UP5000

Lithium Battery

USER MANUAL

V0

About This Manual

Purpose

This manual describes the assembly, installation, operation, maintenance, and troubleshooting of the UP5000 Lithium Battery unit. Ensure you read this manual carefully before installation and operation.

Scope

This manual provides safety and installation instructions as well as information on tools, wiring, commissioning, and routine maintenance for the UP5000 battery system.

Target Group

This document is intended for trained and qualified individuals. Procedures that do not require specific electrical qualifications may be performed by end-users only when explicitly stated. A qualified person must have:

- Relevant know-how and experience in the operation and installation of lithium batteries and electrical devices (in particular inverters).
- Knowledge of the applicable standards and safety procedures related to such installations.
- The ability to recognize and avoid dangers.
- Training on this specific UP5000 product or similar $LiFePO_4$ battery.

Symbol Definitions

The following symbols may be used in this manual or on the product. It is crucial to understand their meaning to ensure safe installation and operation.

⚠ DANGER:	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING:	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION:	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury or equipment damage.
NOTICE:	Indicates practices not related to personal injury but important for correct operation or to avoid equipment damage.
NOTE:	Provides additional information or tips.

Abbreviations

- **BMS:** Battery Management System
- **SOC:** State of Charge
- **DOD:** Depth of Discharge
- **PPE:** Personal Protective Equipment
- **SELV:** Safety Extra Low Voltage
- **LFP:** Lithium Iron Phosphate ($LiFePO_4$)
- **CC/CV/CP:** Constant Current / Constant Voltage / Constant Power
- **RH:** Relative Humidity
- **ADDR:** Address (for DIP Switch)

- **CAN:** Controller Area Network
- **RS485:** Recommended Standard 485 (Serial Communication)
- **RS232:** Recommended Standard 232 (Serial Communication)

DISCLAIMER

Before using this product, please carefully read this manual, especially safety instructions, warning information, terms of use, and disclaimers. Users are solely responsible for any losses caused by their failure to use this product in accordance with this user manual. In compliance with laws and regulations, the final interpretation rights of this document and all related documents of this product belong to the company. No further notifications will be given in case of any update, revision, or termination.

This document is subject to revision and may be updated without prior notice. While the UP5000 Lithium Battery utilizes advanced Lithium Iron Phosphate ($LiFePO_4$) chemistry, recognized for its enhanced safety characteristics compared to other lithium-ion technologies, and incorporates a sophisticated Battery Management System (BMS) for protection, all lithium battery systems inherently store significant electrical energy and carry potential risks if mishandled.

The information, guidelines, and suggestions provided in this manual are intended for professional installers and qualified users. The manufacturer assumes no responsibility for any damages, injuries, or losses arising from:

- Failure to strictly adhere to the instructions and safety precautions detailed in this manual.
- Unauthorized modifications, alterations, or repairs to the product. * Improper installation, commissioning, operation, or maintenance.
- Non-compliance with local electrical codes, building regulations, or industry standards.
- Use of the product outside its specified operating parameters, environmental conditions, or intended applications.
- Damage caused by external factors including, but not limited to, natural disasters, power surges, or incorrect integration with incompatible equipment.

Adherence to this manual and all applicable regulations is critical for safe and reliable operation.

TABLE OF CONTENT

1. SAFETY INSTRUCTIONS

⚠ DANGER

HIGH ENERGY HAZARD: Lithium batteries store a large amount of electrical energy. Failure to follow safety instructions can lead to severe electric shock, fire, explosion, or release of hazardous substances, resulting in death or serious injury.

AUTHORIZED PERSONNEL ONLY: Only qualified, trained, and authorized personnel are permitted to install, operate, maintain, or service the UP5000 battery system.

NO USER-SERVICEABLE PARTS INSIDE: Never attempt to disassemble, modify, open, or repair the battery unit. The battery contains no user-serviceable parts. Any attempt to do so will void the warranty and can lead to catastrophic failure. Contact authorized service personnel for any issues.

DE-ENERGIZE BEFORE WORK: Always ensure the battery system is completely powered off and de-energized, and disconnected from all external electrical sources (inverter, grid, PV, other batteries) before performing any installation, wiring, maintenance, or cleaning. Verify de-energization with a calibrated multimeter at all relevant connection points. Implement Lockout/Tagout (LOTO) procedures.

1.1 GENERAL SAFETY PRECAUTIONS

Read and Understand: Before using the UP5000 battery, thoroughly read and understand all safety instructions, warnings, and procedures in this manual. If any part is unclear, seek clarification from your supplier or a qualified expert before proceeding.

Qualified Personnel: Installation, maintenance, and repair must be performed by qualified, certified, and authorized personnel only, who are familiar with $LiFePO_4$ battery systems and their associated risks.

Fire Safety:

- Keep a Class D fire extinguisher (for metal fires) and an ABC or CO_2 fire extinguisher (suitable for electrical fires) readily accessible.
- **NEVER use water to extinguish a battery fire**, as it can exacerbate the situation with lithium batteries.
- Familiarize yourself with the appropriate fire response for lithium battery incidents.

No Smoking or Open Flames: Strictly prohibit smoking, sparks, open flames, or any ignition sources in the vicinity of the battery system and during installation or maintenance.

Ventilation: Ensure adequate ventilation around the battery to prevent the accumulation of heat and potentially flammable gases (though LFP batteries are generally safer in this regard, good ventilation practice remains essential for thermal management and dispersing any off-gassing in fault conditions).

Chemical Hazard: Although $LiFePO_4$ is a safer lithium chemistry, damaged cells can leak electrolyte. Avoid contact with skin or eyes. Refer to Emergency Procedures (Section 1.5).

1.2 ELECTRICAL SAFETY

⚠ WARNING

LETHAL VOLTAGES: The battery system operates at voltages that can be lethal. Exercise extreme caution and adhere to all electrical safety procedures.

Power Off Verification: Before commencing any work, ensure the battery system is completely powered off. Disconnect it from all AC and DC power sources, including the inverter, PV array, grid, and any paralleled batteries. Use a multimeter to verify zero energy state at terminals and cables.

Short Circuit Prevention:

- **CRITICAL RISK**: Short-circuiting battery terminals or connected live parts can cause extremely high currents, leading to arcing, fire, explosion, and severe burns.
- Do not allow tools, jewelry (rings, watches, necklaces), or other conductive materials to come into contact with battery terminals or busbars simultaneously. Remove all metallic personal items before working on or near the battery.
- Use properly insulated tools specifically rated for electrical work.

Insulation and PPE: Always use properly insulated tools. Wear appropriate Personal Protective Equipment (PPE), including but not limited to:

- Voltage-rated rubber gloves (Class 0 or higher, appropriate for system voltage).
- Safety glasses with side shields or a full-face shield.
- Safety shoes (electrically insulated).
- Flame-resistant (FR) clothing, if available or required by local regulations.

