Open Energy for All

Low Voltage Battery

USER MANUAL

HBX-10LV-USG1

CONTENTS

1. General Information

1.1 About this Document

This document describes the installation, commissioning, operation, troubleshooting, and decommissioning of the battery energy storage system (BESS).

The latest version of this document and further information on the BESS are available in PDF format at https://www.hoymiles.com. It is recommended that this document be readily accessible at all times.

1.2 Product Validity

This document is valid for the following model:

- HBX-10LV-USG1

1.3 Target Group

This document is only for qualified personnel. Only qualified personnel who have been trained or mastered relevant skills can install and maintain the product under the guidance of this document.

The qualified personnel must possess the following skills:

- Knowledge of how batteries work.
- Knowledge of how an inverter works.
- Training in how to deal with the dangers and risks associated with the installation, maintenance, and use of electrical devices.
- Training in the installation and commissioning of electrical devices.
- Knowledge of all applicable laws, standards, and directives.
- Knowledge of and compliance with this document and all safety information.
- Failure to observe the prescribed instructions may potentially void the manufacturer's warranty. If in doubt, please contact Hoymiles.

1.4 Symbols

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

Symbol	Usage
	Indicates a hazard with a high level of risk that, if not avoided, will result in death or serious injury.
	Indicates a hazard with a medium level of risk that, if not avoided, can result in death or serious injury.
	Indicates a hazard with a low level of risk that, if not avoided, can result in minor or moderate injury.
	Indicates a situation that, if not avoided, can result in property damage. NOTICE is used to address practices not related to personal injury.
	Information important for a specific topic or goal but not related to safety.

2. Safety Introduction

The HBX-10LV-USG1 series battery is designed and tested according to international safety requirements. However, certain safety precautions must be taken while installing, operating, and maintaining the battery. Please carefully read all safety instructions before installation, and observe all these safety instructions.

2.1 Intended Use

The HBX-10LV-USG1 battery is a BESS which is for residential applications.

- It is a low voltage Li-ion BESS.
- It can operate in on-grid, off-grid, and backup modes with all officially compatible inverters.
- It can be installed indoors and outdoors.
- It must only be used as stationary equipment.
- Alterations to the product are not allowed unless authorized in writing by the supplier.
- Unauthorized alterations will void the guarantee and warranty claims. Hoymiles will not be liable for any damage caused by such unauthorized alterations.
- It is not suitable for supplying power to life-sustaining medical devices.
- Please ensure that there will be no personal injury due to the power outage of the battery system.
- It can only be used in countries where it is approved by battery suppliers.
- It should be used in accordance with the information provided in this document and local applicable standards and directives. Any other application may cause personal injury or property damage.
- The label must be permanently attached to the product.
- The safety instructions in this document are only supplements to local laws and regulations. Please follow local laws and regulations during installation, operation, and maintenance.

2.2 Safety Information

To prevent personal injury and property damage and to ensure the long-term operation of the product, read this section carefully and observe all safety information at all times.

Symbol	Usage
 DANGER	**Danger to life due to electric shock where surge protection is not used!** If there is no surge protection, a voltage surge can be conducted into the building and to other connected devices in the same system through power cables, network cables or other types of cable. Touching live parts and cables may result in death or lethal injury due to electric shock. • Ensure all devices in the same system and the inverter is integrated with an existing surge protection system or device. • Install the surge protection device in accordance with local laws and regulations
 WARNING	**Danger to life due to overvoltage!** Overvoltage can damage a measurement device and result in voltage being present in the enclosure of the measurement device. Touching the live enclosure of the measuring device results in death or lethal injuries due to electric shock. • Only use measurement devices with a higher voltage range than the system battery voltage. • Do not touch hot surfaces before it cools down.
 WARNING	**Risk of injury due to the weight of the product!** If the product is lifted incorrectly or dropped while being transported or mounted, it may result in injury. • Lift and transport the product carefully. • Wear suitable personal protective equipment, and comply with local regulations during installation, operation, and maintenance.

NOTICE	**Damage to the battery system due to electrostatic discharge!** Internal components of the battery system can be irreparably damaged by electrostatic discharge. • Ground yourself before touching any component.

