UPower

Manual for the installation, operation and maintenance

2025

RKP

CONTENTS

1. Safety precautions

READ AND KEEP THESE INSTRUCTIONS

RKP strongly recommends a thorough review of the following instructions to ensure full familiarity with the product described in this document before any installation, operation, commissioning, or maintenance activities.

All our products undergo rigorous quality control and comprehensive testing at the manufacturing facility, ensuring strict compliance with applicable industry standards and regulatory requirements.

Compliance with these instructions is mandatory for warranted performance and service life.

1.1 Statement

Before transporting, storing, installing, operating, using, or maintaining the equipment, thoroughly read this manual, strictly follow the instructions, and comply with all safety precautions indicated on the equipment and in this manual.

In this manual, "equipment" refers to the products, software, components, spare parts, or services relatedto this manual; "our company"refers to the manufacturer (producer), seller, or service provider of the equipment; "you" refers to the entity responsible for transporting, storing, installing, operating, using, or maintaining the equipment.The "Danger", "Warning", "Caution", and "Note" items in the manual do not cover all safety measures that must be followed. You must also comply with relevant international, national, or regional standards, as well as industry practices.

Our company shall not be liable for any damages or liability arising from violations of safety operation requirements or breaches of safety standards during the design,production, or use of the equipment.

This equipment should be used in environments that meet the design specifications. Otherwise, equipment malfunctions, abnormal functions, or component damage caused by non-compliance are not covered under the equipment quality guarantee, and our company shall not be liable for any personal injuries, property losses, or other consequences.

All operations including transportation, storage, installation, operation, use, and maintenance must comply with applicable laws, regulations, standards, and normative requirements.

Reverse engineering, decompilation, disassembly, adaptation, or any other derivative operations on the equipment software are strictly prohibited. Unauthorized access to proprietary software architecture, source code, or algorithmic logic is prohibited.

Our company shall not be liable for the following situations or their consequences:

- Damage to the equipment caused by force majeure events, including but not limited to earthquakes, floods, volcanic eruptions, mudslides, lightning strikes, fires, wars, armed conflicts, typhoons, hurricanes, tornadoes, or extreme weather.
- Operation outside the usage conditions specified in this manual;
- Installation and use environments that do not comply with relevant international, national, or regional standards;
- Installation and use by unqualified personnel;
- Failure to follow the operation instructions and safety warnings in the product and documentation;
- Damage caused by you or a third party you commissioned for transportation;

• Damage caused by storage conditions that do not meet the product documentation requirements;

• Materials and tools you provide that do not meet local laws, regulations, and relevant standards;

• Damage caused by negligence, misconduct, improper operation, or other reasons not attributable to our company.

1.2 Personal Safety

Danger

• During installation, operations with live electricity are strictly prohibited. Do not install or remove cables while they are energized. When cable cores come into contact with conductors, arcs or sparks may occur, which can lead to fires or personal injury.

• When the equipment is energized, improper or incorrect operations may lead to fires, electric shocks, personal injury, death, or property damage.

• During operations, it is strictly prohibited to wear conductive objects such as watches, bracelets, bangles, rings, or necklaces to avoid electric shock or burns.

• During operations, specialized insulated tools must be used to prevent electric shock or short-circuit faults. The insulation voltage rating must comply with local laws, regulations, standards, and requirements.

Warning

• During operations, specialized insulated tools must be used to prevent electric shock or short-circuit faults.

Personal Protective Equipment (PPE)

1.3 Conventional Requirements

• Do not deactivate the equipment's protective devices or ignore the warnings, cautions, and preventive measures outlined in the manual and on the equipment.

• If a malfunction that could potentially cause personal injury or equipment damage is detected during the operation of the equipment, immediately stop operation, report to the personnel responsible, and implement effective protective measures.

• Equipment must be energized only after verification by certified personnel.

• Avoid direct contact, using other conductors to make contact, or indirectly contacting powered equipment through damp objects. Perform a continuity test using a multimeter set to 1000V range before touching any conductor surface or terminal to ensure there is no risk of electric shock.

• Keep fingers, components, screws, tools, and boards away from operating fans to prevent injury or equipment damage.

1.4 Personnel Requirements

Only qualified professionals and trained personnel are authorized to operate the equipment.

• Professionals who are familiar with the principles and structure of the equipment, have experience in training and operating the equipment, and can clearly understand the various potential sources and magnitudes of hazards during the installation, operation, and maintenance of the equipment.

• Trained personnel: Individuals who have undergone appropriate technical and safety training and possess the necessary experience, are aware of the potential dangers that may arise when performing specific operations, and can take measures to minimize the risk to themselves or others.

• Personnel responsible for the installation and maintenance of the equipment must first undergo rigorous training, master the correct operating methods, understand various safety precautions, and be familiar with the relevant standards of the country/region.

• Only qualified professionals or trained personnel are permitted to install, operate, and maintain the equipment.

• Only qualified professionals are permitted to remove safety facilities and service the equipment.

• Personnel involved in special scenarios such as electrical operations, working at heights, and operating special equipment must possess the specialized operation qualifications required by the local country/region.

• Replacement of equipment or components (including software) must be performed by authorized professionals.

• Except for personnel authorized to operate the equipment, other individuals should not approach the equipment.

1.5 Electrical Safety

Danger

• Before proceeding with electrical connections, ensure that the equipment is in good condition, as failure to do so may result in electric shock or fire.

• Irregular or incorrect operations may lead to accidents such as fires or electric shocks.

• During operation, it is imperative to prevent foreign objects from entering the equipment, as this could cause short circuits, equipment damage, reduction or loss of load power supply, and personal injury.

