

MANUAL



IEC

RCTerra Class 1.0 Series 233kWh C&I Energy Storage System

Model: CESS233-100-01A/B/C/D



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PREFACE

Thank you for choosing the RCT Power C&I Energy Storage System!

You have purchased an innovative, high-quality product with unique features and consistently high efficiency. RCTerra Class 1.0 Series 233kWh products are transformer-less, highly flexible and robust. With this device, you will always achieve the highest possible yield from your PV system and our energy storage system.

 WARNING	The C&I energy storage system is electrical device. During installation, wiring, grid connection, operation, maintenance and service they can cause various hazards. Please read the documents supplied with the product carefully and follow the instructions and device information to avoid material damage and personal injury.
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	Keep this manual in a safe place for future reference.
---	---

1 About this Manual

1.1 Applicable Products

This document applies to the following types of energy storage systems.

- CESS233-100-01A
- CESS233-100-01B
- CESS233-100-01C
- CESS233-100-01D

1.2 Validity, Purpose, Scope of this Document and Legal Regulations

This document is applying to the RCTerra Class 1.0 Series products.

This manual describes the transportation and storage, mechanical installation, electrical connection, power-on and power-off operation, troubleshooting, and maintenance of the energy storage system.

Target Group

This manual is for operators of the power storage plant and qualified technical personnel. The RCTerra Class 1.0 cabinet must and can only be installed by professional technicians who meet the following requirements:

- Have been trained;
- Read this manual thoroughly and understand the safety instructions related to operations;
- Be familiar with local standards and relevant safety regulations of electrical systems.

The content of this manual is regularly updated and revised as a part of the continuous product development.

The current document version can be found at: www.rct-power.com.

We explicitly reserve the right to make technical changes which improve the device or increase its safety standard. These changes do not require a separate notification. RCT Power is not liable for damages resulting from the use of this document.

This manual does not supersede existing laws, regulations, rules, standards or conventions.

The warranty conditions are enclosed with the device. No further warranty claims can be derived from this document.

1.3 Explanation of Symbols and References

It is important to follow the references in the manual during the installation, operation and maintenance of the storage cabinet. The table below shows the warning signs and symbols used in the manual.

Symbols and References	Description
 DANGER	This symbol indicates a direct imminent danger. If the safety regulations are not observed, this may result in death, personal injury or serious damage to property.
 WARNING	This symbol indicates a direct imminent danger of medium risk. If the safety regulations are not observed, this may result in death, personal injury or serious damage to property.
 CAUTION	This symbol indicates a direct imminent danger of low risk. If the safety regulations are not observed, it might result in minor or moderate material damage.
 NOTICE	This symbol indicates a potentially hazardous situation which, if not avoided, could result in material damage to equipment or property.

Symbols and References	Description
	This symbol indicates important information and hints. They will help you to better understand the functionality of the cabinet.
	This symbol indicates that the user manual must be read and understood before the device is put into operation.
	HIGH VOLTAGE WARNING! Indicates hazardous high voltages are present, which, if not avoided, will result in death or serious injury. Thus, only authorized and trained personnel should install and/or maintain this product.
	After disconnecting the electrical connections, wait a minimum of 10 minutes before opening the unit.
	Hot surface!
	Equipment grounding conductor (PE).
	This product must not be disposed of as normal household waste.
	CE mark The cabinet complies with the requirements of the applicable CE guidelines
	TUV certified

1.4 Abbreviation

Unless otherwise specified, devices in this manual are referred to as the abbreviations below.

Complete designation	Description
Commercial and Industrial Storage System	CESS
Power Conversion System	PCS
Static Transfer Switch	STS
Battery Management System	BMS
DC/DC Converter	DC/DC
Energy Management System	EMS
Uninterruptible power supply	UPS

2 Safety Instructions

2.1 Personnel and Qualifications



WARNING

The cabinet and the battery must only be installed, wired, connected, commissioned and serviced by qualified personnel to prevent material damage or personal injury.

The cabinet and the battery must only be installed, wired, connected, commissioned, and serviced by qualified personnel to prevent material damage or personal injury. Qualified personnel authorized to perform the tasks described in this manual must have the following skills and technical expertise:

- Should know electronic, electrical wiring and mechanical expertise, and be familiar with electrical and mechanical schematics.
- Should be familiar with the composition and working principles of the energy storage system and its front and rear-level equipment.
- Should have received professional training related to the installation and commissioning of electrical equipment.
- Be able to quickly respond to hazards and emergencies that occur during installation and commissioning.
- Be familiar with the relevant standards and specifications of the country/region where the project is located.

2.2 Electrical Safety

The RCTerra Class 1.0 Series products were developed and tested in strict accordance with international safety regulations.

All safety instructions relating to electrical and electronic equipment must be complied with during installation, operation and maintenance.



DANGER

Danger to life or serious injury due to electric shock!

- When the cabinet is connected to the power grid, the cables and components inside the cabinet generate high voltage.
- Before electrical connection, ensure that the device is not damaged; otherwise, electric shock or fire may occur.
- Qualified personnel must perform any work that involves wiring, connecting or opening the cabinet case.
- Important: Before performing any electrical work, it is necessary to ensure that the devices and systems in the energy storage integrated system are completely free of power.
- Touching the power grid or the contact points and terminals in the devices connected to the power grid may lead to electric shock.
- The battery side or the power grid side may generate voltage. Always use a multimeter to ensure that there is no voltage before touching.
- Lethal voltages are present inside the product!
 - Note and observe the warnings on the product.
 - Respect all safety precautions listed in these manual and other pertinent documents.
 - Respect the protection requirements and precautions of the lithium battery.
- When installing, maintaining, and repairing the device, ensure that:
 - To disconnect the battery voltage. To turn OFF the battery voltage, you must turn off the voltage source (DC / solar generator and AC / mains) and turn the isolation switch handles of the switch gears to “OFF” position to turn off the battery DC voltage.
 - Disconnect the MCCB to cut off the supply voltage (AC) and do not reconnect until the work is complete.
- Electricity may still exist in the battery when the power supply of the system is disconnected. Wait 10 minutes to ensure the equipment is completely voltage-free before any operation.
- Ensure that other persons stay away from cables and internal components.
- Do not open the door while the device is in operation.
- Do not open the rear guard plate of the electrical room while the device is under operation.



WARNING

Risk of injury due to electric shock!

- Installation, service and maintenance work must only be carried out by a qualified electrician.
- Only power on again after all electrical work has been completed.
- All hoisting, transportation, installation, wiring, operation, and maintenance must be carried out complying with the relevant codes and regulations of the country where the project is located.
- Hazardous Voltage Circuits.
- To Reduce the Risk of injury, read all instructions.
- Risk of Electric Shock or Serious Injury. Care shall be taken when entering enclosure- Authorized personnel only.



CAUTION

Risk of burns on hot parts of the device.

- During standard operation of the device, some parts of the device can become hot.
- Use care when touching the housing while the device is operating.



NOTICE

- All electrical installations must be carried out in accordance with local and national standards and guidelines.
- Contact your local energy supplier or grid operator before connecting the energy storage system to the grid.
- Ensure that electrically conductive surfaces of the entire energy storage system are grounded to prevent personal injury.
- A malfunction can impair cabinet safety. Do not operate or start the energy system if it shows visible damage or if the displayed error message is unclear.
- The cabinet does not contain any parts to be serviced by the owner. Please contact qualified personnel locally for servicing work on the energy storage system.
- Only use devices and accessories approved by the manufacturer. Do not make any changes to the device. Do not remove the type plate.
- Post prominent warning signs around the project location to prevent accidents caused by false switching.
- Place necessary warning signs or barriers near the product.

2.3 Battery Safety

For safe use of the product, the technician should carefully read and strictly observe the safety requirements. The company shall not be liable for product functional abnormality, component damage, personal safety accident, property loss, or other damage caused by the following reasons:

- The batteries are not charged as required, resulting in capacity loss or irreversible damage to the batteries.
- A battery is damaged, falls, or leaks due to improper operations or failure to operate the battery as required.
- The batteries are not powered on in time, which causes damage to the batteries due to over discharge.
- The damage is caused to batteries due to the use of improper equipment for charging and discharging.
- Batteries are frequently over discharged due to improper maintenance, capacity is incorrectly expanded, or the batteries have not been fully charged for a long time.
- Battery operation parameters are incorrectly set.
- Damage is caused to batteries because the battery operating environment does not meet the requirements.
- The customer uses the batteries beyond the scenarios specified in this manual, including but not limited to connect extra loads.
- Batteries are not maintained based on the system manual.
- The product is damaged due to the customer's continued use of batteries beyond the warranty period.
- The product is damaged due to the use of defective or deformed batteries.
- Use batteries provided by the company with other batteries, including but not limited to batteries of other brands or batteries of different rated capacities.
- Product damage or property loss are caused due to storing or installing batteries with flammable/explosive materials.

- Personal safety accidents and property loss are caused by battery-related operations performed by non-professional personnel, or by not wearing qualified protective equipment during operations.
- The battery is damaged due to eating, drinking, smoking and other behaviours near the battery.
- Batteries are stolen.

2.4 Electric Arc Protection



WARNING

To avoid unnecessary injury and device damage, strictly follow the instructions in this manual. If not properly operated, it may cause arc hazards, and may even cause fire, explosion and other risks. RCT is not responsible for arcing, fire, explosion and other accidents caused by failure to operate according to the machine identification or product manual.

The following improper operation may cause arcing, fire, explosion and other hazards inside the device. And always remember that in the event of an accident, it must be handled by qualified professionals. Improper operations for existing accidents may cause a wider range of failures or accidents.

- Plug and unplug DC high-voltage fuses of each device on power.
- Touch the uninsulated end of a potentially live cable.
- Touch wiring bars, terminals, or other parts inside the device that may be live.
- The power cable is improperly connected.
- Parts such as screws fall into the power module.
- Incorrect operation by unqualified operators without training.

Before operating the equipment, assess whether there is an arc risk in the operating area. If there is a risk of arcing, you need to:

- Operators must receive safety training in advance.
- Try to assess the area where the shock is likely to occur.
- Before operating in a possible electric shock area, you must wear the required protective clothing.

2.5 Protective Tools

Special protective equipment must be used during operation, such as wearing protective clothing, insulating shoes, goggles, and insulating gloves.

Item	Name And Graphics			
Protective tools				
	Insulating gloves	Protective clothing	Goggles	Insulating shoes

2.6 Nameplate and Stickers

a. CESS233-100-01A

		Suzhou RCT Power Energy Technology Co.,Ltd Email:info@rct-power.com.cn Add:Unit01 and 02,Building B,No.28,Yongchang Road,Caochu Street, Suzhou,Jiangsu,P.R.China	
Model	CESS233-100-01A		
Manufacturer/Date	RCT Power /		
Serial Number of Unit			
Battery Chemistry	LiFePO ₄		
Max.Storage Capacity/Nominal Voltage	233kWh / 832Vd. c.		
PCS AC Rate Power/Current	100kW/145A		
Nominal Grid Voltage/Frequency	230/400Va. c. (3L/N/PE) / (50/60)Hz		
Nominal Load Voltage/Frequency	230/400Va. c. (3L/N/PE) / (50/60)Hz		
V _{MAX PV} /I _{SC PV} /MPPT Voltage/Max. Input Current	950Vd. c. / 100A / 180~900Vd. c. / 80A		
Max. Number of MPPT	2		
Protection Class	I		
IP Code	IP54(Battery Room IP55)		
Dimensions(mm)/Weight	W1600xH2200xD1300 / 2.9T		
Operating Temperature Range	-25~45℃		



b. CESS233-100-01B

		Suzhou RCT Power Energy Technology Co.,Ltd Email:info@rct-power.com.cn Add:Unit01 and 02,Building B,No.28,Yongchang Road,Caochu Street, Suzhou,Jiangsu,P.R.China	
Model	CESS233-100-01B		
Manufacturer/Date	RCT Power /		
Serial Number of Unit			
Battery Chemistry	LiFePO ₄		
Max.Storage Capacity/Nominal Voltage	233kWh / 832Vd. c.		
PCS AC Rate Power/Current	100kW/145A		
Nominal Grid Voltage/Frequency	230/400Va. c. (3L/N/PE) / (50/60)Hz		
Nominal Load Voltage/Frequency	NA		
V _{MAX PV} /I _{SC PV} /MPPT Voltage/Max. Input Current	950Vd. c. / 100A / 180~900Vd. c. / 80A		
Max. Number of MPPT	2		
Protection Class	I		
IP Code	IP54(Battery Room IP55)		
Dimensions(mm)/Weight	W1600xH2200xD1300 / 2.8T		
Operating Temperature Range	-25~45℃		



c. CESS233-100-01C

 Suzhou RCT Power Energy Technology Co.,Ltd Email:info@rct-power.com.cn Add:Unit01 and 02,Building B,No.28,Yongchang Road,Caohu Street, Suzhou,Jiangsu,P.R.China	
Model	CESS233-100-01C
Manufacturer/Date	RCT Power /
Serial Number of Unit	
Battery Chemistry	LiFePO ₄
Max.Storage Capacity/Nominal Voltage	233kWh / 832Vd. c.
PCS AC Rate Power/Current	100kW/145A
Nominal Grid Voltage/Frequency	230/400Va. c. (3L/N/PE) / (50/60)Hz
Nominal Load Voltage/Frequency	230/400Va. c. (3L/N/PE) / (50/60)Hz
V _{MAX} PV/I _{SC} PV/MPPT Voltage/Max. Input Current	NA
Max. Number of MPPT	NA
Protection Class	I
IP Code	IP54(Battery Room IP55)
Dimensions(mm)/Weight	W1600xH2200xD1300 / 2.8T
Operating Temperature Range	-25~45℃











d. CESS233-100-01D

 Suzhou RCT Power Energy Technology Co.,Ltd Email:info@rct-power.com.cn Add:Unit01 and 02,Building B,No.28,Yongchang Road,Caohu Street, Suzhou,Jiangsu,P.R.China	
Model	CESS233-100-01D
Manufacturer/Date	RCT Power /
Serial Number of Unit	
Battery Chemistry	LiFePO ₄
Max.Storage Capacity/Nominal Voltage	233kWh / 832Vd. c.
PCS AC Rate Power/Current	100kW/145A
Nominal Grid Voltage/Frequency	230/400Va. c. (3L/N/PE) / (50/60)Hz
Nominal Load Voltage/Frequency	NA
V _{MAX} PV/I _{SC} PV/MPPT Voltage/Max. Input Current	NA
Max. Number of MPPT	NA
Protection Class	I
IP Code	IP54(Battery Room IP55)
Dimensions(mm)/Weight	W1600xH2200xD1300 / 2.8T
Operating Temperature Range	-25~45℃











Rechargeable Lithium-Ion Battery Rack

Product Name: C&I Energy Storage System Battery Rack
 Model: RACK-233L1D-IEC-21
 Battery Designation: IFpP/73/175/208/[[(13S)4S]5S]E/-10+40/90
 Nominal Voltage: 832 Vd.c.
 Rated Capacity: 280 Ah
 Rated Energy: 232960 Wh
 Operating Voltage Range: 715~928.2Vd.c.
 Maximum Charging Power: 116480W
 Maximum Discharging Power: 116480W
 DCDC Input/Output: 832Vd.c. /24Vd.c
 Ingress Protection: IP20 /Battery Pack IP67
 Protection Class: I
 Operating Temperature Range: -20~45°C
 Icc / Icp, mr: 15kA with fuse /8000A@1500Vd.c. (L/R≤2ms)



Suzhou RCT Power Energy Technology Co., Ltd
 Add: Unit 01 and 02, Building B, No. 28, Yongchang Road, Caohu Street, Suzhou, Jiangsu, P.R. China

Rechargeable Lithium-Ion Battery

IFpP/73/175/208/[[(13S)4S]E/-20+45/90

Product Name: C&I Energy Storage System Battery Pack
 Model: POWER CESS PACK 47L1D2
 Battery Voltage Range: 143~185.6V
 Nominal Voltage: 166.4 V
 Rated Capacity: 280 Ah
 Rated Energy: 46592 Wh
 Maximum Charging Power: 23296W
 Maximum Discharging Power: 23296W
 Ingress Protection: IP67
 Protection Class: I



Suzhou RCT Power Energy Technology Co., Ltd
 Add: Unit 01 and 02, Building B, No. 28, Yongchang Road, Caohu Street, Suzhou, Jiangsu, P.R. China

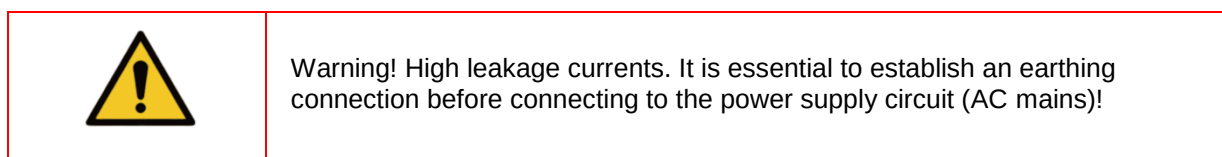


DANGER

NOTES:

- Disassembly or modification is prohibited without the maintenance personnel;
- Do not drop, impact, cut, deform or spearing with a sharp object;
- Do not place at a children or pet touchable area;
- Keeping away from the source of fire to avoid fire or explosion;
- Prohibit spraying, trampling, hitting and destroying, so as not to cause corrosive chemical leakage, fire or explosion;
- Please read the maintenance manual or instructions carefully before maintenance;
- Please wear protective equipment as required before maintenance or replacement







High voltage inside! Risk of electric shock by touching it.



CE mark



TUV Rheinland certified.



Pay attention to corrosion.



No fire.



No stepping on the surface.



This symbol indicates that the user manual must be read and understood before the device is put into operation.



Wear protective goggles before operating.



Wear protective gloves before operating.



Do not dispose of this product as household waste.



This product is recyclable.

3 Product Presentation

3.1 Product Introduction

RCTerra Class 1.0 200 Series product is commercial & industrial energy storage system (CESS) All-in-one rated for outdoor installation. It uses liquid-cooled and lithium iron phosphate battery (LFP), which are installed inside a compact cabinet together with the necessary safety instrumentation and other accessories.

The all-in-one design of RCTerra Class 1.0 Series product provides the very short-time installation. And it provides the unique flexibility. The modular, scalable design for precise project sizing. Integrated DC/DC with MPPT could connect a wide voltage PV system. When meet the grid outage, RCTerra Class 1.0 Series product could switch to backup mode within 50ms to keep your production line or important loads running safe.



Fig. 3-1 Product pictures

3.2 System Solution

■ With PV

The energy received from the connected solar generator and the battery is converted into grid-compliant AC current and feed into the grid. PV energy can also be charged directly into the battery on the DC side.

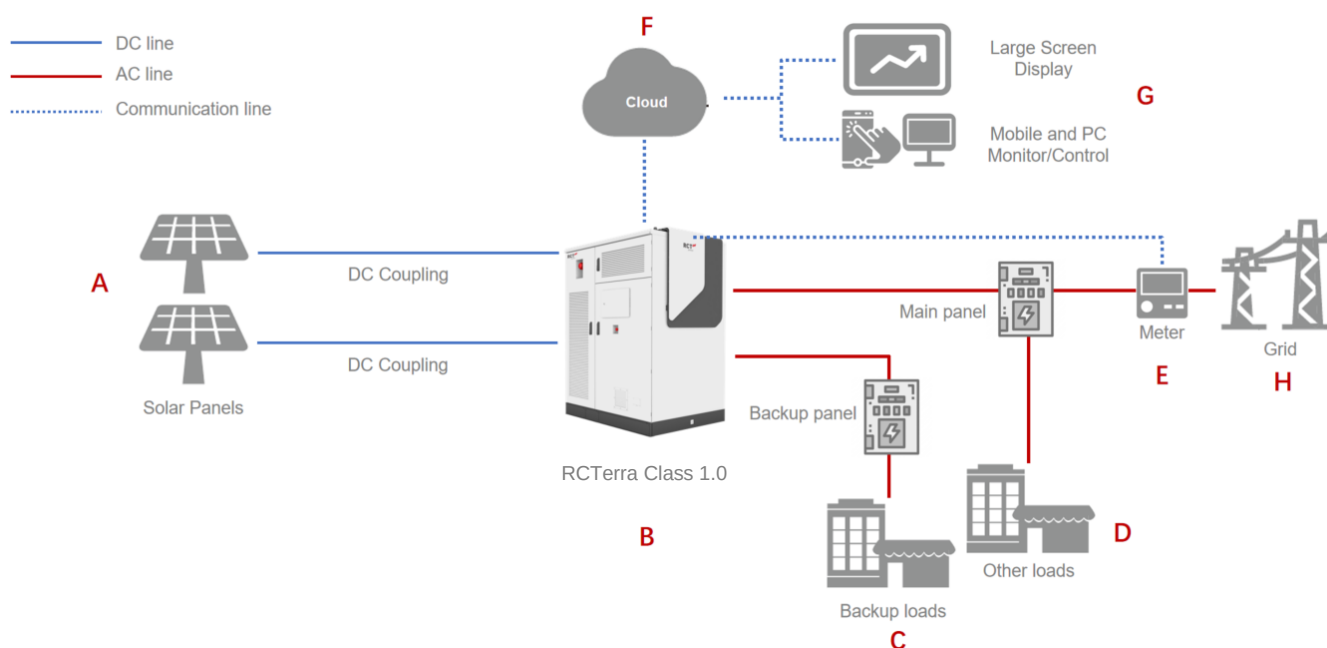


Fig. 3-2 Intended use of RCTerra Class 1.0 cabinet in the PV system

Item	Description	Comment
A	PV Generator	Monocrystalline silicon; polycrystalline silicon
B	C&I Energy Storage System	CESS233-100-01A/B
C	Backup loads	Connect to backup loads, System will disconnect from the grid and provide the power to backup loads within millisecond automatically when meet the grid outage.
D	Other loads	Other loads which are not necessary to be fed with electrical energy during grid outage.
E	Power Meter	Collect AC power measurements
F	Cloud	Energy cloud data storage platform.
G	HMI	Energy data display and function control.
H	C&I Public Grid	400V, 3-phase, L1/L2/L3/N

■ Without PV

The energy received from the power grid is stored in the battery and is then converted into grid-compliant AC current to feed into the facility or back to the grid, dependent upon the interconnect agreement.

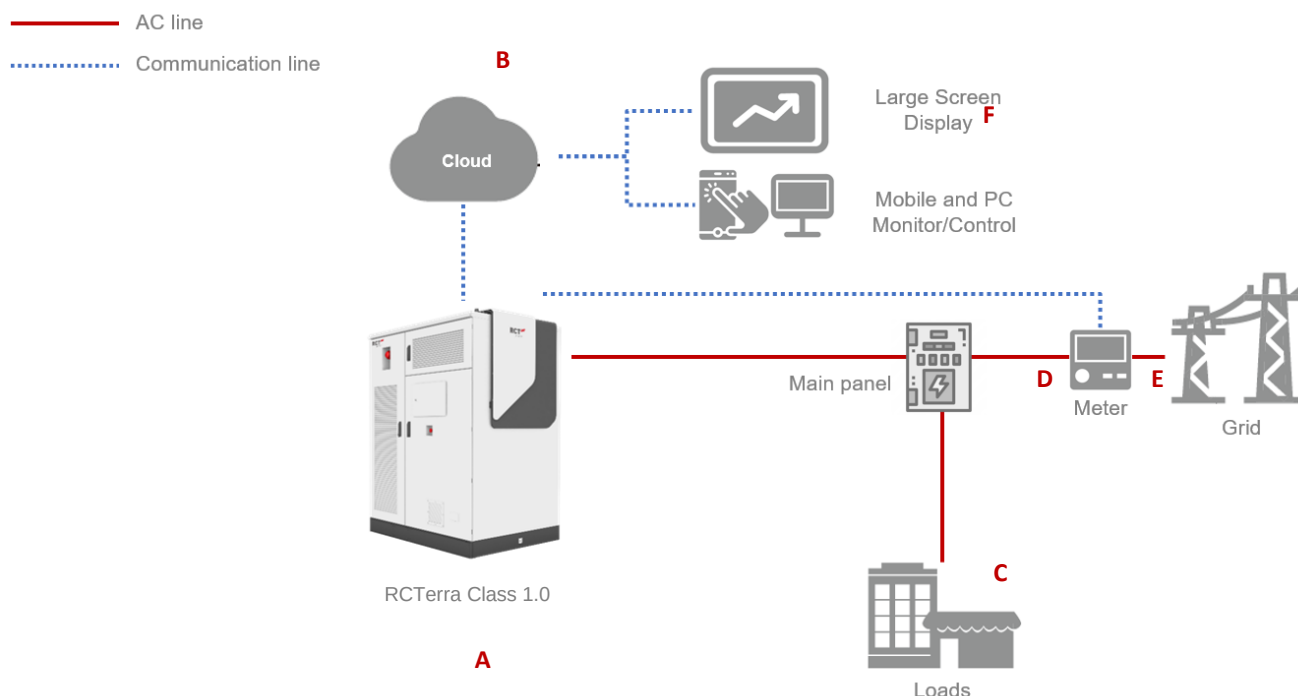


Fig. 3-3 Intended use of RCTerra Class 1.0 cabinet

Item	Description	Comment
A	C&I Energy Storage System	CESS233-100-01C/D
B	Cloud	Energy cloud data storage platform.
C	Loads	Loads which are not necessary to be fed with electrical energy during grid outage.
D	Power Meter	Collect AC power measurements.
E	C&I Public Grid	400V, 3-phase, L1/L2/L3/N.
F	HMI	Energy data display and function control.

3.3 Work Mode

There are eight work modes of system, Backup-only, Self-Consumption, T.O.U, Storm mode, Off-grid, Backup T.O.U, Self-Backup, Self-Peak Shaving.

Item.	Model Number	Work Mode
A	CESS233-100-01A	Self-backup, Backup-only, Self-Consumption, T.O.U, Storm mode, Off-grid, Backup T.O.U, Self-peak shaving
B	CESS233-100-01B	Self-Consumption, T.O.U, Storm mode, Off-grid, Self-peak shaving
C	CESS233-100-01C	Backup-only, T.O.U, Storm mode, Off-grid, Backup T.O.U, Self-backup, Self-peak shaving
D	CESS233-100-01D	T.O.U, Off-grid, Self-peak shaving

3.3.1 Self-backup (Optional)

In this mode, it combines two modes Backup only and Self-consumption together. On grid-tie period users could set up a minimum SOC to store enough energy and prepare for the next grid outage. If the SOC is lower than minimum value, the system will charge the battery to the threshold value as quickly as it can. If the SOC is higher than threshold value, the system will use the excessed energy for self-consumption. The energy in the battery could be used much more efficiently.

3.3.2 Backup-only (Optional)

In this mode, battery is as a backup power supply and always keep sufficient energy. The STS (Static Transfer Switch) inside cabinet monitors the grid, and when the grid is down it automatically switches to backup mode, disconnecting from the grid and supplying power to backup loads.

3.3.3 Self-consumption (Optional)

In this mode, the PV energy is preferentially used by local load (main load and backup load) to improve the self-consumption rate and self-sufficiency rate. The battery is automatically charged and discharged to meet consumption needs and reduce the amount of electricity purchased from the grid.

1) Load priority: Load consumption -> charging the battery ->feeding to the grid

When the PV energy is sufficient, first supply power to the load, then charges the battery, finally feed to the grid.

2) Power priority: PV -> battery -> grid

The PV energy is as the main energy to supply the load, if the PV energy cannot satisfy the needs of local load, then the battery will discharge to the load, and finally use the power from GRID. In the same time, the device monitors the grid, and when the grid is down it automatically switches to backup mode, disconnecting from the grid and supplying power to backup loads.

3.3.4 Time-of-Use (T.O.U) (Optional)

In this mode, users can manage the energy according to their own needs, and set the daily regular charging and discharging configurable profile on the app. The system operates according to a configurable charge/discharge profile - a Time-of-use (T.O.U) arbitrage profile, in which the battery is charged from the PV system or grid when tariffs are low, and discharged when tariffs are high.

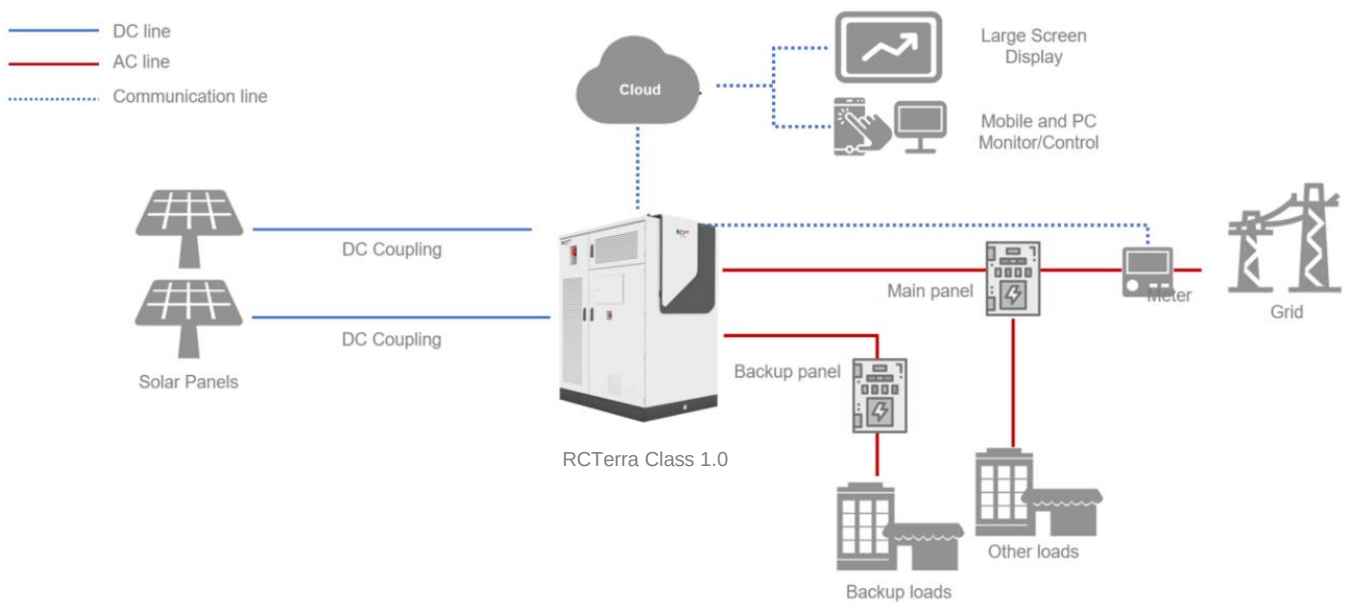


Fig. 3-4 T.O.U mode (With DCDC Module)

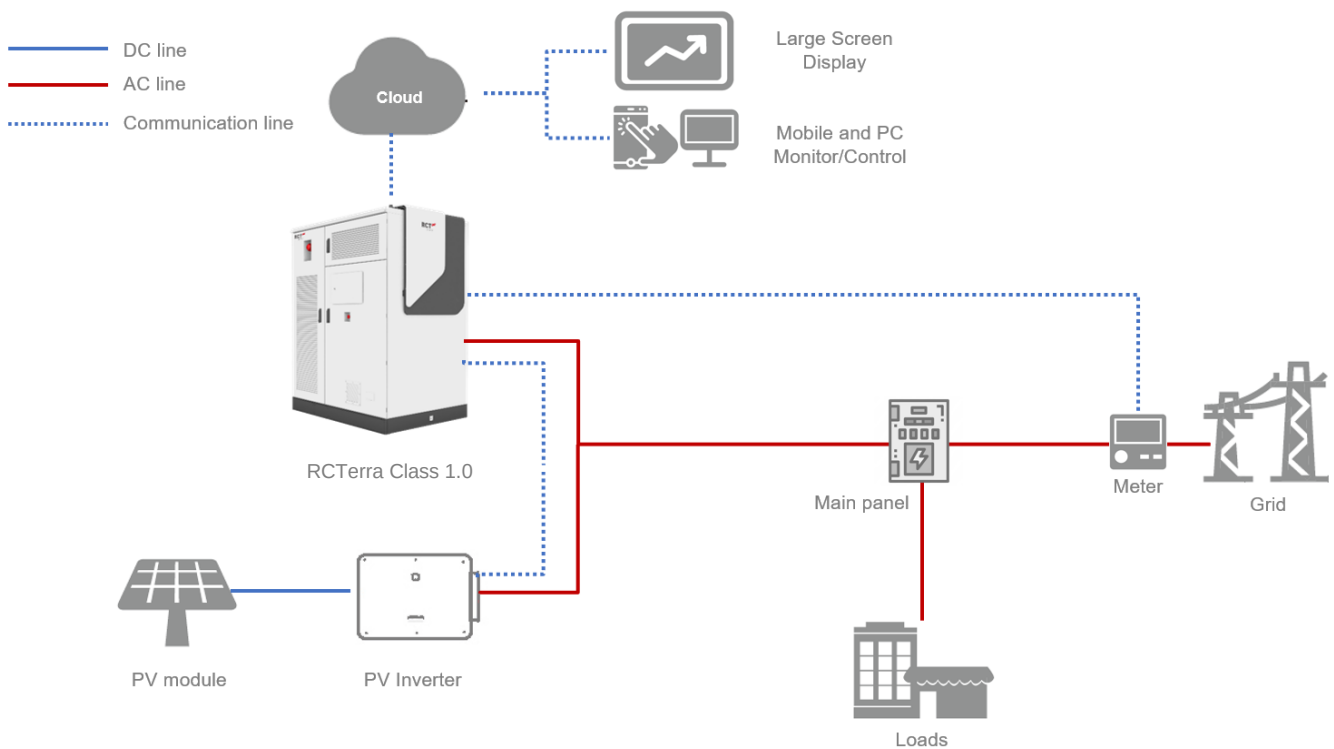


Fig. 3-5 T.O.U mode (With PV Inverter)

3.3.5 Storm Mode (Optional)

In this mode, the system will allow battery charging from Grid in case it can be charged fully as soon as possible to against the grid outage. Battery is as a backup power supply and always keep sufficient energy.

3.3.6 Off-grid (Optional)

In this mode, the system could combine PV system and load to create a micro grid.

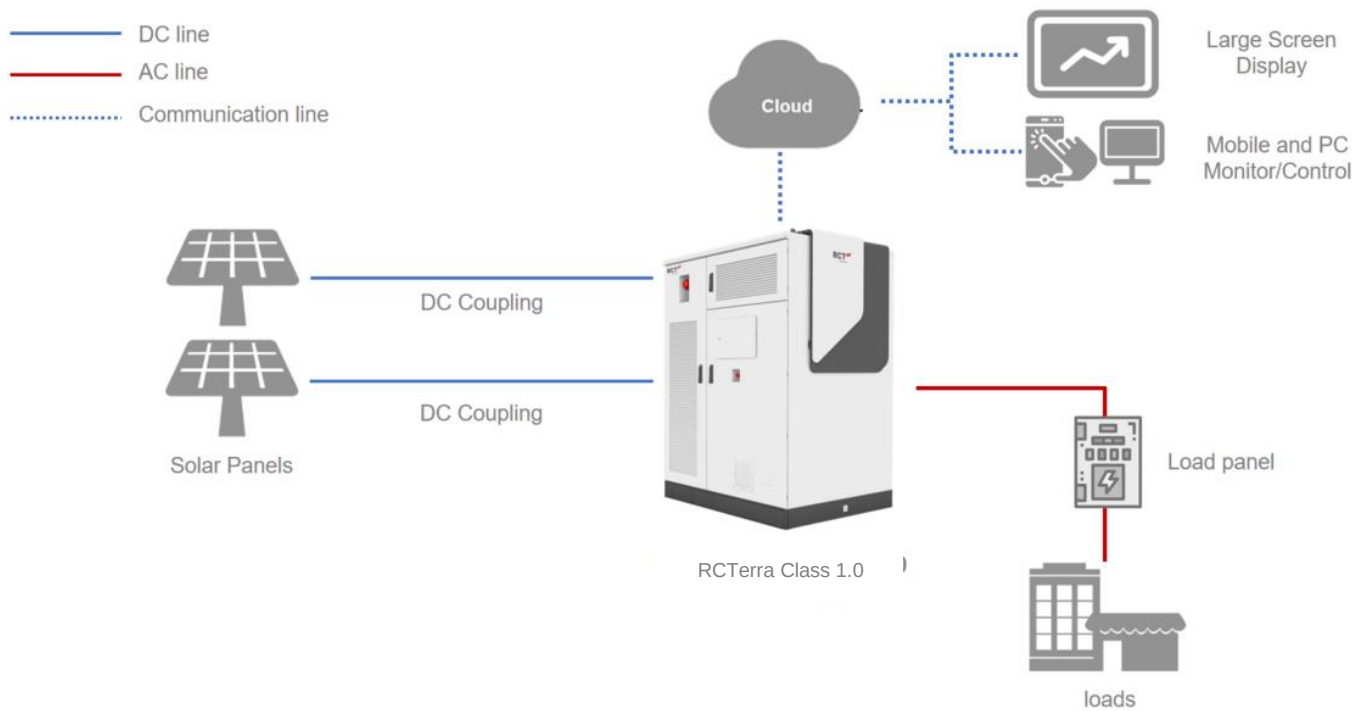


Fig. 3-6 Off-grid mode

3.3.7 Backup T.O.U (Optional)

In this mode, users could make use of T.O.U function base on the backup only mode. End user could set a backup power min. SOC xx%. This SOC will be fixed and prepared for the next grid outage. if there is exceeded capacity, it will be used for T.O.U.

