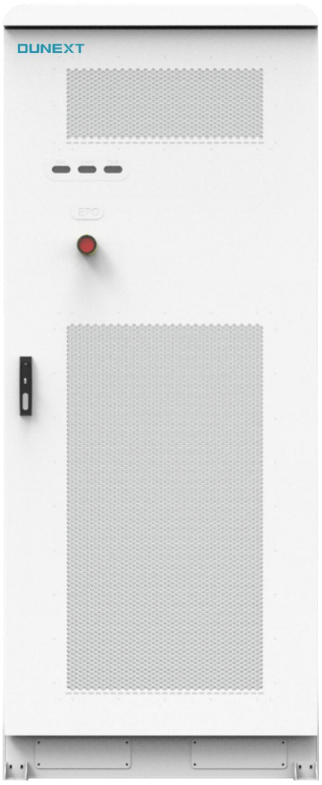
DUNEXT



PCC Series

User Manual

V_1.0 Date 2024/09/01

Notice

This manual contains important safety instructions, installation, electrical connections, commissioning, maintenance, and troubleshooting of the equipment.

Save the manual!

This manual must be stored carefully and be available at all times.

Copyright Declaration

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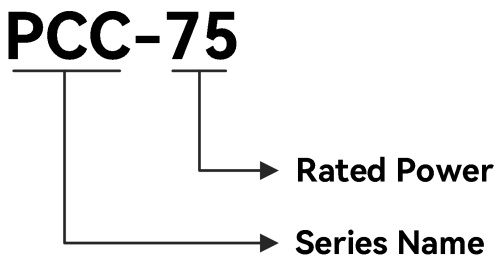
Content

About This Manual

Overview

Please read the product manual carefully before installation, operation, or maintenance of the PCC. This manual contains important safety instructions and installation instructions that must be followed during installation and maintenance of the equipment.

Designation explanation of the PCC:



No.	Meaning	Description
1	Series Name	PCC: On/off grid switching cabinet
2	Rated Power	75: Rated power is 75kVA 125: Rated power is 125kVA 250: Rated power is 250kVA 375: Rated power is 375kVA

Intended Audience

This manual is intended for technical professionals for installation, commissioning and maintenance of the product. The technical personnel has to be familiar with the product, local standards, and electric systems.

Symbol Conventions

The following types of safety instructions and general information appear in this document as described below:

Symbol	Description
 DANGER!	'Danger' indicates a hazard with a high level of risk that, if not avoided, will result in death or serious injury.
 WARNING!	'Warning' indicates a hazard with a medium level of risk that, if not avoided, will result in death or serious injury.
 CAUTION!	'Caution' indicates a hazard with a low level of risk that, if not avoided, could result in minor or moderate injury.
NOTICE NOTICE!	'Notice' indicates a situation that, if not avoided, could result in equipment or property damage.
 NOTE!	'Note' provides tips that are valuable for the optimal operation of the product.

Change History

Changes between document issues are cumulative. The latest document issue contains all the changes made in earlier issues.

Issue 01 (2024-09-01)

This issue is used for first application.

1 Safety Information

1.1 Statement

Before transporting, storing, installing, operating, using, and/or maintaining the equipment, read this document, strictly follow the instructions provided herein, and follow all the safety instructions on the equipment and in this document. In this document, "equipment" refers to the products, software, components, spare parts, and/or services related to this document; "the Company" refers to the manufacturer (producer), seller, and/or service provider of the equipment; "you" refers to the entity that transports, stores, installs, operates, uses, and/or maintains the equipment.

The Danger, Warning, Caution, and Notice statements described in this document do not cover all the safety precautions. You also need to comply with relevant international, national, or regional standards and industry practices. The Company shall not be liable for any consequences that may arise due to violations of safety requirements or safety standards concerning the design, production, and usage of the equipment.