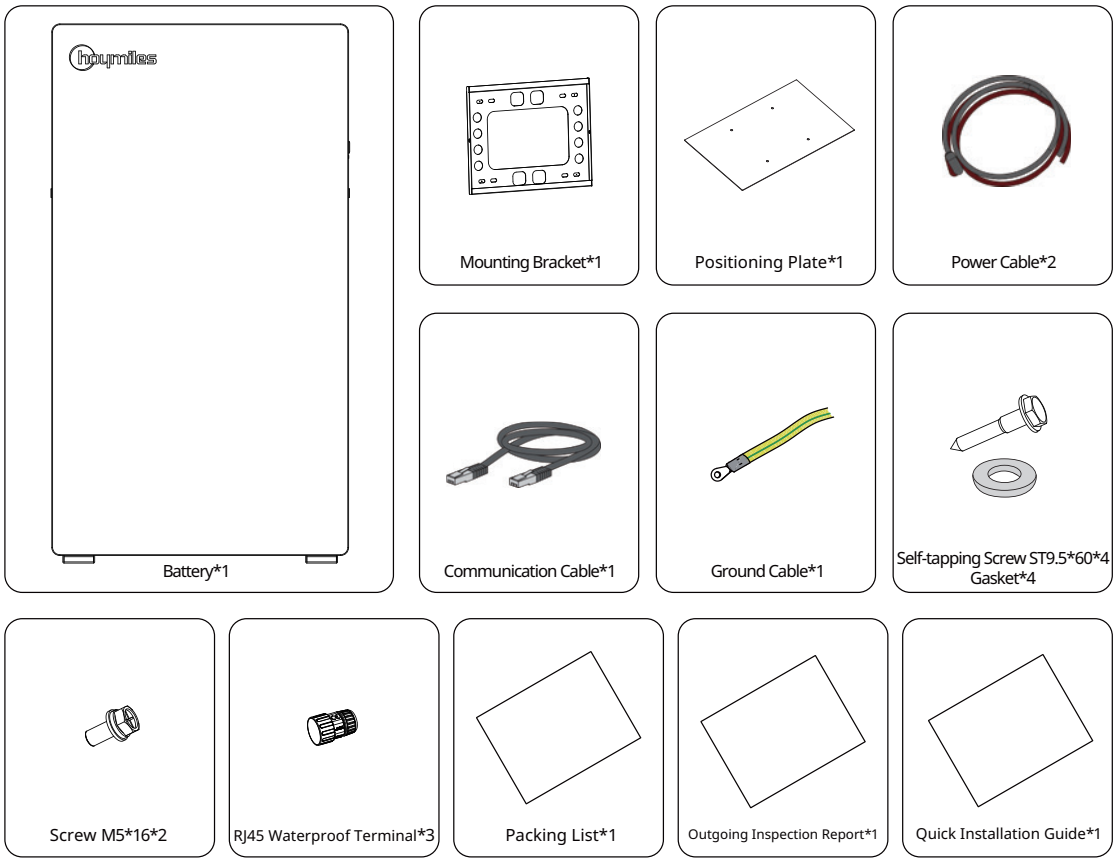
2.3 Symbols on the Label

Symbol	Usage
	Beware of a danger zone! This symbol indicates that the product must be additionally grounded if additional grounding or equipotential bonding is required at the installation site.
	Beware of high voltage and operating current! The product operates at a high voltage and current. Only skilled and authorized personnel can perform relevant operations of the product.
	Beware of fire! This symbol indicates that the product must be stored and installed far from flammable materials.
	Warning battery Leakage!
	WEEE Designation. Do not dispose of the product together with household waste. Dispose of the product in accordance with local disposal regulations for electronic waste.
	CE mark. The product complies with the requirements of the applicable EU directives.
	TÜV Rheinland US mark. The product complies with relevant standards of the United States and Canada.
	RoHS Designation. The EU material and process standards for electrical and electronic products make them more conducive to human health and environmental protection.
	The battery is recyclable. The battery can be recycled by a professional recycling organization. Please refer to the relevant local regulations.
	Observe the documentation. Read and understand all documentation supplied with the product.
	Refer to the instruction manual/booklet.

3. Unpacking and Storage

3.1 Scope of Delivery

Check that the deliverables are complete and intact after unpacking the battery. Please contact your supplier if the components are missing or damaged upon receipt of the battery.



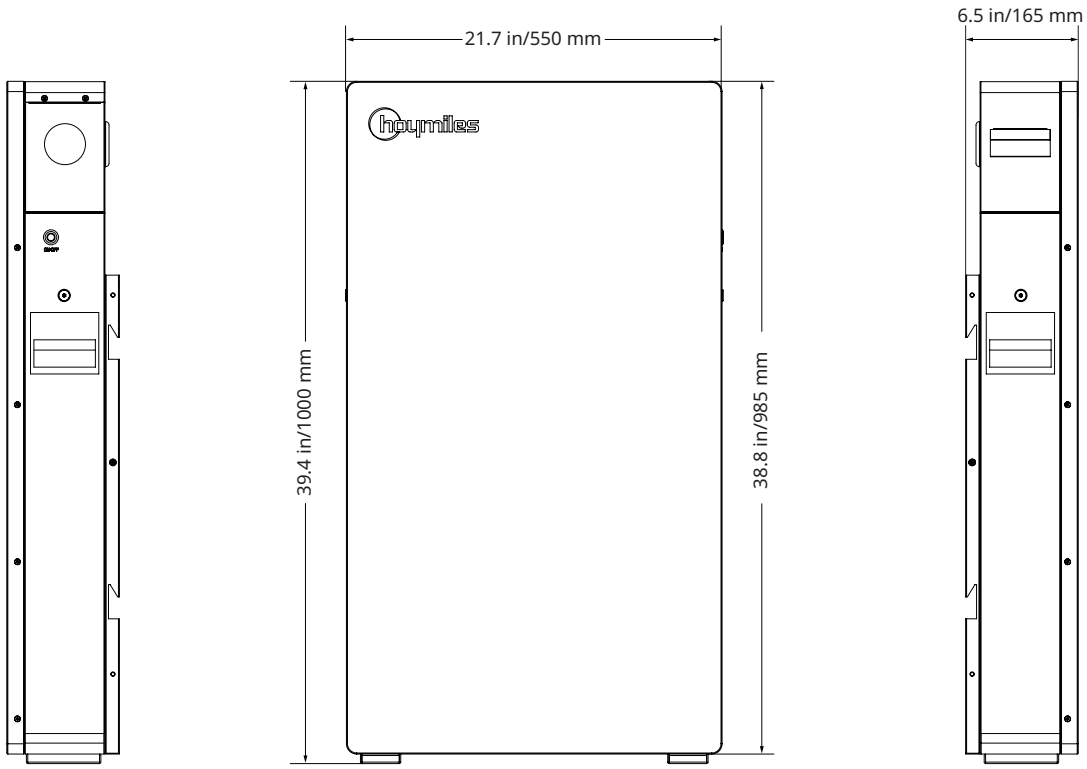
3.2 Product Storage

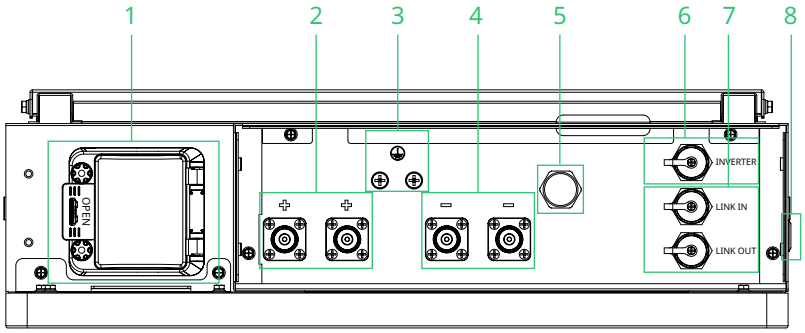
Suitable storage is required if the battery is not installed immediately:

- Store the battery in the original package, and do not unpack the battery.
- The storage temperature must be between 5℉ and 131℉ (-15℃ to +55℃), and the storage relative humidity must be at 95% RH, without condensing.
- The battery SOC should be 25%~50%. Recharge the battery every 6 months to make sure that no overdischarge occurs.
- The package with the battery shall not be tilted or inverted.
- The battery should be stored in a cool and clean place where it can be protected from direct sunlight and bad weather such as rain, snow, or lightning.
- Keep the package away from flammable, explosive, and corrosive materials.
- If the battery has been stored for three months or longer, it must be fully inspected and tested by authorized personnel before it can be put into operation.

