LEDVANCE HIGH VOLTAGE ENERGY STORAGE SYSTEM

INSTALLATION AND OPERATION INSTRUCTION

LES-HV-4K

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CONTENT

IMPORTANT INFORMATION IN THE MANUAL

SCOPE

This installation and operation manual applies to the stackable battery energy storage system. Please carefully read this manual of LES-HV-4K. Installation, preliminary debugging, and maintenance must be carried out by qualified and authorized engineer. Please keep this installation and operation manual and other applicable documents near the battery energy storage system, so that all engineers involved in installation and maintenance can have access to this installation and operation manual at any time.

DESCRIPTION OF LES-HV-4K

Module	LES-HV-4K 102.4V 4.1K	LES-HV-4K 204.8V 8.2K	LES-HV-4K 307.2V 12.3K	LES-HV-4K 409.6V 16.4K	LES-HV-4K 512.0V 20.5K	LES-HV-4K 614.4V 24.6K
Battery module number	1	2	3	4	5	6
Nominal voltage (V)	102.4	204.8	307.2	409.6	512.0	614.4
Nominal capacity (Ah)	40					
Nominal Energy (kWh)	4.096	8.192	12.288	16.384	20.480	24.576
Available Energy (kWh)	3.891	7.782	11.673	15.565	19.456	23.347
Max discharge current (A)	40					
Max charge current (A)	40					
Discharge Energy (kW)	3.5	7.0	10.5	14.0	17.5	20.0
Discharge temperature (°C)	-20 ~ 55					
Charge temperature (°C)	-10 ~ 60					
Cycle life	25±0.5C/0.5C,90%DOD, EOL70%≥6000cycles					
Warranty period	10 years					
Terminal	MC4					
Communication	CAN 2.0/RS485/Wi-Fi/Bluetooth					
SOC display	5LED (20%, 50%, 60%, 80%, 100%)					
Install	Floor mount					
Dimensions (WxDxH mm)	600x400x390	600x400x560	600x400x730	600x400x900	600x400x1070	600x400x1240
Weight (kg)	52	87	122	157	192	227
Humidity	5% ~ 95%RH					
Altitude (m)	≤ 2000					
IP rating of protection	IP65					
Certificate	IEC62619/ EMC/ UN38.3					
Extension	Up to 8 systems can be used in parallel					

IMPORTANT INFORMATION IN THE MANUAL

MEANING OF SYMBOLS

This manual contains the following types of warnings.

 **Danger!** It may cause an electric shock. Even when the equipment is disconnected from the grid, the voltage free state will have a time lag.

 **Danger!** If the instructions are not followed, death or severe injury may occur.

Warning! If the instructions are no followed, a loss may occur.

 **Attention!** This symbol represents information on the device use.

The following types of warning, prohibition, and mandatory symbols are important.

ATTENTOIN! THE RISK OF CHEMICAL BURNS

If the battery is damaged or fails, it may lead to electrolyte leakage, which in turn causes the formation of a small amount of hydrofluoric acid, among other effects. Contact with these liquids can cause chemical burns.
– Do not subject the battery module to severe impact.
– Do not open, disassemble, or mechanically change the battery module.
– In case of contact with an electrolyte, wash the affected area with clean water immediately and seek medical advice promptly.

ATTENTION! THE RISK OF EXPLOSION

Incorrect operation or fire may cause the lithium-ion battery unit to ignite or explode, leading to serious injury.
– Do not install or operate the battery module in explosive or high-humidity areas.
– Store the battery module in a dry place within the temperature range specified in the datasheet.
– Do not open, drill through, or drop the battery cell or module.
– Do not expose the battery cell or module to high temperature.
– Do not throw the battery cell or module into the fire.
– If there is a fire from the battery, please use the CO2 extinguisher. If there is a fire near the batter, please use a dry powder extinguisher.
– Do not use defective or damaged battery modules.

IMPORTANT INFORMATION IN THE MANUAL

 **CAUTION! HOT SURFACE**

– If a malfunction occurs, the parts will become very hot, and touching them may cause serious injury.
– If the energy storage system is defective, please shut it down immediately.
– If the fault or defect becomes obvious, special care should be taken when handling the equipment.

 **NO OPEN FIRE!**

It is prohibited to handle open flames and ignition sources near the energy storage system.

 **NO OBJECTS!** Do not insert any objects into the housing of the energy storage system!

No objects, such as screwdrivers, may be inserted through openings in the casing of the storage system.

 **WEAR SAFETY GOGGLES!** Wear safety goggles when working on the equipment.

 **FOLLOW THE MANUAL!**

When working and operating the equipment, the installation and operation manual provisions must be observed.

GENERAL SAFETY INFORMATION

 **Danger!** Failure to comply with the safety information can lead to life-threatening situations.

– Improper use can cause death. Operators of LES-HV-4K must read this manual and observe all safety information.
– Operators of LES-HV-4K must comply with the specifications in this manual.
– This manual cannot describe all conceivable situations. For this reason, applicable standards and relevant occupational health and safety regulations are always given priority.
– In addition, the installation may involve residual hazards in the following circumstances.
– Incorrect installation.
– The installation is carried out by personnel who did not receive relevant training or guidance.

DISCLAIMER

LEDVANCE GMBH shall not be liable for personal injury, property loss, product damage and subsequent losses under the following circumstances.
– Failure to comply with the provisions of this manual.
– Incorrect use of this product.
– Unauthorized or unqualified personnel repair the product, disassembly the rack and perform other operations.
– Use of unapproved spare parts.
– Unauthorized modifications or technical changes to the product.

IMPORTANT INFORMATION IN THE MANUAL

PROPER USE

– The battery energy storage system can only be installed and operated under the eaves or indoors. The working environment temperature range of LES-HV-4K is-20°C~60°C, and the maximum humidity is 90%. The battery module shall not be exposed to the sun or placed directly beside the heat source.
– The battery module shall not be exposed to a corrosive environment.
– When installing the battery energy storage system, ensure that it stands on a sufficiently dry and flat surface with sufficient bearing capacity. Without the manufacturer's written approval, the installation site's altitude shall not be higher than 2,000 meters. The rated output power of the battery will decrease with the altitude.
– In areas where flooding may occur, care must be taken to ensure that the battery module is installed at a suitable height to prevent contact with water.
– The battery energy storage system must be installed in a fireproof room. This room must have no fire source and must be equipped with an independent fire alarm device, which complies with local applicable regulations and standards. Similar fire-proof requirements apply to other openings in the room (such as windows).
– Compliance with the specifications in this manual is also part of proper use.