3.3.8 Self-peak shaving (Optional)

In this mode, it combines two modes Peak Shaving and Self-consumption together. Users could set up a minimum SOC to store enough energy to prepare for the next peak load demand period. Once our system detect the demand power is beyond the discharge threshold value, the battery will discharge to reduce the power consumption from grid. It could eliminate the short-time spikes and reduce the demand charges of electric utility bill. If the SOC is higher than minimum SOC set up, the system will use the excess energy for the self-consumption.

3.4 Product Specification

3.4.1 Scope of Supply

Our products are inspected for proper condition before shipment.

Despite careful packaging, transport damage can occur. The transport company usually has to take responsibility for this damage.

Please inform the transport company immediately if you notice any damage to the packaging or the cabinet. Your specialist dealer will be happy to assist you if necessary.

Do not install, wire or operate the cabinet if any damage has been detected.

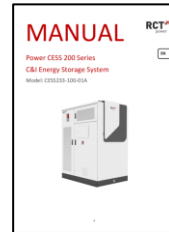
Check the contents of the shipment for completeness in accordance with below.



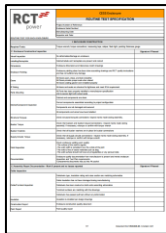
1 x RCTerra Class 1.0 cabinet



5 x MSD (Manual Service Disconnect) *



1 x User manual document



1 x Test report



1 x Touch panel stylus



1 x Door key



1 x Touch panel cover window key



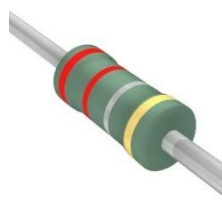
24Vdc power supply fuse



4 x Lifting rings



5 x Fuse 6.3A



1 x EOL Resistance



1 x Fuse 2.0A

* In order to protect the safety of technicians who repair RCTerra Class 1.0 product in high voltage environments or respond to some sudden events, the connection of the battery DC high voltage circuit can be quickly separated via the MSD device, so that the maintenance and other work is in a relatively safe state.

3.4.2 External Description

Cabinet Appearance

The appearance of cabinet is shown as below:

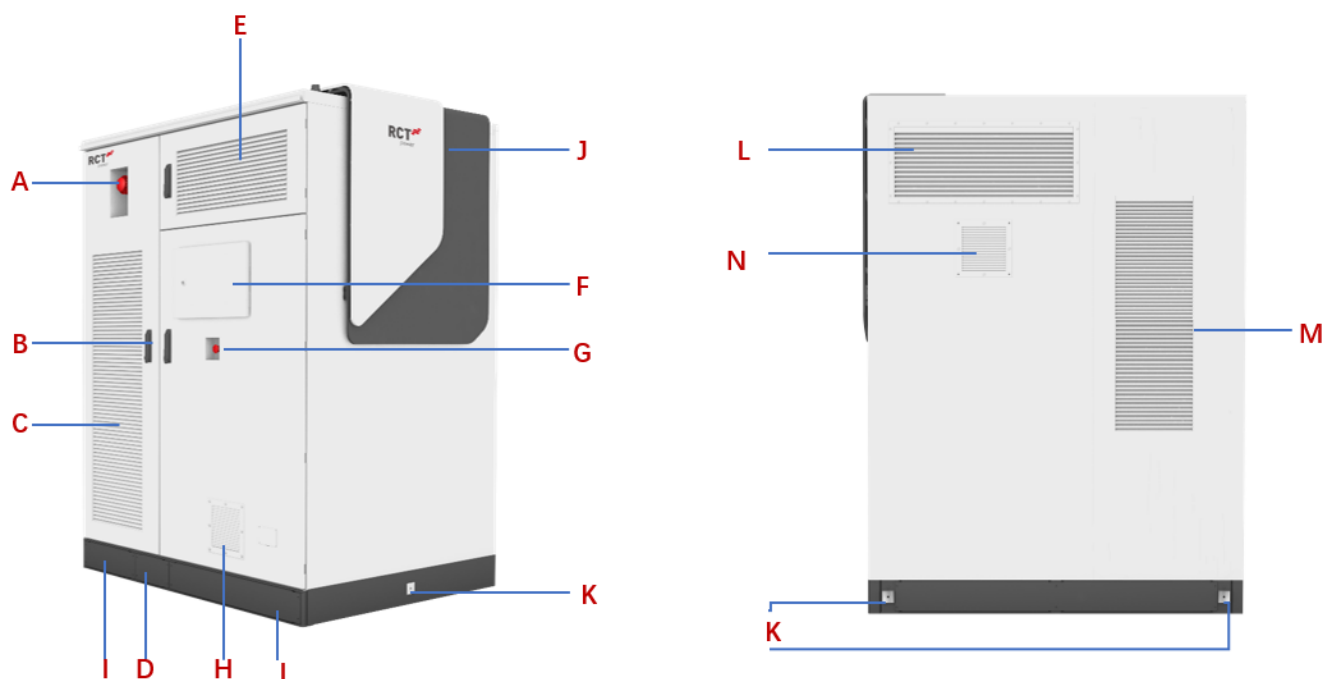


Fig. 3-7 Cabinet appearance

Item.	Description
A	Strobe and siren
B	Door lock
C	Air intake grill
D	Water inlet
E	Chiller air outlet grill
F	Touch panel cover
G	Emergency stop button
H	Exhaust fan intake
I	Forklift hole
J	Label plate
K	Grounding point
L	Chiller air intake grill
M	Air outlet grill
N	Exhaust fan outlet

3.4.3 Mechanical Parameters

The external dimensions of cabinet are shown as below:

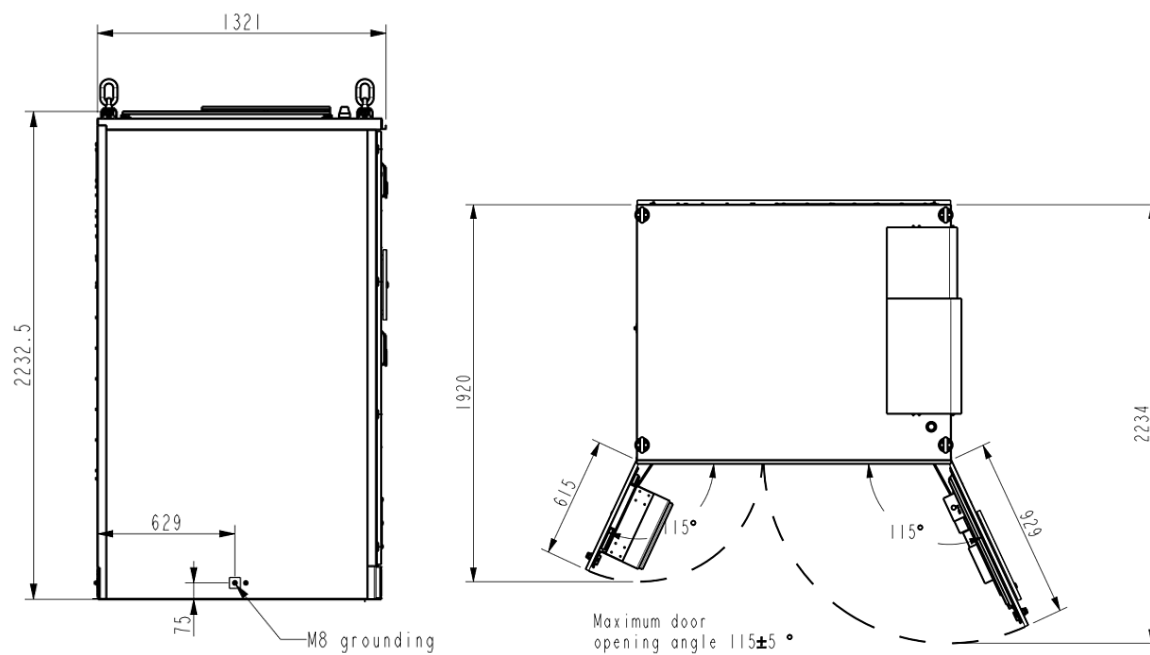


Fig. 3-8 Cabinet dimension

3.4.4 Ventilation Design

The electrical enclosure intakes air from the front side and expels it from the back side.

The chiller enclosure intakes air from the back side and expels it from the front side.



Fig. 3-9 Cabinet ventilation

3.4.5 Internal Design

a. CESS233-100-01A

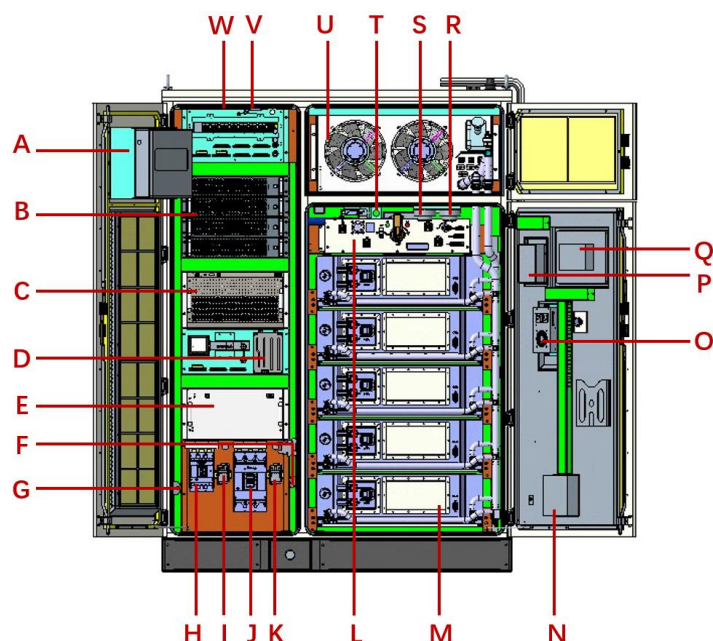


Fig. 3-10 Components inside the cabinet of CESS233-100-01A

Item.	Component	Comments
A	Fire control panel	x 1
B	DC/DC converter	x 4, 50kW DC/DC boost module x 2 and 50kW DC/DC buck module x 2
C	AC/DC inverter	x 1, 100kW AC/DC inverter module
D	UPS G2	x 1, 24V DC
E	STS	x 1, 200kW STS module for auto backup switch
F	External connection interface	x 1
G	PV connection terminal	x 4, Positive "+"x 2, Negative "-"x 2, MPPT x 2
H	Backup load MCCB	x 1, 3P, L1/L2/L3
I	Backup load neutral bus bar	x 1
J	Grid connection MCCB	x 1, 3P, L1/L2/L3
K	Grid neutral bus bar	x 1
L	BMS	x 1
M	Battery pack	x 5, 1P52S, 46.59kWh per pack
N	Exhaust fan	x 2, One is on the front and one is on the back side, Get rid of flammable and explosive gas.
O	Dehumidifier	x 1
P	Aerosol fire suppression	x 1
Q	Touch panel	x 1, EMS platform
R	Temperature detector	x 1, Monitor the temperature inside the cabinet
S	Smoke detector	x 1
T	Mixed gas detector	x 1, Detect flammable and explosive gas
U	Chiller	x 1
V	Door switch	x 2
W	Illumination	x 1

b. CESS233-100-01B

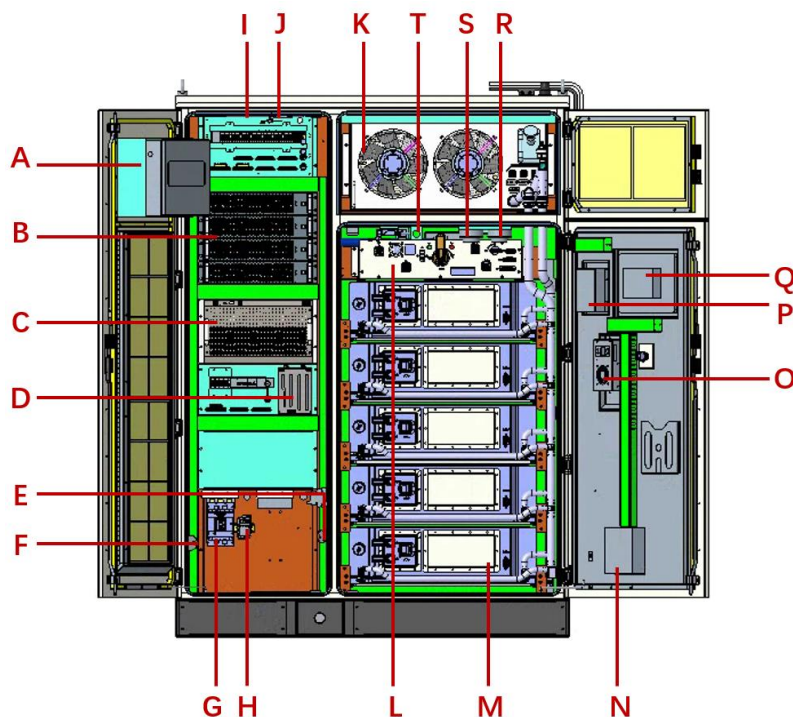


Fig. 3-11 Components inside the cabinet of CESS233-100-01B

Item.	Component	Comments
A	Fire control panel	x 1
B	DC/DC converter	x 4, 50kW DC/DC boost module x 2 and 50kW DC/DC buck module x 2
C	AC/DC inverter	x 1, 100kW AC/DC inverter module
D	UPS G2	x 1, 24V DC
E	External connection interface	x 1
F	PV connection terminal	x 4, Positive "+"x 2, Negative "-"x 2, MPPT x 2
G	Grid connection MCCB	x 1, 3P, L1/L2/L3
H	Grid neutral bus bar	x 1
I	Illumination	x 1
J	Door switch	x 2
K	Chiller	x 1
L	BMS	x 1
M	Battery pack	x 5, 1P52S, 46.59kWh per pack
N	Exhaust fan	x 2, One is on the front and one is on the back side, Get rid of flammable and explosive gas.
O	Dehumidifier	x 1
P	Aerosol fire suppression	x 1
Q	Touch panel	x 1, EMS platform
R	Temperature detector	x 1, Monitor the temperature inside the cabinet
S	Smoke detector	x 1
T	Mixed gas detector	x 1, Detect flammable and explosive gas

c. CESS233-100-01C

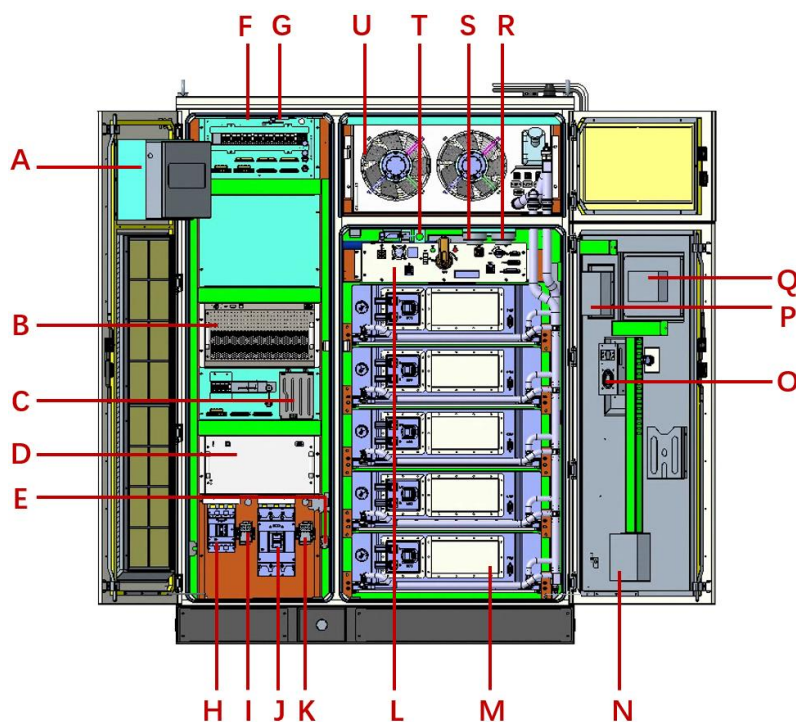


Fig. 3-12 Components inside the cabinet of CESS233-100-01C

Item.	Component	Comments
A	Fire control panel	x 1
B	AC/DC inverter	x 1, 100kW AC/DC inverter module
C	UPS G2	x 1, 24V DC
D	STS	x 1, 200kW STS module for auto backup switch
E	External connection interface	x 1
F	Illumination	x 1
G	Door switch	x 2
H	Backup load MCCB	x 1, 3P, L1/L2/L3
I	Backup load neutral bus bar	x 1
J	Grid connection MCCB	x 1, 3P, L1/L2/L3
K	Grid neutral bus bar	x 1
L	BMS	x 1
M	Battery pack	x 5, 1P52S, 46.59kWh per pack
N	Exhaust fan	x 2, One is on the front and one is on the back side, Get rid of flammable and explosive gas.
O	Dehumidifier	x 1
P	Aerosol fire suppression	x 1
Q	Touch panel	x 1, EMS platform
R	Temperature detector	x 1, Monitor the temperature inside the cabinet
S	Smoke detector	x 1
T	Mixed gas detector	x 1, Detect flammable and explosive gas
U	Chiller	x 1

d. CESS233-100-01D

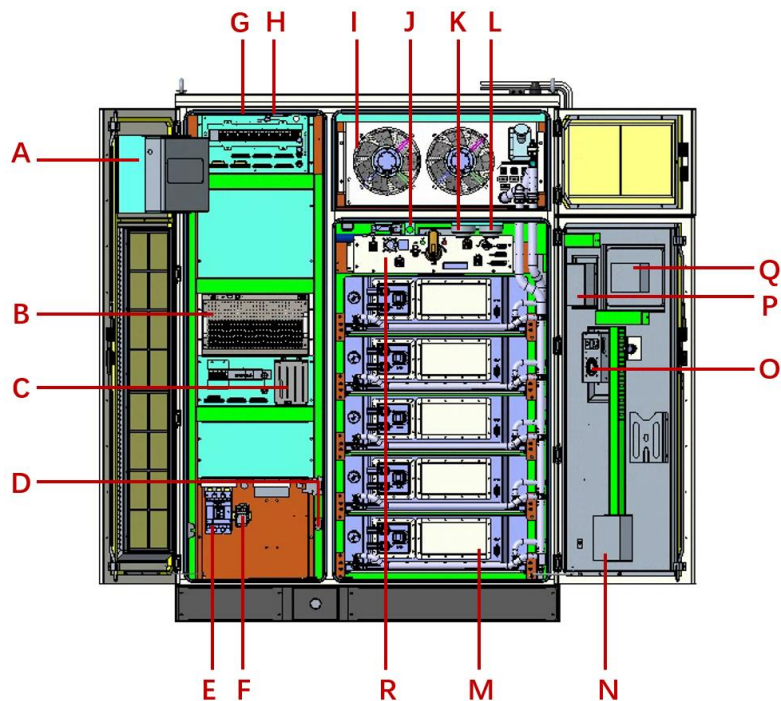


Fig. 3-13 Components inside the cabinet of CESS233-100-01D

Item.	Component	Comments
A	Fire control panel	x 1
B	AC/DC inverter	x 1, 100kW AC/DC inverter module
C	UPS G2	x 1, 24V DC
D	External connection interface	x 1
E	Grid connection MCCB	x 1, 3P, L1/L2/L3
F	Grid neutral bus bar	x 1
G	Illumination	x 1
H	Door switch	x 2
I	Chiller	x 1
J	Mixed gas detector	x 1, Detect flammable and explosive gas
K	Smoke detector	x 1
L	Temperature detector	x 1, Monitor the temperature inside the cabinet
M	Battery pack	x 5, 1P52S, 46.59kWh per pack
N	Exhaust fan	x 2, One is on the front and one is on the back side, Get rid of flammable and explosive gas.
O	Dehumidifier	x 1
P	Aerosol fire suppression	x 1
Q	Touch panel	x 1, EMS platform
R	BMS	x 1

3.4.5.1 Cell Introduction



Parameter	Value
Size (T x H x W)	71.7 ± 0.8 mm * 207.2 ± 0.8 mm * 173.9 ± 0.8 mm
Weight	Max. 5.70kg
Cell type	Prismatic aluminium shell LFP
Rated capacity	280Ah
Rated voltage	3.2Vdc
Rated energy	896Wh
Voltage range	2.5~3.65Vdc

3.4.5.2 Battery Pack Introduction

The LFP battery module is mainly composed of cells in series. The dedicated cells are used for battery management. Control commands are received by means of daisy chain communication, and the collected data is reported.



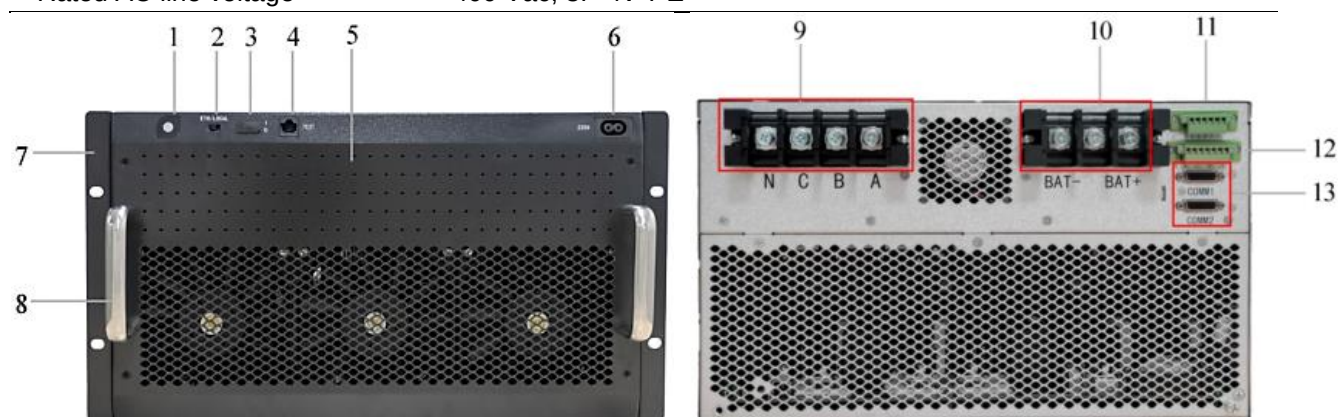
Parameter	Value
Model	POWER CESS PACK 47L1D2
Structure	1P52S
Cell type	LiFePO4
Voltage range	143 Vdc~185.6 Vdc
Rated voltage	166.4Vdc
Rated capacity	280Ah
Rated energy	46.592kWh

Cooling method	Liquid cooling
Delivery capacity	30% SOC
Standard charge/discharge rate	0.5P
Operating temperature range	-25~45°C
Dimension	W 810 x L 1106 x H 243 mm
Weight	332.5 ± 5 kg
Application altitude	2000m

3.4.5.3 AC/DC Inverter Module



Parameter	Value
Operating voltage range (DC connection)	680 - 950 Vdc
Max DC current	160 A
Rated AC power	100 kW
Max AC current	144 A
AC line voltage	400 Vac ± 15 %, 3P+N+PE
Rated AC line frequency	50Hz
Rated AC line voltage	400 Vac, 3P+N+PE



No.	Terminal	Function description
1	Indicator light	- The green light is always on when the output power is running. - When in standby (0kW operation), the green light flashes quickly for 0.5s. - When the machine is not powered on and there is no fault, the green light flashes slowly for 1s.

		The red light always lights up when there is a fault.
2	ETH / LOCAL (reserved)	Ethernet/local debugging switch; dial LOCAL to the right for local debugging; dial ETH to the left.
3	(IO) 6-bit DIP switch	Bits 1-2 are for CAN communication matching resistor access. 3-6 is the modbus address setting (binary) - the 6th bit is the lowest bit (from right to left).
4	TEST (internal only)	Factory background debugging communication port.
5	Vents	Air duct vents
6	220Vac power	220Vac input (for debug only)
7	Fixed bracket	For fixing PCS modules in cabinets.
8	Handle	Drawer module handles, not for load-bearing purposes.
9	AC terminal	AC terminal wiring.
10	DC terminal	DC terminal wiring.
11	Grid current sampling interface	(reserved)
12	Grid voltage sampling interface	(reserved)
13	Communication port	COM (26pin signal terminal) signal port

3.4.5.4 DC/DC Converter Module (Optional)

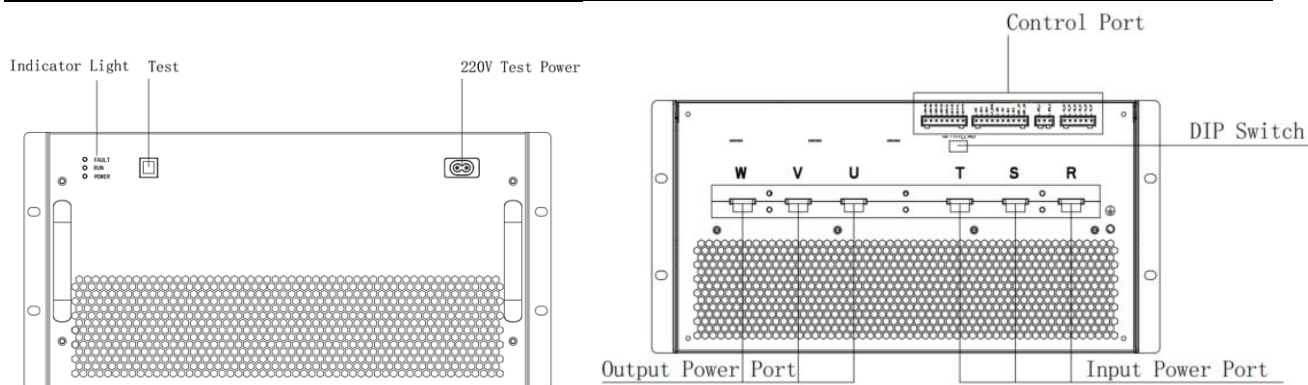


Parameter	Value
Max. number of MPPTs	2
Max. string voltage	950Vdc
Min. string voltage	200Vdc
MPPT operating voltage range	180-900 Vdc
Max. current per MPPT	80 A
Max. power	100 kW

3.4.5.5 STS Module (Optional)



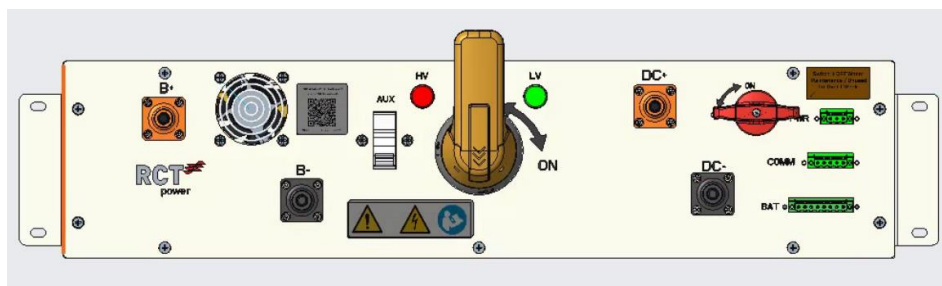
Parameter	Value
Grid port power	200 kW
Grid port rated current	290 A
AC/DC port power	100 kW
Load port power	100 kW
Rated frequency	50 Hz
Switch time	From grid-tied to off-grid < 50ms



Terminal	Function description
Indicator light	Fault: The device is faulty Run: The device is running. Power: The device is powered on.
Test Port	The Test port is a special interface for professional and technical personnel of the manufacturer to debug and test the equipment before leaving the factory. If you want to conduct secondary debugging of some performance parameters of the equipment, please contact the manufacturer's after-sales personnel in time! Do not debug the Test port without the manufacturer's authorization! If you modify the parameters without authorization, it may cause equipment failure or even damage, the company will not be responsible for it!
220V Test Power Port	220V port is a special interface for testing equipment by professional and technical personnel of the factory before leaving the factory. Please do not debug the 220V interface without authorization from the manufacturer! If you modify the parameters without authorization, it may cause equipment failure or even damage, the company will not be responsible!

Output Power Port (AC Output)	U: Output the A phase in the three phase.
	V: Output the B phase in the three phase.
	W: C phase in the output three-phase electricity.
Input Power Port (AC Input)	R: Input phase A in three-phase electricity.
	S: Input phase B in three-phase electricity
	Y: Input phase C in three-phase electricity
Control Port	Connect other devices to ensure that a port always provides a specific function.
Dip Switch	Manually configure the STS communication address using the DIP switch.

3.4.5.6 Switch Gear(Including BMS module)



Parameter	Value
Rated voltage (V)	1500V
Rated current (A)	140A
Protection level	IP67
Temperature range	-40~120℃
Humidity range	5~95%
Salt spray resistance	96H
Altitude (m)	2000
Size (mm)	D470 x W731 x H156
Weight (kg)	30

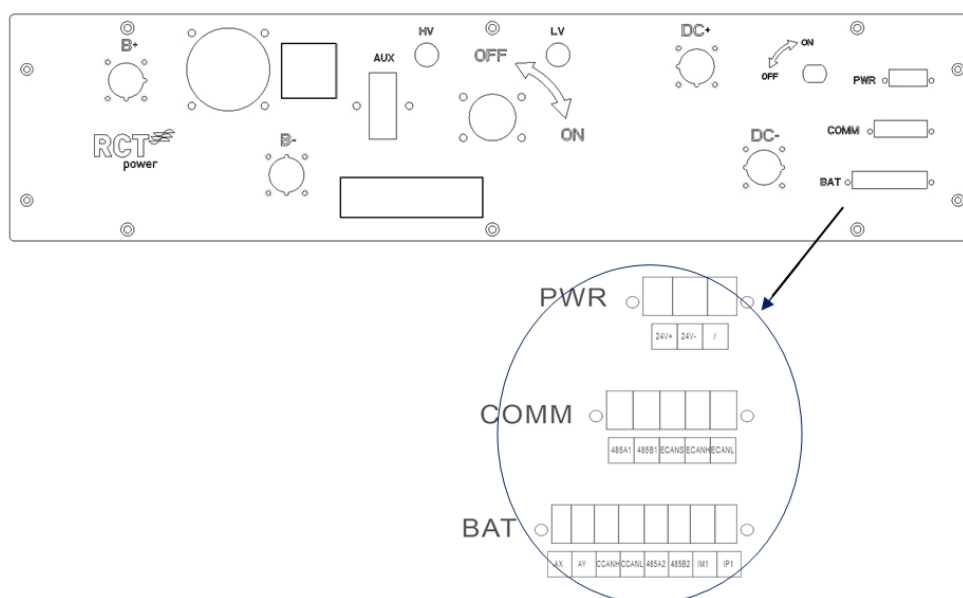


Fig.3-15 Switch Gear Port Identification

Name	Instructions
B+	High voltage input, connected to the positive terminal of the battery pack.
B-	High voltage input, connected to the negative terminal of the battery pack.
DC+	High voltage output, connected to PCS bus positive.
DC-	High voltage output, connected to PCS bus negative.
PWR	24V power input, connected to redundant power supply module.
BAT	Battery communication, connected to battery COM.
COMM	External communication, connected to the main control EMS. DC/DC 24V power supply output, connected to the power redundancy module.
ON/OFF (QS2)	Control the DC/DC power module's DC power input. Control the 24V power input.
AUX	24V control power input.
HV	Bus high voltage status indicator light.
LV	Control power status indicator light.
ON/OFF	Isolation switch operation.

3.4.5.7 Fire Control Panel

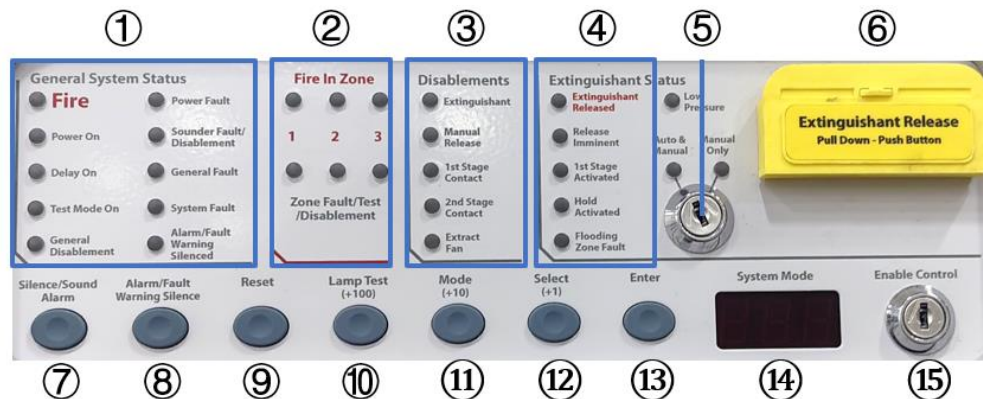


Fig.3-16 Fire Control Panel Introduction

Item	Component	Function Description
1	Area for general system information	Displays LED status green, yellow or red depending on the current system status.
2	Area for Detector status	The red LED on the upper part is the working state alarm, and the yellow LED on the lower part is the fault state.
3	Logical linkage area after the system starts	Output signal, linkage cut off non-fire functions
4	Area for fire extinguishing agent display	Shows detailed information on the release of the fire extinguishing agent via red and yellow LEDs.
5	Selection switch for automatic/manual or only manual extinguishing agent release	Used to switch the release mode for the fire extinguishing agent via key switch.
6	Emergency switch for manual extinguishing agent release	Used for manual release of the fire extinguishing agent.
7	Button for muting/activating the acoustic alarm signal	After enabling the extended access (15), the acoustic signal of the alarm can be switched on or off here.
8	Button for switching off the visual alarm signal	After enabling extended access (15), the visual alarm signal can be switched off here.

9	Button for resetting the fire alarm	Used to reset fire and general system errors after enabling extended access (15). Sensor signals are not reset.
10	Button for checking the LEDs display	Tests front-panel indicators and the internal buzzer by illuminating all LEDs while darkening the front-panel display and sounding the buzzer.
11/12/13	Button for menu navigation for manual configuration	Used for manual configuration of the fire protection control unit via navigation, selection and confirmation of the menu items.
14	3-fold 7-segment display	Used for menu navigation during manual configuration of the fire protection control unit (11/12/13) and shows different system statuses.
15	Key switch for extended access	Extends the access level for the fire protection control unit in order to make button entries and adjust the configuration.

4 Transport and Storage



NOTICE

Failure to transport and store the product in accordance with the requirements in this manual may invalidate the warranty.

4.1 Shock-Resistant Label

To ensure the safety of the product during shipping, a shock-indicator label is affixed to the outer packaging. If you notice that this label has turned red upon receipt, please do not panic. A red label simply indicates that the device has been subjected to a certain degree of vibration. This does not mean the device is damaged or inoperable. To protect your rights, we recommend following these steps:

- Document the scene: Immediately take photos or videos of the discolored shock-indicator label, the outer packaging, and the overall condition of the product to preserve objective evidence.
- Inspect the product's exterior: Carefully check the product's casing, ports, and key components for any visible signs of impact, deformation, or damage.
- Contact After-Sales Service: Regardless of whether the visual inspection reveals any abnormalities, please contact our after-sales team immediately upon discovering the issue and provide the relevant visual evidence. Based on your feedback, we will conduct a professional assessment and handle the matter as soon as possible.

4.2 Transport Methods

RCTerra Class 1.0 cabinet can be transported by sea or road, but does not support railway or air transportation.

RCTerra Class 1.0 cabinet is highly integrated and easy to hoist, which facilitates its transport.

RCTerra Class 1.0 cabinet can be transported by truck in the country.

4.3 Requirements for Transportation

All devices in the RCTerra Class 1.0 cabinet have been installed and fixed before leaving the factory, and they can be hoisted and transported as a whole during transportation.



NOTICE

In the whole process of loading, unloading, and transportation, the safe operation regulations of RCTerra Class 1.0 cabinet in the country/region where the project is located must be observed!

- All tools used for the RCTerra Class 1.0 cabinet and during operation shall be properly maintained.
- All personnel engaged in loading, unloading and anchoring should have received relative training, especially in safety.

- Maritime transportation complies with the transportation requirements of the IMDGCODE and the International Maritime Dangerous Goods Rules.
- Land transport shall comply with the ADR or JTT617 transport requirements.
- To meet the regulatory requirements of the transport regulatory authorities in the transport starting country, route country and destination country.
- Compliance with the international transport of dangerous goods rules and the regulatory requirements of the transport regulatory authorities of the corresponding countries.
- Stacking is prohibited when transportation at ports and on board ships.

4.4 Storage Requirements

- To prevent possible condensation or its bottom from being soaked by rain water in the rainy season. The RCTerra Class 1.0 cabinet should be stored on higher ground.
- Raise the container base due to site conditions. The specific height should be reasonably determined based on site geological and meteorological conditions.
- Store the RCTerra Class 1.0 cabinet on a dry, flat, and stable ground with sufficient carrying capacity and without any vegetation covers. The ground must be flat and dry.
- Before storage, ensure that the doors of the container and all internal equipment are locked.
- Storage environment temperature: -20°C ~ 50°C, recommended storage temperature: -10 °C ~ 35 °C.
- Long-term storage of batteries is not recommended because it may cause the decrease in battery capacity. Even if the battery is stored at the recommended storage temperature, irreversible capacity fade will still occur during periods of rest. The longer it has been stored, the greater the capacity fade. Please refer to the technical protocol for specific rate of capacity fade.
- The relative humidity should be between 0 ~ 95% without condensation.
- The air inlet and outlet of the RCTerra Class 1.0 cabinet should be effectively protected to prevent rain water, sand and dust from penetrating into the container.
- Carry out periodic inspections. Check the cabinet and the inner equipment for damage at least every half a month.
- Before installing a cabinet that has been stored for more than six months, open the door to visually check and ensure that there is no condensation. Check the cabinet and the inner equipment for damage. Check the product after it is powered on and starts. If necessary, request professionals for testing before installation.

