redback technologies

User Manual

3-Phase Power Conversion System

RED-C1-T100AC
RED-C1-T125AC
V1.4
17/3/2026

HISTORY

VERSION	ISSUED	COMMENTS
1.0	14May25	For review
1.1	31May25	T100AC added
1.2	06Jun25	Company identity and address updated
1.3	17Jun25	Minor updates in text and specifications.
1.4	17Mar26	Mainly added content regarding installation precautions and configuration items.

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PRIVACY NOTICE

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1. Introduction

Thank you for purchasing the Redback Technologies Power Conversion System Model: RED-C1-TxxxAC (hereafter called the “converter” and where “xxx” is the nominal power output).
This manual introduces the appearance, main features and working principle of the converter, and provides installation instructions, electrical connection instructions, use and operation instructions, maintenance management, transportation and storage, etc.
Please retain all documentation for future reference.
Note: due to continuous product improvement, your product may appear slightly diferent to the illustrations in this document, but the installation process is correct. If in doubt, please contact Redback Technologies for clarification.
This product meets the requirements of IEC 62477, IEC 61000 and other standards as listed in the product specification.

2. Safety Instructions

IMPORTANT SAFETY INSTRUCTIONS – PLEASE READ

This document has important safety instructions for Redback Technologies products.
Read all the instructions and cautionary markings on the product and any accessories or other equipment included in the installation.
Failure to follow instructions or operate equipment correctly may result in death, injury, equipment damage or failure, or a warranty claim being denied. Use caution to prevent accidents.

AUDIENCE

Installation, maintenance, and connection of inverters must be performed by qualified personnel, in compliance with local electrical standards, wiring rules and the requirements of local power authorities and/or companies (e.g., AS4777 and AS/NZS 3000 in Australia). The Redback system strictly conforms to all related safety rules in design and test.
Safety regulations relevant to the location should be followed during installation, operation, and maintenance.
These instructions are for personnel who:

- Meet all local and governmental code requirements for licensing and training for the installation of electrical power systems with AC and DC voltage up to the Maximum Input Voltage (Vmax) as listed in the product specifications.
- Have appropriate accreditation for installing grid-connected PV systems and energy storage systems.
- Have knowledge of the functional principles and operation of grid-connected systems and knowledge of the installation of electrical devices
- Understand and manage the risks associated with installing and using electrical devices.
- During the preceding 12 months, completed Redback installation training for the Redback RED-C1-T125AC converter.

SYMBOLS USED IN THIS MANUAL

SYMBOL	DEFINITION	SYMBOL	DEFINITION
	**LETHAL DANGER!** Risk of electrocution.		**CAUTION!** Hazard to equipment
	**DANGER!** Risk of electrical shock.		**CAUTION!** Explosion hazard
	**WARNING!** Hazard to human life		**CAUTION!** Lightning strike hazard.
	**WARNING!** Burn hazard		**CAUTION!** Sharps hazard.
	**TIPPING HAZARD.** Do not leave unattended.		**CAUTION!** Fire hazard.
	**HEAVY LIFT.** Seek help.		**DELAY. Equipment is energized.** Wait specified time for equipment to self-discharge.
	**PPE REQUIRED.**Use personal protective equipment.		**DELAY. Equipment is hot.** Allow equipment to cool for the specified time.
	**Information.** The information provided is important for the correct installation, operation and or maintenance of the equipment. Failure to follow there commendations may result in death, personal injury, equipment damage or failure, or a warranty claim being denied.		**PE grounding.** This is the protective grounding (PE) terminal, which shall be firmly grounded during installation toensure personnel safety.

SYMBOLS USED ELSEWHERE

SYMBOL	DEFINITION	SYMBOL	DEFINITION	SYMBOL	DEFINITION
	**KEEP DRY.** Protect the product from excessive humidity. Store under cover.		Do not dispose as household waste.		**REFER TO DOCUMENTS.**
	**FRAGILE.** Handle with care. Do not tip. Do not sling.		This product has recyclable parts. Dispose of correctly.		**RCM-Regulatory Compliance Mark** Required for Australia and New Zealand.
	**THIS SIDE UP.** Transport, handle and store the package with the arrows pointing up.		**INSULATE.** Insulate against extreme hot or cold.		**CE Compliance Mark**
	**STACKING LIMIT.** E.g., stack cartons maximum six high.		**HEAVY!** Bend knees to lift.		**HEAVY!** Two-person lift needed.
	**CENTRE OF GRAVITY.** On carton: indicates the centre of gravity, to assist safe lifting.				

GENERAL SAFETY

SYMBOL	DEFINITION
	**WARNING: Limitations on use** This equipment is NOT intended for use with life support equipment or other medical equipment or devices.
	**CAUTION: Equipment damage.** Only use components or accessories recommended or sold by Redback Technologies or its authorised agents.
	**IMPORTANT**. Do not install this equipment if it appears be damaged in any way. Contact Redback Technologies for assistance. Do not return goods without authorisation.

PERSONAL SAFETY

SYMBOL	DEFINITION
   	**WARNING: PERSONAL INJURY** • Use safe lifting techniques when handling this equipment. For guidance visit safeworkaustralia.gov.auor contact your local WHS authority. • Use standard safety equipment when working on this equipment such as safety glasses, ear protection, steel-toed safety boots, safety hard hats, etc • Use standard safety practices when working with electrical equipment e.g., remove all jewellery, use insulated tools, wear cotton clothing etc. • Never work alone when installing or servicing this equipment. Have an assistant to help if necessary. • Ensure you have an emergency communication and response plan in place. • Do not touch the inverter during operation. The temperature of some parts may exceed 75°C during operation. After shutdown, allow the inverter to cool for at least 10 minutes before touching. • Moving parts: do not put fingers or tools into the fan, otherwise injury may occur. • Ensure that children, pets, and other animals are kept away from the inverter, solar arrays, batteries and utility grid components. • If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

BATTERY SAFETY

SYMBOL	DEFINITION
 	**IMPORTANT** • Danger. High Voltage. Disconnect batteries from the converter before starting maintenance. • Use the battery types recommended by Redback Technologies and follow the manufacturer's recommendations. • Insulate batteries against freezing temperatures. Note: batteries freeze more easily when discharged.

EQUIPMENT SAFETY

SYMBOL	DEFINITION
	**WARNING: IMPROPER USAGE** The protection provided by the equipment may be impaired if not installed and used in a manner not specified by the manufacturer.
	**WARNING: LETHAL VOLTAGE** • Identify all sources of energy. Ensure ALL sources of AC and DC power are disconnected before performing any installation or maintenance on this equipment. Confirm that the terminals and all touch points are de-energised using a validated voltmeter (rated for a minimum 1000 VAC and 1000 VDC). • No user serviceable parts inside. Do not perform any servicing other than that specified in the installation or maintenance instructions unless instructed to do so by Redback Technologies technical support personnel. • Solar arrays may be energised even in low ambient light. Install a high voltage DC rated disconnect, breaker, or accessible fuse box to ensure a safe disconnect from the system (depending on local code requirements). • To avoid electric shock, disconnect the DC input and AC input of the inverter at least 10 minutes before performing any installation or maintenance. • Completely disconnect all sources of power before continuing with any maintenance. Do not open the upper inverter compartment of the system. • Do not tighten the AC and DC terminals or pull on the AC and DC wiring when the inverter is running.
	**WARNING: BURN HAZARD** • External and internal parts may be hot, up to 75°C. Do not remove any cover during operation or touch any internal parts. Allow time for internal parts to cool down before attempting to perform any maintenance.
 	**WARNING: FIRE HAZARD** • Do not keep combustible or flammable materials in the same room as the equipment. The Redback system contains relays and switches which are not ignition protected. • Ensure AC, DC and ground cable sizes conform to local codes and are fit for purpose. Ensure all conductors are in good condition. Do not operate the unit with damaged or substandard cabling. • In case of fire, use dry powder fire extinguisher only. Liquid or other suppressants may create a shock hazard.
   	**CAUTION: EQUIPMENT DAMAGE** • When connecting cables from the inverter to the battery terminals, ensure the proper polarity is observed. Connecting the cables incorrectly can damage or destroy the equipment and void the product warranty. • Ensure no tools, liquids or other objects are allowed to enter the converter otherwise equipment damage will occur. • Thoroughly inspect the equipment prior to energising. Ensure no tools or equipment have been left behind. • Ensure clearance requirements are strictly enforced. Keep all vents clear of obstructions that can prevent proper air flow around, or through, the unit. • Do not remove any cover from the converter. Apart from performing work at the wiring terminals (as instructed in this manual), touching or changing components without authorisation may result in death, injury, equipment damage or failure, or a warranty claim being denied. • Static electricity may damage electronic components. Take appropriate steps to prevent such damage to the inverter; otherwise, the warranty may be annulled. • Ensure the output voltage of the proposed solar array is lower than the maximum rated input voltage of the inverter; otherwise, the inverter may be damaged, and the warranty annulled. • Solar modules should have an IEC61730 Class A rating.
	**CAUTION: LIGHTNING PROTECTION.** PV arrays in the system should be protected by a Lightning Protection System as described in AS/NZS5033:2021.

ADDITIONAL SAFETY INSTRUCTIONS
GROUNDING REQUIREMENTS

DANGER. CURRENT LEAKIAGE HAZARD. Before electrical connection, grounding must be ensured. The grounding terminal must be connected to the earth. Otherwise, there may be electric shock danger when touching the machine.

- When installing equipment, it must be grounded first; and when dismantling the equipment, the ground wire must be dismantled last;
- It is forbidden to destroy the grounding conductor;
- The equipment shall have permanent grounding protection.
- Before operating the equipment, check the electrical connection of the equipment to ensure that the equipment is reliably grounded.

MOISTURE PROTECTION

WARNING. Moisture invasion causes converter damage. To ensure the normal use of the converter, please follow the following instructions:

- When the humidity is >95%, please do not open the cover plate of the converter;
- Under rainy or humid weather conditions, avoid opening the converter door panel for maintenance or repair.
- It should not be used directly in the open air in coastal or desert areas with high salt fog and high dust.

SAFETY WARNING SIGN SETTING

To avoid accidents caused by irrelevant personnel approaching or mis¬ operating the converter, please comply with the following relevant specifications during installation and daily maintenance and repair of the converter.

- Set warning signs at the front and rear switches of the converter to prevent accidents caused by wrong closing.
- Set warning signs or safety warning belts in the operation area to avoid personnel injury or equipment damage caused by irrelevant personnel entering.

ELECTRICAL CONNECTION

WARNING. EXTERNAL REGULATIONS APPLY.

- Electrical connection must be carried out in strict accordance with the description and electrical wiring schematic diagram in this manual.
- The installation environment and connected equipment must comply to the product specifications listed at the end of this document.
- Grid-connected operation shall be allowed by the local Power supply department and professionals shall be invited to carry out relevant operations.

LIVE LINE MEASUREMENT

CAUTION. HIGH VOLTAGE AND CURRENT INSIDE. Accidental touch may cause electrocution.

- Use appropriate protective equipment e.g., insulated gloves.
- The measuring equipment must be:
  - Suitable for voltage, current and power expected, and
  - Correctly connected using a safe, appropriate, standard method, to avoid causing dangers such as arcing.

OTHER CONSIDERATIONS DURING MAINTENANCE OR REPAIR

When maintaining or repairing the converter:

- Ensure that the converter cannot be accidentally energized.
- Test using a multimeter to ensure that the converter is completely de-energized.
- Implement necessary grounding connection.
- Use insulating material to cover the parts that maybe electrified near the operating parts.
- Always maintain an unobstructed escape route.

3. Product Introduction

The main function of converter series products produced by Redback Technologies is to charge and discharge battery components, invert DC into sine wave alternating current that meets the requirements of Power grid and transmit it directly to Power grid through transformer. It can also charge the excess electricity of the Power grid into the battery, so it is an important part of the energy storage system.

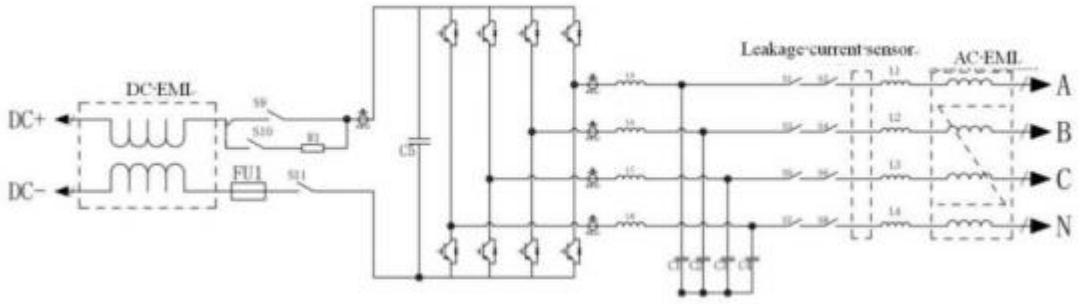
3.1. PRODUCT PRINCIPLE

The converter is the main executive mechanism and core component of the energy storage system, which can realize the AC/DC conversion between the Power grid and the batteries and complete the two-way energy flow between them.