REQUIREMENTS FOR INSTALLATION PERSONAL

All work shall comply with local applicable regulations and standards.
The installation of LES-HV-4K can only be completed by electricians with all following qualifications.
– Trained in dealing with hazards and risks associated with the installation and operation of electrical equipment, systems, and batteries.
– Trained on installation and debugging of electrical equipment.
– Understanding and complying with the technical connection conditions, standards, guidelines, regulations, and laws applicable.
– Knowledge of handling lithium-ion batteries (transportation, storage, disposal, hazard source).
– Understanding and complying with this document and other applicable documents.

SAFETY

SAFETY RULES

To avoid property damage and personal injury, the following rules shall be followed when working on the hazardous live parts of the battery energy storage system.
– It is available for use.
– Ensure that it will not restart.
– Make sure there is no voltage.
– Grounding protection and short circuit protection.
– Cover or shield adjacent live parts.

SAFETY INFORMATION

Part damage or short circuit may cause electric shock and death. A short circuit can be caused by connecting battery terminals, resulting in current flow. This type of short circuit shall be avoided under any circumstances. For this reason, follow these instructions:
– Use insulated tools and gloves.
– Do not put any tools or metal parts on the battery module or high-voltage control box.
– When operating the battery, be sure to remove watches, rings, and other metal objects.
– Do not install or operate this system in explosive or high-humidity areas.
– When working on the energy storage system, first turn off the charging controller, then the battery, and ensure that they are not turned on again. When working on the energy storage system, first turn off the charging controller, then the battery, and ensure that they are not turned on again.

Improper use of the battery energy storage system can lead to death. The use of the battery energy storage system beyond its intended use is not allowed, because it may cause great danger.
Improper handling of the battery energy storage system can cause life-threatening risks, serious injury or even death.

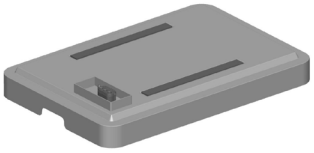
Warning! Improper use can cause damage to the battery cell.

– Do not expose the battery module to rain or soak it in liquid.
– Do not expose the battery module to a corrosive environment (such as ammonia and salt)
– The battery energy storage system shall be debugged no later than six months after delivery.

SCOPE OF DELIVERY

LES-HV-CON AND LES-HV-BASE PACKAGE

1. LES-HV-4K (high voltage control box)



2. LES-HV-4K Base

3. 2M black external communication cable (RJ45 – M19)

4. 2M yellow-green grounding cable (8AWG)

5. 2M DC+ red external power cable (8AWG)

6. 2M DC- black external power cable (8AWG)