Correct Polarity: Ensure correct polarity when connecting battery cables. Incorrect polarity **will** damage the battery, the inverter, and other connected equipment, and can create a fire or explosion hazard. Double-check all connections before energizing.

Work Alone Prohibition: Never work alone on energized or potentially energized high-voltage equipment. Ensure a second person, trained in emergency shutdown and rescue, is present.

1.3 HANDLING AND INSTALLATION SAFETY

⚠ CAUTION

Weight Hazard: The UP5000 battery unit is heavy (approximately 51kg). Use appropriate lifting techniques, mechanical aids (e.g., lifting straps, dolly), or assistance from at least two persons to prevent musculoskeletal injury and damage to the unit.

Physical Damage:

- Handle batteries with extreme care. Avoid dropping, crushing, puncturing, denting, or applying excessive force, as this can cause internal damage, short circuits, and potential safety hazards (thermal runaway, fire).
- Inspect the battery unit thoroughly for any signs of physical damage (cracks, dents, deformation, leaking fluids) before installation.
- **Do not install or use a damaged battery.** Immediately quarantine a damaged battery in a safe, isolated area and contact your supplier.

Secure Mounting: Ensure the battery is securely mounted according to the installation instructions on a stable, robust surface capable of supporting its weight. This prevents it from falling, tipping over, or being subjected to excessive vibration, which could lead to damage or disconnection.

Tripping Hazards: Keep the installation area clear and manage cables effectively to prevent tripping hazards.

1.4 STORAGE SAFETY

NOTICE

Storage Temperature: Store the battery in a dry, cool, well-ventilated indoor place, away from direct sunlight, heat sources, and corrosive substances.

- Recommended storage temperature: -20°C to +45°C (-4°F to +113°F).
- For extended storage (over one year): -20°C to +25°C (-4°F to +77°F) is optimal.
- **Avoid extreme temperatures outside the specified range as this can permanently degrade battery performance and lifespan.**

Charge State for Storage:

- For short-term storage (up to 3 months): Store with SOC between 40% and 60%.
- For long-term storage (more than 3 months): Charge the battery to approximately 60%~80% SOC before storing.

Recharge During Storage: To prevent irreversible capacity loss due to self-discharge and to maintain battery health, recharge the battery to 60%~80% SOC at least every six months during extended storage. Document recharge dates. **Failure to do so may void the warranty.**

Avoid Water Exposure: Do not expose the battery to water, moisture, condensation, or high humidity environments during storage.

Preventive Measures: Ensure that the battery is stored away from flammable materials, corrosive substances, and heat sources. Do not stack heavy objects on the battery.

Original Packaging: If possible, store the battery in its original packaging to provide protection.

1.5 EMERGENCY PROCEDURES

Electrolyte Leakage: $LiFePO_4$ electrolyte is less hazardous than other lithium chemistries, but caution is still essential.

- In the rare event of electrolyte leakage (e.g., from a physically damaged cell), avoid all contact with the leaking substance (skin, eyes, inhalation).
- **Skin Contact**: Immediately rinse the affected area with copious amounts of clean water for at least 15 minutes. Remove contaminated clothing. Seek medical attention if irritation persists.
- **Eye Contact**: Immediately flush eyes with clean water or an eyewash solution for at least 15 minutes, holding eyelids open. Seek immediate medical attention.
- **Inhalation**: If fumes or electrolyte mist is inhaled, move to an area with fresh air immediately. Seek medical attention if respiratory irritation or difficulty breathing occurs.

Damaged Batteries:

- **Do not attempt to use, charge, move (unless for immediate safety), or repair damaged batteries.**
- If a battery shows signs of damage (swelling, leaking, unusual odor, deformation), immediately isolate the area.
- If safe to do so, power down and disconnect the damaged battery.
- Contact the manufacturer, supplier, or qualified hazardous materials team for guidance on handling and disposal.

Fire Response: In the event of a battery fire:

1. **Evacuate the area immediately.** Prioritize human safety.
2. **Contact emergency services** (e.g., fire department) and inform them it is a lithium battery fire.
3. **If safe to do so and you are trained**:
    - Use a Class D fire extinguisher (for lithium-ion battery fires if specified) or a large ABC dry chemical extinguisher or CO_2 extinguisher.
    - **DO NOT USE WATER, FOAM, OR SAND.** Water can react with lithium and worsen the fire or cause explosions.
4. If possible and safe, disconnect all power to the battery system (external breakers, switches) to prevent further energy input.
5. **Ventilate the area** (after the fire is extinguished) to clear smoke and potential toxic fumes, but only if safe to re-enter.

1.6 BATTERY DISPOSAL

NOTICE

ENVIRONMENTAL RESPONSIBILITY: Lithium batteries contain materials that can be harmful to the environment if not disposed of correctly.

Do not dispose of batteries with household or general municipal waste.

The storage, use, and disposal of the products shall be carried out in strict accordance with the product manual, relevant contract, or applicable local, national, and international environmental laws and regulations for lithium battery recycling.

Contact your local authorities, the battery supplier, or an authorized battery recycling facility for proper disposal and recycling procedures. $LiFePO_4$ batteries require specific recycling processes.

Keep records of disposal.

2. PRODUCT OVERVIEW

2.1 BRIEF INTRODUCTION

The UP5000 Lithium Batteries are advanced energy storage devices utilizing Lithium Iron Phosphate ($LiFePO_4$) cell technology. They are designed for use in backup power solutions, solar energy storage systems, and other applications requiring reliable and long-lasting energy storage. The system can be expanded by connecting multiple units in parallel.

2.2 PRODUCT FEATURES

High Performance: Offers a significant discharge current capability

- Max. Discharge Current 160A, Max Charge Current 80A.

Extended Lifecycle: Manufactured with high-quality $LiFePO_4$ cells.

Advanced BMS: Integrated Battery Management System (BMS) provides comprehensive protection against charge/discharge over current, high/low temperatures, while also managing cell balancing for optimal performance.

Environmentally Friendly: Complies with European RoHS standards, SGS Certified, and composed of non-toxic materials.

Scalability: Parallelable up to 15 units for increased energy storage capacity.

High Depth of Discharge (DOD): High DOD and low cut-off voltage of the battery can achieve maximum usage

Communication: Supports RS485, and CAN communication protocols for monitoring and control with compatible inverters.