The charge and discharge management of battery system, charge and discharge Power control of battery energy storage system, grid-connection/grid-disconnection operation modes and mode switching function are realized with advanced control strategies.

It has perfect protection functions, such as island protection, DC overvoltage protection and AC overvoltage/undervoltage protection, etc., to meet the grid-connection/grid- disconnection requirements.

The RED-C1-TxxxAC Main Circuit Diagram is shown below.



3.2. TECHNICAL FEATURES

- Single-stage structure, with high conversion eiciency
- Supports multiple battery types, a perfect converter, and a battery protection function
- Wide DC voltage range
- Support multi-machine parallel connections with good scalability
- Support active and reactive Power regulation
- Support RS485/CAN/Ethernet communication

3.3. PRODUCT TYPE

#	MODEL	VOLTAGE (KV)	CAPACITY (KW)	REMARKS
1	RED-C1-T100AC	0.4	100	Front-facing primary and secondary panels, with airflow entering from the front and exiting from the rear.
2	RED-C1-T125AC	0.4	125	Front-facing primary and secondary panels, with airflow entering from the front and exiting from the rear.

3.4. GRID-CONNECTED OPERATING CONDITIONS

Unless otherwise specified, Redback Technologies converter can operate normally under the following Power grid conditions:

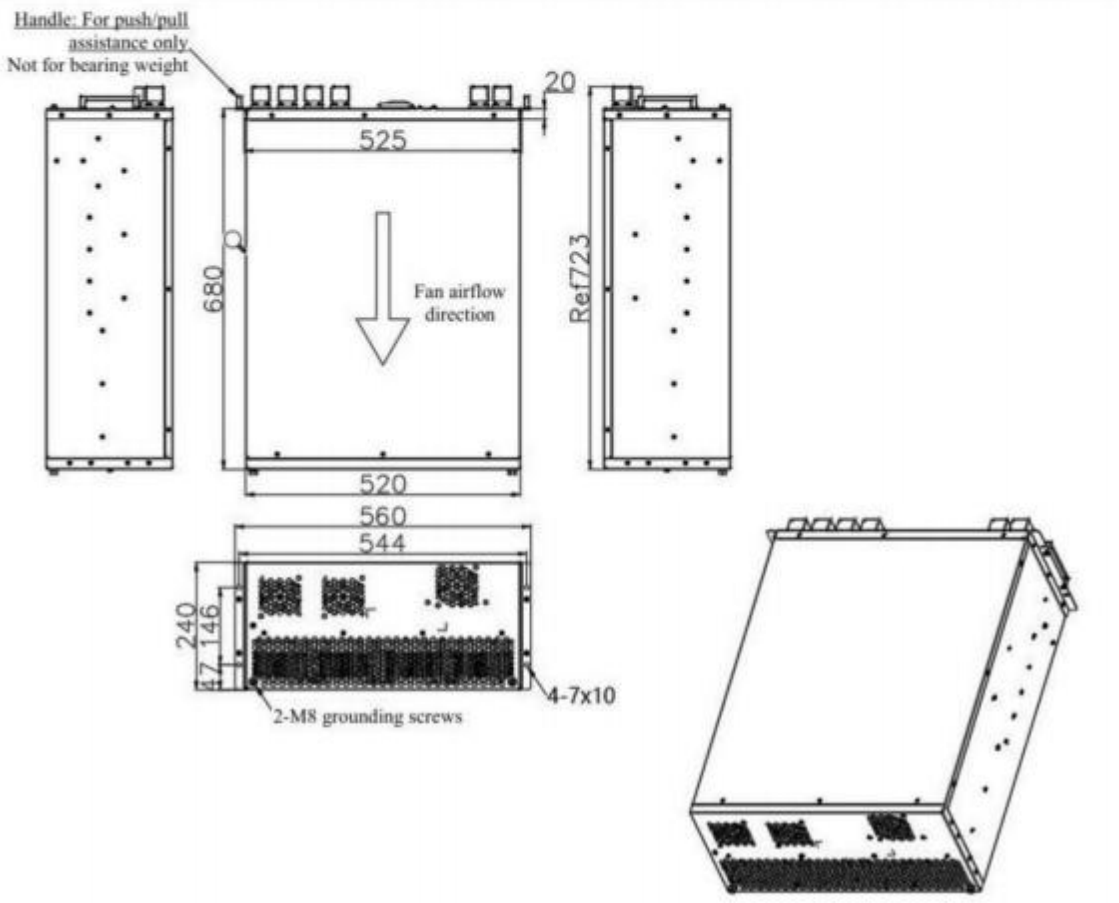
1. Harmonic voltage of Power grid shall not exceed the requirements of local national and Power grid standards and regulations.
2. The three-phase voltage imbalance of AC output terminal shall not exceed the requirements of local national and Power grid standards and regulations.
3. The allowable deviation of grid voltage shall meet the requirements of local national and Power grid standards and regulations.
4. The allowable deviation of grid frequency shall meet the requirements of local national and Power grid standards and regulations.

3.5. LAYOUT OF MAIN PARTS

3.5.1. EXTERNAL APPEARANCE

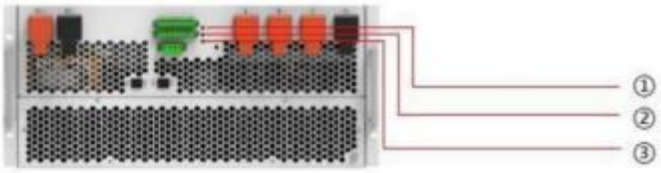
The main external components of converter are shown below, including:

- Communication interface
- IO control interface
- Power input and output interface and so on.



3.5.2. STATUS LEDS

The converter has three LEDs located on the front panel, as shown below. The operational status of the converter is indicated by the LEDs, as shown in the table below.



LED	LABEL	COLOUR	NOTES
1	POW	Yellow ON	DC input is above 60V.
		OFF	DC input is below 60V.
2	ERR	Red ON	A fault exists in the converter.
		OFF	No fault detected.
3	RUN	Green Flashing	Converter is in standby/shutdown mode.
		Green ON	Converter is operating normally.

3.6. OPERATION STATUS

3.6.1. STANDBY STATUS

In standby mode the grid-connected converter is switched on and awaiting instruction. There are five common commands:

COMMAND	OPERATIONAL NOTES
Charge at constant voltage	The charging rate has been pre-set, in Volts.
Charge at constant current	The charging rate has been pre-set, in Amps.
Charge at constant power	The charging rate has been pre-set, in kW.
Discharge at constant voltage	The discharging rate has been pre-set, in Volts.
Discharge at constant power	The discharging rate has been pre-set, in kW.

3.6.2. GRID-CONNECTED OPERATING STATUS

1. The DC input terminal of converter is connected to the DC output of the battery component, and the AC output terminal is connected to the Power grid.
2. Confirm that converter is in normal shutdown status (the panel fault indicator does not light up, the operation indicator flashes, and there is no fault display in the real-time fault information interface).
3. Converter will gradually close the switch and carry out “self-test” in front of AC and DC sides to enter the “grid-connected” status.
4. The Power response is fast, and the charge-discharge conversion time of converter is less than 100ms. When the Power grid is abnormal, it will be disconnected from the Power grid immediately and enter the fault status immediately.
5. In this mode, converter can convert the direct current of the battery into alternating current and merge it into the Power grid; Alternating current from the Power grid can also be charged into the battery.

3.6.3. GRID-DISCONNECTED OPERATION STATUS

1. The DC input terminal of converter is connected to the DC output of the battery component, and the AC output terminal is connected to the load line.
2. Confirm that converter is in normal shutdown status (the panel fault indicator does not light up, the operation indicator flashes, and there is no fault display in the real-time fault information interface).
3. Converter will gradually close the switch and carry out “self-test” in front of AC and DC sides to enter the “grid-disconnected” status.

Note: Reliable connection between system N line and PE must be ensured during grid-disconnected operation.

3.6.4. FAULT STATUS

When converter fails, the Power Conversion System will immediately disconnect the AC-side contactor and DC-side contactor and enter the fault status, thus ensuring the safety of the system. The converter will continuously monitor whether the fault is eliminated or not, and if the fault is not eliminated, it will remain in a fault status.

3.7. BATTERY CONFIGURATION

Battery is an important part of energy storage control system, which needs strict protection during the whole operation process.

Protection parameters are set for converter to ensure that the connected battery pack runs in a safe environment.

Battery configuration parameters include:

- Capacity
- Charging current
- Discharging current
- Over-voltage protection
- Under-voltage protection, etc.

Battery configuration parameters shall be configured by professional personnel. If the configuration parameters are improper, the converter will not work properly.

3.8. FUNCTIONAL PROTECTION

PROTECTION TYPE	COMMENTS
Overvoltage and undervoltage protection of the Power grid	
High and low frequency protection of the Power grid	
DC overvoltage/undervoltage protection	
DC overcurrent protection	The negative electrode has a fuse, you need to add overcurrent protection on the outside of the DC port.
DC polarity reverse protection	
AC overcurrent protection	
Overtemperature protection	
Phase loss protection	
Anti-islanding protection	
AC incoming phase sequence error protection	
Communication fault protection	
Protection according with IGBT Cooling system protection	
Emergency stop	
Feedback the battery fault information protection	From BMS

3.9. STORAGE

After the completion of product acceptance, if the equipment cannot be installed and operated on site immediately and needs to be stored, the following points shall be paid attention to:

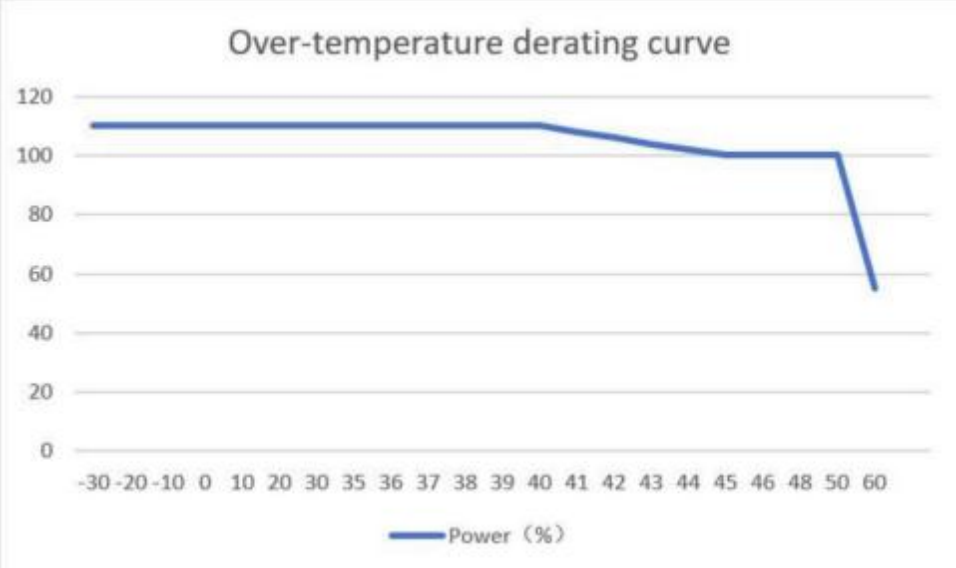
- Restore the packaging to its original status.
- Keep the desiccant in the package and do not abandon it.
- Pay attention to ventilation and moisture prevention when storing equipment and avoid accumulated water in the storage environment.
- Storage temperature: -30℃-+70℃ , storage humidity: 0-95% without condensation.
- Pay attention to the harsh environment around, such as quenching, sudden heat and collision, so as not to cause damage to converter.
- It is recommended to carry out regular inspection once a week to check whether the package is intact and avoid insect bites. If the package is found to be damaged, it shall be replaced immediately.
- If the storage time exceeds half a year, the package shall be opened for inspection and then repackaged.

3.10. TEMPERATURE DERATING LOGIC

The PCS can operate with a 1.1-times long-term overload in an ambient temperature range from -30℃ to 40℃ . It can operate at full-load continuously when the ambient temperature is below 50℃ .