4. Product Introduction

4.1 Product Overview





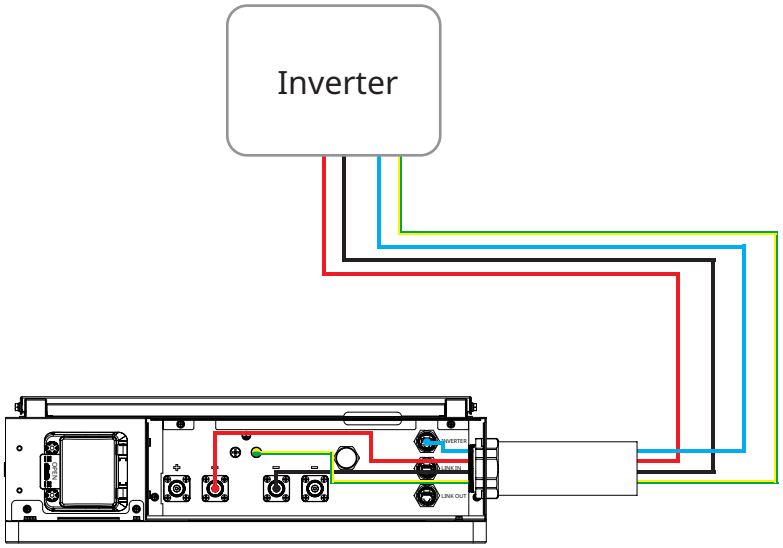
Item	Description
1	125 A DC Breaker
2	Positive Terminal
3	GND
4	Negative Terminal
5	Breather Valve
6	Inverter Communication Terminal
7	Parallel Communication Terminal
8	Power Switch

Pin Definition	Description	1	2	3	4	5	6	7	8
	INVERTER	NC	RS485-A	RS485-B	CAN-H	CAN-L	GND	NC	NC
	LINK IN	NC	BMS-RS485-A	BMS-RS485-B	DI+	DI-	NC	BMS-CAN-H	BMS-CAN-L
	LINK OUT	NC	BMS-RS485-A	BMS-RS485-B	DO+	DO-	NC	BMS-CAN-H	BMS-CAN-L

4.2 System Diagram

A. Single Unit

Diagram 1



B. Parallel Connection with Busbar

Diagram 2

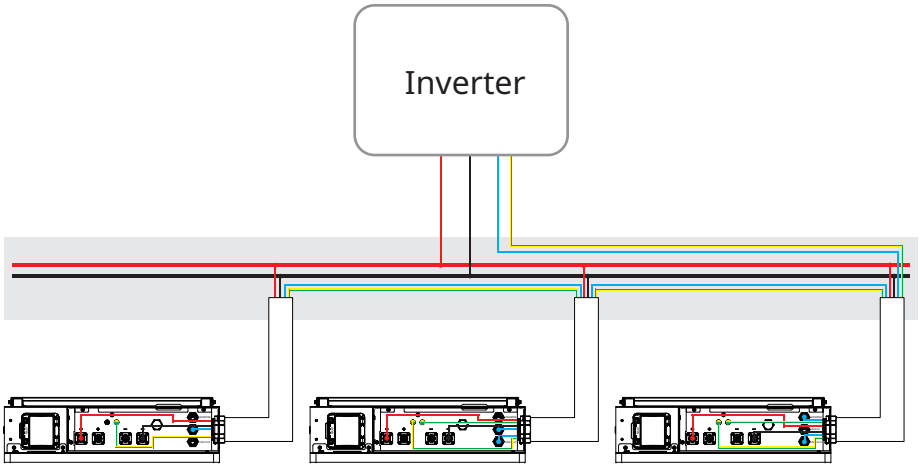
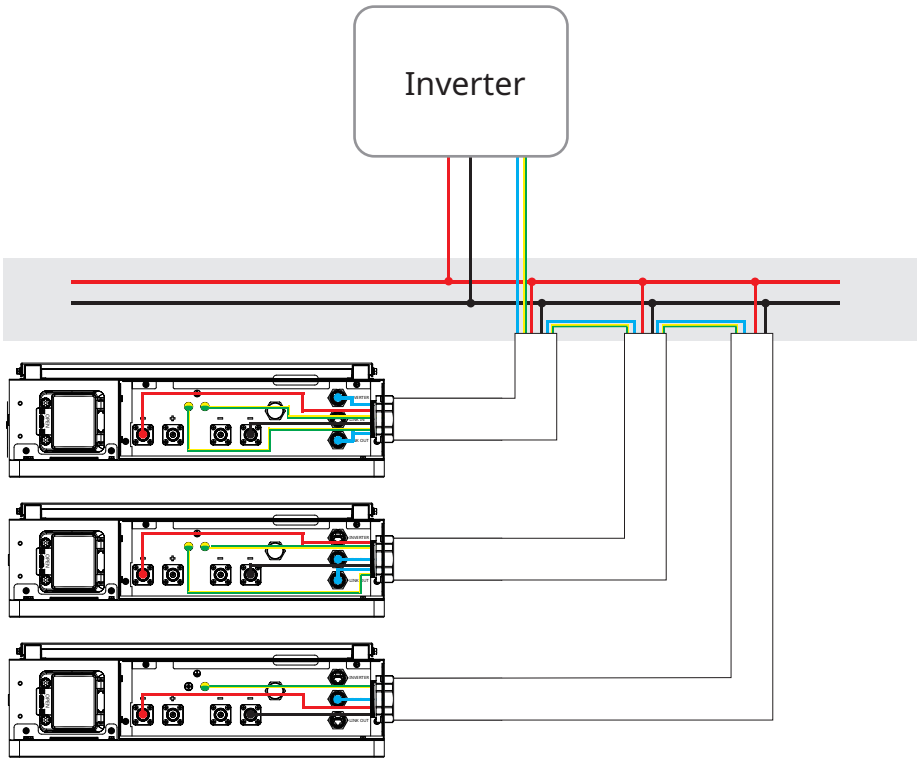


Diagram 3



Note:

- Cables for parallel connection are not provided by Hoymiles and should be purchased separately.