7. Bracket x2

8. Screw (M4x4)

9. Product manual

SCOPE OF DELIVERY

LES-HV-4K BATTERY PACKAGE

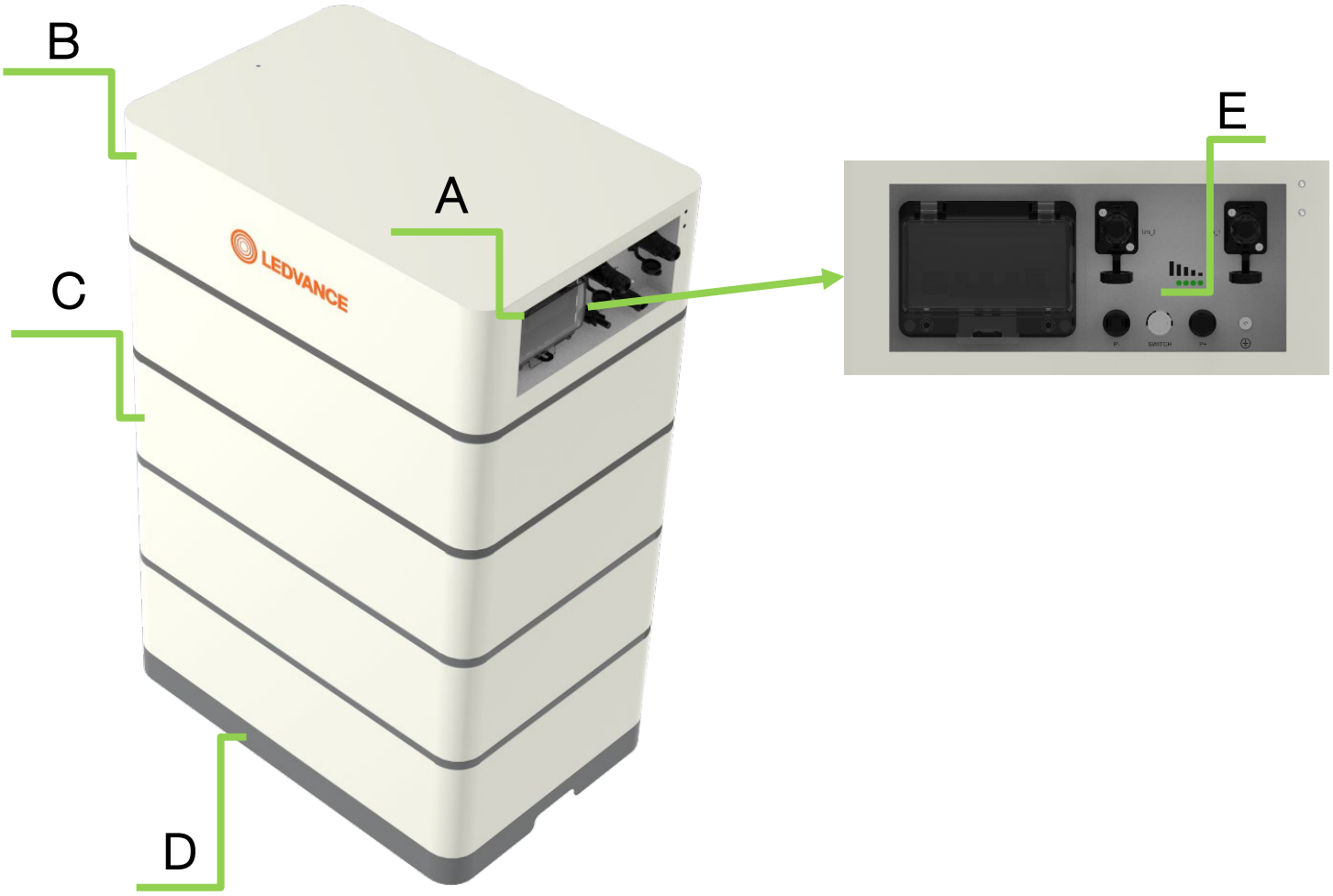
LES-HV-4K x 1

LES-HV-4K Base package	
1	High voltage control box (LES-HV-4K x1)
2	Battery base (LES-HV-4K Base x1)
3	2M black external communication cable (RJ45 – M19)
4	2M yellow-green grounding cable (8AWG)
5	2M DC+ red external power cable (8AWG)
6	2M DC- black external power cable (8AWG)
7	Bracket x2 used to install product on wall
8	Screw (M4 x4)
9	Product manual
LES-HV-4K package	
1	Battery module (LES-HV-4K x1)

BATTERY SYSTEM INTRODUCTION

The Battery System LES-HV-4K is used as a connected battery for the intermediate storage of excess PV energy in an inverter system.

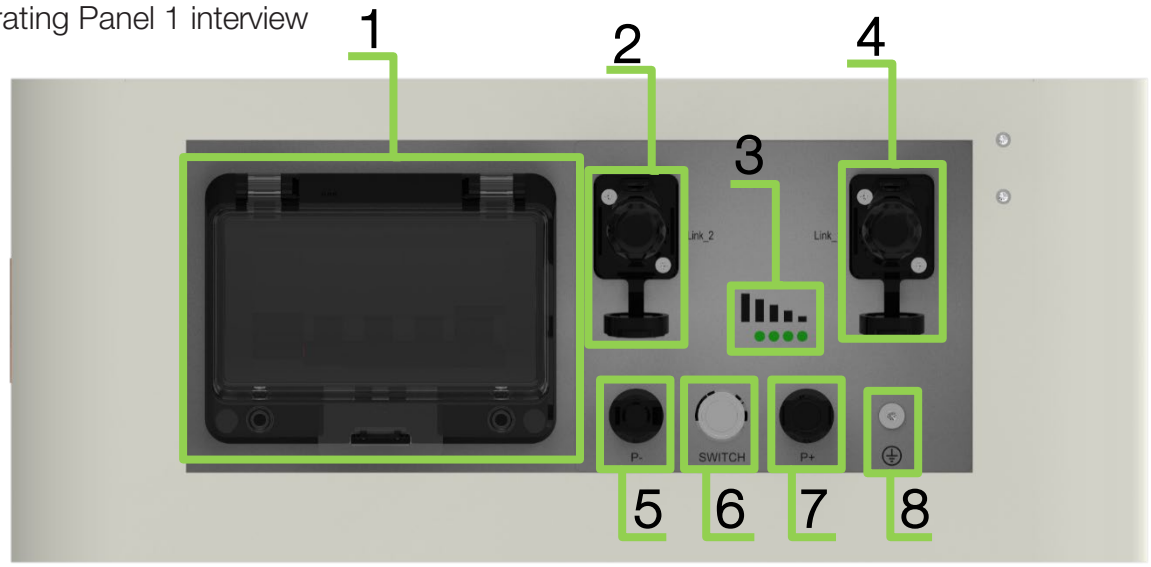
A	Operating Panel
B	LES-HV-4K (high voltage control box)
C	LES-HV-4K (battery module)
D	LES-HV-4K (battery base)
E	Connection ports



BATTERY SYSTEM INTRODUCTION

OPERATING PANEL

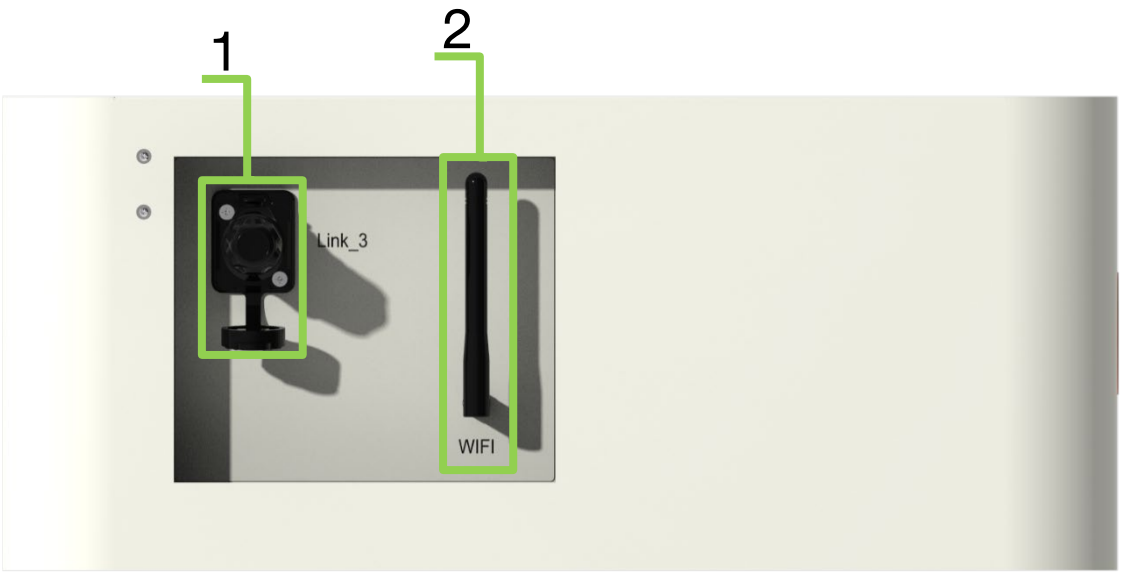
– Operating Panel 1 interview



NO.	Name	Description
1	DC Breaker	High voltage DC breaker
2	Link_2	Communication interface (for maintenance)
3	LED	SOC display
4	Link_1	Communication interface (to PCS)
5	P -	DC – terminal
6	Switch	Start switch
7	P +	DC + terminal
8	Grounding	Grounding connection screw thread

