



User Manual

HV48300 Max

LiFePO₄ Energy Storage Battery



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About This Document

This document describes the installation, electrical connection, commissioning, and troubleshooting procedures for the HV48300 Max high-voltage energy storage system (hereinafter referred to as ESS). Before installing and operating the ESS, please read this document carefully to understand its safety information, functions, and features

This document applies to:

- Technical Support Engineers
- Hardware Installation Engineers
- Commissioning Engineers
- Maintenance Engineers

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1. Safety Information

Disclaimer

Before transporting, storing, installing, operating, using, and/or maintaining the equipment, please read this document carefully, strictly follow all instructions provided herein, and adhere to the safety operating procedures specified in both the equipment and this document. In this document, “Equipment” refers to all products, software, components, spare parts, and/or services related to this document; “company” refers to the manufacturer, distributor, and/or service provider of the Equipment; “you” refers to the entity responsible for the transportation, storage, installation, operation, use, and/or maintenance.

The statements “Danger” “Warning” “Caution” and “Notice” used in this document do not cover all safety precautions. You must also comply with relevant international, national, or regional standards as well as industry practices. The Company assumes no liability for any consequences that may arise from violations of safety requirements or standards related to the design, production, and use of the equipment.

This equipment must be used in an environment that complies with the design specifications. Failure to do so may result in equipment malfunction, abnormal operation, or damage; such are not covered by the warranty. The company assumes no liability for any property damage, personal injury, or death resulting therefrom. During transportation, storage, installation, operation, use, and maintenance, applicable laws, regulations, standards, and specifications must be observed.

The device software must not be reverse-engineered, decompiled, disassembled, adapted, implanted, or otherwise modified; one must not investigate the internal implementation logic, obtain the source code of the device software, infringe upon intellectual property rights, or disclose any performance test results of the device software.

The Company shall not be liable for any of the following circumstances or their consequences:

- Damage to the equipment caused by force majeure, including earthquakes, floods, volcanic eruptions, mudslides, lightning strikes, fire, war, armed conflict, typhoons, hurricanes, tornadoes, and other extreme weather conditions.
- Operation of the device under conditions exceeding those specified in this document.
- The device is installed or used in an environment that does not comply with international, national, or regional standards.
- The equipment is installed or used by unqualified personnel.
- You have not followed the operating instructions and safety precautions specified in the product and documentation.
- Damage to the equipment is caused by your or a third party’s negligence, intentional violation, gross negligence, improper operation, or other causes unrelated to the company.

- Damage to the equipment is caused by your or a third party's negligence, intentional violation, gross negligence, improper operation, or other causes unrelated to the company.
- You have removed or modified the product, or modified the software code, without authorization.
- You or a third party authorized by you caused damage to the device during transportation.
- Damage to the device resulted from storage conditions that do not meet the requirements specified in the product documentation.
- You failed to prepare materials and tools that comply with local laws, regulations, and relevant standards.

1.1 Personal Safety

Danger

Be sure to disconnect the power supply during installation. Never install or remove cables while the power is on.

can cause arcing, sparks, fire, or explosion, which may result in personal injury.

Non-standard or improper operation of live equipment may result in fire, electric shock, or explosion, causing property damage, personal injury or even death.

Before surgery, remove conductive items such as watches, bracelets, rings, and necklaces to prevent electric shock.

During operation, dedicated insulated tools must be used to prevent electric shock or short circuits. The voltage rating of the insulating materials used must local laws, regulations, standards, and technical specifications.

During the procedure, personal protective equipment must be worn, including protective clothing, insulated shoes, safety goggles, a safety helmet, and insulated gloves.

General Requirements

- Do not disable the protective devices. Strictly adhere to the warnings, precautions, and related safety measures outlined in this document and marked on the equipment.
- If there is a risk of personal injury or equipment damage during operation, stop operation immediately, report to the supervisor, and take feasible protective measures.
- Do not energize the equipment until installation is complete or the equipment has been verified by a qualified professional.
- Never touch power supply equipment directly or with conductive objects such as wet items. Before touching any conductive surface or terminal, be sure to measure the voltage at the contact point to ensure there is no risk of electric shock.
- Do not touch the equipment while it is running, as the equipment housing may be hot.
- In the event of a fire, immediately evacuate the building or equipment area, activate the fire alarm system, or call emergency services.
- Under no circumstances should you enter the affected building or equipment area.

Personnel Requirements

- Only qualified and trained personnel are permitted to operate this equipment.
Professionals:
 - Persons familiar with the equipment's operating principles and structure, who have received training in equipment operation or possess operational experience, and who clearly understand the sources and severity of potential hazards during equipment installation, operation, and maintenance.
 - Trained personnel: Persons who have received technical and safety training, possess the necessary experience, are aware of the potential hazards they may face during specific operations, and are able to take protective measures to minimize risks to themselves and others.
- Personnel planning to install or maintain this equipment must be adequately trained to perform all operations correctly and must be familiar with all necessary safety precautions and relevant local standards.
- Only qualified professionals or trained personnel are permitted to install, operate, and maintain this equipment.
- Only qualified professionals are permitted to dismantle safety devices and inspect the equipment. Personnel performing electrical work, work at heights, and special tasks such as equipment preparation must hold the relevant qualification certificates required by local regulations.
- Only certified high-voltage electricians are permitted to operate the equipment.
- Only authorized personnel may replace equipment or components (including software).
- Only personnel who need to operate the equipment are permitted to enter the equipment area.

1.2 Electrical Safety

Danger

Before connecting the power cable, ensure that the equipment is in good condition. Failure to do so may result in electric shock or fire. Non-standard or improper operation may result in fire or electric shock.

Prevent foreign objects from entering the equipment during operation. Failure to do so may result in equipment damage, derating of the load power, power supply failure, or personal injury.

Warning

For equipment requiring grounding, install the grounding cable first during installation, and remove it last when dismantling the equipment.

General Requirements

- Please install, operate, and maintain the equipment in accordance with the procedures described in this document. Do not modify or alter the equipment, add components, or change the installation sequence without authorization.

- Obtain approval from the national or local power utility before connecting the equipment to the grid.
- Comply with power plant safety regulations, such as the work permit system. Set up temporary fencing or warning ropes around the work area and post “No Entry ” signs to prevent unauthorized personnel from entering the area.
- Before installing or removing power cables, shut down the equipment and its upstream and downstream switches.
- If any liquid is detected inside the equipment, immediately disconnect the power supply and stop using the equipment.
- Before operating the equipment, check that all tools meet the requirements and keep a record of them. After operation is complete, collect all to prevent them from being left inside the equipment.
- Before installing the power cable, verify that the cable is correctly labeled and that the cable terminals have been properly insulated.
- When installing the equipment, use a torque tool with an appropriate measurement range to tighten the screws. When tightening screws with a wrench, ensure that the wrench does not tilt. Torque deviation must not exceed 10% of the specified value.
- Ensure that torque tools are used to tighten bolts, and mark them with red and blue after two tightening passes. Inspection: The installer marks the tightened bolts with blue. After the quality inspector confirms that the bolts are tightened, they mark them with red. (The markings must cover the edges of the bolts.)
- After installation is complete, ensure that the protective covers, insulating tubes, and other necessary components for all electrical parts are in place to prevent electric shock.
- If the equipment has multiple input ports, disconnect all input ports before operating the equipment.
- Before performing maintenance on downstream electrical or power distribution equipment, first turn off the power switch on the power supply equipment.
- During equipment maintenance, "Do Not Energize" labels and warning signs to prevent accidental energization. The equipment may only be energized after troubleshooting is complete.
- If fault diagnosis and troubleshooting are required after power has been disconnected, take the following safety measures: First, disconnect the power supply; check whether the equipment for live voltage.
Install a grounding cable. Post warning signs and set up barriers.
- Periodically inspect equipment connections to ensure that all screws are securely tightened.
- Only qualified professionals may replace damaged cables.
- Do not write on, damage, or obscure any labels or nameplates on the equipment. Replace worn labels promptly. Do not use water, alcohol, oil, or other solvents to clean electrical components inside or outside the equipment.

Grounding

- Ensure the equipment’s grounding impedance complies with local electrical standards.