The equipment shall be used in an environment that meets the design specifications. Otherwise, the equipment may be faulty, malfunctioning, or damaged, which is not covered under the warranty. The Company shall not be liable for any property loss, personal injury, or even death caused thereby.

Comply with applicable laws, regulations, standards, and specifications during transportation, storage, installation, operation, use, and maintenance.

Do not perform reverse engineering, decompilation, disassembly, adaptation, implantation, or other derivative operations on the equipment software. Do not study the internal implementation logic of the equipment, obtain the source code of

the equipment software, violate intellectual property rights, or disclose any of the performance test results of the equipment software.

The Company shall not be liable for any of the following circumstances or their consequences:

- The equipment is damaged due to force majeure such as earthquakes, floods, volcanic eruptions, debris flows, lightning strikes, fires, wars, armed conflicts, typhoons, hurricanes, tornadoes, and other extreme weather conditions.
- The equipment is operated beyond the conditions specified in this document.
- The equipment is installed or used in environments that do not comply with international, national, or regional standards.
- The equipment is installed or used by unqualified personnel.
- Fail to follow the operation instructions and safety precautions on the product and in the document.
- Remove or modify the product or modify the software code without authorization.
- You or a third party authorized by you cause the equipment damage during transportation.
- The equipment is damaged due to storage conditions that do not meet the requirements specified in the product document.
- You fail to prepare materials and tools that comply with local laws, regulations, and related standards.
- The equipment is damaged due to your or a third party's negligence, intentional breach, gross negligence, or improper operations, or other reasons not related to the Company.

1.2 Personal Safety

	Ensure that power is off during installation. Do not install or remove a cable with power on. Transient contact between the core of the cable and the conductor will cause electric arcs, sparks, fire, or explosion, which may result in personal injury.
	Non-standard and improper operations on the energized equipment may cause fire, electric shocks, or explosion, resulting in property damage, personal injury, or even death.

	Before operations, remove conductive objects such as watches, bracelets, bangles, rings, and necklaces to prevent electric shocks.
	During operations, use dedicated insulated tools to prevent electric shocks or short circuits. The dielectric withstanding voltage level must comply with local laws, regulations, standards, and specifications.
	During operations, wear personal protective equipment such as protective clothing, insulated shoes, goggles, safety helmets, and insulated gloves.

1.2.1 General Requirements

- Do not stop protective devices. Pay attention to the warnings, cautions, and related precautionary measures in this document and on the equipment.
- If there is a likelihood of personal injury or equipment damage during operations, immediately stop, report the case to the supervisor, and take feasible protective measures.
- Do not power on the equipment before it is installed or confirmed by professionals.
- Do not touch the power supply equipment directly or with conductors such as damp objects. Before touching any conductor surface or terminal, measure the voltage at the contact point to ensure that there is no risk of electric shock.
- Do not touch operating equipment because the enclosure is hot.
- Do not touch a running fan with your hands, components, screws, tools, or boards. Otherwise, personal injury or equipment damage may occur.
- In the case of a fire, immediately leave the building or the equipment area and activate the fire alarm or call emergency services. Do not enter the affected building or equipment area under any circumstances.

1.2.2 Personnel Requirements

- Only professionals and trained personnel are allowed to operate the equipment.

  – Professionals: personnel who are familiar with the working principles and structure of the equipment, trained or experienced in equipment operations

and are clear of the sources and degree of various potential hazards in equipment installation, operation, maintenance.

– Trained personnel: personnel who are trained in technology and safety, have required experience, are aware of possible hazards on themselves in certain operations, and are able to take protective measures to minimize the hazards on themselves and other people.