C. Parallel Connection without Busbar

Diagram 4

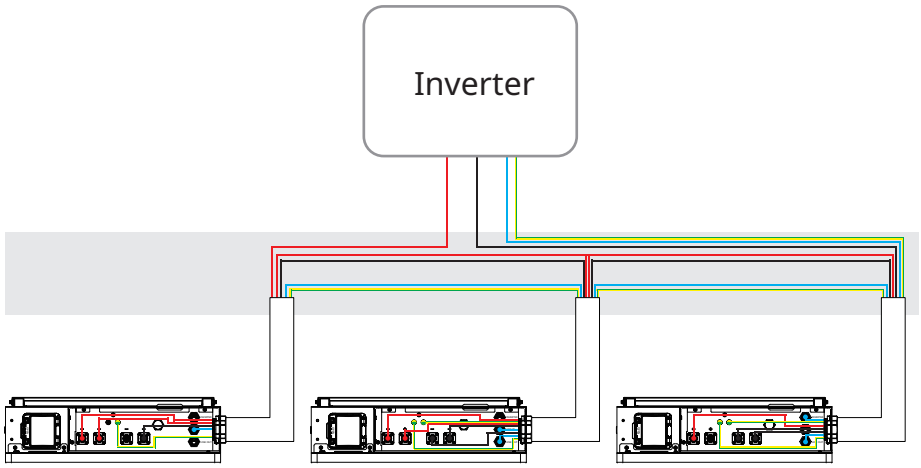
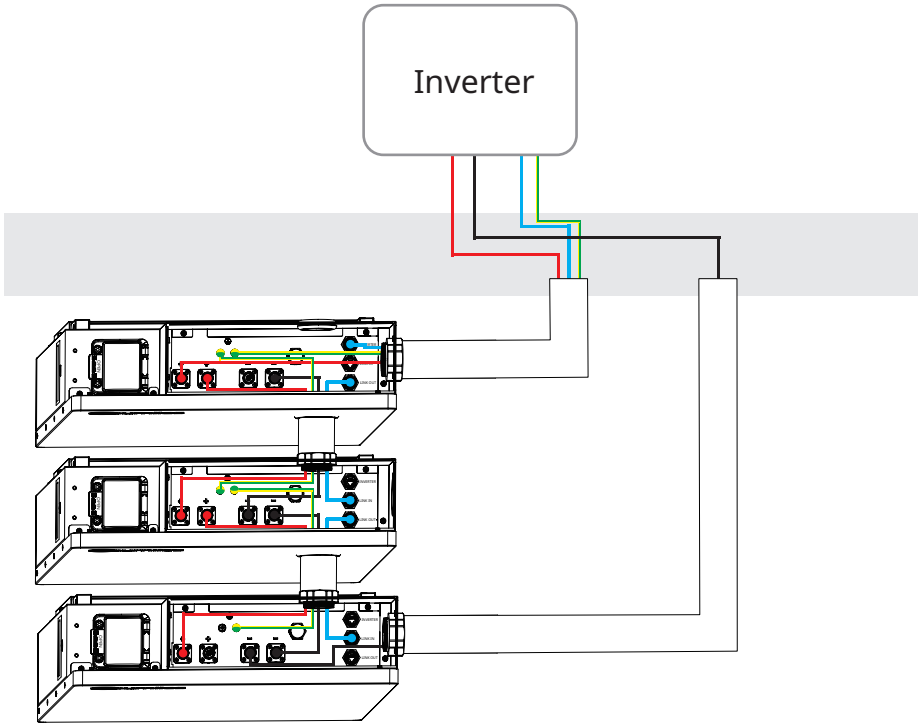


Diagram 5



Note:

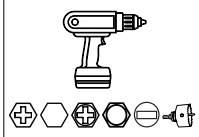
- In this wiring mode, the charge and discharge power must not be more than 12 kW.
- Cables for parallel connection are not provided by Hoymiles and should be purchased separately.

5. Installation Instruction

5.1 Installation Tools

The following tools are recommended in the installation process, and other auxiliary tools can also be used on site if necessary.


Marker


Electric Screwdriver

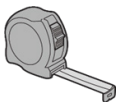

Adjustable Wrench


Torque Wrench


Wire stripper


Network cable crimper


Level


Tape measure


Protective goggles


Safety gloves


Dust mask


Safety shoes

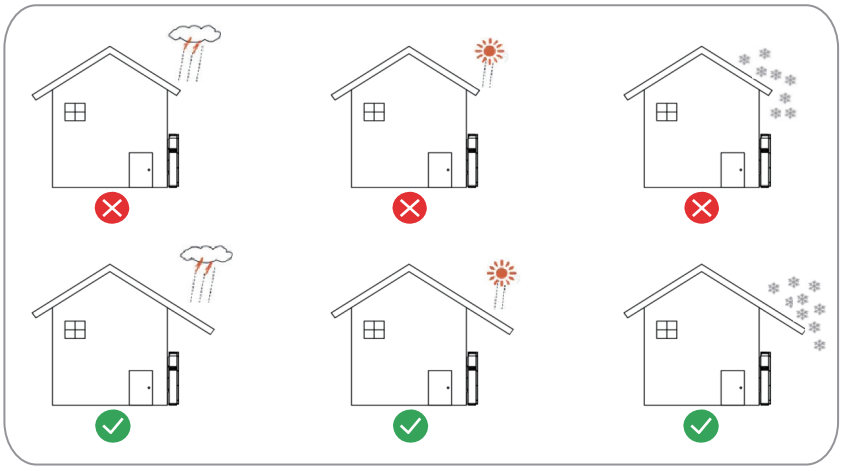
5.2 Mounting

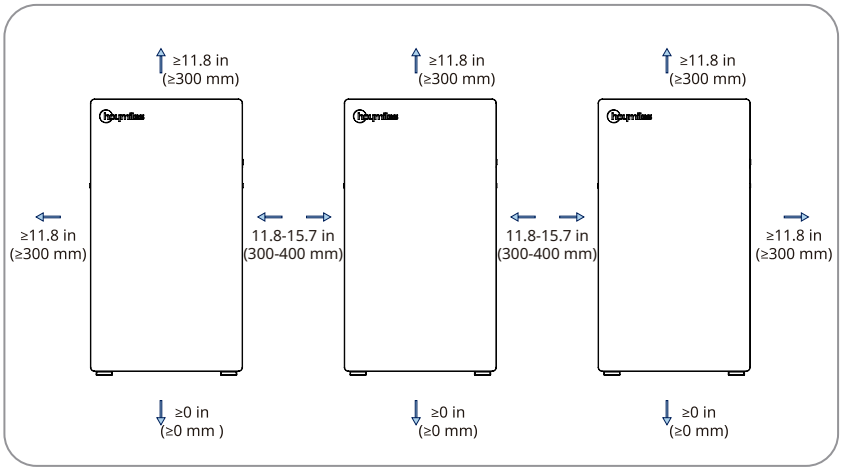
5.2.1 Mounting Requirements

 DANGER	**Danger to life due to fire or explosion!** Despite careful construction, electrical devices can cause fires. This can result in death or serious injury. • Do not mount the product in places containing highly flammable materials or gases. • Do not mount the inverter in places where there is a risk of explosion.