Warning

• For equipment that requires grounding, the protective ground wire must be installed first during installation; when removing the equipment, the protective ground wire must be removed last.

Caution

• Cables are not permitted to pass through the air intake and exhaust vents of the equipment .

• Due to the electrochemical corrosion effects between copper and aluminum, it is strictly prohibited to use aluminum wires for direct connection.

1.6 General Requirements

• Installation, operation, and maintenance must be performed in accordance with the step-by-step procedures outlined in this manual. Unauthorized modification, addition, alteration of the equipment, or changes to the installation sequence are strictly prohibited.

• Erect temporary barriers or warning ropes around the work area and display 'No Entry' signs.

• Before installing or removing power cables, ensure that the equipment itself and its upstream and downstream switches are switched off.

• If any liquid is found to have entered the equipment, immediately shut off the power and discontinue use.

• Prior to operating the equipment, carefully inspect all tools to ensure they meet the required standards and log them in the register; after operation, check all tools to prevent them from being left inside the equipment.

• Before installing power cables, confirm that the cable labels are correct and that the cable terminals are properly insulated.

• When working at heights, wearing a safety helmet, safety belt, or waist rope is mandatory, and these must be secured to a sturdy structure.

1.7 Grounding Requirements

• The grounding impedance of the equipment must meet local electrical standards.

• The equipment should be permanently connected to a protective earth.
Before operating the equipment, inspect the electrical connections to ensure that the equipment is reliably grounded.

• The protective earth connection of the equipment and the grounding screw of the metal casing should have a reliable electrical connection.

• It is prohibited to operate the equipment without installing the grounding conductor.

• It is forbidden to damage the grounding conductor.

1.8 Mechanical Safety

Danger

• When working at heights, wearing a safety helmet, safety belt, or waist rope is mandatory, and these must be secured to a sturdy structural component. It is strictly prohibited to attach to moving, unstable objects or metal with sharp edges to prevent the hook from slipping and causing a fall accident.

Warning

• Ensure that all tools are fully prepared and have passed inspection by a professional organization. The use of tools with defects, those that have not passed inspection, or those beyond their inspection validity period is strictly forbidden. Guarantee that all tools are secure and not subjected to overload.

1.9 General Requirements

• Any paint scratches occurring during transportation or installation must be promptly repaired; prolonged exposure of scratched areas is strictly prohibited.

• Arc welding, cutting, or similar operations on the equipment are prohibited without prior evaluation by our company.

• Installation of additional equipment on top of the existing equipment is prohibited without prior evaluation by our company.

• When performing work in the space above the equipment, protective measures should be added on top of the equipment to prevent damage.

• Please use the correct tools and ensure that you are familiar with their proper usage methods.

1.10 Lifting Safety

• Personnel involved in lifting operations must receive relevant training and be qualified before being permitted to work.

• The lifting area must be marked off with temporary warning signs or barriers.

• The foundation for lifting operations must meet the load-bearing requirements for crane operations.

• Before lifting, ensure that lifting tools are securely fastened to fixed objects or walls that meet load-bearing standards.

• During lifting, walking under the boom or the lifted load is strictly prohibited.

• During lifting, dragging wire ropes or lifting gear is prohibited, and striking with hard objects is not allowed.

1.11 Symbols and crucial safety information

Pay special attention to the symbols and safety information in the manual or on the equipment, which highlight potential hazards or provide important procedural details.

DANGER

- **DANGER - identifies the most serious and immediate hazards which can cause serious personal injury or death**

WARNING

- **WARNING - identifies hazards or unsafe practices which can result in serious personal injury or death**

CAUTION

- **CAUTION - identifies hazards or unsafe practices which can result in minor personal injury or product or property damage**

NOTE

- **NOTE - identifies important procedures or requirements that, if not followed, can result in product or property damage**

CONTACT US

If you have any further questions about this manual, our field service team will be pleased to help. See contact information.

2. User Feedback and Revisions

Users may report issues or suggest improvements via the official website. Each new revision of this manual will integrate feedback to improve clarity and usability.

3. Product introduction

3.1 Technical data and performance

Items	Unit	Parameters
Rated power	kW	10
DC voltage	V	36-57.6
Max. DC current	A	390(MAX)
Dimensions W*D*H	mm	40i(indoor): 875*1775*2060
		40o(outdoor): 915*1775*2110
Ambient operating temperature	°C	0~50(40i-Indoor) /-25~50(40o-Outdoor)
Storage temperature	°C	-15~50 (SOC=50%)
Weight	kg	2800(40i-Indoor/40o-Outdoor)
Lifetime	Cycle/Years	+20,000/+25
Short circuit current	A	1300
Communication interface		Modbus-TCP
Series	Module	Max. 6
Enclosure		IP20(40i-Indoor) / IP54(40o-Outdoor)
Certifications		IEC 62932
Auxiliary power	Vac	100~240
	Hz	50/60
	W	Off: 20 Typical: 600 Max.: 800

The battery's charge and discharge characteristic curve is shown in the figure below.