When the ambient temperature is between 50℃ and 60℃ , it operates with derating (The capacity is derated by 4.5% for every degree Celsius. When the ambient temperature reaches 60℃ , the operable capacity is 55% of the rated capacity).

If the ambient temperature exceeds 60℃ , it will be shut down for protection.



4. Product Installation

4.1. INSTALLATION SITE REQUIREMENTS

The converter is rated IP20 and generates some noise. To ensure the normal operation of the equipment, the converter must be installed so it is:

- Located inside a closed building or a suitable IP54 or higher rated enclosure.
- In a dry location: not in a wet, damp or humid place.
- Protected from direct sunlight and rain.
- With an ambient temperature range -30℃ to +60℃ .
- In an area suiciently large and well-ventilated to enable cooling air circulation and dissipation of heat.
- In a clean location (during and after installation).
- Away from and or noise-insulated from residential locations.
- Located in an EMC appropriate place e.g., industrial site.
- In an area suiciently large to enable safe installation and maintenance procedures.
- Placed on a structurally suitable platform.
- Protected from excessive vibration.

It is recommended to install converter in the chassis of the whole machine.
The space, air duct, ventilation equipment and various protective measures of the chassis shall be strictly designed to meet the following requirements.

4.1.1. INSTALLATION DIRECTION

When installing converter, please install it horizontally in front and back or sideways, and do not install it upside down.

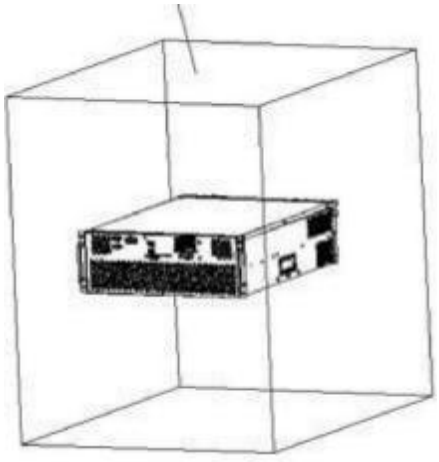


Figure 3-1 Schematic Diagram of Recommended Installation Direction

4.1.2. INSTALLATION IN CABINET

This product is rated IP20—it is suitable for indoor use. For outdoor use the product must be enclosed in a suitable IP54 or higher rated enclosure.

Heat dissipation instructions: For the installation layout of converter in the cabinet, it is necessary to consider the heat dissipation space, and the air inlet and outlet of the cabinet shall face the module.

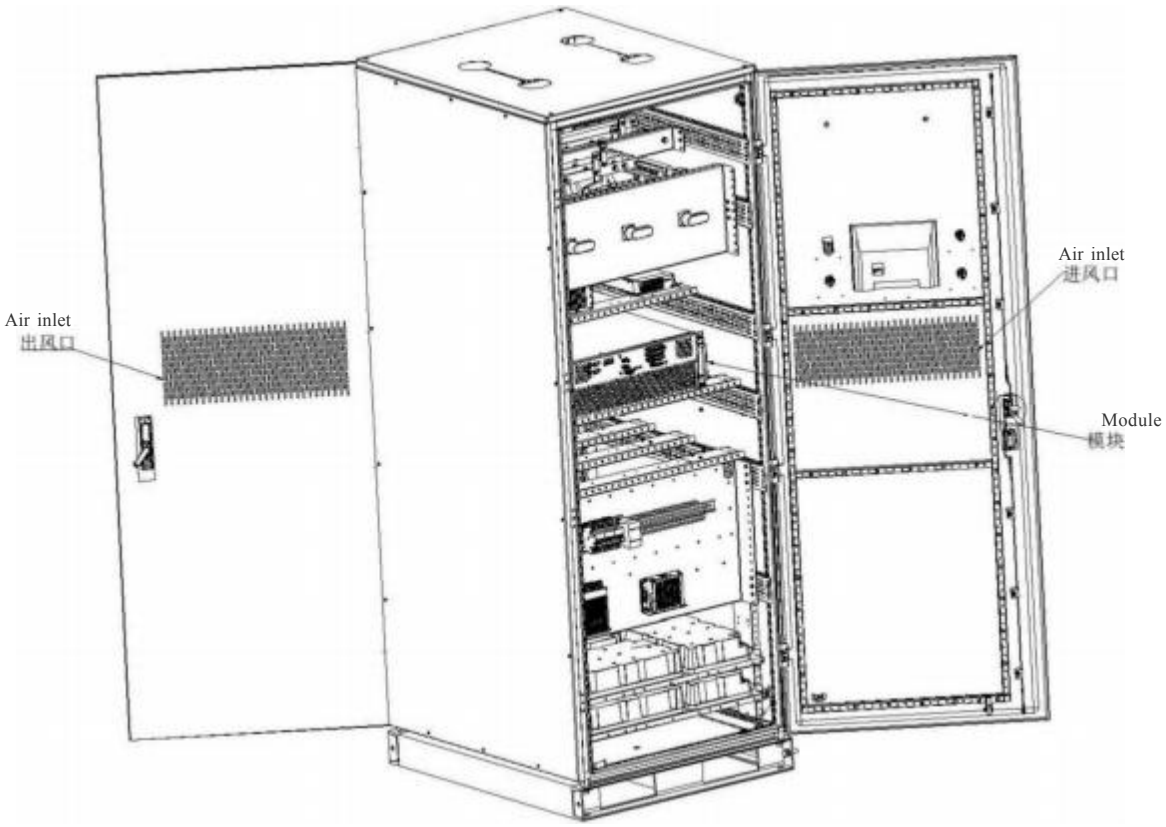


Figure 3-2 Schematic Diagram of Drawer Installation

Table 3-1 Drawer Installation Cabinet Heat Dissipation Parameters

Model	Number of Fans	Total air Volume at Working Point	Actual Efective Area of Cabinet Facing converter Air Inlet (mm2)	Actual Efective Area of Cabinet Facing converter Air Outlet (mm2)
RED-C1-TxxxAC	9	861cfm (24.4m³/min)	73075	116920

Notes:
1. CFM =0.0283 m3/min
2. The above-mentioned "actual efective area" refers to the through-hole area
3. This parameter table is only for the air inlet and outlet area of a single converter module, and the ventilation heat of other devices in the cabinet is not calculated

Space requirements

When installing the converter, maintain adequate clearance between the cabinet and other equipment to ensure sufficient space for the narrowest maintenance access and ventilation. If the air intake/outlet is obstructed, install a fan within the cabinet, with the equipment positioned at least 200mm away from the fan. The spatial requirements are illustrated as follows:

4.1.3. SPACE REQUIREMENTS

When installing converter, keep proper distance from other equipment to meet maintenance requirements.

4.1.4. WIRING SPECIFICATION

The cables used in the system can generally be divided into Power cables and communication cables.
When laying communication cables, it is necessary to keep away from Power cables, and the cables shall be kept at right angles at intersections. When laying, try to keep the cable length as short as possible and keep a distance from the Power cable. It is advised that the insulation impedance of BT+ and BT- to ground at DC terminal should be greater than 10 M Ω.

4.1.5. VENTILATION REQUIREMENTS

When converter runs, it will generate a lot of heat. When the ambient temperature is too high, it will afect the electrical performance of the equipment and even damage the equipment. Therefore, it is necessary to fully consider the release of the heat when designing the chassis to ensure the normal and eicient operation of the equipment.

4.1.6. VENTILATION ENVIRONMENT

To meet the ventilation requirements of converter, the installation environment of ventilation equipment shall meet the following conditions:

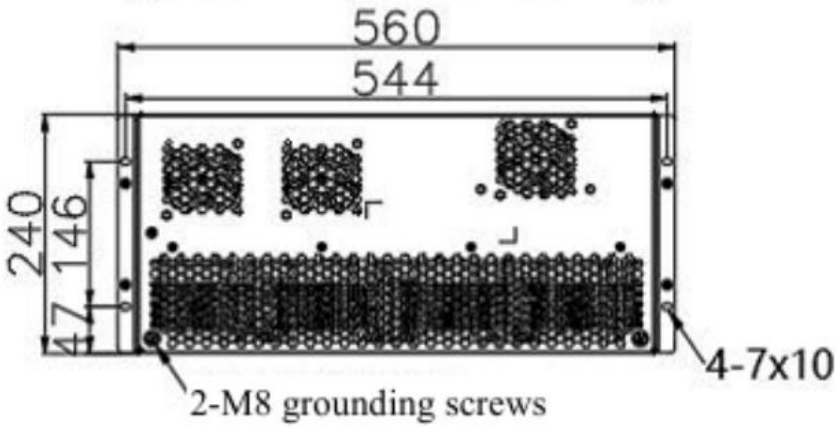
- Power Conversion Systems shall not be installed in places with poor ventilation and low air flow.
- The air inlet shall be replenished with suicient air.
- It is necessary to ensure that the air inlet area is equivalent to the front panel area of converter, and an exhaust fan is added to the air outlet.
- Ensure that the air inlet and outlet of converter are unobstructed and there is no return air.

To ensure the safe, reliable and eicient operation of the equipment, the ambient temperature of the equipment must be in the range of -30℃-+60℃ , so it must be equipped with appropriate ventilation devices to dissipate the heat generated by the equipment.

There is no installation clearance requirement at the bottom of the equipment; only the dimensional tolerance of the equipment needs to be reserved for the installation clearance at the top and sides.It is recommended to provide a 5 mm clearance at the bottom, top, and sides of the equipment.

4.1.7. Fixed installation of equipment

The equipment shall be fixed and installed with a total of four M6 screws, and mounted on the cabinet via mounting lugs.The screw fixation installation position is shown in the figure below：



Model Capacity	Mounting dimensions for ear-mounting fixing screws				Screw specification	Torque for mounting lug fixing screws
	W1	W2	H1	H2		
125KVA	544	560	47	146	M6	4~5N·m

Wiring specification

The cables used in the system can generally be divided into Power cables and communication cables. When laying communication cables, it is necessary to keep away from Power cables, and the cables shall be kept at right angles at intersections. When laying, try to keep the cable length as short as possible and keep a distance from the Power cable. It is advised that the insulation impedance of BT+ and BT- to ground at DC terminal should be greater than 10 MΩ.

Ventilation requirements

When PCS runs, it will generate a lot of heat. When the ambient temperature is too high, it will affect the electrical performance of the equipment and even damage the equipment. Therefore, it is necessary to fully consider the release of the heat when designing the platform to ensure the normal and efficient operation of the equipment.

Ventilation environment

In order to meet the ventilation requirements of PCS, the installation environment of ventilation equipment shall meet the following conditions:

a) Power Conversion Systems shall not be installed in places with poor ventilation conditions and low air flow;

b) The air inlet shall be replenished with sufficient air;

c) It is necessary to ensure that the air inlet area is equivalent to the front panel area of PCS, and an exhaust fan is added to the air outlet;

d) Ensure that the air inlet and outlet of PCS are unobstructed and there is no return air;

In order to ensure the safe, reliable and efficient operation of the equipment, the ambient temperature of the equipment must be in the range of -30℃-+60℃, so it must be equipped with appropriate ventilation devices to dissipate the heat generated by the equipment;

Other protection

The protection grade of PCS is IP20, and PCS is suitable for installation in dry and clean Power station environment. At the same time, prevent water leakage from damaging PCS. According to EMC requirements and noise levels, PCS shall be installed in industrial environment.

4.2. PREPARATION OF INSTALLATION TOOLS

The tools and parts needed for installation are as follows:

- Torque wrench M8 (torque 12 ± 0.15 N•m).
- Screwdriver.
- Wire stripper.
- Terminal pressing machine.
- Megohmmeter and multimeter.

4.3. MECHANICAL INSTALLATION

It is strictly prohibited for non-professionals to install the equipment.

Converter is packed and transported in cartons,

Energy storage converter devices are heavy: use suitable handling equipment e.g., trolleys, forklifts, or cranes.

Use appropriate personal protective equipment (PPE) during installation.

The handles on the equipment are only for pushing and pulling the modules and are not allowed to bear weight.
Notes:

1. Converter is a whole and must not be decomposed during transportation or installation. Faults caused by modification without Redback Technologies authorization are not covered by the warranty.

2. Do not make the Power Conversion System tilt, shake violently or suddenly bear force during moving, such as suddenly lowering or lifting.