The installation location must meet the following requirements:

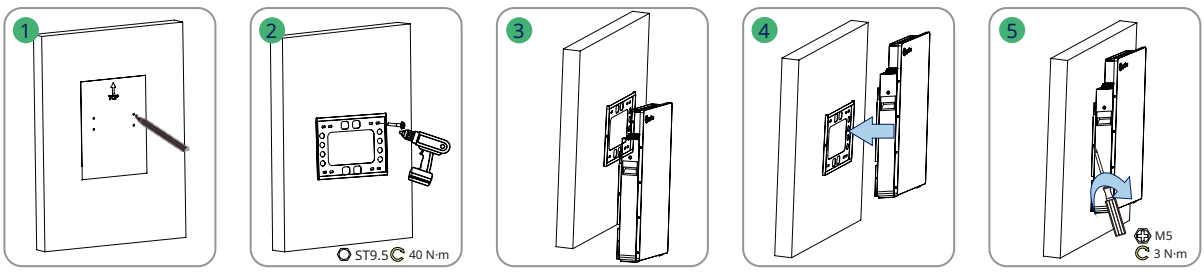
- The equipment should be installed on a solid surface such as concrete or masonry.
- The installation location must be inaccessible to children.
- The installation location must be suitable for the weight and dimensions of the BESS.
- The equipment should be protected from conductive (metal) dust.
- The installation location should be away from water sources, heat sources, and inflammable and explosive materials.
- The installation location must not be close to the fire.
- The product should be installed at eye level so that the LED indicators can be read without difficulty.
- The circuit breaker of the BESS must always be freely accessible.
- The altitude of the installation location should not be more than 6562 ft (2000 m).
- The operating temperature should be between 5℉ and 131℉ (-15°C to +55°C).
- The ambient humidity should be less than 95% RH, without condensing.
- The product must be protected from direct sunlight. If the product is installed under direct sunlight, the exterior components may age prematurely, and overheating might occur. When the temperature rises, the power may be derated, and the battery lifespan will be reduced.





5.2.2 Wall Mounting Steps

Procedure	
Step 1	• Place the positioning plate (the same size as the battery) against the wall and mark the drilling holes.
Step 2	• Fix the mounting bracket with self-tapping screws and gaskets, and make sure that the mounting bracket is firmly attached to the mounting surface.
Step 3	• Handle the battery to the installation place; (Remove the top cover before handling.)
Step 4	• Mount the battery on the bracket as shown below.
Step 5	• Use screws to secure the battery.



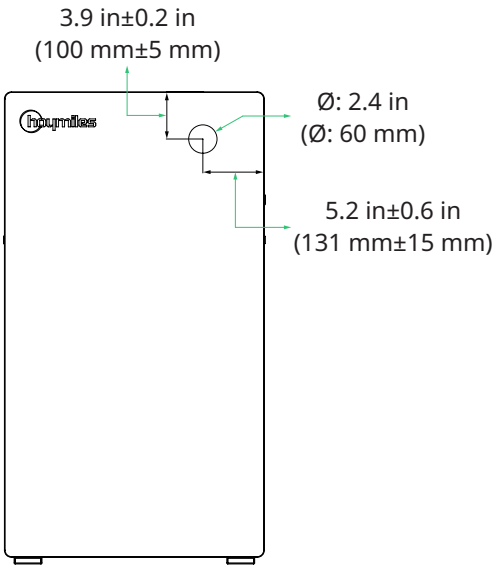
5.3 Electrical Connection

NOTICE	Before the electrical connection, ensure that the circuit breaker and power switch of the battery and all switches connected to the energy storage system are in the OFF state. Otherwise, an electric shock may occur.

Cable	Specification
Ground Cable	10 AWG/6 mm²
Positive Cable	1 AWG/50 mm²
Negative Cable	1 AWG/50 mm²
Communication Cable	Standard communication network cable

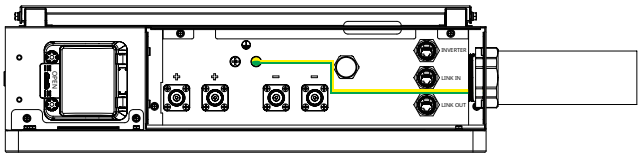
5.3.1 Punching (only for the system diagram 5)

