User Manual

Residential Lithium Battery System

Type: BHF-S series

BHF-S-series.R110.V1.0

Contents

1. About This Manual

1.1 Products Covered by This Manual

Li-ion Battery: BHF-S Series energy storage system.

1.2 Target Group

This manual is intended for a qualified electrician. Any electrical installation and maintenance on the battery must be performed by qualified electricians in compliance with standards, wiring rules or requirements of local grid authorities or bodies.

1.3 Symbols Used

The following types of safety precautions and general information symbols are used in this manual. These important instructions must be followed during installation, operation and maintenance of the battery.

Symbol	Description
⚠ DANGER	Indicates a hazard with a high level of risk that, if not avoided, will result in death or serious injury.
⚠ WARNING	Indicates a hazard with a medium level of risk that, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a hazard with a High level of risk that, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates a situation that, if not avoided, could result in equipment or property damage.

1.4 Storage of the Manual

Please keep the manual properly and operate in strict accordance with all

safety and operating instructions in this manual. The information in this manual is subject to change without notice. Please check ***www.LIVOLTEK.com*** for more information.

2. Safety

The manual describes the installation, commissioning, maintenance of the battery. Please read it carefully before operating. To prevent personal injury and property damage and to ensure long-term operation of the product, please read and follow all the instructions and cautions on the battery and this user manual during installation, operation or maintenance at all times.

2.1 Important Safety Instructions

⚠ DANGER

Danger to life from electric shock.

- Before performing any work on the battery, make sure the battery is power off and the DC isolator is disconnected.
- Do not short connect the DC connectors of the battery, which may cause electric shock to personnel and damage to the product.
- Do not touch DC connectors of the battery.
- If an error occurs, contact your local distributor or qualified electricians.

⚠ WARNING

- Only authorized service personnel are allowed to install the battery or perform servicing and maintenance.
- The power should be disconnected before attempting any maintenance or cleaning or working to the battery.
- **NOTICE**
- Do not open the battery or change any components without authorization, otherwise the warranty commitment for the battery will be invalid.
- Appropriate methods must be adopted to protect battery from electrostatic

discharge; any damage caused by ESD is not warranted by the manufacturer.

2.2 Response to Emergency Situations

2.2.1 Leaking Batteries

- If the battery leaks electrolyte which is corrosive, avoid contact with the leaking liquid or gas. Direct contact may lead to skin irritation or chemical burns. If one is exposed to the leaked substance, do these actions:
- **General Advice:** Immediate medical attention is required. Show the safety data sheet (SDS) to the doctor in attendance.
- **Eye Contact:** Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician if feel uncomfortable.
- **Skin Contact:** Take off contaminated clothing and shoes immediately. Wash off with plenty of water for at least 15 minutes and consult a physician if feel uncomfortable.
- **Ingestion:** Do not induce vomiting. Never give anything by mouth to an unconscious person. Call a physician or Poison Control Center immediately.
- **Inhalation:** Move victim into fresh air. If breathing is difficult, give oxygen. Do not use mouth to mouth resuscitation if victim ingested or inhaled the substance. If not breathing, give artificial respiration and consult a physician immediately.
- **Protecting of First-aiders:** Ensure that medical personnel are aware of the substance involved. Take precautions to protect themselves and prevent spread of contamination.

2.2.2 Wet Batteries or Damaged Batteries

- If the battery is wet or submerged in water, do not try to access it.
- If the battery seems to be damaged, they are not fit for use and may pose a danger to people or properties.
- Please pack the battery in its original container, and then return it to your distributor

2.2.3 Fire

The battery may catch fire when it is put into fire. In case of a fire, please make sure that a dry chemical, carbon dioxide or alcohol-resistant foam extinguisher is nearby. Do not use a solid water stream as it may scatter or spread fire.

2.2.4 Advice for Firefighters

- In any fire, wear self-contained breathing apparatus (MSHA/NIOSH approved or equivalent) and full protective gear.
- Fight fire from a safe distance, with adequate cover.
- Prevent fire extinguishing water from contaminating surface water or the ground water system.