BATTERY SYSTEM INTRODUCTION

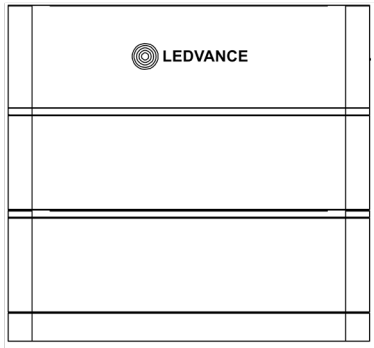
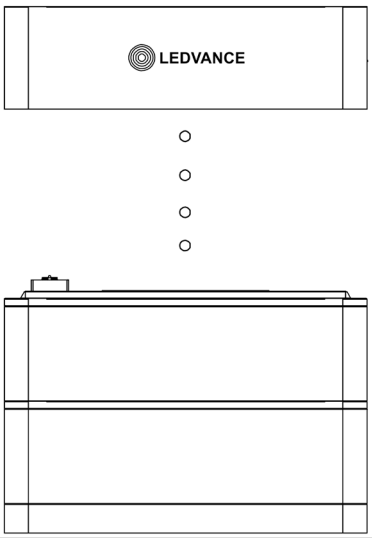
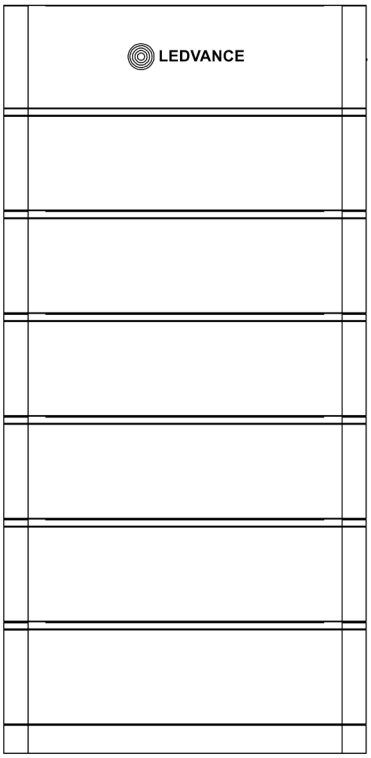
– Operating Panel 2 interview



NO.	Name	Description
1	Link_3	Communication interface (To other batteries in parallel)
2	Wi-Fi	Wi-Fi antenna

BATTERY SYSTEM INTRODUCTION

NUMBER OF BATTERY MODULES SUPPORTED BY LES-HV-4K

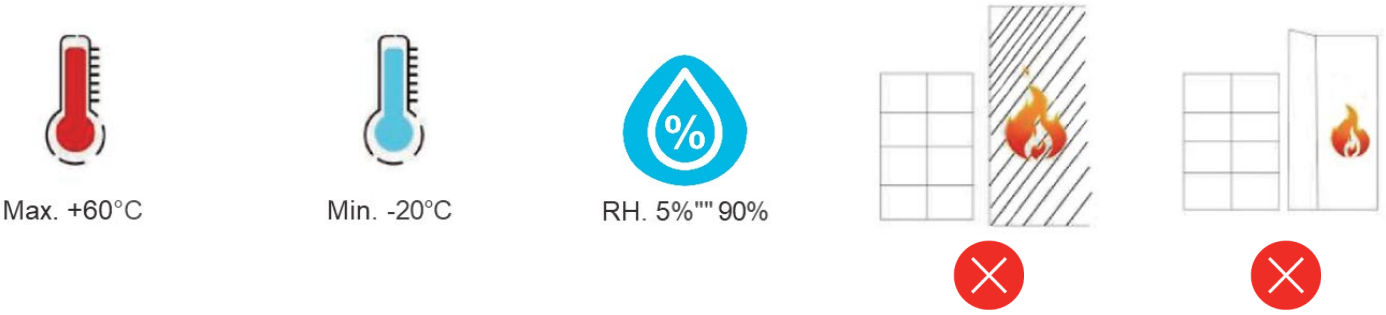
		
2 modules	2 modules ≤ N ≤ 6 modules	6 modules

Note: Minimum two battery modules are required and Maximum Six modules in one parallel

INSTALLATION

INSTALLATION PLACE REQUIREMENT

– Installed on the surface with enough dryness, horizontal and flat, and has sufficient carrying capacity. (For example, concrete or masonry)
– The altitude of the installation location must not be higher than 2000 meters. (The output power of the battery will decrease with the height of the altitude)
– If in the flood area, you must pay attention to ensure that the battery is installed in an appropriate altitude to prevent contact with water.
– Ensure there is no fire source, and it must be equipped with an independent fire alarm device.
– Cannot be exposed to corrosive environments.
– The working temperature range should be -20C to 60°C.
– The maximum environment humidity is 90%
– Can't be exposed to the sun or beside the heat source directly.
– The installation site must be away from the children and the old.
– The installation position must be compatible with the weight and size of the battery.



INSTALLATION

TOOLS REQUIREMENTS

– When installing the battery system, wear the following safety equipment.

Gloves

Goggles

Safety Shoes

– To install the battery system, you need the following tools.

socket head wrench

External hexagonal wrench

electric drill

ATTENTION!

– Because the DC cable or connector on the battery system may cause electric shock or life-threatening life, do not contact the end of the non-insulating cable.
– If the battery module incorrectly lifts or falls in the process of transportation or installation, it may cause the risk of injury due to the weight of the battery module.
– Carefully transport and lift the battery module. Consider the weight of the battery module.
– For those who work for the battery system, please wear qualified personal protection equipment.