10kW/40kWh charge and discharge curve

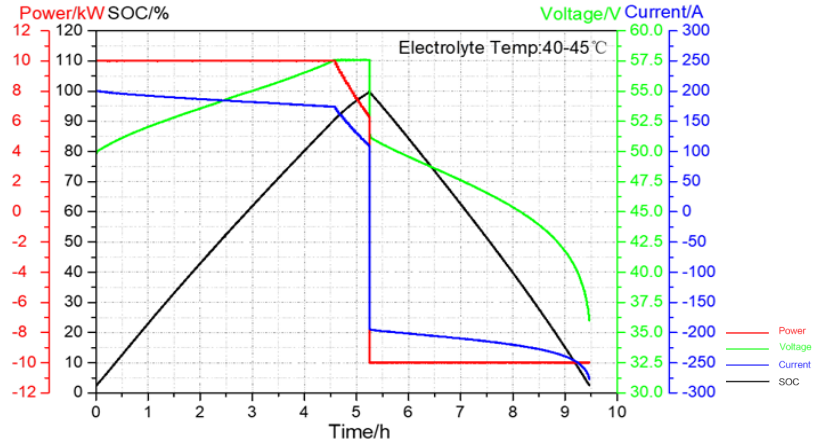
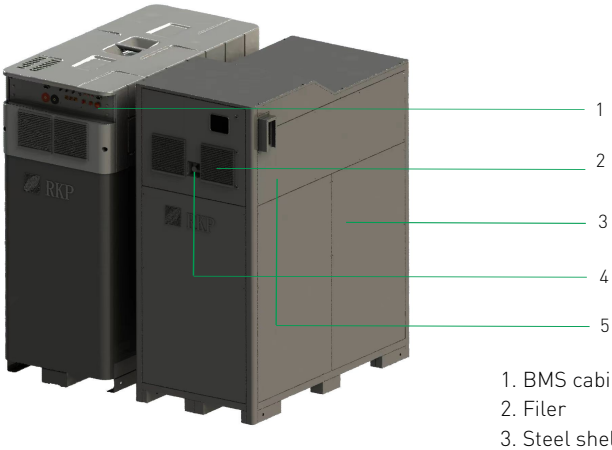


Fig.3.1.1 The charge and discharge curve

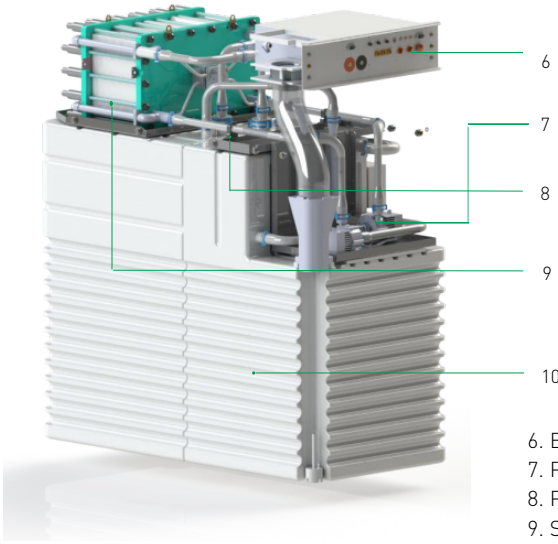
3.2 UPower Module structure and function

The product features a simple assembly of common industrial components, designed for global standardization and localized manufacturing near customers.



1. BMS cabinet[a)]
2. Filer
3. Steel shell[b)]
4. Emergency stop
5. Cover[c)]

Fig.3.2.1 UPower Module



6. BMS cabinet
7. Pump[d)]
8. Pipe clamp
9. Stack
10. Electrolyte tank[e)]

Fig.3.2.2 Inside structure of UPower Module

Note:

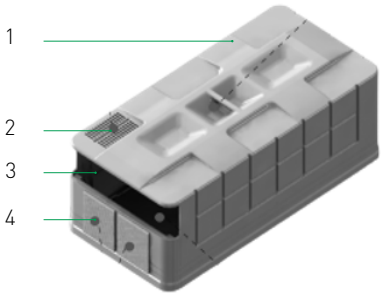
a) &d): Pump & BMS cabinet: Highly modular with few moving parts - only two pumps and one fan that can be quickly replaced, embedded BMS;

b) Steel shell: System protection flood-proof to 1.4m secondary; containment;

c) Cover: Field-rugged IP54 protection from rain, dust and insects;

e) Electrolyte tank: Seamless leak proof design with high surface area for simple total system cooling.

3.3 Component function presentation

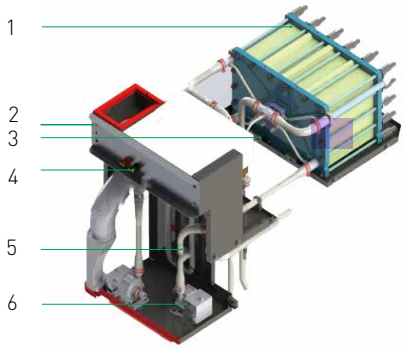


1.Cover
The closed system equipment ensures safety and aesthetic appeal.

2.Cooling system outlet
Dissipate heat generated during systemoperation

3.BMS panel

4.Cooling system inlet
Inhale and filter the cold air to cool the battery



1. Stack
The core area of electrochemical reaction

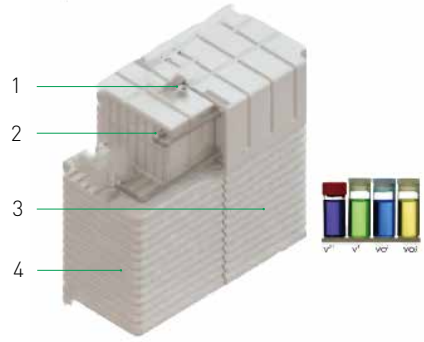
2. BMS (Battery Management System)
Manage battery operation,data acquisition and uploading