2.3 PRODUCT APPEARANCE

2.4 TECHNICAL SPECIFICATIONS

2.4.1 GENERAL PARAMETERS

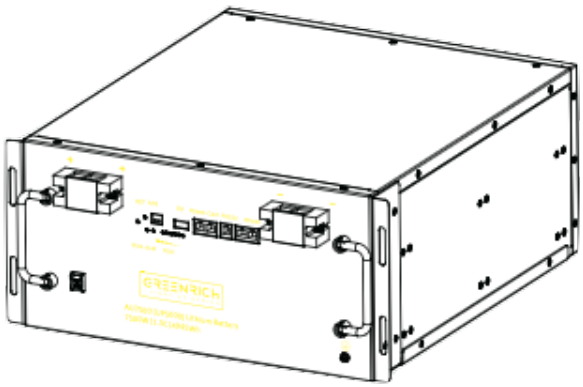
Parameter	Value

Model	UP5000
Performance	
Rated Power	5000W
Nominal Voltage	51.2V DC
Nominal Capacity (Energy)	4.946kWh
Charge Mode	CC/CV/CP
Max. Charge Current 1)	80A
Charge Cut-off Voltage	57.4V
Discharge Mode	CC/CP
Discharge Cut-off Voltage	44.8V
Max. Discharge Current 2)	160A
Peak Discharge Current 3)	350A (100ms)
General Specification	
Dimension W x D x H	536*438*220.6mm
Net Weight	50.88kg
Operating Temperature	Charging : -10~+45°C / Discharging : -20~+60°C
Storage Temperature	-20~+45°C(three months) / -20~+25°C (one year)
Humidity	5% to 95% RH (non-condensing)
Life Cycle	10 years warranty, 6000 Cycles
Parallel Capability	Up to 15 units

Notes：

1)For better battery life cycles, we suggest charge in 48A(0.5C @25˚C)
2)For better battery life cycles, we suggest discharge in 48A(0.5C @25˚C)
3)Peak Current excludes repeated short duration (less than 100ms) of current pattern.

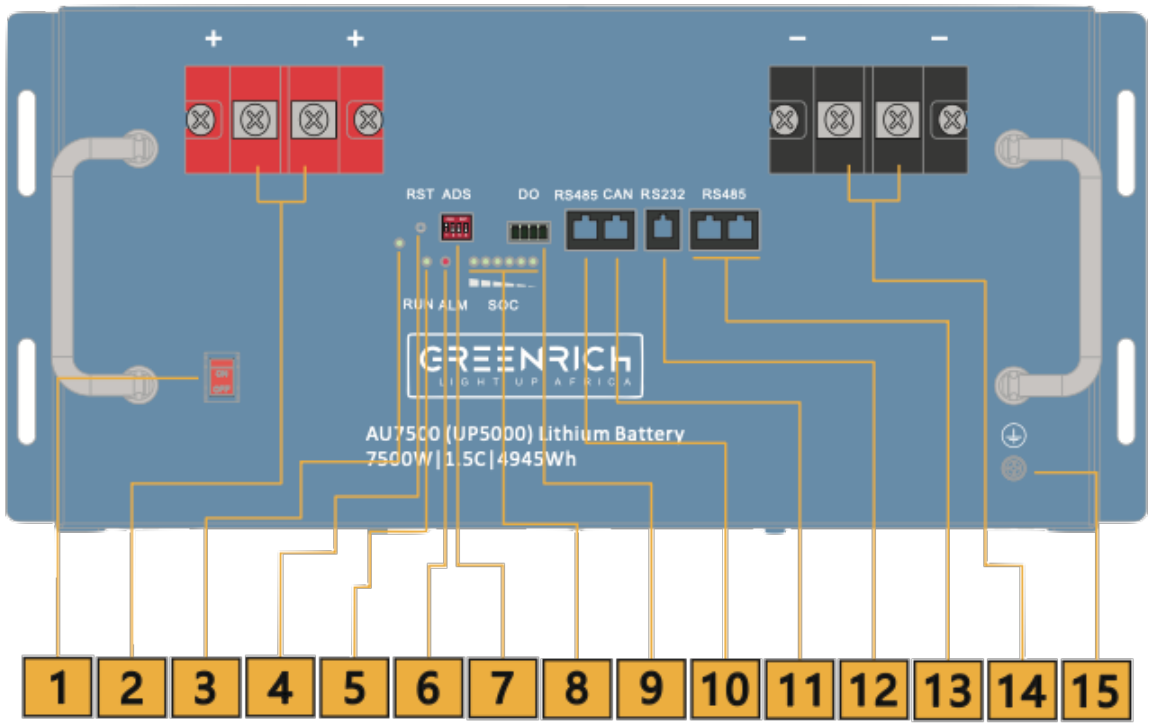
2.4.2 DIMENSIONS AND WEIGHT



- **Dimensions:** ~536mm x 438mm x 220.6mm
- **Net Weight:** 50.88kg

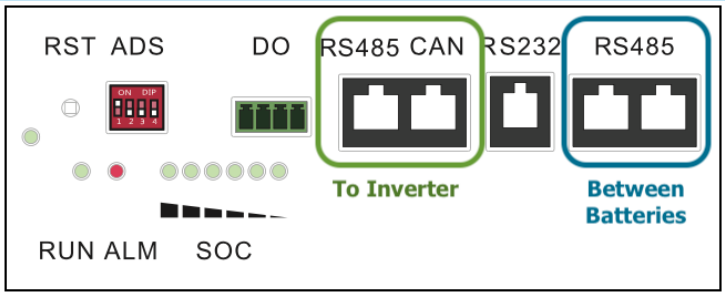
2.5 INTERFACE DESCRIPTION

2.5.1 FRONT PANEL OVERVIEW

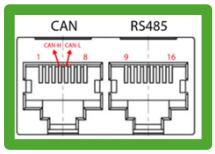


Item	Name	Definition
1	Power Switch (ON/OFF)	Main power switch for the battery unit
2	Positive Terminal	Battery power output positive or parallel connection positive line.
3	On/Off LED	On/Off indicators (See Section 5.2 for details).
4	Reset Switch	
5	Run LED	Indicators (See Section 5.2 for details).
6	ALM LED	Alarm LED indicator (See Section 5.2 for details).
7	ADS (DIP Switch)	4-bit Battery Address DIP switch. For setting a unique address for each battery unit.
8	SOC LEDs	Status of Charge indicators (See Section 5.2 for details).
9	DO (Dry Contact)	Dry Contact output for signaling external devices (e.g., fault, low battery).
10	RS485	RS485 communication port for communication with the inverter.
11	CAN	CAN communication ports for communication with the inverter.
12	RS232 Port	RS232 Communication port
13	RS485 Battery Port	2 RS485 communication ports for parallel batteries
14	Negative Terminal	Battery power output negative or parallel connection negative line.
12	Ground Terminal	Grounding connection point.

2.5.2 Communication Port Pinouts (RS232, RS485, CAN)



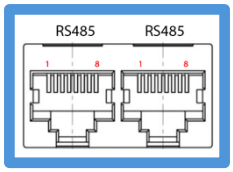
CAN / RS485 Inverter communication port



RJ45 plug in 8P8C stand type

Pin (CAN)	Description	Pin (RS485)	Description
1、2、3、6、8	NC	9、16	RS485-B1
5	CANL	10、15	RS485-A1
4	CANH	11、14	GND
7	GND	12、13	NC

RS485 inter-battery communication ports



2 x RJ45 plug in 8P8C stand type

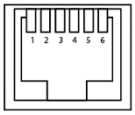
Pin (RS485)	Description
1、2、3、6、8	NC
5	CANL
4	CANH
7	GND

Dry Contact

Pin	Description
1 to 2	Normally closed. The circuit opens in the event of a battery fault or protection activation.
3 to 4	Normally closed. The circuit opens when a low battery warning is triggered.