- Ensure the equipment is permanently connected to protective grounding. Before operating the equipment, check that its electrical connections are reliably grounded.
- Do not operate the equipment if the grounding conductor is not properly installed.
- Do not damage the grounding conductor.
- Before connecting the power supply, the protective grounding terminal on the equipment housing must be connected to ground; otherwise, contact current may.

Wiring Requirements

- When selecting, installing, and routing cables, you must comply with local safety regulations and codes.
- When laying the power cable, ensure that the cable is not twisted or kinked. Never splice or solder the power cable; if absolutely necessary, use a longer cable.
- Ensure that all cables are properly connected, well insulated, and comply with relevant specifications.
- Ensure that the channels used for cabling have no sharp edges; where cables pass through conduits or cable openings, cushioning material should be provided to prevent damage to the cables from sharp edges or burrs.
- If cables are routed into the cabinet from the top, first bend them into a U-shape outside the cabinet before routing them inside.⁹
- Ensure that cables of the same type are neatly bundled together in a straight line, and that the cable sheathing is intact. When routing different types of cables, ensure a minimum spacing of 30 mm between them.
- Once cable connections are complete or work is temporarily suspended, immediately seal the cable openings with sealant to prevent small animals or moisture from entering.
- Use cable supports and cable clamps to securely install the cables. Ensure that cables in the backfill area are in close contact with the ground to prevent deformation or damage during backfilling.
- If external conditions (such as cable layout or ambient temperature) change, verify the suitability of the cable in accordance with IEC-60364-5-52 or local laws and regulations. For example, confirm that its current-carrying capacity meets the requirements.
- When routing cables, maintain a minimum clearance of 30 mm between the cable and any heat-generating components or areas. This prevents cable insulation from damage or degradation.
- At low temperatures, severe impact or vibration may damage the plastic cable sheath. To ensure safety, please observe the following requirements:
 - Cables may only be laid or installed at temperatures above 0°C. Exercise extreme caution when handling cables, especially in low-temperature environments.
 - Cables stored at sub-zero temperatures must be kept at room temperature for at least 24 hours before installation.
- Never perform any improper handling, such as dropping the cable directly from a vehicle.

Otherwise, cable performance may deteriorate due to damage, thereby affecting its current-carrying capacity and temperature rise capability.

1.3 Environmental Requirements

Hazards

Never expose the equipment to flammable or explosive gases or fumes. Do not operate the equipment in such environments.

Do not store any flammable or explosive substances in the vicinity of the equipment.

Do not place the equipment near heat sources or open flames, such as smoke, candles, heaters, or other heating devices. Overheating may damage the equipment or cause a fire.

Warning

Install the device in an area away from liquids. Do not install it in areas prone to condensation (such as under water pipes or exhaust vents), or areas prone to water leakage (such as air conditioning vents, ventilation openings, or equipment room air intakes). Ensure no liquid enters the interior of the equipment to prevent malfunctions or short circuits. To avoid damage to the equipment or fire caused by high temperatures, ensure that ventilation openings or cooling systems are not blocked or covered by other objects while the equipment is in operation.

General Requirements

Ensure the device is stored in a clean, dry, and well-ventilated environment, and implement appropriate protective measures.

The environment must have temperature and humidity control capabilities and be effectively protected against dust and condensation.

Please ensure that the installation and operating environment of the equipment remains within the specified limits. Failure to do so may compromise its performance and safety.

Under severe weather conditions such as lightning, rain, snow, or winds of force 6 or higher, it is strictly prohibited to install, use, or operate outdoor equipment and cables (including but not limited to mobile devices, operating equipment, and cables; inserting or removing connectors from signal ports connected to outdoor facilities; working at heights; performing outdoor installations; and opening doors).

Do not install this equipment in environments containing dust, smoke, volatile or corrosive gases, infrared or other radiation, organic solvents, or salty, humid air.

Do not install this equipment in environments containing conductive metal or magnetic dust.

Do not install this equipment in areas prone to microbial growth (such as fungi or mold).

Do not install this equipment in areas prone to microbial growth (such as fungi or mold).

Do not install this device in areas subject to strong vibration, noise, or electromagnetic interference.

Ensure that the site complies with local laws, regulations, and relevant standards.

Ensure that the ground in the installation environment is solid, free of soft or spongy soil, and not prone to settlement. The site must not be located in low-lying areas prone to water accumulation or snow, and the site's elevation must be higher than the highest historical water level in the area. Do not install the equipment in a location where it may be submerged in water.

If the equipment is installed in an area with dense vegetation, in addition to routine weeding, the ground beneath the equipment must be reinforced with concrete or gravel.

1.4 Battery Safety

Danger

Never connect the positive and negative terminals of the battery together, as this may cause a short circuit. A battery short circuit generates a high transient current and releases a large amount of energy, which may cause battery leakage, smoke, flammable gas leakage, thermal runaway, fire, or explosion. To prevent battery shortcircuiting, do not perform maintenance while the battery is powered.

Never place the battery in high-temperature environments or near heat sources, such as direct sunlight, open flames, transformers, or heaters. Battery Overheating may cause leakage, smoke, flammable gas release, thermal runaway, fire, or explosion.

Protect the battery from mechanical vibration, drops, impacts, punctures, and strong shocks. Otherwise, the battery may be damaged or catch.

To prevent leakage, smoke, flammable gas release, thermal runaway, fire, or explosion, do not disassemble, modify, or damage the battery, for example: Do not insert foreign objects into the battery, crush the battery, or immerse the battery in water or other liquids. Do not use other metal objects to contact the battery terminals, as this may generate heat or cause electrolyte leakage.

If the battery model being used or intended for replacement poses a risk of fire or explosion, Please use the battery model recommended by the manufacturer.

Battery electrolyte is toxic and volatile. If a battery leaks or emits an unusual odor, do not touch the leaked liquid or inhale the associated gases. In such cases, immediately move away from the battery and contact a professional. The professional must wear safety goggles, rubber gloves, a gas mask, and protective clothing, disconnect the device from the power source, remove the battery, and contact a technical engineer.

A battery is a sealed system that does not release any gases during normal operation. However, if the battery is mishandled— such as being burned, punctured, crushed, struck by lightning, overcharged, or exposed to other harsh environments that could cause thermal runaway—the battery may be damaged, or abnormal chemical reactions may occur inside the battery, leading to electrolyte leakage or the generation of gases such as carbon monoxide (CO) and hydrogen (H₂). To prevent fire or equipment corrosion, ensure that flammable gases are properly vented.

Gases produced by burning batteries may irritate the eyes, skin, and throat. Take protective measures immediately

Warning

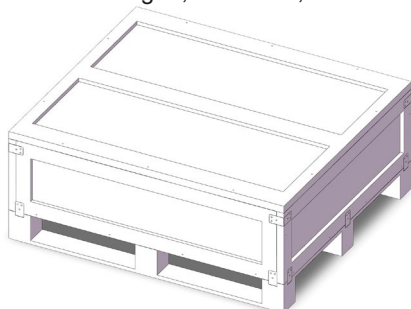
Install the battery in a dry area. Never install it beneath locations prone to water leakage, such as air conditioning vents, ventilation vents, equipment room air intakes, or near water pipes. Ensure that liquids do not enter the equipment to prevent malfunctions or short circuits.

Before installing and commissioning the battery, fire protection equipment, such as fire extinguishers and carbon dioxide fire suppression. Before commissioning, ensure that the installed fire safety equipment complies with local laws and regulations.

Before unpacking, storing, or transporting, verify that the packaging is intact and that the batteries are correctly positioned according to the labels on the packaging.

Never place the battery upside down, vertically, on one side, or at an angle; stack it according to the stacking instructions on the packaging and ensure the battery does not fall or become damaged. Otherwise, these batteries will need to be scrapped.

After unpacking the batteries, place them in the correct orientation. Never place the batteries upside down, on their side, at an angle, or in a stacked configuration. Ensure that they do not fall or become damaged; otherwise, these batteries must be scrapped.



Tighten the screws on the copper bars or cables to the torque specified in this document. Periodically check that the screws are tight, inspect for rust, corrosion, or other foreign objects, and clean them promptly. Loose screw connections can cause excessive voltage drops, and the batteries may short-circuit when the current is high.

After the battery is discharged, it must be recharged promptly to avoid damage caused by over-discharge.