2.3 Handling and Storage Precautions

- Handling is performed in a well ventilated place.
- Wear suitable protective equipment.
- Avoid contact with skin and eyes.
- Keep away from heat/sparks/open flames/ hot surfaces.
- Take precautionary measures against static discharges.
- Keep containers tightly closed.
- Keep containers in a dry, cool and well-ventilated place.
- Keep away from heat/sparks/open flames/ hot surfaces.
- Store away from incompatible materials and foodstuff containers.

2.4 Limitation of Liability

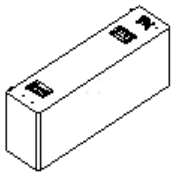
- Any product damage or property loss caused by the following conditions LIVOLTEK does not assume any direct or indirect liability.
- Product modified, design changed or parts replaced without LIVOLTEK authorization;
- Changes, or attempted repairs and erasing of series number or seals by non

LIVOLTEK technician;

- System design and installation are not in compliance with standards and regulations;
- Failure to comply with the local safety regulations;
- The Product has been improperly stored in distributor's or end user's premises;
- Transport damage (including painting scratch caused by movement inside packaging during shipping). A claim should be made directly to shipping or insurance company as soon as the container/packaging is unloaded and such damage is identified;
- Failure to follow any/all of the user manual, the installation guide and the maintenance regulations;
- Improper use or misuse of the device;
- Insufficient ventilation of the device;
- The maintenance procedures relating to the product have not been followed to an acceptable standard;
- Force majeure (violent or stormy weather, lightning, overvoltage, fire etc.)
- Damages caused by any external factors.

3. Scope of Delivery

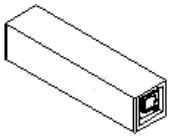
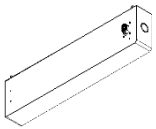
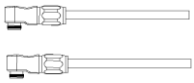
3.1 Battery subassembly

				
A	B	C	D	E

The table below lists the quantity of each component

Object	Description	Quantity
A	Battery Pack	1
B	Wall-Mounting Bracket A	2
C	Bolts for Bracket	4
D	Locating Pin	3
E	Certificate	1

3.2 Control box & Mounting Base subassembly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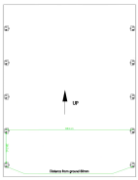
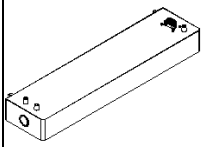
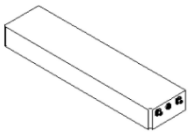
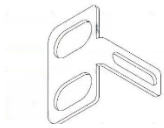
				
F	G	H	I	J
				
K	L			

The table below lists the quantity of each component

Object	Description	Quantity
A	Control Box	1
B	Mounting Base	1
C	bolts for Bracket	12
D	Power cable	1
E	Communication cable	1
F	Locating Pin	3
G	Wall-Mounting Bracket C	4
H	Wall-Mounting Bracket B	4
I	Perforating paper	1

J	Expansion anchor bolts	8
K	SDS Document	1
L	User Manual	1

3.3 Subassembly of Tandem optional kit

 				
A		B	C	D
				
E	F	G	H	I

The table below lists the quantity of each component

Object	Description	Quantity
A	Tandem optional kit	1 pair
B	Wall-Mounting Bracket B	4
C	Expansion anchor bolts	8
D	Locating Pin	3
E	Bolt for Bracket	12
F	Wall-Mounting Bracket C	4
G	Perforating paper	1

NOTE: Accessories for different applications may be different.

4 Product Description

Thank you for choosing the LIVOLTEK battery. The BHF-S Series battery is a series of High Voltage Lithium-ion battery. It is designed for residential and commercial energy storage system. It must only be connected with an officially tested inverter.