3. BOP (Balance of Plant)
Support stack and piping system

4. Cable entry:
Connect DC cable and communication line

5. Piping:
Transport electrolyte

6. Pump
Promote the circulation electrolyte in the system

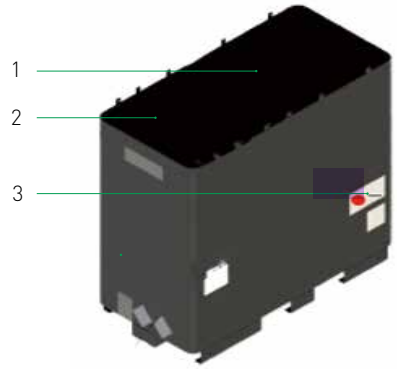


1. Return pipeline of the tank

2. Overflow pipe of the tank

3. Electrolyte (internal)
Provide reactants for electrochemical reaction

4. Tank
Store electrolyte



1. Tank Separator
Separate positive and negative storage tank

2. Support with mounting holes
Fix the BOP and the cover

3. Product label

3.4 Product application

3.4.1 Single UPower Module

The following schematic diagram illustrates the application of a single UPower Module in which the partial UPower Module (including PCS) is shown in the dashed frame.
The auxiliary power supply of UPower Module is excluded and it can be obtained from the front end or back end of PCS.

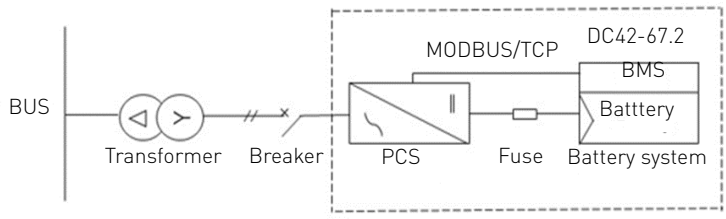


Fig.3.4.1 Schematic diagram of PCS

Suggestion:

If the distance between the battery and the PCS is more than 3 meters,it is recommended to install a fuse at the outlet of the battery. The voltage and model need be adjusted with the actual value and comply with IEC standards.

3.4.2 UPower Module in string

In the application,this product can be series into a variety of specifications of the battery units,power and capacity can be configures according to customer demand. At present,the max specification of the battery units can be achieved 6 series (60kW/240kWh) with a suitable PCS, number of units can also continue to be used in parallel to increase the power and total capacity. Taking 6 battery series as an example,the application wiring diagram as follows:

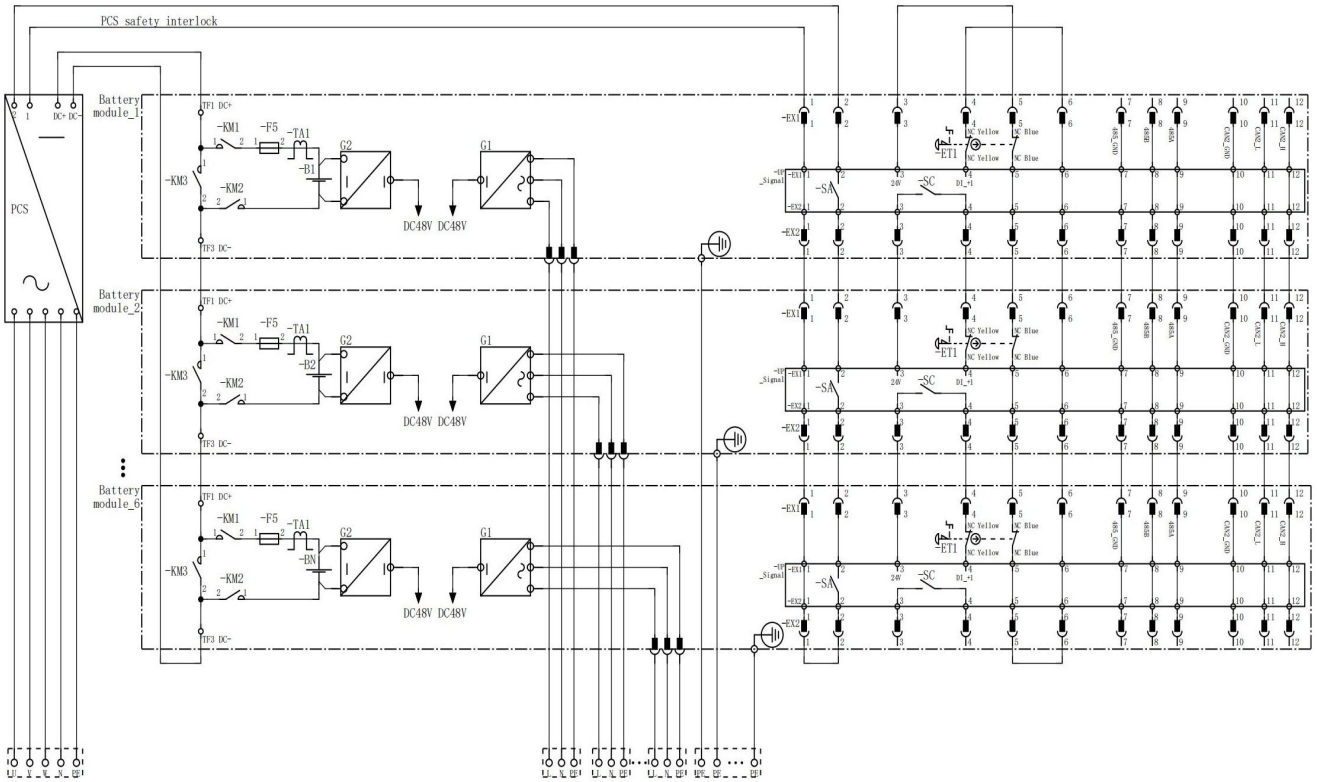
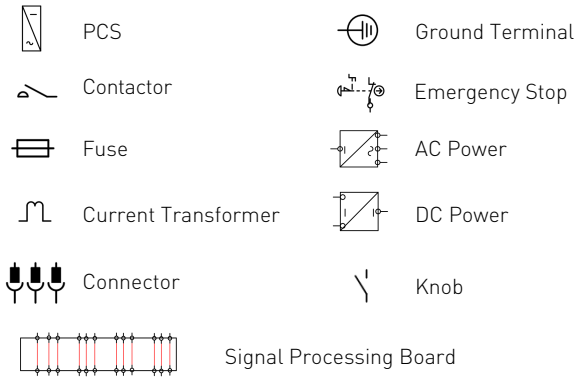


