Battery-Box Premium

Operating Manual

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



Be Connect 2.0

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BYD AMERICA LLC V1.3

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This operating manual is in accordance with the Technical Documentation section, Section 17 of NFPA 79, or CSA C22.2 No. 301. The Instructions for installation, operation and maintenance of the battery systems should address electrical safety including arc flash in accordance with NFPA 70E or CSA Z462.

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BYD AMERICA LLC

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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 3.16 and BMS 3.24.

1.2. Target Group

The instructions in this document may only be performed by a qualified person 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
- Trained in dealing with the hazards associated with the installation and operation of electrical equipment and batteries
- Trained 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 is not due to non-compliance.

1.3. Content and Structure of this Document

This document contains safety information and instructions, scope of delivery, battery system overview, installation, electrical connection, commissioning, operation, decommissioning, extension, troubleshooting, maintenance and storage, disposal of the battery system, technical data and contact information. 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 USA directives. 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 with this symbol indicates actions only to be performed by a qualified person.

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	BYD America LLC
SOC	State of Charge

2. Safety

2.1. Intended Use

The battery system is for residential use and works with a photovoltaic system. It is a high voltage Li-ion battery storage system, with a 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 a 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 occur 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 is granted. Unauthorized alterations will void the guarantee and warranty claims. BYD 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 the 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, please perform the following 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 their 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 modules into the fire.
- Do not soak the battery modules in water or seawater.
- Do not expose the battery modules 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 they are defective, or appears cracked, broken or otherwise damaged, or fail 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 inverter 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 the weight of the battery module

Injuries may occur 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.

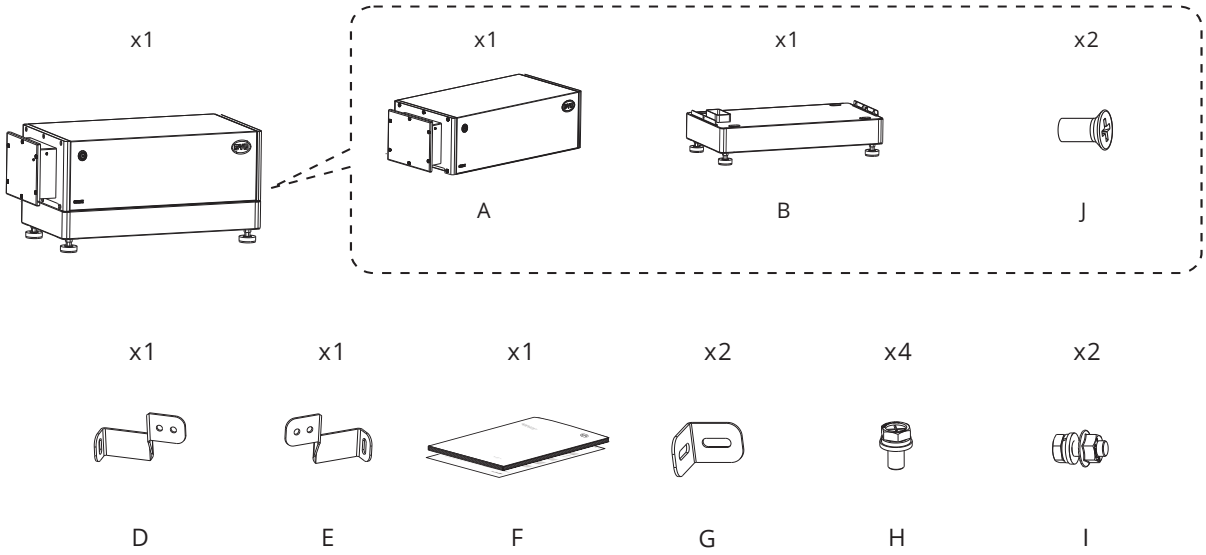
NOTICE

Damage to the battery system due to under voltages

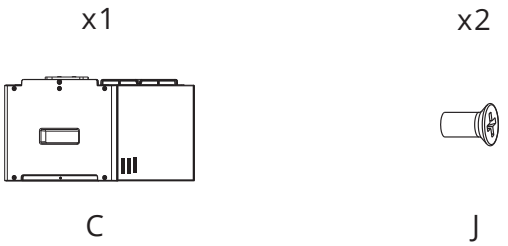
- If the battery system doesn't start at all, please contact BYD's local after-sales service team within 48 hours. Otherwise, the battery could be permanently damaged.

3. Scope of Delivery

BCU and Base Package



Battery Module Package

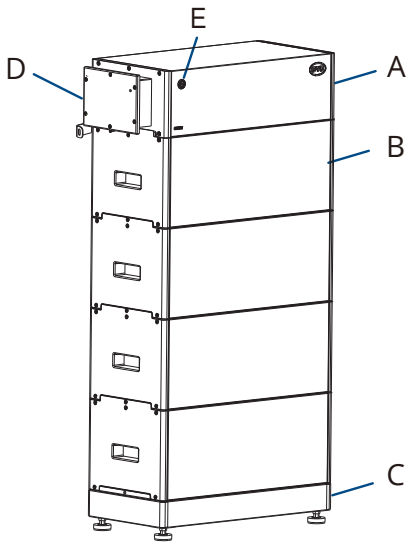


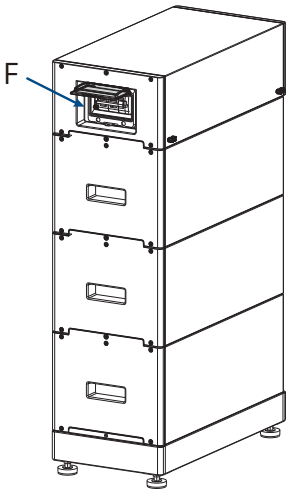
A	BCU
B	Base
C	Battery Module
D	Hanger (BCU Part Left)
E	Hanger (BCU Part Right)
F	Documents (Quick Start Guide, Compatible Inverter List, Packing List)
G	Hanger (wall part)
H	M5 screw to fix D/E on BCU
I	M6 bolt and nut to fix D and G
J	M4 x 14 countersunk screw for fixing the modules, base and BCU together

4. Battery System Overview

4.1. Battery System Description

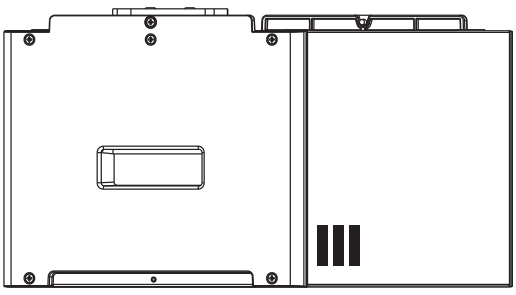
The Battery-Box Premium HVL is used as a connected battery for the intermediate storage of excess PV energy in an inverter system.

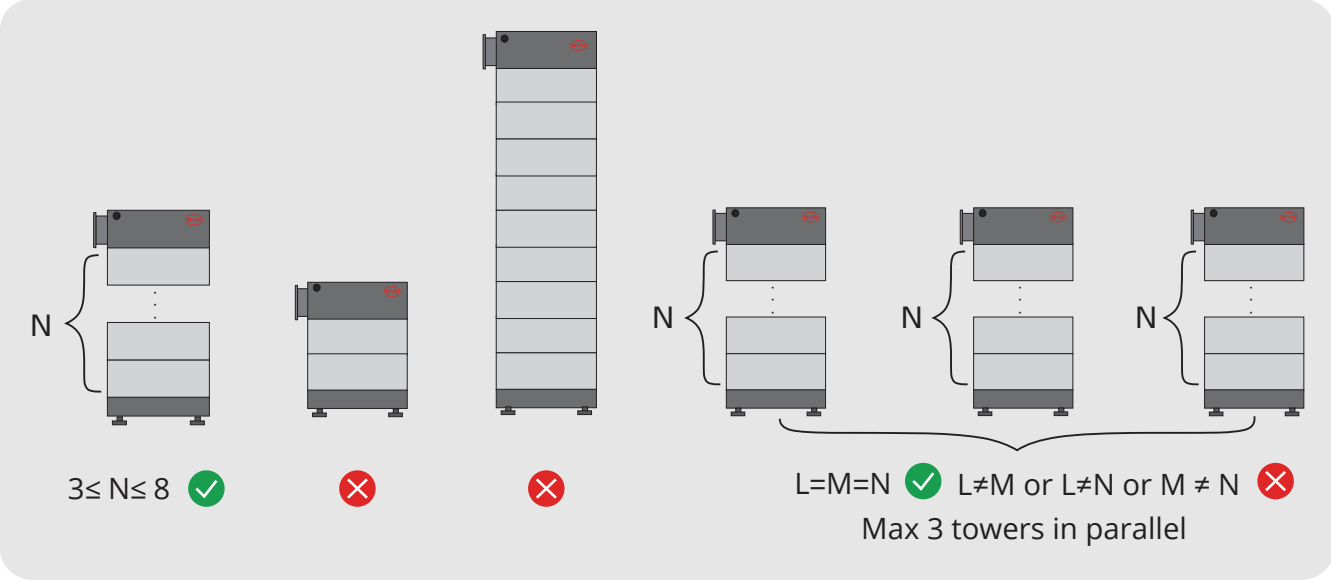




A	BCU
B	Battery module
C	Base
D	Operating panel
E	LED button
F	Air switch

There are three stripes printed on the module.





Three to eight HVL battery modules could be stacked in one tower. Maximum three battery systems could be connected in parallel.

4.2. Interface

Be Connect 2.0

Be Connect 2.0 is an app for Android and iOS system devices, which can be downloaded from Google Play or App Store. (Please search Be Connect 2.0 or scan the QR code on the cover of this document)

With Be Connect 2.0, you can update the firmware, configure the battery system, read the battery status and events, upload logs to the server, etc.

Be Connect Plus

Be Connect Plus (BCP) is a PC app, which can be downloaded from our website (https://www.bydbatterybox.com/downloads).

With BCP, you can configure and diagnose the battery system, read the general battery status information and events, update the firmware, download historical events, etc.

Be Connect Monitoring

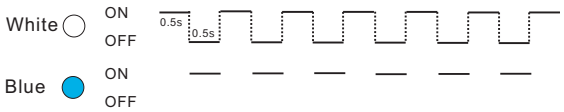
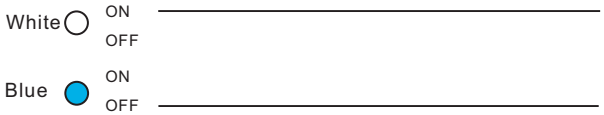
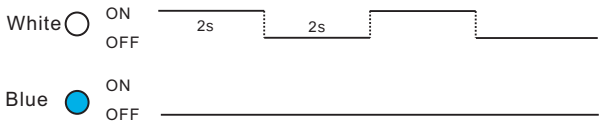
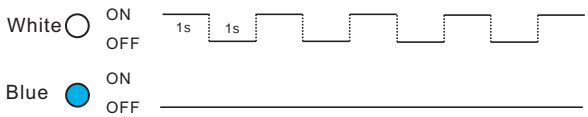
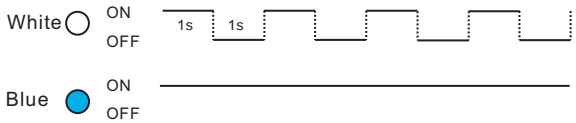
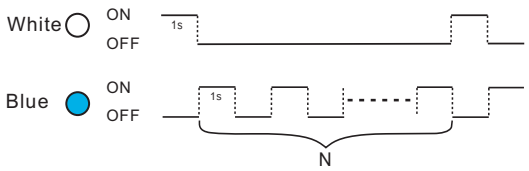
The battery system is equipped with an "Ethernet" port as a standard. When your battery accesses the internet, it will join the Be Connect Monitoring, which is a platform that BYD's service team could diagnose the battery system and update firmware remotely for customers. It is highly recommended you make the internet connection available 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.
	Disposal Do not dispose of the system together with household waste. Please contact BYD's Service (contact information at the end of this document) to dispose of it in accordance with regulations for electronic waste and used batteries.
	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 shock. .
	Beware of the 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.