RS232

Pin	Description
1, 2, 6	NC
3	TX
4	RX
5	GND



2.5.3 DIP SWITCH CONFIGURATION (ADDR)

Each battery module must have a unique address. The address is set using the 4-bit DIP switch (Item 6).

For a Single Battery System (Standalone Unit):

- If you are installing only **one** UP5000 battery unit that connects directly to the inverter (not in parallel with other batteries), its address **must be set to 1**. This identifies it as the primary (and only) battery communicating with the inverter.

For a Parallel Battery System (Multiple Units):

When connecting multiple battery units in parallel (up to 15 units):

- One unit **must** be designated as the **Master battery**. The Master battery's address **must be set to 1**. This unit communicates directly with the inverter and coordinates the other (slave) batteries.
- All other batteries in the parallel string are **Slave batteries**. Each Slave battery **must** have a unique address from 2 to 15.
- Refer to the table below for setting these addresses.

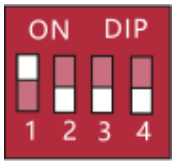


Figure 1 - indication of address 1 settings

Address	DIP #1 (MSB)	DIP #2	DIP #3	DIP #4 (LSB)
1	ON (Up)	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
12	OFF	OFF	ON	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
15	ON	ON	ON	ON

NOTICE:

SINGLE BATTERY CONFIGURATION: For a system with only one battery unit, ensure its address is set to 1.

PARALLEL SYSTEM - MASTER BATTERY: In any parallel battery system, one battery unit MUST be configured with Address 1 to function as the Master battery.

PARALLEL SYSTEM - UNIQUE SLAVE ADDRESSES: In a parallel system, all slave batteries must have unique addresses (from 2 to 15). Duplicate addresses will cause communication failures and system malfunction.

A maximum of 15 batteries in total (1 Master + 14 Slaves) are supported in a parallel configuration.

Incorrect DIP switch settings are a common cause of communication failures, inability for the inverter to recognize batteries, or overall system malfunction. Always verify settings before powering on.

Power off the battery unit before changing DIP switch settings to ensure the new address is correctly registered by the BMS upon startup.

2.6 BATTERY MANAGEMENT SYSTEM (BMS)

The integrated BMS provides critical protection and management functions:

2.6.1 VOLTAGE PROTECTION

- **Over-Voltage Protection (Charging):** The battery will stop charging when the cell or pack voltage reaches the maximum cut-off value. Charging will resume once the voltage drops below a predefined recovery value.
- **Under-Voltage Protection (Discharging):** The battery will disconnect the output when the cell or pack voltage drops to the minimum cut-off value. It will recover once it is recharged to a predefined recovery voltage.

2.6.2 CURRENT PROTECTION

- **Over-Current Protection (Charging):** The battery will stop charging if the charging current exceeds the maximum allowed value. Protection is typically released after a delay or when the condition is rectified.

- **Over-Current Protection (Discharging):** The battery will stop discharging if the discharge current exceeds the maximum allowed value (continuous or peak). Protection is typically released after a rated delay time or when the load is reduced.

2.6.3 TEMPERATURE PROTECTION

- **Over-Temperature Protection (Charging/Discharging):** If the internal temperature of the battery exceeds the safe operating range (e.g., 0°C ~ +55°C during charging, -20°C ~ +60°C during discharging), protection will be triggered, and the battery will stop charging or discharging. It will resume operation once the temperature returns to the allowed range.
- **Under-Temperature Protection (Charging/Discharging):** Similarly, if the temperature falls below the safe operating range, the battery will be protected.

2.6.4 OTHER PROTECTIONS

- **Short Circuit Protection:** In the event of an external short circuit, the BMS will trigger protection, typically by opening the discharge path. Protection may be released after removing the load/short circuit and potentially after a delay or a reset/recharge signal.
- **Dormancy/Sleep Mode:** The device may enter a low-power dormant state automatically if there are no external loads, no charging source, and no external communication for an extended to conserve energy.

NOTICE:

While the BMS provides comprehensive protection, it is designed to mitigate risks under normal operating conditions and is not a substitute for proper installation, adherence to operating limits, or regular maintenance. The BMS may not prevent all failures under extreme misuse, unauthorized modifications, or conditions beyond its design parameters.

3. INSTALLATION

⚠ DANGER

- Installation must only be performed by qualified personnel familiar with lithium battery systems and associated electrical hazards.
- Ensure all power sources (grid, PV, existing batteries, inverter) are completely de-energized and locked out before starting installation.
- Failure to follow proper installation procedures can result in equipment damage, fire, electric shock, or serious injury.

3.1 PRE-INSTALLATION CHECKS

3.1.1 SAFETY REQUIREMENTS

- The installation area must comply with all local safety regulations and building codes.
- All circuits connected to this power system with an external voltage of less than 48V (control circuits) must meet SELV requirements (e.g., as defined in IEC60950).
- Only use inverters and other equipment that are explicitly compatible with the UP5000 $LiFePO_4$ battery system (48V nominal, supporting the required communication protocol if used).
- Ensure all cabling is appropriately sized for the maximum expected current and protected against physical damage.
- Sufficient space must be available for the batteries, including clearances for ventilation and access.

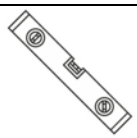
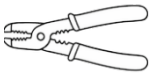
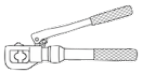
- If a battery cabinet or rack is used, ensure it is correctly installed, grounded, and capable of supporting the total weight of the batteries.

The installer is solely responsible for ensuring the entire system design, component selection, and installation methods comply with all applicable local, national, and international electrical codes, safety standards, and building regulations. Failure to do so will void the product warranty and may result in severe hazards.

3.1.2 REQUIRED TOOLS AND EQUIPMENT

Tools

The following tools are required to install the battery pack:

			
Crimping tool	Marker	Philips insulated screwdriver	Spirit level
			
Wire stripper	Hydraulic crimping tool	Tape measure	Spirit level

3.1.3 SAFETY GEAR

⚠ **CAUTION:**

Use properly insulated tools to prevent accidental electric shock or short circuits.