Note: Before the battery is installed, please switch off the Switch on the high Voltage Control Box.
Note: Wear gloves, goggles, and safety shoes before installation.

INSTALLATION STEPS

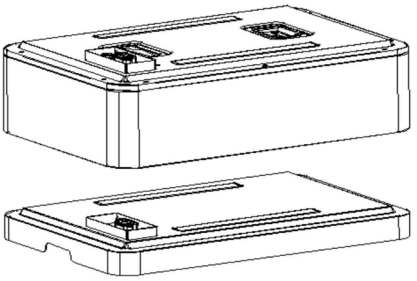
CAUTION!

– Before installation, please make sure to wear the safety shoes to prevent foot injury.
– The weight of a battery module is over 30kg. please use the movable tools with two workers to complete stacking work.
– Do not use the movable handle tool to carry the battery module when the distance is ≥10m.
– Before using the transport tools, check whether they are reliable.
– The installation humidity ranges from 5% to 90%.

INSTALLATION

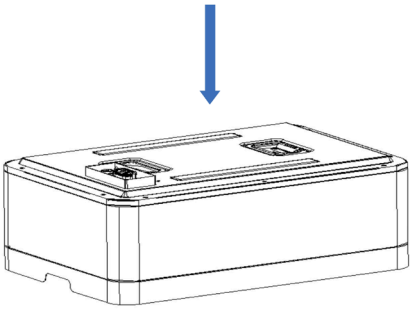
PRODUCT INSTALLATION STEPS

– Take out the base and battery module. Place the base on hard floor lift the battery module on top of the base using a movable handle tool.

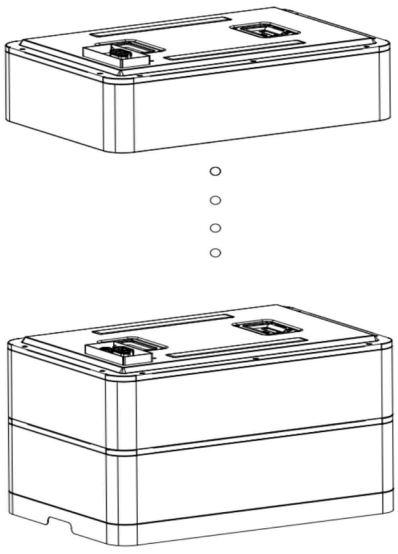


CAUTION!

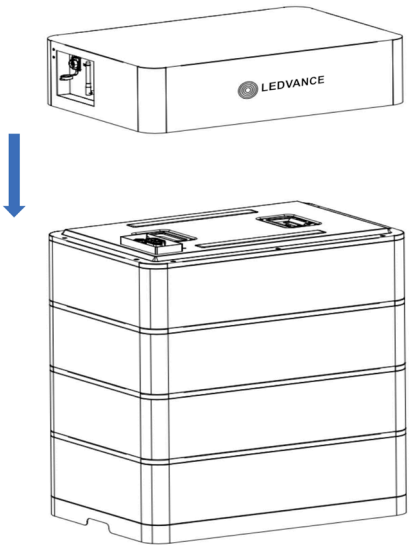
– After the battery module is connected to the base, the battery module plug-in port is electrified. Take good insulation protection, pay attention to high voltage dangers and shot circuit dangers!



– Stack the corresponding connection ports at the bottom of the battery module. The number of stackable battery modules for a single battery system ranges from 2 to 6.

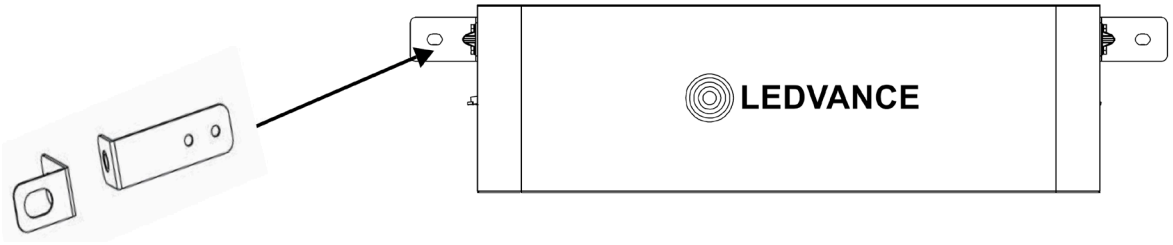


– Take out the high voltage box, and install the wall fixing plate on the pre-mounting hole of the high voltage box with M4*8 screws.

