing failed
Blue LED is flashing ten times	Low SOC
Blue LED is flashing eleven times	BMS and BMU communication failed
Blue LED is flashing twelve times	Inverter communication failed
Blue LED is flashing thirteen times	Address registration failed
Blue LED is flashing fourteen times	System parameters loading failed

12. Maintenance and Storage

Cleaning

It is recommended that the battery system be cleaned periodically. If the enclosure is dirty, please use a soft, dry brush or a dust collector to remove the dust. Liquids such as solvents, abrasives, or corrosive liquids should not be used to clean the enclosure.

Maintenance

The battery module should be stored in an environment with a temperature range between 14 to 122 °F, and charged regularly according to the table below with no more than 0.5 C (A C- rate is a measure of the rate at which a battery is discharged relative to its maximum capacity.) to the SOC of 40% after a long time of storage.

Storage environment temperature	Relative humidity of the storage environment	Storage time	SOC
Below 14 °F	/	Not allowed	/
14~77°F	5%~70%	≤ 12 months	25%≤SOC≤60%
77~95°F	5%~70%	≤ 6 months	25%≤SOC≤60%
95~122°F	5%~70%	≤ 3 months	25%≤SOC≤60%
Above 122°F	/	Not allowed	/

NOTICE

Damage to the battery system due to under voltages







- If the battery system doesn't start at all, please contact BYD local after-sales service within 48 hours. Otherwise, the battery could be permanently damaged.

13. Disposal of the Battery System

Disposal of the system must comply with the local applicable disposal regulations for electronic waste and used batteries.

- Do not dispose of the battery system with your household waste.
- Avoid exposing the batteries to high temperatures or direct sunlight.
- Avoid exposing the batteries to high humidity or corrosive atmospheres.
- For more information, please contact BYD US.

14. Technical Data

						
	HVL 12.0	HVL 16.0	HVL 20.0	HVL 24.0	HVL 28.0	HVL 32.0
Battery Module	HVL (4 kWh, 51.2 V, 99.2 lb)					
Number of Modules	3	4	5	6	7	8
Usable Energy [1]	12 kWh	16 kWh	20 kWh	24 kWh	28 kWh	32 kWh
Max Output Current [2]	50 A	50 A	50 A	50A	50 A	50 A
Peak Output Current [2]	75 A, 3 s	75 A, 3 s	75 A, 3 s	75 A, 3 s	75 A, 3 s	75 A, 3 s
Nominal Voltage	153.6 V	204.8 V	256 V	307.2 V	358.4 V	409.6 V
Operating Voltage	120~172.8 V	160~230.4 V	200~288 V	240~345.6 V	280~403.2 V	320~460.8 V
Dimensions (H/W/D)	39.2 x23.0 x 11.7 inch	48.3 x23.0 x 11.7 mm	1411 x23.0 x 11.7 mm	1644 x23.0 x 11.7 mm	1877 x23.0 x 11.7 mm	2110 x23.0 x 11.7 mm
Weight	330.7 lb	429.9 lb	529.1lb	628.3 lb	727.5 lb	826.7 lb
Operating Temperature	14 ° F and 122°F					
Battery Cell Technology	Lithium Iron Phosphate (cobalt -free)					
Communication	CAN/RS485					
Enclosure Protection Rating	IP55					
Round-trip Efficiency	≥96%					
Certification	UL 1793 / IEC62619 / FOC / UN38.3					
Applications	ON Grid / ON Grid + Backup / OFF Grid					
Warranty [3]	10 Years					
Compatible Inverters	Refer to BYD Battery -Box Premium HVL Compatible Inverter List					
Battery designation	IFpP/47/174/122/16S/M/ -20+50/90					

[1] DC Usable Energy, Test conditions: 100% DOD, 0.2C charge & discharge at 77°F. System Usable Energy may vary with different inverter brands .

[2] Charge derating will occur between 14°F and 41°F.