		
Insulated gloves	Safety googles	Safety shoes

3.1.4 UNPACKING AND INSPECTION

1. When the equipment arrives at the installation site, loading and unloading should be carried out according to rules and regulations, to prevent exposure to direct sunlight and rain.
2. Before unpacking, verify the total number of packages against the shipping list. Check boxes for any signs of external damage.
3. Handle all items with care during unpacking to protect surface coatings and prevent damage.
4. After opening the packaging:
   - Carefully read all technical documentation provided.
   - Verify all items against the packing list (see Section 3.1.5) to ensure everything is present and undamaged.
   - Inspect the battery unit for any signs of physical damage (dents, cracks, leaking). **DO NOT install damaged batteries.**

- If any items are missing or damaged, or if internal packaging is compromised, document it (take photos) and contact your supplier immediately.

3.1.5 PACKING LIST

No.	Item	Q'ty (pcs)	Note
1	Battery UP5000	1	51.2V 96.6Ah (Nominal Capacity 4.946kWh)
2	Power Cable - Positive	1	Red, 4AGW, 310mm length, with SC25-6 terminals on both ends
3	Power Cable - Negative	1	Black, 4AGW, 310mm length, with SC25-6 terminals on both ends
4	Ground Wire	1	Yellow-Green, 300mm length, with OT-6 terminals on both ends.
5	Communication Cable	1	310mm length, with RJ45 8P8C connectors on both ends

3.2 INSTALLATION ENVIRONMENT

3.2.1 ENVIRONMENTAL REQUIREMENTS

- **Temperature:**
  - Operating: Charging: 0°C to +45°C; Discharging: -20°C to +60°C.
  - Recommended for optimal life: Charging: 0°C to +45°C; Discharging: -20°C to +60°C.
  - Ideal ambient temperature: 15°C to 30°C.
- **Humidity:** 5% to 95% RH (non-condensing).
- **Altitude:** Maximum 4000m above sea level.
- **Ventilation:** Ensure adequate airflow around the battery to prevent overheating.
- **Ground:** The installation surface (wall or floor for racks) must be flat, level vertical, and capable of supporting the battery's weight.

3.2.2 INSTALLATION LOCATION PRECAUTIONS

⚠ **CAUTION**:

Improper installation location can reduce battery life and pose safety risks.
Avoid installing the battery in locations with:

- Direct sunlight exposure.
- Exposure to rain, snow, or excessive moisture
- Near flammable or explosive materials or gases.
- On or near flammable wall/floor materials (unless appropriate fire-resistant backing is used).
- Areas prone to flooding.
- Excessive dust or corrosive environments.
- Close proximity to the sea (to prevent exposure to brine and high humidity, unless in a suitable enclosure)

3.3 MECHANICAL INSTALLATION

⚠ **WARNING**:

- The UP5000 unit weighs approximately 50.88kg. Use proper lifting techniques and assistance (e.g., two people or lifting aids) to prevent injury.

- Ensure the wall or mounting structure is strong enough to support the weight of the. Use appropriate anchors for the wall type.

3.3.2 PARALLEL INSTALLATION (PHYSICAL ARRANGEMENT)

The UP5000 can be installed with up to 15 units in parallel.

- **Rack Mounting:** If using a battery rack, follow the rack manufacturer's instructions. Ensure the rack is rated for the total weight and provides adequate support and ventilation for each battery.

3.4 ELECTRICAL INSTALLATION

⚠ DANGER

- **Verify De-energization:** Before making any connections, use a multimeter to confirm that all power sources (grid, PV, other batteries, inverter) are completely OFF and locked out. Verify that there is no voltage present on any conductors or terminals you will be working with.
- **Correct Polarity:** Double-check all connections for correct polarity. Reversed polarity can cause severe damage to the battery, busbars, inverter, and other equipment, and may create a fire or explosion hazard.
- **Proper Torque:** Tighten all terminal connections (battery plugs, OT ring terminals to busbars, busbar to inverter connections, ground terminals) to the manufacturer's recommended torque specifications using a calibrated torque wrench. Loose connections can cause overheating, arcing, and fire. Over-tightening can damage terminals or connectors.
- **Qualified Personnel:** All electrical installation work must be performed by qualified and certified electricians or personnel specifically trained in lithium battery energy storage systems.

NOTICE:

The cable specifications and connection methods described herein are for the UP5000 unit itself. The installer is responsible for correctly sizing, protecting, and installing all external cabling (e.g., from busbars to inverter) and circuit protection devices according to the total system current, voltage drop considerations, and all relevant electrical codes.

⚠ WARNING

- **Short Circuits:** Always prevent short circuits. Do not allow tools or any conductive material to bridge positive and negative terminals or live parts. Use insulated tools.
- **Battery Plugs:** Handle battery plug connectors with care. Ensure they are correctly oriented and fully seated when making connections. Do not force connect the connectors.

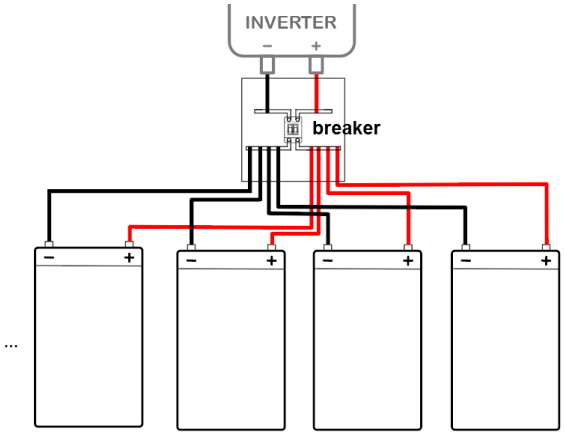
3.4.1 GROUNDING

1. Identify the Ground Terminal (Item 12 on the front panel, see Section 2.5.1) on each UP5000 battery unit.
2. Using the provided **Ground Wire** (Yellow-Green, 310mm, OT-6 ring terminals on both ends), connect one end to the Ground Terminal on the battery unit. Secure it firmly.
3. If the batteries are in parallel, for the first battery, connect the other end of the Ground Wire to a dedicated system ground busbar or a verified common grounding point of the electrical installation. For other batteries, the Ground wires are connected in series.
4. The system ground busbar must be properly connected to earth according to local electrical codes and standards.

NOTICE: Proper grounding is essential for safety, reducing electromagnetic interference (EMI), and ensuring correct operation of protective devices.

3.4.2 CONNECTING BATTERIES IN PARALLEL (POWER TO BUSBAR)

All UP5000 battery units in a parallel system will have their power cables connected to common positive and negative busbars.