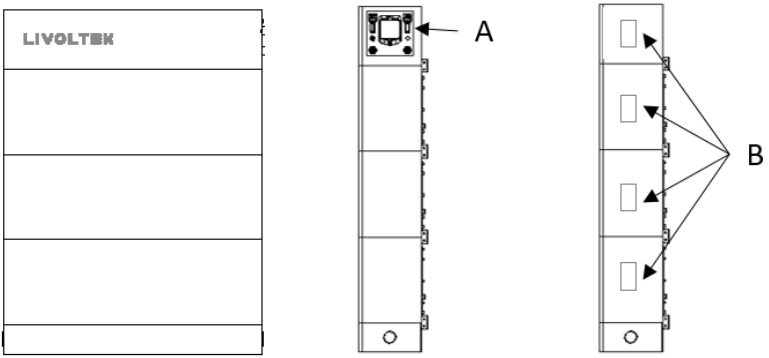


Figure 1. View of the BHF-S Series Lithium Battery

Position	Definition
A	Connection Area For BHF-S series application with hybrid inverter
B	Nameplate Label: Clearly identify the product, including the SN, technical data, certifications, etc.

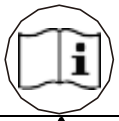
⚠ CAUTION

If the battery is not used or not installed for a long time, it is recommended to measure the voltage and charge it before use for better maintenance.

Icons on the Nameplate

Symbol	Explanation
	Caution, Risk of Danger
	Caution, Risk of Electric Shock
CE	CE marking The battery complies with the requirements of the applicable EU directives.
	Read the user manual before using
	WEEE Mark. The scrapped battery cannot be put into the garbage can and must be professionally recycled.

Icons on the warning label

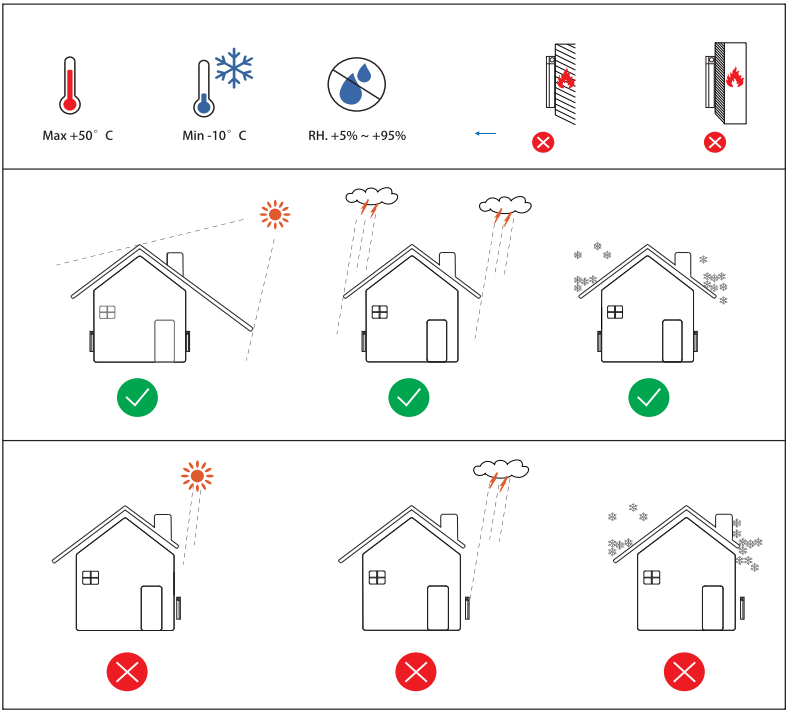
Symbol	Designation
	Refer to the Operating Manual before using
	Caution, Risk of Danger
	Caution, Risk of Electric Shock
	Keep the battery away from open flame or ignition sources.
	Keep the battery away from children.
	Do not short circuit the battery.
	WEEE Mark. The scrapped battery cannot be put into the garbage can and must be professionally recycled.

5 Mounting

5.1 Environment Requirements

Install the Battery System on the surface with sufficient bearing capacity and flatness, wooden surface is prohibited. Increase the bearing capacity and flatness of the surface by laying the foundation, adding bearing plates and so on.

- Keep children away from the battery.
- The optimal ambient temperature for the battery is 15~35℃.
- Avoid exposing the equipment to direct sunlight or rain.
- Install the equipment away from heat/cold source.
- Do not install the equipment in the place where the temperature changes extremely.
- Install the equipment away from strong interferences to ensure its regular work.
- Do not install the equipment in places prone to accumulate water.
- Do not put inflammable or explosive matters near the equipment.



5.2 Tools

These tools are required to install the battery system.