- Personnel who plan to install or maintain the equipment must receive adequate training, be able to correctly perform all operations, and understand all necessary safety precautions and local relevant standards.
- Only qualified professionals or trained personnel are allowed to install, operate, and maintain the equipment.
- Only qualified professionals are allowed to remove safety facilities and inspect the equipment.
- Personnel who perform special tasks such as electrical operations, working at heights, and operations of special equipment must possess the required local qualifications.
- Only certified high-voltage electricians are allowed to operate medium voltage equipment.
- Only authorized professionals are allowed to replace the equipment or components (including software).
- Only personnel who need to work on the equipment are allowed to access the equipment

1.3 Electrical Safety

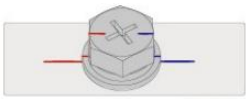
	Before connecting cables, ensure that the equipment is intact. Otherwise, electric shocks or fire may occur.
	Non-standard and improper operations may result in fire or electric shocks.
	Prevent foreign matter from entering the equipment during operations. Otherwise, equipment short-circuits or damage, load power derating, power failure, or personal injury may occur.

 WARNING!	For the equipment that needs to be grounded, install the ground cable first when installing the equipment and remove the ground cable last when removing the equipment.
 CAUTION!	Do not route cables near the air intake or exhaust vents of the equipment.

1.3.1 General Requirements

- Follow the procedures described in the document for installation, operation, and maintenance. Do not reconstruct or alter the equipment, add components, or change the installation sequence without permission.
- Obtain approval from the national or local electric utility company before connecting the equipment to the grid.
- Observe the power plant safety regulations, such as the operation and work ticket mechanisms.
- Install temporary fences or warning ropes and hang "No Entry" signs around the operation area to keep unauthorized personnel away from the area.
- Before installing or removing power cables, turn off the switches of the equipment and its upstream and downstream switches.
- If any liquid is detected inside the equipment, disconnect the power supply immediately and do not use the equipment.
- Before performing operations on the equipment, check that all tools meet the requirements and record the tools. After the operations are complete, collect all of the tools to prevent them from being left inside the equipment.
- Before installing power cables, check that cable labels are correct and cable terminals are insulated.
- When installing the equipment, use a torque tool of a proper measurement range to tighten the screws. When using a wrench to tighten the screws, ensure that the wrench does not tilt and the torque error does not exceed 10% of the specified value.
- Ensure that bolts are tightened with a torque tool and marked in red and blue after double-check. Installation personnel mark tightened bolts in blue. Quality inspection personnel confirm that the bolts are tightened and then mark them in red, as shown in Figure 1-1. (The marks must cross the edges of the bolts.)

Figure 1-1 Bolts tightening marks



- After the installation is complete, ensure that protective cases, insulation tubes, and other necessary items for all electrical components are in position to avoid electric shocks.
- If the equipment has multiple inputs, disconnect all the inputs before operating the equipment.
- Before maintaining a downstream electrical or power distribution device, turn off the output switch on the power supply equipment.
- During equipment maintenance, attach "Do not switch on" labels near the upstream and downstream switches or circuit breakers as well as warning signs to prevent accidental connection. The equipment can be powered on only after troubleshooting is complete.
- If fault diagnosis and troubleshooting need to be performed after power-off, take the following safety measures: Disconnect the power supply. Check whether the equipment is live. Install a ground cable. Hang warning signs and set up fences.
- Check equipment connections periodically, ensuring that all screws are securely tightened.
- Only qualified professionals can replace a damaged cable.
- Do not scrawl, damage, or block any labels or nameplates on the equipment. Promptly replace labels that have worn out.
- Do not use solvents such as water, alcohol, or oil to clean electrical components inside or outside of the equipment.

1.3.2 Grounding Requirements

- Ensure that the grounding impedance of the equipment complies with local electrical standards.
- Ensure that the equipment is connected permanently to the protective ground. Before operating the equipment, check its electrical connection to ensure that it is reliably grounded.
- Do not work on the equipment in the absence of a properly installed ground conductor.
- Do not damage the ground conductor.

- For the equipment that uses a three-pin socket, ensure that the ground terminal in the socket is connected to the protective ground point.
- If high touch current may occur on the equipment, ground the protective ground terminal on the equipment enclosure before connecting the power supply; otherwise, electric shock as a result of touch current may occur.