Disclaimer

The Company shall not be held liable for any damage or other consequences resulting from the batteries it provides due to the following causes:

- Batteries may be damaged due to force majeure, such as earthquakes, floods, volcanic eruptions, mudslides, lightning strikes, fires, war, armed conflicts, typhoons, hurricanes, tornadoes, and other extreme weather conditions.
- Batteries may be damaged if the operating environment of on-site equipment or external power supply parameters do not meet normal operating requirements, such as such as the battery's actual operating temperature being too high or too low, or an unstable power grid with frequent power outages. Batteries may be damaged, dislodged, leak, or crack due to improper operation or incorrect connections.
- After the battery is installed and connected to the system, failure to power it on in a timely manner due to your actions may result in damage to the battery due to overdischarge. The battery is damaged because you failed to have it repaired in a timely manner.

- You have set incorrect battery operating parameters.
- Mixing different types of batteries will accelerate capacity degradation. For example, using our batteries together with batteries from other manufacturers or batteries with different rated capacities.
- You have not maintained the batteries properly, resulting in frequent over-discharging; you have increased the load capacity without notifying us; or periods without fully charging the battery.
- You have not maintained the battery in accordance with the operating instructions, such as failing to inspect the battery terminals regularly.
- Battery damage is caused by failure to store the battery in accordance with storage requirements (e.g., storing it in a damp environment or one exposed to rain).
- Due to reasons on your part, the battery was not charged as required during storage, resulting in loss of battery capacity or other irreversible damage. Battery damage may be caused by you or a third party, such as moving or reinstalling the battery.
- You may have changed the battery's usage scenario without notifying the company. You may have connected additional loads to the battery.
- The battery has been stored beyond the maximum recommended duration.
- The battery warranty has expired. We recommend that you do not use batteries whose warranty has expired, as this poses a safety hazard.

General Requirements

Before installing, operating, or maintaining the battery, please read the battery user manual carefully and strictly adhere to its requirements. The safety precautions specified in this document safety precautions are critical and require special attention.

Please use the battery within the specified temperature range. Do not charge the battery when the ambient temperature is below the permissible range to prevent internal short circuits caused by charging at low temperatures.

Before unpacking the battery, inspect the packaging to ensure it is intact. Never use a battery with damaged packaging. If any damage is found, immediately notify the carrier and the manufacturer immediately. Install the battery within 24 hours of unpacking. If installation cannot be performed promptly, return the battery to its original packaging and store it in a dry indoor environment free of corrosive gases.

Never use damaged batteries (e.g., those damaged by dropping, impact, swelling, or denting of the casing), as such type of damage may result in electrolyte leakage or the release of flammable gases. If electrolyte leakage or structural deformation occurs, immediately contact the installer or professional maintenance personnel to remove or replace the battery. Damaged batteries must not be stored near other equipment or flammable materials and must be kept out of reach of non-professionals.

Before handling the battery, ensure there are no pungent or burning odors in the vicinity. When installing the battery, never place installation tools, metal parts, or other foreign objects on top of it. After installation is complete, remove any debris from the the battery surface and surrounding area.

Do not install the battery pack in rainy, snowy, or foggy weather. Otherwise, the battery pack may corrode due to moisture or rain.

If the battery accidentally comes into contact with moisture, do not install it. Immediately move the battery to a safe, isolated area and dispose of it properly. Before installing the battery pack, inspect it for abnormalities. If any of the following symptoms are observed, the battery pack is considered abnormal:

- The battery pack casing is visibly deformed or damaged.
- The voltage between the positive and negative terminals of the battery pack is significantly below the specified range.

Check whether the positive and negative battery terminals are accidentally grounded. If grounding is detected, disconnect the battery terminals from the ground.

Never perform welding or grinding work near the battery to prevent sparks or arcs from causing a fire.

If the battery is not used for an extended period, store and charge it in accordance with the battery's usage requirements. Do not use equipment that does not comply with local laws and regulations to charge or discharge the battery. Keep the battery circuit disconnected during installation and maintenance.

During storage, inspect damaged batteries for signs of smoke, flames, electrolyte leakage, or overheating.

If a battery malfunctions, its surface temperature may rise. Do not touch the battery to avoid burns. Do not stand, lean, or sit on top of the equipment.

In backup power applications, the battery must not be used under the following circumstances:

- Medical devices critical to human life
- Control devices (such as trains and elevators), as this may result in personal injury
- Computer systems of social and public importance
- Locations near medical equipment
- Other devices similar to those listed above

Short-circuit protection

When installing and maintaining batteries, use insulating tape to wrap the exposed cable terminals on the battery.

Prevent foreign objects (such as conductive objects, screws, and liquids) from entering the battery to avoid causing a short circuit.

Handling of Leaks

Electrolyte is corrosive and may cause irritation and chemical burns. If you come into direct contact with battery electrolyte, take the following measures immediately:

Inhalation: Immediately evacuate the contaminated area, breathe fresh air, and seek medical attention immediately.

Eye contact: Immediately flush eyes with water for at least 15 minutes; do not rub eyes, and seek medical attention immediately.

Skin contact: Immediately wash the affected area with soap and water, and seek medical attention immediately.

Ingestion: Seek medical attention immediately.

Recycling

Dispose of used batteries in accordance with local laws and regulations. Never dispose of batteries as household waste. Improper disposal of batteries may result in environmental pollution or explosions.

If the battery leaks or is damaged, contact technical support or a battery recycling company for disposal. If the battery has exceeded its service life, contact a battery recycling company for disposal.

Do not expose used batteries to high temperatures or direct sunlight.

Do not place used batteries in environments with high humidity or corrosive substances. Never use a faulty battery. Please contact a battery for disposal to prevent environmental pollution.

Precautions

Please read this manual carefully before installation and operation.

If long-term storage is required, charge the battery once every 6 months to ensure that the State of Charge (SOC) remains at 90% or.

When the low-voltage alarm is triggered, the battery must be fully charged within 12 hours.

The output voltage of each battery module exceeds 48 volts. Personal safety must always be prioritized during operation. All battery terminals must be disconnected before performing maintenance.

If any abnormalities are detected, please contact Pytes or its distributor within 24 hours.

Any direct or indirect damage to the battery resulting from the above circumstances will void the warranty.

2. Product Description

Model	Rated Voltage (V)	Operating Voltage Range (V)	System Energy (kWh)	Rated DC Power (kW)
HV48300 Max (1P5S)	256	224–288	80.38	40.19
HV48300 Max (1P6S)	307.2	268.8–345.6	96.46	48.23
HV48300 Max (1P7S)	358.4	313.6–403.2	112.54	56.27
HV48300 Max (1P8S)	409.6	358.4–460.8	128.61	64.31
HV48300 Max (1P9S)	460.8	403.2–518.4	144.69	72.35
HV48300 Max (1P10S)	512	448–576	160.77	80.38
HV48300 Max (1P11S)	563.2	492.8–633.6	176.84	88.42
HV48300 Max (1P12S)	614.4	537.6–691.2	192.92	96.46
HV48300 Max (1P13S)	665.6	582.4–748.8	209.00	104.50
HV48300 Max (1P14S)	716.8	627.2–806.4	225.08	112.54

HV48300 Max (1P15S)	768	672–864	241.15	120.58
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The HV48300 Max is a high-voltage energy storage system based on lithium iron phosphate batteries, a new-generation energy storage product developed and manufactured by Pytes. The system can work in conjunction with PCS (power conversion systems), DC chargers, inverters, UPS, and other equipment, making it suitable for a wide range of applications including microgrids, solar energy storage systems, and off-grid energy storage. With its long cycle life, compact design, lightweight construction, easy installation, and broad compatibility with PCS systems fully meet the application requirements of energy storage systems.

The HV48300 Max is equipped with a built-in Battery Management System (BMS) to manage and monitor battery status, parameters such as battery voltage, current, and temperature. The battery energy storage system features a modular design, with each battery module having a capacity of 16.076 kWh, with up to 15 battery modules capable of being connected in series. Its total energy capacity can be expanded from 80.38 kWh (5 × 16.076 kWh) to 241.15 kWh (15 × 16.076 kWh).