Starting from the date of delivery of RCT Power, the RCTerra Class 1.0 cabinet with a storage period of more than 3 months under the above conditions are to be charged and discharged once to bring the system SOC to 20%~50%.

5 Mechanical Installation

5.1 Inspection before Installation

5.1.1 Deliverables Inspection

Check whether deliverables are complete against the attached packing list.

5.1.2 Product Inspection

- Check whether the container received is the ordered one.
- Check the RCTerra Class 1.0 cabinet and the internal equipment for any damage.

If any problems are found or there is any question, please contact the forwarding company or RCT Power.



Only install the RCTerra Class 1.0 cabinet when it is complete and intact.
Before installation, ensure that:

- The RCTerra Class 1.0 cabinet is in good condition without any damage.
- All internal equipment is in good condition without any damage.

5.2 Installation Environment Requirements

5.2.1 Installation Site Requirement

- The climate environment and geological conditions, such as stress wave emission and underground water level, should be fully considered when selecting the installation site.
- The environment around the installation site should be dry and well ventilated.
- There should be no trees around the installation site to prevent branches or leaves blown off by heavy winds from blocking the door or air inlet of the energy storage system.
- The installation site should be away from areas where toxic and harmful gases are concentrated, and free from inflammable, explosive and corrosive materials.
- The RCTerra Class 1.0 cabinet noise level is $\leq 70\text{dB}$ @1m, please consider carefully before installation.

5.2.2 Outdoor Requirements

- There should be no vegetation or flammable plants within 3 meters of the installation site of the energy storage system or energy storage power station to prevent wildfires caused by high temperatures in summer.
- The top of the energy storage system cannot be covered, such as not installed under the shed, not laying photovoltaic panels on the top.
- The safe distance between the energy storage system and the production building should comply with local fire codes or standards.
 - Storage systems located outdoors should be at least 3m away from boundaries, public roads, buildings, flammable materials, hazardous materials, high piles, parking Spaces, and other hazards not related to the grid infrastructure.
 - When one of the following conditions is met, the distance between the energy storage system and the production building can be reduced to 0.9m, and the space requirements of equipment transportation, installation, and maintenance need to be considered.
 - The energy storage system has an independent fire-resistant firewall of 1h, and the length and height of the firewall should be 1.5m beyond the outer outline of the energy storage system.
 - The walls adjacent to the energy storage system are provided with non-combustible exterior walls with no openings or combustible finishes, and the exterior walls are fire resistant to REI 120 fire resistance rating.
- The distance between the exhaust device of the energy storage system and the heating, ventilation, air conditioning air intakes, windows, doors, discharge platforms, and fire sources of other buildings or facilities should be $> 4.6\text{m}$.
- Do not install an energy storage system in a salt-damaged or polluted area because it may be corroded.

5.2.3 Foundation Requirements

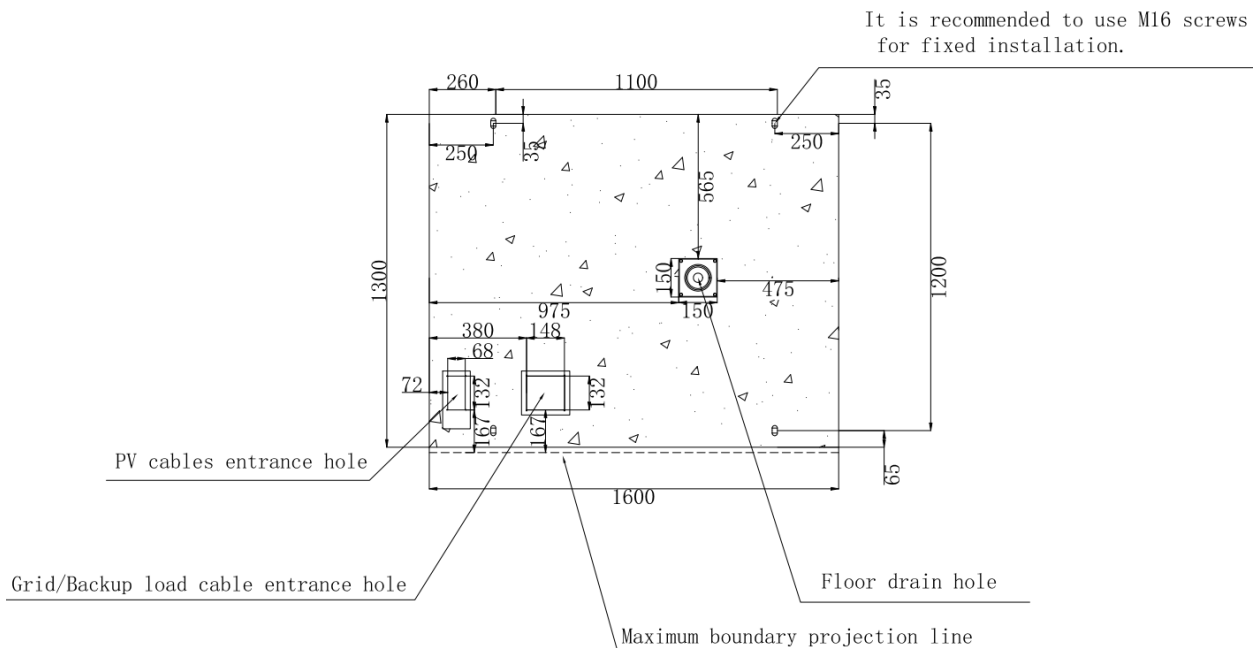


NOTICE

The RCTerra Class 1.0 cabinet is heavy as a whole. Before constructing the foundation, it is necessary to inspect the installation site in detail (mainly referring to the geological conditions and environmental climatic conditions, etc.). Commence the design and construction of the foundation only after confirming that all requirements are met.

Unreasonably constructed foundation will bring great troubles to the installation of the RCTerra Class 1.0 cabinet, affecting the normal opening and closing of the doors and the normal operation. Therefore, the foundation of the RCTerra Class 1.0 cabinet must be designed and constructed according to certain standards to meet the requirements of mechanical support, cable routing and later maintenance and overhaul.

- The soil at the installation site should be compact.
- Compact and fill the foundation pit to provide sufficient and effective support for the container.
- Raise the foundation to prevent the container base and the interior from rain erosion.
- The cross-sectional area and height of the foundation should meet the requirements.
- Construct corresponding drainage in conjunction with local geological conditions.
- Built a cement foundation with sufficient cross-sectional area and height. The foundation height is determined by the construction party according to the site geology.
- Consider cable routing when building the foundation.
- The installation carrier should be firm and reliable. The bearing capacity of the foundation should exceed 3.4 tons. (Estimated weight of the assembly is 3.4 tons.)
- The bottom of the foundation pits must be strengthened and filled. The surface of the foundation shall be solid, flat and level (horizontal error $\leq 4\text{mm}$). Sunken or filled foundation is not acceptable.
- Built a maintenance platform around the foundation to facilitate later maintenance.
- During the foundation construction, reserve enough space for the AC and DC side cable trench according to the position and size of the cable inlet and outlet holes and pre-embed the cable conduit.
- A drainage system is necessary to prevent the bottom or internal equipment of the cabinet from being soaked in water during the rainy season or during heavy rainfall.
- Both ends of all embedded pipes should be temporarily sealed to prevent impurities from entering and causing troubles to later wiring.
- After all cables are connected, cable inlet, outlet and connector should be sealed with fireproof mud or other suitable materials to prevent rodent access.



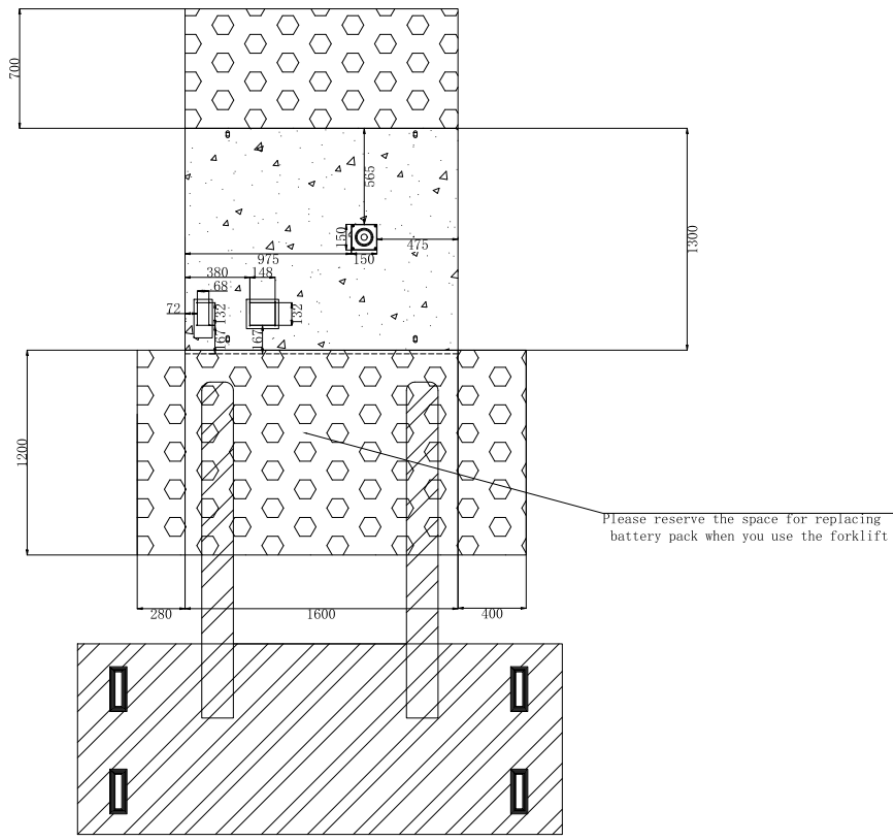


Fig. 5-1 Foundation instruction Top view Unit: mm

5.2.4 Installation Spacing Requirement

Equipment space requirements must also meet installation environment requirements. For a single cabinet installation, the first figure below illustrates the minimum clearance required for forklift access. To ensure optimal heat dissipation and facilitate maintenance such as replacing battery modules, PCS components, sufficient space around the installation site must be reserved. Please maintain a clearance of at least **2m** in front of and behind the equipment, and at least **1m** to the left and right. The following figure shows the minimum space requirements for single-cabinet installation and maintenance.

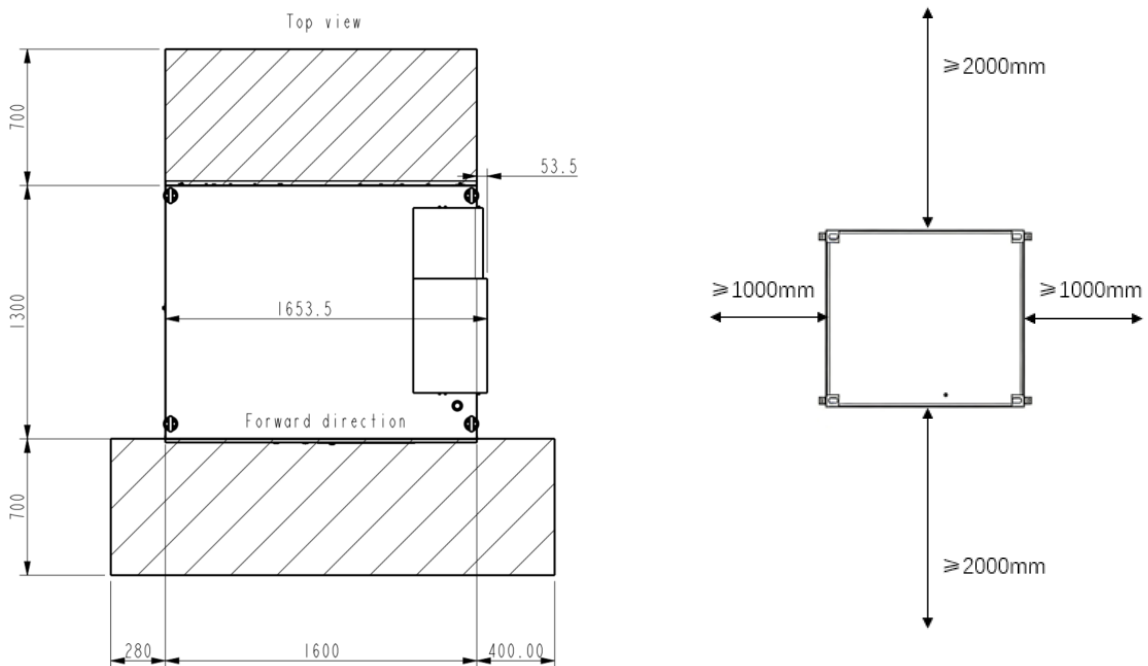


Fig. 5-2 Installation space top view Unit: mm

5.2.5 Parallel Space Requirements

Impacted Factors of Parallel Installation:

■ Fire Safety:

Preventing Thermal Runaway Propagation: Sufficient spacing acts as a physical fire barrier, preventing heat and flames from spreading too quickly to adjacent cabinets if a thermal runaway event occurs in one unit.

Providing Firefighting Operation Space: It offers essential working space for fire rescue efforts and equipment deployment (e.g., fire extinguishers, hydrants).

■ Heat Dissipation and Thermal Management:

Energy storage cabinets typically use a forced-air cooling mode, such as "front intake, rear exhaust". If the spacing is too small, hot exhaust air can be recirculated into the intake of adjacent cabinets. This leads to elevated intake air temperatures, creating a heat cycle that significantly reduces cooling efficiency. This can cause the system to report high-temperature faults and may even trigger safety risks.

■ Operations, Maintenance and Safety:

Working Space: Technicians require adequate space to open cabinet doors (the doors themselves have thickness and require swing clearance), perform wiring, and conduct inspections and maintenance tasks.

Emergency Evacuation: In the event of an incident, personnel must be able to evacuate quickly.

Recommended Distance:

- The recommended distance between parallel cabinets is **0.9m**. If there is a great ventilation around the cabinets, the distance between parallel machines can be properly reduced. The figure below shows the minimum space requirements for installation and maintenance in a parallel configuration.

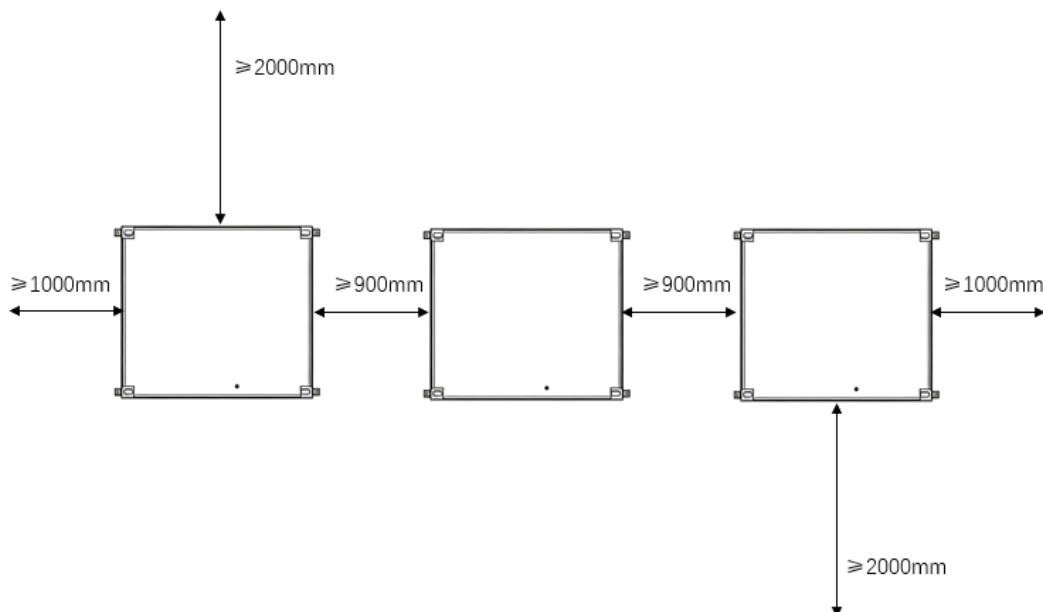


Fig. 5-3 Parallel space top view Unit: mm

- For easy operations and maintenance, the recommended clearance between the front and rear of the cabinet is **2m**, and a minimum clearance of **1m** must be maintained on both sides of the parallel system.
- Maximum number of parallel machines: Please refer to the technical data.

5.3 Forklift Transport

If the installation site is flat, you can use a forklift to move the RCTerra Class 1.0 cabinet. The bottom of the cabinet is equipped with fork holes specially used for forklift transportation. Move the cabinet through the side fork holes. If a forklift is used, the following requirements should be met:

- The forklift should be equipped with sufficient load capacity.
- The length of the forklift feet should meet the requirements of the device.
- The length of fork needs to be longer than 1800mm.

The forklift feet should be inserted into the fork pockets at the bottom of the workstation (for the location of the fork pockets, see the figure below). The depth of the forklift feet inserted into the pockets should be the depth of the pockets.

- Remove the front cover plate before move the cabinet.
- The weight of RCTerra Class 1.0 cabinet is about 3.4 tons, please select appropriate equipment
- The transportation, moving and putting down of the cabinet should be slow and stable. It is recommended to try transportation.
- Only place the cabinet in a stable place. The place should be well drained without any obstruction or bulging. The cabinet should be fixed by four bottom mounting screws into the foundation.

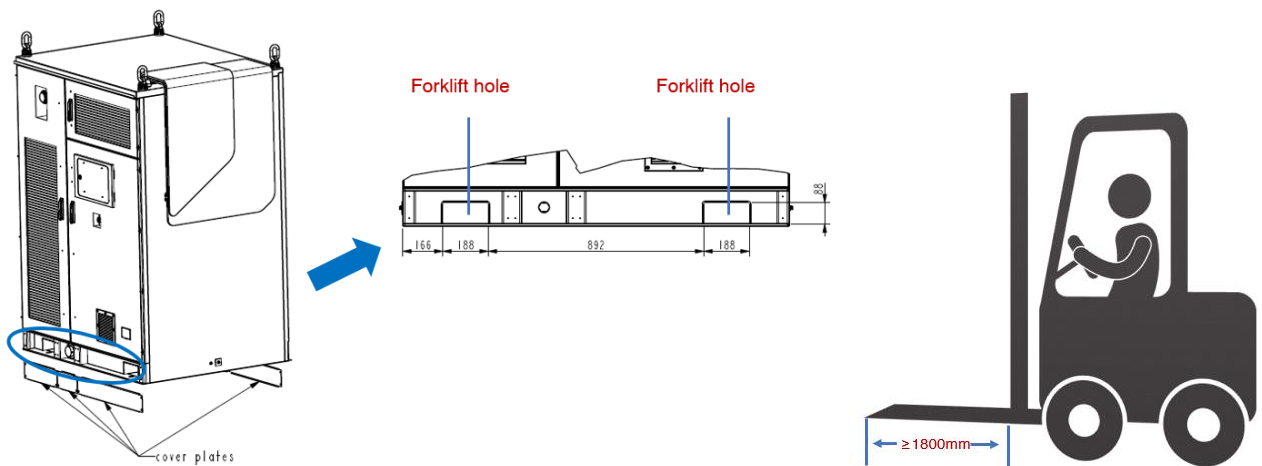


Fig. 5-4 Forklifting guide Unit: mm

5.4 Hoisting and Transport

5.4.1 Safety Precautions

When lifting the device, at least the following requirements must be met:

- All safety requirements must be met.
- A professional instructor is needed in the whole hoisting process.
- The strength of the sling used should be able to withstand the weight of the devices.
- Ensure that all sling connections are safe and reliable, and that the lengths of the slings connected to the corner fittings are equal.
- The length of the sling can be adjusted appropriately according to the actual requirements of the site.
- During the lifting process, the devices must be stable and not skewed.
- Please lift the devices from the top.
- Take all necessary auxiliary measures to ensure the safe and smooth lifting of the devices.



- Observe the safety operating rules of the crane at all times.
- Standing within 5 to 10 meters of the hoisting areas is strictly forbidden! Anybody standing under the boom or station is strictly forbidden in the whole hoisting process.
- The hoisting work must be stopped in violent weather days. For example, in strong wind, heavy rain, or thick fog conditions.

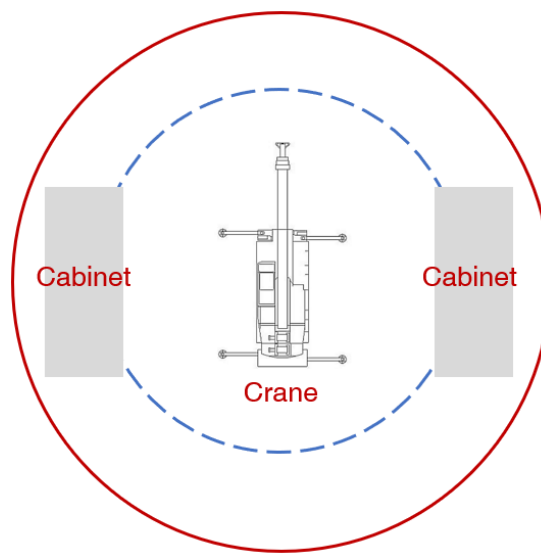


Fig. 5-5 Hoisting safety guide

5.4.2 Hoisting

In the process of lifting the devices, each operation link should be carried out according to the following requirements:

- The devices should be lifted vertically, and no dragging on the ground or the top of the lower cabinet should occur when lifting, and the devices should not be dragged on any surface.
- The devices should be suspended after being lifted 300 mm from the supporting surface. Check the connection between the lifting tools and the devices. Lift only after confirming that the connection is firm.
- After the devices are in place, they should be put down gently and steadily. It is strictly forbidden to place the devices in a vertical place by shaking the lifting tools.
- The place where the devices are placed should be solid and flat, with good drainage, without obstacles or protrusions.
- The recommended hoisting position is showing as below.

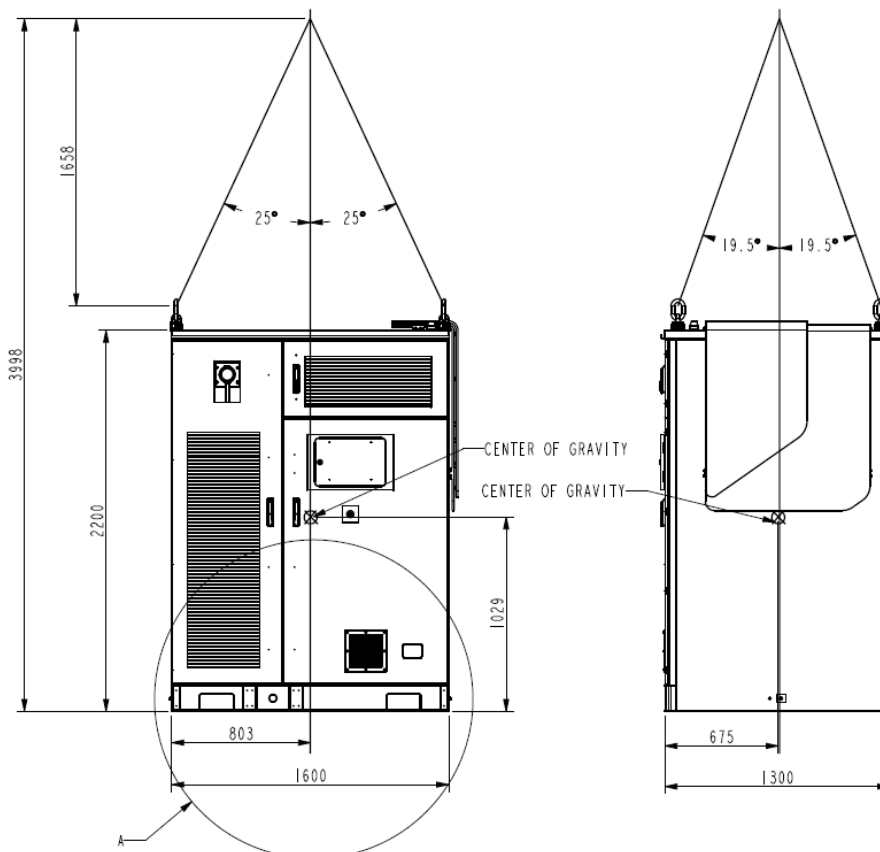


Fig. 5-6 Hoisting guide Unit: mm

5.5 Fixed Installation

The recommended rod is M16. After customer places our cabinet across the threaded rods, put on the gasket and then screw on the nuts. See the reference line drawing for the bottom view as below.

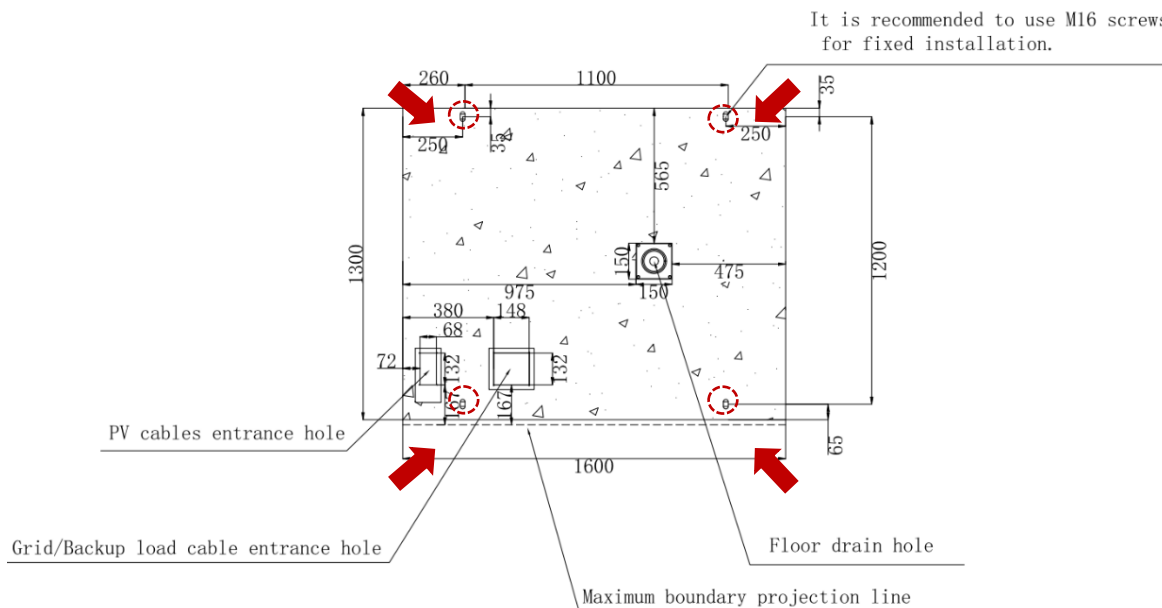


Fig. 5-7 Cabinet fixation guide bottom view Unit: mm

6 Electrical Connection

6.1 Precautions

 DANGER	High voltage! Electric shock! - It is strictly forbidden to directly touch the live parts in the unprotected state! - Before installation, ensure that the all switches are off.
 WARNING	Sand and moisture penetration may damage the electrical equipment in the cabinet, or affect their operating performance! - Avoid electrical connections during sandstorms or when the relative humidity in the surrounding environment is greater than 95%. - Perform electrical connection when there is no sandstorm and the weather is fair and dry. - Before wiring, check and ensure that the polarity of all input cables is correct. - During electrical installation, do not forcibly pull any wires or cables, as this may compromise the insulation performance. - Ensure that all cables and wires have sufficient space for any bends. - Adopt the necessary auxiliary measures to reduce the stress applied to cables and wires. - After completing each connection, carefully check and ensure that the connection is correct and secure.
 NOTICE	Type B RCD is recommended for the system.

6.2 Electrical Connection Overview

■ CESS233-100-01A

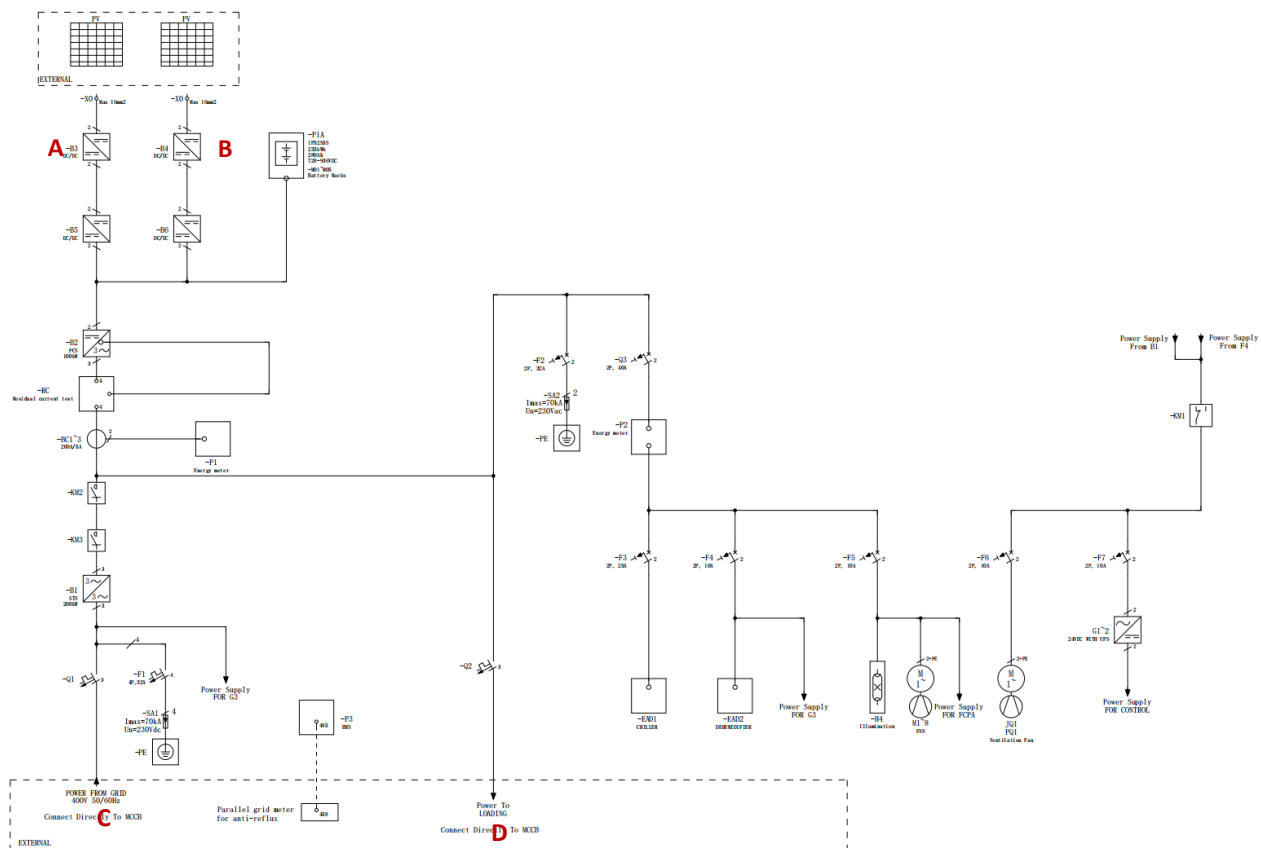


Fig. 6-1 CESS233-100-01A Electrical SLD overview

CESS233-100-01B

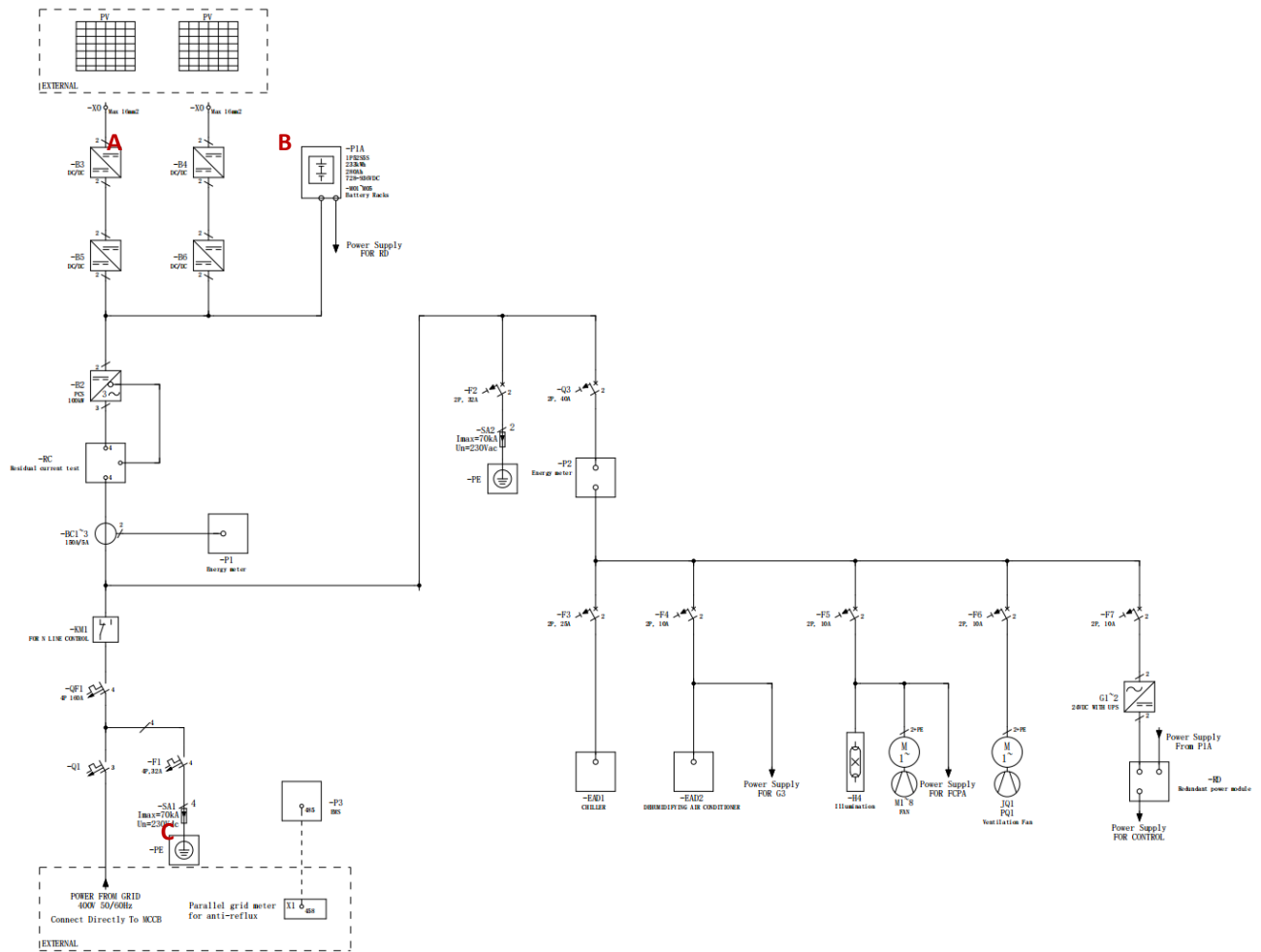


Fig. 6-2 CESS233-100-01B Electrical SLD overview

CESS233-100-01C

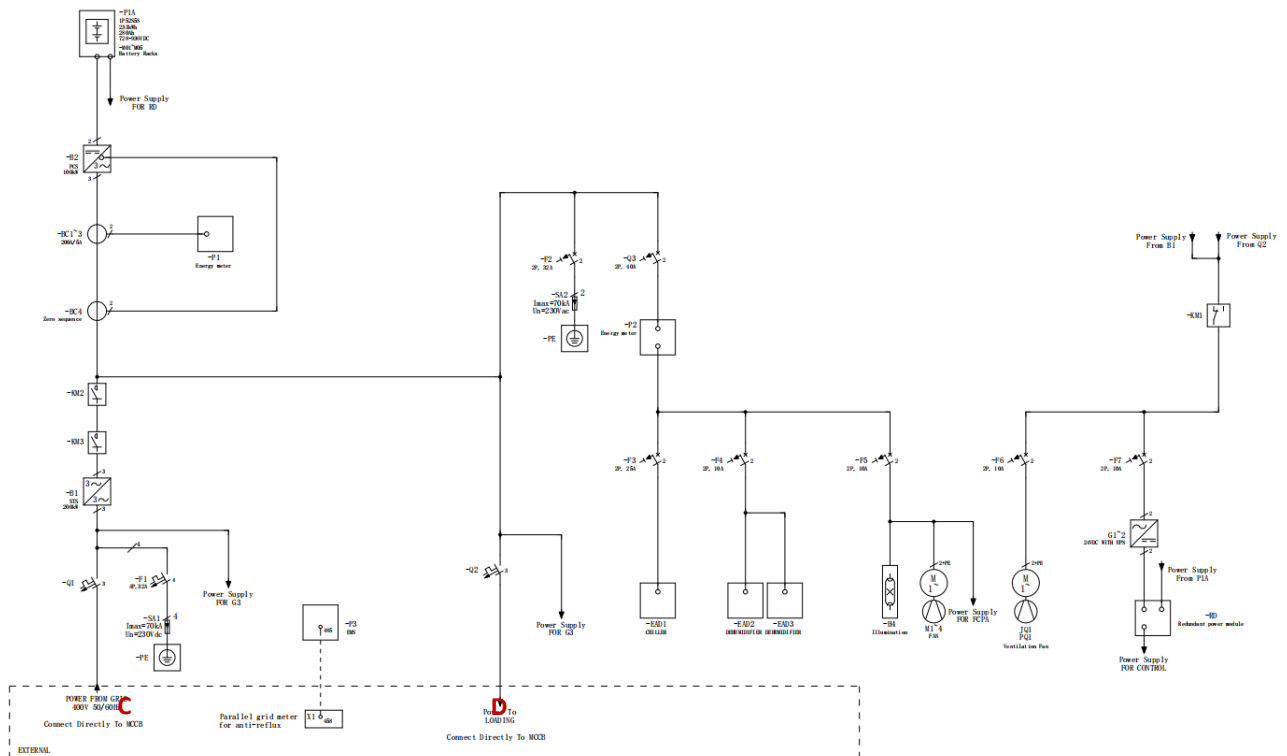


Fig. 6-3 CESS233-100-01C Electrical SLD overview

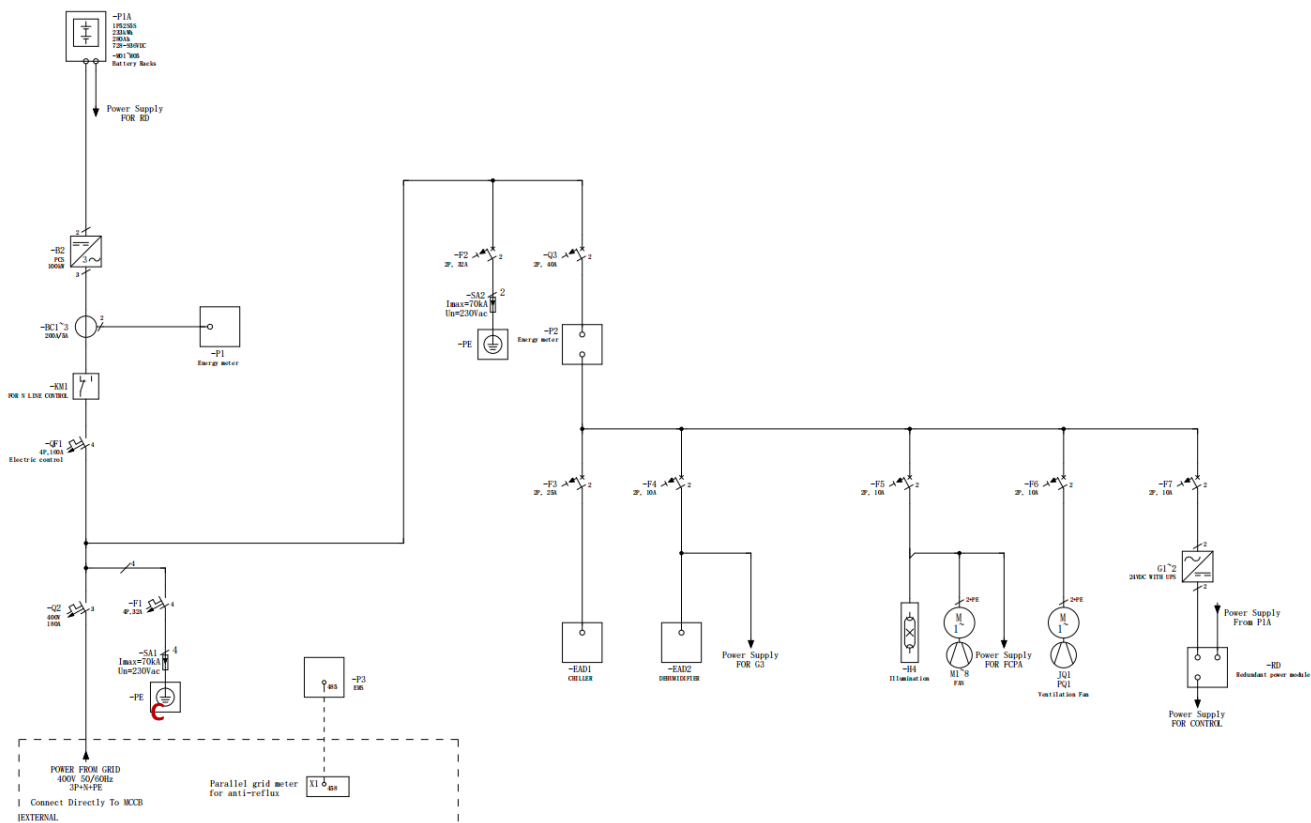


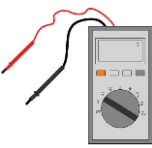
Fig. 6-4 CESS233-100-01D Electrical SLD overview