3. Read the marked parameters carefully to select the appropriate means of transportation and storage location.

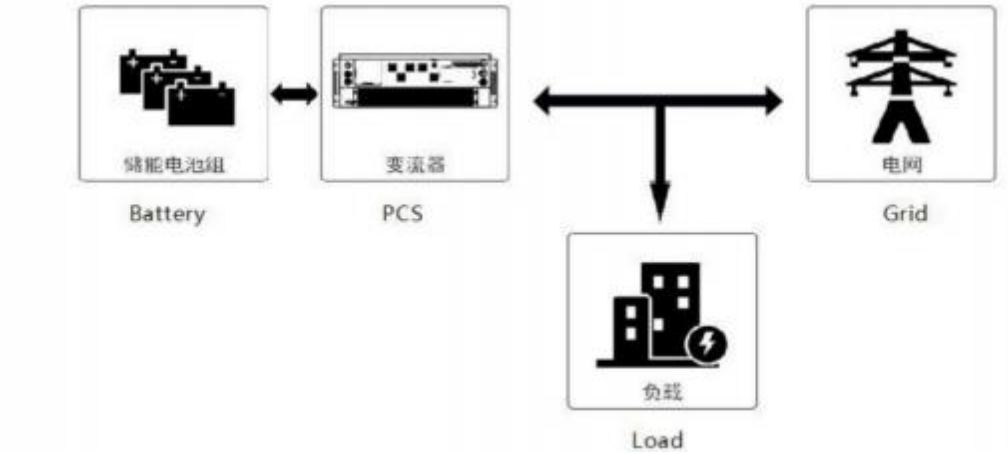
To ensure that converter is in a better protective status during transportation, transport with packaging as much as possible, and transport according to various signs on the packaging. The illustration of packaging signs is as follows:

ICON	SIGN	ICON	SIGN
	Gravity centre mark		Fragile: Handle with care. Avoid damage to the Power Conversion System caused by excessive collision and friction in transportation environment
	This way up. It is forbidden to lay, tilt or invert the Power Conversion System horizontally		Keep dry. Guard against damp, to avoid rain or damp on the Power Conversion System

If a custom outdoor cabinet is required, all parameters specified in 4.1.2 Installation in Cabinet, 4.1.3 Space Requirements and 4.1.6 Ventilation Environment of the manual must be strictly followed to ensure the cabinet's heat dissipation, protection performance and installation dimensions are matched with the PCS. Failure to do so will affect the normal operation of the equipment and invalidate the product warranty.

4.4. ELECTRICAL INSTALLATION

4.4.1. SYSTEM DIAGRAM



4.4.2. INPUT AND OUTPUT REQUIREMENTS

DANGER. HIGH VOLTAGE. There is a high voltage electric shock hazard when converter works, so only electricians with professional skills can operate converter.
All connection to the device must be performed without voltage.
If the wrong input and output terminals are connected, converter will be damaged.
Failure to follow this warning may result in serious personal injury or significant property damage or death.

4.4.2.1.Battery assembly

The positive and negative open circuit voltage of the battery assembly shall not exceed 1000 V DC, otherwise the equipment will be in an overvoltage protection status and cannot work normally.

Considering the safety protection measures, converter to connect with the battery system, it needs to be
equipped with a circuit breaker.The dc braker shall comply with the requirements of local regulation, including AS60947.3:2023. (Ue DC: ≥1000V; In: 315-400A; Ics ≥20kA; Icu ≥20kA) .

This product can cause a DC current in the PE conductor. Where a residual current-operated protective device (RCD) is used for protection against electric shock, only a RCD of type B is allowed on the supply side of this product.It is recommended that the rated residual operating current of the selected Type B residual current device (RCD) be 300 mA.The PCS does not have a backup port. An RCD device is internally integrated on the grid side, so no additional external RCD device is required for the grid side.

4.4.2.2. Three-phase grid

Converter will constantly check whether the Power grid meets the grid-connected conditions (the grid-
connected requirements of countries vary, and the converter protection parameters must be set accordingly. Refer to the local grid-connected laws and regulations for detailed information), and the Power grid is a three- phase Power grid. Before installation and grid connection, it shall be allowed by the local Power department.

Considering the safety protection measures, RED-C1-TxxxAC need to add a current protection device, It is recommended to add a AC circuit breaker, (Ue AC: ≥400V; In: 315-400A; Ics ≥10kA; Icu≥10kA)

4.4.2.3. Cable requirements

MODEL	RED-C1-TXXXAC	
Mounting aperture	DC-side ϕ9 opening, M8 connection screws, recommended tightening torque: 7-10 N•m	
Battery assembly BT+	≥70 mm2 * 1	BT+
Battery assembly BT-	≥70 mm2 *1	BT-
Power grid	≥70 mm2 * 4	ABCN
PE grounding protection	≥35 mm2 *1	The cross-section of the PE wire should be of the same material as the ABCN wire and not less than 1/2 of the cross-sectional area of

		the phase conductor.
SECONDARY HARNESS REQUIREMENTS		
RS485/CAN/SYNC cable	2-core twisted pair shielded cable	Secondary signal harness
Network cable	Standard STP shielded network cable	STS current sensor

4.4.3. PREPARATION BEFORE ELECTRICAL WIRING

Before wiring, pay attention to the following:

1. Ensure that converter is shutdown.
   a. Check the panel indicator light is not ON.
   b. Test there is no voltage on the AC-side or DC-side,
2. Switch the AC-side incoming switch to OFF.
3. Switch the battery side switch to OFF.
4. The converter is now ready. You may begin wiring connections.

4.4.4. DC-SIDE WIRING

DANGER. The positive and negative poles of the output of the battery assembly shall not be connected inversely, and the positive and negative inputs of the corresponding converter shall be connected after the polarity is measured and determined with a multimeter.

The DC side wiring method is as follows:

Step 1: Measure the open circuit voltage of the battery assembly with a multimeter to ensure that it is within the allowable range.

Step 2: Confirm the positive and negative poles of the voltage with a multimeter.

Step 3: Strip approximately 1 cm of insulation from the end of the cable.

Step 4: Crimp the wiring copper cable terminal . Put the stripped copper core into the wire pressing hole of the copper cable terminal , and press the wiring copper cable terminal tightly with tools. The number of crimping wires shall be more than two.

Step 5: Install the heat shrinkable sleeve, and select the heat shrinkable sleeve that is more consistent with the cable size, with a length of about 5 cm.

Sleeve the heat shrinkable sleeve on the copper cable terminal to completely cover the wire pressing hole of the copper cable terminal, tighten the heat shrinkable sleeve with a hot blower, and tighten the DC terminal assembly correctly.

Step 6: Connect the positive cable output from the battery assembly to the DC+.

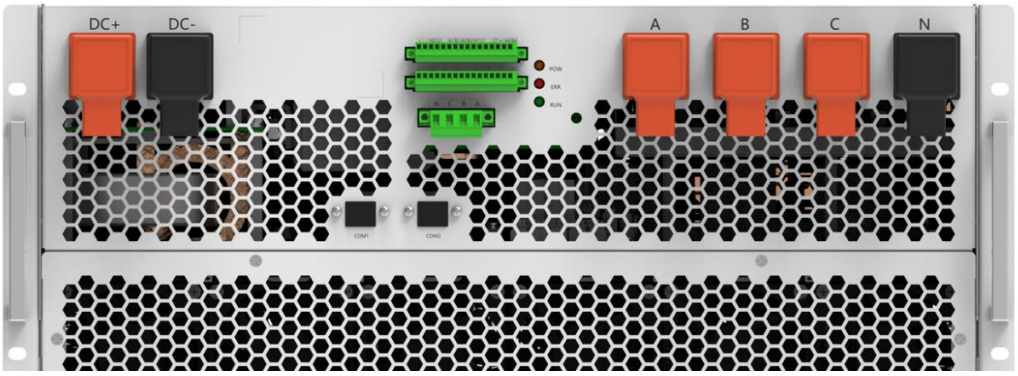
Step 7: Connect the “DC-” terminal of the PCS to the negative output of the battery assembly as described in Step 6.

Step 8: Ensure that the wiring is firmly connected.Fasten the DC terminals with M8 screws; the recommended tightening torque is 7–10 N·m.

The manufacturing method of the DC side cable is shown below:

Note: No additional accessories are required for DC cable connections.

As terminal covers are provided on the DC terminals, fingers are prevented from contacting the live DC side after the DC wiring is completed, as shown in the figure below.The terminal cover features a snap-in design. During installation, it securely clamps the DC terminal via the built-in clearance on the cover, preventing accidental disengagement under normal conditions.



4.4.5. AC-SIDE WIRING

DANGER. When connecting to AC Power grid, disconnect the circuit breaker of AC distribution cabinet to ensure that the AC wire connected to the terminal is not electrified.

The AC-side output voltage of converter is AC 400 V. Connect the AC-side as follows:

Step 1: Measure with multimeter to confirm that the connection terminal has been Powered off.

Step 2: Determine the phase sequence of AC connecting cables.

Step 3: Strip approximately 1 cm of insulation from the end of the cable.

Step 4: Crimp the copper cable terminal, and place the exposed copper core part of the stripped thread end into the wire pressing hole of the copper cable terminal. Use tools to press the copper cable terminal tightly, with the number of crimping times for no more than two.

Step 5: Install the heat shrinkable sleeve, and select the heat shrinkable sleeve that is more consistent with the cable size, with a length of about 5 cm.

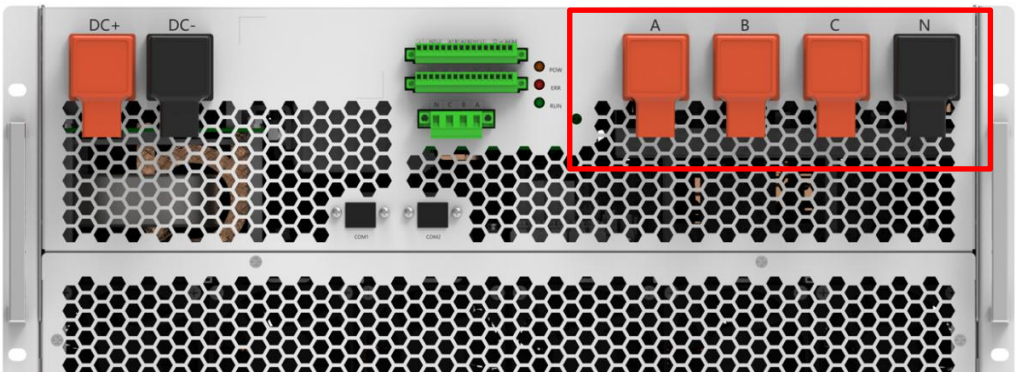
Sleeve the heat shrinkable sleeve on the copper cable terminal to completely cover the wire pressing hole of the copper cable terminal, tighten the heat shrinkable sleeve with a hot blower.

Step 6: Connect the “L1”, “L2”,“L3”and “L4” cables to the A (U), B (V), C (W) and N phases of the AC circuit breaker in the Power Conversion System to ensure the accuracy of the phase sequence.Fasten the AC terminals with M8 screws; the recommended tightening torque is 7–10 N·m.

The manufacturing method of the DC side cable is shown below:

Note: No additional accessories are required for AC cable connections.

As terminal covers are provided on the AC terminals, fingers are prevented from contacting the live AC side after the AC wiring is completed, as shown in the figure below.The terminal cover features a snap-in design. During installation, it securely clamps the DC terminal via the built-in clearance on the cover, preventing accidental disengagement under normal conditions.



4.4.6. GROUNDING CONNECTION

DANGER. Individual devices in converter need to be grounded. Do not change PE copper bar connection wire without permission, otherwise a shock hazard may be created.

In order to ensure safety, all PCS shall be grounded through PE conductor. The PE copper bar in the PCS cabinet has been reliably connected with the shell of PCS in the cabinet. When PE connection is carried out, it is necessary to reliably connect the PE grounding copper bar with the equipotential connection device in the installation site or electrical control room. The grounding resistance shall not be higher than 0.1 Ω.Grounding connection can be made to any one of the grounding terminals on the equipment.In addition, the earthing connection of the equipment shall be provided with an earth fault alarm in accordance with the requirements of AS 5033.

In the event of an earth fault, the DC and AC power supplies of the equipment shall be disconnected immediately. After waiting for at least 10 minutes to ensure the equipment is completely powered off, maintenance personnel shall check whether the equipment is reliably grounded by measuring the earth resistance and other methods, and investigate suspected earth fault points (such as damaged cables, loose connections, etc.). The equipment can only be restored to power supply after the earthing connection has been repaired and qualified.

The simple production process of the grounding cable is as follows:

Step 1: Prepare a yellow-green cable of sufficient length with a cross-sectional area of at least 35 mm^2.