2.1 Technical Specifications

Key Parameters	
Battery Type	LFP
Battery Module Capacity	16.076 kWh
Battery Module Nominal Voltage	51.2 V
Battery module capacity	314 Ah
Battery module weight	120.6 kg
Number of battery modules in series (optional)	15
Number of expandable battery modules	5–15
System nominal voltage	768 V (15S)
System Energy	241.15 kWh
Rated Charge/Discharge Current	157 A
Maximum Charge/Discharge Current	205 A

Other parameters	
Operating Temperature	Charging: 32°F ~ 131°F (0°C~55°C) Discharging: -4°F ~ 131°F (-20°C~55°C)
Storage Temperature	Within 1 month: -20°C to 50°C (-4°F to 122°F) 1–3 months: -10°C to 40°C (14°F to 104°F) 3–12 months: > 0°C–30°C (32°F–86°F)
Thermal Management	Smart fan cooling
Communication Ports	TCP / RS485 / CAN
Humidity	0–95%
Altitude	<3000 m
Protection Rating	IP20
System Dimensions (W×H×D)	2040 × 1150 × 850
Approximate system weight (kg)	1930
Mounting Method	Rack-mount
Recommended discharge depth	0.5P/0.5P, 90%
Cycle Life	25±2°C, 0.5C / 0.5C, EOL 70% ≥ 6000
Warranty	Basic warranty 5 years/Advantage warranty 10 years; or 6,000 cycles (Conditions:0.5P/0.5P, 90% DOD; Recommended SOC Range = 10–100%; 20°C–35°C, ret 70%)
Certifications	UL9540, UL9540A, UL1973, UL60730, UN38.3, IEC62619, IEC63056, IEC60730, CE EMC, IEC62477, IEC62040, ECM

2.2 Features

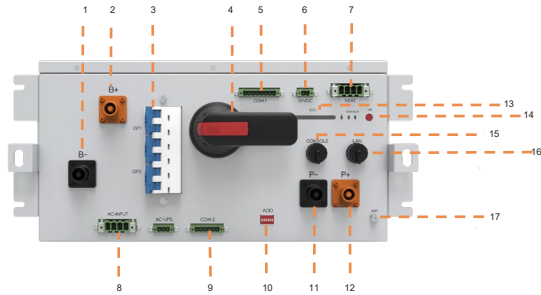
Non-toxic, pollution-free, eco-friendly

- Safe and long cycle life
- Multiple protections are provided by the Battery Management System (BMS), including overcharge/over-discharge, overcurrent, and high/low temperature protection.
- Self-management of charge/discharge status and cell voltage/capacity balancing
- Flexible configuration with broad compatibility across various PCS systems
- Air-cooled heat dissipation ensures excellent thermal performance for each module
- Wide operating temperature range, excellent discharge performance, and long cycle life
- Compact structure, lightweight, and modular design; installation, maintenance, and replacement are all very convenient.

2.3 Components

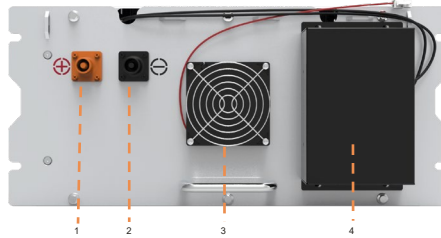
Note: This document uses a 241 kWh system as an example; configurations may vary.

2.3.1 Main Control Unit



1	B-	Battery negative terminal
2	B+	Battery positive terminal
3	QF1	AC-INPUT Control Switch
4	QS	Disconnect Switch
5	com1	Master-slave communication interface
6	24 VDC	Fan Power Supply
7	HEAT	Heating pad power supply
8	AC INPUT	AC Input
9	COM2	Communication interface with external PCS and BCU
10	ADD	DIP Switch
11	P-	Connect to inverter negative terminal
12	P+	Connect to the positive terminal of the inverter
13	SOC indicator	/
14	SW	Power Button
15	CONSOLE	DEBUG
16	LAN	/
17	Wi-Fi	/

2.3.2 Battery Module



1	Battery Power Terminal (Positive)
2	Battery power terminal (negative)
3	Fan
4	BMU

3. Transportation and Storage

3.1 Shipping Requirements

Danger

Handle the battery with care during loading and unloading. Failure to do so may result in a short circuit or damage to the battery (such as leakage or cracking), or even a fire or explosion.

Warning

Never move the battery by holding its terminals, bolts, or cables, as this may cause damage to the battery.

The battery must be kept in the correct orientation during transport. The battery must not be inverted or tilted, and must be protected from, mechanical impact, rain, snow, or immersion in water.

Before unpacking, storing, or transporting, ensure that the packaging is intact and that the battery is positioned correctly according to the label on the packaging. Never place the battery upside down, vertically, on one side, or at an angle. Stack the batteries according to the stacking requirements on the packaging box.

Ensure that the batteries do not fall or become damaged; otherwise, they will need to be scrapped.

Battery modules are pre-charged to 50% SOC (State of Charge) prior to shipment or customized according to actual requirements; the remaining capacity will be determined prior to on-site installation based on storage duration and environmental conditions.

1. These battery modules comply with the UN38.3 standard.
2. Comply with laws and regulations regarding the transport of dangerous goods, in particular the revised European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR).

3.2 Storage Requirements

Hazards

Store the battery in a dry, clean, and well-ventilated indoor environment, away from strong infrared radiation or other radiation sources, organic solvents, corrosive gases, and conductive metal dust. Never expose batteries to direct sunlight or rain, and keep them away from heat sources and ignition sources.

If the battery is defective (e.g., burnt, leaking, swollen, or water-damaged), it should be transferred to a hazardous materials warehouse for separate storage.

The distance between the battery and any flammable materials must be at least 3 meters. The battery must be disposed of as soon as possible.

When storing, position the battery correctly according to the markings on the packaging. Never place the battery upside down, on its side, or at an angle. Battery stacking must follow the stacking requirements on the packaging box.

Store the batteries in a designated area. Never store batteries together with other equipment, and do not stack them too high. If, appropriate storage facilities must be provided.

Caution

Batteries should be put into use immediately after deployment to the site. Batteries stored for long periods should be charged periodically; otherwise, they may be damaged.

- The storage environment must comply with local regulations and standards.
- The storage environment must be kept clean and dry. The product must be protected from rain and moisture.
- The air must not contain corrosive or flammable gases.
- Storage environment requirements are as follows:
 - Storage conditions : Within 1 month: -20°C to 50°C (-4°F to 122°F); 1–3 months: -10°C to 40°C (14°F to 104°F); 3–12 months: >0°C to 30°C (32°F to 86°F); Recommended storage temperature: 20–30°C.
 - Relative humidity: 5% to 80%
- If equipment other than the battery pack has been in storage for more than two years, it must be inspected and tested.
 - Have it inspected by a professional before use.
- Proof must be provided that the product has been stored in accordance with relevant requirements (e.g., temperature requirements).
 - Humidity log data, photos of the storage environment, and inspection reports.

- Ensure that batteries are delivered according to the “first-in, first-out” (□) principle. The storage period should be calculated from the date of the most recent charge indicated on the battery packaging, and the last charge date must be updated after each charge.

4. System Installation

4.1 Pre-installation Inspection

Inspect the outer packaging

Before unpacking the battery, check the outer packaging for damage (such as holes or cracks) and verify the battery model. If you find any damage or if the battery model does not match your order, do not open the product and contact your dealer as soon as possible.

Check the Contents

After unpacking the battery, please check that all included items are intact, complete, and free of obvious damage. If any items are missing or, please contact your dealer. For details on the quantity of items included with the battery, please refer to the packing list below.