SGS c us 801043	North America Listed Mark from SGS.
	Do not short-circuit.

4.4. LED Signals

Blinking white and blue alternatively		The battery system is initiating.
Solid white		Idle (the battery system is neither charging nor discharging).
Blinking white slowly		The battery system is charging.
Blinking white quickly		The battery system is discharging.
Blinking white and solid blue		The battery system is discharging, and the SOC is below 15%.
Blinking white and blue		An error has occurred (refer to the Service Guideline and Checklist for further details).

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 close to the heat sources.

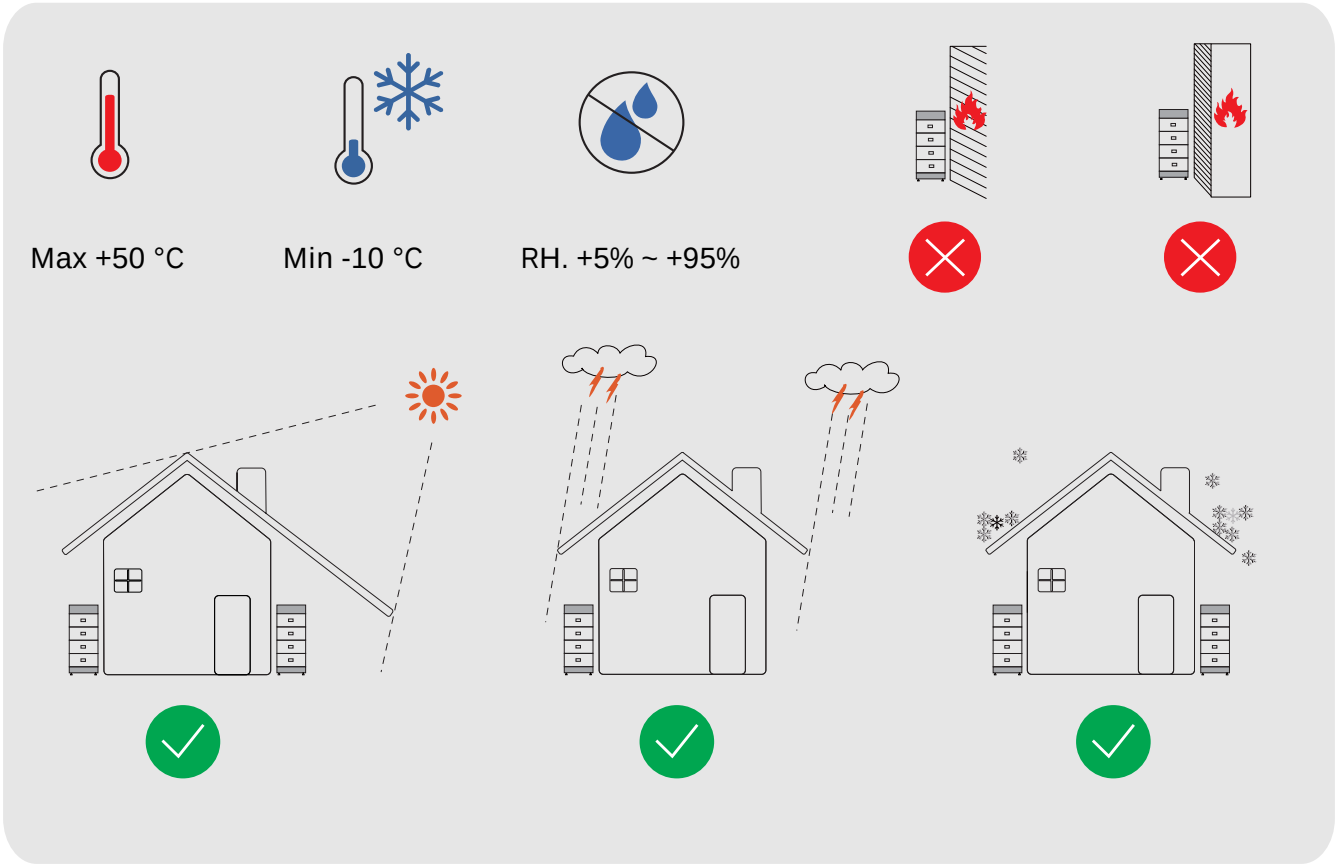
e) The altitude of the installation location should be less than 9843 ft.

f) The ambient temperature should be between 14 °F to 122 °F.

g) The ambient humidity should be between 5-95%.

h) For indoor residential use, battery systems are only intended to be installed in attached or detached garages, sheds, enclosed utility closets, basements, storage or utility spaces within dwelling units and are not intended for installation in habitable spaces and livings spaces in dwelling units.

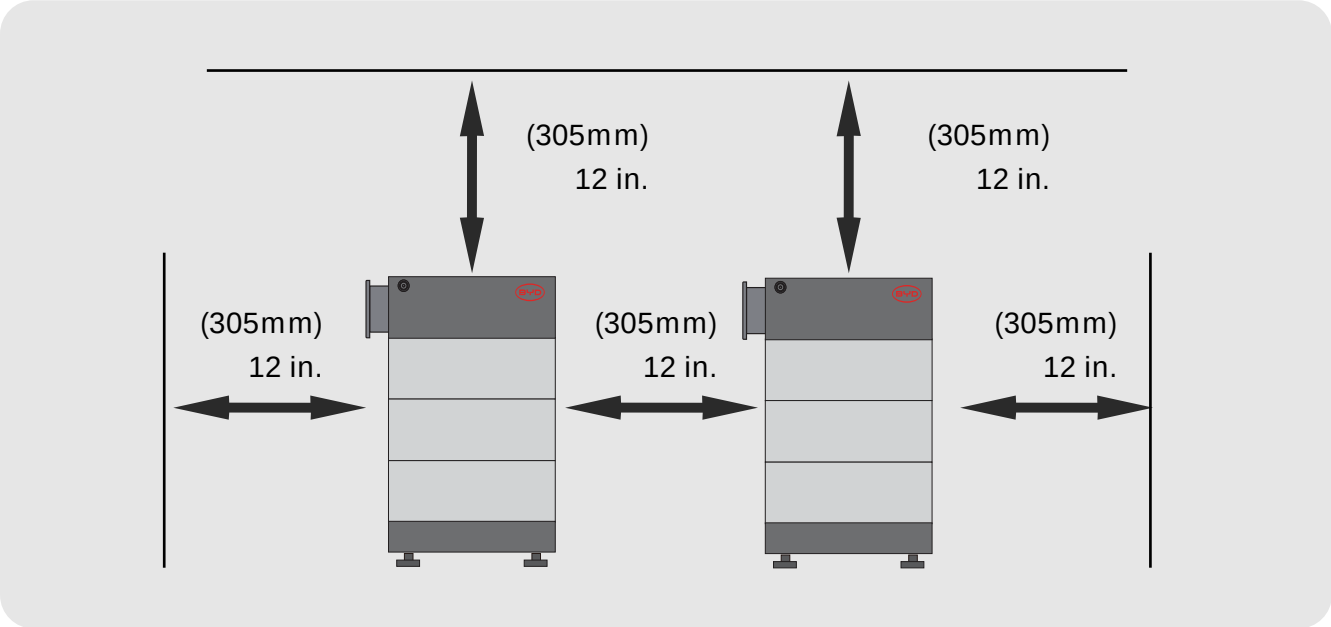
i) For outdoor residential use, battery systems should not be exposed to the direct solar irradiation, rainwater and snow





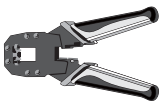
5.1.2. **Requirements for Installation** Space

For multiple towers installation, a minimum of 305 mm (12 in.) should be reserved between per battery tower or openings (e.g. windows, doors, HVAC inlets or other operable openings), and a minimum of 508 mm (20 in.) should be reserved in the front of the battery towers. Other clearances, please refer to following figure. Note: If any requirement doesn't comply the local standards or directives, please take the local standards or directives into account.



5.1.3. Tools

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



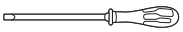
Network Wire Clamp



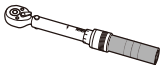
Pen



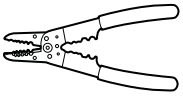
Phillips Screwdriver Bit



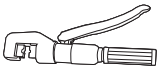
Flat-Head Screwdriver



Torque Wrench



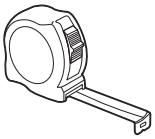
Wire Stripper



Crimping Plier



Wrench



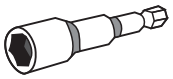
Tape Measure



Drill



Hair dryer



Cylinder Screwdriver

5.1.4. Safety Gear

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



Insulated gloves



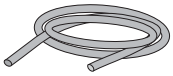
Safety goggles



Safety shoes

5.1.5. Additionally Required Installation Materials

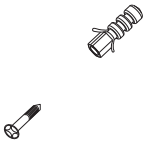
x2



K

DC Cable

x2



L

Expansion Anchor Bolt (M8x40)



M

Cat5 Shield

x1



N

PE Terminal

x1



O

PE

x1



P

Heat Shrink Tubing

5.2. Installation

⚠ QUALIFIED PERSON

⚠ DANGER

Danger to life due to electric shock resulting from 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 inverter is disconnected from all voltage sources.

⚠ CAUTION

Risk of injury due to the weight of the battery module

Injuries may occur 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.

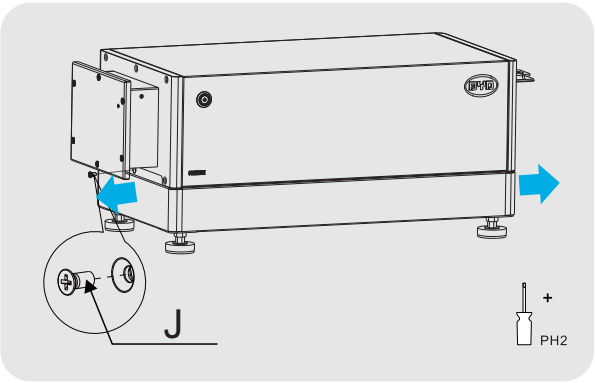
Additionally required installation materials (not included in the scope of delivery):

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

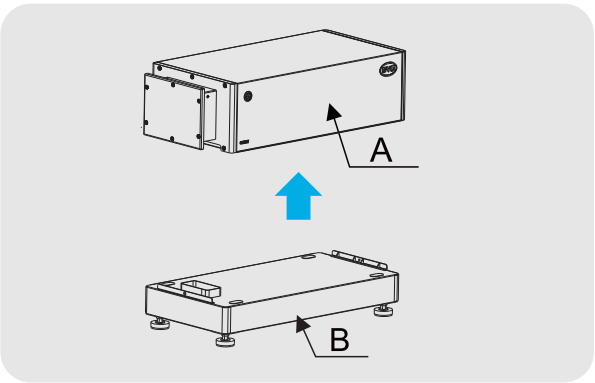
Procedure:

1. Take the BCU and base out of the package.

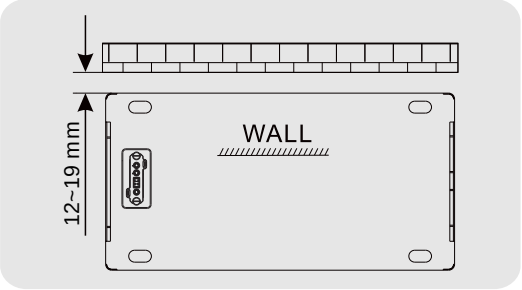
2. Loose the two screws with screwdriver PH2.