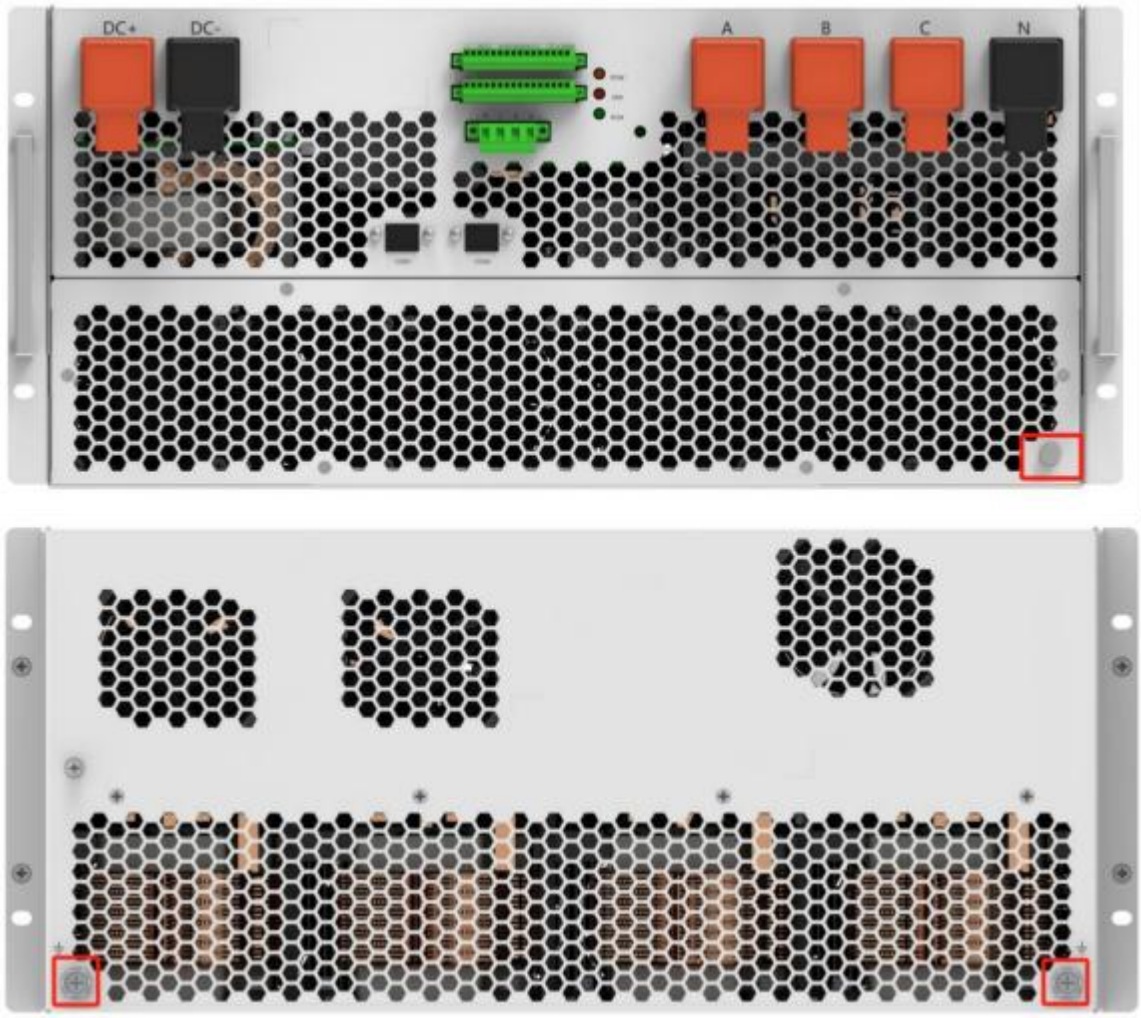
Step 2: Strip the insulation layer of the cable by approximately 10 mm and crimp a suitable terminal.

Step 3: Install a heat-shrinkable sleeve matching the size of the grounding cable, with a length of about 5 cm. Put the heat-shrinkable sleeve over the terminal to completely cover the crimping hole, then heat and shrink the sleeve with a hot air gun.

The front panel grounding terminal uses an M5 connecting screw, with a recommended tightening torque of 2.5–3.5 N·m.The rear panel grounding terminal uses an M8 connecting screw, with a recommended tightening torque of 7–10 N·m.

Additionally, no additional accessories are required for connecting the grounding cables.

The converter PE grounding points are shown below.



Only one of the multiple grounding terminals on the equipment needs to be connected.

DANGER.Because individual devices in PCS need to be grounded, please do not change PE copper bar connection wire without permission, so as to avoid electric shock danger!

If a grounding fault occurs, the grounding fault indicator light will flash and the equipment will shut down. This function is the default setting.

4.5. INSTALLATION INSPECTION

To ensure the safe and reliable operation of converter, please check its installation according to the items listed in the following table before putting into operation, to ensure the correctness of installation.

INSTALLATION CHECKLIST	
MECHANICAL INSPECTION ITEMS	
1	Converter has no deformation or damage.
2	The fixation and support of converter lug are stable and reliable.
3	Converter has enough space around.
4	The temperature, humidity and ventilation of the environment in which converter is located meet the requirements.
5	The cooling air circulates smoothly.
6	The sealing protection of cabinet body is complete and reliable.
ELECTRICAL INSTALLATION INSPECTION	
7	Converter grounding is complete and firm.
8	The Power grid voltage matches with converter rated output voltage.
9	The phase sequence of Power grid connection is correct, and the fastening torque meets the requirements.
10	The positive and negative poles of DC input are connected correctly, and the fastening torque meets the requirements.
11	The communication wiring is correct and keeps a certain distance from other cables.
12	Cable number is marked correctly and clearly.
13	The insulation shield is complete and reliable, and the danger warning sign is clear.
OTHER INSPECTIONS	
14	All useless conductive parts are tightened with insulating cable ties.
15	There are no tools, parts, conductive dust or other foreign matters left behind in the interior.
16	There is no condensation of moisture or ice inside.

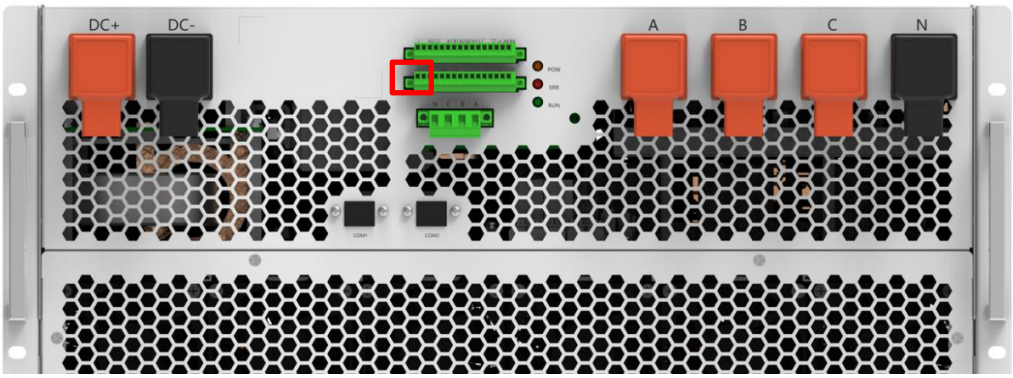
4.6. COMMUNICATIONS

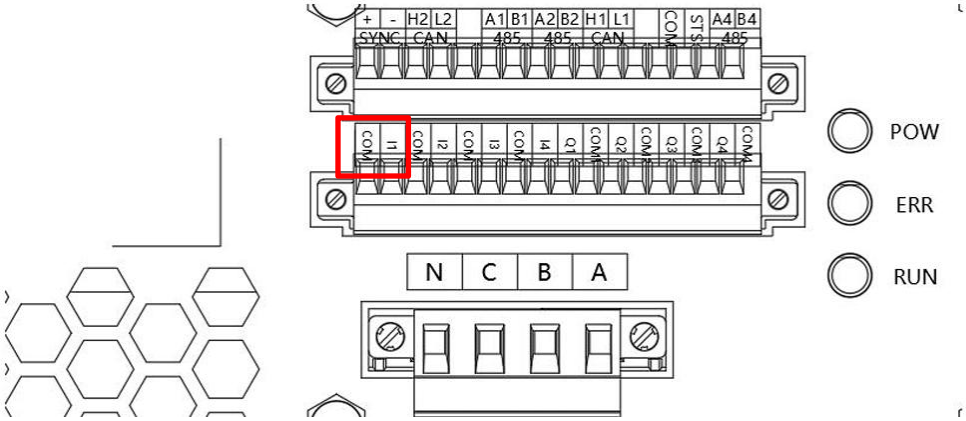
The product is only suitable for DRM0

converter DRM response mode

1、COM Port

The connection ports are as follows:





2、Explain

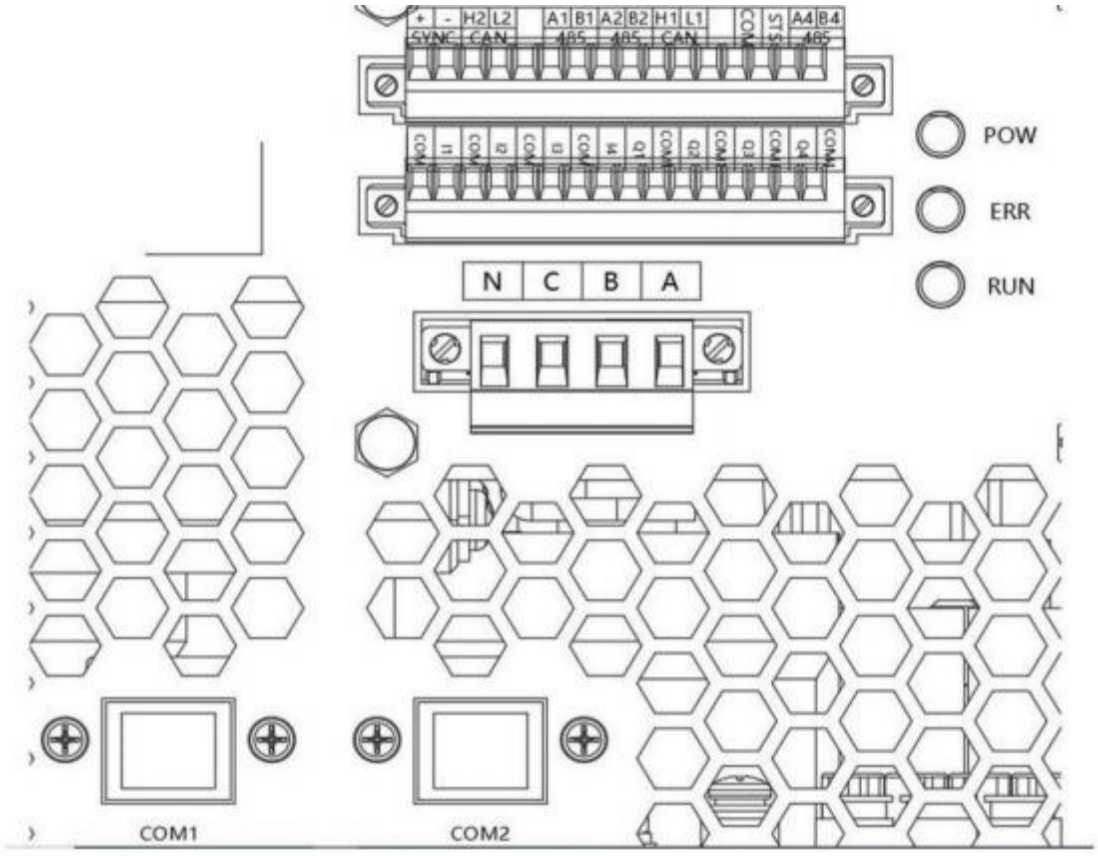
connecting DRED device for DRM control: When switches I1 and COM are switched on, the solar converter should be turned off.Terminal I1 corresponds to COM LOAD/0, and terminal COM corresponds to REF GEN/0.

I1 COM	connecting DRED device for DRM control: When switches I1 and COM are switched on, the solar converter should be turned off.

Converter can be reserved with three RS485, two Ethernet interface , two CAN and several dry contact ports for communication between converter and batter components, user local station or remote upper computer, and
has Ethernet interface with Power station monitoring system.

TERMINAL DEFINITIONS

The Terminal Panel layout is shown below.