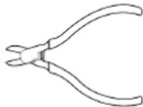


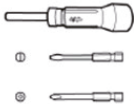


Packing List

Category	Item	Description	Quantity
Battery Control Unit List	HV48300 SE Rack BCU Bare Unit	/	1
	HV48300SE BCU Rack B Positive Lead	/	1
	HV48300SE BCU Rack B Negative Lead	/	1
	HV48300SE P Positive Lead	/	1
	HV48300SE P Negative Lead	/	1
	HV48300SE Rack BCU-BMU Fan Cable	/	1
	HV48300SE Rack-Mount Cascading Input Cable Assembly	/	1
	HV48300 - Rack BCU to PCS Communication Harness	/	1
	Phoenix 4-pin connector	/	1
	Phoenix 3-pin plug	/	1
	Phoenix 6-pin connector	/	1

	Assembly screws	M6×16	4
Battery Module Unit List	HV48300 SE BMU	UL3932 2/0 AWG, orange	1
	Communication cable	16.08 kWh battery module (general)	1
	Power cable	UL1332/ 22 AWG×8 /350 mm black	1
	Dust cover	370mm×220mm ×12mm	2
	Assembly screws	M6×16	4
Battery Rack Unit List	HV48300 MAX Rack Base	/	1
	HV48300 MAX Rack Top Cover	/	1
	HV48300SE BMU-BMU Fan Cable	/	1
	HV48300SE Dual Male Battery Row Fan Cable	/	1
	HV48300SE Dual-Female Battery Rack Fan Cable	/	1
	HV48300 MAX Base Grounding Wire	/	1
	HV48300SE Rack B Positive/Negative Connection Cable (Long)	/	1
	Assembly screws	M6×16	48

4.2 Prepare tools and instruments

4.2.1 Tools

Diagonal pliers	Crimping tool	Cable tie
		
Torque screwdriver	Torque wrench	Utility knife
		

Multimeter	Insulated gloves	Safety boots
		

Note: Use insulated tools to avoid the risk of electric shock or short circuits. Alternatively, if insulated tools are not available, cover all exposed metal surfaces of the tools with insulating tape.

4.2.2 Fire Suppression System

The room where the system is installed must be equipped with a fire suppression system. The fire suppression system should be inspected regularly to ensure it is in proper working order.

Note: Refer to local regulations for specific usage and maintenance requirements.

4.3 Determine the installation location

4.3.1 Installation Environment Requirements

Danger

The HV48300 Max has an IP20 protection rating and must be installed in a restricted area.

The HV48300 Max is a high-voltage DC system and must be operated by qualified and authorized personnel.

Cleaning

This battery system is equipped with high-voltage connectors. Cleaning conditions can affect the system's insulation performance. Before installing or operating the system, dust and metal shavings must be removed. Cleaning is recommended in a dust-free environment. If the system is operating under overload conditions, it should be shut down before cleaning.

Operating Temperature

HV48300 Max system operating temperatures: Charging: 32°F to 131°F (0°C to 55°C)
 Discharging: -4°F to 131°F (-20°C to 55°C);
 Optimal temperature range: 18°C–28°C.

Warning

If the battery operating temperature exceeds the normal range, it will trigger the battery system's over-temperature/low-temperature alarm or protection mechanism, thereby shortening the battery cycle.

Grounding System

Ensure the system is properly grounded before installation.
The grounding system resistance must be $\leq 100 \text{ m}\Omega$.

Installation Angle Requirements

This battery may only be installed on the ground.
Never install the battery in a forward-tilted, backward-tilted, sideways-tilted, horizontal, or inverted position.

4.3.2 Installation Location Requirements

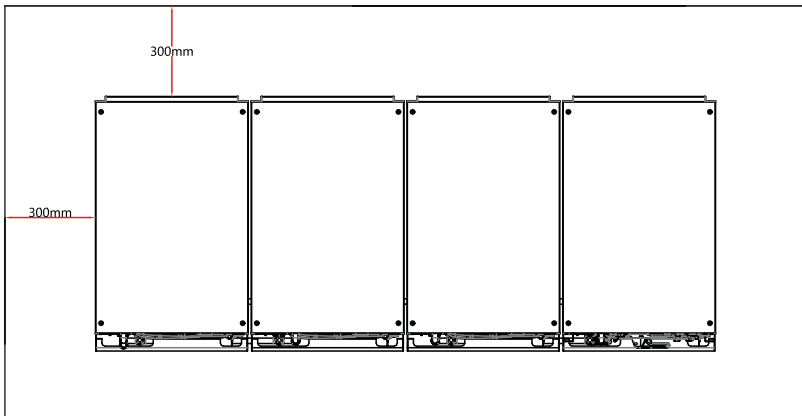
Install the battery on a solid concrete floor. If using another type of floor, it must be made of fire-retardant material and meet the equipment's load-bearing requirements.

4.3.3 Installation Space Requirements

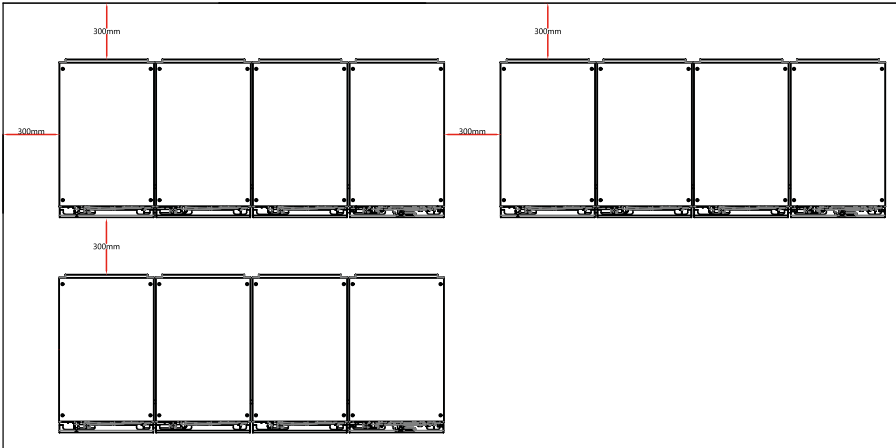
During installation, ensure that there are no other devices (except for related Pytes equipment and sunshades) or flammable or explosive materials. Allow sufficient space for heat dissipation and safety isolation.

Please allow ample space for the battery. The following layout recommendations (top view) are based on a 1P15S system arranged in four columns:

Single Cluster



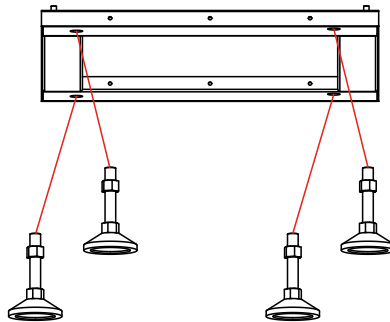
Multiple Clusters



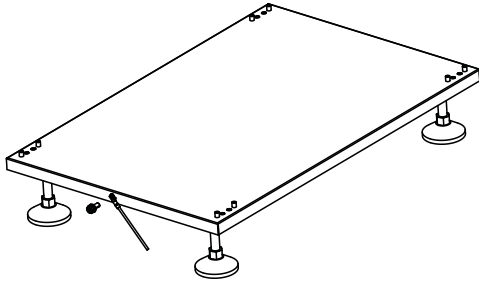
4.4 Equipment Installation

4.4.1 Battery Module and Battery Control Unit Installation

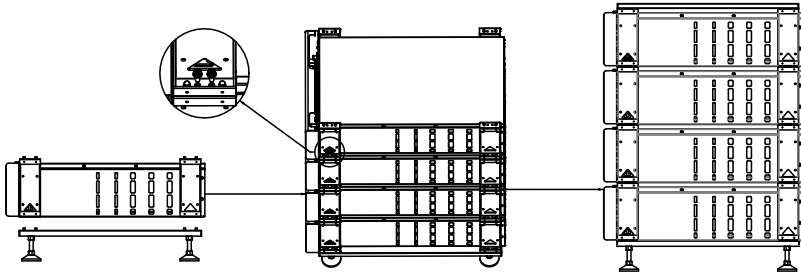
1. Remove the base and secure the four leveling feet to the base to ensure it sits flat on the ground.



2. Secure one end of the grounding cable to the base with screws, and connect the other end to the grounding bar at the installation site using a wrench.

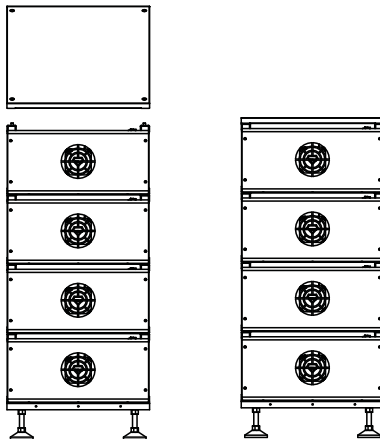


3. Stack the four battery groups layer by layer from bottom to top. Secure each battery group with 8 bolts.

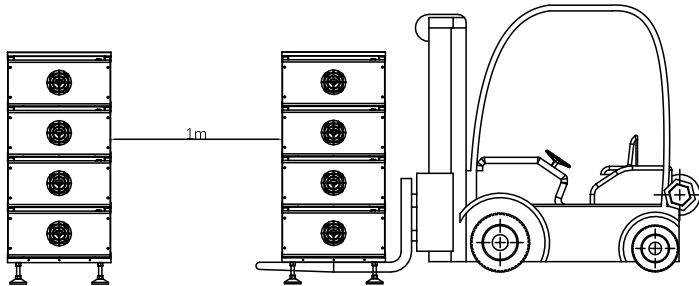


Note: Each battery module weighs ≥ 120 kg. Exercise extreme caution during all handling and disassembly operations.