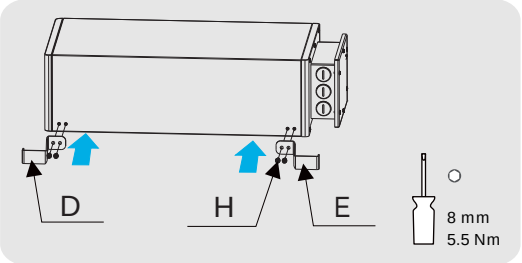
3. Remove the BCU from the base.



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



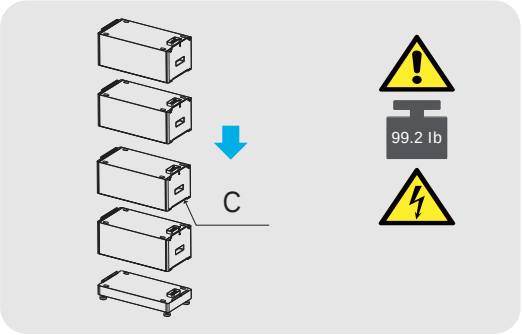
5. Take a battery module out of the package and mount it on the base. Pay attention to the direction of the module. The blind-mate connectors on the battery module and the base should be on the same side.



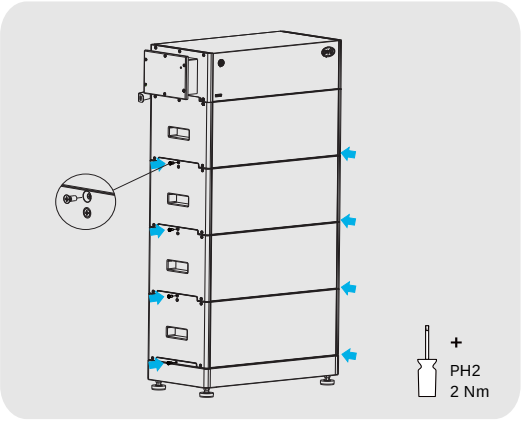
6. Repeat the operations for other battery modules.

7. Install the hanger (BCU part) to the BCU with screws (M5x14) using a cylinder screwdriver (8 mm (5/16 in)) and tighten them (torque: 5.5 Nm /48.68 lbf in).

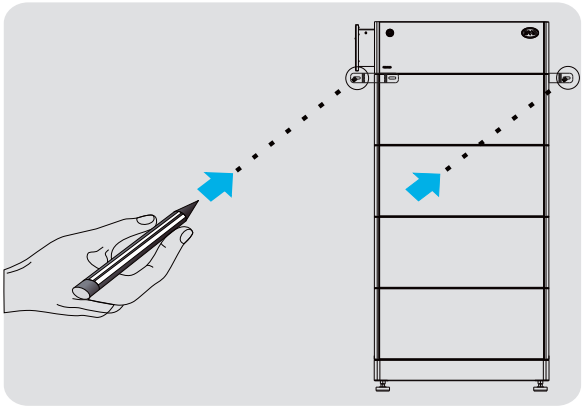
8. Mount the BCU on the top of the battery modules. It's recommended to connect cables on the BCU first when five or more battery modules are needed to be installed in one tower.



9. Tighten the screws (M4x14) connecting the battery module and the base, battery nodules, BCU and battery module 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.

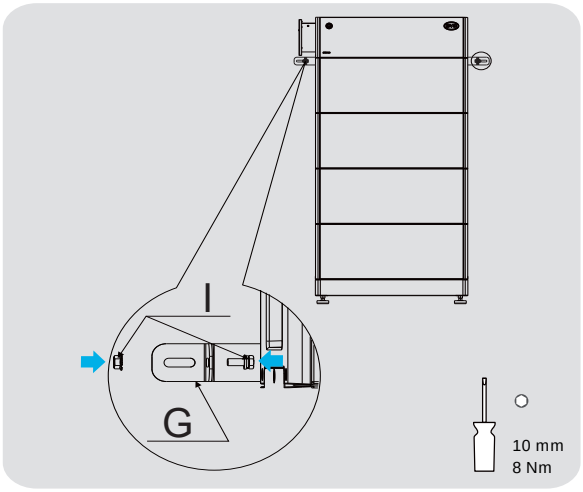


11. Put the hanger aside and drill the marked holes.

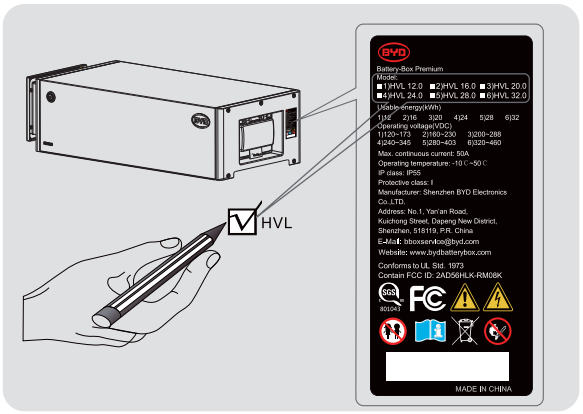
12. Insert screw anchors into the drill holes if the support surface requires them.

13. Secure the hanger using screws (M8x40 is recommended).

14. Tight 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

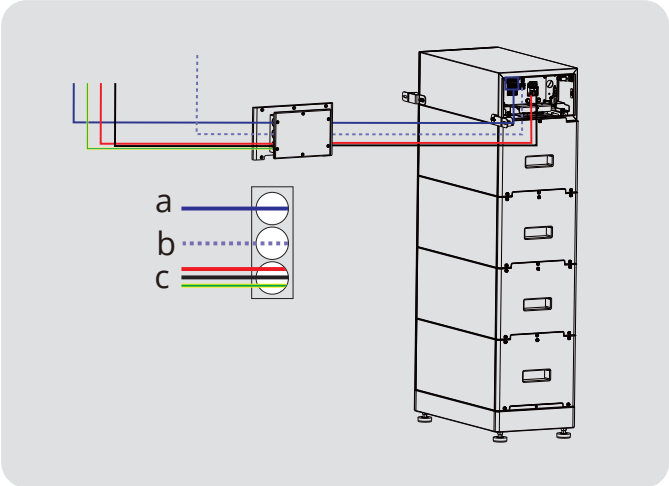
Damage to the battery system due to under voltages

- 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

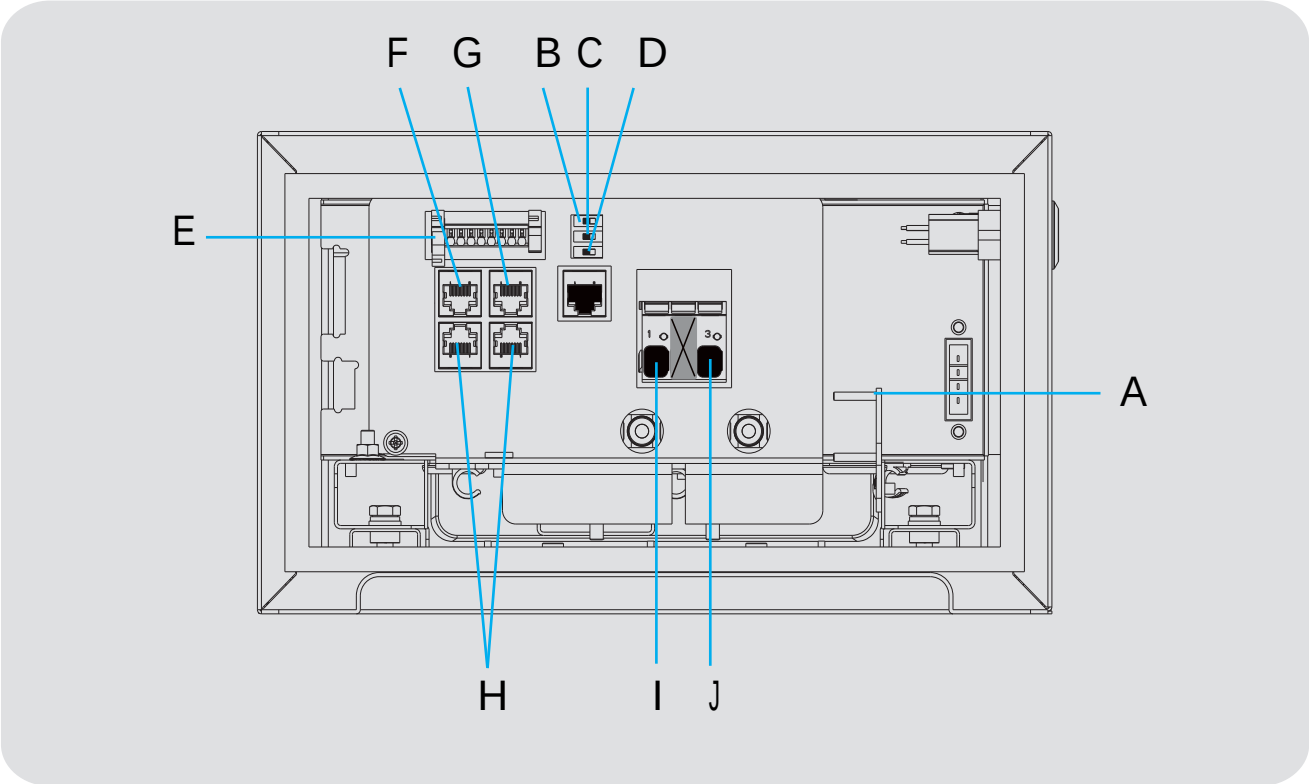
6.1. Overview of the Connection Area

Exterior view



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

Interior View



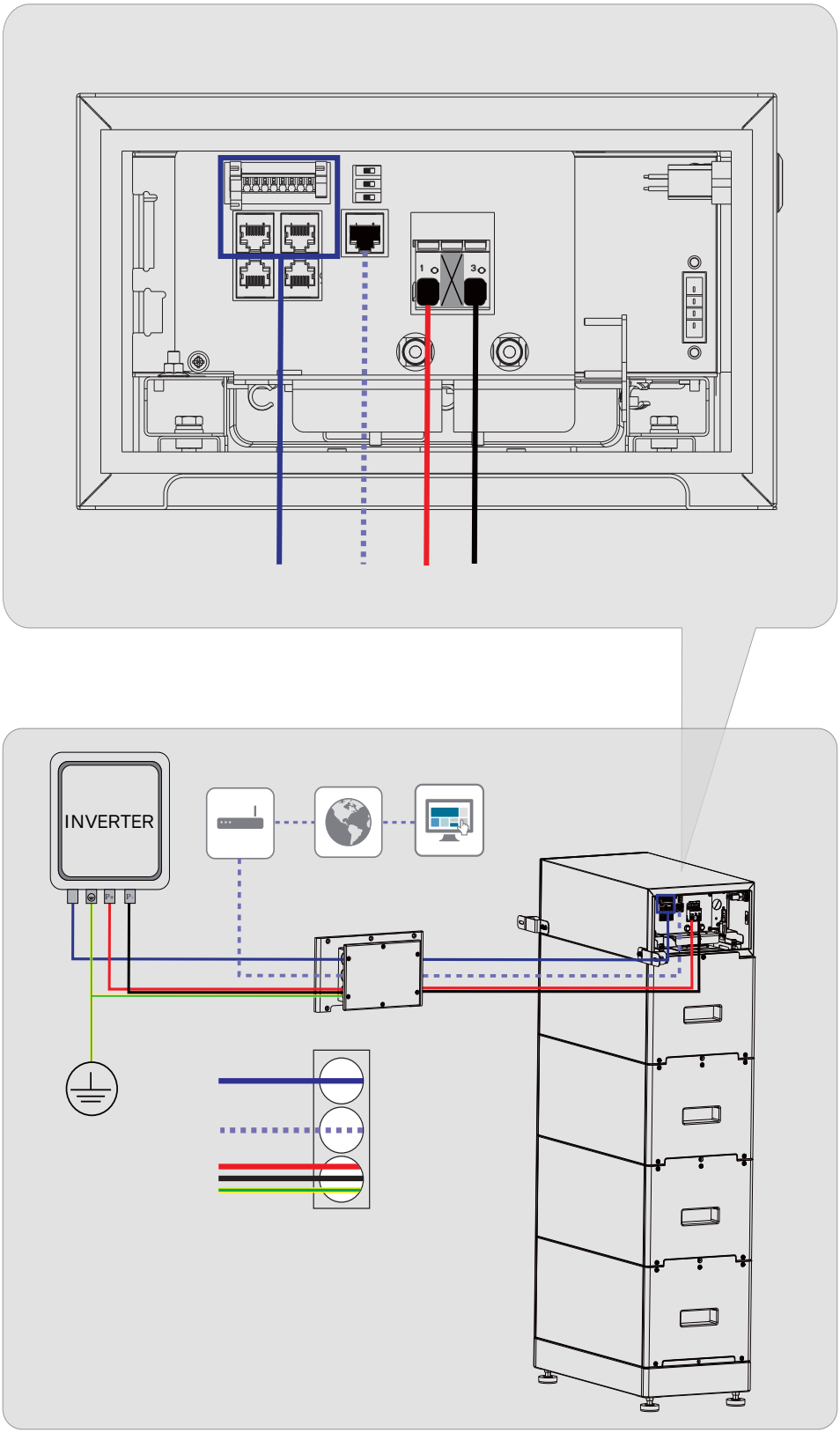
A	Panel open sensor
B	Dip switch for communication with the inverter (CAN protocol)
C	Dip switch for communication with the inverter (RS485 protocol)
D	Dip switch reserved for parallel connection
E	8-pin terminal block for connecting an inverter’s data cable. (CAN or RS485 protocol)
F	RJ45 port for connecting an inverter's data cable. (CAN protocol)
G	RJ45 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 an Ethernet cable is recommended, not compulsory.