			
Drill	Screw Driver	Marker	Hexagon keys
			
Tap measure	Multi-meter	Utility knife	

It is recommended to wear the following safety gear when dealing with the battery system.

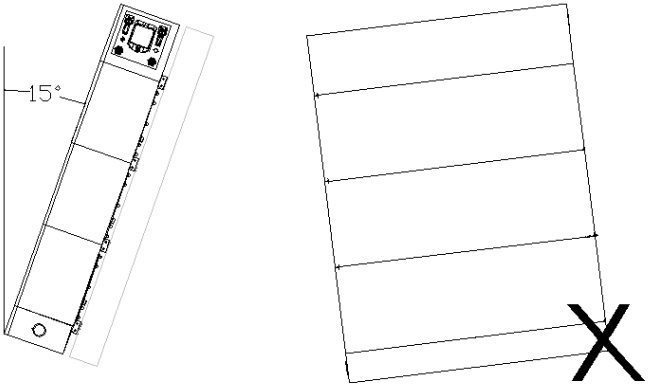
			
Insulated Gloves	Safety Goggle	Safety shoes	Dustproof Mask

5.3 Angle and Space Requirements

5.3.1 Angle requirement

⚠ CAUTION

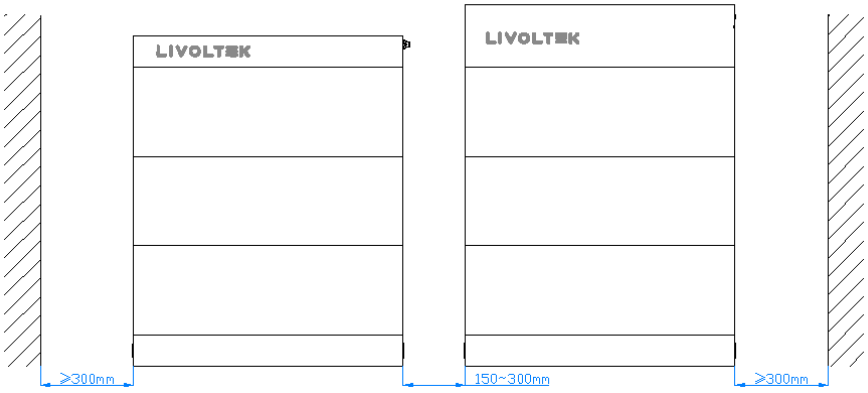
Never install the Battery horizontally, or with a forward tilt or with a backward tilt or even with upside down. Install the battery upright or at a maximum back tilt of **15 degrees** to facilitate heat dissipation.

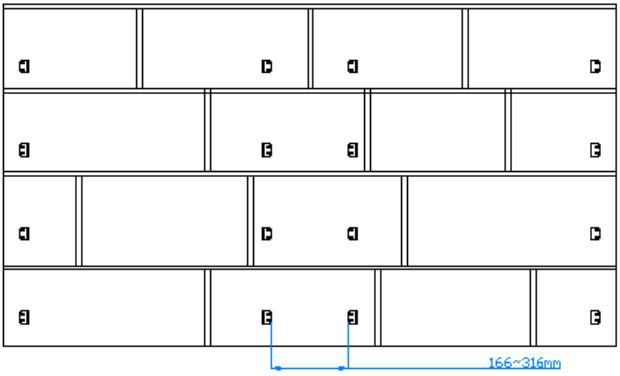


This battery is indoor version and can be only installed in an indoor location.The space around batteries recommended refer to the figure below.

5.3.2 Space requirement for the battery

CAUTION The horizontal space between 2 adjacent batteries should not exceed 300 mm, the horizontal space between 2 adjacent wall-mounted brackets should not exceed 316 mm, otherwise the length of parallel power cables will be insufficient.





5.4 Mounting the Battery

5.4.1 Unpack and Check for Transport Damage

Unpack the battery package and make sure the battery is intact during transportation. If there are any visible damages, such as cracks, or missing parts, please contact your dealer immediately.

5.4.2 Pre-installation check

- After opening the package, check if the package items are complete. If there is any part missing, please contact your dealer immediately.
- Check and confirm the battery is power off and DC breaker is off before any further step.
- Turn on the DC breaker, when the battery self-test successfully, its green light turns on. If the red light is on, please contact your dealer immediately.
- Then go on to next step after turning off the battery.