6.2.1 Wiring instructions

Item	Recommended specification
PV connection terminals A/B	16mm ² ~25 mm ² , 2 MPPT Note: String combiner box max. 20 m away from CESS200 cabinet for 16 mm ² otherwise use 25 mm ² cables max.
Grid port connection terminals C	70mm ² ~150mm ² , 3 phases L1/L2/L3/N
Backup load port connection terminals D	50mm ² ~ 70mm ² , 3 phase L1/L2/L3/N

6.3 Preparation before Wiring

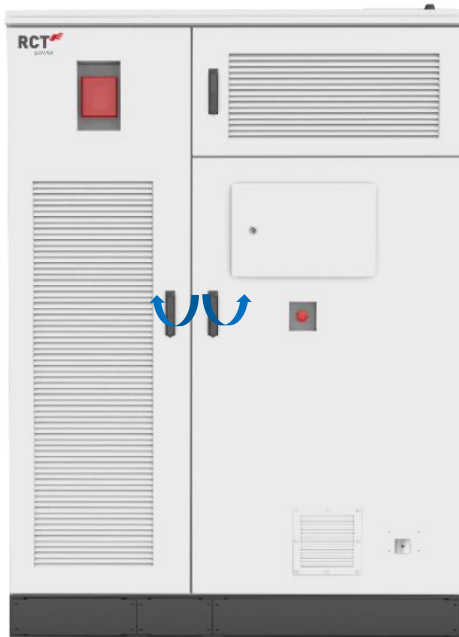
6.3.1 Preparing Installation Tools

Item	Name And Graphics			
Installation tools				
	Torque screwdriver	Heat gun	Wire stripper	Hydraulic pliers
				
	Torque wrench	Screwdriver	Multimeter	

6.3.2 Open the Door

Open the door before the cable is connected.

- Move upward the cover over the lock hole.
- Insert the door key and turn it clockwise
- Rotate the handle clockwise (the right door) and anti-clockwise (the left door).



6.3.3 Preparing Cables

The cables must meet the following requirements:

The current carrying capacity of the cable meets requirements. Factors affecting the current carrying capacity of a conductor include but are not limited to:

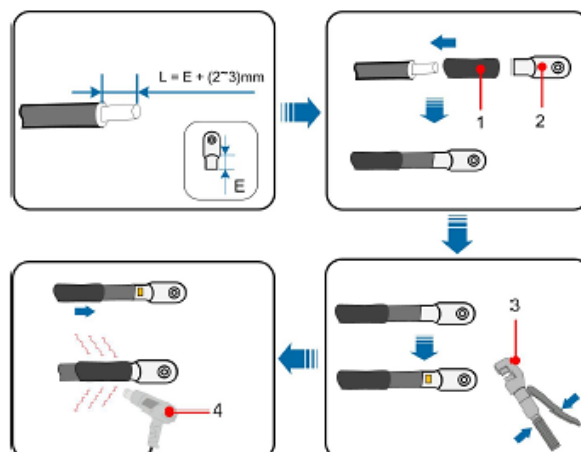
- Environmental conditions;
- Type of the insulation material of the conductor;
- Cabling method;
- Material and cross-sectional area of the cable.

- Select cables with a proper diameter according to the maximum load, and the cables should be long enough.
- Only flame-retardant cables can be used.
- AC output cables of three phases must be of the same specifications and materials.
- All DC input cables must be of the same specifications and materials.

6.3.4 Crimp Terminal

Crimp OT/DT terminals

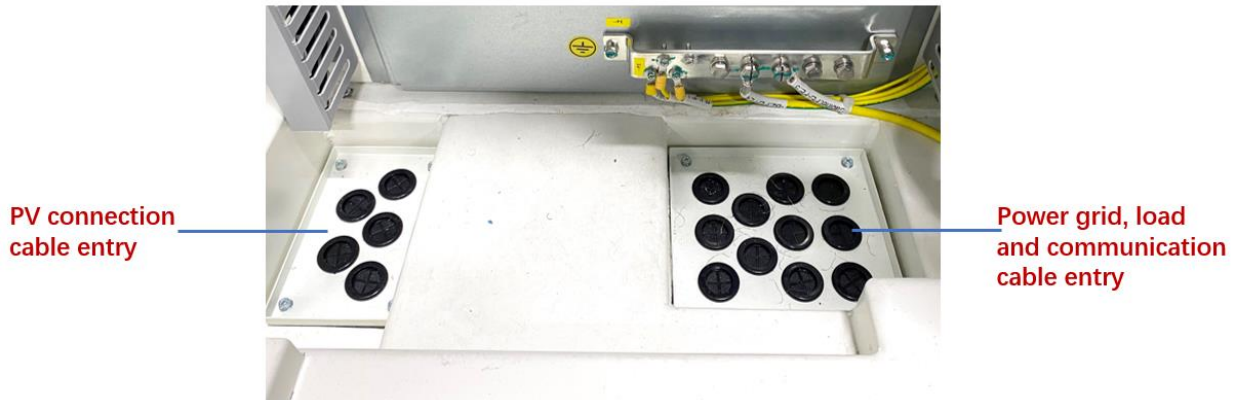
Follow the steps shown below to crimp terminal.



6.3.5 Cable Entry Design

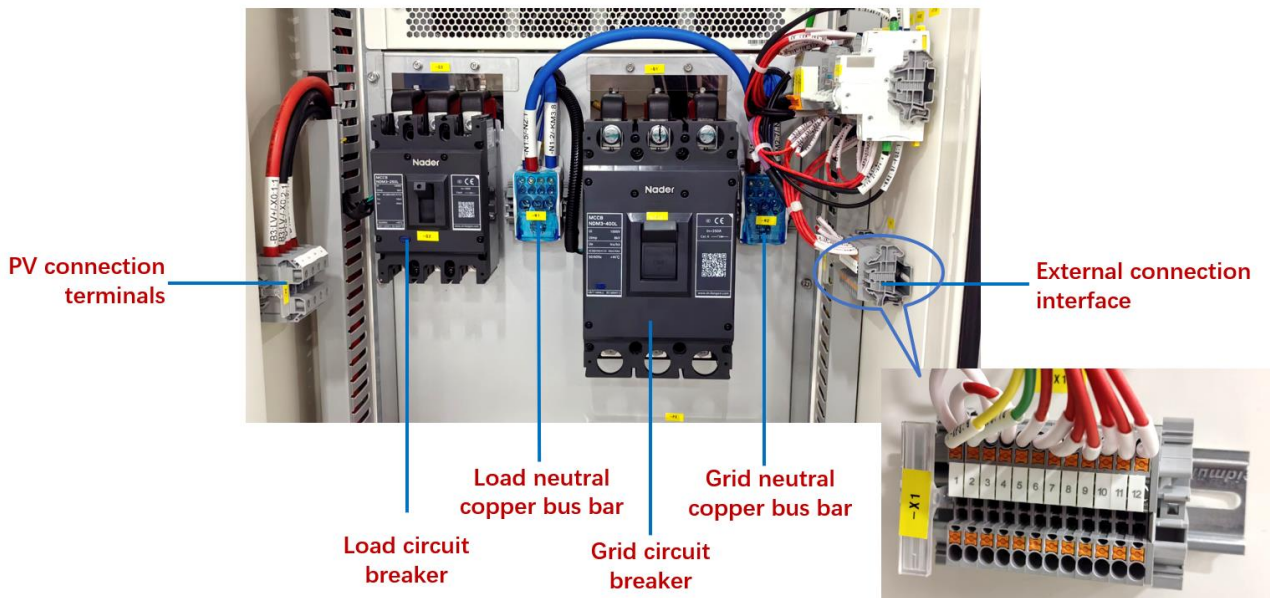
The cables connecting the outdoor cabinet and external equipment can enter the inside from the bottom cable entry of the outdoor cabinet.

Cables entry hole is shown as below:

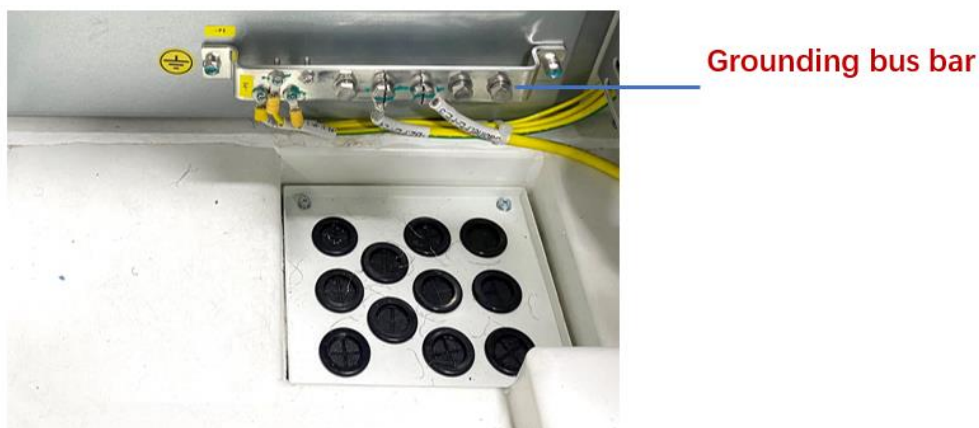


Cable entrance is from the bottom with split area for PV power cables, Grid Power cable, Load Power Cables and communication cables.

- Signal cables come in/out cabinet, Copper cable conductor cross sectional area: $0.75\text{mm}^2 \sim 1.5\text{mm}^2$
- External connection interface:
 - 2 x RS485 signal cables connect to terminal X1:1~4
 - 4 x Dry contact signal cables connect to terminal X1:5~12

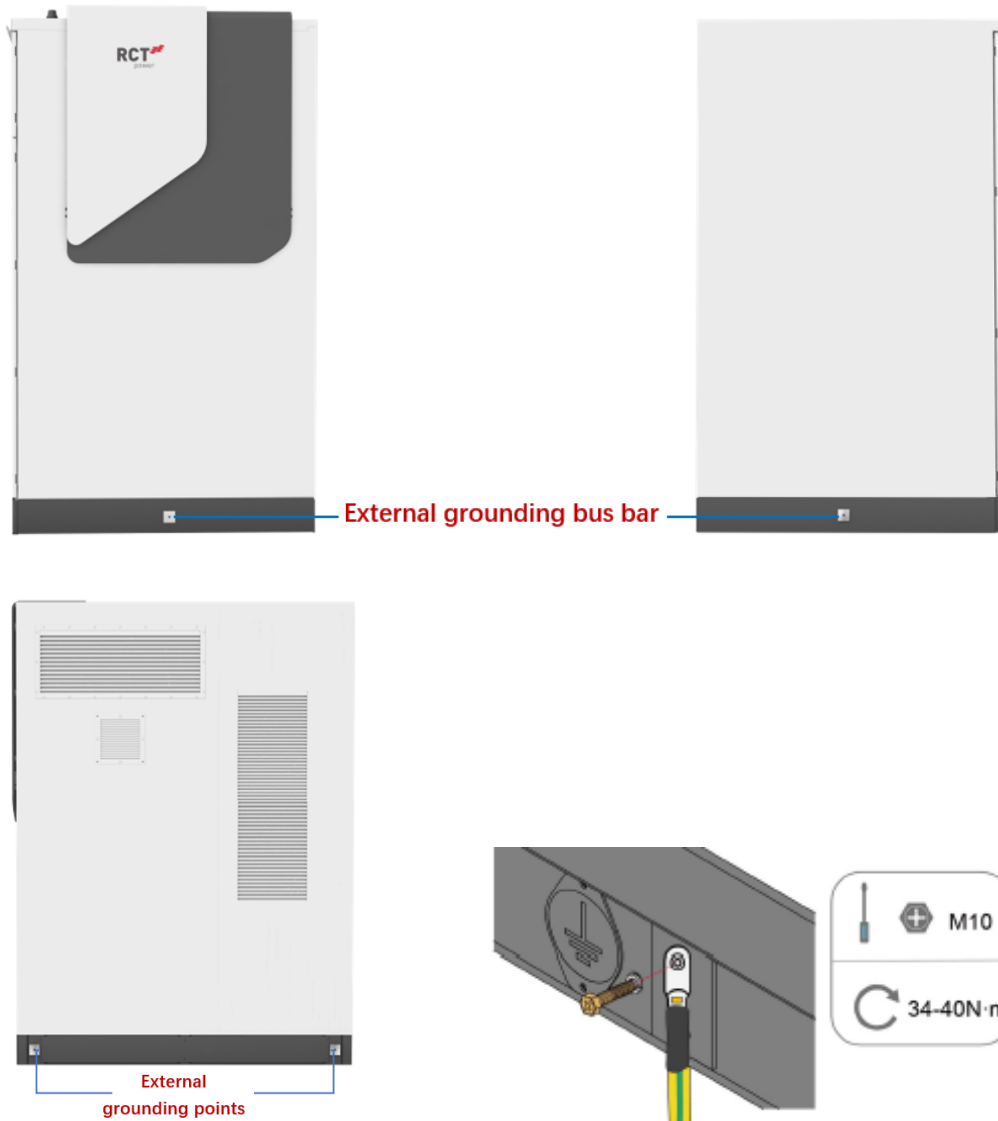


6.4 Ground Connection



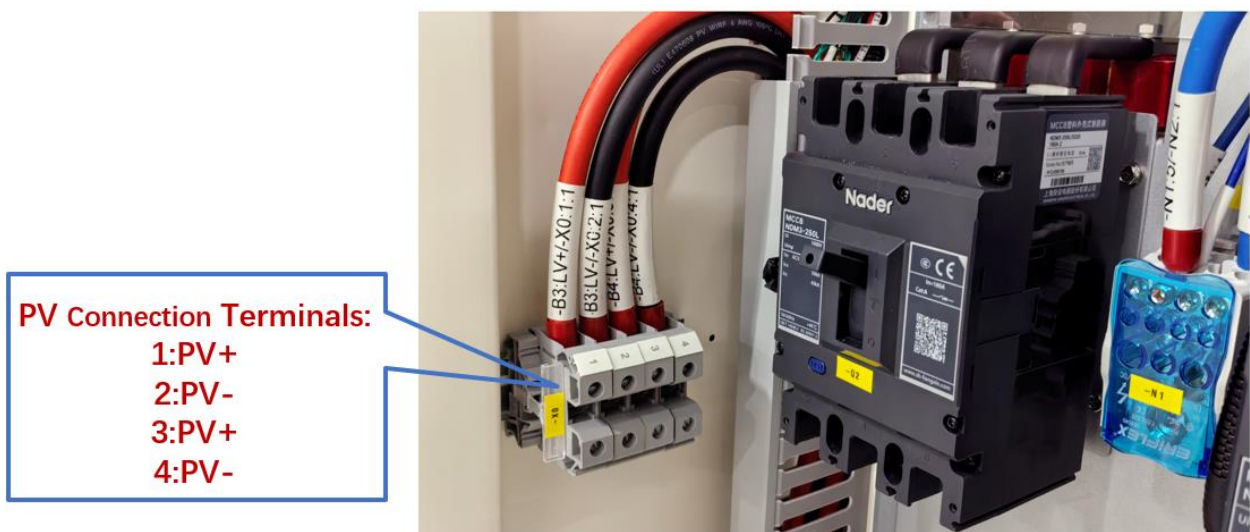
- Use a grounding cable of $70\text{ mm}^2 \sim 95\text{ mm}^2$ to ensure a reliable connection between the grounding points and the grounding points of the RCTerra Class 1.0 cabinet. (The grounding point is covered with protective tape before delivery. Remove the tape before wiring.)

- The grounding points is showing as below.



6.5 PV side DC Connection

- a. CESS233-100-01A/B



- We have 2 MPPTs for our system. So, there are total 4 positive and negative interfaces for the PV connection.
- Use copper cable conductor cross sectional area: 16mm²~25mm².

6.6 AC Connection

6.6.1 Grid Port Connection

a. CESS233-100-01A/C



b. CESS233-100-01B/D



- Grid port cables connect to terminal MCCB (L1/L2/L3) and Neutral bus bar.
Note: For AC connection, first remove the two screws on the MCCB to remove the cover, then connect the cable to the position in the above pictures, and install the cover back.
- Use copper cable conductor cross sectional area: 70mm²~150mm².

Note: Cabinets of CESS233-100-01A & C contain STS, and the cable entering into the cabinet is 120mm²; the cable entering into the cabinet of CESS233-100-01B and D is 70mm². Due to external factors such as distance and temperature, the choice of cable diameter will be affected, and the specific cable diameter will be determined according to the site situation.

6.6.2 Load Port Connection

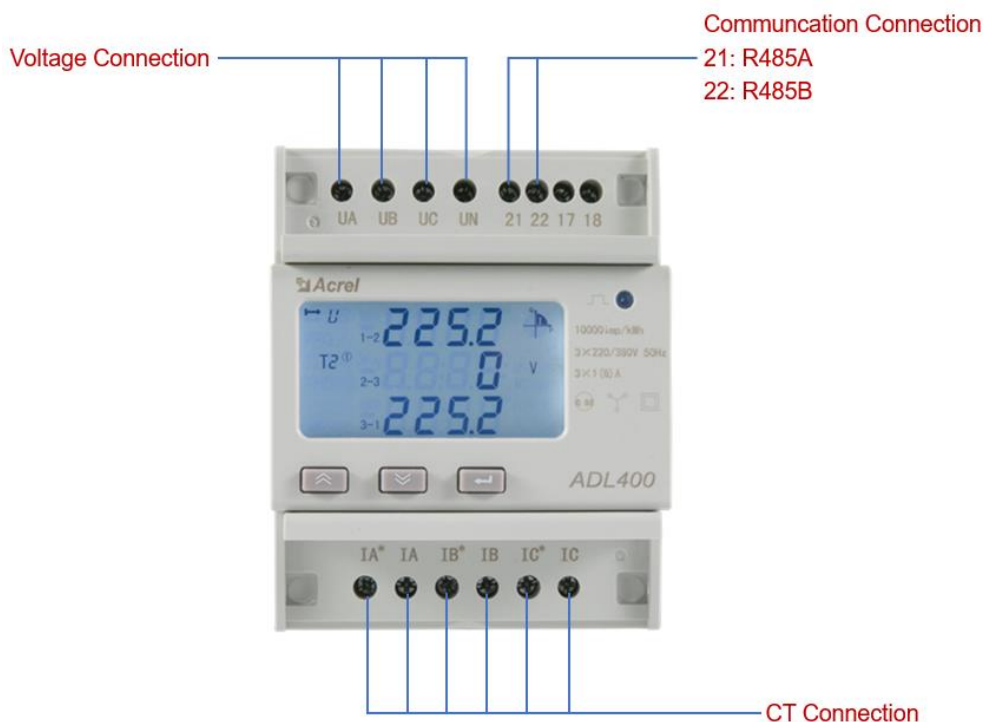
a. CESS233-100-01A/C

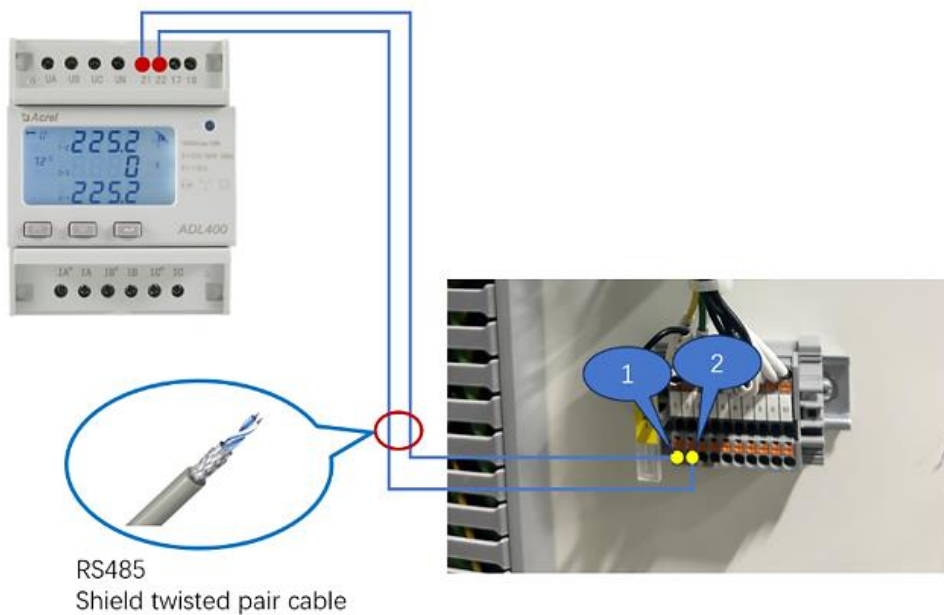


- Load port cables connect to terminal MCCB (3 phases) and Neutral bus bar.
Note: For AC connection, first remove the two screws on the MCCB to remove the cover, then connect the cable to the position in the above pictures, and install the cover back.
- Use copper cable conductor cross sectional area: 50mm² ~ 70mm².

6.7 External Meter Connection

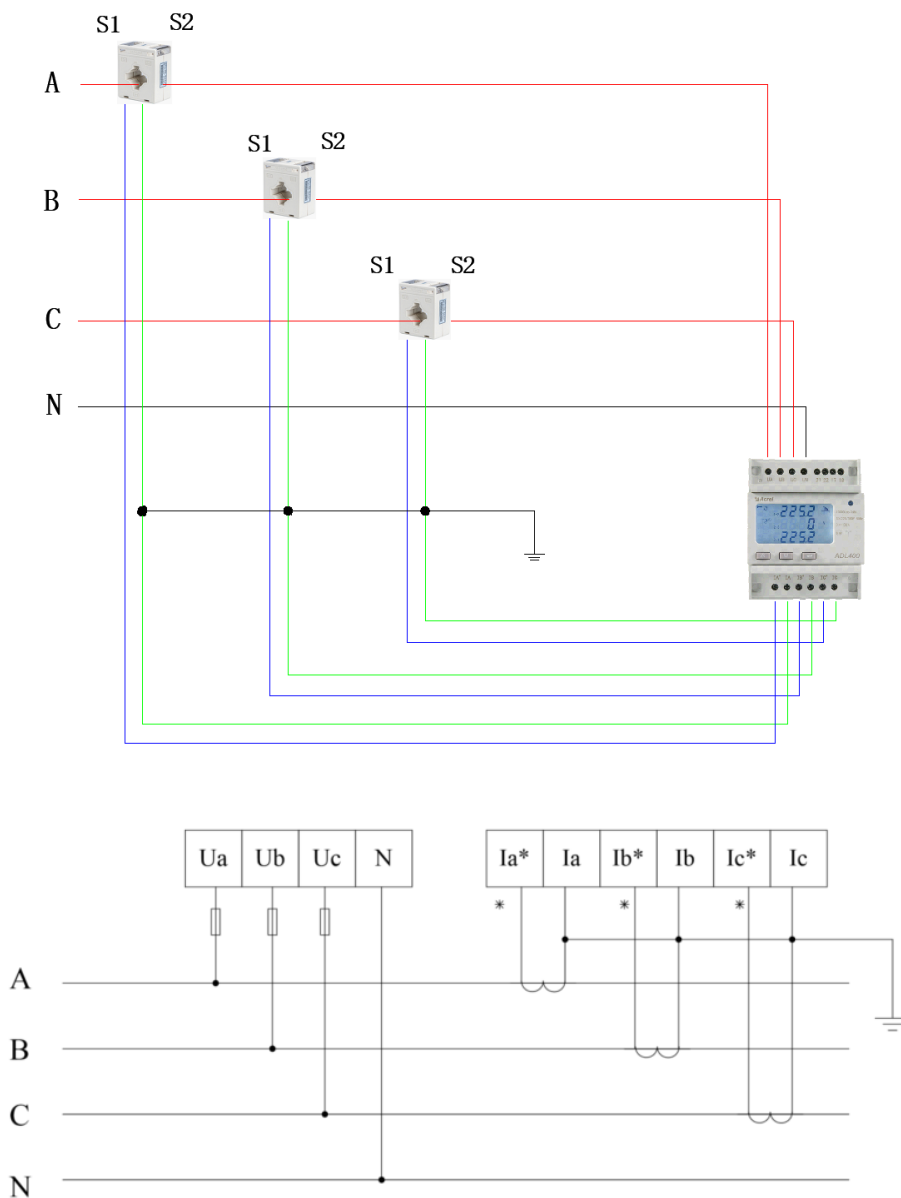
6.7.1 Meter Connection





Step: Use the shielded twisted cable to connect the port "21" on the meter with port "1" and "2" of X1 terminal array in cabinet.

6.7.2 CT Connection

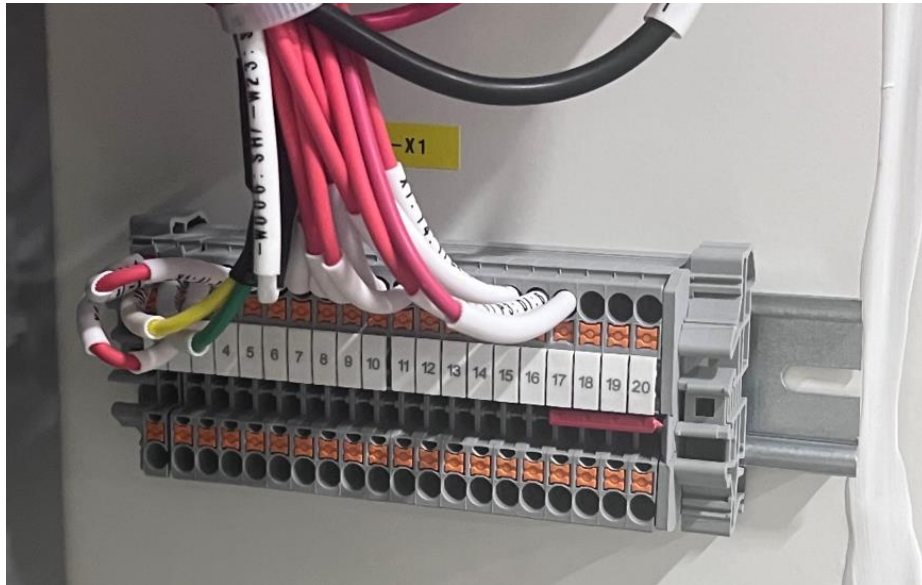




NOTICE

If the meter is rated 0.5s or above, a CT with an output current of 5A or 1A is acceptable, but if the distance is more than 10 meters, a CT with an output current of 1A is recommended.

6.7.3 DIDO Connection



- **DI ports:** 13, 14, 15, 16, 17, 18, 19, 20
- **DO ports:** 5, 6, 7, 8, 9, 10, 11, 12

DI1—13, 17; DI2—14, 18; DI3—15, 19; DI4—16, 20;
DO0—5, 6; DO1—7, 8; DO2—9, 10; DO3—11, 12;

6.8 DRM Port Connection (Australia only)

DRED means demand response enable device. The AS/NZS 4777.2:2020 required inverter need to support demand response mode (DRM). This function is for inverter that comply with AS/NZS 4777.2:2020 standard.67.

DRED is used for Australia and New Zealand installation to support several demand response modes.

DRM 0	×	DRM 1		DRM 2	
DRM 3		DRM 4		DRM 5	
DRM 6		DRM 7		DRM 8	

7 Battery MSD Installation

Before powering up our system. Please install all 5 MSDs plugs to the battery pack MSDs sockets.



■ Installation procedure

Step 1. Press latch Push lever unlock Press the button and rotate the push rod up at the same time.



Step 2. Rotate the push rod towards the opposite insert surface. Hearing a click indicates that the putter is in the pre-loaded position.



Step 3. Plug and socket housing should overlap each other.



Step 4. The socket rotation column should be fully inserted into the guide rail, and the clicking sound can be heard at this time.



Step 5. Rotary push rod 90 °.

- a. Make sure that the rotating column is all in the guide rail before rotating the push rod; otherwise, the rotating column may break.
- b. Rotate the push rod to the horizontal position, when the push rod is parallel to the mounting surface.



Step 6. Push into CPA. Nudge the red CPA with your hand.



Step 7. Install in place. Installation in place as shown in the following picture.

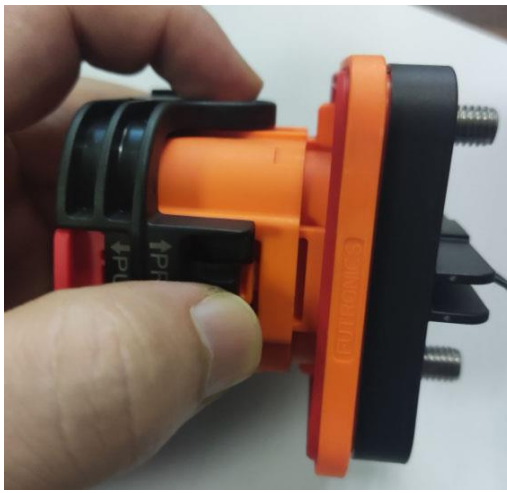


■ **Remove procedure**

Step 1. Pull back the red CPA.



Step 2. Press latch push lever unlock. Press the button and rotate the push rod up at the same time.



Step 3. Rotate the push rod towards the opposite insert surface. The feeling of a stick in the hand indicates that the putter is in place.



Step 4. Press the plug to unlock the button. Press the plug to unlock the button.



Step 5. Separation completion.

8 Powering up and Shutdown



- The RCTerra Class 1.0 cabinet can only be put into operation after confirmation by a professional and approved by the local power department.
- For RCTerra Class 1.0 cabinet with a long shutdown time, check the equipment thoroughly and carefully to ensure all indexes are acceptable before powering it on.

8.1 Inspection before Powering up

Before powering up the equipment, check the following items carefully.

- Check whether the wiring is correct.
- Check whether the protective covers inside the equipment are installed firmly.
- Check whether the emergency stop button is released.
- Check and ensure that there is no grounding fault.
- Check whether the AC and DC voltages meet startup conditions and ensure that there is no over-voltage with a multimeter.
- Check and ensure that no tools or components are left inside the equipment.
- Check all air inlets and outlets for blockage.

If the RCTerra Class 1.0 cabinet has been stored for more than six months, the top radiator fan should be checked for proper rotation, noise or stalling before powering up.

8.2 Powering up Steps

Step 1 Power up the Cabinet

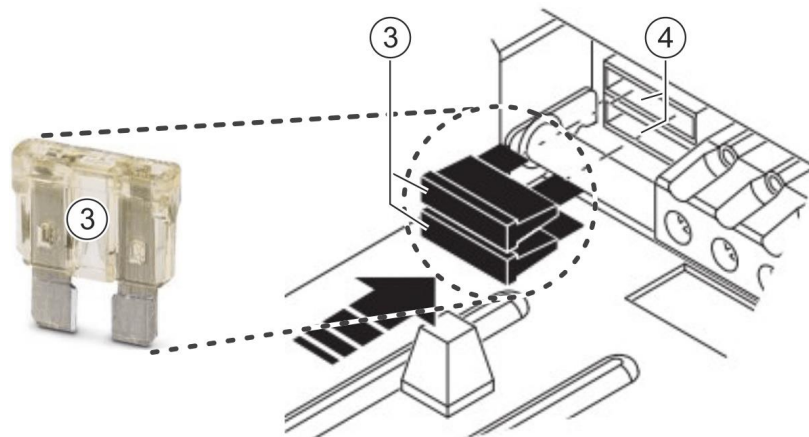
- Open 2 front doors and open the EMS protective cover window by using the keys delivered with the cabinet.
- Install the MSD to the battery pack. There are 5 battery packs need to be installed with MSD. (For the installation step, please see the part "[Battery MSD installation](#)")
- Install the 24V DC power supply fuse.
 - a) Press the two latches (1) and open the front flap (2).



- b) Insert the flowing cable.



c) Insert the 24 V fuse (3) into the holder (4).



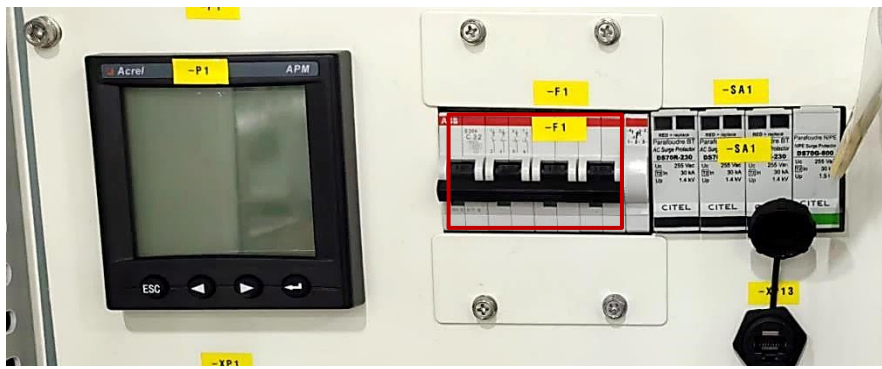
d) Close the front flap (2) again until the two locks (1) engage.