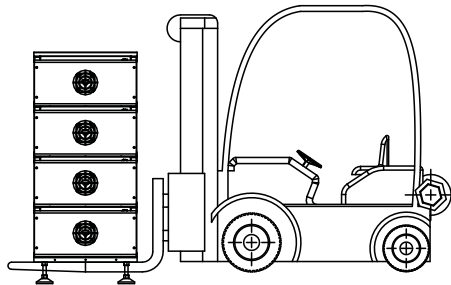
4. Install the cover plate.



5. After the first battery group is installed, the second battery group must be installed at a minimum distance of 1 meter. After installation, use a forklift to move the second battery group to the right of the first battery group; the spacing between the two battery groups should be maintained at 100 mm or more.



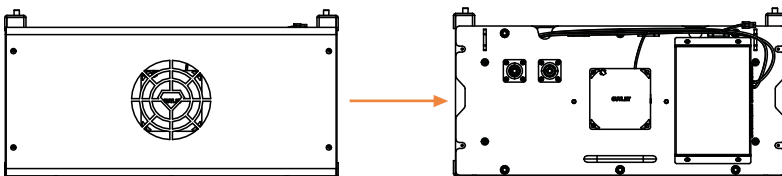
6. Repeat the above steps for the third battery pack and the high-voltage control cabinet.



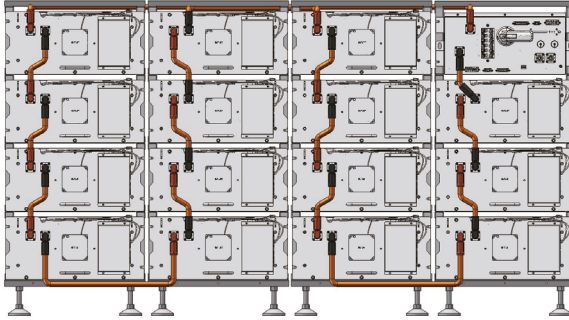
7. Connect the cables as shown in the figure below.

Remove the front panel from each battery module.

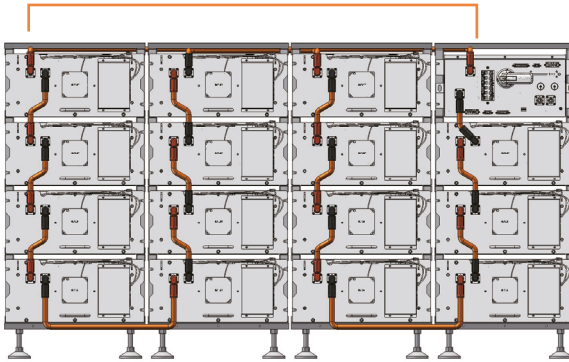
- Positive power cable
- Negative power cable
- - - Communication cable



Use cables to connect the battery modules in series; connect the negative terminal (B-) of the high-voltage control module to the negative terminal (B-) of the first battery module, and connect the positive terminal (B+) of the high-voltage control module to the positive terminal (B+) of the last battery module.

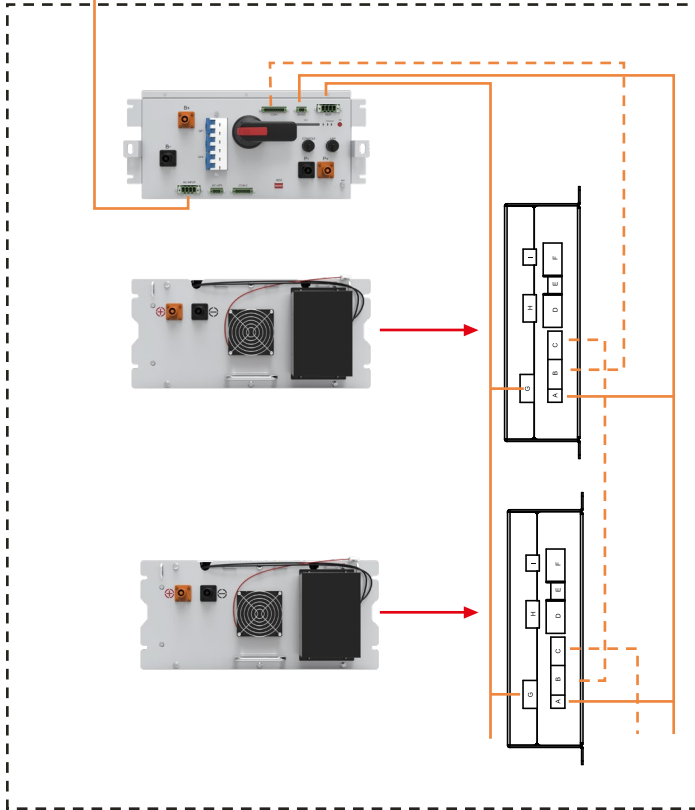
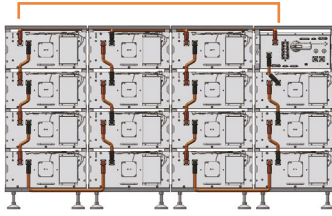


Connect the positive terminal B+ of the high-voltage control module to the positive terminal B+ of the last battery module.



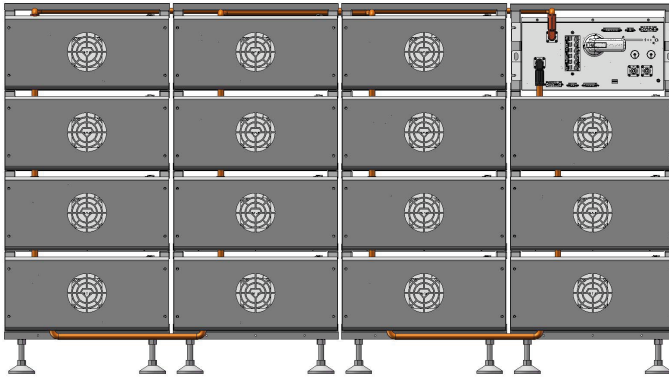
Connect the communication and power supply cables between the high-voltage box and the battery modules.

AC 110–220



A	B	C	D	E
Fan	Communication 0	Communication 1	CCS1	Temperature Sampling
F	G	H	I	
CCS2	Heating Pad Power Supply	Heating Pad Control	Reserved Interface	

8. Secure the front cover plate of each battery pack with bolts.



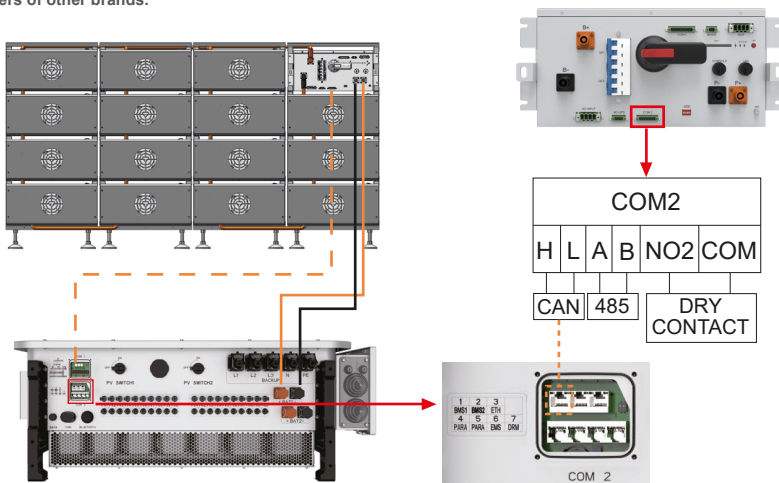
5. Battery System Connection to Inverter

5.1 Connecting Power and Communication Cables

Connect the P+ terminal of the high-voltage box to the BAT+ terminal of the PCS, and the P- terminal to the BAT- terminal of the PCS. Connect the com2 communication interface of the high-voltage box to the BMS interface of the PCS.