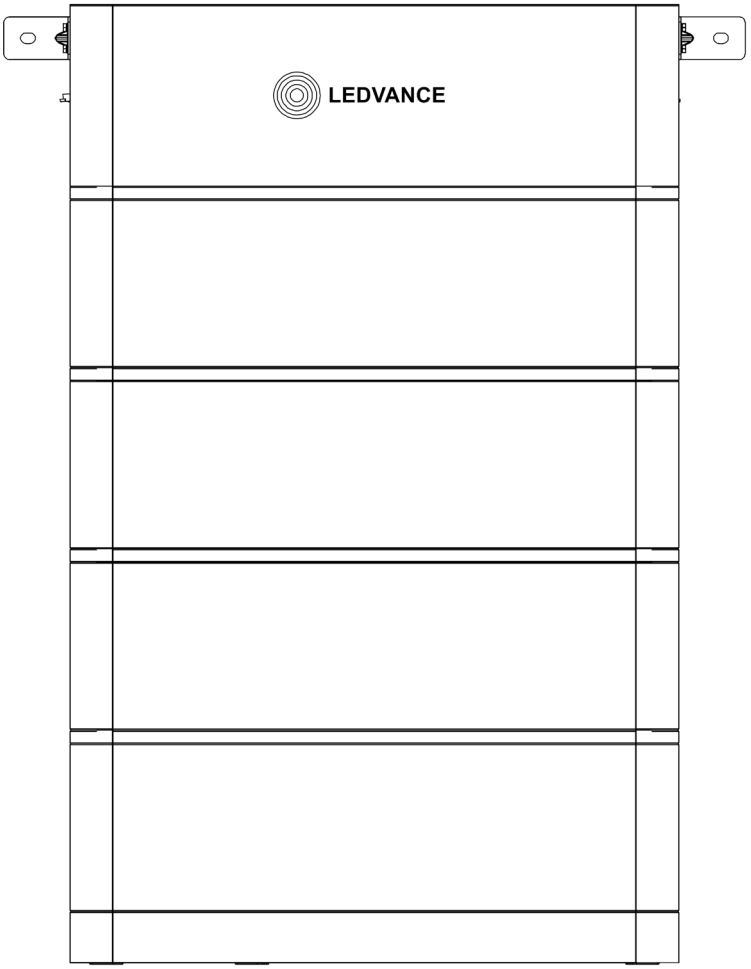


INSTALLATION

– Finally, install the high voltage box to the top layer of the battery module



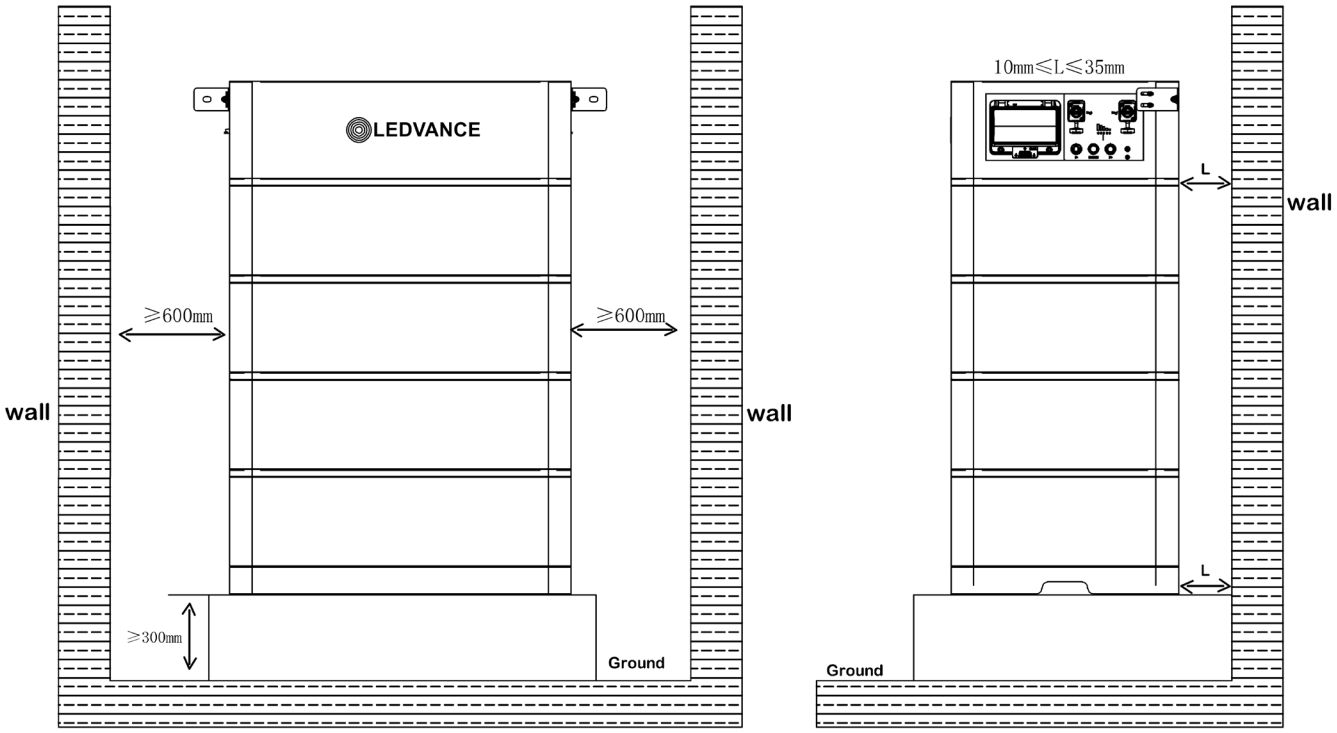
– Place the high voltage box on one side of the wall, mark the positions of fixing holes, drill two holes in the wall with a depth of 100-110mm using the electrical drill, install expansion bolts in the holes and secure the high voltage box to the wall with a proper hammer.



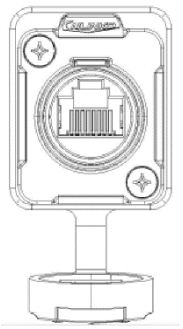
INSTALLATION

SELECTION OF INSTALLATION SITES

The installation location is recommended to meet the size requirements of the figure below



DEFINITION OF INTERFACE

Link_1	Link_2		Link_3		
D1_L	1	DC24V-	1	DC24V-	
/	2	ADDR_DI	2	ADDR_DO	
/	3	CAN2_S	3	CAN2_S	
CAN3_H	4	CAN2_H	4	CAN2_H	
CAN3_L	5	CAN2_L	5	CAN2_L	
/	6		6		
RS485_1A	7		7		
RS485_1B	8		8		

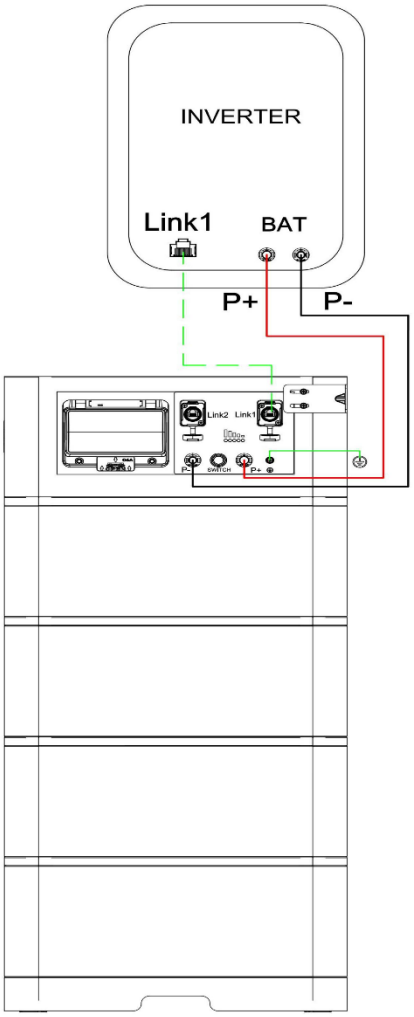
INSTALLATION

BATTERIES IN PARALLEL

CAUTION!