The terminal definitions are as follows (where 4-8 are reserved STS interfaces):

#	PART NAME	NOTES
1	SYNC+, SYNC-	For multi-machine grid-disconnected parallel synchronization signals.
2	CAN H2, L2	CAN2 port for PCS parallel communication
3	485 A1, B1	485-1 port for BMS communication
4	485 A2, B2	485-2 for PCS and DCDC module communication
5	CAN H1, L1	CAN1 port for BMS communication
6	COM, STS	Used to control the grid-connected and grid-disconnected STS switch
7	485 A4, B4	485-4 for DSP debugging
8	I1-4	I1-4 for DI input detection (active input, external only needs to be open or short-circuited, I1-I4 default normally open, can be set on the upper computer);
9	Q1-4	Q1-4 for DO output (dry contact, only supports external 24V power input)
10	A/B/C/N	Grid-side voltage sampling, generally used with grid-connected and grid-disconnected STS switch
11	COM1	Reserved network port: COM1 for debugging port (display),
12	COM2	Reserved network port: COM2 for EMS communication port

	1	2	3	4
Input	Emergency stop	BMS fault detection	STS overtemperature	Grid-connected and grid-disconnected switch feedback contact
Output	Cabinet fan control	Fault output dry contact	Grid-connected and grid-disconnected switch feedback contact	Breaker opening coil of grid-connected and grid disconnected switch

5. Start-up Process and Shutdown Process

5.1. RELEVANT REQUIREMENTS

Before being put into operation, the installation of equipment shall be thoroughly checked, especially whether the DC and AC terminal voltages meet the requirements of converter and whether the polarity is correct. Check whether the connections of the system have met the requirements of relevant standards and specifications.
Check whether the system is well grounded.

5.2. PRE-STARTUP CHECKS

5.2.1. CONVERTER

Before converter is Powered on, please carry out a series of inspections according to the following steps:

1. Check the installation and wiring of Power Conversion System according to Section 3.
2. Ensure that all AC and DC circuit breakers are in an open status.

5.2.2. POWER GRID VOLTAGE

1. Check whether the three-phase connection identification of converter
2. corresponds to the three-phase identification of Power grid one by one.
3. Check whether the voltage of Power grid lines is within the predetermined range and record the voltage value.
4. Check whether the voltage of Power grid frequency is within the predetermined range and record the frequency value.
5. Measure THD (Total Harmonic Distortion) of Power grid voltage. If the distortion is serious, converter may not operate.

5.2.3. DC-SIDE VOLTAGE

1. Connect the DC-side from the bus box or DC distribution cabinet to the converter.
2. Ensure the DC input polarity is correct.
3. Measure and record DC (open circuit) voltage, which does not exceed the maximum allowable DC voltage.

5.2.4. Start-up

PCS start-up steps are as follows:

Step 1: After confirming that all the above inspections show no abnormality, energize the DC side and open the DC disconnector/circuit breaker outside the cabinet; then energize the AC side and manually close the AC side circuit breaker.

Step 2: After about 1 minute at this time, some electrical parameters on AC and DC sides can be seen through the upper computer software;

Step 3: Confirm whether the status of the device is normal: The fault warning lamp is not on;

Step 4: Enter the background software to set relevant operation parameters. If there is a touch screen, set relevant operation parameters according to the startup guide, and set the equipment to “start” after the parameter setting is completed;

Step 5: Wait for about 2 min for the equipment to complete the startup process. During this time, there will be a sound of contactors closing, and the insulation test on the DC side will be completed. A longer waiting time is normal. If the equipment is not operated for a long time, it will enter a grid-connected "standby" state;

Step 6: After PCS is running (the running indicator is on), check whether there is any abnormality in PCS. For example, if the noise is abnormal, and abnormal smell or smoke occurs, it is necessary to stop the machine immediately for inspection.

5.2.5. Shutdown steps Normal shutdown steps:

When the background is set to the shutdown status, PCS enters the automatic shutdown process. After the Power IGBT is sealed, the equipment will automatically disconnect the contactors on the AC/DC side. At this time, there will be a sound of contactor disconnection. After about 10 s, the normal shutdown is completed (if the equipment is required be standby for a long time, the switches on the DC side and the AC side shall be disconnected in turn);

The Power of AC side is cut off, and the primary Power supply of the AC side outside the cabinet is disconnected;

The Power of DC side is cut off, and the primary Power supply of the DC side outside the cabinet is disconnected;

Wait at least 10 minutes before opening the cabinet door, and use a multimeter to measure the voltages at the DC and AC ports. The equipment contains energy storage devices; ensure complete discharge before performing any other operations. After confirming that the voltages at both DC and AC ports are within the safe range, install the grounding wire before proceeding to the next step.

Maintenance personnel carry out maintenance and overhaul operations.

5.2.6. Emergency Shutdown Procedure

The EMS sends a signal to the PCS via the dry contact input port I1 (closed point is valid), and the equipment automatically blocks the pulse and disconnects the contactors on the AC and DC sides. At this time, there will be a sound of contactor disconnection. After about 10 s, the shutdown will be completed;

Disconnect the power of AC side and the primary power supply outside the cabinet on AC side;

Disconnect the power of DC side and the primary power supply outside the cabinet on DC side;

Open the cabinet door, check the electricity with an electroscope (there are energy storage devices inside the cabinet, and further operations should be carried out after the completion of discharge). When it is confirmed safe through the electricity check, hang the grounding wire, and then proceed to the next step;

Maintenance personnel carry out maintenance and overhaul operations.

6. How to set parameters and view using the host computer

This device does not support Internet access functionality. Various communication ports equipped on the device are only used for local system debugging, device parameter configuration and on-site data interaction, with no design or functional support for public network connection.

For detailed information about the host computer, please refer to the host computer operation manual.

When the password attribute value is empty, use the default password for login, but prompt to change the new password and change the password attribute value to the new one; for the next login, if the password attribute value is not empty, it will be judged normally. In addition, add the password reset function. Before resetting the password, the original old password needs to be entered first.

We will provide host computer software for your debugging use, and you can contact us via the email or phone number provided in the warranty card.

System requirements: Windows operating system;

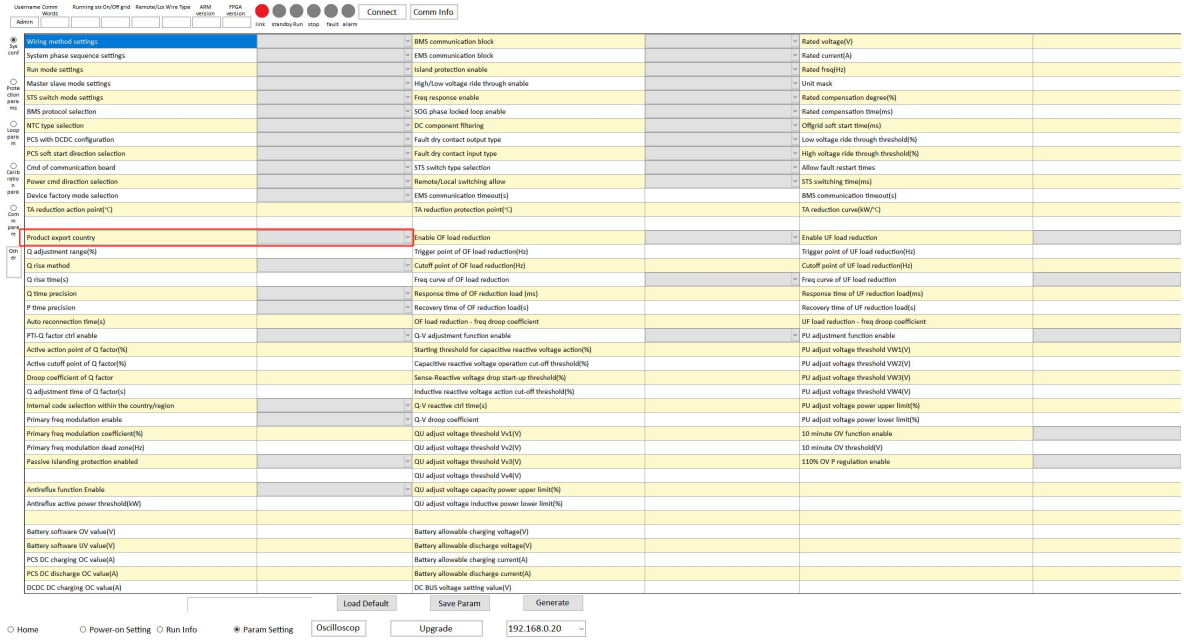
It needs to run under the .NET Framework 3.5 framework. You can click to run it directly first. If the system does not have the .NET library, some Windows systems will pop up an automatic download prompt for the .NET library when connected to the Internet; just click to download and install it. If there is no Internet connection or the automatic download and installation prompt does not pop up, you need to download the .NET library manually;

If other error boxes pop up and it fails to run, please contact the manufacturer.

After the software is installed, insert the network cable into the COM1 port and connect it to the computer, then configure the computer's IP address to 192.168.4.40.

6.1 How to set country grid code and protection settings during commissioning

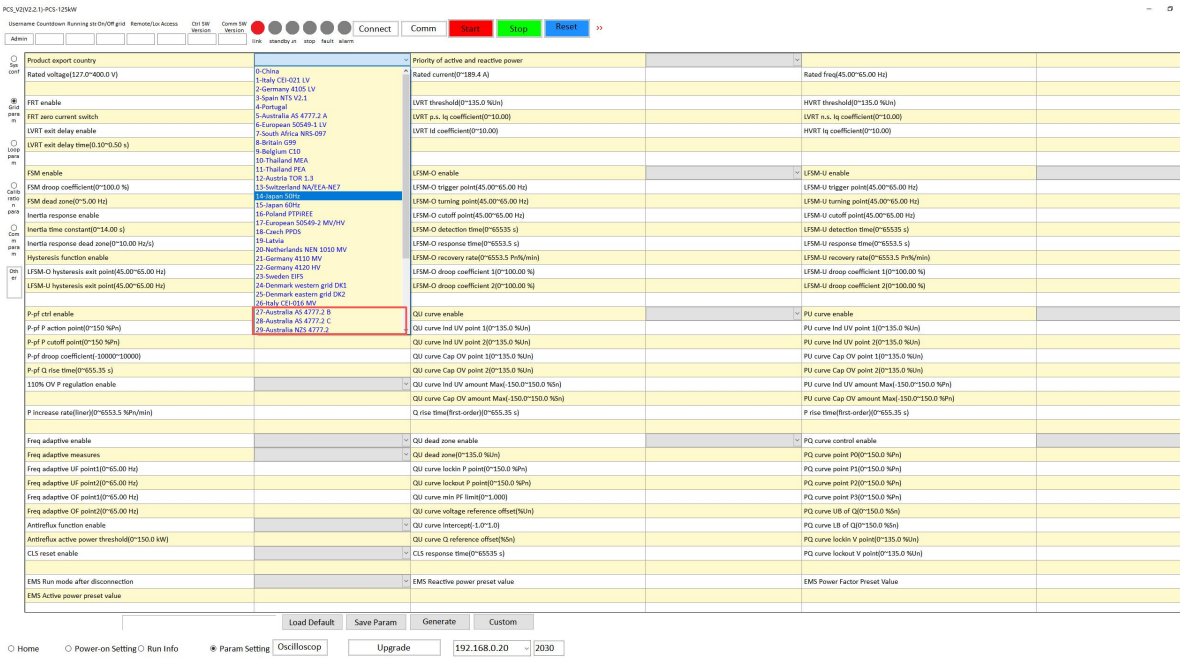
On the upper computer's screen, the following information will be displayed:



The national power grid code can be set via the Product Export Country option, thereby updating the grid protection parameters corresponding to that country.You can also manually modify the grid protection parameters on this page.