- Positive power cable
- Negative power cable
- ⋯ Communication cable

Note: The connection shown here uses a Solis inverter as an example; this can serve as a reference for connecting inverters of other brands.



6. System Startup

Danger

Please wear personal protective equipment and use dedicated insulated tools to avoid electric shock or short circuits.

Warning

If any fault is detected during live operation, immediately turn off the battery power. The fault must be rectified before continuing operation.

After the battery is used for system debugging or discharged, it should be charged promptly. Otherwise, the battery may be damaged due to over-discharge.

If the state of charge (SOC) of a stored battery is low, it may lead to over-discharge or damage. The battery should be charged promptly.

Notice

Before the equipment is put into operation for the first time, all parameters must be correctly configured by qualified personnel. Improper parameter settings may result in noncompliance with local grid connection requirements and affect the normal operation of the equipment.

6.1 Verification before power-up.

Check Items and Acceptance Criteria:

No.	Inspection Item	Acceptance Criteria
1	Battery Installation	Installed correctly and securely
2	Cable Wiring	The cables have been laid correctly according to the customer's requirements.
3	Cable Ties	The cable ties are evenly spaced and secure.
4	Grounding	PE cable connections are correct, secure, and reliable.
5	Switching	The DC switch and all switches connected to the battery are in the off position.
6	Cable Connections	The AC power cord, DC input cable, battery cable, and signal cables are all correctly, securely, and reliably connected.
7	Unused Terminals and Ports	All unused terminals and ports are secured with waterproof caps.
8	Installation Environment	The installation space is suitable, and the installation environment is clean and tidy.

6.2 System Power. Turn On

Step 1: Set the DIP switches correctly according to the corresponding PCS brand. The DIP settings are as follows:

DIP Switch

Code Bit						PCS
1	2	3	4	5	6	
0	1	0	0	0	0	Deye
0	1	1	0	0	0	Soils
0	0	0	1	0	0	Sol-ArK

Note: The code positions 1, 2, 3, 4, 5, and 6 in the schematic represent DIP switches arranged from left to right (as viewed from the front panel). Up = "1", Down = "0". * PYTES may update compatible inverters without prior notice.

Step 2: Turn on the external switch and the inverter according to the inverter operating manual.

Step 3: Turn on the isolator switch on the BCU.

Step 4: Turn on the external power switch on the BCU.

Step 5: Briefly press the SW button on the BCU; the RUN LED will flash, and all batteries will begin operating.

6.3 LED Indicator Descriptions

Battery Status	Protection/ Alarm/ Normal	ALM	Running	Capacity LED						Description
Shut down		Close	Close	Close	Close	Close	Close	Close	Off	All indicator lights off
Power On	Normal	On	On	On	Turn on	Enable	Open	Open	Turn on	All lights turn on simultaneously for one second.
Standby	Normal	Off	Blink 1	Off	Off	Close	Close	Close	Close	Standby Indicator
	Alarm	Flashing 3	Off	Off	Off	Off	Close	Close	Close	Battery voltage is too low
Charging	Normal	Off	Light	Capacity-based						
	Alarm	Flashing 3	Light	Capacity-based						
	Protection	Light	Off	Off	Off	Close	Close	Close	Turn off	
Discharge	Normal	Off	Flashing 3	Capacity-based						
	Alarm	Flashing 3	Flashing 3	Capacity-based						
	Protection	Light	Off	Off	Off	Close	Close	Close	Close	

Note: The flashing patterns are Note: The blink patterns are described as follows: Blink 1: "0.3 seconds on / 3.7 seconds off"; Blink 2: "0.5 seconds on / 0.5 seconds off"; Blink 3: "0.5 seconds on / 1.5 seconds off"; Blink 4: "0.7 seconds on / 9.3 seconds off"

7. System Maintenance

Danger

Please wear personal protective equipment and use dedicated insulated tools to avoid electric shock or short circuits.

Warning

Never perform maintenance on the battery while the device is powered on. Before performing operations such as inspection or tightening screws to the specified torque, you must first disconnect the battery power, explain the associated risks to the customer, obtain the customer's written consent, and implement effective safety precautions. After the battery is discharged, recharge it promptly to avoid damage caused by over-discharge. Before moving or reconnecting the equipment, disconnect the power supply and battery connections, and wait five minutes until the equipment is completely de-energized. Before performing equipment maintenance, use a multimeter to check whether dangerous voltages are still present on the DC busbar and the components to be maintained.

Caution

Never connect two or more cables in parallel to the positive or negative power terminals of the battery.

When preparing cables, keep them away from the equipment to prevent cable debris from entering the interior. Cable debris may generate sparks, resulting in personal injury and equipment damage.

7.1 System Power Off

Step 1: Turn off the AC switch between the inverter and the utility grid.

Step 2: Turn off the DC switch between the battery and the inverter.

Step 3: Turn off the DC switch between the PV system and the inverter.

Step 4: Press and hold the SW button on the BCU for 3 seconds, then wait 20 seconds until the battery is completely shut down.

Step 5: Turn off the external power supply switch on the BCU.

Step 6: Turn off the isolating switch.

Caution

Do not turn off the external power switch while the system is running.

Before replacing a battery module, charge and discharge the replacement battery to the same voltage as the other modules in the system. Otherwise, the system will take a long time to achieve voltage balance between modules.

7.2 Routine Maintenance

System Cleanliness

Inspection Items	Inspection Method	Maintenance Interval
System Cleanliness	Regularly check the cabinet for obstructions and dust accumulation.	Every 6 to 12 months
System Operational Status	Check the battery for damage or deformation. While the battery is in operation, verify that its parameters are set correctly.	Every 6 months
the electrical connection	Check that the cables are securely fastened. Check that the cables are in good condition, especially where they come into contact with metal surfaces for scratches Confirm that unused DC input terminals and battery terminals and other ports are secured with covers.	The first inspection should be performed 6 months after initial commissioning. Thereafter, inspections may be conducted at intervals of 6 to 12 months.
Grounding reliability	Check that the grounding cable is securely connected.	The initial inspection should be performed 6 months after initial commissioning. Thereafter, inspection intervals may be 6 to 12 months.

7.3 Troubleshooting

Danger

The HV48300 Max is a high-voltage DC system and must only be operated by qualified personnel. Before troubleshooting, ensure that all cable connections and switches are in proper condition and that the system can start normally.

No.	Issue	Possible Causes	Solution
1	Turn on the BMS. Status The LED is red . All battery module status LEDs are green.	The battery pack is in a protected state. You can be equipped with over current protection or fault protection. No external communication with the host controller.	Check the battery via the monitor or maintenance software Check whether the unit and battery modules are <input type="checkbox"/> triggering an alarm. Check the communication status with the host controller and the condition of the communication cable. Reverse connection poses a serious hazard!

2	The BMS status indicator Displayed in red; the status of some battery module status indicators.The LED displays green, while another Some display red.	This battery pack is in protection mode.You can Provides overcurrent , overvoltage, undervoltage voltage, over-temperature, under-temperature, or fault protection.	use monitoring or maintenance software to check the battery cells and whether the battery module has protection functions and has not failed.
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7.4 Replacement of major components

Danger

The HV48300 Max is a high-voltage DC system and must only be operated by certified personnel. Its power cables and plugs always carry high-voltage DC from the series-connected battery modules. Exercise caution when handling the power plug.

7.4.1 Battery Module Replacement

Step 1: Use the charger to fully charge both the new battery module and the existing modules (SOC 100%);

Step 2: Turn off the power to the entire system. Ensure that the P+ or P- terminals are not live.

Step 3: Disconnect the power cable (\pm) and communication cable connectors.

Step 4: Remove the screws from the front panel of the battery module.

Step 5: Remove the battery module from the rack and install it in place.

Step 6: Install the new battery module and connect the cables.

Step 7: Turn on the system power.

7.4.2 Replacing the Control Module (BMS)

Step 1: Turn off the power to the entire system. Ensure that the P+ or P- terminals are not live.

Step 2: Unplug the power cables (+/-) and the communication cable.

Step 3: Remove the screws from the front panel of the battery module.

Step 4: Install the new control module (BMS) and reconnect all cables.

Step 5: Start the system according to the operating instructions in Chapter 4.

Caution

Before disconnecting the communication cable, mark the cable numbers to avoid incorrect cable connections later.