Step 2 Power up the Cabinet

- Close the AC grid port circuit breaker Q1 (CESS233-100-01A/B/C/D), and load port circuit breaker Q2 (CESS233-100-01A/C).



- Close the SPD1 switch F1.



- Close the main auxiliary power switch Q3.



- Close the switch F2, chiller switch F3, dehumidifier switch F4, illumination switch F5, ventilation fan switch F6, and UPS switch F7.



- Close the fuse terminals X3.



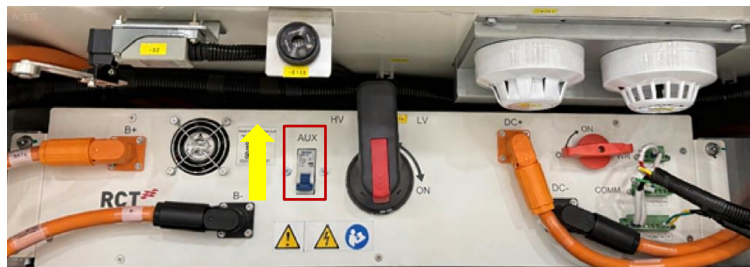
- Close the UPS switch F8.



- Turn on the QS2 switch of the BMS.
Note: Minimize prolonged idling of the discharge end. The 24V power comes from the battery system. Long idling means constant 24V output. If the discharge end idles for over 3 days, with individual cell voltage under 2.5V for 30 minutes straight, the QS2 switch will cut off 24V output. Then, the equipment need to be repowered and recharged. After the system experiences an extended shutdown lasting over one week, the main switch of the switch gear and the QS2 must be turned to the OFF position to prevent the battery system from becoming over-discharged and unable to restart.



- Turn on the BMS auxiliary 24V DC supply switch. And the BMS could get power and start the self-inspection.



- Turn on the total DC switch clockwise.



- Open the door of the fire control panel by key and connect the red cable to the 24V lead-acid battery (If the fire control panel still rings, you can turn the key clockwise to power and then turn it back, and then click the reset button).



8.3 Shutdown Steps

Step 1 Shutdown the EMS Software

- Shutdown PCS and BMS through EMS system (refer to [12.8.1](#) and [12.8.2](#) for details).
- For the EMS setting. Please read the instruction of EMS following contents.

Step 2 Shutdown the Cabinet

- Open the right battery enclosure door and the left electrical enclosure door.
- Disconnect the switch F2, chiller switch F3, dehumidifier switch F4, illumination switch F5, ventilation fan switch F6, and UPS switch F7.
- Disconnect the main auxiliary power switch Q3.
- Disconnect the fuse terminals X3.
- Disconnect the switch F1.
- Disconnect the UPS switch F8.
- Turn off the total DC switch by anti-clockwise.
- Turn off the BMS 24V DC auxiliary power supply switch.
- Disconnect the QS2 switch of the BMS.
- Disconnect the AC grid port circuit breaker Q1 (CESS233-100-01A/B/C/D) and load port circuit breaker Q2 (CESS233-100-01A/C).
- Remove the red cable from the 24V lead-acid battery.
- If the cabinet is left for a long time (for example, more than one week), at least one MSD is removed to ensure that the DC side is powered off.
- Close all the door.

9 The Thermal Management System

The TMS system is liquid cooling, which main function is to maintain the temperature of the battery system to an allowable operating temperature range. Following is the coolant pipe layout.

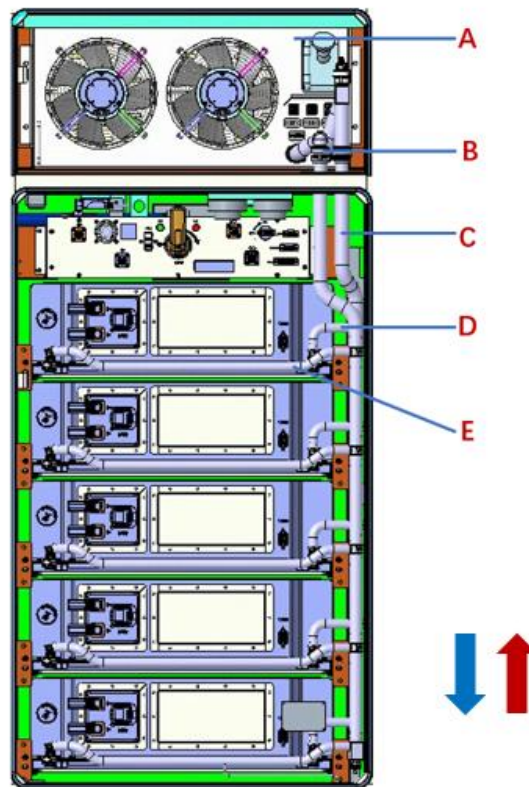


Fig. 9-1 Thermal management system

Item.	Description
A	Chiller
B	Main Coolant Inlet Pipe Line
C	Main Coolant Outlet Pipe Line
D	Sub Coolant Outlet Pipe Line
E	Sub Coolant Inlet Pipe Line

Blue arrow: Low temperature; Red arrow: High temperature.

Cooling power is auto-adjustable according to ambient temperature & discharge/charge status. TMS system components' working status is depend on the target battery cell temperature controlling by BMS.

Coolant: BASF Glysantin G30 50% concentration

Refrigerant pipe line pressure: 3.5Mpa

Coolant pipe line pressure: <3bar

10 Fire Suppression

10.1 General Rules

Please comply with the fire laws and regulations of the country/region where the project is located. Check and maintain the fire equipment regularly to ensure a normal operation of all functions.

10.2 Fire Suppression Equipment

The RCTerra Class 1.0 cabinet has an aerosol fire suppression system that can effectively extinguish the fire. It is equipped with combustible gas detectors, smoke detectors, and temperature detectors. If any abnormality is detected, the system sends a signal to the station-level alarm host through the electrical compartment external terminal for early warning of fire.



NOTICE

Combustible gas detectors need to be functionally tested and calibrated every year to ensure the detection accuracy.

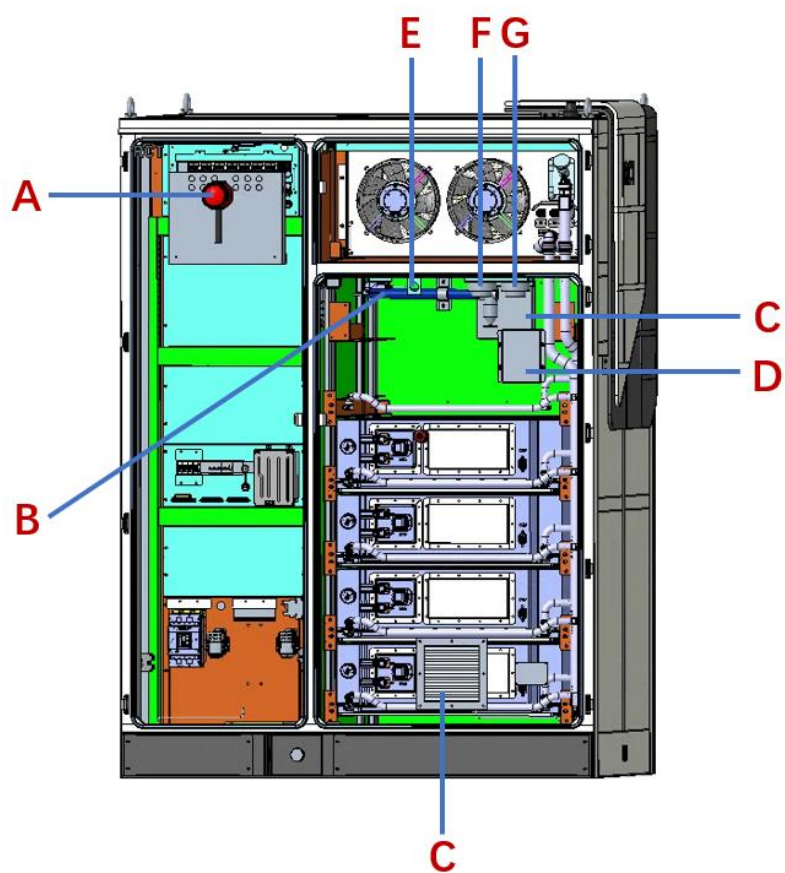


Fig. 10-1 Firefighting equipment

Item.	Description
A	Strobe and siren
B	Dry pipe and sprinkler
C	Exhaust fan
D	Aerosol fire suppression generator
E	Mixed gas detector
F	Smoke detector
G	Temperature detector

10.3 Exhaust System

When the concentration of combustible gas is detected to reach setting value, the combustible gas detector in the cabinet sends a signal to the EMS for fire warning, while the signal is transmitted to the EMS to shut down the system and turn on the exhaust system (start the air intake equipment and exhaust equipment).

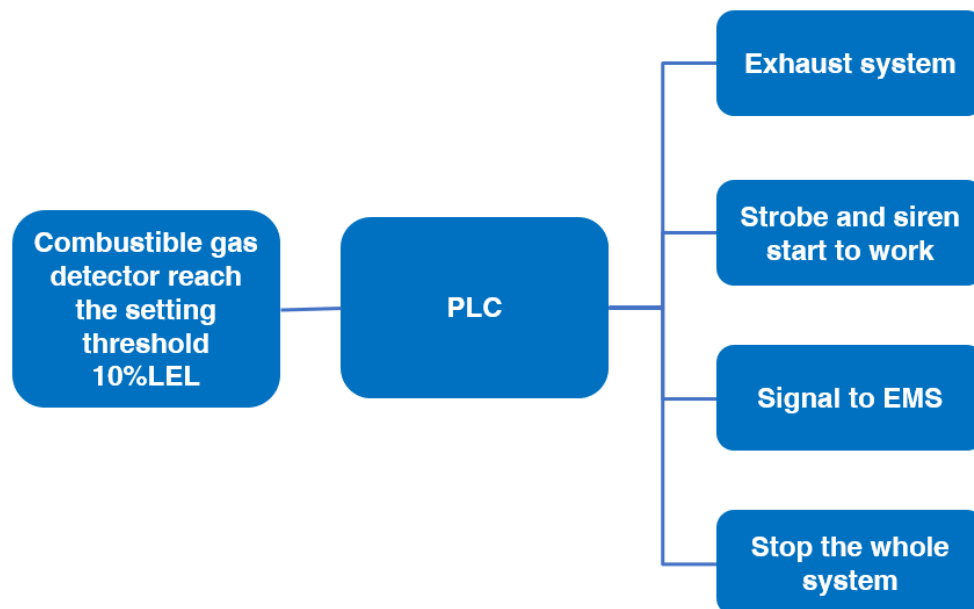
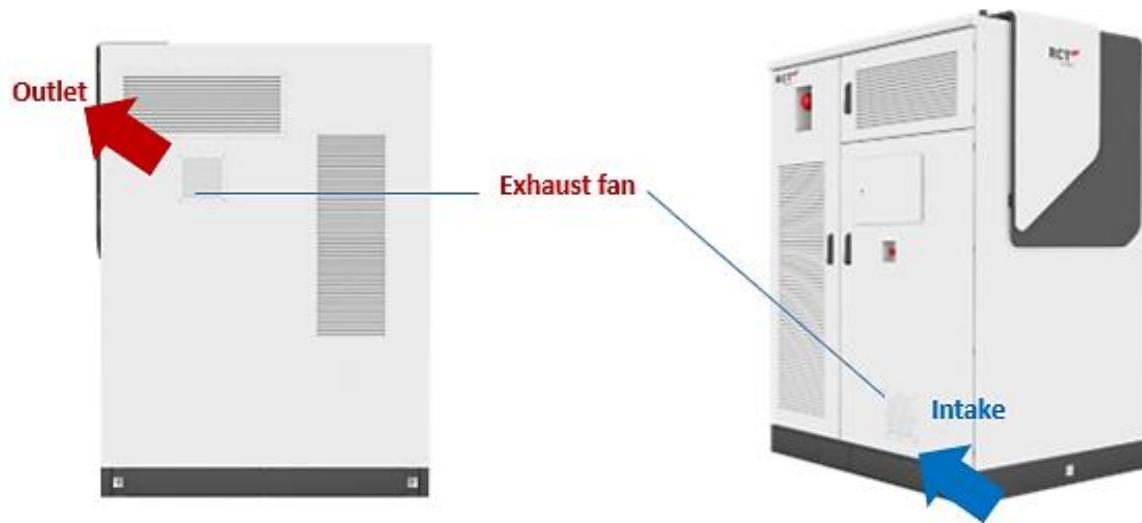


Fig. 10-2 Principle of exhaust system

10.4 Water-based Fire Protection System

The RCTerra Class 1.0 cabinet is equipped with water-based fire protection system. External firefighting water sources are introduced through the water inlet at the lower front of the cabinet. The water is conveyed via internal dry pipelines to the battery cabinet, where specialised sprinkler convert the water flow into water mist to implement firefighting. This process provides forced cooling to the battery clusters, isolates oxygen, and suppresses the spread of thermal runaway, thereby achieving rapid fire suppression and preventing reignition.

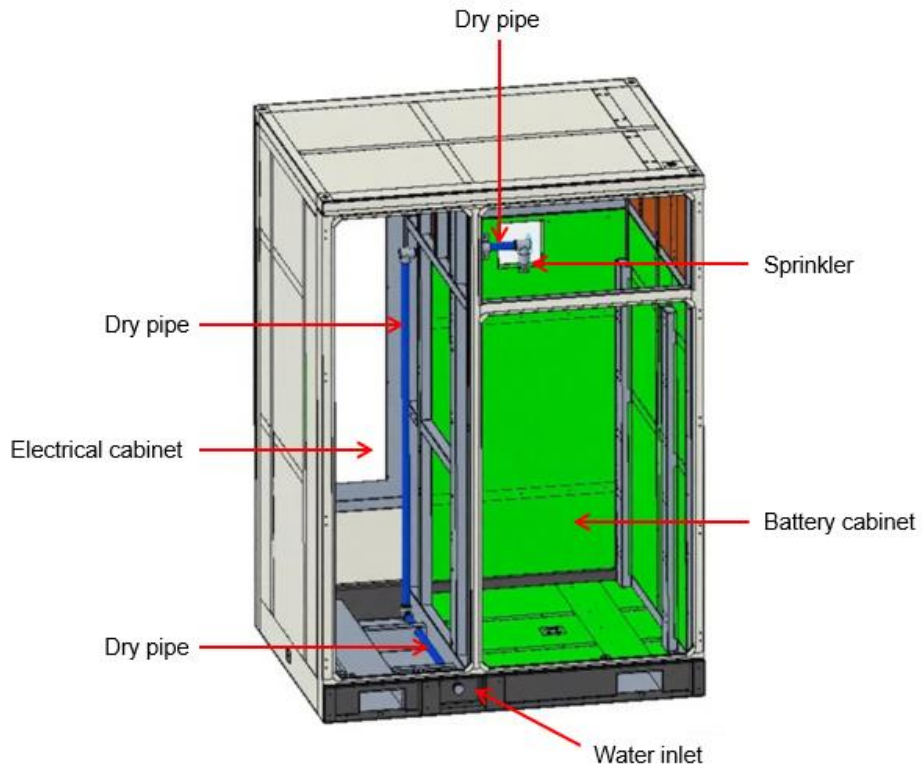


Fig. 10-3 Water-based fire protection system

10.5 Aerosol Fire Suppression System

The RCTerra Class 1.0 cabinet is equipped with an aerosol fire suppression system. Aerosol generators are automatic units which are thermally activated. The aerosol fire suppression system is automatically activated when the smoke and temperature detector reach the setting threshold.



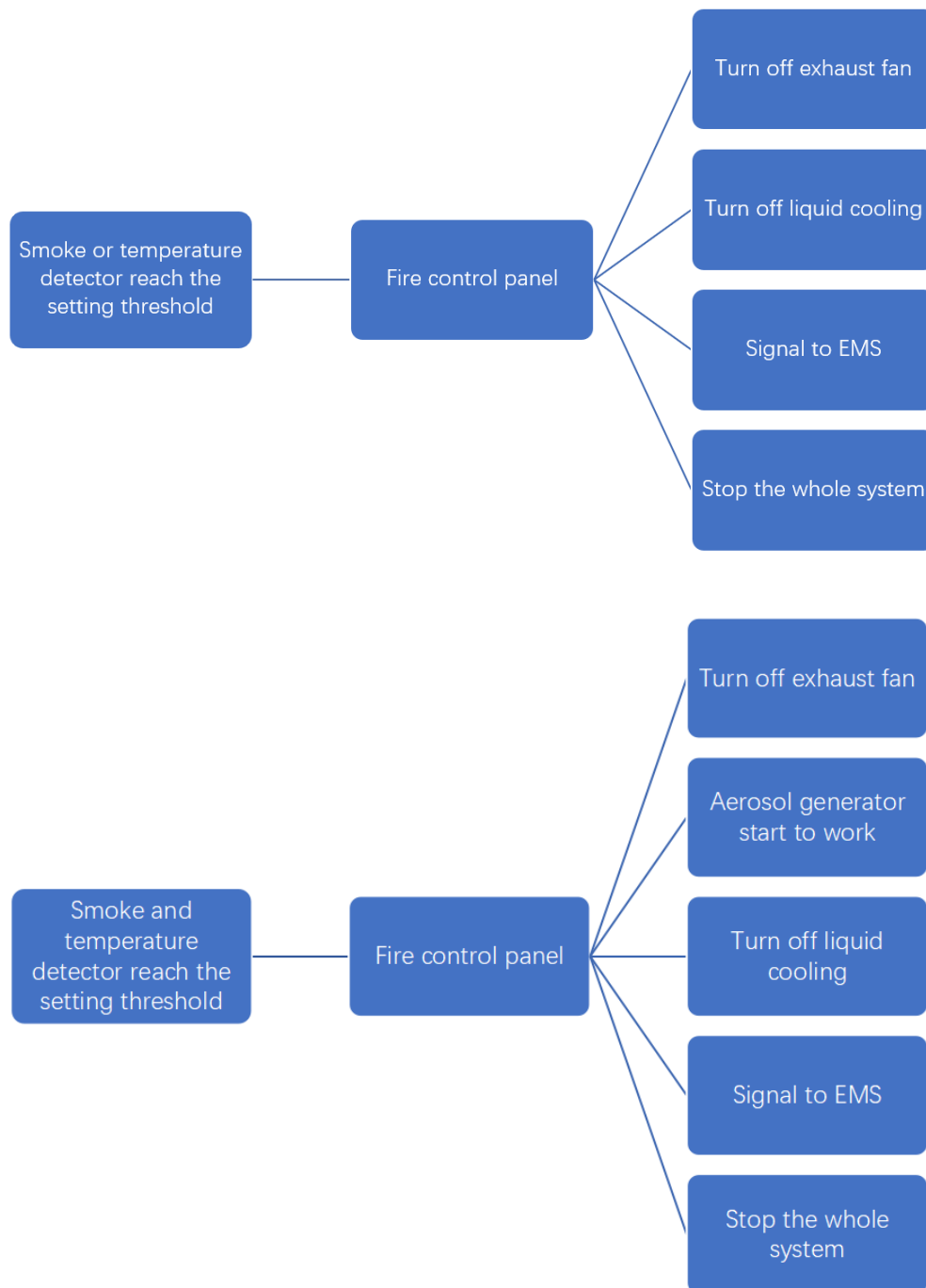


Fig. 10-4 Principle of aerosol fire suppression system

11 Dehumidifier Instruction

11.1 Dehumidifier Setting

After booting, the dehumidifier enters the self-test state, after the self-test is completed, the dehumidifier enters the working state after 3 seconds, and the digital tube displays the humidity value of the cabinet.



Item.	Description
Manual / Auto	The indicator is on, indicating that the dehumidifier is operating manually. The indicator is off, indicating that the dehumidifier is running automatically.
Dehumidifying	If the indicator is steady on, it indicates that the device is dehumidifying. If the indicator is off, it indicates that dehumidification is complete. (Manual light is not on, indicating automatic dehumidification; manual light is on, indicating manual dehumidification.)
Comm	If the indicator is on, it indicates that host data is being received at this time.
Fault	If the indicator light is on, it indicates that the device is faulty.

11.2 Display Description

1. Manual mode: When the dehumidifier works in the automatic state, the "manual" indicator is off. After pressing the "Manual/OK" button, the "manual" indicator is steady on. When the "Manual" indicator is on, the dehumidifier starts the dehumidifier module, press the " Manual/OK " button again, the dehumidifier automatically switches to automatic mode.

2. Parameter setting mode: After the power is turned on, the dehumidification device self-test passes, automatically enter the automatic mode. The left digit displays the current temperature value, the right digital tube shows the current humidity value. Press the "Set/Exit" button to set the dehumidification start value and dehumidification off value.

2.1 Setting the Humidity Startup Value: When the dehumidifier works normally (the current humidity value and temperature value are displayed respectively on the two digital tubes), press the "SET/Exit" button, the dehumidifier enters the setting state, and the digital tube displays "H" (The first digit of the left digital tube shows "H", indicating that the two digits on the right are the humidity start value; the first digit of the left digit shows "L", indicating that the right two digits are the humidity off value at this time; the first digit of the digital tube on the left shows "t", indicating that the two digits on the right are the starting value of temperature). Press the "↑" or "↓" button to change the starting value of humidity and then press the " Manual/OK " button to save the settings, the humidity startup value setting is modified successfully.

2.2 Set the humidity off value: When the dehumidifier works normally (the current humidity value and temperature value are displayed respectively on the two digital tubes), press the "SET/Exit" button, and the dehumidifier enters the setting state. Press the "SET/Exit" button repeatedly until "L" is displayed on the first part of the digital tube on the left side (The first digit of the left digital tube shows "H", indicating that the two digits on the right are the humidity start value; the first digit of the left digit shows "L", indicating that the right two digits are the humidity off

value at this time; the first digit of the digital tube on the left shows “t”, indicating that the two digits on the right are the starting value of temperature). Press the "↑" or "↓" button to change the off value of humidity and then press the " Manual/OK " button to save the settings, the humidity off value setting is modified successfully.

2.3 Set the temperature startup value: When the dehumidifier works normally (the current humidity value and temperature value are displayed respectively on the two digital tubes), press the "SET/Exit" button, and the dehumidifier enters the setting state. Press the "SET/Exit" button repeatedly until “t” is displayed on the first part of the digital tube on the left side (The first digit of the left digital tube shows “H”, indicating that the two digits on the right are the humidity start value; the first digit of the left digit shows “L”, indicating that the right two digits are the humidity off value at this time; the first digit of the digital tube on the left shows “t”, indicating that the two digits on the right are the starting value of temperature). Press the "↑" or "↓" button to change the temperature startup value and then press the " Manual/OK " button to save the settings, the temperature startup value setting is modified successfully.

3. Communication address adjustment: Power on, dehumidifier in the self-test state, press the "↓" button to enter the communication address adjustment interface, at this time you can press the"↑" or "↓" button to adjust the communication address. After adjustment, press the "Manual/OK" button to save and press the "SET/Exit" button to exit.

4. Viewing the temperature: On the main screen of the dehumidifier, press the "↓" button to display the internal temperature. After 8 seconds, the humidity is displayed the humidity automatically or press the "↓" button to display the humidity.

5. 485 Communication: The dehumidification device has the function of data upload and remote control, the specific communication protocol is attached.

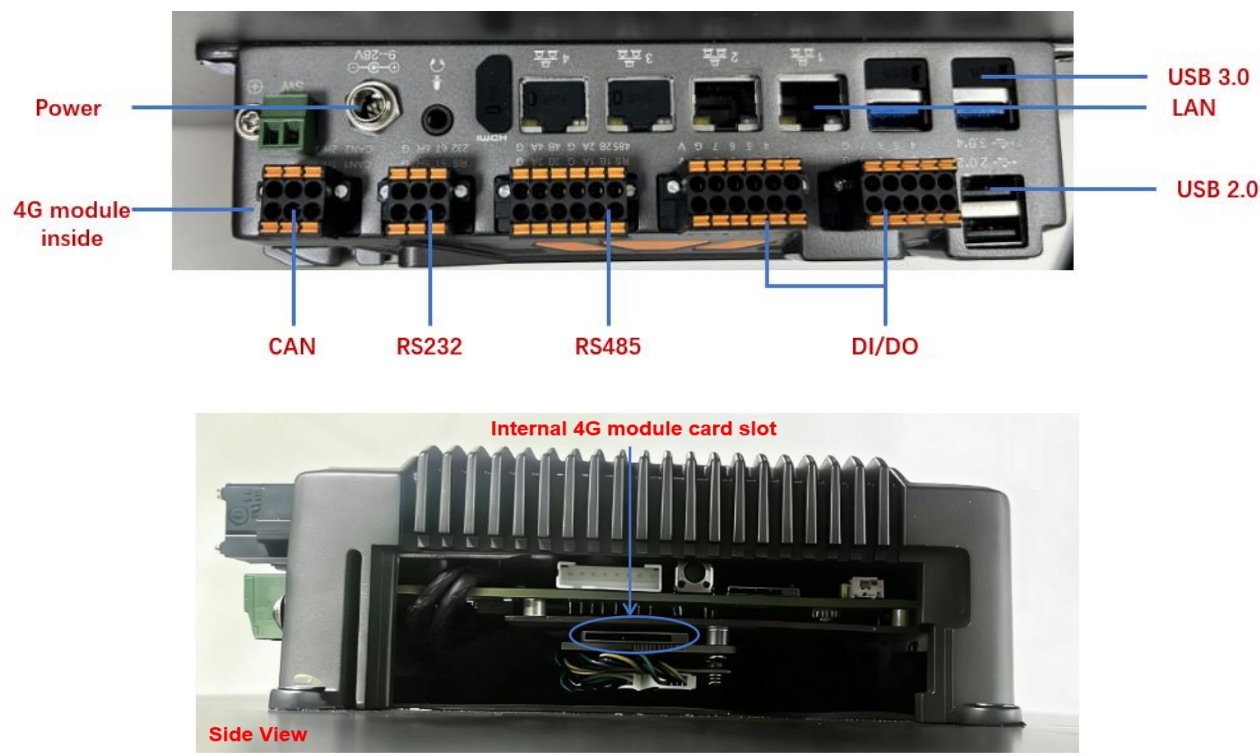
6. Fault display description: When the humidity value is displayed, the digital tube displays "--", indicating that the humidity sensor is faulty or there are water beads on the humidity sensor; If "--" is displayed when the temperature value is displayed, the temperature sensor is faulty.

- The fault code is as follows:
- E1: The external temperature sensor is faulty.
 - E2: Cold surface temperature sensor failure.
 - E3: Hot surface temperature sensor failure.
 - E4: The external ambient temperature is too high.
 - E5: The internal ambient temperature is too high.

 NOTICE	■ The temperature disconnect value does not need to be set, the software automatically adjusts, the return difference is 5°C. For example, if the start temperature is set to 10 ° C, the disconnect temperature is set to 15 ° C. ■ When the device is equipped with an external heater, click the "↓" button to check the external temperature. Press the "↓" button again, view internal temperature.
--	--

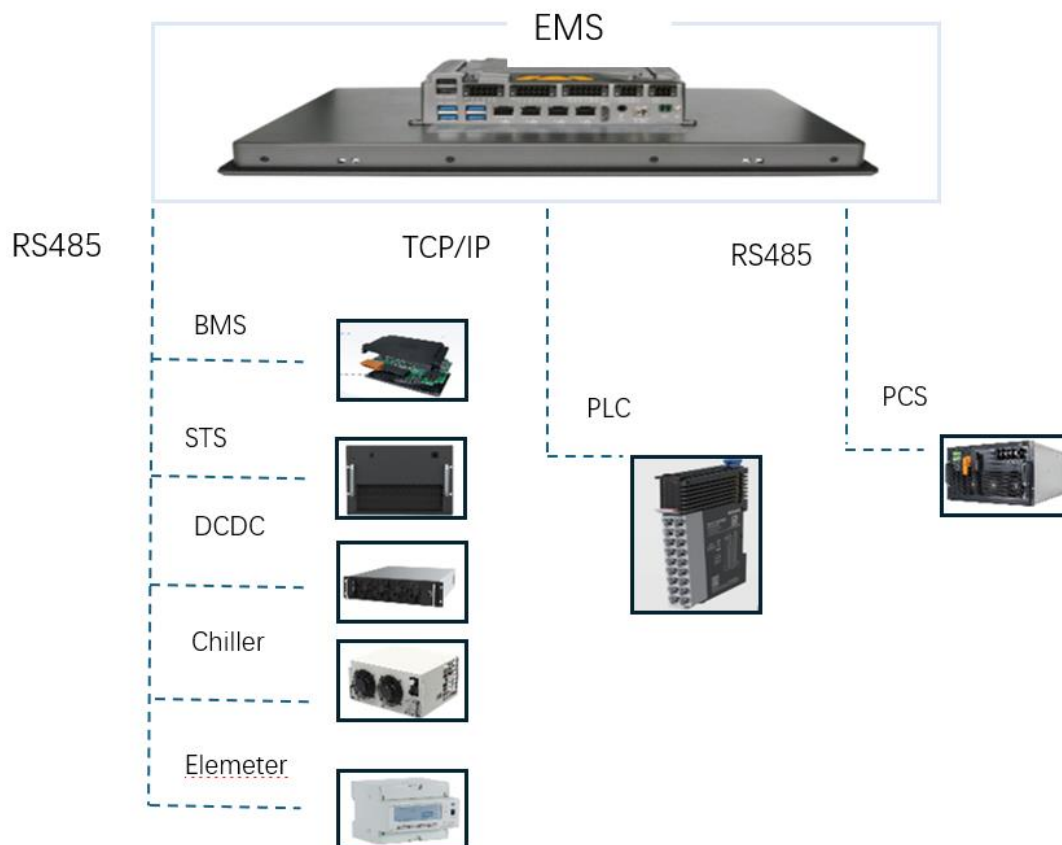
12 EMS Instruction

12.1 Touch Panel Interface



Note: The 4G module card slot is located within the touch panel and currently supports select carriers only.

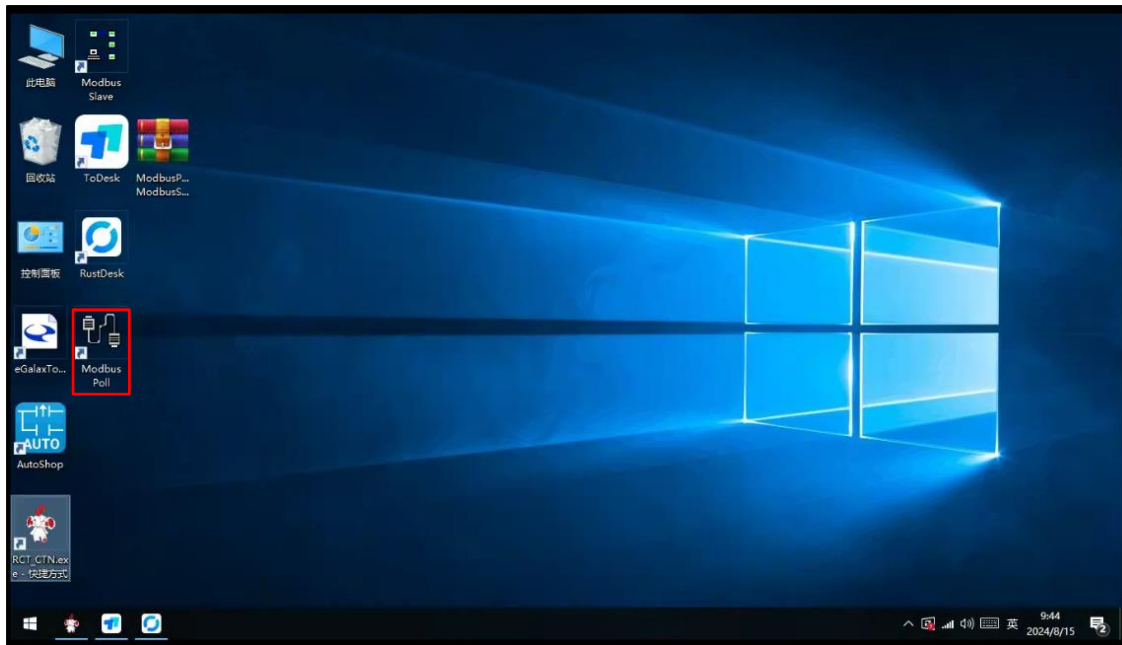
12.2 System Chart



12.3 Modbus Poll Communication

Note: During hardware debugging, ensure that cables are connected to all devices and auxiliary power supply is complete.

1. Remotely connect the industrial computer of the storage cabinet.
2. Open Modbus Poll on the industrial control computer of the energy storage cabinet to test the communication. The connection method is shown below.



1) PCS

■ Connection Setup (As shown in figure 1)

Connection: Serial port;

Serial Settings: COM1;

9600 Baud, 8 Data bits, None Parity, 1 Stop Bit;

■ Read/Write Definition (As shown in figure 2)

Slave ID: 1; If it is with STS, the stations are in order, and the station ID is 2.

Function: Select according to PCS manual; register: 03 ;

Address: Select according to PCS manual; address: 29184;

Quality: Fill in as needed (Default 10); Read: 100.

2) BMS

■ Connection Setup (As shown in figure 1)

Connection: Serial port;

Serial Settings: COM2;

9600 Baud, 8 Data bits, Node Parity, 1 Stop Bit;

■ Read/Write Definition (As shown in figure 2)

Slave ID: 2;

Function: Select according to PCS manual; register: 04 ;

Address: Select according to PCS manual; address: 8193;

Quality: Fill in as needed (Default 10); Read: 100.

3) Meter

■ ADL400 Connection Setup (As shown in figure 1)

Connection: Serial port;
Serial Settings: COM3;
9600 Baud, 8 Data bits, None Parity, 1 Stop Bit;

■ Read/Write Definition (As shown in figure 2)

Slave ID: 1;
Function: Select according to meter manual; register: 03 ;
Address: Select according to PCS manual; address: 0;
Quality: Fill in as needed (Default 10); Read: 100.

■ ADL100 Connection Setup (As shown in figure 3)

Connection: Serial port;
Serial Settings: COM3;
9600 Baud, 8 Data bits, Node Parity, 1 Stop Bit;

■ Read/Write Definition (As shown in figure 2)

Slave ID: 2;
Function: Select according to meter manual; register: 03 ;
Address: Select according to PCS manual; address: 0;
Quality: Fill in as needed (Default 10); Read: 100.

4) Chiller

■ Connection Setup (As shown in figure 1)

Connection: Serial port;
Serial Settings: COM4;
9600 Baud, 8 Data bits, Node Parity, 1 Stop Bit;

■ Read/Write Definition (As shown in figure 2)

Slave ID: 1;
Function: Select according to meter manual; register: 03 ;
Address: Select according to PCS manual; address: read 2001, write 3001;
Quality: Fill in as needed (Default 10); read: 18, write: 1.

5) PLC

■ Connection Setup (As shown in figure 3)

Connection: Modbus TCP/IP;
IP Address or Node Name: 192.168.0.100;

■ Read/Write Definition (As shown in figure 2)

Slave ID: 1;
Function: Select according to PLC manual; register: 03 ;
Address: Select according to PLC manual; address: 0;
Quality: Fill in as needed (Default 10); read: 100.

6) STS

■ Connection Setup (As shown in figure 1)

Connection: Serial port;
Serial Settings: COM1;

9600 Baud, 8 Data bits, Node Parity, 1 Stop Bit;

- Read/Write Definition (As shown in figure 2)

Slave ID: 1;

Function: Select according to meter manual; register: 03 ;

Address: Select according to PLC manual; address: 0;

Quality: Fill in as needed (Default 10); read: 100.

7) DCDC

- ◆ **Boost**

- Connection Setup (As shown in figure 1)

Connection: Serial port;

Serial Settings: COM1;

9600 Baud, 8 Data bits, Node Parity, 1 Stop Bit;

- Read/Write Definition (As shown in figure 2)

Slave ID: 1;

Function: Select according to meter manual; register: 03 ;

Address: Select according to PLC manual; address: 0;

Quality: Fill in as needed (Default 10); read: 100.

- ◆ **Buck**

- Connection Setup (As shown in figure 1)

Connection: Serial port;

Serial Settings: COM1;

9600 Baud, 8 Data bits, Node Parity, 1 Stop Bit;

- Read/Write Definition (As shown in figure 2)

Slave ID: 1;

Function: Select according to meter manual; register: 03 ;

Address: Select according to PLC manual; address: 0;

Quality: Fill in as needed (Default 10); read: 100.