Fig.3.4.2 Diagram of 6 UPower Module in string

Note:

1. UPower 1-6: 6* (10 kW), 6* (36~57.6 Vdc), 278A
2. Power conversion system (PCS), DC voltage: 806~1500V;
3. Distribution box AC supply: for ESS auxiliary power management String Controller:
   - Power supply: 400Vac
   - Communication protocol: MODBUS/TCP
   - Function: system control for both battery and PCS, power output control;4. Gounding protection for ESS.

Schematic symbols:



4. Transportation and storage

4.1 Packing

Each UPower Module container is packed as a single delivery unit.

For road and rail transport:

- Secured to a pallet using transport bending plate and screws;
- Covered by a protective plastic film.

For air and sea transport:

- Under a heat-sealed cover with desiccant bags;
- Packed in wooden crates.

Fig.4.1.1 Packing-plastic film

Fig.4.1.2 Packing-wooden crate

4.2 Transportation

Before transportation, ensure that protective measures are in place for both personnel and goods to prevent slipping or tipping.

Status of the equipment on delivery:

Proper shipping name: batteries, wet, filled with acid, electric
Storage Marine pollutant: No
Poison inhalation hazard: No

For road transport, if necessary, nail or chock the transport pallet in place on the truckbed; during transport in city, the truck speed should not exceed 60km/h.

The UPower Modulecabinet should be transported, lifted or moved upright.
Use only approved slings when lifting. Maximum angle between two lifting slings is set to 60 degrees.

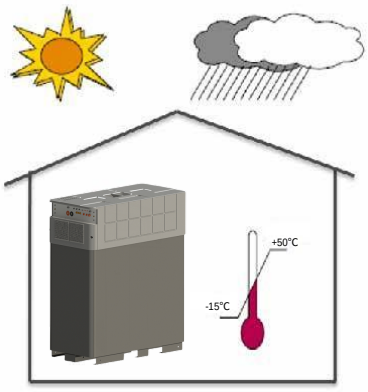
Leave the UPower Module cabinet in its original packing until it arrives on-site ready for installation.

Fig.4.2.1 Road transportation

4.3 Temporary storage

If the UPower Module is not installed upon delivery, it may be stored for up to 6 months under the following conditions.

- Preserve the equipment in its original factory packaging;
- Any parts unpacked for testing should then be repacked in their original packaging.;
- The site chosen for storage must be a dry and well ventilated indoor area, ambient temperature between -15 °C ~ 50°C.
- The storage area must be capable of protecting the product against possible damage due to: water, water vapour, saline atmospheres, all types of pollution, micro-organisms.



4.4 Unpacking & handling

If the box is temporarily opened to check for potential damage, secure it from bad weather like wind and rain. Before the equipment arrives at the final destination, do not remove the packaging bag and keep the original package effectively as long as possible.

Proceed with unpacking the UPower Module only when they are to be installed on site.

4.4.1 Unpacking

Tools and accessories required:

- Cutter for road and rail transport packaging (ribbon strips & plastic film);
- Crowbar for air and sea transport packaging (wooden crates);
- Suitable protective gloves.

After unpacking, the remaining materials (plastic cover, wooden crates, pallet, etc.) should be sorted and sent to appropriate recycling services.

4.4.2 Handling

After unpacking, the cabinets must be handled carefully and appropriately as per the manual requirements. The latter document must be clearly and securely attached to the UPower Module itself.

According to the site restrictions, engineers will select appropriate equipment such as forklift or pallet jack to move the UPower Module system to the designed location and take it to the proper position.

Maximum weights for standard UPower Module			
Name	Power	Weight	Note
UPower Module	10kW	2800kg	Electrolyte included

The weights are without additional equipment.

Table 4.1 UPower Module weight

4.5 Receiving inspection

Check transportation damage

Upon receiving the UPower Module cabinets, please check that the delivered equipment has not been damaged during transport. If any such damage has occurred, record the damages by photos; a claim must be submitted to the carrier immediately.

Check completeness

- Check the completeness and correctness of the goods as per the shipment advice and packing list;
- Check the panel serial number on the delivery notice and that of the package and cabinet label;
- Check completeness and correctness of accessories, including sub frame;
- Standard pack includes the installation and maintenance manuals, one piece of operating handle (normally fixed on right side of the panel); other accessories may be included depending on the configuration of the product itself or ordered spare parts.

Check functions

- Perform a visual check of the cabinets. Any faults or omissions must be reported immediately to the supplier;
- Carry out a function test on the UPower Module.

5. Installation and operation

5.1 Installation tools & assistant devices

The tools and auxiliary devices required for UPower Module installation are listed below:

Tool name	Specification	Remarks
Wrench	Adjustable (According to actual demand)	For earthing, connecting, etc.
Paint or mar	Green	To mark fixed bolts
ker Gloves	Safety gloves	In proper sizes for all workers

Table 5.1 Tool list for installation

5.2 Ground connection

Once the battery is positioned, connect it to the grounding network.