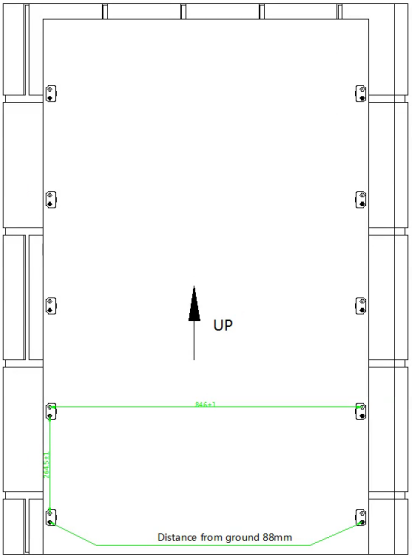
5.4.3 Procedure for Inverter

For more detailed information and installation steps, please refer to the Inverter user manual & quick installation guide.

5.4.4 Procedure for BHF-S series Application

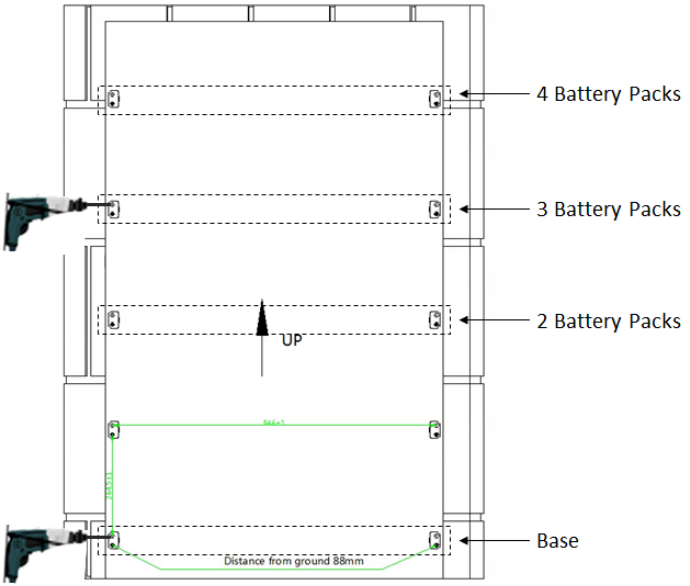
STEP 1: Anchor Battery Bracket

- Make sure the wall is strong enough to withstand the weight of battery.
- Take out the perforating paper and put the bottom of perforating paper parallel to the floor, then stick the perforating paper on the wall.



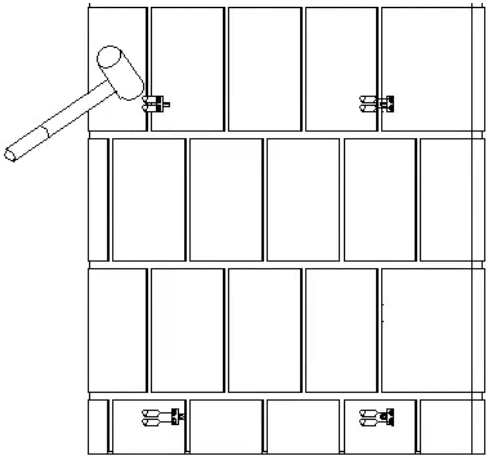
STEP 2: Drill mounting holes

- Drill a certain number of holes with a φ8 drill bit, make sure the holes are deep enough (at least 65mm) to support the battery.
- The following picture shows the scenario of installing 3 battery packs and drilling the holes, if 2 or 4 packs need to be installed, refer to the location marked in the picture below.
- Then take the perforating paper down after drilling.



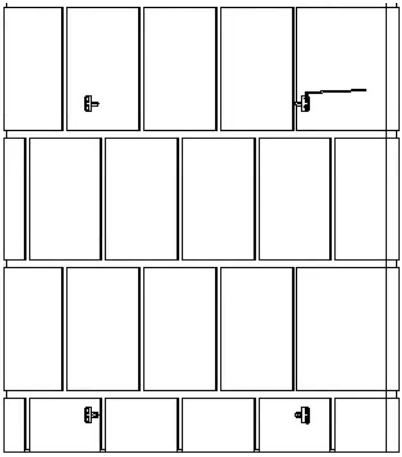
STEP 3: Hammer the expansion anchor bolts

- Hammer the expansion anchor bolts into the holes to lock **Wall-Mounting Bracket C**;
- Make sure Wall-Mounting Bracket is locked correctly according to shapes in perforating paper.