1.3.3 Cabling Requirements

- When selecting, installing, and routing cables, follow local safety regulations and rules.
- When routing power cables, ensure that there is no coiling or twisting. Do not join or weld power cables. If necessary, use a longer cable.
- Ensure that all cables are properly connected and insulated, and meet specifications.
- Ensure that the slots and holes for routing cables are free from sharp edges, and that the positions where cables are routed through pipes or cable holes are equipped with cushion materials to prevent the cables from being damaged by sharp edges or burrs.
- If a cable is routed into the cabinet from the top, bend the cable in a U shape outside the cabinet and then route it into the cabinet.
- Ensure that cables of the same type are bound together neatly and straight and that the cable sheath is intact. When routing cables of different types, ensure that they are at least 30 mm away from each other.
- When cable connection is completed or paused for a short period of time, seal the cable holes with sealing putty immediately to prevent small animals or moisture from entering.
- Secure buried cables using cable supports and cable clips. Ensure that the cables in the backfill area are in close contact with the ground to prevent cable deformation or damage during backfilling.
- If the external conditions (such as the cable layout or ambient temperature) change, verify the cable usage in accordance with the IEC-60364-5-52 or local laws and regulations. For example, check that the current-carrying capacity meets requirements.
- When routing cables, reserve at least 30 mm clearance between the cables and heat-generating components or areas. This prevents deterioration or damage to the cable insulation layer.
- When the temperature is low, violent impact or vibration may damage the plastic cable sheathing. To ensure safety, comply with the following requirements:

– Cables can be laid or installed only when the temperature is higher than 0℃. Handle cables with caution, especially at a low temperature.

– Cables stored at below 0℃ must be stored at room temperature for more than 24 hours before they are laid out.

- It is forbidden to directly push the cable from the car and other non-standard operations, to avoid the damage of the cable performance decline, affecting the current load and temperature rise.

1.4 Environment Requirements

	Do not expose the equipment to flammable or explosive gas or smoke. Do not perform any operation on the equipment in such environments.
	Do not store any flammable or explosive materials in the equipment area.
	Do not place the equipment near heat sources or fire sources, such as smoke, candles, heaters, or other heating devices. Overheat may damage the equipment or cause a fire.
	Install the equipment in an area far away from liquids. Do not install it under areas prone to condensation, such as under water pipes and air exhaust vents, or areas prone to water leakage, such as air conditioner vents, ventilation vents, or feeder windows of the equipment room. Ensure that no liquid enters the equipment to prevent faults or short circuits.
	To prevent damage or fire due to high temperature, ensure that the ventilation vents or heat dissipation systems are not obstructed or covered by other objects while the equipment is running.

1.4.1 General Requirements

- Ensure that the equipment is stored in a clean, dry, and well-ventilated area with proper temperature and humidity and is protected from dust and condensation.
- Keep the installation and operating environments of the equipment within the allowed ranges. Otherwise, its performance and safety will be compromised.
- Do not install, use, or operate outdoor equipment and cables (including but not limited to moving equipment, operating equipment and cables, inserting connectors to or removing connectors from signal ports connected to outdoor facilities, working at heights, performing outdoor installation, and opening doors) in harsh weather conditions such as lightning, rain, snow, and level 6 or stronger wind.
- Do not install the equipment in an environment with dust, smoke, volatile or corrosive gases, infrared and other radiations, organic solvents, or salty air.
- Do not install the equipment in an environment with conductive metal or magnetic dust.
- Do not install the equipment in an area conducive to the growth of microorganisms such as fungus or mildew.
- Do not install the equipment in an area with strong vibration, noise, or electromagnetic interference.
- Ensure that the site complies with local laws, regulations, and related standards.
- Ensure that the ground in the installation environment is solid, free from spongy or soft soil, and not prone to subsidence. The site must not be located in a low-lying land prone to water or snow accumulation, and the horizontal level of the site must be above the highest water level of that area in history.
- Do not install the equipment in a position that may be submerged in water.
- If the equipment is installed in a place with abundant vegetation, in addition to routine weeding, harden the ground underneath the equipment using cement or gravel.
- Before opening doors during the installation, operation, and maintenance of the equipment, clean up any water, ice, snow, or other foreign objects on the top of the equipment to prevent foreign objects from falling into the equipment.
- When installing the equipment, ensure that the installation surface is solid enough to bear the weight of the equipment.