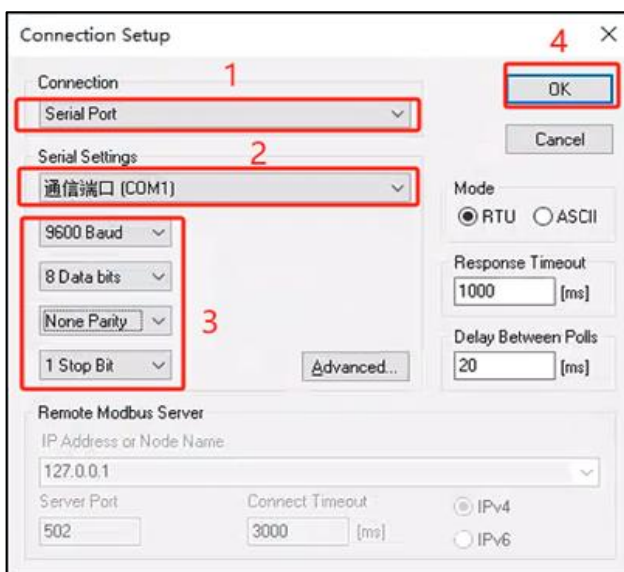


Figure 1

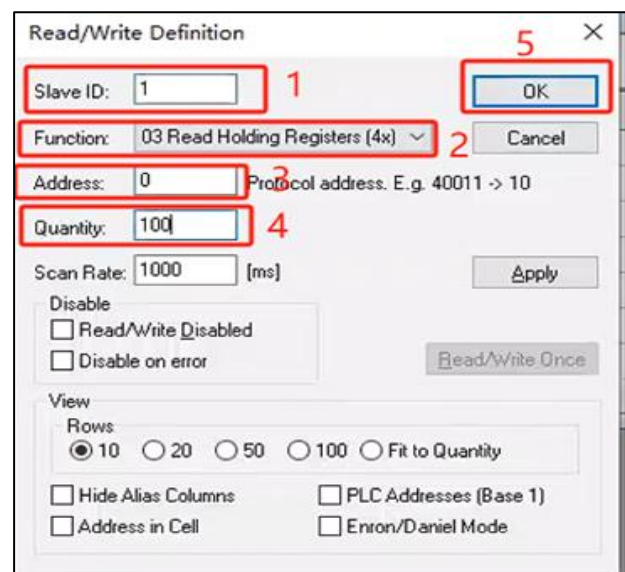


Figure 2

Connection Setup

Connection: **Modbus TCP/IP**

Serial Settings:

- COM7
- 9600 Baud
- 8 Data bits
- None Parity
- 1 Stop Bit

Mode: ☒ RTU ☐ ASCII

Response Timeout: 1000 [ms]

Delay Between Polls: 20 [ms]

Remote Modbus Server:

IP Address or Node Name: 192.168.0.100

Server Port: 502

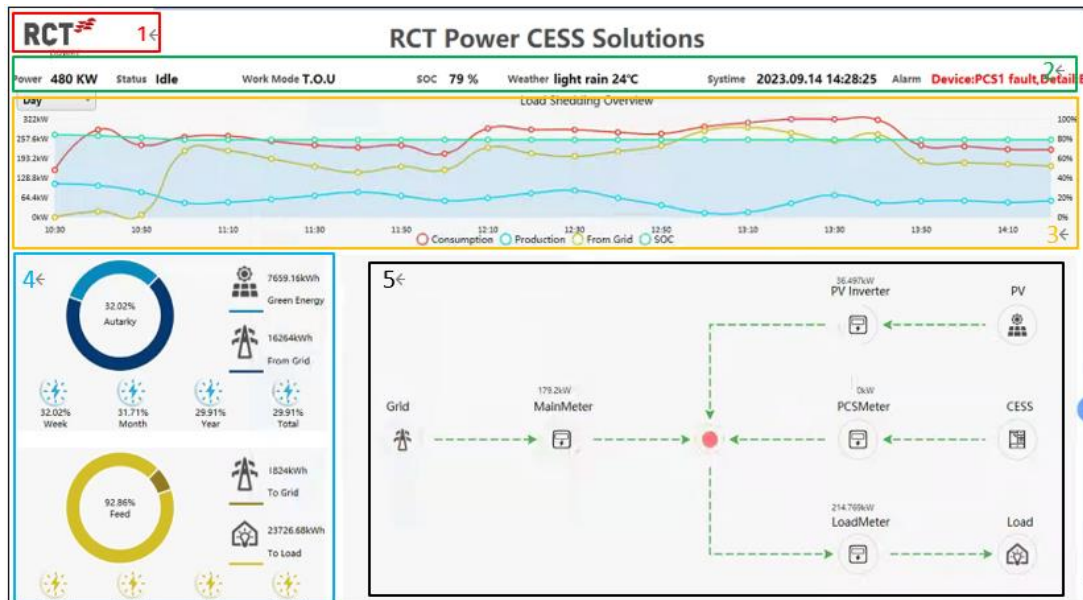
Connect Timeout: 3000 [ms]

☒ IPv4 ☐ IPv6

OK Cancel

Figure 3

12.4 UI



No.	Description
1	Click the “RCT Power” logo with left mouse button, you will return the main home page. Click the right mouse button, you will see the menu bar.
2	Energy storage equipment operation information: power operation, charge and discharge state, working mode, battery SOC, weather, system time, alarm equipment
3	Green Power (Daily)
4	Graph: Blue chart: The energy distribution generated by the storage cabinet this week (PV & Grid) . Yellow chart: The energy consumption distribution of the storage cabinet this week (Load & Grid) .
5	Energy diagram

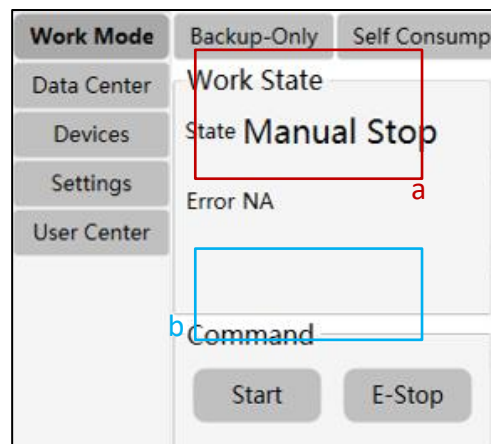
12.5 Work Mode

All the work modes are based on the demand management. Minimizing the peak power from the grid. And in some countries, we couldn't feed the energy to the grid. But in some places, it's available.

Mode	Description
Backup-only	Customers could set a minimum SOC value % manually. Our system should ensure there is enough capacity in our product to face the next load shedding (grid outage) period. Meanwhile our system could control the external diesel to switch on/off to feed the load if there is not enough capacity in our battery.
T. O. U	Under this mode customers could set the charge and discharge time and power according to local time-of-use price.
Self-consumption	Maximize using the power from the solar roof.
Storm mode	System will react the incoming storm via the build-in weather forecast. And a warning notice will be showed on the error log area. And customers could switch on this mode manually.
Off-grid	Create your own micro power grid independently.
Backup T.O.U	Combine backup-only and T.O.U mode together.
Self-backup	Combine Backup-only and Self-consumption modes together.
Self-peak shaving	Combine Peak Shaving and Self-consumption modes together.

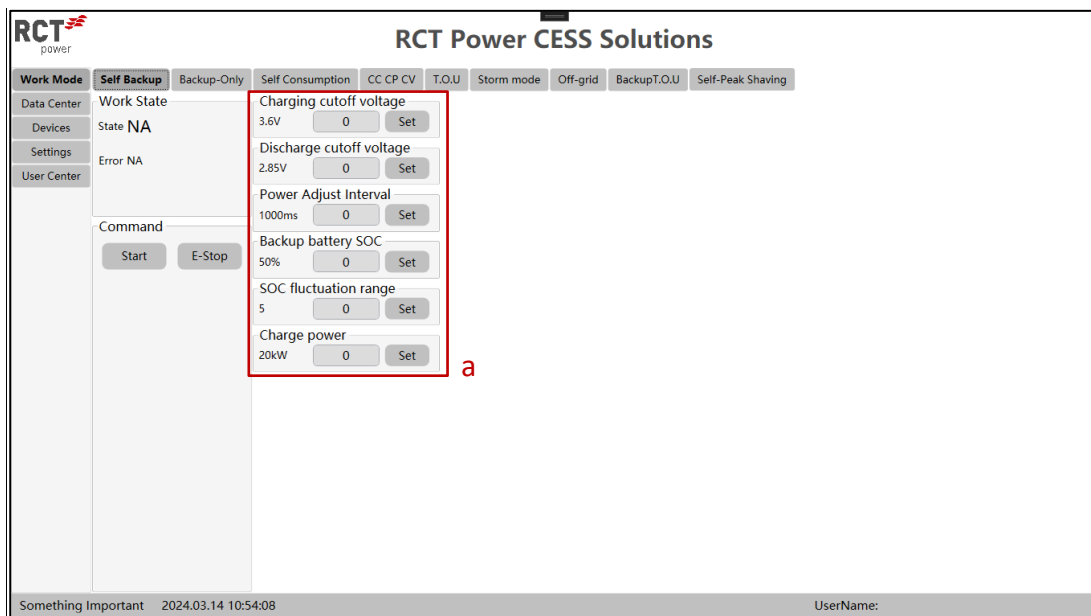
12.6 Select the Work Mode

- Click on the left menu bar “Device” Button-> “Work Mode” Button
- Notice: Before the mode runs, BMS is in high voltage state.
 - a. Work mode Running status;
 - b. Command Area.



12.6.1 Self-Backup(Optional)

- a. Parameter setting area



Step1: Click on the left menu bar “Devices” button-> “Work Mode” button->Click “Self-Backup” button;

Step2: Enter parameters, in the , click button;

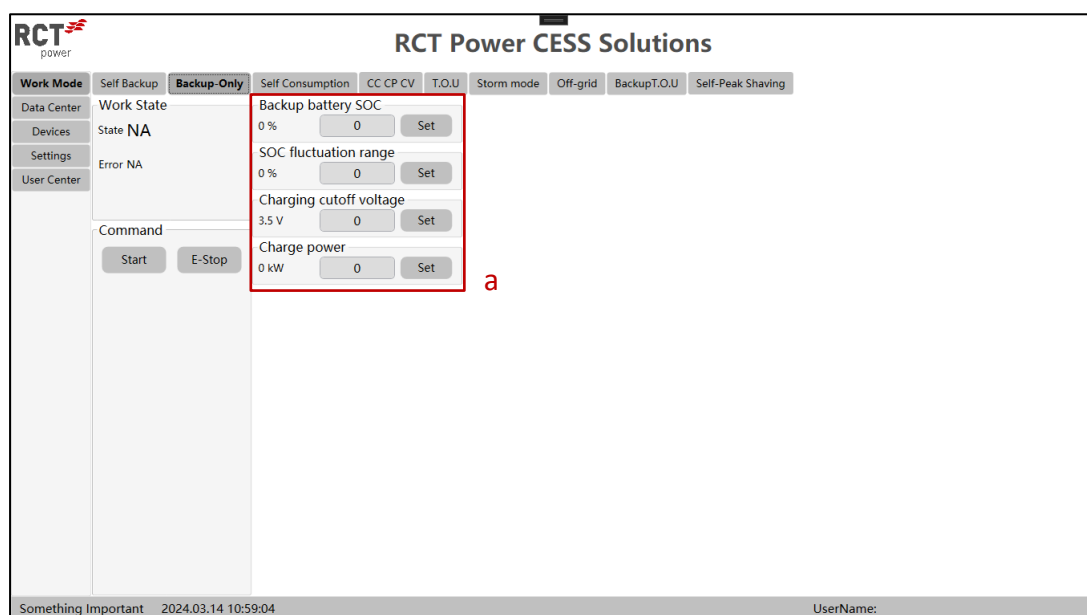
Charging cutoff voltage	2.75 V~3.57 V;
Discharging cutoff voltage	2.75 V~3.57 V;
Power Adjust Interval	The default value is 5000 ms, not less than 1000 ms;
Backup battery SOC	0 ~ 100%;
SOC fluctuation range	0 ~ 100%;
Charge power	Not exceeding rated power.

Step3: Click button, observe , “NA”->“Self Discharge”, “Discharge Only” or “Self Charge” or “Charge Only”.

Step4: Stop: Click button; E-Stop: Click button.

12.6.2 Backup-Only (Optional)

a. Parameter setting area:



Step1: Click on the left menu bar “Devices” button-> “Work Mode” button->Click “Backup-Only” button;

Step2: Enter parameters in the , click button.

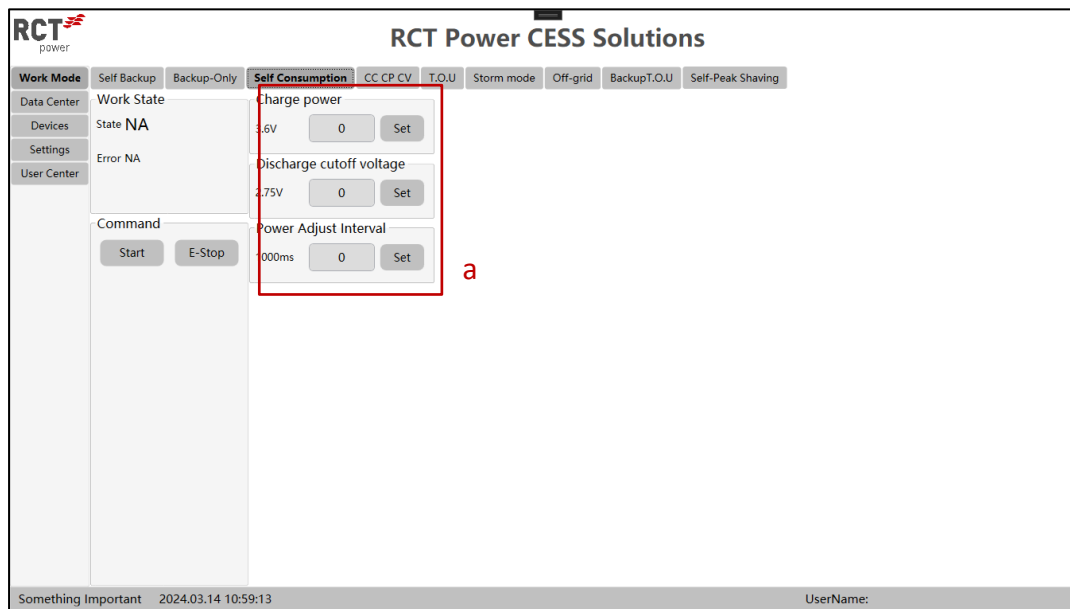
Backup battery SOC	0 ~ 100%;
SOC fluctuation range	0 ~ 100%;
Charging cutoff voltage	2.75 V~3.57 V;
Charge power	Not exceeding rated power.

Step3: Click button, observe , "NA" -> "Discharge" or "Charge"

Step4: Stop: Click button; E-Stop: Click button.

12.6.3 Self-consumption (Optional)

a. Parameter setting area:



Step1: Click on the left menu bar "Devices" button-> "Work Mode" button->Click "Self-Consumption" button;

Step2: Enter parameters, in the , click button;

Charge power	Not exceeding rated power.
Discharging cutoff voltage	2.75 V~3.57 V
Power Adjust Interval	The default value is 5000 ms, not less than 1000 ms.

Step3: Click button, observe , "NA" -> "Discharge" or "Charge";

Step4: Stop: Click button; E-Stop: Click button.

12.6.4 Time-of-Use(T.O.U) (Optional)

a. Parameter setting area

b. Set the power curve

Start Time: Time to start charging and discharging

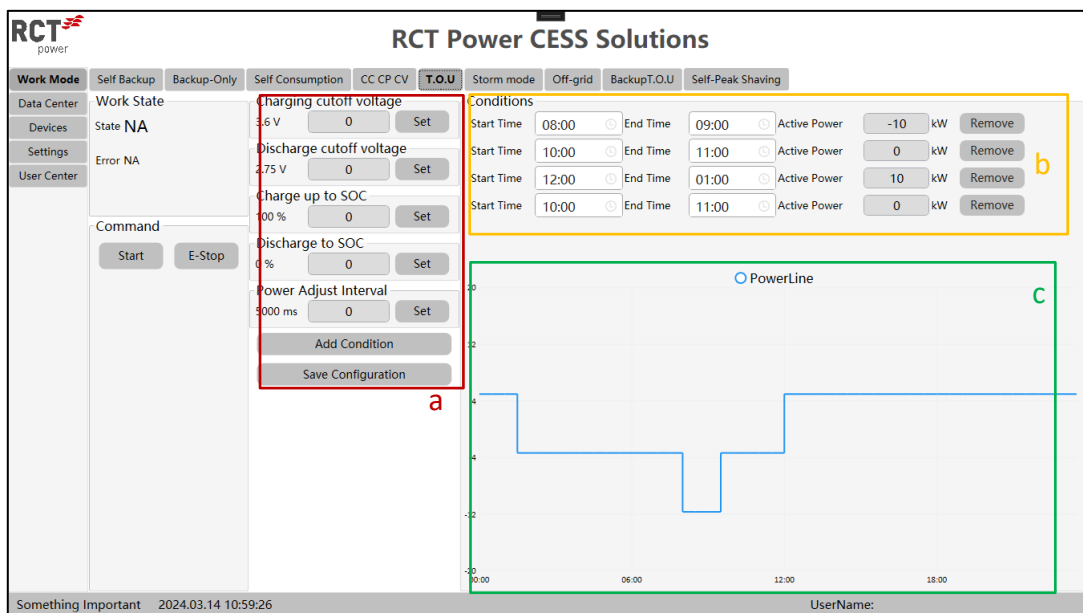
End Time: Time to end charging and discharging

Active Power: Not exceeding rated power.

Note: When the active power is positive, the device discharges.

When the active power is negative, the device charges.

c. Power curve panel



Step1: Click on the left menu bar “Devices” button-> “Work Mode” button->Click “T.O.U” button;

Step2: Enter parameters in the ,click button;

Charging cutoff voltage	2.75 V~3.57 V
Discharging cutoff voltage	2.75 V~3.57 V
Charge up to SOC	0 ~ 100%
Discharge to SOC	0 ~ 100%
Power Adjust Interval	The default value is 5000 ms, not less than 1000 ms.

Step3: Each time click the button will add a row of ;

Step4: Enter start time in the ,enter active power in the kW;if remove, click button;

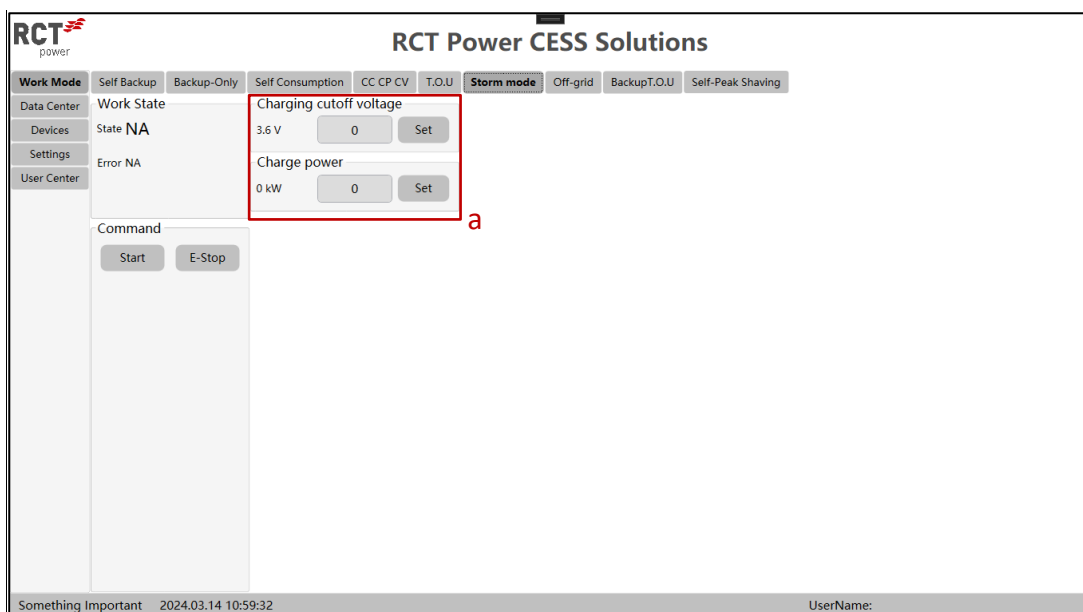
Step5: Click button, the power curve appears in zone C.

Step6: Click button, observe "NA"->" Discharge" or" Charge"

Step7: Stop: Click button; E-Stop: Click Button;

12.6.5 Storm Mode (Optional)

a. Parameter setting area



Step1: Click on the left menu bar “Devices” button-> “Work Mode” button->Click “Storm Watch” button;

Step2: Enter parameters, in the ,click Button;

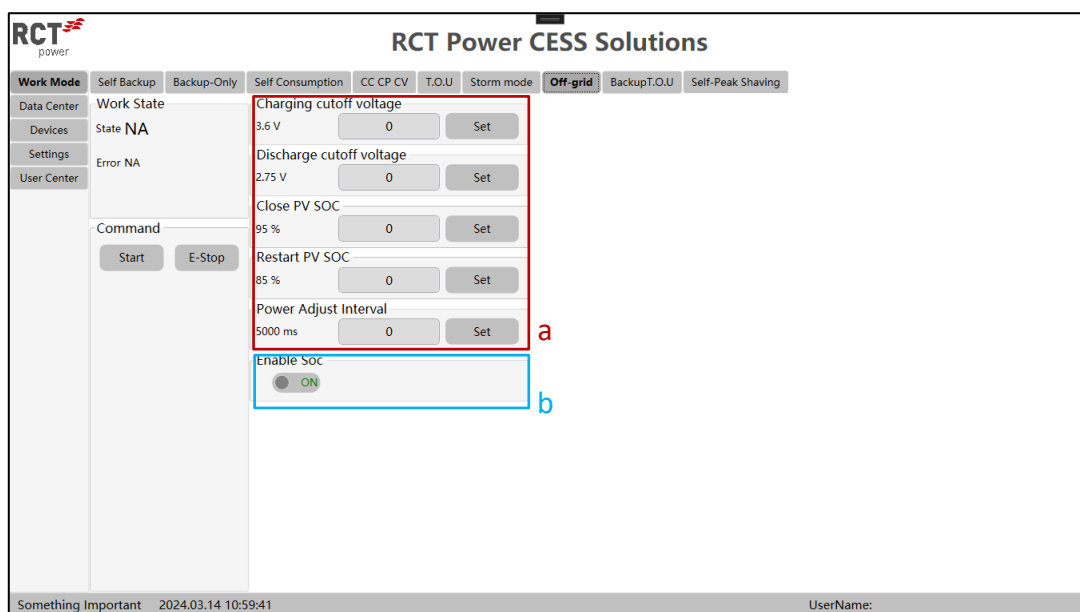
Charging cutoff voltage	2.75 V~3.57 V;
Charge power	Not exceeding rated power.

Step3: Click button, observe , “NA”->”Discharge” or “Charge”

Step4: Stop: Click button; E-Stop: Click button.

12.6.6 Off-grid (Optional)

- Parameter setting area
- Select area



Step1: Click on the left menu bar “Devices” button-> “Work Mode” button->Click “Off-Grid” button;

Step2: Click button to turn it into (If selected, SOC is used as the condition of charge and discharge cutoff. If not selected, the voltage is used as the condition of charge and discharge cutoff);

Step3: Enter parameters in the and then click button;

Charging cutoff voltage	2.75 V~3.57 V
Discharging cutoff voltage	2.75 V~3.57 V
Close PV SOC	0 ~ 100%, default value: 95%
Restart PV SOC	0 ~ 100%, default value: 85%
Power Adjust Interval	The default value is 5000 ms, not less than 1000 ms.

Step4: Click button, observe , “NA”-> ”Battery”;

Step5: Stop: Click button; E-Stop: Click button.

12.6.7 Backup T.O.U (Optional)

- Parameter setting area
- Set the power curve

Start Time: Time to start charging and discharging

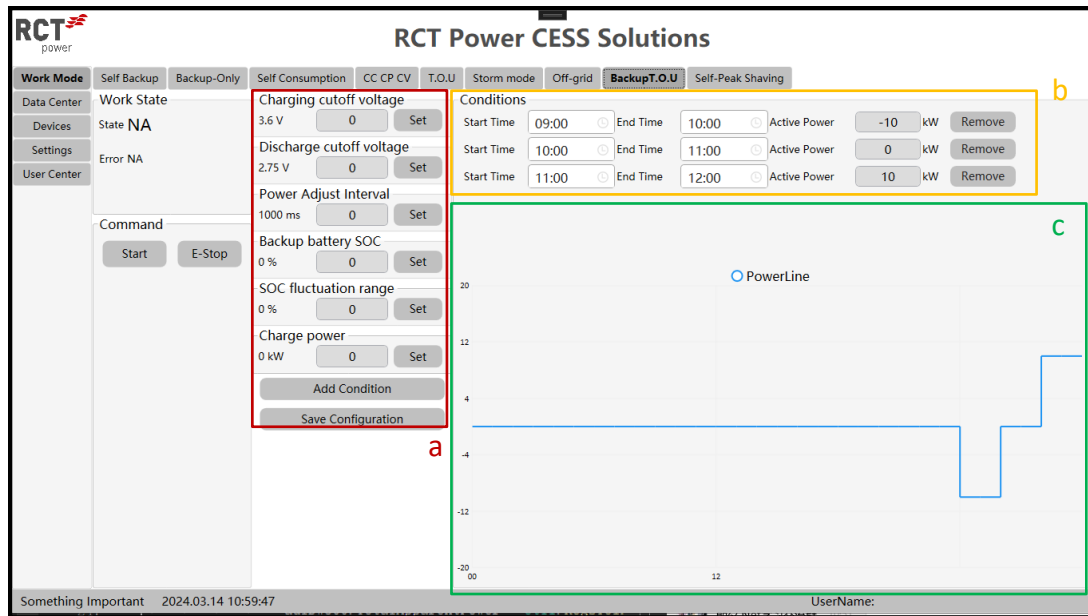
End Time: Time to end charging and discharging

Active Power: Not exceeding rated power.

Note: When the active power is positive, the device discharges.

When the active power is negative, the device charges.

c. Power curve panel



Step1: Click on the left menu bar “Devices” button-> “Work Mode” button->Click “BackUp T.O.U” button.

Step2: Enter parameters in the , click button;

Charging cutoff voltage	2.75 V~3.57 V
Discharging cutoff voltage	2.75 V~3.57 V
Power Adjust Interval	The default value is 5000 ms, not less than 1000 ms.
Backup battery SOC	0 ~ 100%
SOC fluctuation range	0 ~ 100%
Charge power	Not exceeding rated power.

Step3: Each time you click the , add a row of ;

Step4: Enter start time in the , enter active power in the ; if remove click button;

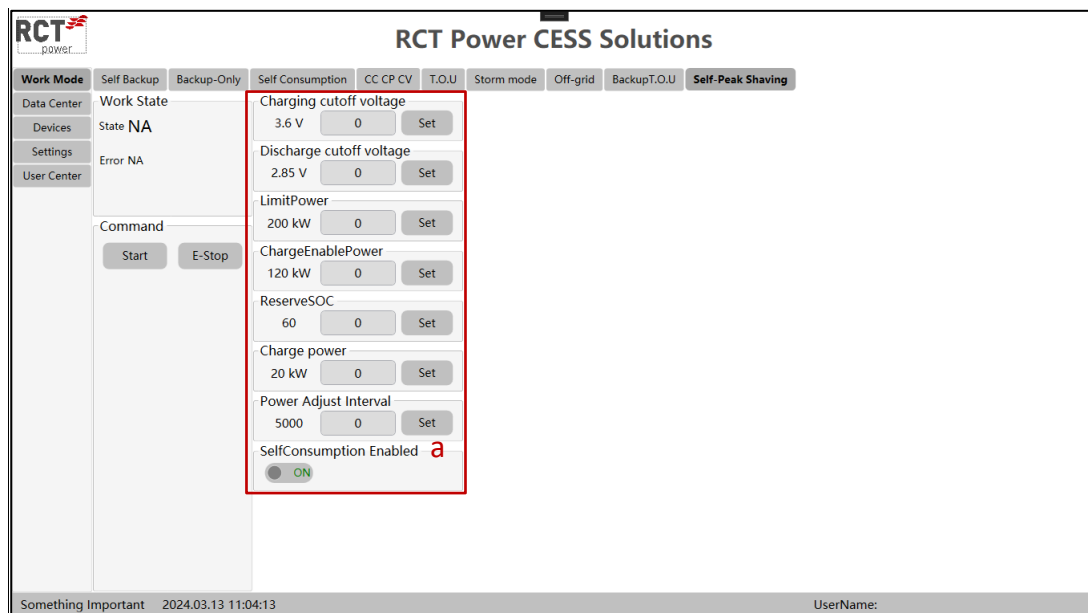
Step5: After modification, click button, the power curve appears in zone C;

Step6: Click button, observe ,”NA”->” Discharge” or” Charge”;

Step7: Stop: Click button; E-Stop: Click button.

12.6.8 Self-Peak Shaving (Optional)

a. Parameter setting area:



Step1: Click on the left menu bar “Devices” button-> “Work Mode” button->Click “Peak shaving” button.

Step2: Click ☐ ON button to turn it into ☐ OFF (If there is PV, turn it on; otherwise, turn it off);

Step3: Enter parameters in the 0, click button;

Charging cutoff voltage	2.75 V~3.57 V
Discharging cutoff voltage	2.75 V~3.57 V
Limit Power	Set according to the on-site situation.
Charge Enable Power	Not exceeding rated power
Reserve SOC	0 ~ 100%
Charge power	Not exceeding rated power.
Power Adjust Interval	The default value is 5000 ms, not less than 1000 ms.

Step4: Click button, observe State NA, "NA"-> "Discharge" or "Charge",

Step5: Stop: Click button; E-Stop: Click button.

12.7 Data Center

1. Report

a. Parameter setting area:

Start time: The start date of the report.

End time: The end date of the report.

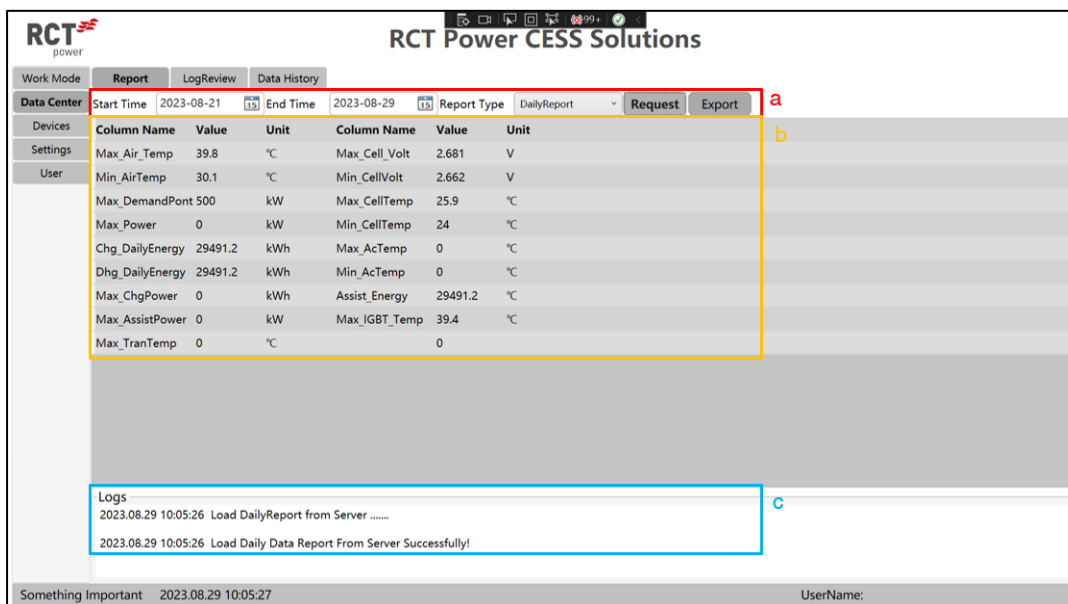
Report type: To select report type (Daily report, Summary report or Test report);

Report form button;

Export data button.

b. Report information display area;

c. Log information.



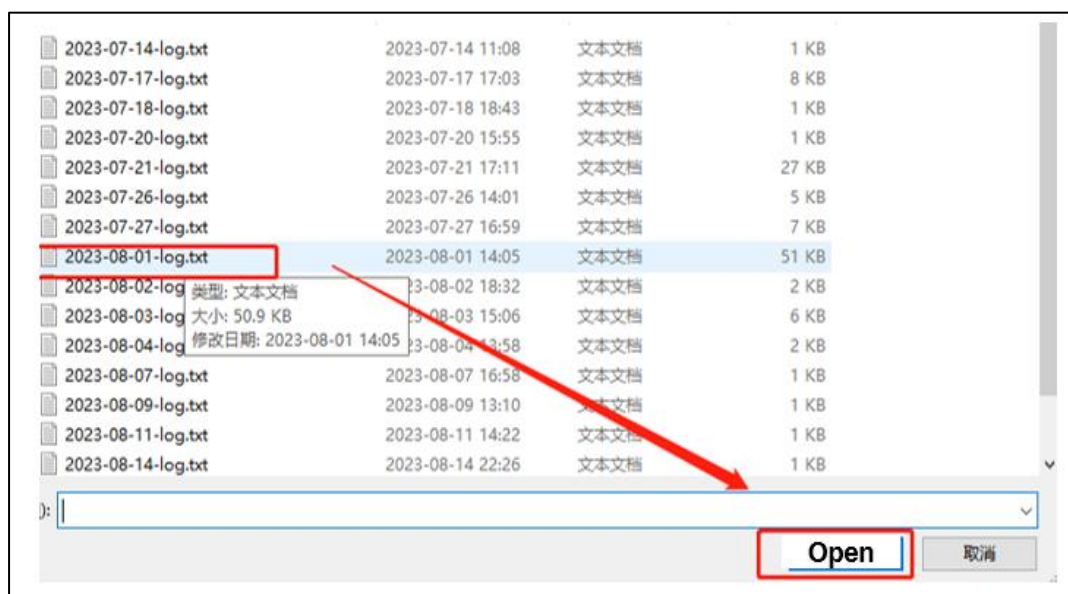
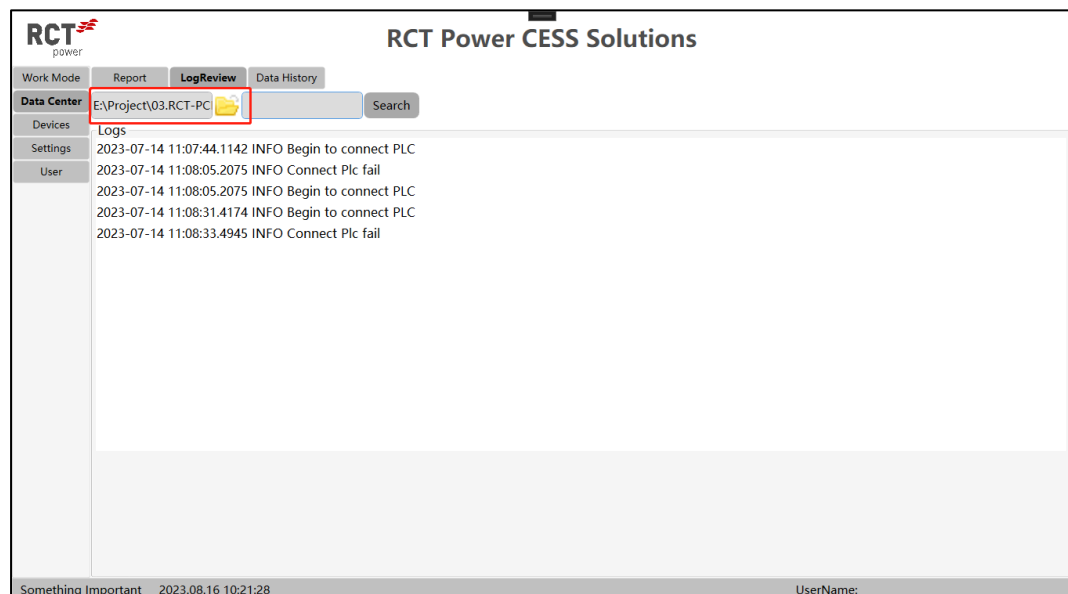
Step1: Click on the left menu bar “Data Centre” button->Click “Log Review” button.

Step2: Enter start and end time in the , Click button to select the report type.

Step3: Click button, display reports in Zone b.

Step4: Click button to export Data.

2. Log Review

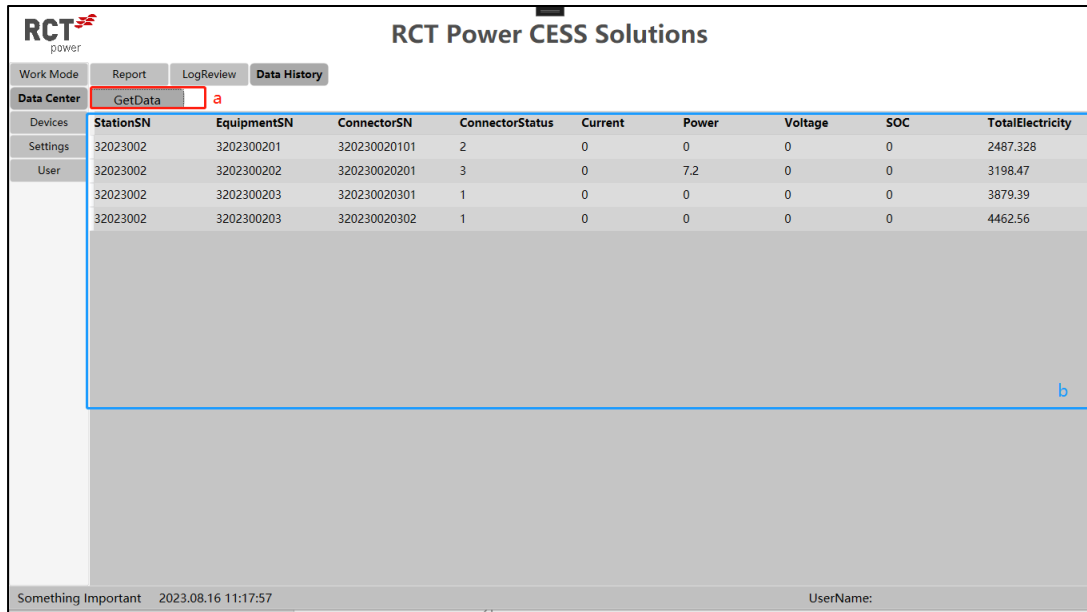


Step1: Click on the left menu bar “Data Centre” button->Click “Log Review” button.