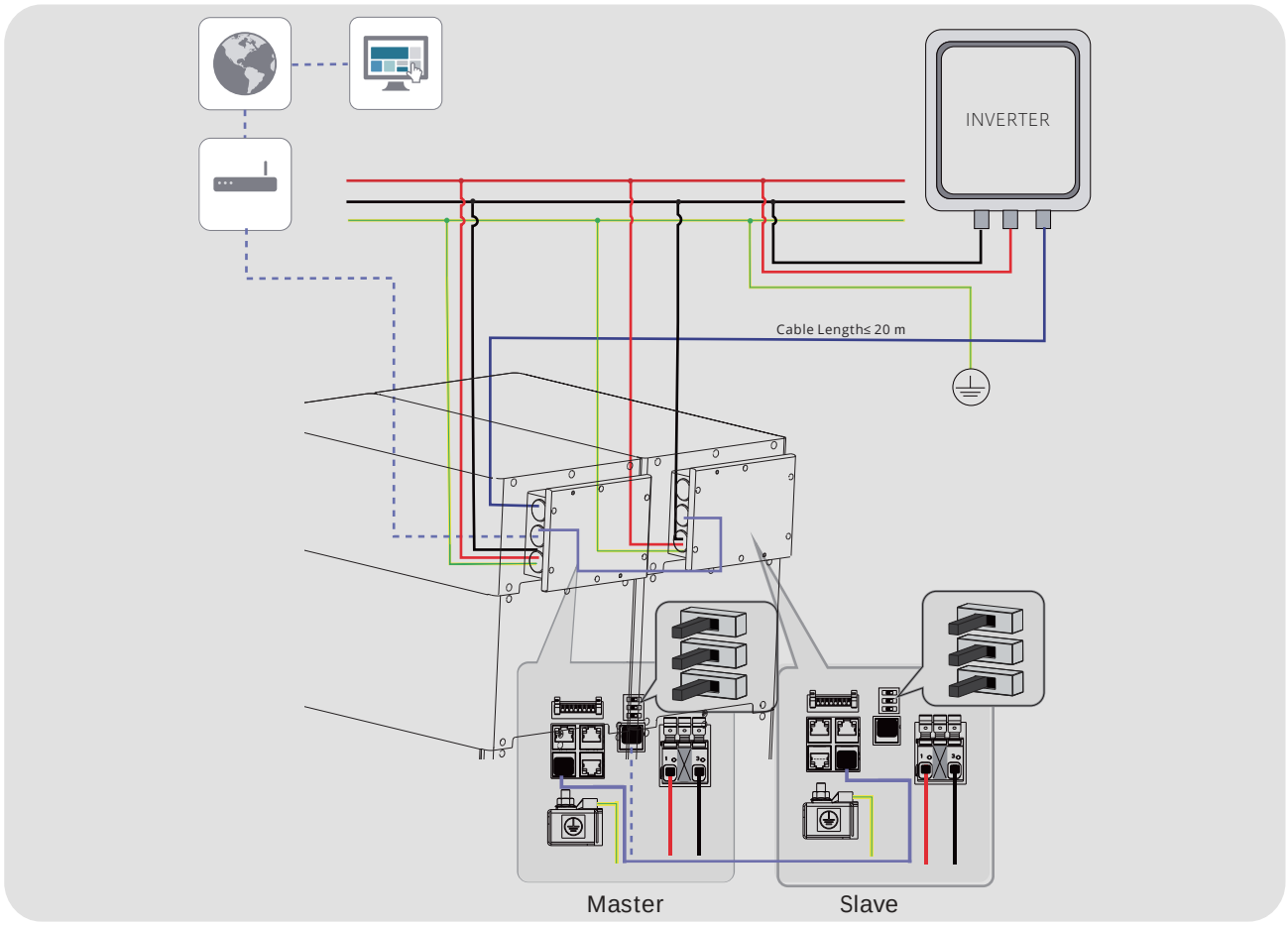
There are different methods to connect a inverter with the battery system. You can choose the suitable one for you.

6.2. Connection Diagram

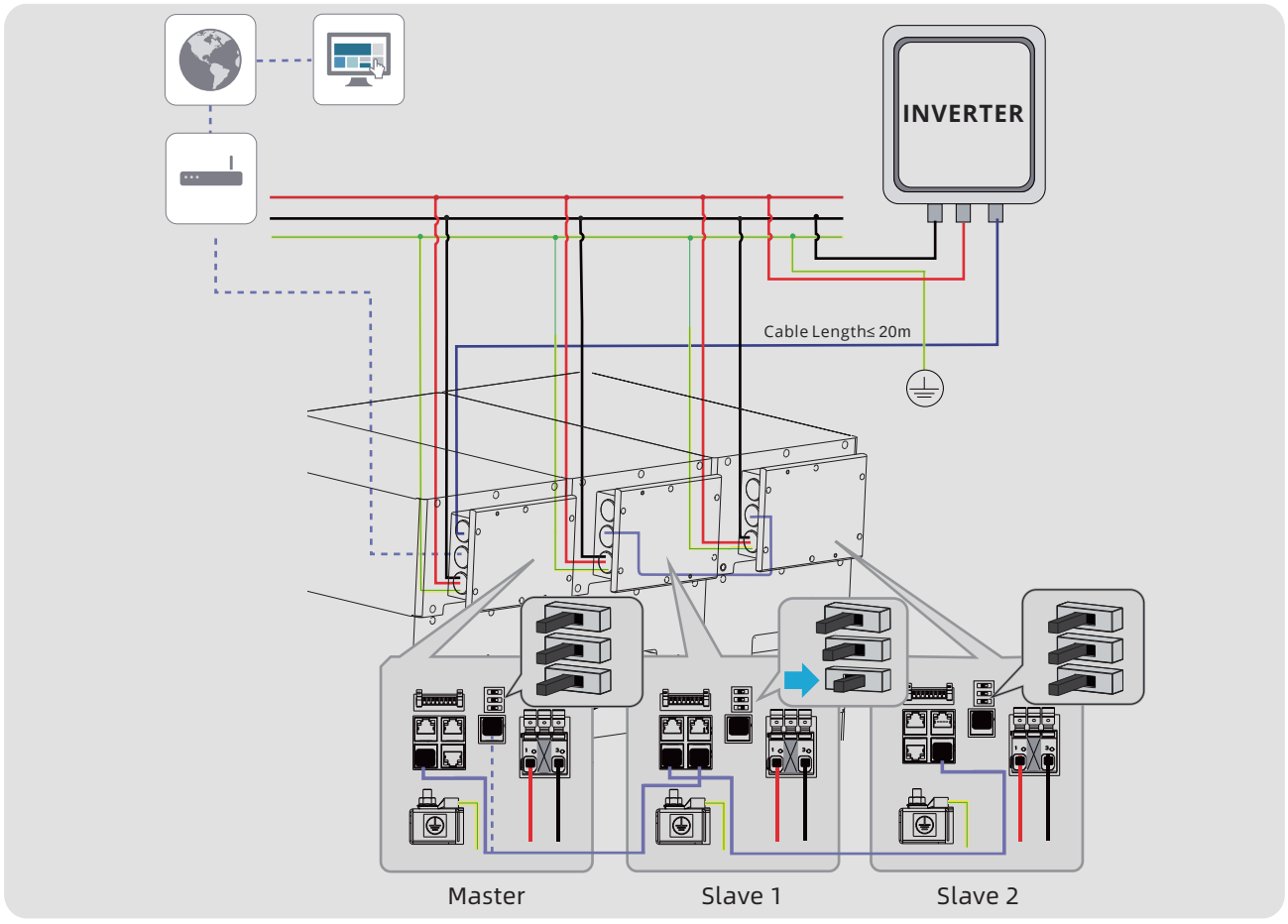
6.2.1. One Battery System



6.2.2. Two Battery Systems



6.2.3. Three Battery Systems



6.3. PE and DC Cables Connection

⚠ QUALIFIED PERSON

⚠ DANGER

Danger to life due to electric shock resulting from 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 inverter is disconnected from all voltage sources.

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

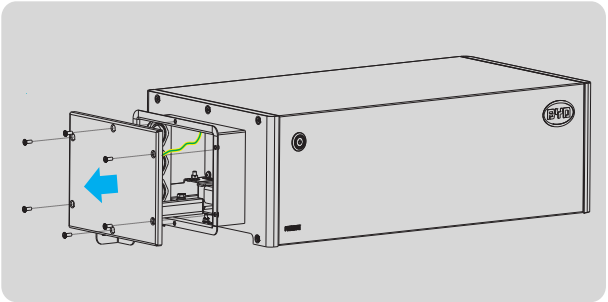
a) Rigid Conduit (3/4" conduit size punch)

b) Grounding cable (with terminal) cross-section, 10 mm^2/17 AWG. Recommend terminal size, 5 mm (13/64 in)

c) Two DC power cables

DC cable Requirement

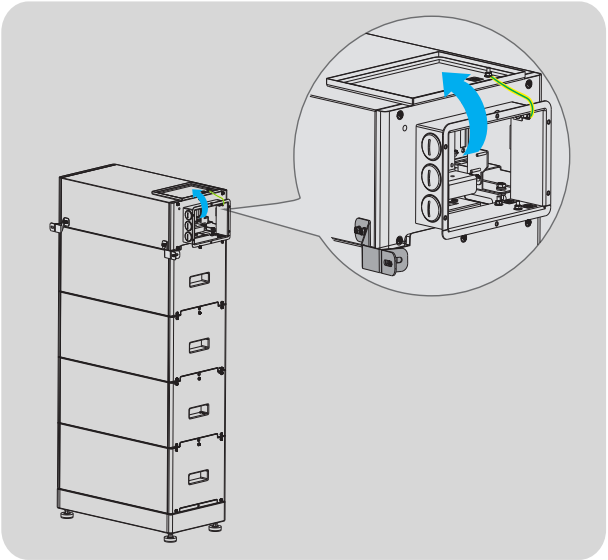
- Conductor cross-section: 6 mm^2 (9 AWG)-16 mm^2 (5 AWG). The diameter of the cable should be between 4 mm (5/32 in) to 9 mm (23/64 in). Follow the requirements of the inverter manufacturer.
- Insulation stripping length: 16-18 mm(41/64-45/64 in)
- Maximum cable length: 8 m (5/16 in)