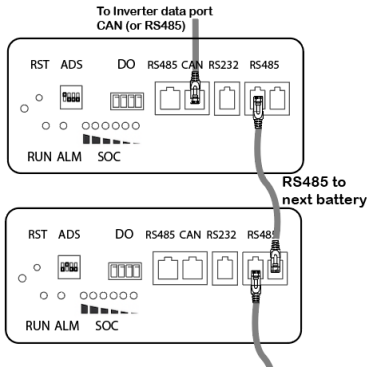


1. **Power Off All Units:** Ensure all battery units to be paralleled have their main Power Switch.
2. **Set DIP Switches:** Configure the unique address for each battery unit using the ADDR DIP switches (see Section 2.5.3). The master battery (which will communicate with the inverter) is typically Address 1.
3. **Install Busbars:** Securely mount the appropriately rated positive and negative busbars in the installation enclosure or rack. Ensure they are adequately insulated and supported, with sufficient clearance to prevent accidental contact.
4. **Connect Positive Power Cables:**
    - For each battery unit, take its provided **Positive Power Cable (Red)**.
    - Connect one OT ring terminal end to the **positive busbar**. Ensure the contact surfaces are clean and the connection is tightened to the specified torque.
    - Connect the other OT ring terminal end to the Positive (+) power output port on the UP5000 unit. Ensure the connection is tightened to the specified torque..
5. **Connect Negative Power Cables:**
    - For each battery unit, take its provided **Negative Power Cable (Black)**.
    - Connect one OT ring terminal end to the **negative busbar**. Ensure the contact surfaces are clean and the connection is tightened to the specified torque.
    - Connect the other OT ring terminal end to the Negative (-) power output port on the UP5000 unit. Ensure the connection is tightened to the specified torque.
6. Repeat steps 4 and 5 for all battery units in the parallel system.

⚠ CAUTION:

- Ensure all positive cables connect only to the positive busbar and all negative cables connect only to the negative busbar.
- Keep cable runs neat and avoid excessive lengths. Secure cables to prevent strain on terminals.

3.4.3 CONNECTING BATTERIES IN PARALLEL (INTER-BATTERY COMMUNICATION)



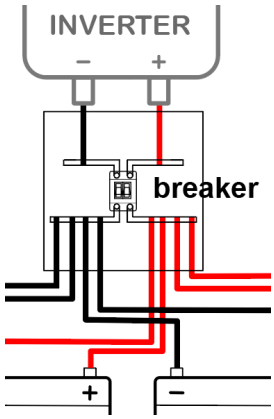
Communication between parallel UP5000 battery units is established by daisy-chaining them using their dedicated inter-battery RS485 communication ports. Each battery unit is equipped with two such RS485 ports (typically RJ45 sockets) specifically for this purpose, allowing one port for input from a previous battery and one for output to the next battery in the chain. The first battery and the last battery in the chain will each have one inter-battery RS485 port unused.

NOTICE:

- The Master battery (designated by DIP switch Address 1) will be part of this inter-battery communication daisy chain. Its separate, dedicated inverter communication ports (RS485 or CAN) are used for communication with the inverter (see Section 3.4.4).

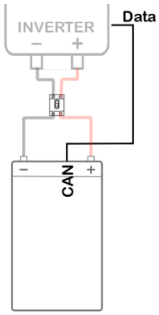
3.4.4 CONNECTING TO THE INVERTER (POWER AND COMMUNICATION)

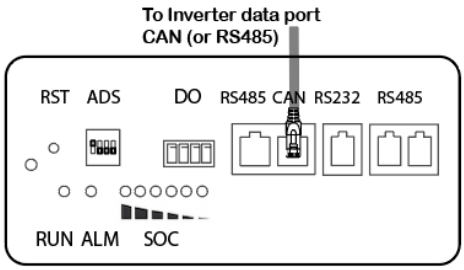
1. **Power Cables from Busbar to Inverter (via Breaker):**



   - The installer must provide and install suitably sized power cables (Positive and Negative) to connect the main busbars to the DC input of the inverter.
   - A DC circuit breaker (see Section 3.4.5) **must** be installed in this path, typically between the positive busbar and the inverter's positive DC input. Some breakers also switch negative.
   - Connect a cable from the **positive busbar** to the input side of the DC circuit breaker.
   - Connect a cable from the output side of the DC circuit breaker to the Inverter's DC Positive (+) input terminal.
   - Connect a cable from the **negative busbar** directly to the Inverter's DC Negative (-) input terminal (unless the breaker also switches the negative).
   - Ensure correct polarity and tighten all connections to the specified torque.

2. Communication Cable from Master Battery to Inverter:





- Master Battery Only: Only the designated Master Battery (typically set to Address 1 via its ADDR DIP switch) communicates directly with the inverter.
- Dedicated Inverter Port: The Master Battery uses its dedicated "CAN / RS485 Inverter Port" (Item 9 on the front panel, see Section 2.5.1) for this communication. The choice of using CAN or RS485 will depend on the communication protocol supported and required by the connected inverter.
- Cable Type:

  - This communication cable is typically installer-supplied or a standard communication cable (e.g., shielded twisted pair CAT5e/6 or specific CAN/RS485 cable) compatible with both the UP5000's inverter port (RJ45) and the inverter's corresponding communication port.
  - Refer to the inverter manufacturer's manual for their specific communication port type, pinout, and recommended cable specifications.

- Connection: Securely plug the prepared communication cable into the selected port (CAN or RS485) on the Master Battery and the corresponding port on the inverter.

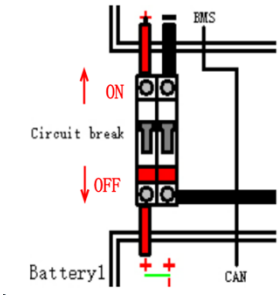
NOTICE:

- Ensure all communication cables are run separately from high-current DC power cables where possible, or shielded appropriately, to minimize electromagnetic interference (EMI).
- Configure the inverter with the correct battery type (UP5000 or compatible $LiFePO_4$ profile) and communication protocol settings (CAN/RS485, baud rate, addresses, etc.) as per both the inverter manual and any UP5000 specific communication guidelines.

3.4.5 CIRCUIT BREAKER INSTALLATION

NOTICE:

- An external DC circuit breaker is **mandatory** and must be installed between the main battery busbars and the inverter.
- **Selection Criteria:**
  - **Type:** Must be a DC-rated breaker.
  - **Voltage Rating:** Must be greater than the maximum possible system voltage (e.g., for a 51.2V nominal system that can charge up to ~57.4V, a breaker rated for at least 75V DC or higher is recommended.
  - **Current Rating:** Sized according to the maximum continuous charge/discharge current of the total battery system and the ampacity of the connecting cables. It should provide overcurrent protection for the cables and the inverter input. Consult inverter specifications and local codes.

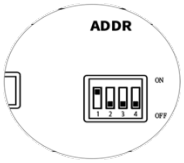


- **Interrupting Capacity:** Must be sufficient to safely interrupt the maximum potential fault current from the battery system.

- **Installation:**
  - Install the breaker in the positive line between the positive busbar and the inverter. Some installations may also require breaking the negative line.
  - The breaker must be installed in an easily accessible location for manual operation (ON/OFF) and emergency disconnection.
  - Follow the breaker manufacturer's installation instructions.