Step2: Click  icon, select file and click the “Open “button.

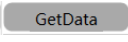
3. Data History:

- a. Get Data button;
- b. Information display area.



Devices	StationSN	EquipmentSN	ConnectorSN	ConnectorStatus	Current	Power	Voltage	SOC	TotalElectricity
Settings	32023002	3202300201	320230020101	2	0	0	0	0	2487.328
User	32023002	3202300202	320230020201	3	0	7.2	0	0	3198.47
	32023002	3202300203	320230020301	1	0	0	0	0	3879.39
	32023002	3202300203	320230020302	1	0	0	0	0	4462.56

Step1: Click on the left menu bar “Data Centre” button->Click “Data History” button.

Step2: Click  Button, displays the report in area b.

12.8 Equipment Information

12.8.1PCS

Step: Click on the left menu bar “Device” button-> “PCS” button.

- a. Config: To configure the PCS parameters.

Note: Active Power: + Discharge, - Charge;

On or Off Grid Status: 0: On-Grid, 1: Off-Grid;

Reactive compensation power (unit 0.1).

- b. Command area: To start/stop PCS.

- c. Change View area:

Main: To display PCS current, voltage, power, temperature, run state and related configuration parameters.

Status: To display PCS parameters.

Config: To configure the PCS parameters.

Warning: All possible faults of PCS are listed in detail. If the fault entry is black, it means that there is no fault; if the fault entry is red, it means that the item is faulty and needs to be troubleshooting.

■ Device Communication

Step1: Enter the following parameters in the config area. Then click **Open** button to turn it into **Close**.

Connection	Port	Baud Rate	Data Bits	Stop Bits	Parity	Station NO.	Device Index
Modbus RTU	COM1	9600 bps	8	One	None	2	1

Step2: Observe that the value displayed on the “State” interface on the right changes from "NA" to the specific value, indicating that the communication is successful.

■ Start PCS

Step1: Before PCS start, the BMS must be in the DC high voltage state (For details, please see [“12.8.2 BMS”](#)).

Step2: Click the **Start** button. If nothing goes wrong, the “Run State” in the State status interface will change from “Standby” to “Run”.

■ Stop PCS

Step: Click the **Stop** button and the PCS will stop.

Note: Fault Reset: Click **Reset** button in area b.

Reset the data from Max Intv to Error Rd Cnt: Click **Reset** button in area a.

12.8.2BMS

Step: Click on the left menu bar “Device” button-> “BMS” button.

- Config: To configure the BMS parameters.
- Command area: To connect/disconnect the DC high volt.
- Change View area.
Status: To display the real-time data of BMS.
Config: To modify BMS parameters.
Warning: To display information about BMS faults.
Cell Data: To display real-time data of the battery unit
- To display the corresponding interface selected in area c.

■ Device Communication

Step1: Enter the following parameters in the config area, click **Open** button to turn it into **Close**.

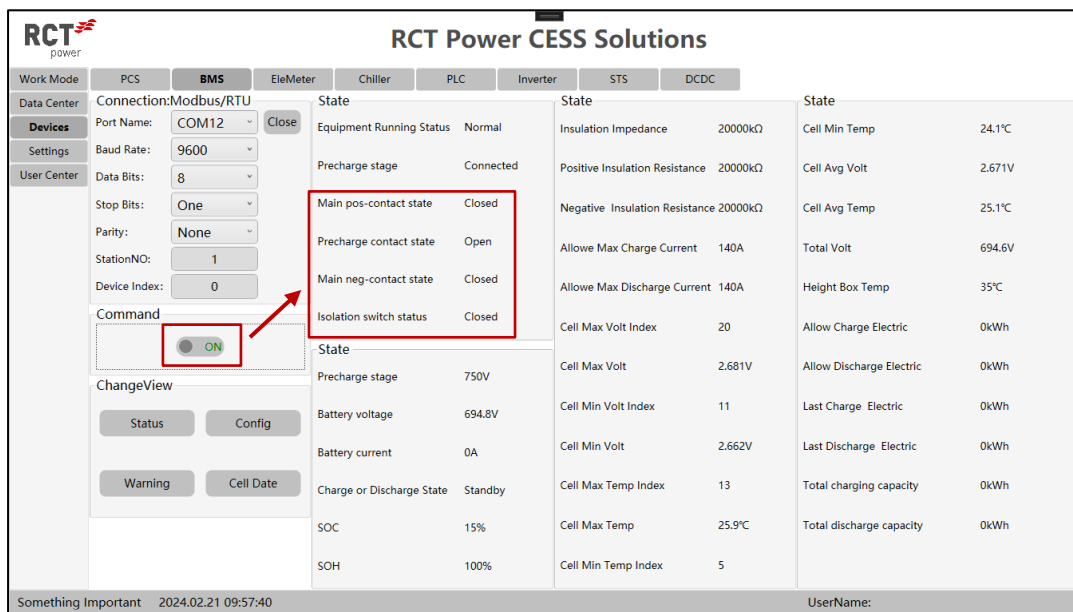
Connection	Port	Baud Rate	Data Bits	Stop Bits	Parity	Station NO.	Device Index
Modbus RTU	COM2	9600bps	8	One	None	2	1

Step2: Observe that the value displayed on the “State” interface on the right changes from "NA" to the specific value, check whether the data is consistent with the parameters in the following figure.

Step3: If the data shows no problem, you can click the **OFF** button to connect the DC high volt.

■ Connect the DC high volt

Click  button to turn it into . Then, observe the “State” interface, as shown in the figure:



RCT Power CESS Solutions

Work Mode: PCS BMS EleMeter Chiller PLC Inverter STS DCDC

Data Center: Connection: Modbus/RTU Close

Devices: Port Name: COM12

Settings: Baud Rate: 9600

User Center: Data Bits: 8

Stop Bits: One

Parity: None

StationNO: 1

Device Index: 0

Command: 

ChangeView: Status Config Warning Cell Date

State

Equipment Running Status	Normal	Insulation Impedance	20000kΩ	Cell Min Temp	24.1°C
Precharge stage	Connected	Positive Insulation Resistance	20000kΩ	Cell Avg Volt	2.671V
Main pos-contact state	Closed	Negative Insulation Resistance	20000kΩ	Cell Avg Temp	25.1°C
Precharge contact state	Open	Allowe Max Charge Current	140A	Total Volt	694.6V
Main neg-contact state	Closed	Allowe Max Discharge Current	140A	Height Box Temp	35°C
Isolation switch status	Closed	Cell Max Volt Index	20	Allow Charge Electric	0kWh
State		Cell Max Volt	2.681V	Allow Discharge Electric	0kWh
Precharge stage	750V	Cell Min Volt Index	11	Last Charge Electric	0kWh
Battery voltage	694.8V	Cell Min Volt	2.662V	Last Discharge Electric	0kWh
Battery current	0A	Cell Max Temp Index	13	Total charging capacity	0kWh
Charge or Discharge State	Standby	Cell Max Temp	25.9°C	Total discharge capacity	0kWh
SOC	15%	Cell Min Temp Index	5		
SOH	100%				

Something Important 2024.02.21 09:57:40 UserName:

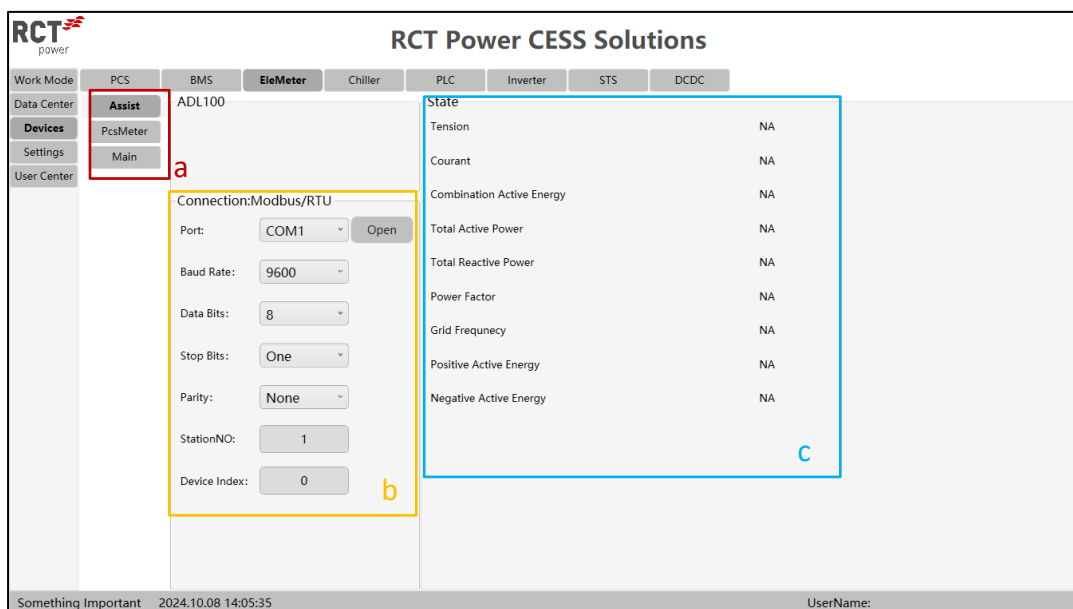
■ Disconnect the DC high volt:

Click  button to turn it into .

12.8.3 Ele Meter

Step: Click on the left menu bar “Device” button-> “Ele Meter” button.

- Meter switching panel;
- Config: To configure the Ele Meter parameters;
- To display the real-time data of Ele Meter.



RCT Power CESS Solutions

Work Mode: PCS BMS EleMeter Chiller PLC Inverter STS DCDC

Data Center: ADL100

Devices: Assist PcsMeter Main

Settings: Connection: Modbus/RTU Open

User Center: Port: COM1

Baud Rate: 9600

Data Bits: 8

Stop Bits: One

Parity: None

StationNO: 1

Device Index: 0

State

Tension	NA
Courant	NA
Combination Active Energy	NA
Total Active Power	NA
Total Reactive Power	NA
Power Factor	NA
Grid Frequency	NA
Positive Active Energy	NA
Negative Active Energy	NA

Something Important 2024.10.08 14:05:35 UserName:

■ ADL 100 Device Communication (Assist):

Step1: Enter the following parameters in the config area. Then click  button to turn it into .

Connection	Port	Baud Rate	Data Bits	Stop Bits	Parity	Station NO.	Device Index
Modbus RTU	COM3	9600bps	8	One	None	2	2

Step2: Observe that the value displayed on the “State” interface on the right changes from "NA" to the specific value, indicating that the communication is successful.

■ ADL 400 Device Communication (PCS Meter):

Step1: Enter the following parameters in the config area. Then click **Connect** button to turn it into **Disconnect**.

Connection	Port	Baud Rate	Data Bits	Stop Bits	Parity	Station NO.	Device Index
Modbus RTU	COM3	9600bps	8	One	None	1	1

Step2: Observe that the value displayed on the “State” interface on the right changes from "NA" to the specific value, indicating that the communication is successful.

Parallel, anti-counter meter configuration guide (Main):

A variety of models can be selected, and the meter model needs to be specified according to customer requirements or manufacturers.

Recommended Acrel: ADL400, ADW300, DTSD1352, DTSD3366D.

Connection	Port	Baud Rate	Data Bits	Stop Bits	Parity	Station NO.	Device Index
Modbus RTU	COM3	9600bps	8	One	None	1	3

12.8.4Chiller

Step: Click on the left menu bar “Device” button-> “Chiller” button.

- Device communication area;
- Chiller control area;
- Change View area.
 - Status: To display the real-time data of chiller.
 - Warning: To display information about chiller faults.
- To display the real-time data of chiller.
- Config: To configure the chiller parameters.

Device Communication:

Step1: Enter the following parameters in the config area. Then, click **Open** button to turn it into **Close**.

Connection	Port	Baud Rate	Parity	Data Bits	Stop Bits	Station NO.	Device Index
Modbus RTU	COM4	9600bps	None	8	One	1	1

Step2: Click **OFF** button to turn it into **ON**, observe that the value displayed on the “System Parameter” interface on the right changes from "NA" to the specific value, indicating that the communication is successful.

Setting Parameter:

To modify the parameters, enter values in “Setting values” **0** and click **Set** button on the right. If the current value changes to the modified value, the modification succeeds. Otherwise, the modification fails.

12.8.5 PLC

Step: Click on the left menu bar “Device” button-> “PLC” button.

- Device communication area;
- To display the real-time data of PLC.
- Config: To configure the PLC parameters.

■ Device Communication:

Step1: Enter the following parameters in the config area. Then click **Connect** button to turn it into **Disconnect**.

Connection	IP	Port	Station No.	Device Index
Modbus TCP	192.168.0.100	502	1	1

Step2: Observe that the value displayed on the “Run State” interface on the right changes from "NA" to the specific value, indicating that the communication is successful.

■ Setting Parameter:

To modify the parameters, enter values in “Setting values” and click **Set** button on the right.

12.8.6 Inverter

Step: Click on the left menu bar “Device” button-> “Inverter” button.

- Device communication area;
- Command area: To start/stop inverter;
- Change View area.
Status: To display the real-time data of inverter.
Warning: To display information about inverter faults.
- To display the real-time data of inverter.
- Config: To configure the chiller parameters.

■ Device Communication:

Step1: Enter the following parameters in the config area. Then, click **Open** button to turn it into **Close**.

Connection	Port	Baud Rate	Parity	Data Bits	Stop Bits	Station NO.	Device Index
Modbus RTU	COM2	9600bps	None	8	One	2	0

Step2: Observe that the value displayed on the state interface on the right changes from "NA" to the specific value, indicating that the communication is successful.

■ Setting Parameter:

To modify the parameters, enter values in “Setting values” and click **Set** button on the right. If the current value changes to the modified value, the modification succeeds. Otherwise, the modification fails.

12.8.7 STS (Optional)

Step: Click on the left menu bar “Device” button-> “STS” button.

- Device communication area;
- To display the real-time data of STS.

The screenshot shows the RCT Power CESS Solutions software interface. The top navigation bar includes Work Mode, PCS, BMS, EleMeter, Chiller, PLC, Inverter, STS, and DCDC. The left sidebar has buttons for Data Center, Devices, Settings, and User Center. The main area is divided into three sections: STS State, STS Status, and STS Power. The STS State section contains a configuration area for Modbus/RTU connection, including Port (COM1), Baud Rate (9600), Data Bits (8), Stop Bits (One), Parity (None), StationNO (1), and Device Index (0). The STS Status section displays real-time data for STS State, STS Temperature, STS Grid Frequency, STS Thyristor closing signal, and STS Conduction State. The STS Power section displays real-time data for STS Grid PhaseA Voltage, STS Grid PhaseB Voltage, STS Grid PhaseC Voltage, Load Current A, Load Current B, Load Current C, STS Grid PhaseA Current, STS Grid PhaseB Current, STS Grid PhaseC Current, Harmonic Volt A(%), Harmonic Volt B(%), Harmonic Volt C(%), Harmonic Volt A, Harmonic Volt B, Harmonic Volt C, STS Grid PhaseA Active Power, STS Grid PhaseB Active Power, STS Grid PhaseC Active Power, Phase A Reactive Power, Phase B Reactive Power, Phase C Reactive Power, Phase A Apparent Power, Phase B Apparent Power, Phase C Apparent Power, Load Power Factor A, Load Power Factor B, Load Power Factor C, and Revision. The bottom status bar shows the date and time (2024.10.08 14:07:12) and the username (UserName:).

■ Device Communication:

Step1: Enter the following parameters in the config area. Then click **Open** button to turn it into **Close**.

Modbus	Port	Baud Rate	Data Bits	Stop Bits	Parity	Station NO.	Device Index
Modbus RTU	COM1	9600bps	8	One	None	1	1

Step2: Observe that the value displayed on the state interface on the right changes from "NA" to the specific value, indicating that the communication is successful.

12.8.8 DCDC (Optional)

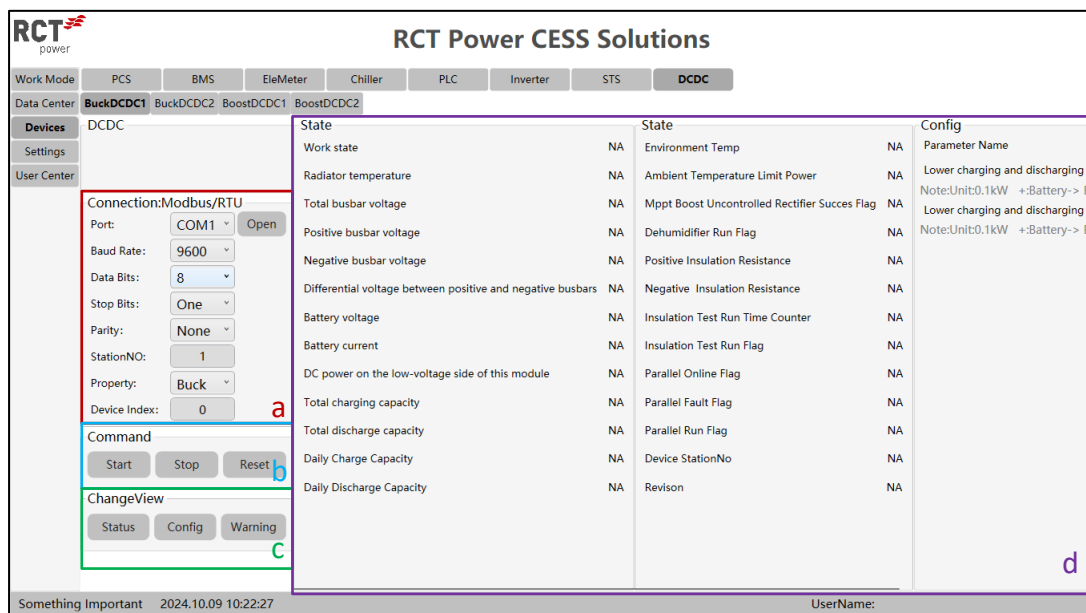
Step: Click on the left menu bar “Device” button-> “DCDC” button.

- Config: To configure the DCDC parameters.
- Command area: To start/stop the DCDC module.
- Change View area.
 - Status: To display the real-time data of DCDC modules.
 - Config: To modify DCDC modules parameters.
 - Warning: To display information about DCDC faults.
- To display the real-time data of DCDC modules.

The DCDC module is divided into Buck circuit and Boost circuit.

The communication physical port refers to RS485 A or RS485 B on the DC/DC module. (Physical interface: 485_1A/485_1B)

Protocol description: Modbus RTU, support 03 read data and 06 write data function.



■ Buck DCDC 1 Device Communication:

Step1: Enter the following parameters in the config area. Then click **Open** button to turn it into **Close**.

Connection	Port	Baud Rate	Data Bits	Stop Bits	Parity	Station NO.	Property	Device Index
Modbus RTU	COM1	9600bps	8	One	None	3	Buck	1

Step2: Observe that the value displayed on the state interface on the right changes from "NA" to the specific value, indicating that the communication is successful.

Note: Contact technical personnel for the value input in the Config field.

■ Start Buck DCDC 1

Step: Click the **Start** button. If nothing goes wrong, the "Work State" in the State interface will change from "Standby" to "Run".

Note: If the battery voltage is <3V, you can turn on the "Start" button of Buck; Otherwise, open the Start button after starting the corresponding working mode.

■ Stop Buck DCDC 1

Step: Click the **Stop** button, observe "Work State" changing from "Run" to "Standby".

■ Buck DCDC 2 Device Communication:

Step1: Enter the following parameters in the config area. Then click **Open** button to turn it into **Close**.

Connection	Port	Baud Rate	Data Bits	Stop Bits	Parity	Station NO.	Property	Device Index
Modbus RTU	COM1	9600bps	8	One	None	5	Buck	2

Step2: Observe that the value displayed on the state interface on the right changes from "NA" to the specific value, indicating that the communication is successful.

Note: Contact technical personnel for the value input in the Config field.

■ Start Buck DCDC 2

Step: Click the **Start** button. If nothing goes wrong, the "Work State" in the State interface will change from "Standby" to "Run".

Note: If the battery voltage is <3V, you can turn on the "Start" button of Buck; Otherwise, open the Start button after starting the corresponding working mode.

■ Stop Buck DCDC 2

Step1: Click the  button, observe "Work State" changing from "Run" to "Standby".

■ Boost DCDC 1 Device Communication:

Step1: Enter the following parameters in the config area. Then click  button to turn it into .

Connection	Port	Baud Rate	Data Bits	Stop Bits	Parity	Station NO.	Property	Device Index
Modbus RTU	COM1	9600bps	8	One	None	4	Buck	3

Step2: Observe that the value displayed on the state interface on the right changes from "NA" to the specific value, indicating that the communication is successful.

Note: Contact technical personnel for the value input in the Config field.

■ Start Boost DCDC 1

Step: Click the  button. If nothing goes wrong, the "Work State" in the State interface will change from "Standby" to "Run".

■ Stop Boost DCDC 1

Step: Click the  button, observe "Work State" changing from "Run" to "Standby".

■ Boost DCDC 2 Device Communication:

Step1: Enter the following parameters in the config area. Then click  button to turn it into .

Connection	Port	Baud Rate	Data Bits	Stop Bits	Parity	Station NO.	Property	Device Index
Modbus RTU	COM1	9600bps	8	One	None	6	Buck	4

Step2: Observe that the value displayed on the state interface on the right changes from "NA" to the specific value, indicating that the communication is successful.

Note: Contact technical personnel for the value input in the Config field.

■ Start Boost DCDC 2

Step: Click the  button. If nothing goes wrong, the "Work State" in the State interface will change from "Standby" to "Run".

■ Stop Boost DCDC 2

Step: Click the  button, observe "Work State" changing from "Run" to "Standby".



- When opening the system, first start the Buck and then start the Boost.
- When closing the system, first stop the Boost and then stop the Buck.
- Before starting the Boost, turn on the PV source first.
- Before starting the Buck, BMS is on high voltage status.

12.9 Settings

12.9.1 Upload

Step: Click on the left menu bar "Settings" button-> "Upload" button.

- Option area
- Thingsboard Connection area
- Cloud Connection area
- Manua area
- Save and Setting button.

RCT Power CESS Solutions

Work Mode: **Upload** SysSettings Parallel ModbusTcp IO Setting

Data Center: Option

Devices: ☐ SSL Connection ☒ Enable Reconnect ☐ Test Mode ☐ Close ThingBoard ☐ Close Cloud

Settings: Thingsaboard Connection

User Center: Server Address: 192 . 168 . 2 . 122 Port: 1883 Qos: 0 Connect Queue Status: 33 Clear

Device ID: nQrXGxWqXlqjXyWxYLzv Device Secret: [empty]

Cloud Connection

Server Address: 192.168.2.86 Port: 31883 Qos: 0 Connect Queue Status: 33 Clear

Station SN: sta20230001

Manual

Option: Thingsaboard

Subscribe Topic: [empty] Subscribe

Publish Topic: [empty] Publish

Publish Message: {"ts":1669192001000,"values":{"cell_voltage":3.123}}

Save Setting

Something Important 2024.09.19 16:01:39 UserName:

■ Option

SSL Connection: Secure connection with SSL certificate.

Enable Reconnection: Automatic reconnection for non-human disconnection.

Test Mode: Manual area is enabled.

RCT Power CESS Solutions

Work Mode: **Upload** SysSettings Parallel ModbusTcp IO Setting

Data Center: Option

Devices: ☐ SSL Connection ☐ Enable Reconnect ☒ Test Mode ☐ Close ThingBoard ☐ Close Cloud

Settings: Thingsaboard Connection

User Center: Server Address: 192 . 168 . 2 . 122 Port: 1883 Qos: 0 Connect Queue Status: 2 Clear

Device ID: nQrXGxWqXlqjXyWxYLzv Device Secret: [empty]

Cloud Connection

Server Address: 192.168.2.86 Port: 31883 Qos: 0 Connect Queue Status: 2 Clear

Station SN: sta20230001

Manual

Option: Thingsaboard

Subscribe Topic: [empty] Subscribe

Publish Topic: [empty] Publish

Publish Message: {"ts":1669192001000,"values":{"cell_voltage":3.123}}

Save Setting

Something Important 2024.09.19 14:50:32 UserName:

Close ThingBoard: The Thingsboard Connection area cannot be edited.

RCT Power CESS Solutions

Work Mode: **Upload** | SysSettings | Parallel | ModbusTcp | IO Setting

Data Center: Option

Devices: ☐ SSL Connection ☐ Enable Reconnect ☐ Test Mode ☒ Close ThingBoard ☐ Close Cloud

Settings

User Center

Thingsaboard Connection

Server Address: 192 . 168 . 2 . 122 Port: 1883 Qos: 0 **Connect**

Device ID: nQrXGxWqXlqjXyWxYLzv Device Secret:

Queue Status: 2 **Clear**

Cloud Connection

Server Address: 192.168.2.86 Port: 31883 Qos: 0 **Connect**

Station SN: sta20230001

Queue Status: 2 **Clear**

Manual

Option: Thingsaboard

Subscribe Topic: **Subscribe**

Publish Topic: **Publish**

Publish Message: {"ts":1669192001000,"values":{"cell_voltage":3.123}}

Save **Setting**

Something Important 2024.09.19 14:51:03 Username:

Close Cloud: The Cloud Connection area cannot be edited.

RCT Power CESS Solutions

Work Mode: **Upload** | SysSettings | Parallel | ModbusTcp | IO Setting

Data Center: Option

Devices: ☐ SSL Connection ☐ Enable Reconnect ☐ Test Mode ☐ Close ThingBoard ☒ Close Cloud

Settings

User Center

Thingsaboard Connection

Server Address: 192 . 168 . 2 . 122 Port: 1883 Qos: 0 **Connect**

Device ID: nQrXGxWqXlqjXyWxYLzv Device Secret:

Queue Status: 2 **Clear**

Cloud Connection

Server Address: 192.168.2.86 Port: 31883 Qos: 0 **Connect**

Station SN: sta20230001

Queue Status: 4 **Clear**

Manual

Option: Thingsaboard

Subscribe Topic: **Subscribe**

Publish Topic: **Publish**

Publish Message: {"ts":1669192001000,"values":{"cell_voltage":3.123}}

Save **Setting**

Something Important 2024.09.19 14:51:31 Username:

■ Thingsaboard Connection

Step1: Enter the Server Address, Port, Device ID in the b area and click **Connect** button.

Step2: Click **Clear** button to clear the current unuploaded data.

■ Cloud Connection

Step1: Enter the Server Address, Port, Station SN in the c area and click **Connect** button.

Step2: Click **Clear** button to clear the current unuploaded data.

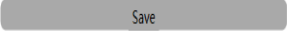
■ Manual

Step1: To close Thingsaboard Connection or Cloud Connection in option bar.

Step2: Enter sub topic and click **Subscribe** button.

Step3: Enter pub topic and click **Publish** button.

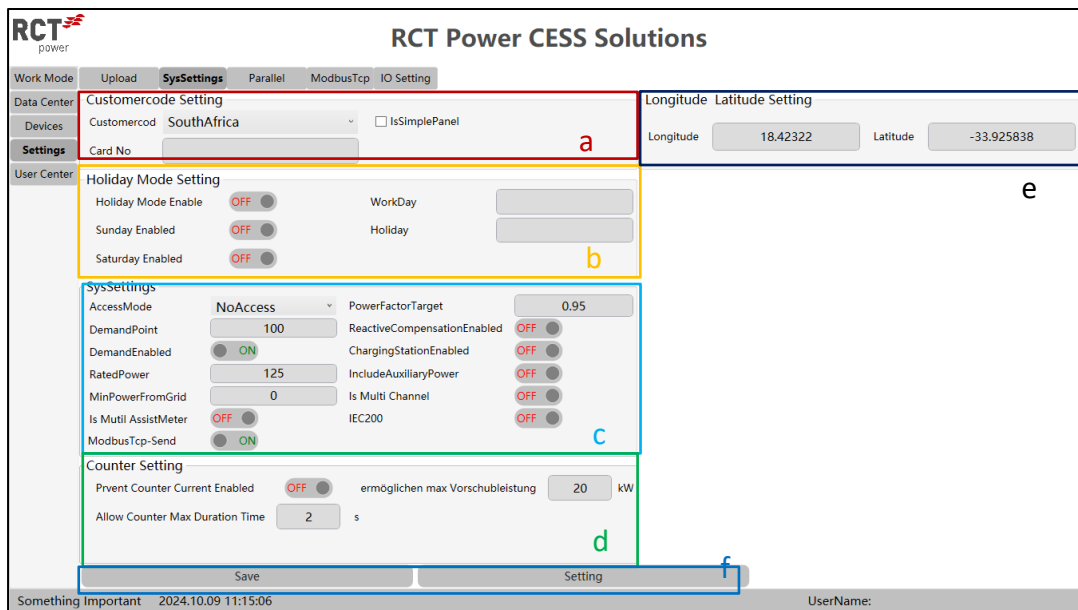
Manual	
Option	Thingsaboard
Sub Topic	
Pub Topic	
Pub Message	{'ts':1669192001000,'values':{'cell_voltage':3.123}}

Click the  button when all Settings are complete.

12.9.2 Sys Settings

Step: Click on the left menu bar “Settings” button-> “Sys Settings” button.

- Customer code setting area
- Holiday Mode Setting area
- Sys settings area
- Counter Setting area
- Longitude Latitude Setting area
- Save and Setting area



■ Customer Code Setting

Enter the customer code and card number of the industrial computer, and prevent the need to open the cover to view the card number when the traffic runs out.

■ Holiday Mode Setting

Storage cabinets can be set for working days and holidays.

■ Sys Settings

Access Mode	No Access Ac Access Dc Access Multi Access
Demand Point	Power demand control input, generally minus a maximum rated power of the device.
Rated Power	Rated power of energy storage system.
Min Power From Grid	Minimum load power of the grid.
Power Factor Target	Power factor.

Demand Enabled	
Is Mutil Assist Meter	
Modbus Tcp-Send	The default is off.
Reactive Compensation Enabled	OFF: ☐
Charging Station Enabled	ON: ☐
Include Auxiliary Power	
Is Mutil Channel	

■ Counter Setting

Prevent Counter Current Enabled	The default is off. OFF: ☐ ON: ☐
Allow Max Reactive Power	The time allowed to feed power to the grid. =0, indicates that countercurrent is not allowed at all; >0, indicates the value that allows countercurrent.
Allow Counter Max Duration Time	The maximum power allowed to be fed to the grid

■ Longitude Latitude Setting

Enter latitude and longitude to display local weather conditions.

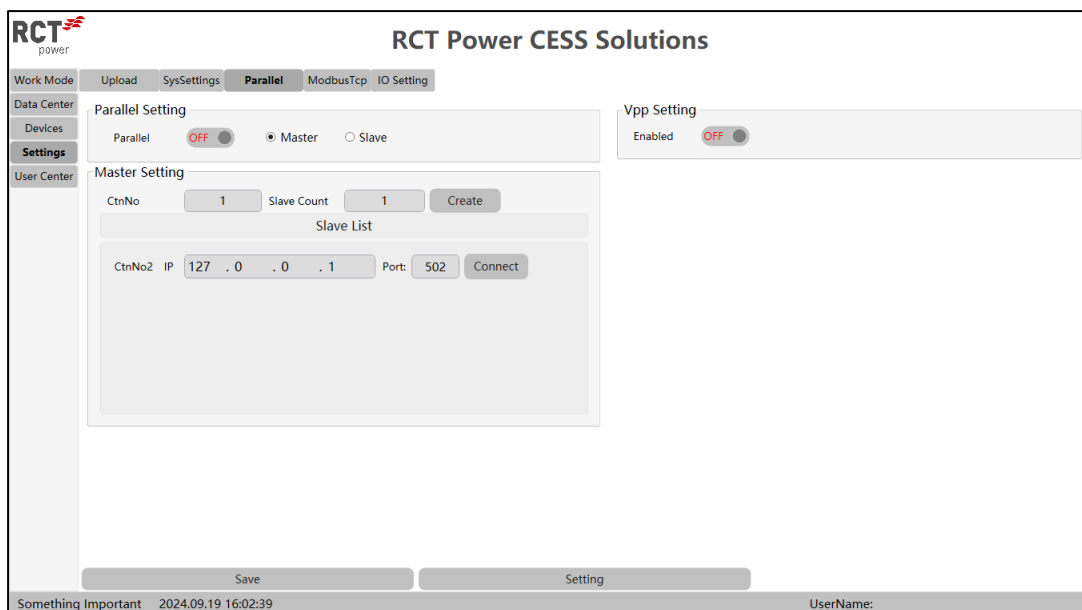
WARNING

The System Settings screen contains energy storage calculation parameters and conditions. All parameter modifications and settings must be completed by the specified agent (the administrator with the highest authority). For parameters whose meanings are not clear, please contact service. Do not modify them without authorization.

12.9.3 Parallel

If there are multiple devices, you need to achieve 1 master multi-slave or multi-master multi-slave, you need to perform parallel settings.

The default parallel mode is off. Click ☐ button to turn the red button into ☐ and select the current device as the master station or slave station.

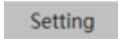
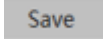


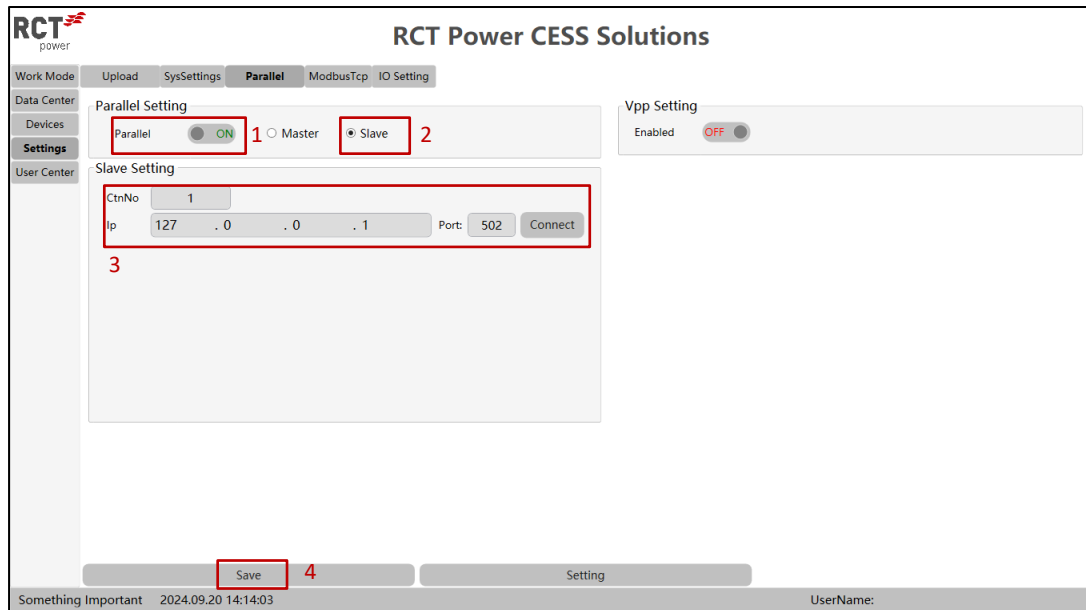
■ Slave Setting (Operation on slave device)

Step 1: Click  button to turn the red button into .

Step 2: Select .

Step 3: Enter the CtnNo, IP and port, click the  button and the settings are complete.

Step 4: Click the  button and then click  button.



■ Master Setting (Operation on master device)

Enter the CtnNo, starting with 1 by default, and then enter the number of slave count.

Take 1 master station and 2 slave stations as an example:

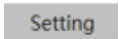
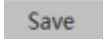
Step 1: Click  button to turn the red button into .

Step 2: Select .

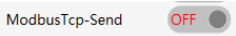
Step 3: Enter the CtnNo: 1, slave count: 2, click the  button; two lines appear in the "Slave Setting" panel.

Step 4: Enter the IP and port number of the slave station respectively, and then click the  button.

Note: Before performing this operation, you must set and connect the two slave devices. If the slave device is not connected, a communication fault is reported to the master device.

Step 5: Click the  button and then click  button.

12.9.4 Modbus Tcp

This interface is displayed only when the  button is enabled on the system setting interface. This function is enabled only when the customer uses the dispatch mode onsite.

12.9.5 IO Setting

This interface is designed to connect external loads to the cabinet when the factory generates reverse power flow to the grid, and to set the conditions for starting or shutting down these loads in order to consume the excess power.