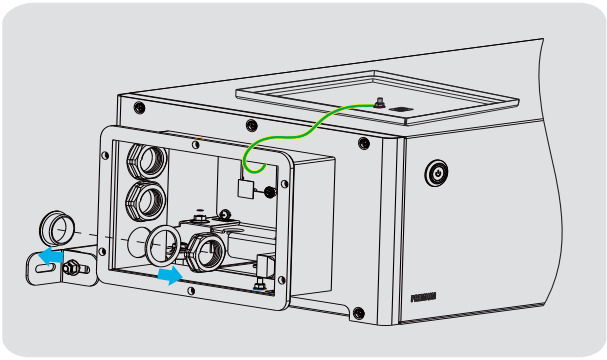
Procedure:

1. Make sure the air switch of BCU is off.
2. Use a Phillips screwdriver PH2 to take off the operating panel of BCU.

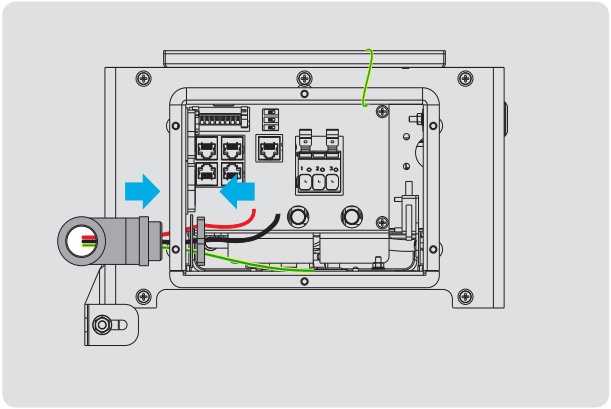
   Attention: Bonding wire connected to this access panel internally. Take care when removing the access panel.
3. Put the operating panel on the BCU.



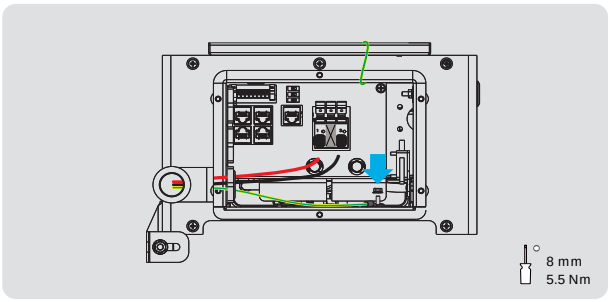
4. Remove the original plastic cover from the bottom hole.



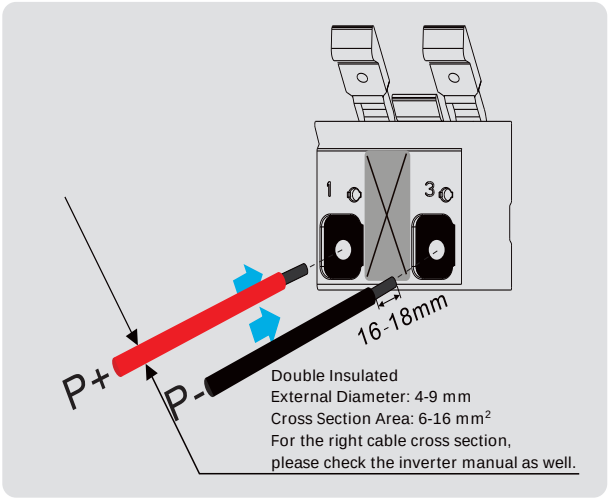
5. Get the cables through the conduit, and fix it on the BCU.



6. Loose 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 an 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

⚠ QUALIFIED PERSON

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

a) One data cable

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

Data cable requirements:

The length and quality of the cable will affect the quality of the signal. Please 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.

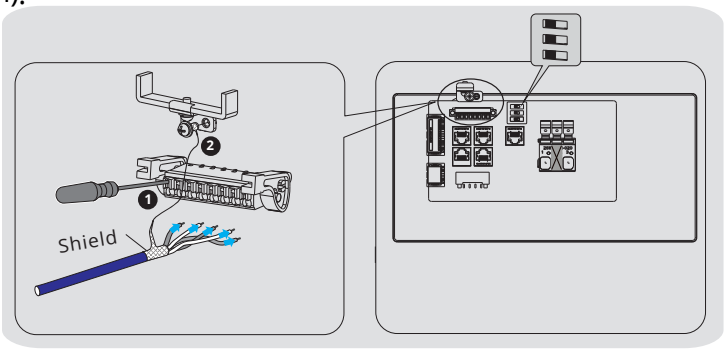
For connection with some inverters, if the data cable goes together with the power cable, it should be 22 AWG, 600V insulated.

Procedure:

1. Remove the original plastic cover from the top hole.
2. Get 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 by 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 them 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 block. Pay attention to the assignment of the terminal block and communication connection on the inverter.

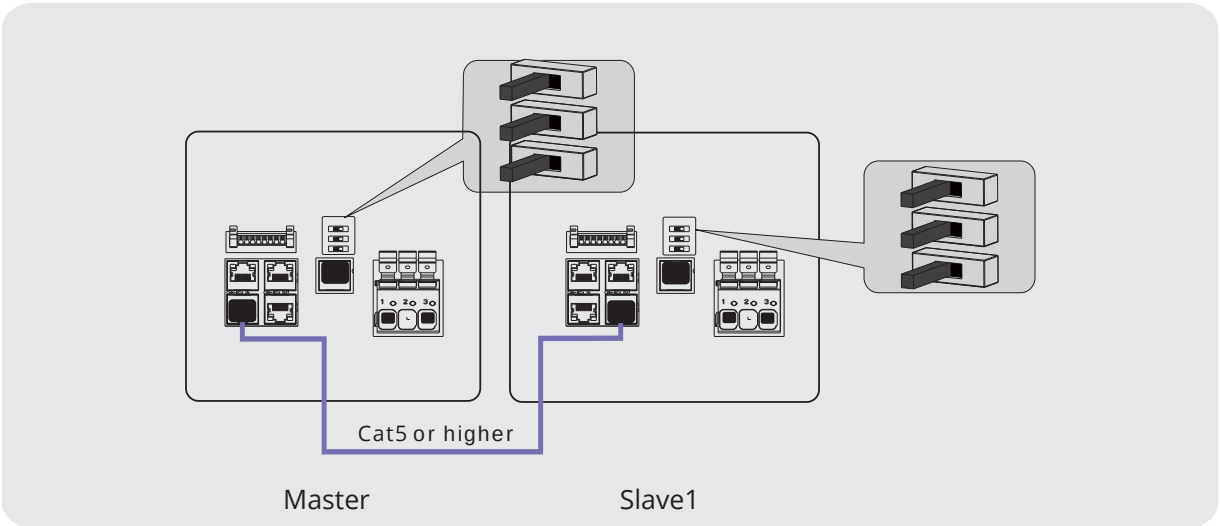
   Make sure that the conductors are plugged into the terminal points tightly by pulling slightly on the conductors.
7. Ground the shielding to the screw above.

6.5. Connecting the Data Cable to other Battery System(s)

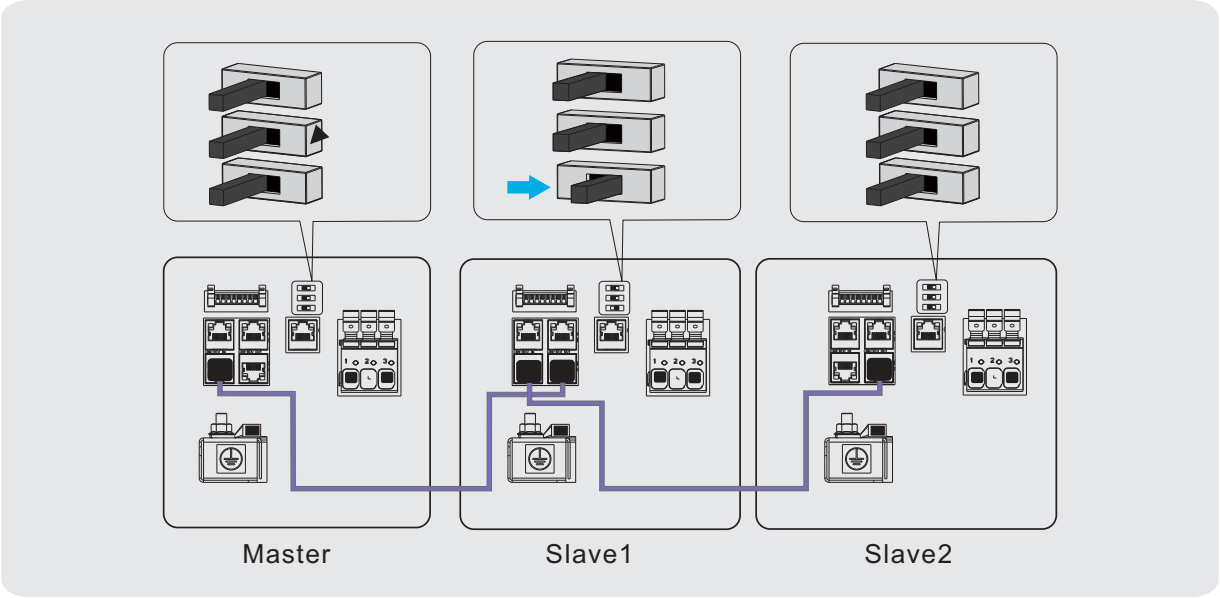
⚠ QUALIFIED PERSON

This connection could only need to be made when two or three battery systems are connected in parallel.

The connection diagram of two battery systems could be read below.



The connection diagram of three battery systems could be read below.



6.6. Connecting the Network Cables

⚠ QUALIFIED PERSON

⚠ 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 inverter 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):

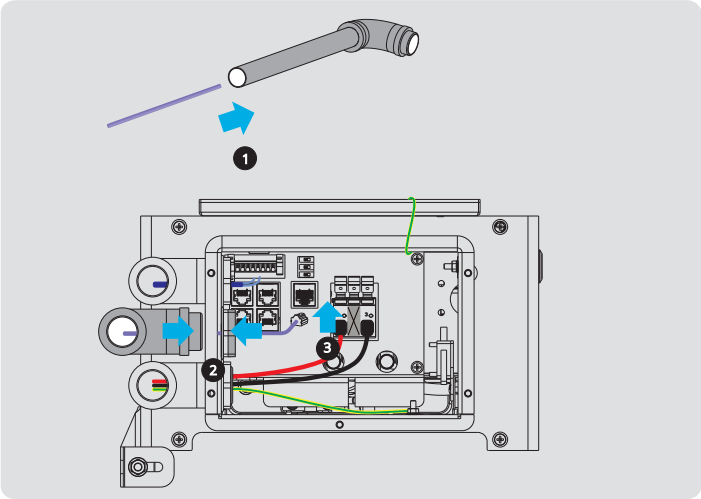
a) One data cable

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

Data cable requirements:

The length and quality of the cable will affect the quality of the signal. Please 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. Get the data cable through the conduit, and fix it on the BCU.
3. Plug the cable to the corresponding RJ45 port.