7.5 Battery Storage and Charging

For long-term storage, battery cells should be stored in an environment with a temperature range of 0°C to 30°C (32°F to 86°F), relative humidity <65%, and free of corrosive gases.

It is recommended to discharge and recharge the battery every 3 months. The maximum interval between discharging and recharging should not exceed 6 months, and the State of Charge (SOC) should not be less than 90% at each recharge.

Caution

Failure to follow the above instructions during long-term storage will significantly shorten the battery's cycle life.

8. Emergency Response

8.1 Battery Leakage

Danger

Leaking electrolyte is a colorless, viscous liquid that may evaporate rapidly and is flammable; it will turn into a white salt residue. This electrolyte has a pungent odor, is corrosive, and can cause irritation to the eyes and skin. Do not come into contact with it.

When handling chemical spills, professional maintenance personnel and firefighters must wear the necessary protective equipment, such as air-purifying respirators and other personal protective equipment. For household members, if a battery leak occurs, it is recommended to follow these steps:

- (1) Immediately stop ESS operation and switch the battery power control module (DCDC) to the off position. Turn off the inverter's AC circuit breaker and set the inverter's DC switch to the off position.
- (2) Indoor installation scenarios: Evacuate all personnel from the room immediately, open doors, windows, and ventilation systems, and turn off all indoor ignition sources during the evacuation. Outdoor installation scenarios: Notify outdoor personnel to stay away from the site and set up warning signs to cordon off the area.
- (3) After evacuating to a safe area, immediately notify professional maintenance personnel or firefighters to handle the emergency.

Avoid contact with electrolytes or released gases. If contact occurs, take the following measures:

- Inhalation protection: Immediately evacuate the contaminated area, breathe fresh air as soon as possible, and seek medical attention immediately.
- Eye Contact: Immediately flush eyes with water for at least 15 minutes. Do not rub eyes, and seek medical attention immediately.
- Skin Contact: Immediately wash the affected area with soap and water, and seek medical attention as soon as possible.
- Ingestion: Seek medical attention immediately.

8.2 Fire Hazard

Danger

In the event of smoke or fire, do not open the door to the battery storage room if smoke is dense to avoid the risk of explosion and inhalation of toxic gases. If a lithium battery catches fire, it will release □ flammable and toxic gases. Therefore, during firefighting operations, all firefighters must must wear full protective gear, including flame-retardant/fire-resistant clothing, air-purifying respirators or breathing apparatus, firefighter helmets and face shields, and insulated boots.

A lithium battery fire may burn for several hours. After the fire is extinguished, residual heat generated by damaged internal battery components may cause the fire to reignite. Once the open flames have been extinguished, continue spraying water to cool the battery. The battery may be removed only after its temperature has dropped to within $\pm 10^{\circ}\text{C}$ of room temperature and has been continuously monitored for 24 hours to confirm there are no signs of a temperature rise. Store the removed battery in a safe location (an open and secure outdoor area is recommended).

Procedures; Processes

1. If the battery emits smoke or catches fire, immediately notify all household members to evacuate.
2. After evacuating to a safe outdoor area (recommended distance: 20 meters), contact the fire department immediately. While waiting for fire rescue, please contact the installer and Pytes Technical Support.
3. Firefighters arrived at the scene and extinguished the fire.
4. After the fire is extinguished, set up warning signs to cordon off the area and spray water to cool the battery to room temperature $\pm 10^{\circ}\text{C}$. (You may use an infrared thermometer or thermal imager for detection.)
5. Monitor the battery for 24 hours to ensure there are no signs of temperature rise before removing it. (Only qualified personnel are permitted to remove the battery.)
6. After removing the battery, move it to a safe location (an open and safe outdoor area is recommended) and place it in a fire sand box or saltwater. These operations must be performed by qualified personnel, who must wear insulation protective gear, such as insulated gloves, insulated shoes, and personal protective equipment (PPE).
7. After the battery fire has been extinguished, if there are no potential risks at the site, the battery must be handled and recycled by qualified personnel in accordance with local laws and regulations.

8.3 Immersion; Immersion Method

If the battery pack is exposed to moisture or submerged in water, turn off all power switches on the inverter side and do not perform any further operations. Please contact Pytes or an authorized dealer for technical support.

8.4 Battery power loss or severe impact

Danger

If a battery is dropped or subjected to a severe impact during installation, it may malfunction and become unusable. Using a faulty battery poses safety hazards, such as battery cell leakage or electric shock.

If the battery shows signs of visible damage, emits an unusual odor, smokes, or catches fire, immediately evacuate the area, call emergency services, and contact a professional. A professional can extinguish the fire using fire extinguishing equipment while taking appropriate safety precautions.

If the battery shows no visible deformation or damage, and there are no obvious unusual odors, smoke, or signs of fire, please contact a professional to move the battery to a well-ventilated area, or contact a recycling company for disposal.

9. Technical Specifications

Product	Battery Control Unit (BCU)
System operating voltage range	224–864 V
System Operating Current	157 A
Monitoring Communication	RS232
Battery communication	CAN, RS485
External Communication	CAN, RS485, dry contacts, WiFi
Power consumption	11.52 W
Dimensions (W × D × H)	436 × 543 × 225 mm / 17.1 × 21.3 × 8.8 in
Weight	25 kg / 55.1 lbs
Protection Rating	IP20
Wi-Fi Module	RF Band Range: 2.412 GHz–2.472 GHz
	Transmit Power 802.11b: +17 ± 1.5 dBm (@11 Mbps); 802.11g: +15 ± 1.5 dBm (@54 Mbps); 802.11n: +14 ± 1.5 dBm (@HT20, MCS7) Antenna Type: External Wi-Fi sticker, I-PEX to SMA 3 dBi
	Gain: 3 dBi

Product	Battery Module Unit (BMU)
Cell Type	LFP
Nominal Energy	16.076 kWh
Rated Voltage	51.2 V
Rated capacity	314 Ah
Continuous operating current	157 A
Voltage range	44.8–57.6 V
Expansion	5–15
Discharge Depth	90%
Dimensions (W × D × H)	440 × 787 × 227 mm / 17.3 × 30.9 × 8.9 in
Weight	120.6 kg / 265.8 lbs
Cycle life	≥6,000 cycles
Operating Temperature	Operating temperature: 0°C to 45°C(32°F to 113°F) Discharge temperature: -10°C to 50°C(14°F to 122°F)
Storage Temperature	Within 1 month: -20°C to 50°C (-4°F to 122°F); 1–3 months: -10°C to 40°C (14°F to 104°F); 3–12 months: >0°C to 30°C (32°F to 86°F)
Protection Rating	IP20
Certifications	UL9540, UL9540A, UL1973, UL60730, UN38.3, IEC62619, IEC63056, IEC60730, CE EMC, IEC62477, IEC62040, ECM

10. System Commissioning

Commissioning Steps	Content
Preparation; Setup	<p>Do not power on the load before powering on the HV48300 Max.</p> <p>Note : Except for the HV48300 Max, the startup procedures for all other equipment must follow the instructions.</p>
System Functions	<p>Parameter Tuning:</p> <p>Communication: Check the communication status between the HV48300 Max and the equipment to confirm whether it is normal or has triggered an alarm. Power Conversion System (PCS): Before grid connection, the PCS or inverter system must be operating normally, and all parameters must meet the standard requirements of the HV48300 Max.</p> <p>System Operation: Charging/discharging, charging stop, discharging stop, current limiting, etc.</p> <p>Note: Before starting the HV48300 Max, all parameters for the PCS and EMS must be configured.</p>
Monitoring Function	<p>Connect to the main console terminal to verify that the HV48300 Max data is displayed correctly on the monitoring system.</p>
Operational Testing	<p>After system commissioning is complete, a trial run should be conducted under low-load conditions for a period of time to verify that the high-voltage DC system meets requirements.</p>

Warranty Card

Customer Information			
Contact Name			
Phone Number		Email	
Address			
Product Information			
Battery Model		Inverter Brand/Model	
Battery Quantity		Inverter Quantity	
Purchase Date		Inverter Using Time	
Serial Number		on/off Grid	
Installer Information			
Installer Name		Installation Date	
Problem Description			
Photos of Battery Wiring			
Photos of Inverter Wiring and Panels			



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The right of interpretation belongs to Pytes Energy