NOTE ***- Work permits are required;***
- Avoid collision and injury. All necessary PPE is required.

5.3 Cable connection

All battery terminals are located on the BMS cabinet body, front, or bottom, as shown in the figure below.

5.3.1 UPower 40i BMS cabinet

Fig.5.3.1 Position of UPower 40i BMS cabinet

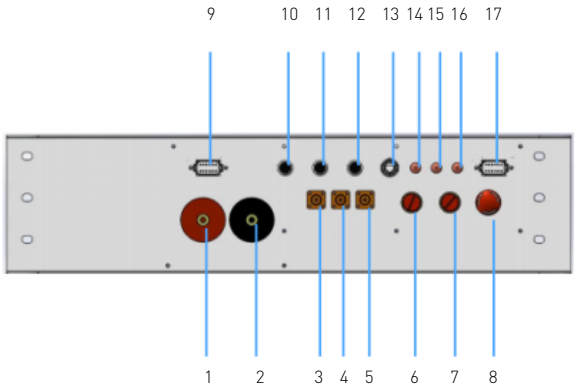


Fig.5.3.2 Interface of BMS cabinet

1. DC+
2. DC-
3. L P1-1
4. N P1-2
5. PE P1-3
6. Start/Stop
7. Reset
8. Emergency Stop
9. EX1
10. Fuse 1
11. Fuse 2
12. Fuse 3
13. Ethernet E1
14. Power light
15. Running light
16. Fault light
17. EX2

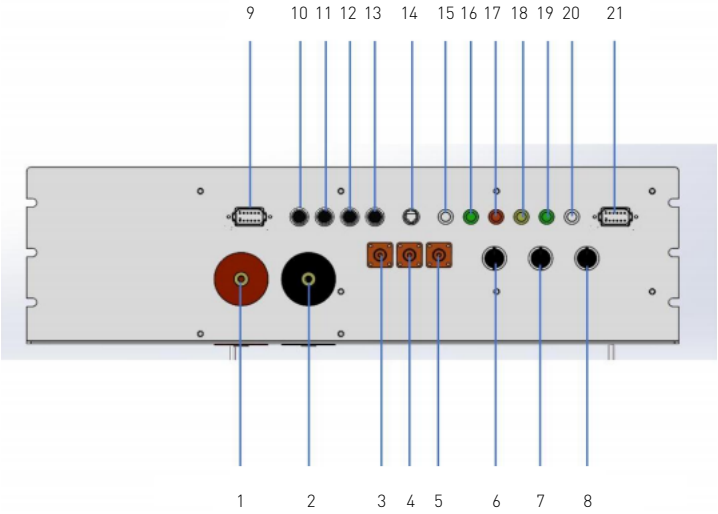
Emergency Stop

When an emergency occurs,people can take protective measures by quickly pressing this button And it will make the contact earthed and stop all pumps (all aux. voltage)

5.3.2 UPower 40o BMS cabinet

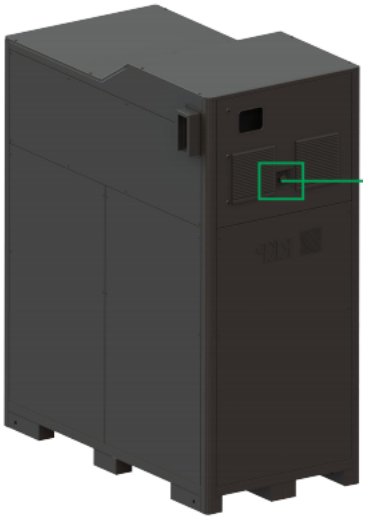
Fig.5.3.3 Position of UPower 40o BMS cabinet

*Remove the cover on the front of the BMS and you can see the location of the BMS



1. DC+
2. DC-
3. L P1-1
4. N P1-2
5. PE P1-3
6. Start/Stop
7. ON/OFF
8. Close/Open (Control the mixing valve)
9. EX1
10. Fuse 1
11. Fuse 2
12. Fuse 3
13. Fuse 4
14. Ethernet E1
15. Power light
16. Running light
17. Fault light
18. Alarm light
19. Open light: Green-Valve open
20. Close light: White-Valve close
21. EX2

Fig.5.3.4 Interface of BMS cabinet



Emergency Stop

When an emergency occurs, people can take protective measures by quickly pressing this button And it will make the contact earthed and stop all pumps (all aux. voltage)

5.4 Wiring

In the figure above, the terminals with serial numbers 9, 17 Single UPower Module is deployed, and no connection is required.

CAUTION ***- Avoid operation with electricity;***
- Ensure the cable bend is rounded and avoid sharp cutting.

Name	From	End	Note
DC side positive	DC +	PCS +	BMS
DC side negative	DC -	PCS -	BMS
System interlock protection	P2-1	Customer control cabinet	BMS
The network connection	E1	Customer control cabinet	BMS
Auxiliary power supply	P1-1	Customer control cabinet	BMS
Ground connection	Ground point	Battery BOP	BMS
Ground connection	Ground point	Ground net through	Battery
PCS safety interlock	PCS cabinet	Customer control cabinet	

Table 5.3 Wiring schematic

5.5 Manual disconnection

5.5.1 Device

During the installation and debugging of the system, it is necessary to disconnect the KM1 and KM2 DC contactors, which are located on the mainline of the battery's positive and negative poles and specifically installed in the BMS box, as shown in the figure 5.6.1 below.