– The length of the power cables between the combiner box and the inverter
– If the combiner box is not used, the parallel connection device should meet the following requirements
  a) No less than IP 55 for the outdoor use
  b) Maximum Operating Voltage, 1000V DC
  c) Maximum Output Current, 50A DC
  d) Breaking Current, 50A DC
– The total power cable length between each battery cluster and the inverter should be less than 20 meters

SINGLE BATTERY SYSTEM

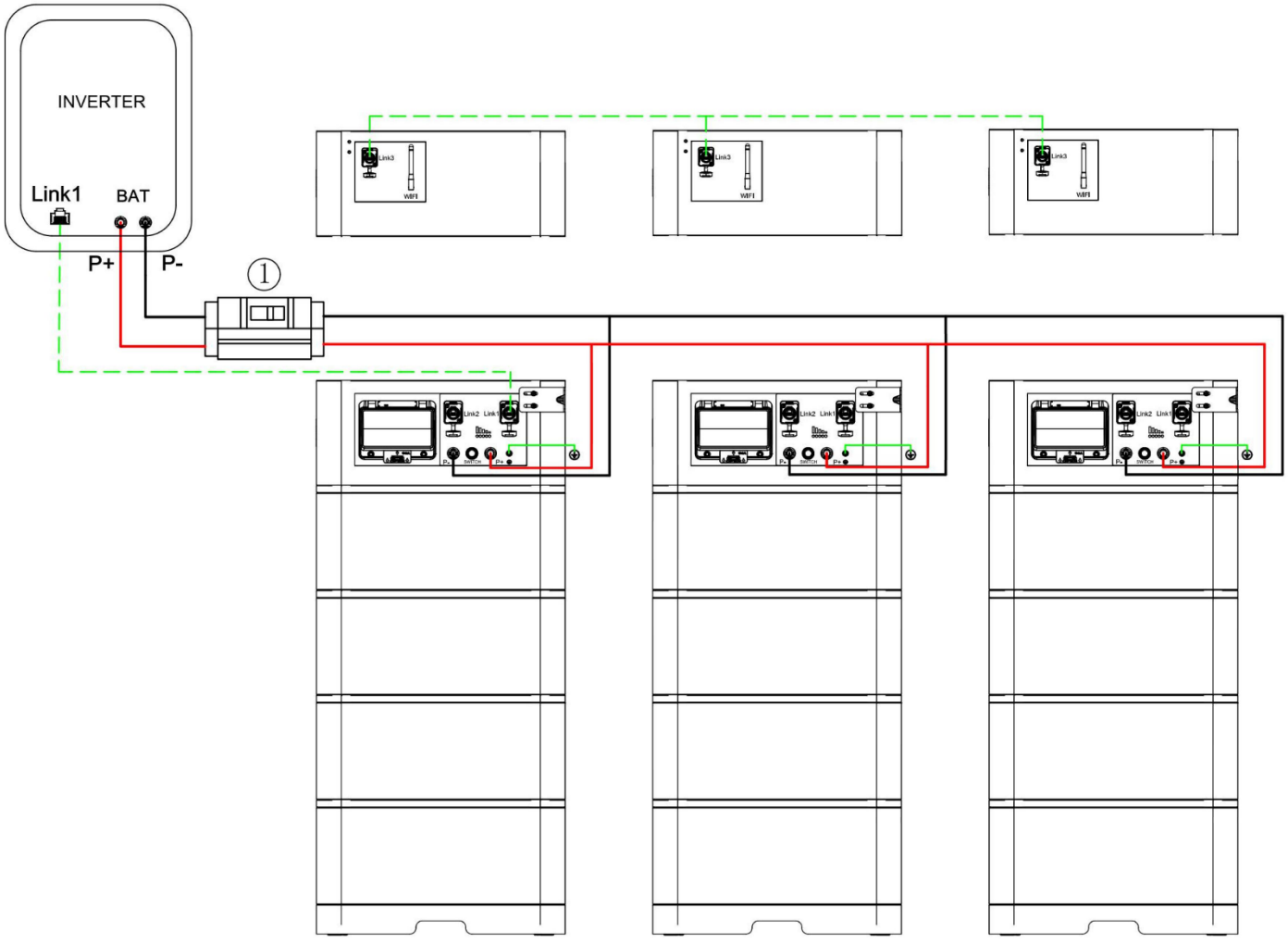


COMMISSIONING

SWITCH ON THE BATTERY SYSTEM

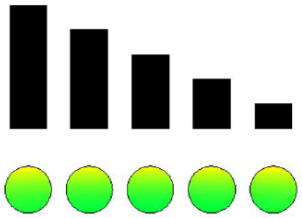
Requirements:
– The battery and the inverter must be properly installed and fixed
– All cables must be correctly connected

Steps:
– Turn the external protection switch between the high voltage box and the inverter from OFF to ON
– Turn the high voltage isolation switch of the high voltage box from OFF to ON
– After startup, the system enters the self-check mode, the green LED is lit, and the light state corresponds to the current SOC power. Without other light indication, the battery system enters the high-voltage standby mode and can work normally.
– If the battery pack I connected in the “ready” state after the inverter, and cannot normally power on normally. At this time, you can press “start” switch for more then ten seconds, the state becomes “high voltage standby”, force the power on.