- All cable holes must be sealed. Seal the used cable holes with sealing putty. Seal the unused cable holes with the caps delivered with the equipment.
- After installing the equipment, remove the packing materials such as cartons, foam, plastics, and cable ties from the equipment area.

1.5 Mechanical Safety

 DANGER!	When working at heights, wear a safety helmet and safety harness or waist belt and fasten it to a solid structure. Do not mount it on an insecure moveable object or metal object with sharp edges. Make sure that the hooks will not slide off.
 WARNING!	Ensure that all necessary tools are ready and inspected by a professional organization. Do not use tools that have signs of scratches or fail to pass the inspection or whose inspection validity period has expired. Ensure that the tools are secure and not overloaded.
 WARNING!	Before installing equipment in a cabinet, ensure that the cabinet is securely fastened with a balanced centre of gravity. Otherwise, tipping or falling cabinets may cause bodily injury and equipment damage.
 WARNING!	When pulling equipment out of a cabinet, be aware of unstable or heavy objects in the cabinet to prevent injury.
 WARNING!	Do not drill holes into the equipment. Doing so may affect the sealing performance and electromagnetic containment of the equipment and damage components or cables inside. Metal shavings from drilling may short-circuit boards inside the equipment.

1.5.1 General Requirements

- Repaint any paint scratches caused during equipment transportation or installation in a timely manner. Equipment with scratches must not be exposed for an extended period of time.
- Do not perform operations such as arc welding and cutting on the equipment without evaluation by the Company.
- Do not install other devices on the top of the equipment without evaluation by the Company.
- When performing operations over the top of the equipment, take measures to protect the equipment against damage.
- Use correct tools and operate them in the correct way.

1.5.2 Moving Heavy Objects Safety

- Be cautious to prevent injury when moving heavy objects, follow instructions in Figure 1-2.

Figure 1-2 Moving Heavy Objects Instructions

- If multiple persons need to move a heavy object together, determine the manpower and work division with consideration of height and other conditions to ensure that the weight is equally distributed.
- If two persons or more move a heavy object together, ensure that the object is lifted and landed simultaneously and moved at a uniform pace under the supervision of one person.
- Wear personal protective gears such as protective gloves and shoes when manually moving the equipment.
- To move an object by hand, approach to the object, squat down, and then lift the object gently and stably by the force of the legs instead of your back. Do not lift it suddenly or turn your body around.
- Move or lift the equipment by holding its handles or lower edges. Do not hold the handles of modules that are installed in the equipment.

- Do not quickly lift a heavy object above your waist. Place the object on a workbench that is half-waist high or any other appropriate place, adjust the positions of your palms, and then lift it.
- Move a heavy object stably with balanced force at an even and low speed. Put down the object stably and slowly to prevent any collision or drop from scratching the surface of the equipment or damaging the components and cables.
- When moving a heavy object, be aware of the workbench, slope, staircase, and slippery places. When moving a heavy object through a door, ensure that the door is wide enough to move the object and avoid bumping or injury.
- When transferring a heavy object, move your feet instead of turning your waist around. When lifting and transferring a heavy object, ensure that your feet point to the target direction of movement.
- When transporting the equipment using a pallet truck or forklift, ensure that the tynes are properly positioned so that the equipment does not topple. Before moving the equipment, secure it to the pallet truck or forklift using ropes. When moving the equipment, assign dedicated personnel to take care of it.
- Choose sea or roads in good conditions for transportation. Do not transport the equipment by railway or air. Avoid tilt or jolt during transportation.
- When moving and transporting an air conditioner, keep it upright and do not place it horizontally or upside down. If the package of the air conditioner is damaged or the tilt indicator on the package changes color, contact the Company's service engineers.