6.7. Close up

Procedure:

Fix the Operating Panel. To do this, insert the screws (M4x14) 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

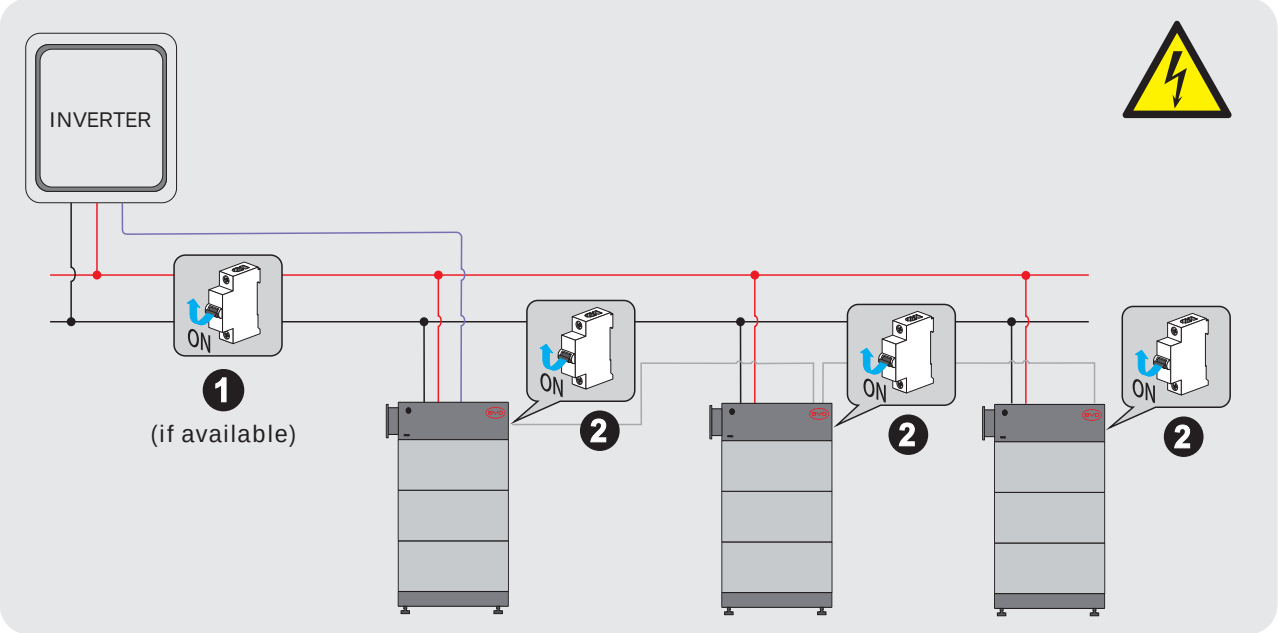
7.1. Switch on the Battery System

⚠ QUALIFIED PERSON

Requirements:

- The power cable connection between the battery system and the inverter must be 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 blink (0.5 s white and 0.5 s blue alternately) for a while, and then turns white, which means the battery system is ready to work.
5. If it 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 team within 48 hours.

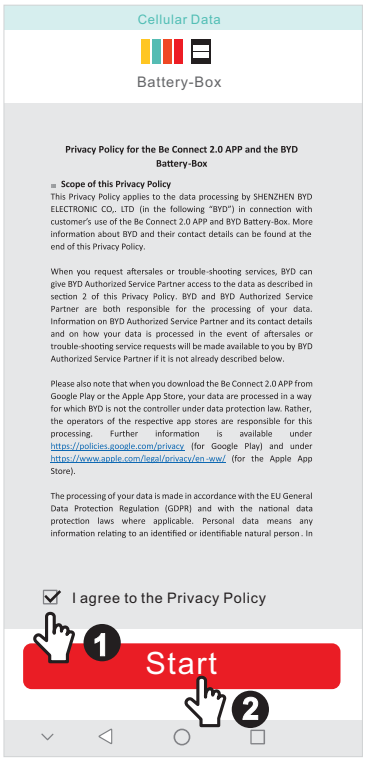
7.2. Configure the Battery System

⚠ QUALIFIED PERSON

Procedure:

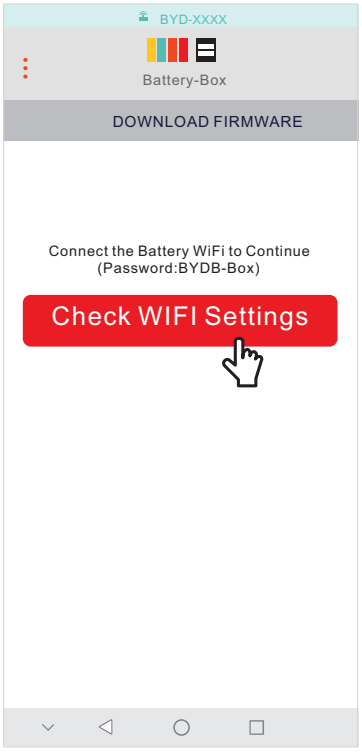
1. Download **Be Connect 2.0** from Google Play or App Store. The battery system requires the latest version of firmware to operate. So please make sure you have downloaded the latest firmware in your device (cell phone, Ipad, etc.), or your device could access the internet during configuration.

2. Tick the box in front of "I agree to the Privacy Policy", and then tap the "Start" button.

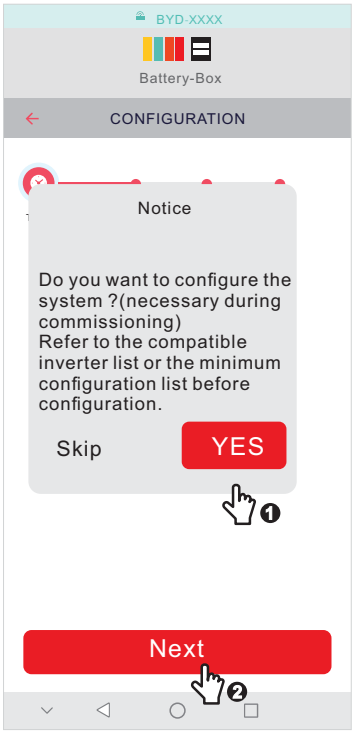


3. The app will check the firmware, and download it when the internet is available. If there is no internet available, you can tap "Skip" to skip the firmware checking.

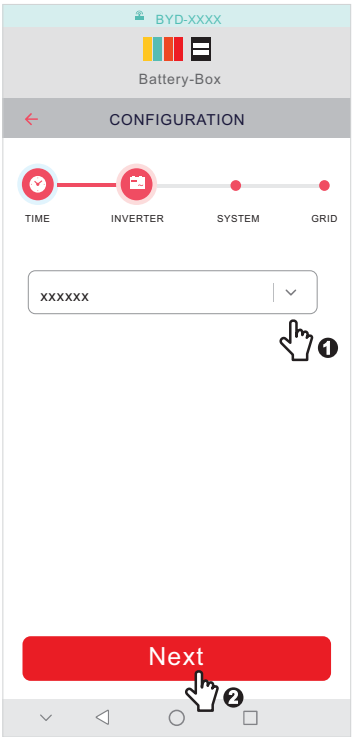
4. After downloading the firmware, tap the button "Check WIFI Settings" to connect Wi-Fi of the battery, which begins with "BYD-", and the full name could be found at the BCU label near the air switch.



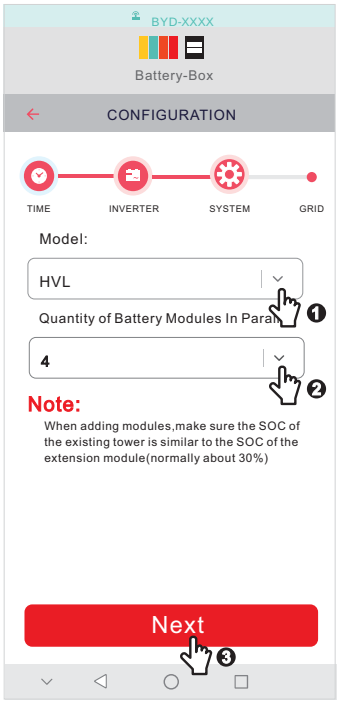
5. The app will update the firmware automatically. After that, a notice will pop up. Tap "Yes" if you need to configure the battery system, and then tap "Next" on the "Time Confirm" page.



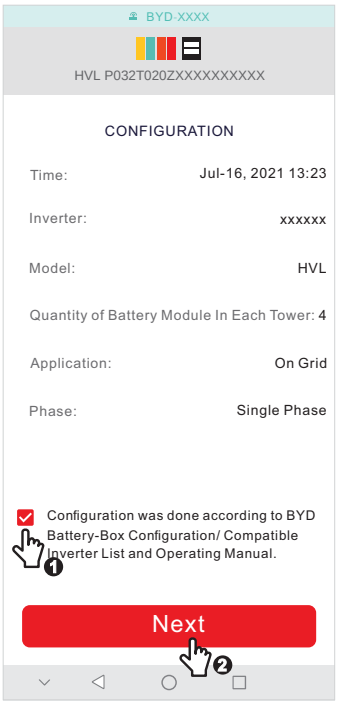
6. Choose the inverter brand which will operate together with the battery system.



7. Choose the battery system model, HVL. And then, set how many battery modules are installed per tower.



8. Check the summary of the configuration information. If no problem, tick the sentence, and tap "Next", otherwise, go back and do the configuration again.



Note:

1. Restart the Be Connect 2.0 if it is stuck somewhere.
2. 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** the Inverter **and Commission**ing

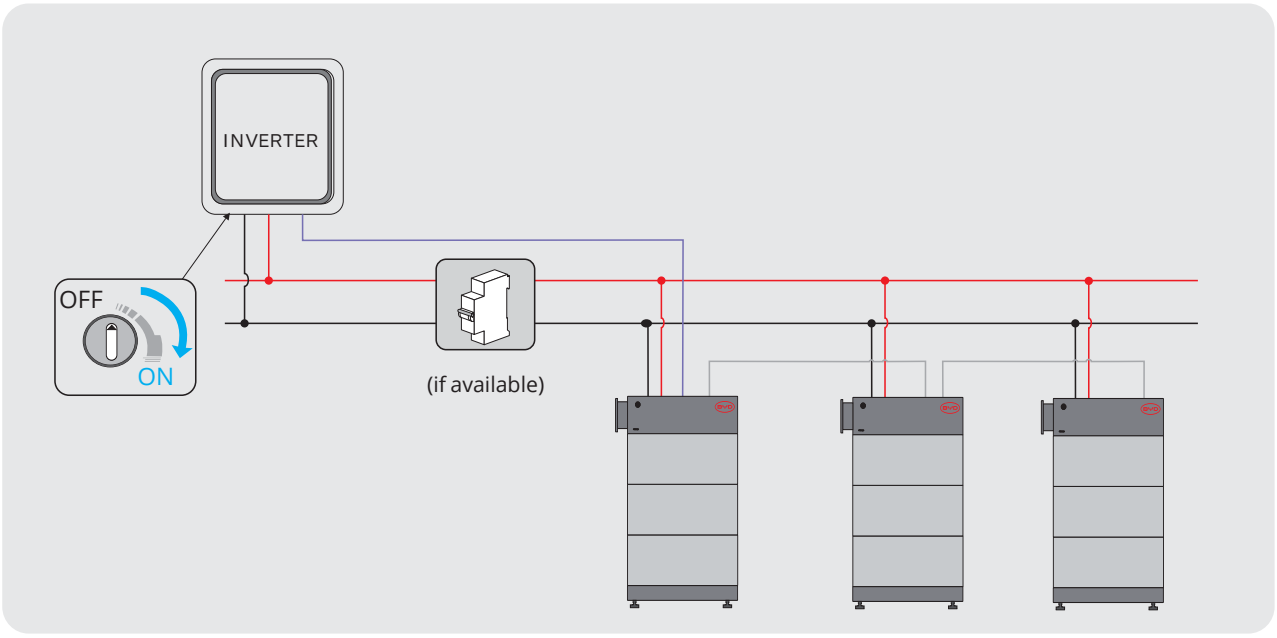
⚠ QUALIFIED PERSON

Procedure:

1. Mount and connect the inverter according to the inverter manufacturer's instruction.
2. Switch on the inverter.
3. Configure the inverter and do the commissioning according to the inverter manufacturer's instruction.