COMMISSIONING

DIODE MEANING



Green x5 show SOC

SWITCH OFF THE BATTERY SYSTEM

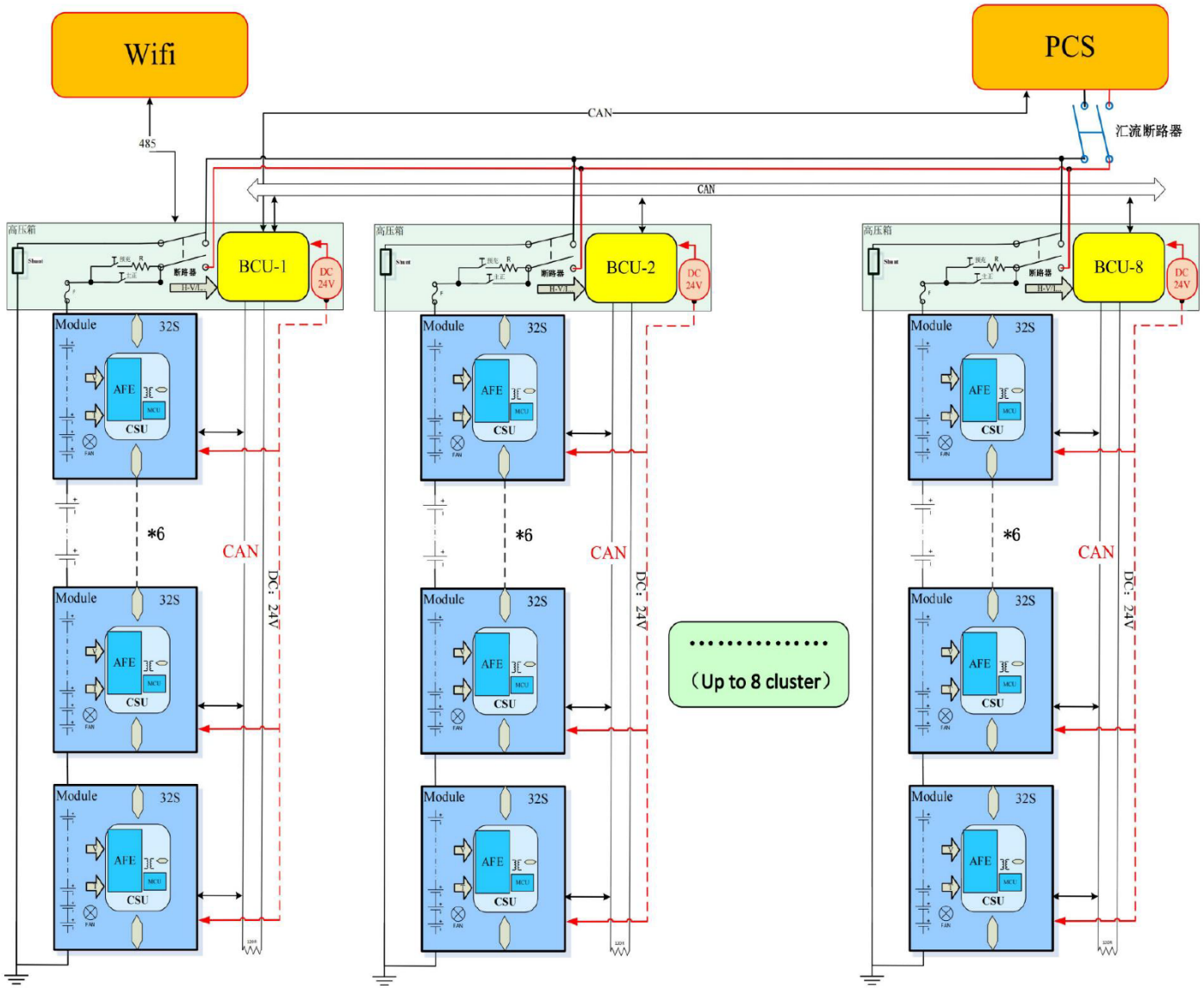
Steps:

– Turn the high voltage isolation switch of the high voltage box from ON to OFF.
– Turn the external protection switch between the high voltage box and the inverter from ON to OFF. If two or three battery systems are connected in parallel, please firstly switch off the first battery which has a communication connection to the inverter, and then switch off all the other batteries.

SAFETY DESIGN

– The battery system cannot be turned on if the battery is incomplete or is not installed properly
– The system will automatically shut down if the battery does not communicate with the inverter for 24 hours
– The system will automatically shut down if the battery or inverter installation error occurs for 10 minutes
– The system will automatically shut down if the voltage is too low within 60 seconds

ELECTRICAL SCHEMATIC DIAGRAM



MAINTENANCE AND STORAGE

CLEANING

We recommend to clean the battery system regularly. If the battery housing is dirty, use a soft dry brush or dust collector to remove the dust. Do not use solvents, abrasives, or corrosive liquids to clean the housing.

STORAGE

If the battery energy storage system will not be used for a long time, please refer to the following table to save the power. After charging, turn off all switches on the battery energy storage system to ensure the lowest system power consumption.

Storage environment temperature	Relative humidity of the storage environment	Storage time	SOC
Below -10°C	/	Not allowed	/
-10 – 25°C	5% - 70%	≤ 12 months	25% ≤ SOC ≤ 60%
25 – 35°C	5% - 70%	≤ 6 months	25% ≤ SOC ≤ 60%
35 – 50°C	5% - 70%	≤ 3 months	25% ≤ SOC ≤ 60%
Above 50°C	/	Not allowed	/

Note: To ensure the battery service life, keep the storage temperature of the battery module between 0°C and 35°C.

DISPOSAL

For details related to the disposal of battery modules, please contact us.
Observe applicable regulations on waste battery disposal. Immediately stop the use of damaged batteries.
Please contact your installer or sales partner before disposal. Ensure that the battery is not exposed to moisture or direct sunlight.

Attention

– Do not dispose of batteries and rechargeable batteries as domestic waste! You are legally obliged to return used batteries and rechargeable batteries.
– Waste batteries may contain pollutants that can damage the environment or your health if improperly stored or handled.
– Batteries also contain iron, lithium and other important raw materials, which can be recycled.

Do not dispose of batteries as household waste!