[3] Condition apply. Refer to BYD Battery-Box Premium HVL Limited Warranty.

15. Contact Information

BYD USA Service

bboxusservice@byd.com

Telephone: +1(833) 338 -8721

BYD Global Service

bboxservice@byd.com

Telephone: +86 755 89888888 -47175

Address: No. 3009, BYD Road,
Pingshan, Shenzhen, 518118, P.R. China

www.bydbatterybox.com

Social media link

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

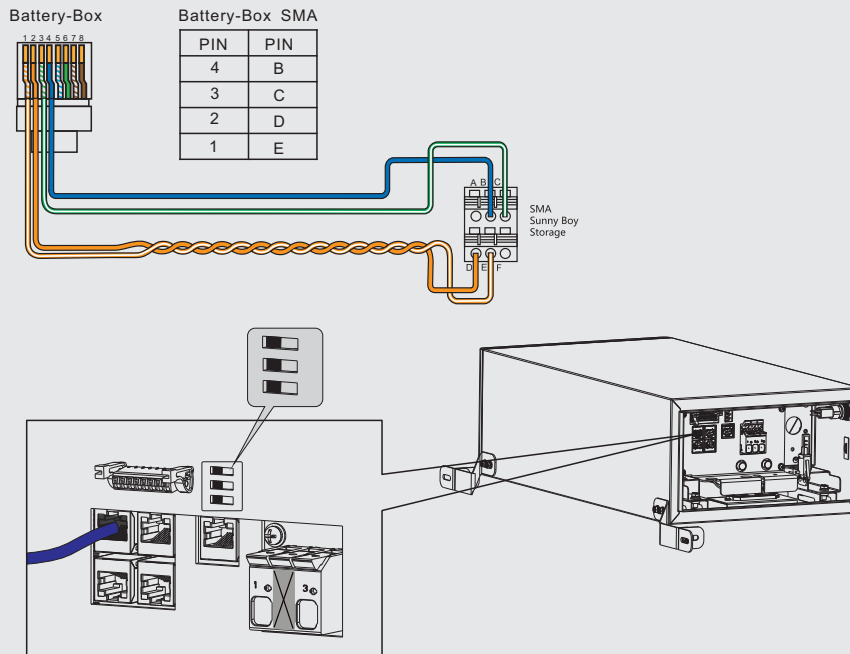
https://twitter.com/BYD_BatteryBox

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

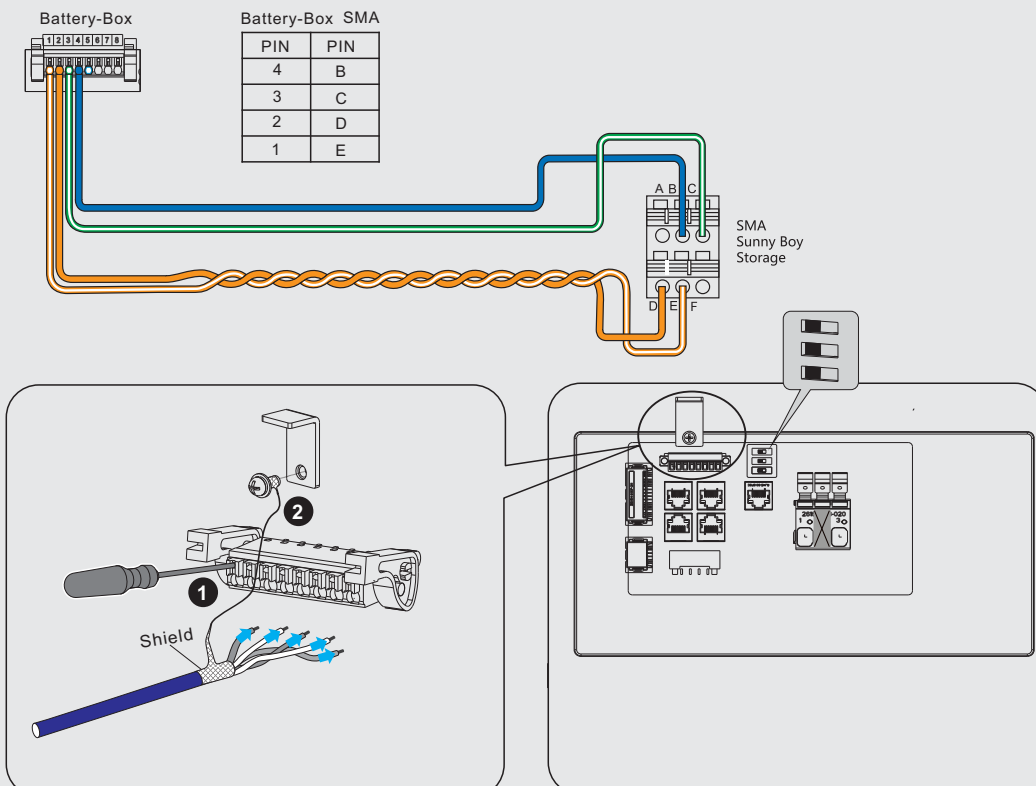
Appendix Connection Options with Inverters