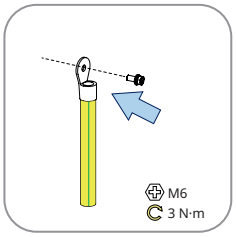
Procedure



5.3.2 Ground Cable Connection

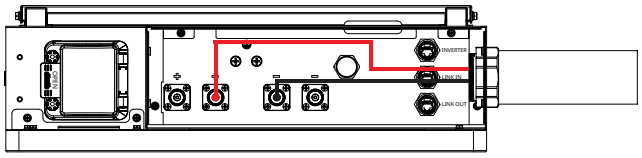
Procedure



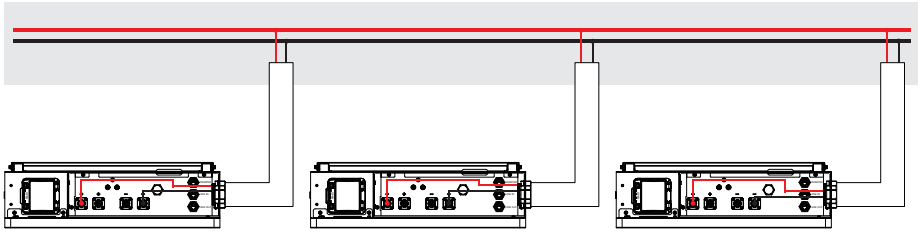


5.3.3 Power Cable Connection

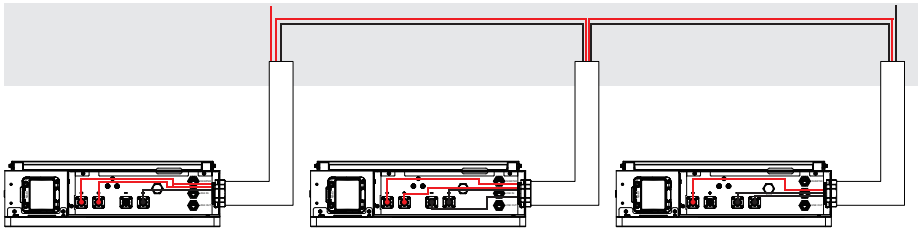
A. Single Unit

Procedure


B. Parallel Connection with Busbar

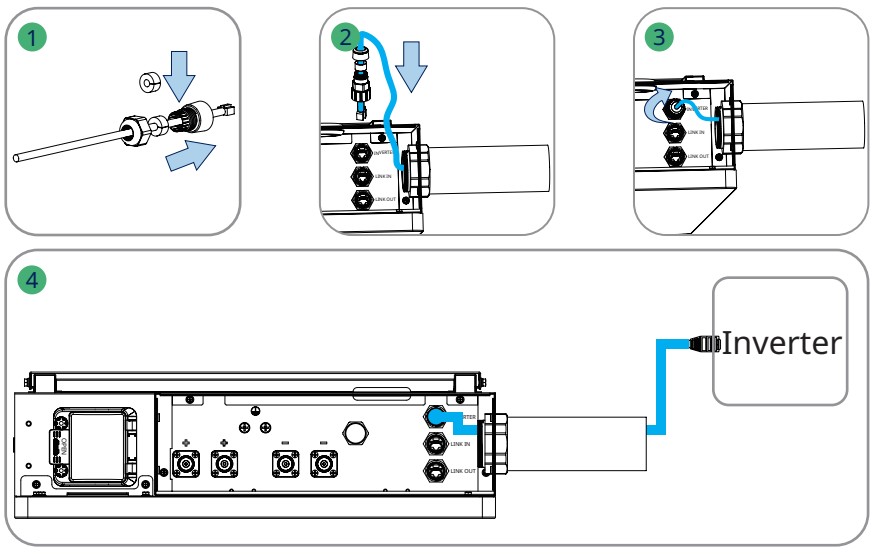
Procedure


C. Parallel Connection without Busbar

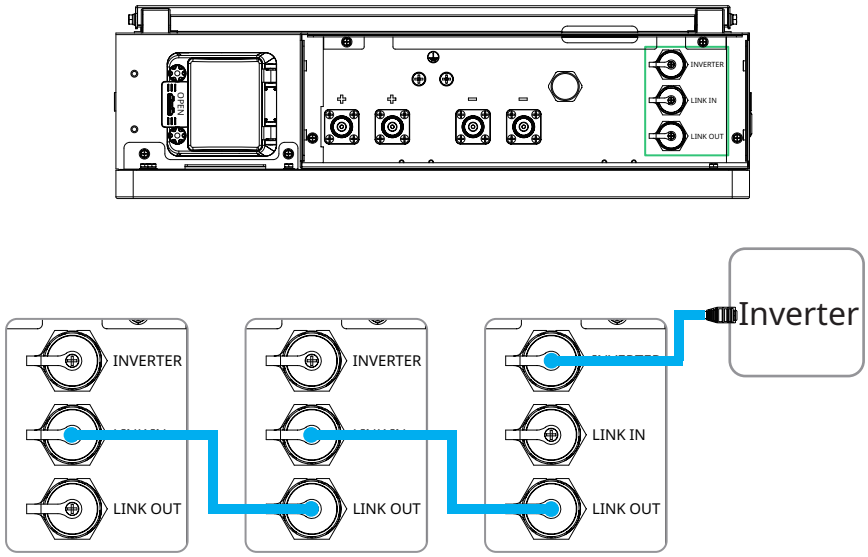
Procedure


5.3.4 Communication Cable Connection

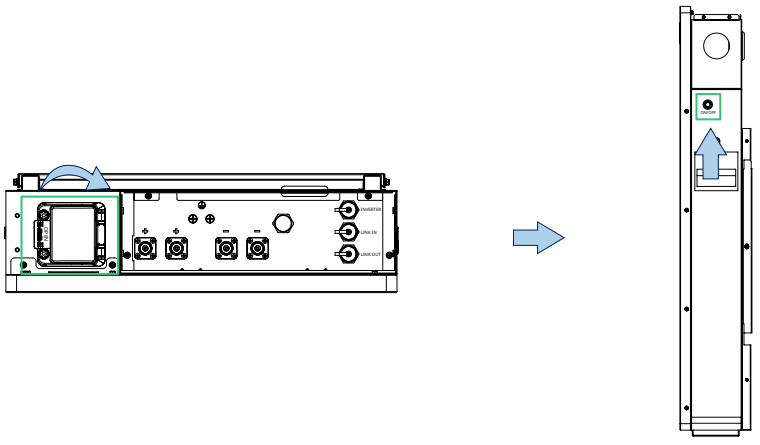
A. Single Unit

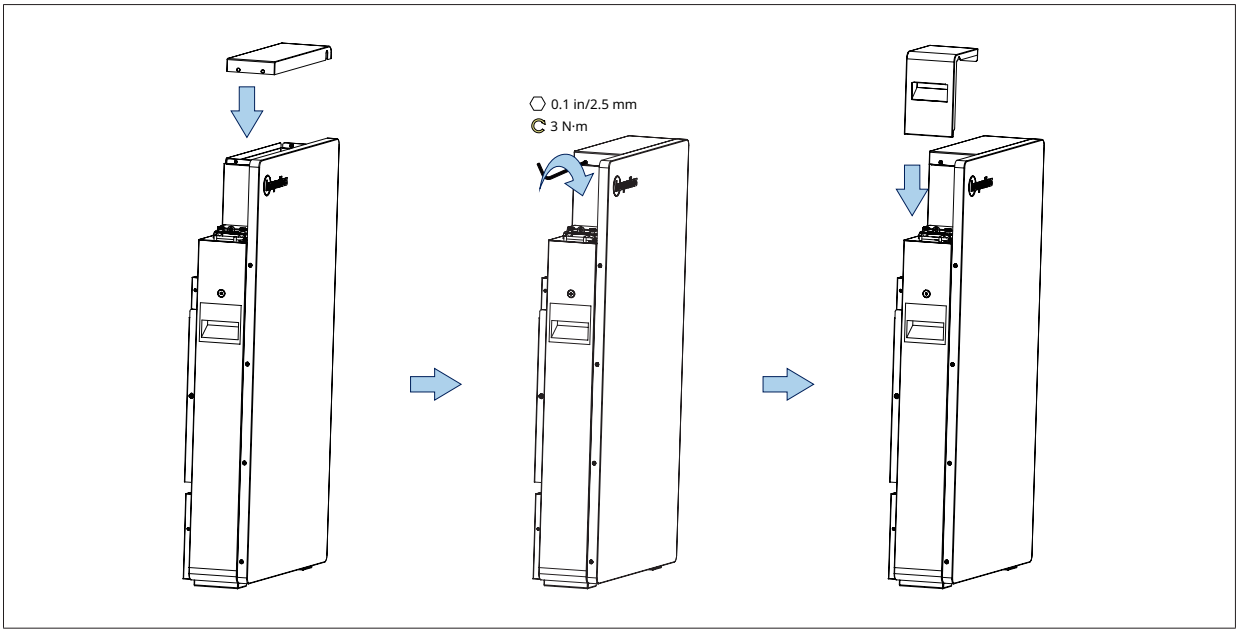
Procedure


B. Parallel Connection

Procedure


5.3.5 Battery Activation

Procedure	
Step 1	Open the cover of the circuit breaker and turn on the circuit breaker.
Step 2	Turn on the power switch. After five seconds, a blue indicator flashes, indicating that the operation is normal.
Step 3	Put back the top right cover, tighten the screws, and put back the top left cover.
	