The KM3 is a bypass contactor. Used in series with batteries. When the battery fails or for some reason doesn't work. Receiving the control instruction, KM3 activation causes this system to short-circuit and other systems operate normally.

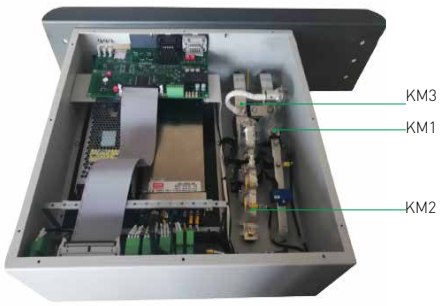


Fig.5.6.1 Position of contactors

5.5.2 Manual disconnection method

The control button for manually disconnecting the device is on the BMS panel.
Refer to the 'Reset' button below.There are "ON" and "OFF"on the "Reset" button.
When the system needs to be disconnected manually, press the reset button to
the "OFF"position. KM1 and KM2 will be disconnected, and the system will enter the circuit breaker state.

When the system needs to be started manually, press the reset key to the "ON".Af ter receiving the start command, KM1 and KM2 will be disconnected together and the system will start.

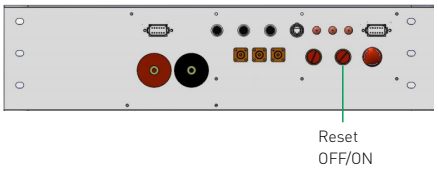


Fig.5.6.2 Interface of UPower 40i BMS

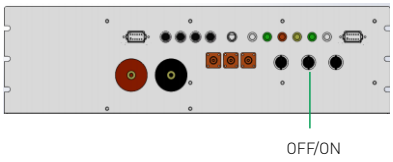


Fig.5.6.3 Interface of UPower 40o BMS

5.6 System commissioning

After the battery is installed, the system will be commissioned. Make sure the local equipment can operate safety first and then cooperate with the customer for remote control and commissioning.

After the local commissioning of the battery is completed, it shall cooperate with the owner to conduct remote commissioning. After the acceptance as required, the battery shall be finally delivered to the owner.

The local debugging process needs to ensure the following:

- Insulation resistance is normal
- Sensor parameters normal
- Fan starts normally
- Pump operation is stable and current is normal.
- Communication is normal
- No leakage

5.7 Site acceptance test (SAT)

Visual inspection

Before system operation begins, a visual check must be conducted to ensure that the system is in proper condition and ready for testing.

Insulation resistance measurement

The insulation resistance measurement will verify the electrical isolation of each stack from ground by measuring the resistance between the positive current collector of each stack and ground. Insulation testing is to be conducted.

Data historian verification

Data monitoring uses software called Wincc and the historian data is recorded in the computer database of Wincc. These data streams will provide the basis for portions of the system evaluation, such as capacity and performance asessments. The proper communication, security, archival and register alignment of these assets are to be verified.

Site controller verification

A site controller (SC) is required as a communication interface between the AC storage system and the customer. The site controller will be responsible for transmitting relevant control information between the MODBUS (or other) protocol, used to transmit the customer's demands or the grid conditions to the battery management system (BMS), and vice versa. To verify that SC is properly installed and configured, various functional tests will be conducted.

Additionally, the system capacity and performance tests will be conducted by using the SC.

Standard performance and demonstration

RKP will provide the basic system performance standards and test steps of UPower system for the concrete project. The system shall demonstrate a round trip efficiency of greater than 60% for the above daily cycle.

5.8 Gas Management and Safety Features

The Rongke Power lron Vanadium Flow Battery system is designed with robust safety features to ensure reliable operation under all expected conditions. During normal use, the system may produce small byproducts and effectively managed within industry safety standards.In rare cases of abnormal conditions, the system in corporates multiple layers of protection:

- The Battery Management System (BMS) continuously monitors systemperformance. lf an issue arises, the BMS immediately signals the Power Conversion System (PcS) and Energy Management System (EMS) to safely shut down the battery.

- An emergency stop is available for manual shutdown if needed. The system's gas management feature, including a U-Pipe with aneutralization agent, ensures that any products are safely treated beforebeing released.

- To ensure the long-term effectiveness of the U-pipe, it is recommended to apply the additional oil on top of the neutralization agent, in accordance with the manufacturer's specifications, during installation and commissioning.

6. Maintenance

6.1 Maintenance tools & assistant devices

The tools and auxiliary devices required for UPower maintenance are listed below:

Tool name	Specification	Remarks
Double open-ended spanners	7, 13, 16, 17	According to actual demand
Plier	Red	
Flat screwdriver	4# +	
Clamp Ammeter	Comply with IEC standards	
Multimeter	Comply with IEC standards	
Insulating resistance meter	Comply with IEC standards	
Wrench	Adjustable	For earthing, connecting, etc.
Paint or marker	Green	To mark fixed bolts
Gloves	Safety gloves	In proper sizes for all workers
Ratchet wrench	Adjustable	
Duster cloth	Comply with IEC standards	
Mask	Comply with IEC standards	
Goggles	Comply with IEC standards	
Electric wrench	Adjustable	
Flat-head screwdriver	Adjustable	

Table 6.1 Tool list for maintenance

6.2 Equipment inspection

During system operation, the BMS monitors parameters in real time and records and saves the data. No manual operation is required. The specific monitoring contents are shown in the table below:

Checking information		
Item		Inspection basis
Leakage	Pipe	Fluid leakage alarm
	Filter	
	Pump	
	Tank	
	Stack	
	SOC	
Pump	Pump current	No the pump current or current difference alarm
Stack	Stack Voltage	Stack voltage within 36V ~ 57.6V
Temperature	Electrolyte	within 0°C~ 50°C
	Environmental	within 0°C ~ 50°C

Table 6.2.1 Checking Information 1

During the operation of the system, the components of the system need to be checked periodically. The specification content and period are shown in the table below:

Checking information			Frequency		
Item		Inspection basis	Day	Month	Year
Stack	Spring	Spring is not loose			√
Pump	Audible inspection	No abnormal sound during working			√
BMS	BMS indicator light	Operation indicator light is normal			√
	Visual inspection	Not rust in appearance, no abnormal smell or sound			√
Heater	Ventilation duct	No damage to the ventilation duct			√
	Air filter	Air filter is not blocked			√
	Fan	No abnormal sound during running			√

Table 6.2.2 Checking Information 2

6.3 Recovery measurement for low SOC fault

This section describes the procedure through which individual UPower modules within a string can be brought back in too peration following a Low SOC fault where in:

• The fault cannot be overcome by standard operation procedures (i.e. issuance of commands to reset alarms and connect);

• The total DC voltage of the system's (i.e. UPower string, BESS) DC bus still meets the minimum DC voltage requirement for PCS.

NOTE ***- For more detailed procedure description please refer to the document "SOP -UPower– Low SOC Fault Recovery"***

6.4 U-pipe Maintenance

• Effect: By adding phenolphthalein and alkaline reagents, it absorbs the spilled acidic gas, protects the pressure in the barrel from being too high, and achieves the liquid sealing effect to prevent oxygen from entering the side reaction.

• Detection method: Visual inspection of the joint for damage and deformation.

• Detection standard：Visual inspection of the color of the liquid in the U-pipe, the absence of color proves the need to add alkaline reagents.

• Handling method: The phenolphthalein was dissolved in 75% alcohol, and the alkaline reagent was added to the U-pipe tube through the medical needle.

• Tools：Syringes, phenolphthalein, medical alcohol, alkaline reagents, latex gloves.

• Notes：When adding reagents, choose the U-pipe outlet to add, because there will be gas overflow after the inlet twist.

6.5 Replacement

The UPower Module is designed for more than 25 years operation and minimal maintenance however the reareseveral parts which life time is less than 25 year sneed replacement according to its real operational situation.The involved parts
include electrolyte pumps, cooling fan, sensors and filters.
The standard operation process for replacement is prepared in a separate document as mentioned at the beginning of this file.
The design for replacement has been considered so that maintenance person on site is able to carry out and compete each single part in 15 minute safter reading th eguidance document.

NOTE ***-For more detailed procedure description please refer to the document "SOP-UPower–Pump Replacement" and "SOP-UPower– Fan Replacement" .***

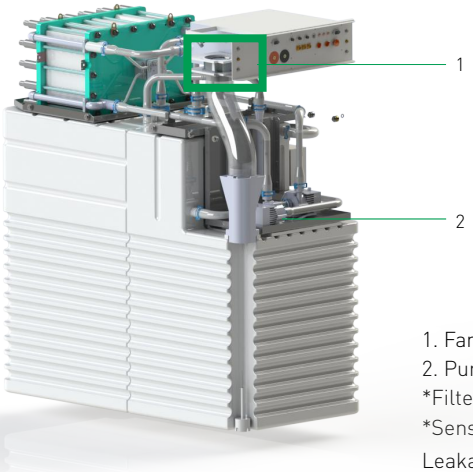


Fig.6.4.1 Position of fan and pump

1. Fan
2. Pump
*Filters(Please refer to Figure 3.2.2)
*Sensors:
Leakage sensor: Tank bottom
Temperature sensor*2:Tank outer side wall

7. Emergency control plan

7.1 Summary of danger sources

Electrical shock:
Professional equipment is required to operate the equipment when the voltage exceeds the safety range.

Corrosion risk:
Vanadium electrolyte is acidic and corrosive, which is not allowed to come into direct contact with the skin or swallowed. If the vanadium electrolyte is accidentally splashed into the eyes, it may cause minor burns. Rinse immediately with plenty of water and seek medical assistance immediatelty.

Scrap processing:
Battery scrap, please contact Rongke Company for disposal. Rongke Company will follow the corresponding standards.

7.2 First aid measures

General advice
Consult a physician and provide this safety data sheet to the attending doctor.

If inhaled
If breathed in, move person into fresh air. If not breathing, administer artificial respiration. Consult a physician.

In case of skin contact
Remove contaminated clothing and shoes immediately.
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and cons ult a physician.
Continue rinsing eyes during transport to hospital.

If swallowed
Do NOT induce vomiting. Never administer anything orally to an unconscious person. Rinse mouth with water.

Acute poisoning symptoms:
dyspnea, fever, gastrointestinal disorder, pulmonary edema, pneumonia.

7.3 Firefighting measures

Conditions of flammability
VFBs are inherently non-flammable and non-combustible due to their aqueous electrolyte composition, which consists of vanadium ions in sulfuric acid solution and undergoes only reversible redox reactions during operation.

7.4 Accident release measures

Personal precautions

Use personal protective equipment. Avoid inhaling vapours, mist, or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

Environmental precautions

Prevent the product from entering drains.

Methods and materials for containment and cleaning up

Material is a corrosive liquid. Stop the leak if it is safe to do so, and absorb it with DRY earth, sand, or other non-combustible material.

Avoid getting water inside the UPower Module.

Do not touch spilled material. Prevent entry into sewers, basements, or confined areas. Seek assistance for disposal.

NOTE

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