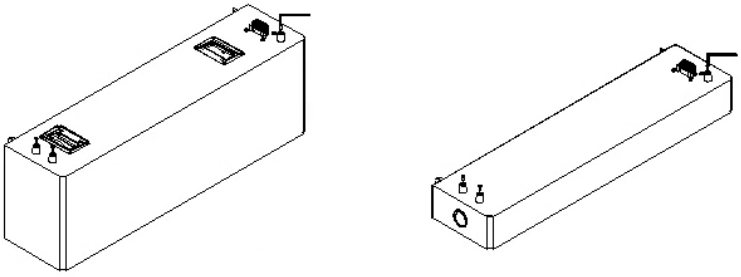
STEP 4: Screw the bolts

- Screw the expansion bolts clockwise tightly;



STEP 5: Screw the Locating Pin

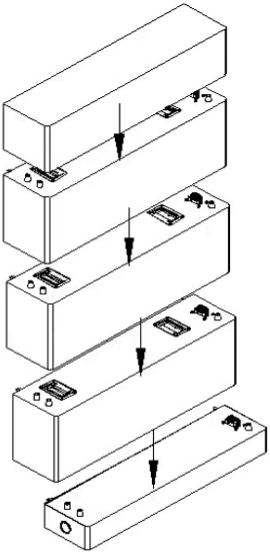
- Screw the Locating Pin to the Battery and Mounting Base.



STEP 6: Install the battery to the bracket

- Connect Ground wire to the Mounting base and ground firstly;
- Stack the Mounting base, Battery pack and Control box in turn;
- Make sure electrical connection plug is well pluged to each other;
- Lock the Bolts between bracket A,B,C and Battery referring to the picture

below, make sure different part is locked tightly to each other.



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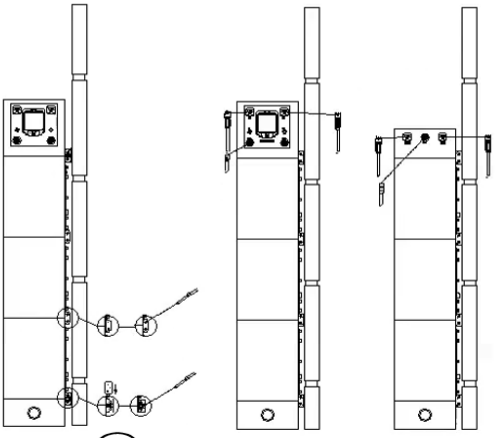

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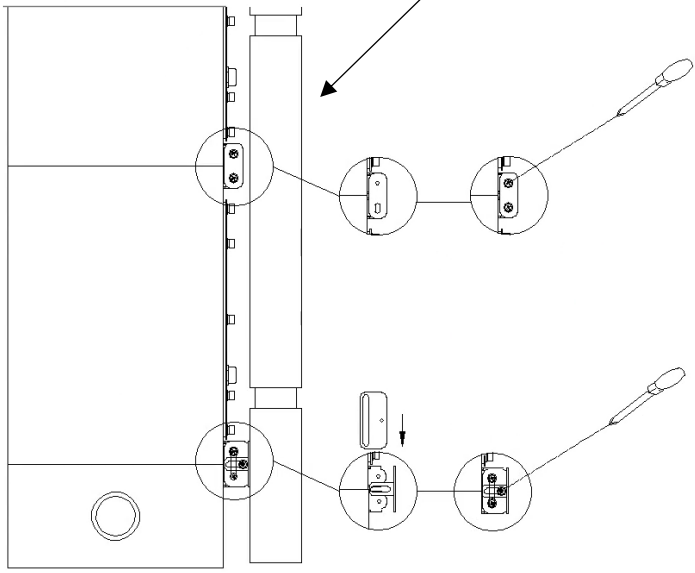
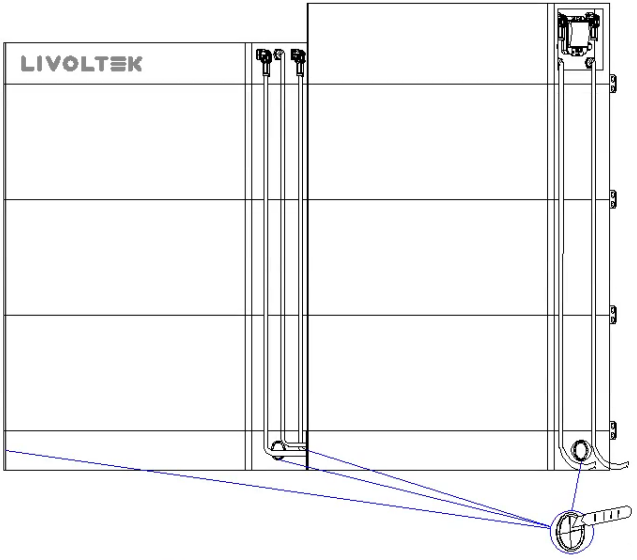