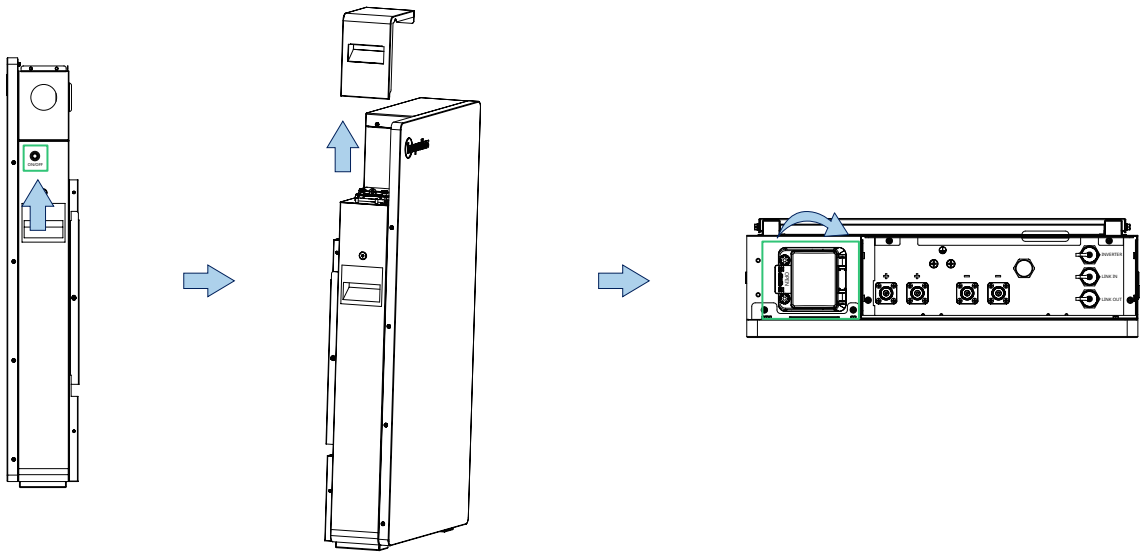
Battery Status	Indicator	Indicator Status
Standby		On for 0.25s; Off for 3.75s.
Charge		On for 0.5s; Off for 1.5s.
Discharge		The indicator stays lit.
Protection Status		On for 0.5s; Off for 0.5s.
Inverter Communication Fault		On for 0.5s; Off for 0.5s.
Parallel Communication Fault		On for 0.25s; Off for 3.75s.
Alarm/Fault		The indicator stays lit.
Shutdown		The indicator is off.

Note:

- When the battery is started, the red indicator and blue indicator flash alternatively, indicating that the battery self-test is normal.

5.3.6 Battery Shutdown

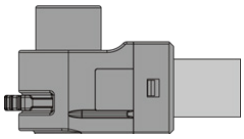
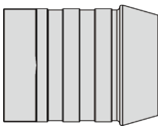
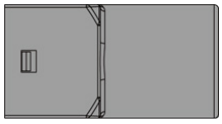
Procedure	
Step 1	Turn off the power switch.
Step 2	Remove the top left cover.
Step 3	Open the cover of the circuit breaker and disconnect the circuit breaker.

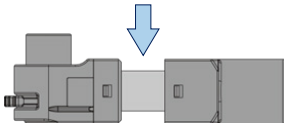
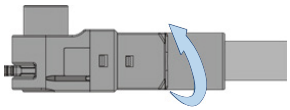


6. Cable Assembling (if required)

6.1 Power Cable

Material List (Plug components may be purchased separately from the supplier).

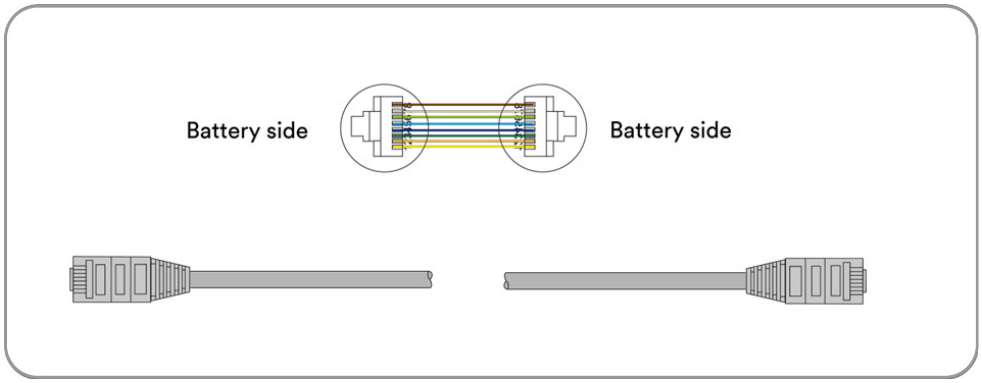
		
Plug sub assembly	Cable sealing ring	Plug protection cover

Procedure		
Step 1	Thread the cable through the isolation cable sealing ring and plug protection cover.	
Step 2	Strip the cable insulation by 13 mm.	
Step 3	Crimp the cable and terminal with a crimping tool. (The red plug is used for the positive cable, and the black plug is used for the negative cable.)	
Step 4	Tighten the isolation cap and plug contact.	

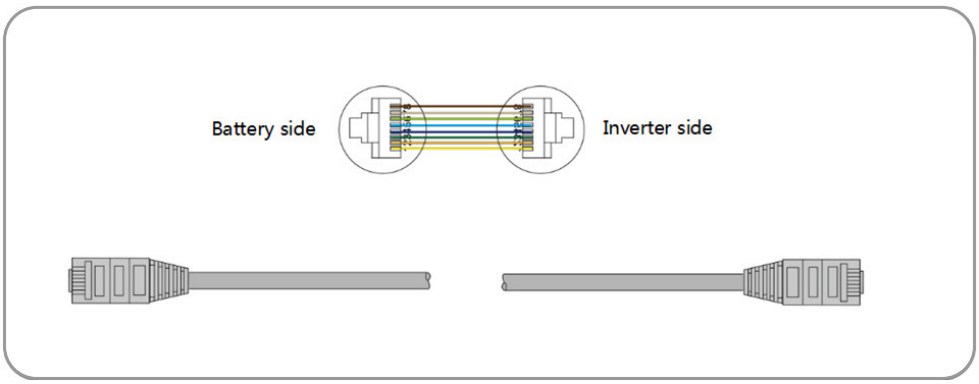
6.2 Communication Cable

Battery to Battery

Alternatively, a standard straight CAT 5 Ethernet cable can be used.