If the battery information could be read correctly at the inverter, it means the connection is all right.

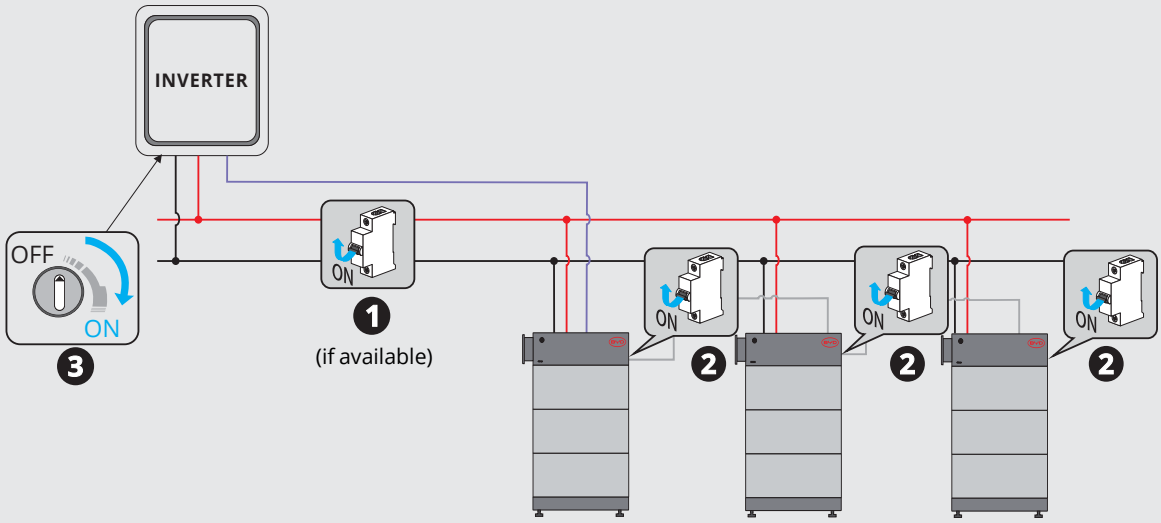
If LED still blinks blue, and/or there are some battery errors shown at the inverter, please refer to the chapter 11 ("Trouble Shooting") of this manual and also read the Service Guideline and Checklist.



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) Switch on the air switch between the inverter and battery if there is any; 2) switch on the battery system; 3) switch on the inverter.



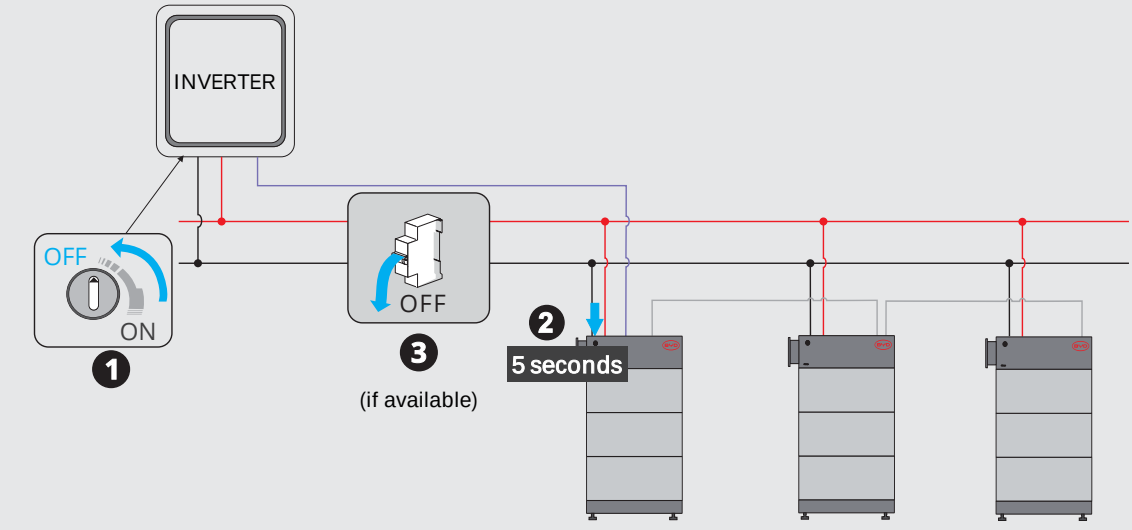
Switch on process: ① Switch between battery and inverter (if available); ② Battery; ③ Inverter

8.2. Switch off the Battery System

The procedure 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.

If two or three battery systems are connected in parallel, only the LED Button on the master system needs to be pressed. The slave system(s) will be turned off automatically.



Switch off process: ① Inverter; ② Battery; ③ Switch between battery and inverter (if available)

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 or there is an error for 10 minutes.

8.4. WLAN Activation

The WLAN of the battery system will be disappeared in five hours after the system started. Restart the system or press the LED button for around one second while the system is on could activate the WLAN again.

Pressing the LED button three times (each time around one second) within six seconds could reset the battery WLAN.

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 for different inverters. Please follow the inverter manufacturer's instructions here.

9. Decommissioning

⚠ QUALIFIED PERSON

To decommission the inverter completion of its service life, proceed as described in this section.

⚠ CAUTION

Risk of injury due to the weight of battery module

Injuries may occur 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 due to electric shock caused by 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 would lead to lethal electric shocks.

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

Procedure:

1. Shut off the inverter.
2. Switch off the battery system.
3. Switch off the air switch between the inverter and the battery system if there is any.
4. Loosen 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 the 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. Remove the BCU from the 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.

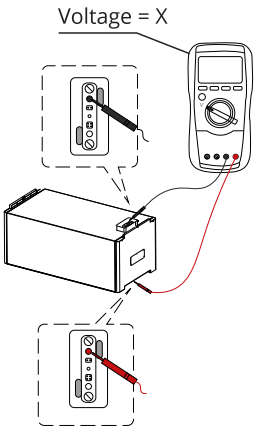
Dispose of the battery system in accordance with the locally applicable disposal regulations for electronic waste.

10. Extension

The SOC of the existing battery system and the new battery module should be similar before the new battery module is added to the existing system.

Procedure:

1. Measure the voltage (X) of the new battery module with a multimeter, get a value (X).



2. Refer to the following table to find out the SOC (Y) corresponding to the X.

	Voltage (X)/V	SOC (Y)
HVL	X<50.32	0~5%
	50.32≤X<51.52	5~10%
	51.52≤X<51.74	10~15%
	51.74≤X<52.24	15~20%
	52.24≤X<52.64	20~25%
	52.64≤X<52.85	25~30%

3. Charge or discharge the existing battery system till the SOC is around the corresponding Y.
4. Switch off the inverter.
5. Switch off the battery system.
6. Switch off the air switch between the inverter and the battery system if there is any.
7. Take the BCU off.
8. Add the new battery module on the top of the other battery modules.
9. Put BCU back on the top of the new battery module.
10. Switch on and configure the battery system.
11. Start the inverter.

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.dom.

11.1. Battery System Behavior under Fault Conditions

Blue light blinking

If the LED blinks white and blue for one second each alternately, it indicates an error has occurred. (When the system is initiating, the light alternates between white and blue every 0.5s, which is not an error.)

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

Please note that if the communication with the inverter is not established, the blue light may blink three or eleven times. If so, check the communication with the inverter first.

Except for the LED light, you can also read the real time error and historical logs with the help of Be Connect Plus or Be Connect 2.0. (refer to 4.2 of this document)

BYD US service can also get the error messages of the battery system through the remote server Be Connect Monitoring. It is highly recommend to connect the battery system to the internet.

NOTICE

Damage to the battery system due to undervoltages

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

11.2. LED Light Designation for Errors

Blue LED is blinking once	DC cable connection incorrect
Blue LED is blinking twice	Precharge transistor or relay Faulty
Blue LED is blinking three times	BIC communication failed
Blue LED is blinking four times	Fault Temperature sensor
Blue LED is blinking five times	Fault voltage sensor
Blue LED is blinking six times	Fault current sensor
Blue LED is blinking seven times	Faulty battery module
Blue LED is blinking eight times	Precharge failed
Blue LED is blinking nine times	BIC balancing failed
Blue LED is blinking ten times	Reserved
Blue LED is blinking eleven times	BMS and BMU communication failed
Blue LED is blinking twelve times	Inverter communication failed
Blue LED is blinking thirteen times	Address registration failed
Blue LED is blinking 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 (C-rate is a measure of the rate at which a battery is discharged relative to its maximum capacity) to the SOC of 30% 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.

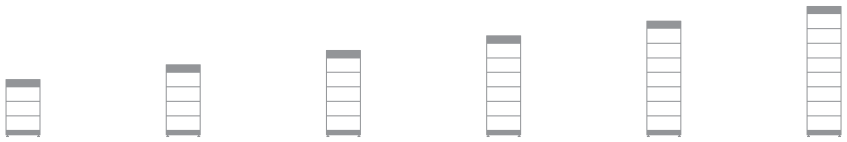
• Do not dispose of the battery system with your household waste.

• 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 servie (see contact detailed information at the bottom of this document).

14. Technical Data



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	50 A	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	120-173V	160-230 V	200-288 V	240-345 V	280-403 V	320-460 V
Dimensions (H/W/D)	39.2× 23.0× 11.7 inch	48.3× 23.0× 11.7 inch	57.5× 23.0× 11.7 inch	66.7× 23.0× 11.7 inch	75.9×23.0× 11.7 inch	85.0× 23.0× 11.7 inch
Weight	330.7 lb	429.9 lb	529.1 lb	628.3 lb	727.5 lb	826.7 lb
Operating Temperature	14 °F to 122 °F					
Battery Cell Technology	Lithium Iron Phosphate (cobalt-free)					
Communication	CAN/ RS485					
Enclosure Protection Rating	NEMA 3R					
Round-trip Efficiency	≥ 96%					
Certification	UL9540A/ UL1973/ IEC60730/ FCC/ 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					

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

[2] Charge derating will occur between14 °F and 41 °F.

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

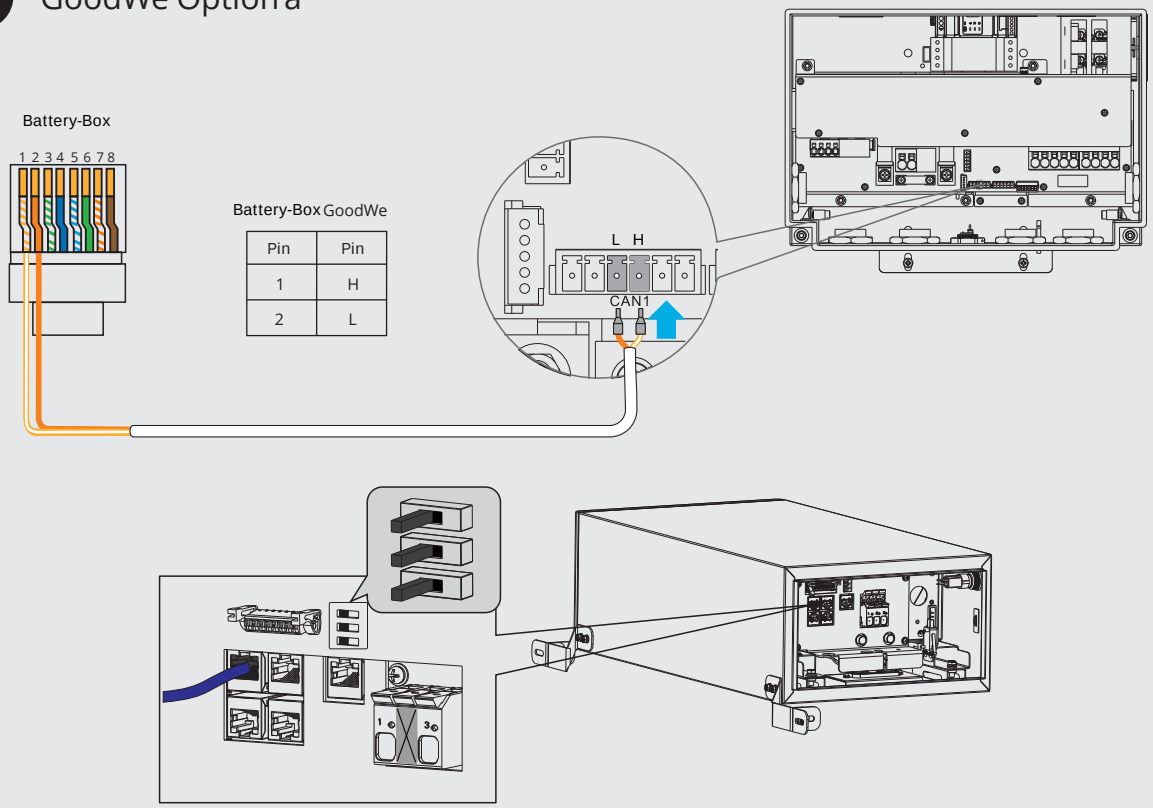
15. Contact Information

USA	**BYD US Service**
Email	us.homeenergy@byd.com
Telephone	626-491-2333
Address	888 E Walnut St. Suite 200A, Pasadena, CA 91101, USA
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Telephone	+86 755 89888888-47175
Address	No.3009, BYD Road, Pingshan, Shenzhen, 5118118, P. R. China
Website	www.bydbatterybox.com
Social Media Link	https://www.facebook.com/BatteryBoxBYD https://twitter.com/BYD_BatteryBox https://www.linkedin.com/company/byd-battey-box