6.2 How to enable/setup available power quality response modes during commissioning

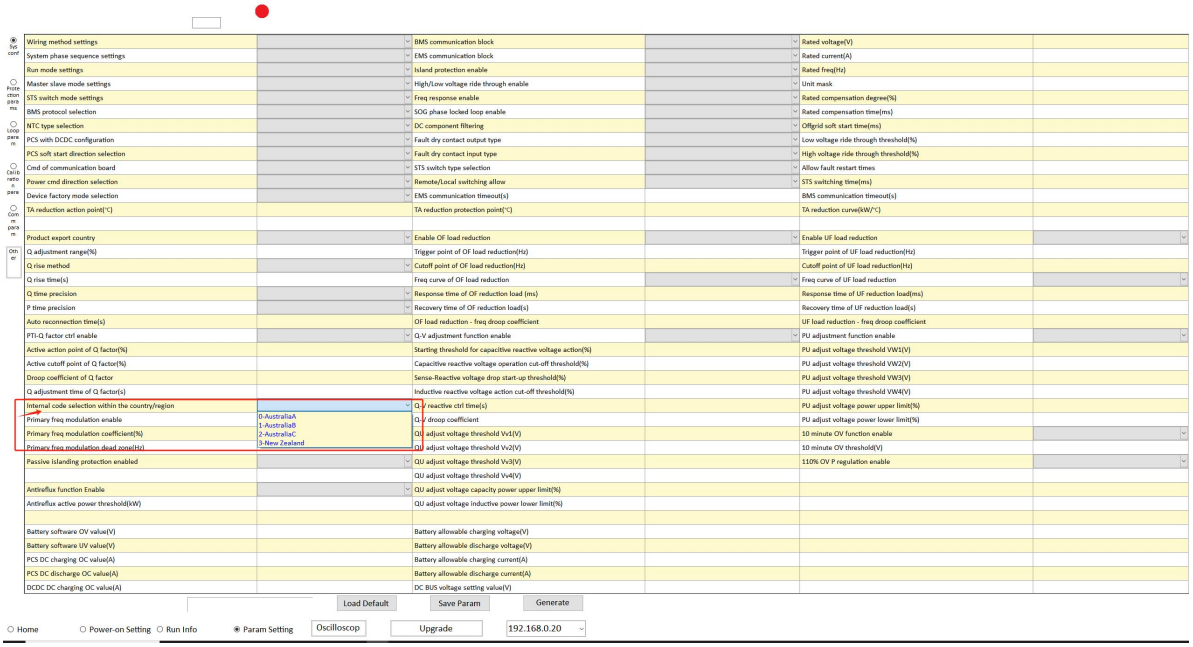
On the upper computer's screen, the following information will be displayed:



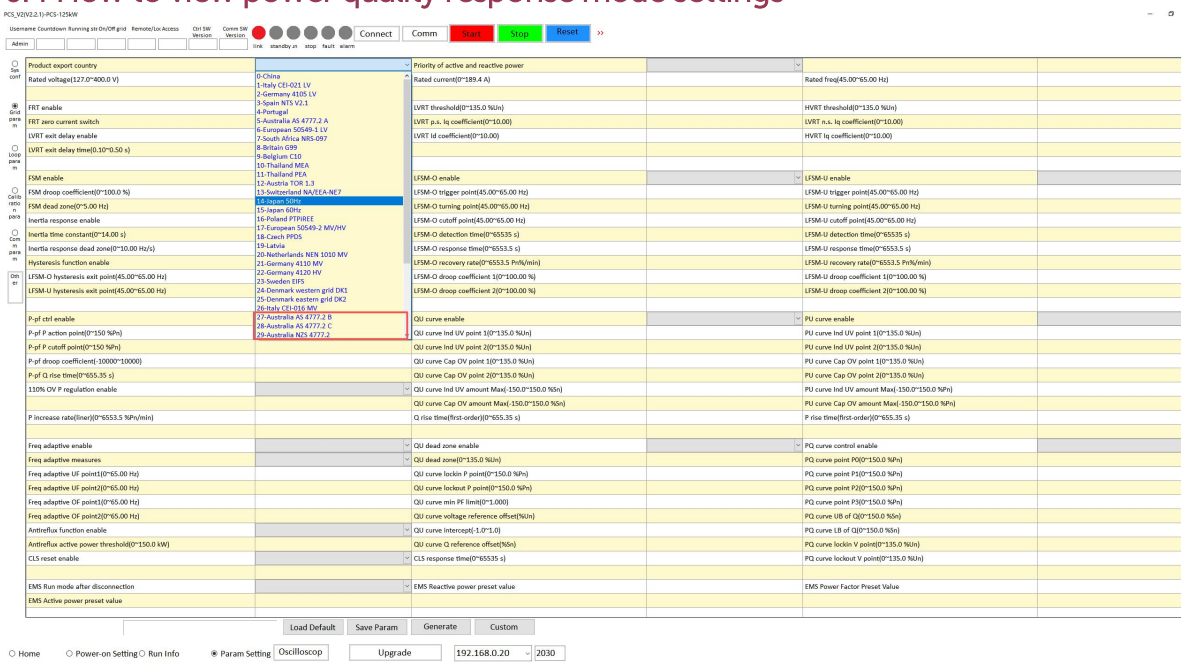
You can set the national grid code via the Product Export Country option, which will update the power quality response mode corresponding to that country.

6.3 How to view country grid code and protection settings

On the upper computer's screen, the following information will be displayed:

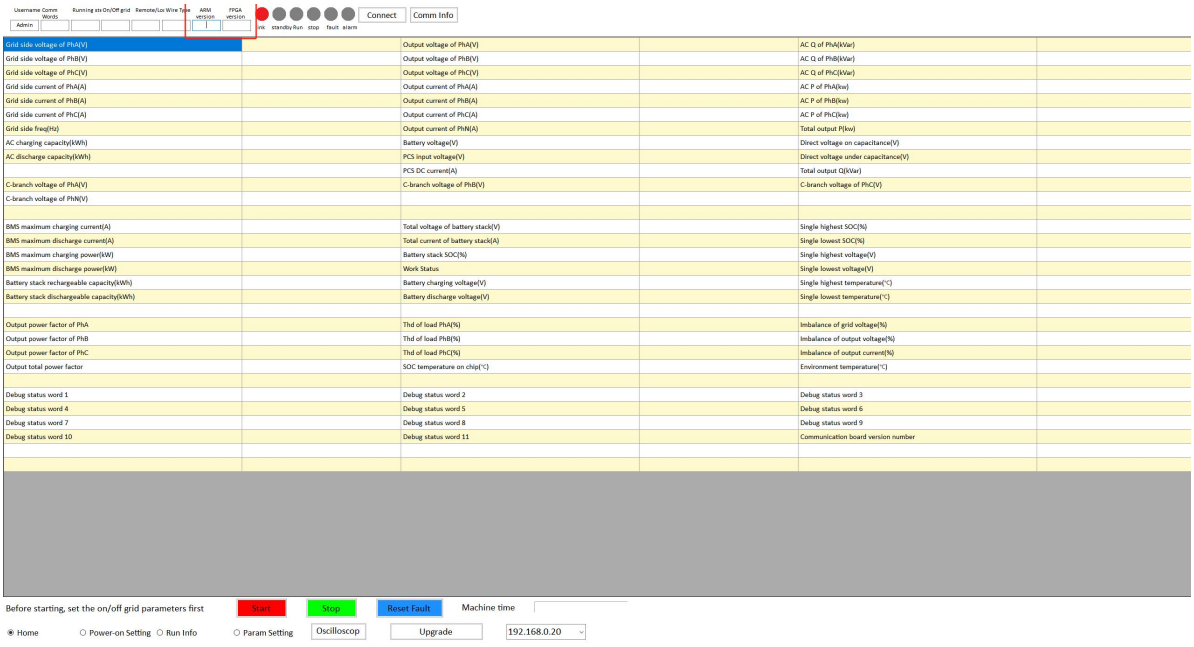


6.4 How to view power quality response mode settings



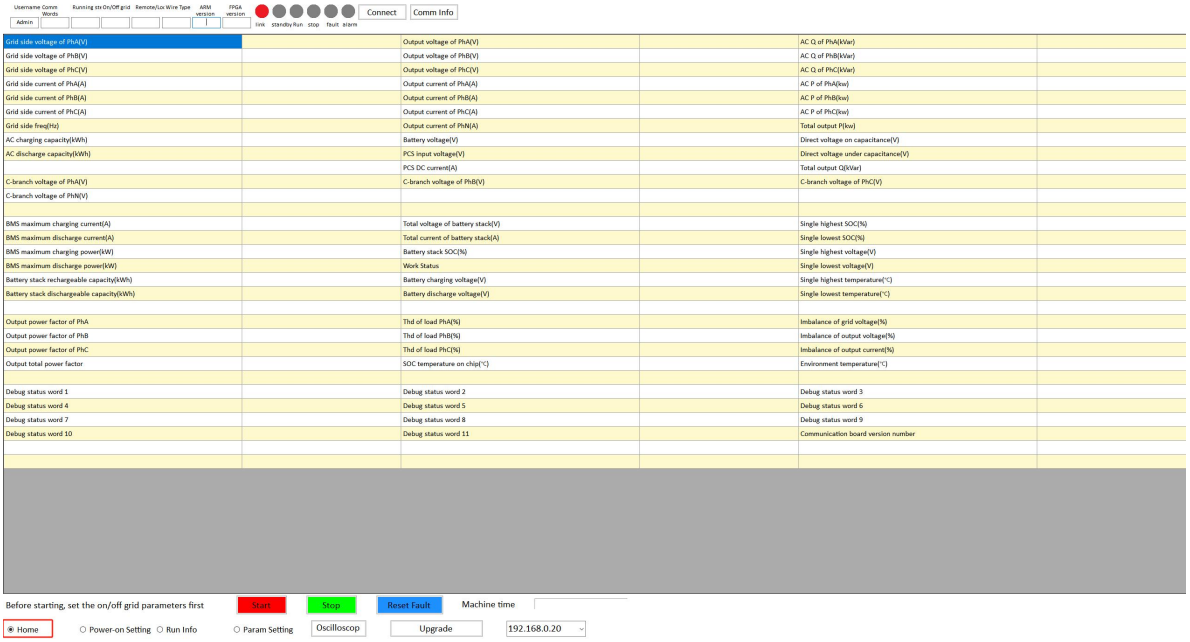
Setting the national grid code via the Product Export Country option will update the corresponding power quality response mode for that country. Therefore, the power quality response mode can be checked simply by viewing the Product Export Country option, as they have a one-to-one correspondence.

6.5 How to view the firmware



6.6 How to view converter monitoring information

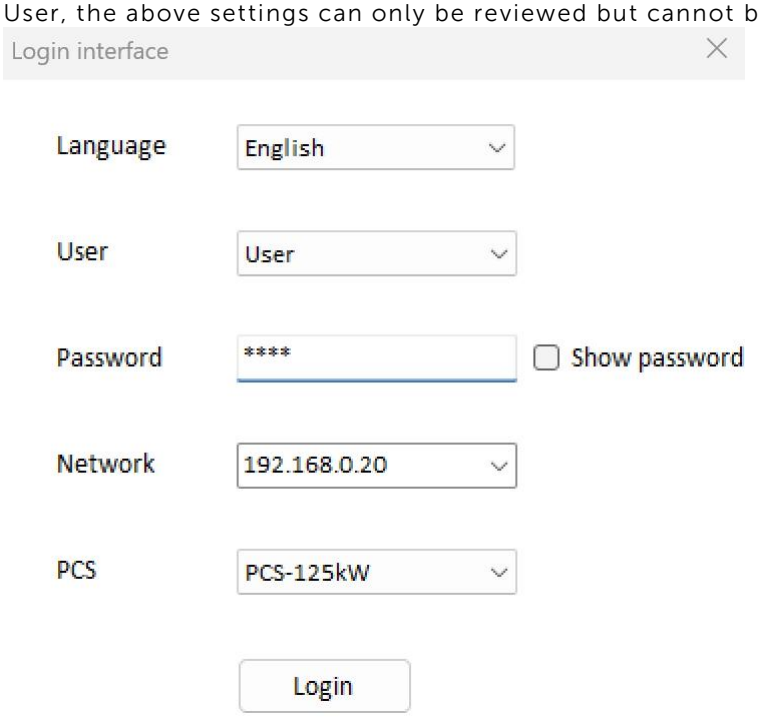
On the upper computer's screen, the following information will be displayed:



6.7 The above settings shall only be reviewable by the user and cannot be modified.

On the upper computer's screen, the following information will be displayed:

On the login interface of the upper computer, there are two identity options: User and Administrator, with different corresponding passwords.When logging into the upper computer as a User, the above settings can only be reviewed but cannot be modified.