3.5 SYSTEM CONFIGURATION

3.5.1 DIP SWITCH SETTINGS FOR PARALLEL OPERATION



- Re-confirm that each battery in a parallel set has a unique address set via its ADDR DIP switch (Section 2.5.3). Set the master battery (communicating with the inverter) to Address 1.

3.5.2 COMMUNICATION SETUP WITH INVERTER

- On the inverter, configure the battery type as "Lithium" or specifically "UP5000" if listed.
- Select the correct communication protocol (CAN or RS485) and baud rate as required by the UP5000 and the inverter.
- Refer to both the UP5000 documentation (if more detail is provided on specific protocols) and the inverter manual for detailed setup instructions.

4. COMMISSIONING

⚠ **WARNING:**

- Commissioning involves energizing the system. Follow all safety precautions.
- If any abnormal conditions (sparks, smoke, unusual smells, error messages) are observed, immediately power down the system using the battery power switch and the external DC breaker and investigate the cause before proceeding.

4.1 PRE-POWER-ON CHECKLIST

Before powering on the system for the first time:

1. **Visual Inspection:** Double-check all mechanical installations are secure.
2. **Wiring Checks:**
    - Verify all power cable connections for correct polarity.
    - Confirm all power and grounding terminals are tightened to the specified torque.
    - Ensure all communication cables are correctly connected and secured.
3. **DIP Switch Settings:** Confirm correct and unique addresses for all parallel batteries. Master battery set to Address 1.
4. **External Breaker:** Ensure the external DC circuit breaker between the battery system and the inverter is in the **OFF** position.
5. **Inverter Status:** Ensure the inverter is initially OFF or in standby mode as per the inverter manual's first-time startup procedure.
6. **Environment:** Check that the installation environment meets requirements (temperature, humidity, no obstructions to ventilation).

4.2 INITIAL STARTUP PROCEDURE

4.2.1 POWERING ON THE BATTERY SYSTEM

1. **For each battery unit in the parallel system, starting with the Master (Address 1) and then slaves:**
2. **BMS Activation & Self-Test:**
    - Press the Power Switch (Item 6) on the front panel to the "ON" position, the unit will power on and perform a self-test.
    - Observe the LED indicators on the front panel.

4.2.2 VERIFYING LED INDICATORS

- After powering on, the SOC indicator should light up (e.g., solid green or flashing, refer to Section 5.2).
- The SOC (State of Charge) indicators should display the current charge level.
- Observe the SOC / Power Indicator LED Behavior & Color for any fault indications. Refer to Section 5.2 (LEDs). Do not proceed if a fault is indicated until it is resolved.

⚠ WARNING:

If the SOC LEDs indicate a fault, or if any abnormal behavior (e.g., unusual sounds, smoke, unusual smells, error messages) are observed, immediately power down the system using the battery power switch and the external DC breaker and investigate the cause before proceeding.

4.2.3 VOLTAGE CHECKS

1. **Individual Battery Voltages (Optional, for advanced check):** If accessible and safe, measure the voltage at the terminals of each battery unit to ensure they are within the expected range (e.g., 44.8V – 57.4V depending on SOC).
2. **System Output Voltage:**
    - With all batteries ON and the external DC breaker still OFF, use a multimeter to measure the DC voltage at the battery-side terminals of the external DC circuit breaker (or at the main output terminals of the master battery / busbar).

- The voltage should be stable and within the UP5000's operating range (e.g., approximately 52V-54V if shipped at 60-80% SOC, or corresponding to actual SOC).
- Verify correct polarity.

4.3 INVERTER INTEGRATION AND SYSTEM TEST

1. **Power on Inverter:** Follow the inverter manufacturer's instructions to power on the inverter.
2. **Close External DC Breaker:** Once the battery system voltage and polarity are confirmed correct and the inverter is ready, switch the external DC circuit breaker (between battery and inverter) to the **ON** position.
3. **Verify Communication:**
    - Check the inverter's display panel or monitoring software for confirmation of communication with the battery BMS.
    - The inverter should recognize the battery and display its parameters (SOC, voltage, current).
    - If communication fails, re-check communication wiring, DIP switch settings, and inverter configuration (protocol, battery type).
4. **Functional Test:**
    - Charging Test: If a charging source (Grid/PV) is available and configured, initiate a system charge via the inverter. Monitor the charging current and voltage on the inverter and, if possible, via battery monitoring. Ensure they are within the UP5000's specifications.
    - Discharging Test: Apply a load to the inverter. Monitor the discharging current and voltage. Ensure they are within specifications.
    - Observe the system for a period (Suggest at least 30 minutes) to ensure stable operation.

NOTICE:

If the battery system has been in storage for a long time, it may require a full charge cycle to calibrate the SOC estimation and balance the cells.

5. OPERATION

5.1 NORMAL OPERATION

Once commissioned, the UP5000 battery system will operate automatically, managed by its internal BMS and controlled by the connected inverter.

- The BMS will protect the battery from over-charge, over-discharge, over-current, and over/under-temperature conditions.
- The inverter will manage charging from sources like solar PV or the grid and discharging to supply loads.

5.2 LED INDICATOR STATUS

5.2.1 LED INDICATOR DEFINITION

State		Charging						Discharge					
Capacity indicator		L6	L5	L4	L3	L2	L1	L6	L5	L4	L3	L2	L1
Levels	0~16%	Off	Off	Off	Off	Off	Flashing 2	Off	Off	Off	Off	Off	On
	16-33%	Off	Off	Off	Off	Flashing 2	On	Off	Off	Off	Off	On	On
	33-50%	Off	Off	Off	Flashing 2	On	On	Off	Off	Off	On	On	On
	50-66%	Off	Off	Flashing 2	On	On	On	Off	Off	On	On	On	On
	66-83%	Off	Flashing 2	On	On	On	On	Off	On	On	On	On	On
	83-100%	Flashing 2	On	On	On	On	On	On	On	On	On	On	On
Running Light		On						Flash 3					

5.2.2 LED INDICATOR STATUS

State	Normal/ Alarm/ Protection	On/Off	RUN	ALM	Power Level LEDs	Notes
Shutdown	Sleep	Off	Off	Off	Off	All LED Off
Standby	Normal	On	Flash1	Off	According to SOC	Standby Mode
	Alarm	On	Flash1	Flash3		Battery low voltage
Charge	Normal	On	On	Off	According to SOC	Maximum LED flash, ALM not flash when OVP alarm on
	Alarm	On	On	Flash3		
	OVP	On	On	Off	On	Switch to standby when there are no electric supply
	Temp/occ/ failure	On	Off	On	Off	Stop charging

Discharge	Normal	On	Flash3	Off	According to SOC	
	Alarm	On	Flash3	Flash3		
	UVP	On	Off	Off	Off	Stop discharging
	Temp/ocd/ ascd/failure	On	Off	On	Off	Stop discharging
Failure		Off	Off	On	Off	Stop charging/ discharging

5.2.3 FLASHING INSTRUCTIONS

Flashing mode	On time	Off time
Flashing 1	0.25s	3.75s
Flashing 2	0.5s	0.5s
Flashing 3	0.5s	1.5s

5.3 SHUTTING DOWN THE SYSTEM

For Maintenance or Emergency:

1. Turn OFF loads connected to the inverter.
2. Turn OFF the charging source to the inverter (e.g., PV array isolator, grid input breaker to the inverter).
3. Switch the external DC circuit breaker (between battery and inverter) to the **OFF** position.
4. Press the Power Switch on each UP5000 battery unit to the "OFF" position, starting with slave units and then the master unit.