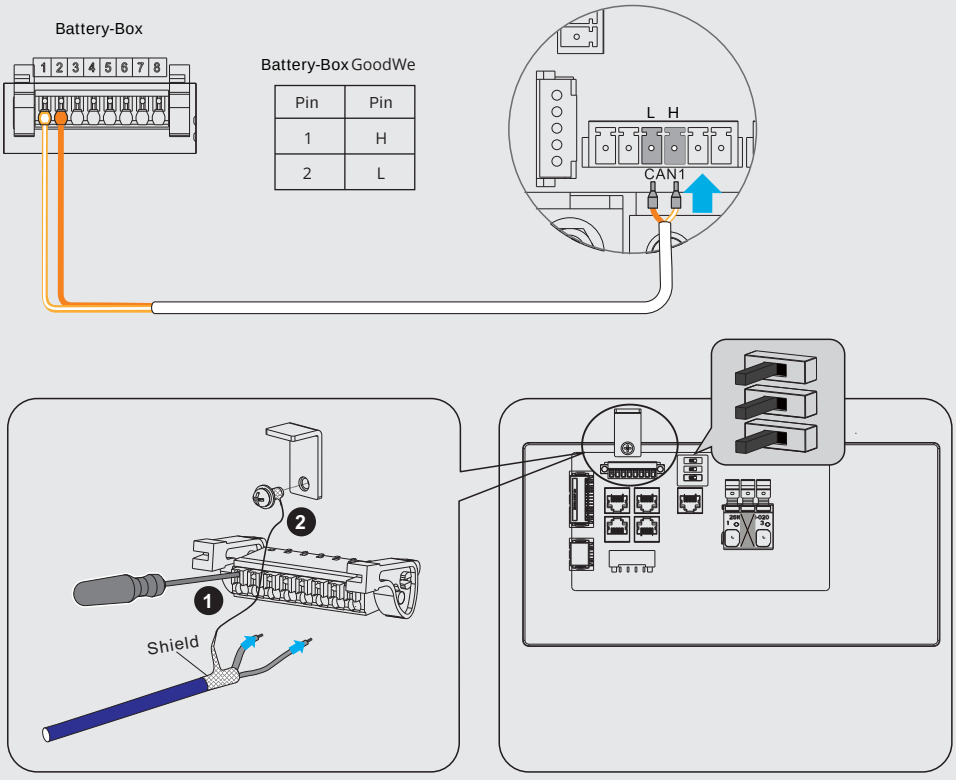
Appendix Connection Options with Inverters

Before the installation, please check if the planned configuration is already released according to the latest BYD Battery-Box Premium HVL Compatible Inverter List.

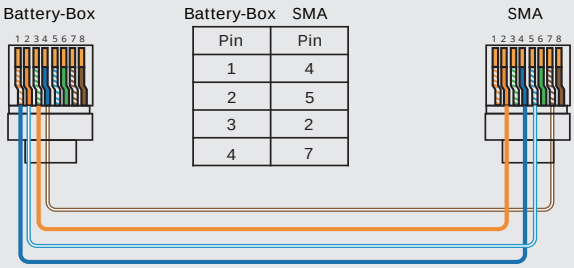
a GoodWe Option a



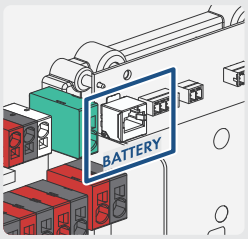
b GoodWe Option b

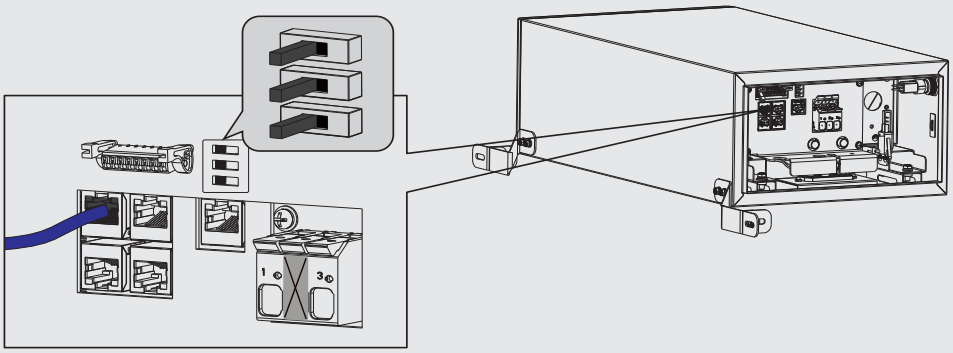


c SMA Option a

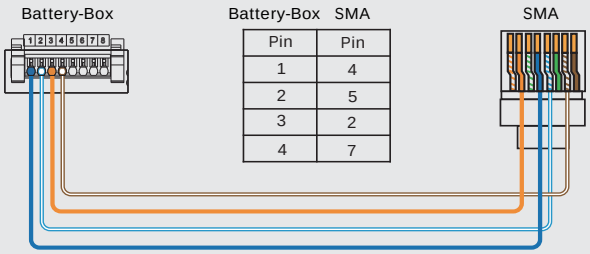


Pin	Pin
1	4
2	5
3	2
4	7

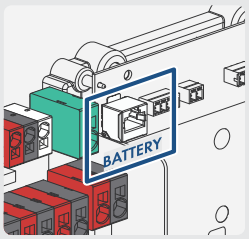


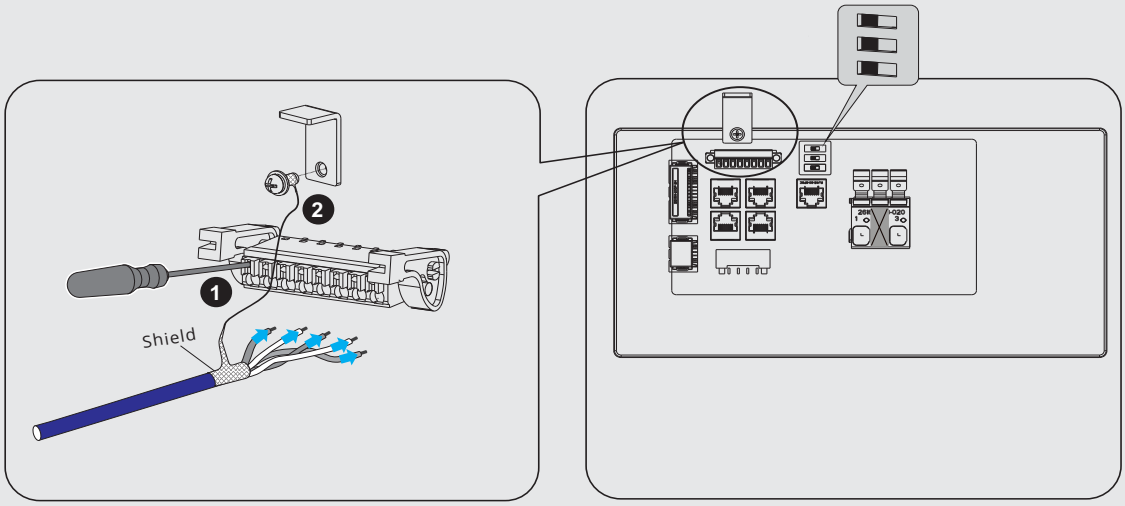


d SMA Option b

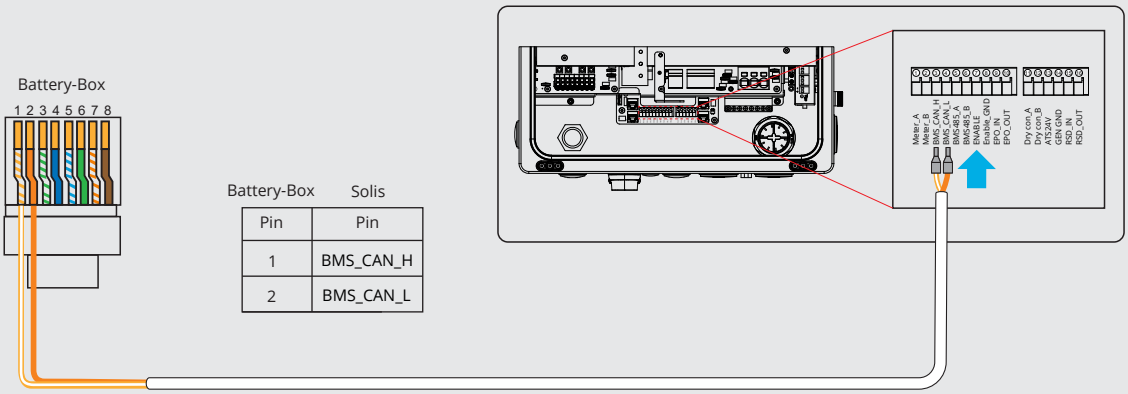


Pin	Pin
1	4
2	5
3	2
4	7

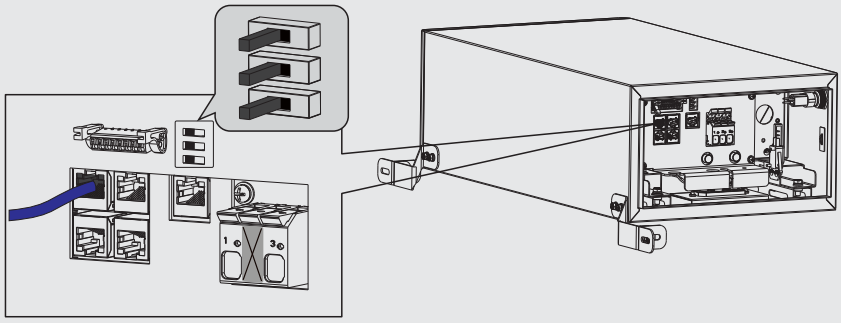




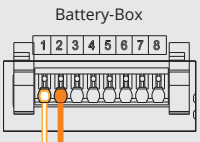
e Solis Option a



Battery-Box	Solis
Pin	Pin
1	BMS_CAN_H
2	BMS_CAN_L



f Solis Option b



Battery-Box	Solis
Pin	Pin
1	BMS_CAN_H
2	BMS_CAN_L