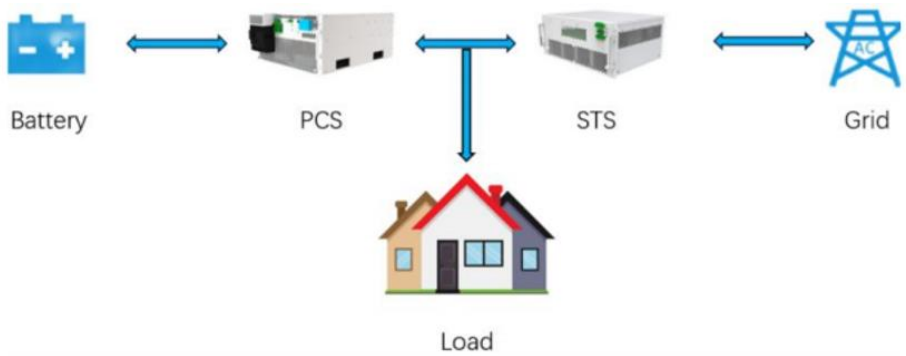


6.8 Active anti-islanding method

The MW PCS adopts an active and passive combined detection mode in the islanding protection function to address the issue of passive detection failure under extreme matching conditions.
The specific control strategy is as follows.
The passive control strategy includes over/under voltage protection. That is, it monitors the grid voltage. When the voltage exceeds the normal range, such as being higher than the set upper limit value or lower than the lower limit value, it cuts off the connection between the distributed power source and the grid.
And also Over/Under Frequency Protection: When the grid frequency exceeds the normal operating frequency range, corresponding protective actions are taken.
The active control strategy uses AFD frequency offset control. By actively changing the frequency of the converter output,the frequency of the AC power output by the converter exceeds the normal range. Combined with passive over/under frequency protection,this enables the detection of an isolated island and the cessation of power supply. Another method adopted is reactive power injection detection. The main principle is to inject reactive current, perturb the amplitude and frequency of the grid, and combine with passive voltage amplitude and frequency protection to achieve the purpose of preventing islanding.

6.9 Grid-Connected/Off-Grid Switching

The module itself supports operation in grid-connected PQ mode and off-grid operation as a VF source with load. When paired with an additional STS module, it can achieve grid-connected/off-grid state switching within 20ms.
Trigger signals are transmitted between the PCS and STS via a DC interface. A signal of 15V to 24V controls the STS to disconnect, while a 0V signal controls the STS to conduct.
Automatic grid-connected to off-grid switching: The PCS samples and evaluates the grid. When the PCS detects abnormal grid voltage, it sends a trigger signal; the STS then disconnects from the grid, and the PCS switches from grid-connected mode to off-grid mode to provide voltage support for the system, which then operates in islanded mode.
Automatic off-grid to grid-connected switching: When the PCS detects that the grid voltage has returned to normal, the microgrid system synchronizes with the grid voltage. Once the phase and frequency are consistent, the STS is conducted to connect with the grid, switching from off-grid mode to grid-connected mode.
Passive grid-connected/off-grid switching: When the PCS receives an islanded operation command, it controls the STS to disconnect. Meanwhile, the PCS provides voltage support for the microgrid, and the system operates in islanded mode. When the PCS receives a command to exit islanded operation, the microgrid system synchronizes with the grid voltage, and the STS is conducted to connect with the grid, enabling grid-connected operation.
The wiring diagram for grid-connected/off-grid switching is shown below:



7. Shutdown Process

7.1. PLANNED SHUTDOWN

1. When the background is set to the shutdown status, converter enters the automatic shutdown process.
   a. After the Power IGBT is sealed, the equipment will automatically disconnect the contactors on the AC/DC side.
   b. At this time, there will be a sound of contactor disconnection.
   c. After about 10 s, the normal shutdown is completed
2. If the equipment is to be shut down for a long time, the switches on the DC-side and the AC -side shall be disconnected in turn).
3. The Power of AC-side is cut of, and the primary Power supply of the AC-side outside the cabinet is disconnected.
4. The Power of DC-side is cut of, and the primary Power supply of the DC-side outside the cabinet is disconnected.
5. Open the cabinet door and use the electroscope to check the electricity (there is an energy storage device inside, so it is necessary to ensure that other operations are carried out after the discharge is completed). After the electricity is checked to be safe, the next step can be carried out after the grounding wire is hung.
6. Maintenance personnel carry out maintenance and repair operations.

7.2. EMERGENCY SHUTDOWN PROCEDURE

1. The EMS sends a signal to the PCS via the dry contact input port I1 (closed point is valid).
   a. The equipment blocks the pulse and disconnects the contactors on the AC and DC-sides.
   b. At this time, there will be a sound of contactor disconnection.
   c. After about 10 s, the shutdown will be completed.
2. Disconnect the power of AC-side and the primary power supply outside the cabinet on AC-side.
3. Disconnect the power of DC-side and the primary power supply outside the cabinet on DC-side.
4. Open the cabinet door
   a. Check the electricity with an electroscope (there are energy storage devices inside the cabinet, and further operations should be carried out after the completion of discharge).
   b. When confirmed safe, hang the grounding wire
5. The converter is now ready for maintenance and repair operations.

8. Transportation

When transporting converter, users are only allowed to use the transportation method described in the user manual. Please consider the weight of converter and its non-centred centre of gravity when transporting.

9. Maintenance and Repair

First, disconnect the converter from the battery assembly and the Power grid. When it is confirmed that these Power supplies will not be connected again, wait for at least 10 minutes, and then perform all maintenance and repair operations on the converter.

DISCONNECT THE POWER GRID FROM THE BATTERY

1. Disconnect the converter from the AC Power grid.
2. Disconnect the converter from the battery assembly to ensure that the converter will not be accidentally reconnected.
3. Disconnect the converter AC-side upper circuit breaker and battery side circuit breaker switches
4. Test with a multimeter to ensure that the converter equipment has been completely disconnected and has no voltage.
5. Even if the converter is disconnected from the Power grid/main Power supply and battery assembly, Therefore, please
6. Wait at least 10 minutes before starting any work on the converter. Some converter components (such as capacitors) have residual voltage and require time to discharge.

MAINTENANCE AND MODIFICATION

The converter can only be maintained and modified by personnel authorized by Redback Technologies.

For personal safety, please use the original accessories provided by the manufacturer.

If non-original accessories are used, there will be no guarantee of compliance with relevant certification standards in terms of electrical safety and EMC.

FUNCTIONAL AND SAFETY PARAMETERS

Do not change converter parameters without authorization from the local Power supply company and instructions from Redback Technologies. Unauthorized changes to functional safety parameters may cause injury and damage to persons or converter. In this case, Redback Technologies will not provide warranty services.

10. Maintenance schedule

10.1. REGULAR MAINTENANCE

HIGH VOLTAGE. DANGER OF ELECTROCUTION.
DISCONNECT ALL SOURCES OF AC AND DC ENERGY BEFORE STARTING MAINTENANCE.
USE APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT (PPE).

- Battery storage systems must be disconnected from the converter prior to maintenance.
- Use lockouts and signage to prevent accidental power-up during maintenance.
- The equipment contains energy storage components. After disconnection, wait for at least 10 minutes before beginning maintenance.
- Only qualified personnel are permitted to perform maintenance on the converter.
- Failure to follow these instructions may result in death or severe electric shock injury.

Converter must be maintained regularly to ensure its normal operation and service life. The recommended routine maintenance cycle and work contents are shown in the table below.

ITEM	DESCRIPTION	FREQUENCY
1	Clean the dust at the air inlet of the Power module.	Monthly
2	Check whether there is dust, moisture or condensed water vapor inside the box.	Monthly
3	Check whether the cable connection is loose and tighten the screws if necessary.	Monthly
4	Check the cables for any signs of insulation aging or damage. If such issues are found, apply additional insulation measures or replace the cables.	Monthly
5	Check whether there is abnormal noise during the operation of the equipment.	Monthly
6	Check warning signs and add or replace them if necessary.	Every three months
7	Conduct a routine inspection for corrosion on all metal parts for the AC/DC main switch.	Every six months

10.2. WASTE DISPOSAL

Do not dispose of as household waste. This product contains materials and recyclables that should not enter the general waste stream. Consult your local waste management authority for advice on correct disposal.

11. Specifications

MODEL	RED-C1-T100AC	RED-C1-T125AC
DC SIDE (BATTERY PORT)		
Max. DC voltage	DC 1000 V	DC 1000 V
Min. DC voltage	DC 600 V	DC 600 V
Start up voltage	DC 600 V	DC 600 V
DC voltage range	DC 630-950 V	DC 630-950 V
Rated DC power	100 kW	125 kW
Rated DC current	DC 158.7 A	DC 198 A
Max. DC power	110 kW	137.5 kW
Max. DC current	DC 174.6 A	DC 217 A
Overvoltage Category(OVC)	II	II
AC SIDE (GRID INTERACTIVE PORT)		
Rated AC Input/Output active Power PE	100 kW	125 kW
Rated AC Input/Output current	144.3 A	180 A
Max. AC Input /Output apparent Power PE	110kVA	137.5 kVA
Max. AC Input/Output current	158.7 A	198 A
Nominal AC voltage Ur	3L/N/PE, 400/230 V	3L/N/PE, 400/230 V
AC voltage tolerance	-15%-+15%	-15%-+15%
Nominal frequency/Frequency FNETZ	50 /60 Hz	50 /60 Hz
Harmonic (THDi)	≤3% (at nominal Power), Linear load	≤3% (at nominal Power), Linear load
Power factor	-0.99-+0.99, At nominal Power	-0.99-+0.99, At nominal Power
Adjustable reactive Power range	-100%–100%	-100%–100%
Overvoltage Category (OVC)	III	III
Rated conditional short-circuit current [A a.c.]	AC 10kA	AC 10kA
AC SIDE (OFF-GRID)		
Nominal AC voltage Ur [Va.c.]	AC 3L/N/PE, 400/230 V	AC 3L/N/PE, 400/230 V
AC voltage tolerance	AC 400 V ± 3%	AC 400 V ± 3%
AC rated Input /Output apparent Power PE [kVA]	100 kVA	125 kVA
Max. AC Input/Output current [A a.c.]	AC 158.7 A	AC 198 A
Harmonic THDu	≤3%, Linear load	≤3%, Linear load
DC voltage component	<0.5% , Linear load	<0.5% , Linear load
Unbalance load capacity	100%	100%
Nominal frequency/Frequency FNETZ	50 /60 Hz	50 /60 Hz
GENERAL INFORMATION		
Inverter topology	Non-isolated	Non-isolated
Max. eiciency	>99%	>99%
Communication	RS485, CAN, Ethernet	RS485, CAN, Ethernet
Demand response mode	DRM0 supported	DRM0 supported
Enclosure Dimensions (W * H * D, mm)	520 x 240 x 680	520 x 240 x 680
Weight	70 kg	70 kg
Degree of protection	IP20	IP20
Operating ambient temperature [°C]	-30-60°C (≥50°C for limited load)	-30-60°C (≥50°C for limited load)
Allowable relative humidity	≤95%	≤95%
Cooling method	Forced air cooling	Forced air cooling
Max. operating altitude	4,000 m (derates above 2000m)	4,000 m (derates above 2000m)
Protection class	Class 1	Class 1
Pollution degree	2	2
Applicable standards	IEC 62477; IEC 61000	IEC 62477; IEC 61000
Supported battery types	lithium-ion batteries	lithium-ion batteries
Country of manufacture	Made in China	Made in China
Active anti-islanding method	Reactive Power Perturbation	Reactive Power Perturbation

<END OF USER MANUAL>

12. Quality Assurance

11.1. WARRANTY PERIOD

The warranty period of this product is one year. If otherwise stipulated in the contract, the contract shall prevail.

During the warranty period of Redback Technologies products, customers should take the initiative to show the invoice and date of purchasing products to Redback Technologies service personnel during maintenance. At the same time, the nameplate on the product shall be clearly visible, otherwise Redback Technologies has the right to refuse repair.

12.2. WARRANTY CONDITIONS

Redback Technologies will repair or replace the products that fail during the warranty period free of charge. The faulty equipment shall be owned by Redback Energy Pty Ltd. after replacement. The customer should reserve a certain time for Redback Energies Pty Ltd. to repair the faulty equipment.

Exemption from liability

a. Our company has the right not to provide warranty services under the following circumstances:
b. The product has no Redback Technologies logo;
c. The product or components have exceeded the warranty period of Redback Technologies;
d. Failure or damage (such as too high temperature, too low temperature, too wet or dry environment, too high altitude and unstable voltage or current) caused by failure to meet the requirements of the instruction manual, non-working environment specified by the product or wrong installation, storage and use;
e. Failure or damage caused by installation, repair, alteration or disassembly by non-Redback Technologies after-sales service personnel, except those entrusted by Redback Technologies after- sales service;
f. Failure or damage caused using non-Redback Technologies components;
g. Failure or damage caused by accident or man-made reasons (such as operation error, scratch, handling, bumping and inappropriate voltage connection), or transportation damage;
h. Failure or damage caused by force majeure such as natural disasters (such as earthquake, lightning strike and fire);
i. Other failures or damages not caused by quality problems of Redback Technologies equipment (including components).