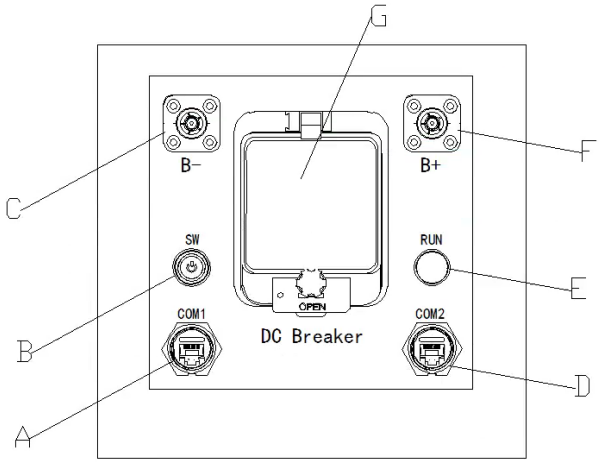
STEP 7: Install more packs

- If more than 4 packs need to be installed, divide them into two columns of which has no more than four packs for each column.
- Using tandem optional kit to replace Control Box and Mounting Base.
- Cut the holes in the bottom with a knife and connect power and communication cable correctly.



6 Electrical Connection

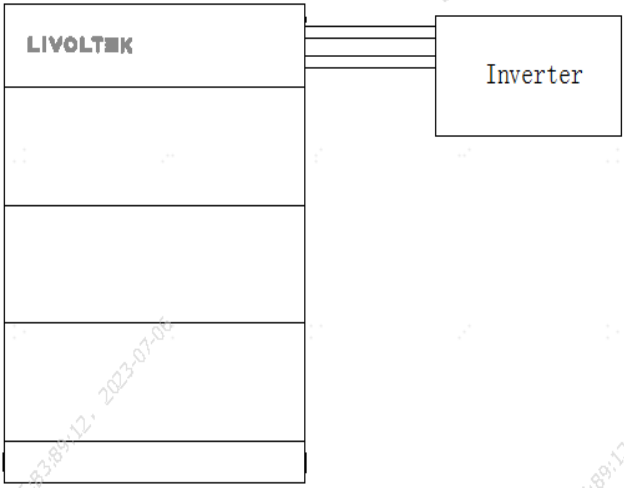
6.1 Overview of the Connection Area



Position	Definition
A	BMS COM 1
B	Power Switch
C	Battery-
D	BMS COM 2
E	LED Indicator
F	Battery+
G	DC Breaker

6.2 Battery Power Connection

Battery connection diagram



Red /Blue/Yellow solid line: Positive / Negative power/grounding cable

Black dotted line: CAN communication cable.

Procedure:

Before connecting the power cables, make sure the DC breaker of the battery is disconnected.

STEP 1:

Install the Quick-Plugs of power cable to the battery.

STEP 2:

Install the OT terminals ends of grounding cable to the grounding point of the battery, then connect it the grounding point of inverter.