Battery to Inverter



7. Routine Maintenance

To ensure that the battery can operate for a long time, it is recommended to perform the following maintenance items. Make sure that all maintenance items are performed after the battery is powered off.

Check Item	Check Method	Maintenance Interval
System Cleanliness	• Periodically check whether the battery is damaged or deformed. • Clean the system.	Once every 6 months to 12 months
System Operation Status	• Check whether there is abnormal sound during operation; • Check whether the indicator works normally. • Check whether the system parameters are set correctly. • Update the software.	Once every 6 months
Electrical Connection	• Check whether the cables are firmly connected and intact; in particular, ensure that the parts being contacted with the metal surface are not scratched; • Check whether the cable is discolored.	The first inspection is 6 months after the initial commissioning, and the subsequent inspections can be carried out once every 6 to 12 months.
Grounding Reliability	• Check whether the ground cables are firmly connected.	The first inspection is 6 months after the initial commissioning, and the subsequent inspections can be carried out once every 6 to 12 months.

8. Handling Precautions and Guidelines for Product

These Handling Precautions and Guidelines for Rechargeable Battery System (“Handling Precautions and Guidelines”) shall only apply to the packs manufactured by Hoymiles. Customers shall strictly follow these Handling Precautions and Guidelines, and shall alert its customers, contract manufacturers, agents, distributors, service providers, and end-users of the risks of the packs. Customers should also ensure that they observe their obligations as specified in the document and the handling precautions and guidelines. Detailed information is available on the printed label of the product, a quick installation guide, a help file, or an official website. The entire chain including customers, distributors, and end-users should be committed to these obligations so that the product can be properly handled, transported, installed, operated, and maintained.

Statement (1):

Customers are requested to contact Hoymiles in advance, if and when customers need other applications or operating conditions other than those described in this document. Additional experimentation may be required to verify performance and safety under such conditions.

Statement (2):

Hoymiles will take no responsibility for any accidents in the event the product is used for applications or under conditions other than those described in this document.

- Use the product under specified charge/discharge conditions.
- Do not immerse the product in water.
- Do not heat the product.
- Do not attempt to crush, drop, or penetrate the product.
- Do not attempt to have any modifications.

- Leave the product in cool places.
- Stop using the product with any colour change or mechanical damage detected during assembly, charging, normal operation, and storage.
- In case of leakage or smells, track to the thermal source, remove the thermal source, and clean it with water.
- Do not place or leave the pack and equipment in the reach of the children.
- Keep leaked electrolytes away from the eyes or skin. In case of leakage contact with eyes or skin, immediately clean with water and seek help from a doctor. Serious damages can be caused due to delayed treatment.
- Do not put the pack into a fire. Do not use it or leave it in a place near fire, heaters, or high-temperature sources. The heat can melt the pack insulator and damage the safety vent, resulting in overheating, explosion, or fire of the pack.
- Do not submerge the product in water or wet the product. If the protective devices are damaged, abnormal charging current and voltage may cause a chemical reaction within the product, which may result in overheating, explosion, or fire of the pack.
- Do not reversely connect the positive (+) and negative (-) terminals of the product.
- Do not contact the product terminals (+ and -) directly with a wire or any metal (like a metal necklace or a hairpin). Otherwise, the product will be short-circuited and generate excessive current, which may result in the overheating, explosion, or fire of the pack.
- Do not throw or drop the pack. Strong impact may damage the protective devices, and an abnormal chemical reaction might occur during charge, resulting in overheating, explosion, or fire of the pack.
- Do not drive a nail in, hit with a hammer, or stamp on the pack. Otherwise, the pack may be deformed and short-circuited, resulting in overheating, explosion, or fire of the pack.
- Do not solder the pack directly. Heat applied during soldering may damage the insulator of the safety vent and mechanism, resulting in overheating, explosion, or fire of the pack.
- Do not disassemble or alter the pack. The pack employs a safety mechanism and a protection device to avoid any danger. If they are damaged, the pack might overheat, explode, or catch fire.
- Do not put the pack in a microwave oven or a pressure cooker. Sudden heat may damage the sealing of the pack and may cause overheating, explosion, or fire of the pack.
- Do not leave the pack in a charger or equipment if it generates an odour and/or heat, changes colour and/or shape, leaks electrolytes, or encounters any other abnormality. In such a case, immediately take the pack out of the charger or equipment and keep it away from fire. Otherwise, the pack might overheat, explode, or catch fire.
- Stop charging or using the battery after the battery reaches its lifetime; otherwise, the battery might cause overheating, explosion, or fire.
- Do not use the pack beyond specified conditions. Otherwise, the pack might encounter overheating, damage, or performance deterioration.
- Read the instructions regarding the installation and operation to avoid damages due to incorrect operations.
- The battery may have insufficient power capacity after long storage.
- Knockoff or counterfeit battery.
- Any inconsistency among serial number, model number, and product code.
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9. Technical Datasheet

Model	HBX-10LV-USG1
System Data	
Battery Type	LiFePO4
Rated Capacity	200 Ah
Usable Energy	10 kWh
Rated Voltage	51.2 V
Voltage Range	44.8 V-58.4 V
Rated Charging Current	0.6C, 120 A
Max. Continuous Charging Current	0.6C, 120 A
Rated Discharging Current	0.6C, 120 A
Max. Continuous Discharging Current	0.6C, 120 A
Max. Charge/Discharge Power	6 kW/6 kW
Peak Discharge Current/Power	160 A/8 kW, 1 min
Communication Interface	CAN, RS485
Recommended Depth of Discharge (DOD)	90%
Max. Parallel Quantity	Max. 16 Sets in Parallel, 160 kWh
Protection	
Overvoltage and Undervoltage Protection	Integrated
Over Current Protection	Integrated
Overtemperature and Undertemperature Protection	Integrated
DC Breaker	Integrated
General	
Dimension (W × H × D)	21.7 × 39.4 × 6.5 inch (550 × 1000 × 165 mm)
Weight	214 lbs (97 kg)
Installation Environment	Indoor/Outdoor
Charging Temperature	23°F to 131°F (-5°C to +55°C)
Discharging Temperature	5°F to 131°F (-15°C to +55°C)
Protection Degree	NEMA Type 4
Cooling	Natural Convection
Altitude	≤6562 ft (2000 m)
Cycle Life (77°F/25°C, 0.6C)	≥6000 Cycles
Certification	UN 38.3, UL 1973, UL 9540A, UL 9540
Warranty	10 Years

Floor 6-10, Building 5, 99 Housheng Road, Gongshu District,
Hangzhou 310015
P. R. China
+86 571 2805 6101

General inquiry: info@hoymiles.com
Technical support: service@hoymiles.com

Visit https://www.hoymiles.com/ for more information.