- Command area: Enable or disable the counter-current reduction function.
- Add or remove load devices:
 - Counter-Flow Power: Set the reverse power flow threshold.
 - Duration: Set the duration of continuous reverse power flow.
 - Operation Time: Set the running time of the load after it is activated.
 - Power Consumption: Set the grid power consumed by the load.
 - Detection Interval: During the operation of the cabinet, the system checks whether the load meets the conditions for activation or shutdown every few minutes.
 - When both the Counter-Flow Power and the Duration meet the set conditions, the load is activated.
 - When the load has been running for longer than the set Operation Time, system checks whether the current power consumption from the grid is greater than the value set for Power Consumption:

- If the current power consumption is greater than the set Power Consumption value, the load is shut down.
- If the current power consumption is less than the set Power Consumption value, the load continues to run until the condition is met.

c. Perform IO tests manually.

The screenshot shows the RCT Power CESS Solutions web interface. The left sidebar contains navigation links: Work Mode, Data Center, Devices, Settings, and User Center. The main content area is titled 'RCT Power CESS Solutions' and has tabs for Upload, SysSettings, Parallel, and IO Setting (which is selected). Under the IO Setting tab, there is a section for 'IO Setting' with an 'Enabled' toggle switch currently set to 'OFF' (labeled 'a'). Below this is a table with columns: Index, Counter-flow Power(kW), Duration(min), Operation Time(min), Power consumption(kW), and Detection Interval(min). The table contains three rows of data, each with a 'Remove' button (labeled 'b'). At the bottom of the IO Setting section is an 'Add' button. Below the IO Setting section is the 'IO Test' section, which has a table with columns: Type, Index, Value, Result, and Operation. It contains two rows: 'DO' with Index 1, Value 0, and a 'Write' button; and 'DI' with Index 1, Value 0, and a 'Read' button (labeled 'c'). At the bottom of the interface are 'Save' and 'Setting' buttons, and a status bar showing 'Something Important', the date '2024.09.23 13:44:51', and 'UserName:'.

■ IO Setting

Step 1: Connect the device to the DO port of the EMS (For interfaces, see [12.1 Touch panel interface](#)).

Step 2: Click the **Add** button and

1	20	5	10	10	1
---	----	---	----	----	---

 lines appear below.

Step 3: Enter Index, Counter-flow Power, Duration, Operation Time, Power consumption, Detection Interval.

Step 4: Click **OFF** button to turn the button into **ON** to enable this function.

Step 5: To remove this device, click **ON** button to turn the button into **OFF** and then click **Remove** button.

■ IO Test

Enter the DI/DO parameters of the device you want to test to manually test the counter-current protection of this device function.

12.10 User

Step: Click on the left menu bar "User" button.

RCT
power

RCT Power CESS Solutions

Work Mode
Data Center
Devices
Settings
User

User Information

UserName

Password

Role

Create Delete

Step1: Enter the user name and password;

Step2: Choose the role, ;

Step3: Choose button Create Account, click Delete Account.

Role	Permission
User	Only view data
Administrator	All

13 Safety Setting (Australia only)

Please use the PCS's upper computer interface UI to select the different safety setting according to the different local compliance.

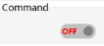
For compliance with AS/NZS 4777.2:2020, please select from Australia A/B/C. Please contact your electricity grid operator for which region to use.

Please input the number in this box with 1~4 to select the different region safety compliance.

		G - 64.06	Australia Region	1		1: Australia A: 2: Australia B: 3: Australia C: 4: New Zealand: 5: Allowed...	
		G - 64.81	Over Frequency	52.00			
		G - 64.82	Under Frequency	47.00			
		G - 64.85	f _{hyst}	0.10			
		G - 64.129	Volt Watt-Vw1	253.0		V	
		G - 64.130	Volt Watt-Vw2	260.0		V	
		G - 64.136	Volt Watt-Vw2-Ch	215.0			
		G - 64.137	Volt Watt-Vw1-Ch	207.0			
		G - 64.145	Volt Var-Vv1	207.0		V	
		G - 64.146	Volt Var-Vv2	220.0		V	
		G - 64.147	Volt Var-Vv3	240.0		V	
		G - 64.148	Volt Var-Vv4	258.0		V	

14 Error Message and Troubleshooting

Error message	Description	Cause and possible corrective action
ERR_Pcs_EPO	PCS EPO Fault	Click the 'Reset' button on the EMS PCS command area, wait 10 minutes and the alarm will be cleared automatically. If the error still occurs, please contact service.
ERR_Pcs_IGBT_O_I	PCS Device IGBT Over Current	
ERR_Pcs_Bus_hawe_O_V	Pcs Device Busbar Hardware Over Volt	
ERR_Pcs_pomd_WaveLimit_I	Pcs Device Power Module Wave Current Limiting Fault	
ERR_Pcs_Balance_Hard_O_I	Pcs Device Balance Hardware Over Current	
ERR_Pcs_24V	Pcs Device 24V Power Supply Fault	
ERR_Pcs_Fan	Pcs Device Fan Fault	
ERR_Pcs_Conn	Pcs Device Connection Fault	Wait 10 minutes and the alarm will be cleared automatically. If the error still occurs, please contact service.
ERR_Pcs_SPD	Pcs Device SPD Fault	
ERR_Pcs_pomd_O_T	Pcs Device Power Module Over Temp	
ERR_Pcs_15V	Pcs Device 15V Power Supply Fault	Click the 'Reset' button on the EMS PCS command area, wait 10 minutes and the alarm will be cleared automatically. If the error still occurs, please contact service.
ERR_Pcs_Sys_Fire_Alarm	Pcs Device System Fire Alarm Fault	
ERR_Pcs_Cell_dry	Pcs Device Cell Dry Connect Fault	
ERR_Pcs_O_Load	Pcs Device Over Load	
ERR_Pcs_O_VA ERR_Pcs_O_VB ERR_Pcs_O_VC	PCS Device A、B、C Over Volt	Check whether the AC connection is correct, if no problem, please power off and restart; if the error still occurs, please contact service.
ERR_Pcs_U_VA ERR_Pcs_U_VB ERR_Pcs_U_VC	PCS Device A、B、C Under Volt	
ERR_Pcs_G_O_Frq	Pcs Device Grid Over Frequency	
ERR_Pcs_G_U_Frq	Pcs Device Grid Under Frequency	Check whether the AC connection is correct, if no problem, please contact service.
ERR_Pcs_G_Pha	Pcs Device Grid Phase Error	
ERR_Pcs_stwk_pha_O_IA ERR_Pcs_stwk_pha_O_IB ERR_Pcs_stwk_pha_O_IC	PCS Device A、B、C Software Phase Over Current	
ERR_Pcs_G_V_Unb	PCS Device Grid Volt Unbalance	Check whether the AC connection is correct, if no problem, please power off and restart; if the error still occurs, please contact service.
ERR_Pcs_G_I_Unb	PCS Device Grid Current Unbalance	
ERR_Pcs_G_Def_pha	PCS Device Grid Default Phase	
ERR_Pcs_N_O_I	PCS Device Neutral Cable Over Current	

Error message	Description	Cause and possible corrective action
ERR_Pcs_PreChgBus_O_V	Pcs Device Precharge Busbar Over Volt	Click the 'Reset' button on the EMS PCS command area and the alarm will be cleared automatically. If the error still occurs, disconnect the main AC connection MCCB Q1 and wait for 10 minutes to connect Q1 again. If the error is still unresolved, please contact service.
ERR_Pcs_PreChgBus_U_V	Pcs Device Precharge Busbar Under Volt	
ERR_Pcs_Unctl_Recti_Bus_O_Volt	Pcs Device Uncontrol Rectifier Busbar Over Volt	
ERR_Pcs_Unctl_Recti_Bus_U_Volt	Pcs Device Uncontrol Rectifier Busbar Under Volt	
ERR_Pcs_RunBus_O_V	Pcs Device Running Busbar Over Volt	Max. allowed DC-voltage was exceeded. Wait 3 hours and the alarm will be automatically cleared. If the error still occurs, please contact service.
ERR_Pcs_RunBus_U_V	Pcs Device Running Busbar Under Volt	■ The BMS device is not on high voltage status. Turn on  button. ■ Min. allowed DC-voltage was exceeded. Wait 3 hours and the alarm will be automatically cleared. If the error still occurs, please contact service.
ERR_Pcs_PosNegBus_Unb	Pcs Device Positive/Negative Busbar Unbalance	Wait 10 minutes and the alarm will be automatically cleared. If not, click the 'Reset' button on the EMS PCS command area. If the error still occurs, disconnect the main AC connection MCCB Q1 and wait for 10 minutes to connect Q1 again. If the error is still unresolved, please contact service.
ERR_Pcs_Cell_O_V	Pcs Device Cell Over Volt	Max. allowed DC-voltage was exceeded. Wait 3 hours and the alarm will be automatically cleared. If the error still occurs, please contact service.
ERR_Pcs_Cell_U_V	Pcs Device Cell Under Volt	
ERR_Pcs_AC_PreChg_O_I	Pcs Device AC Precharge Over Current	Click the 'Reset' button on the EMS PCS command area and the alarm will be cleared automatically. If the error still occurs, disconnect the main AC connection MCCB Q1 and wait for 10 minutes to connect Q1 again. If the error is still unresolved, please contact service.
ERR_Pcs_AC_Mode_Bus_U_V	Pcs Device AC Mode Busbar Under Volt	
ERR_Pcs_AC_O_I	Pcs Device AC Over Current	
ERR_Pcs_PreChg_O_Time	Pcs Device Precharge Over Time	
ERR_Pcs_PreChg_O_IA ERR_Pcs_PreChg_O_IB ERR_Pcs_PreChg_O_IC	Pcs Device Precharge A、B、C Over Current	
ERR_Pcs_AB_Samp_ZeroDrif	Pcs Device AB Sample Zero Drift Fault	

Error message	Description	Cause and possible corrective action
ERR_Pcs_STS_Comm	Pcs Device STS Communication Fault	Check whether the communication cable is on, disconnect the main AC connection MCCB Q1 and wait for 10 minutes to connect Q1 again. If the error still occurs, please contact service.
ERR_Pcs_Battery_Sys	Pcs Device Battery System Fault	
ERR_Pcs_EMS_Comm	Pcs Device EMS Communication Fault	
ERR_Pcs_PreChg_Relay_ON	Pcs Device Precharge Relay ON Fault	
ERR_Pcs_PreChg_Relay_OFF	Pcs Device Precharge Relay OFF Fault	
ERR_Pcs_PreChg_Relay_ON_State	Pcs Device Precharge Relay ON State Fault	
ERR_Pcs_PreChg_Relay_OFF_State	Pcs Device Precharge Relay OFF State Fault	
ERR_Pcs_Main_Relay_ON	Pcs Device Main Relay ON Fault	
ERR_Pcs_Main_Relay_OFF	Pcs Device Main Relay OFF Fault	
ERR_Pcs_Main_Relay_ON_State	Pcs Device Main Relay ON State Fault	Click the 'Reset' button on the EMS PCS command area and the alarm will be cleared automatically. If the error still occurs, disconnect the main AC connection MCCB Q1 and wait for 10 minutes to connect Q1 again. If the error is still unresolved, please contact service.
ERR_Pcs_Main_Relay_OFF_State	Pcs Device Main Relay OFF State Fault	
ERR_Pcs_Inver_O_VA ERR_Pcs_Inver_O_VB ERR_Pcs_Inver_O_VC	Pcs Device Inverter Over Voltage	
ERR_Pcs_Inver_U_VA ERR_Pcs_Inver_U_VB ERR_Pcs_Inver_U_VC	Pcs Device Inverter Under Voltage	
ERR_Pcs_G_Island	Pcs Device Grid Island Fault	
ERR_Pcs_Sys_Syntony	Pcs Device System Syntony Fault	
ERR_Pcs_stwk_O_VI	Pcs Device Software Over Volt/Current	
ERR_Pcs_md_Adress	Pcs Device Module Adress Fault	
ERR_Pcs_Off_G_NO-Sync_Sig	Pcs Device off-grid No-Synchronization Signal Fault	
ERR_Pcs_Off_G_Short-Out	Pcs Device off-grid short-circuit Fault	Click the 'Reset' button on the EMS PCS command area, wait 10 minutes and the alarm will be cleared automatically. If the error still occurs, please contact service.
ERR_Pcs_low_V_O_Time	Pcs Device Low Voltage Crossing Over Time fault	
ERR_Bms_BMU_Hardware	BMS Device BMU Hardware Fault	
ERR_Bms_BCU_Hardware	BMS Device BCU Hardware Fault	Please contact service to replace the BMU of the BMS device.

Error message	Description	Cause and possible corrective action
ERR_Bms_FusePro	BMS Device Fuse Fault	Check all battery MSD installation status, if the error still occurs after all MSDS are inserted, please contact service.
ERR_Bms_ConAdh	BMS Device Contactor Adhesion Fault	Click the  button on the EMS BMS command area to disconnect DC high voltage, wait 10 minutes to restart again, the alarm will be cleared automatically. If the error still occurs, please contact service.
ERR_Bms_BMU_Comm	BMS Device BMU Communication Fault	Please contact service.
ERR_Bms_BAU_Comm	BMS Device BAU Communication Fault	
ERR_Bms_CurSen	BMS Device Current Sensor Fault	
ERR_Bms_IMD	BMS Device Insulation Monitoring Device Fault	Check whether the positive or negative insulation resistance value is smaller than 20000kΩ, please contact service.
ERR_Bms_DisOpen	BMS Device Isolation switch Disconnect abnormally	Please contact service.
ERR_Bms_O_V	Level 1 alarm for overvoltage.	This fault can not affect device running.
ERR_Bms_U_V	Level 1 alarm for undervoltage.	
ERR_Bms_Cell_O_V	Level 1 alarm for cell overvoltage.	
ERR_Bms_Cell_U_V	Level 1 alarm for cell undervoltage.	
ERR_Bms_Dis_O_I_Le1	Level 1 alarm for discharging overcurrent.	
ERR_Bms_Cha_O_I_Le1	Level 1 alarm for charging overcurrent.	
ERR_Bms_DisBat_O_T	Level 1 alarm for battery discharging over temperature.	
ERR_Bms_DisBat_U_T	Level 1 alarm for battery discharging under temperature.	
ERR_Bms_ChaBat_O_T	Level 1 alarm for battery charging over temperature.	
ERR_Bms_ChaBat_U_T	Level 1 alarm for battery charging under temperature.	
ERR_Bms_IR_Low	Level 1 alarm for low insulation resistance.	
ERR_Bms_HVB_T_H	Level 1 alarm for switch gear connector high temperature.	
ERR_Bms_CellV_H	Level 1 alarm for high cell voltage difference.	
ERR_Bms_Cell_T_H	Level 1 alarm for high cell temperature difference.	
ERR_Bms_SOC_Low_Le1	Level 1 alarm for low SOC.	

Error message	Description	Cause and possible corrective action
ERR_Bms_O_V_Le2	Level 2 alarm for overvoltage.	This fault can not affect device running.
ERR_Bms_U_V_Le2	Level 2 alarm for undervoltage.	
ERR_Bms_Cell_O_V_Le2	Level 2 alarm for cell overvoltage.	
ERR_Bms_Cell_U_V_Le2	Level 2 alarm for cell undervoltage.	
ERR_Bms_Dis_O_I_Le2	Level 2 alarm for discharging overcurrent.	
ERR_Bms_Cha_O_I_Le2	Level 2 alarm for charging overcurrent.	
ERR_Bms_DisBat_O_T_Le2	Level 2 alarm for battery discharging over temperature.	
ERR_Bms_DisBat_U_T_Le2	Level 2 alarm for battery discharging under temperature.	
ERR_Bms_ChaBat_O_T_Le2	Level 2 alarm for battery charging over temperature.	
ERR_Bms_ChaBat_U_T_Le2	Level 2 alarm for battery charging under temperature.	
ERR_Bms_IR_Low_Le2	Level 2 alarm for low insulation resistance.	
ERR_Bms_HVB_T_H_Le2	Level 2 alarm for switch gear connector high temperature.	
ERR_Bms_CelVolDif_H_Le2	Level 2 alarm for high cell voltage difference.	
ERR_Bms_Cell_T_Dif_H_Le2	Level 2 alarm for high cell temperature difference.	
ERR_Bms_SOC_Low_Le2	Level 2 alarm for low SOC.	
ERR_Bms_O_V_Le3	Level 3 alarm for overvoltage.	Disconnect the DC high volt on the EMS BMS command area and turn off the switch gear 24V DC auxiliary power supply switch. Wait for 10 minutes to restart. If the error still occurs, please contact service.
ERR_Bms_U_V_Le3	Level 3 alarm for undervoltage.	
ERR_Bms_Cell_O_V_Le3	Level 3 alarm for cell overvoltage.	
ERR_Bms_Cell_U_V_Le3	Level 3 alarm for cell undervoltage.	
ERR_Bms_Dis_O_I_Le3	Level 3 alarm for discharging overcurrent.	
ERR_Bms_Cha_O_I_Le3	Level 3 alarm for charging overcurrent.	Power up the cabinet, chiller will start cooling. Wait 10 minutes and the alarm will be cleared automatically.
ERR_Bms_DisBat_O_T_Le3	Level 3 alarm for battery discharging over temperature.	
ERR_Bms_DisBat_U_T_Le3	Level 3 alarm for battery discharging under temperature.	
ERR_Bms_ChaBat_O_T_Le3	Level 3 alarm for battery charging over temperature.	
ERR_Bms_ChaBat_U_T_Le3	Level 3 alarm for battery charging under temperature.	Check whether the positive or negative insulation resistance value is smaller than 20000kΩ, please contact service to check whether the fuse needs to be replaced.
ERR_Bms_IR_Low_Le3	Level 3 alarm for low insulation resistance.	
ERR_Bms_HVB_T_H_Le3	Level 3 alarm for switch gear connector high temperature.	
		Wait 10 minutes and the alarm will be automatically cleared. If the error still occurs, please contact service.

Error message	Description	Cause and possible corrective action
ERR_Bms_Cell_V_Dif_H_Le3	Level 3 alarm for high cell voltage difference.	Wait 3 hours and the alarm will be automatically cleared. If the error still occurs, please contact service.
ERR_Bms_Cell_T_Dif_H_Le3	Level 3 alarm for high cell temperature difference.	
ERR_Bms_SOC_Low_Le3	Level 3 alarm for low SOC.	Battery discharge to the lowest SOC. Note: This fault can not affect device running.
ERR_Plc_EAD5DehComm	The dehumidifier communication failed.	■ Check whether the dehumidifier equipment is damaged, if so, please contact service. ■ Check the cables between the PLC and the dehumidifier, if damaged, wrap electrical tape around it. If there is no problem with the above two items, please contact service.
ERR_Plc_ModuleCode	PLC module Code Error	Please contact service.
ERR_Plc_K1Switch	K1 Switch Status	
ERR_Plc_Q3_PCS3_MCB	Q3 Auxiliary Power MCB Status	Check the status of the Q3 switch, whether it is open or closed. If it is open, close the Q3 switch.
ERR_Plc_FireSys_Sta1	Fire System Fault	Wait 10 minutes and the alarm will be automatically cleared. If the error still occurs, please contact service.
ERR_Plc_FireSys_Sta2	Fire System Alarm	Please contact service.
ERR_Plc_VenFan	Fan Fault Status	Check whether the fan is damaged.
ERR_Plc_VenAirGri	Ventilate air-inlet grille Status	Check whether the exhaust fan is damaged.
ERR_Plc_F1SA1MainPower_SpdPro_MCB	F1&SA1 Main Power SPD Protection MCB Status	Check the F1 switch status; ON or OFF, if it is OFF, close the F1 switch.
ERR_Plc_F2&SA2_Main_Power_SPD_Protect_MCB_Status	F2&SA2 Main Power SPD Protection MCB Status	Check the F2 switch status; ON or OFF, if it is OFF, close the F2 switch.
ERR_Plc_F3ChiPower_MCB	F3 Chiller Power Supply MCB Status	Check the F3 switch status; ON or OFF, if it is OFF, close the F3 switch.
ERR_Plc_F4DehPower_MCB	F4 Dehumidifier Power Supply MCB Status	Check the F4 switch status; ON or OFF, if it is OFF, close the F4 switch.
ERR_Plc_F5CablllPower_MCB	F5 Cabinet Illumination Power Supply MCB Status	Check the F5 switch status; ON or OFF, if it is OFF, close the F5 switch.
ERR_Plc_F6H2VenSysPower_MCB	F6 H2 Detection System Power Supply Status	Check the F6 switch status; ON or OFF, if it is OFF, close the F6 switch.
ERR_Plc_F724VDCPower_MCB	F7 24V DC Power Supply Status	Check the F7 switch status; ON or OFF, if it is OFF, close the F7 switch.

Error message	Description	Cause and possible corrective action
ERR_Plc_SE1E_StopBut	SE1 E-Stop Button Status	Confirm the external emergency stop status. If the emergency stop is pressed, rotate it outward to reset it.
ERR_Plc_DC24UPS_Bat	24VDC UPS Status	Check the status of the 24V UPS, if it is fault, please contact service.
ERR_Plc_H2Det	H2 detector status. 0=Normal; 1=Fault; 2=Alarm.	Fault: Wait 10 minutes and the alarm will be automatically cleared. If the error still occurs, please contact service. Alarm: Please contact service.
ERR_Plc__F101_Aerosol_Status	Aerosol status. 0=Normal; 1=Fault; 2=Discharged.	Please contact service.
ERR_Plc_K3PCS_Estop	K3 PCS E-Stop Switch Status	If it is fault, please contact service.

15 Routine Maintenance

15.1 Precautions Before Maintenance

- There is a fatal high voltage inside the cabinet equipment of the energy storage integrated system. If accidentally touched, there is a risk of fatal electric shock.
- After shutdown, please wait at least 10 minutes before opening the cabinet door. Before performing maintenance work, please ensure that there is no electricity inside the equipment.
- Only qualified and authorized personnel can perform maintenance and other operations on the energy storage integrated system.
- When carrying out maintenance work, do not leave screws, washers and other metal parts inside the energy storage integrated system, otherwise it may damage the equipment!
- The entry of sandstorms and moisture may damage the electrical equipment within the energy storage integrated system or affect the operational performance of the equipment!
- During the sandstorm season or when the relative humidity in the surrounding environment exceeds 95%, do not open the equipment cabinet doors inside the energy storage integrated system.
- Maintenance work can only be started when there is no wind or sand and the weather is clear and dry.
- To avoid the risk of electric shock, all AC/DC side switches and the front and rear circuit breakers of the energy storage integrated system should be disconnected before maintenance, repair, and other operations.

15.2 Maintenance Item and Period

15.2.1 Maintenance (Every half a year to once a year)

Maintenance Tasks	Method
Software Maintenance	Check the settable parameters on the EMS.
Safety function	■ Check whether the emergency stop button work normally. ■ Simulate shutdown. ■ Check the warning marks and other device marks, and replace them timely when they are fuzzy or damaged.
Internal components inspection	■ Check the cleanness of the circuit board and other elements and components. ■ Check the temperature of the radiator and the amount of dust accumulated. ■ Clean heat-dissipation modules with a vacuum cleaner if necessary. ■ Replace the air filter screen when necessary. Note: It is necessary to check ventilation of the air inlet. Otherwise, fault may occur due to overheating if the module cannot be cooled effectively.
Device maintenance	■ Carry out regular inspection for corrosion of all metal components (Once per half a year). ■ Check the contactors (auxiliary switches and micro-switches) annually to ensure the good mechanical operation. ■ Check the running parameters (especially voltage and insulation). ■ The radiator fan is a wearing part and it is recommended that it is replaced when abnormalities are found.

15.2.2 Maintenance (Once a year)

Maintenance Tasks	Method
Outside the container	Check the following items, and correct immediately those failing to meet relevant requirements: ■ Check whether there are flammable objects on the top of the container. ■ Check whether the welding points between the container and the foundation steel plate is firm and whether there is corrosion. ■ Check whether there is any damage, flaking paint or sign of oxidization on the enclosure. ■ Check whether the lock of the cabinet door can be unlocked flexibly. ■ Check whether the sealing strip is fixed properly.
Inside the container	■ Check whether there are foreign objects, dust, dirt, and condensed water inside the integrated energy storage system. ■ Check sign of animals or insects inside the cabinet.
Air inlet and outlet	Check the temperature of the radiator and the amount of dust accumulated. Clean

Maintenance Tasks	Method
	heat-dissipation modules with a vacuum cleaner if necessary.
Wiring and cable layout	Completely power off the devices inside the system before checking. For any non-conformances found during inspection, correct them immediately. ■ Check whether the cable layout is normal and whether there is a short circuit. For any non-conformances found during inspection, correct them immediately. ■ Check whether all cable entrances are well sealed. ■ Check whether there is water seepage inside the device. ■ Check whether the power cables are loose, and fasten them again by the torque specified previously. ■ Check whether the power cables and control cables are damaged, especially if the surface contacting the metal surface is cut. ■ Check whether the insulation tapes on the power cable terminals fall off.
Ground connection and equipotential connection	■ Check whether the ground connection is correct and the grounding resistance value meets the specifications. ■ Check whether the equipotential connection inside the integrated system is correct.
Fan	■ Check the running status of fans. ■ Check whether fans are blocked. ■ Check if there is abnormal noise during operation of the fans.
Screw	Check whether internal screws fall off.

15.2.3 Maintenance (Every two years)

Maintenance Tasks	Method
System status and cleaning	Check the following items and correct them immediately if they do not meet the requirements: ■ Check whether there is any damage or deformation of the container and internal devices. ■ Check if there is abnormal noise during operation of internal devices. ■ Check whether the temperature in the container is excessively high. ■ Check whether the humidity and the amount of dust inside the container is within the normal range. Clean the equipment if necessary. ■ Check whether the air inlet and outlet of the device are blocked.
Warning marks	Check whether the warning labels and marks are clearly visible and free of stains and damage. Replace them if necessary.
Ground of the shielded layer of cables	Check whether the cable shielding layer is in good contact with the insulation sleeve and whether the copper bus bar is firmly fixed.
Surge protection device and fuse	Check whether the SPD and fuse are properly fastened.
Corrosion	■ Check whether there is oxidation or rust inside the cabinet.

15.3 Maintenance of Liquid Cooling System

Maintenance Tasks	Content	Method	Maintenance tools
Chiller system	Check that the HMI of the liquid cooling unit does not report a warning.	Check if the unit reports a "low water tank level" alarm and replenish the fluid when this alarm is received.	Slotted screwdriver, Phillips screwdriver, water pump, water pipe, clamp.
Chiller pump	■ Check whether the cooling air inlet hole of the chiller pump is blocked. If so, clear it with a brush; ■ Visually inspect the pump body (not the joint parts) and check whether there is obvious	■ The pump runs smoothly without abnormal noise; ■ There is no obvious dripping on the pump body (except condensate).	■ Brush

	liquid dripping (except condensate). If so, replace the sealing ring of the pump.		
Chiller fan	Check whether the fan blades cannot rotate or are damaged. If so, replace the fan.	■ The fan blade rotates smoothly without abnormal noise. ■ No damage to fan blade. Note: Check this item at least half a year. Blade damage inspection is not mandatory.	Screwdriver with long handle

15.4 Container Maintenance

15.4.1 Measures for Repairing Appearance Damage

	It is necessary to check whether the protective paint sprayed on the shell has peeled off or peeled off. If found, please repair it in a timely manner. It is strictly prohibited to touch up paint in adverse weather conditions such as rain, snow, strong winds, and sandstorms when there is no obstruction outdoors.
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Case 1: Dirt on surface caused by water spots and dusts can be cleaned.

No.	Cleaning Tools	Component source
1	Cleaning cloth	Not included in the scope of supply
2	Water	
3	Alcohol or other non-corrosive detergent	

Procedure:

- 1、Wet the cleaning cloth (or other scrubbing tools) with water, and scrub the dirty parts on surface.
- 2、If the dirt cannot be cleaned with water, scrub with 97% alcohol till the surface is acceptable. (Or try to use non-corrosive detergents that are generally used locally)

Case 2: Shallow scratches (without exposing the steel plate substrate) and indelible stains and rust.

No.	Cleaning Tools	Component source
1	Abrasive paper	Not included in the scope of supply
2	Cleaning cloth	
3	Water	
4	Alcohol	
5	Brush	
6	Color code RAL9010 paint	

Procedure:

- 1、Polish the paint surface with blistering or scratches with an abrasive paper for a smooth surface.
- 2、Wet the cleaning cloth with water or 97% alcohol, and scrub the damaged parts to remove surface stains.
- 3、Perform paint repair for the scratched parts with a soft brush after the surface is dried; brush the paint as uniform as possible.

Case 3: Dirt on surface caused by water spots and dusts can be cleaned.

No.	Cleaning Tools	Component source
1	Abrasive paper	Not included in the scope of supply
2	Cleaning cloth	
3	Water	
4	Alcohol	
5	Zinc rich primer	
6	Brush	
7	Color code RAL9010 paint	

Procedure:

- 1、 Polish the paint surface with blistering or scratches with an abrasive paper for a smooth surface.
- 2、 Wet the cleaning cloth with water or 97% alcohol, and scrub the damaged parts to remove surface stains.
- 3、 After the surface is dry, spray zinc rich primer on the exposed parts of the substrate for protection. Spraying should completely cover the exposed substrate.
- 4、 Perform paint repair for the scratched parts with a soft brush after the primer is dried; brush the paint as uniform as possible.

15.4.2 Checking Sealing Strips

If the sealing strip is in good condition, it can effectively prevent water seepage inside the container. Therefore, carefully check the sealing strip and replace it immediately if there is any damage.

15.5 Coolant Replacement



Normally coolant is not a health hazard, excessive exposure may cause irritation to the eyes, skin and breathing.

Object	Standard	Period	Tools
Coolant (Glysantin G30: Ethylene glycol concentration 50%)	1. There are obvious impurities in antifreeze; 2. Antifreeze is significantly darker in color.	1 year	Water pump, hose, hose clamp, slotted screwdriver

Personal protection

Wear personal protective equipment (PPE) when changing coolant. PPE should comply with relevant national standards, including but not limited to the following protective equipment.

No.	Protective parts	Protective equipment
1	Respiratory protection	Please use gas masks in high concentration areas.
2	Hands protection	Use oil-resistant, chemical-resistant protective gloves.
3	Eyes protection	Please use protective goggles.
4	Skin and body protection	Use non-permeable protective clothing and safety shoes.

Disposal considerations

No.	Protective parts	Protective equipment
1	Coolant	Discharges are made in accordance with local regulations and are not disposed of haphazardly.
2	Rubbish remnant	Separate and recycle, and if it meets the relevant regulations, it can be burned or reused.
3	Containers	Unpolluted containers can be recycled, while containers that cannot be cleaned clearly must be disposed of.

Accidental release measures

- When a coolant leak occurs, refer to the following measures to deal with it.
- Immediately contact a professional to have uninvolved persons evacuated quickly to safety.
- Cut off the source of the spill as far as possible and prevent it from entering spaces such as sewers, drains and bodies of water.
- When cleaning up spilled liquids, wear protective equipment to protect your body from contact with the spilled or released material.
- Use sand, mud or other materials that can be used as barriers to set up barriers to prevent diffusion. Recover liquid directly or store in absorbent. Clean the contaminated area with detergent, water and a hard broom. Put the collected liquid in a disposable container.

No.	Contact method	Measures
1	Inhalation	Move to fresh air. If breathing has stopped, give artificial respiration first aid. Seek medical attention.
2	Skin contact	Take off contaminated clothing. Rinse the skin thoroughly with soap and water. Seek medical attention if skin inflammation or rash occurs.
3	Eyes contact	Flush eyes with plenty of water for at least 15 minutes. Seek medical attention.
4	Ingestion	If ingested, but conscious, water or milk to drink and actively seek medical help, do not induce vomiting unless instructed by healthcare patients. If you cannot get help from a doctor, please send the patient and the container and label to the nearest medical emergency center or hospital. Do not give any food to unconscious patients.

16 Exclusion of Liability

Although the information contained in this manual has been carefully checked for accuracy and completeness, no liability can be assumed for errors or omissions.

RCT Power reserves the right to change the hardware and software features described in this manual at any time without prior notice.

Warranty or liability claims of any kind are excluded due to one or more of the following reasons:

- Incorrect use or installation of the product.
- Installation or operation of the product in an unsuitable environment.
- The relevant safety regulations during installation and commissioning at the operation site are ignored.
- The product relevant safety notices and instructions contained in the product documentation are ignored.
- By installing or operating the product under insufficient safety and security conditions.
- By modifying the product or by unauthorised software installation.
- A defect in the product caused by the operation of the product or adjacent equipment outside the permitted limits.
- Damage caused by force majeure.

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RCT Power does not accept any liability for damage caused by incorrect or lost data, due to incorrect operation or malfunction of the cabinet, the software, additional devices or personal computers.

17 Recycle



NOTICE

- The Company does not recycle batteries. Contact local recycling agencies to handle batteries.
- If there are no such agencies in your area, you can contact the nearest foreign recycling agencies.

Procure:

Step 1: Contact the nearest recycling agency.

- According to the requirements of the recycling agency, electrical and iron components of the energy storage system should be dismantled and classified after a power outage.

Step 2: Recycling agencies assess the costs.

- All costs/revenues arising from recycling shall be borne by the user themselves.

Step 3: Recycling agencies carry out recycling.

- Collect all recycled lithium batteries in one area and have the recycling agency come to the site for centralized processing.
- Electrical components such as refrigerators and inverters do not contain flammable or explosive dangerous goods and can be scrapped and recycled in accordance with relevant laws and regulations of overseas countries.

Step 4: Recycling companies handle recycling.

- The recycled lithium batteries are at the disposal of the recycling companies.

18 Technical Data

Technical Data	RCTerra Class 1.0 Series			
Model Name	CESS233-100-01A	CESS233-100-01B	CESS233-100-01C	CESS233-100-01D
GENERAL				
Nominal Capacity	233 kWh			
Usable Capacity(95% DOD)	221.35kWh			
Maximum Charge\Discharge Rate	0.5C			
Self-Discharge Rate	≤3.5% (per month)			
Relative Operating Humidity	0% ~ 95% RH, Non-condensing			
Operating Temperature Range	-25°C ~ 45°C			
Storage Temperature Range	-30°C ~ 50°C (recommended 0°C to 30°C)			
Operating Altitude	≤2000m			
Dimensions (mm)	W1600 x H 2200 x D1300			
Corrosion-proof Grade/Salt Spray Resistance	C4			
Weight	2900 kg	2800kg	2800kg	2800kg
Max. Number Of ESS used in parallel(On-grid)	\	\	\	12
Max. Number Of ESS used in parallel(Off-grid)	\	\	\	5
IP Rating	IP54 (Battery room IP55)			
Noise Level	≤70dB			
Communication Protocol	Modbus TCP/RTU, CAN			
Black-start Function(Dark start)	Yes			
AC Line Frequency	50/60 Hz			
Auxiliary Power Supply	External powered			
BMS	Integrated			
EMS	Integrated			
SAFETY FEATURE				

Technical Data	RCTerra Class 1.0 Series			
Model Name	CESS233-100-01A	CESS233-100-01B	CESS233-100-01C	CESS233-100-01D
Flammable/explosive Gas Detection	Yes			
Flammable/explosive Gas Exhaust	Yes			
Smoke Detection	Yes			
Temperature Detection	Yes			
Fire Suppression	Aerosol			
Siren and Strobe Alarm	Yes			
Dry Pipe and Sprinkle	Yes			
Emergency Stop Button	Yes			
BATTERY				
Battery Rack Quantity	1			
Battery Pack Quantity Per Rack	5			
Battery Pack Structure	1P52S			
Battery Capacity Per Pack	46.592kWh			
Battery Type	LiFePO4			
DC-side Rated Voltage	832 Vdc			
DC-side Operating Voltage Range	715~928 Vdc			
Cooling Concept	Liquid-cooling			
Cycle Lifetime	≥6000cls(70%SOH,25±2°C)			
PCS				
DC Connection				
Operating Voltage Range	680~950 Vdc			
Max. DC Current	160A			
AC Connection				
Rated AC Power	100 kW			

Technical Data	RCTerra Class 1.0 Series			
Model Name	CESS233-100-01A	CESS233-100-01B	CESS233-100-01C	CESS233-100-01D
Rated AC Current	144 A			
Rated AC Voltage	400 Vac, 3P+N+PE			
Power Factor Adjustable Range	-1 ~ +1			
Peak Efficiency	>98.5%			
Long-term Overload Capacity	110%			
Cooling concept	Air-cooling			
DC/DC Converter (Optional)				
Max. Number of MPPTs	2		/	
Max. String Voltage	950 Vdc		/	
Min. String Voltage	200 Vdc		/	
Max. Input Current per MPPT	80 A		/	
MPPTS Voltage Range	180 Vdc ~ 900 Vdc		/	
Rated Power	100 kW		/	
Peak Efficiency	>99%		/	
STS (Optional)				
Rated Power	200 kW	/	200 kW	/
Rated Voltage	400 Vac	/	400 Vac	/
Rated Frequency	50/60 Hz	/	50/60 Hz	/
Long-term Overload Capacity	110%	/	110%	/
STANDARDS				
EN IEC 62619, IEC 63056, EN 62477-1, IEC 60730-1 Annex H, EN62040, EN 62109-1&-2, EN IEC 61000-6-2&-6-4, EN 62933-5-2, VDE-AR-E 2510-50, UN 38.3, RED, NRS 097-2-1 Clause 4.1.13				

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