Please first check if the planned configuration is already released according to the latest Battery -Box Premium HVL Compatible Inverter List, before the installation.

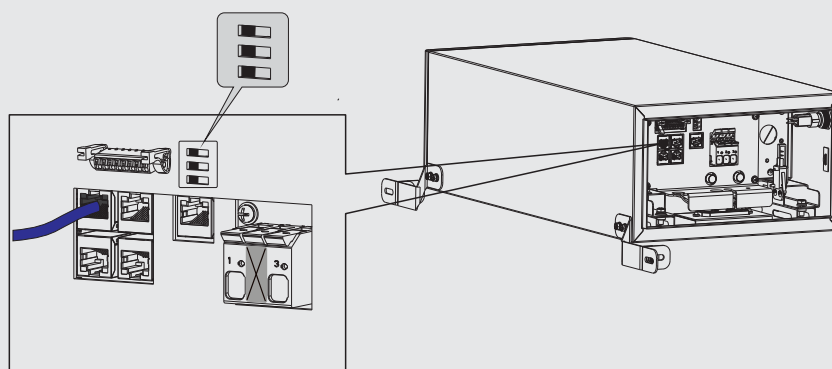
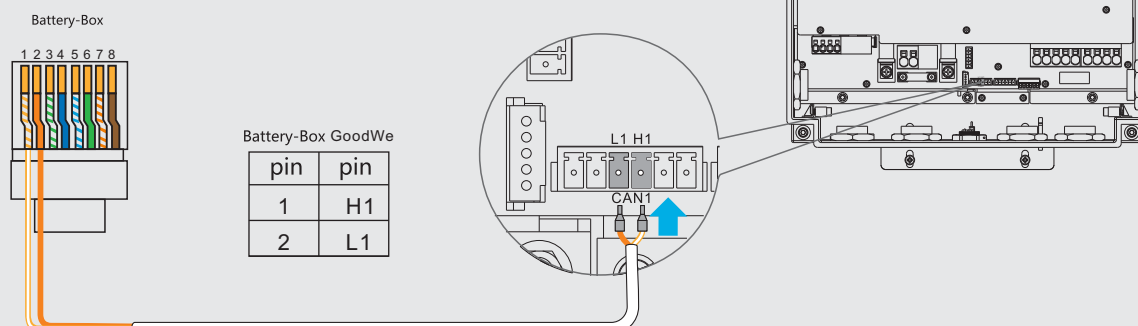
2a SMA SBS 3.8-US/5.0-US/6.0-US Option a



2b SMA SBS 3.8-US/5.0-US/6.0-US Option b



2c GOODWE A-ES series option a



2d GOODWE A-ES series option b