STEP 3:

Plug the other ends of power cables into inverter.

6.3 BMS Communication Connection

Please check whether the BMS communication cable in the accessory box is appropriate for the battery. If you are not sure for that, please confirm with your vendor.

Procedure:

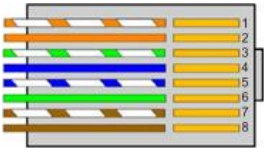
STEP 1:

Please insert the connector of the communication cable into the BMS Communication COM2 port of battery.

STEP 2:

Please insert the other end of the cable in the corresponding port of inverter.

BMS Connector Pin Definition:

	1	Orange/white	BMS_CAN_H
	2	*Orange*	BMS_CAN_L
	3	/	Reserved
	4	/	Reserved
	5	/	Reserved
	6	/	Reserved
	7	/	Reserved
	8	/	Reserved

7 Operating of the Battery

7.1 LED Indicator

The LED indicates the operating status of the battery.

LED	Explanation
Green	Green light indicates the battery works well.
Red	Fault occurs in the battery. SOC ≤8%

When red light is on for more than 6 hours indicates fault occurs in the battery, please contact technical support for help.

7.2 Turn On/Off the Battery

- When turn it on the battery, turn on the switch firstly, and then turn on the DC breaker;
- When turn it off the battery, disconnect the DC breaker firstly, and then turn off the switch.
- Check the following items before starting the battery.
  - Check the battery system has been installed completely.
  - Check the appearance of the battery system is intact.
  - Check the battery system output wiring harness is correctly connected to the positive and negative terminals of the battery and inverter to avoid misconnection and reverse connection.

7.3 Commissioning Procedure

➢ Manually connect the DC breaker of all the batteries, then switch all the batteries on. Then BMS will enter the self-test state. Wait until the indicator is steady on in green, which indicates that the battery system is powered on and runs normally.

8 Decommission

Decommission the battery in the system after the inverter is decommissioned. Proceed as follows to decommission the battery.

- Manually switch all the batteries off, then disconnect the DC breaker of all the batteries.
- One minute after the DC breaker is disconnected, disconnect all cables between the battery and other devices.

9 Technical Data of Battery Pack

Electrical Data	**BHF-10250 102.4V50AH 5.12KWh**
Cell Type	LFP
Total Energy	5.12kWh
Depth of Discharge	90%
Usable Energy	4.6 kWh
Nominal Voltage	102.4V
Nominal Capacity	50 Ah
Operating Voltage Range	86.4~115.2 V
Rated Charge/Discharge	25 A/25A

Max. Charge/Discharge	48A/48A
Max. Number of a Cluster	6 Units
General Data	
Communication	CAN
Operating Temperature	0~55℃ charge / -20~55℃ discharge
Dimension(W*H*D)	870*208.7*288.5mm
Weight	62kg
IP Protection Type	IP65

10 Technical Data of Battery System

Product model	BHF-S10	BHF-S15	BHF-S20	BHF-S25	BHF-S30
Nominal Voltage (V)	204.8	307.2	409.6	512.0	614.4
Operating Voltage Range（V）	172.8~230.4	259.2~345.6	345.6~460.8	432~576	518.4~691.2
Rate Capacity (Ah)	50				
Number of packs	2	3	4	5	6
Total Energy (kWh)	10.2	15.4	20.5	25.6	30.7
Usable Energy （kWh）	9.2	13.8	18.4	23.0	27.6

Nominal Power (kW)	5.1	7.7	10.2	12.8	15.4
Max power (kW)	9.8	14.7	19.7	24.6	29.5
Rated Charge/Discharge Current （A)	25				
Max charge/Discharge Current (A)	48				
Depth of Discharge	90%				
Operating Temperature	CH:0~55℃ DCH:-20℃~55℃				
Operating Humidity	5%~95%				
Operating Altitude	< 4000m				
Communication	CAN				
Cooling Type	Natural				
Ingress Protection	IP65				
Dimensions （mm)	870*208.7*878.5	870*208.7*1167	870*208.7*1455	870*208.7*1167+870*208.7*778.5	870*208.7*1167+870*208.7*1067
Weight（kg)	147	209	271	356	418

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