For Short Periods (System remains available):

- The inverter may have a standby or off mode that can be used. The battery itself will enter a low-power state if there's no charge/discharge activity.

6. MAINTENANCE

⚠ **WARNING:**

- Maintenance should only be performed by qualified personnel.
- Always power down the battery system and disconnect it from the inverter (via the external DC breaker) before performing any physical maintenance unless otherwise specified for live checks.
- Wear appropriate PPE.

6.1 ROUTINE MAINTENANCE SCHEDULE

Check Content	Maintenance Method	Maintenance Cycle
System Cleaning	Check for dust, debris, or corrosion. Clean the exterior of the battery units with a dry or slightly damp (water only) lint-free cloth. Ensure ventilation openings are clear. Check for any physical damage or deformation.	Once every six months to once a year.
System Running State	Check for any abnormal sounds during operation (before shutdown for other checks). Check that LED indicators work normally during operation. Check system parameters (SOC, voltage, temperature) via inverter monitoring or BMS software (if accessible) are normal.	Once every six months.

Electrical Connections	Visually inspect all power and communication cable connections for tightness, signs of overheating (discoloration), corrosion, or damage. ⚠ CAUTION: **Torque checks should only be done by qualified personnel with the system powered down.** Check cable insulation for damage, especially where cables contact metal surfaces or pass through openings.	Half a year after first commissioning, then once every half a year to a year thereafter.
Ground Reliability	Visually inspect the ground cable connection for tightness and corrosion.	Annually.
Ventilation	Ensure that ventilation pathways around the batteries and in the room are not obstructed.	Quarterly.

NOTICE:

Failure to perform routine maintenance as outlined, or performing maintenance with unqualified personnel, can lead to premature product degradation, system malfunction, safety hazards, and may void the product warranty.

6.2 CLEANING

- Use a soft, dry cloth to clean the exterior of the battery.
- If necessary, a cloth lightly dampened with clean water can be used.

⚠ CAUTION:

Never use solvents, abrasive cleaners, or large amounts of water, as these can damage the casing or internal components. Ensure the unit is dry before re-energizing.

6.3 CABLE AND CONNECTION CHECKS

- Regularly inspect cables for any signs of wear, cracking, or damage to the insulation.
- Check terminals for any signs of corrosion or looseness. If corrosion is present, the connection should be cleaned and re-secured by qualified personnel. If looseness is suspected, terminals should be re-torqued to specification by qualified personnel with the system de-energized.

6.4 BATTERY HEALTH AND SOC MANAGEMENT

- Avoid frequently discharging the battery to very low SOC levels (e.g., below 10%) if not necessary, as this can impact long-term cycle life for some $LiFePO_4$ usage patterns.
- Ensure the battery undergoes a full charge cycle periodically (e.g., quarterly or as recommended by the inverter settings) to allow for cell balancing and SOC calibration.
- If the system is not used for extended periods, follow long-term storage guidelines (Section 7.2).

7. STORAGE

7.1 SHORT-TERM STORAGE (UP TO 3 MONTHS)

- Store the battery in a cool, dry, well-ventilated area.
- Storage Temperature: -20°C to +45°C.
- Relative Humidity: 5% to 85% RH.
- Ensure the battery's Power Switch is OFF.
- SOC should ideally be between 40% and 60%. If SOC is very low, charge it before storing.

7.2 LONG-TERM STORAGE (MORE THAN 3 MONTHS)

- **Storage Temperature:** -20°C to +25°C is optimal for minimizing capacity loss.
- **SOC:** Charge or discharge the battery to 60%~80% SOC before storage.

- **Recharge:** Recharge the battery to 60%~80% at least every six months. Failure to do so can lead to irreversible capacity loss or battery damage due to self-discharge.
- **Environment:** Store in a dry, clean, well-ventilated area away from corrosive substances, heat sources, and direct sunlight.
- **Power Switch:** Ensure the battery's Power Switch is OFF.

⚠ CAUTION:

Non-compliance with the specified storage conditions, including temperature, SOC, and periodic recharging, will significantly reduce the battery's lifespan, lead to irreversible capacity loss, and may void the warranty.

8. DECOMMISSIONING AND DISPOSAL

8.1 SAFE DECOMMISSIONING

1. Follow the shutdown procedure in Section 5.3 to safely power down the battery system and isolate it from the inverter and other power sources.
2. Disconnect all cables from the battery unit(s) by qualified personnel.
3. Carefully demount the battery unit(s) from the wall.

8.2 BATTERY DISPOSAL

⚠ DANGER:

Improper disposal of lithium batteries can harm the environment and pose safety risks.

- **DO NOT** dispose of lithium batteries in household waste or landfills.
- **DO NOT** incinerate lithium batteries.
- UP5000 batteries must be recycled by an authorized battery recycling facility that handles $LiFePO_4$ chemistry.
- Contact your local waste management authorities, installer, or battery supplier for information on approved collection and recycling programs in your area.
- Follow all local and national environmental regulations for battery disposal.

9. APPENDIX

9.1 COMPATIBLE INVERTER LIST

No.	Brand of inverter	No.	Brand of inverter
1	Deye/Sunsynk	12	Sofar
2	Growatt	13	Solarfam
3	Lux Power	14	Solax
4	Goodwe	15	Megarevo
5	East	16	Voltronic Power
6	SMA	17	SRNE
7	Solis	18	Pylon Tech
8	Victron	19	SAJ
9	Voltron	20	Kehua
10	Chisage	21	Sermatec
11	Must		

WARRANTY CLAIM FORM

Note: Signature or Seal stamp required. Please print, sign or stamp and then email to the Distributor. Distributor shall have no obligation for unqualified application such as incorrect information or missing necessary information.

Product Model		Serial Number(S/N)	
Company Name			
Contact Person		Contact Number	
Contact Email			
Company Address			
Name of End user			
Date of Installation			
Installation Location (Outdoors and indoors)			

Fault Description

Can the battery start up	Communication is normal	LED status (Quantity and color)

Warranty Claim Authorized Signature：

The following information must provide after faulty battery been replaced Replacement Information

Replaced by		Replace Date	

Replacement Information Authorized signature:	
Contact Distributor:	
Distributor Name: (With stamp for confirmation)	
Contact Email:	
Telephone #:	

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