1.5.3 Work-at-height Safety

- Any operations performed 2 m or higher above the ground shall be supervised properly.
- Only trained and qualified personnel are allowed to work at heights.
- Do not work at heights when steel pipes are wet or other risky situations exist. After the preceding conditions no longer exist, the safety owner and relevant technical personnel need to check the involved equipment. Operators can begin working only after safety is confirmed.
- Set a restricted area and prominent signs for working at heights to warn away irrelevant personnel.
- Set guard rails and warning signs at the edges and openings of the area involving working at heights to prevent falls.

- Do not pile up scaffolding, springboards, or other objects on the ground under the area involving working at heights. Do not allow people to stay or pass under the area involving working at heights.
- Carry operation machines and tools properly to prevent equipment damage or personal injury caused by falling objects.
- Personnel involving working at heights are not allowed to throw objects from the height to the ground, or vice versa. Objects shall be transported by slings, hanging baskets, aerial work platforms, or cranes.
- Do not perform operations on the upper and lower layers at the same time. If unavoidable, install a dedicated protective shelter between the upper and lower layers or take other protective measures. Do not pile up tools or materials on the upper layer.
- Dismantle the scaffolding from top down after finishing the job. Do not dismantle the upper and lower layers at the same time. When removing a part, ensure that other parts will not collapse.
- Ensure that personnel working at heights strictly comply with the safety regulations. The Company is not responsible for any accident caused by violation of the safety regulations on working at heights.
- Behave cautiously when working at heights. Do not rest at heights.

1.5.4 Ladder Use Safety

- Use wooden or insulated ladders when you need to perform live-line working at heights.
- Platform ladders with protective rails are preferred. Do not use single ladders.
- Before using a ladder, check that it is intact and confirm its load bearing capacity. Do not overload it.
- Ensure that the ladder is securely positioned and held firm, as shown in Figure 1-3.

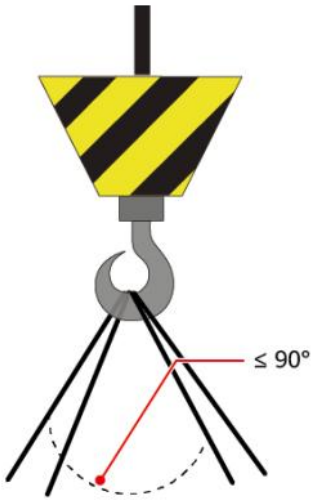
Figure 1-3 Ladder Holding Example

- When climbing up the ladder, keep your body stable and your center of gravity between the side rails, and do not overreach to the sides.
- When a step ladder is used, ensure that the pull ropes are secured

1.5.5 Hoisting Safety

- Only trained and qualified personnel are allowed to perform hoisting operations.
- The hoisting area is to be isolated by erecting temporary warning signs or fences.
- Ensure that the foundation where hoisting is performed on meets the load bearing requirements.
- Before hoisting objects, ensure that hoisting tools are firmly secured onto a fixed object or wall that meets the load-bearing requirements.
- During hoisting, it is strictly prohibited to stand or walk under the crane or hoisted object.
- Do not drag steel ropes and hoisting tools or bump the hoisted objects against hard objects during hoisting.
- Ensure that the angle between two hoisting ropes is no more than 90 degrees, as shown in figure 1-4.

Figure 1-4 Requirement of Angle Between Two Hoisting Ropes



1.5.6 Drilling Safety

- Obtain consent from the client and contractor before drilling.
- Wear protective equipment such as safety goggles and protective gloves when drilling holes.
- To avoid short circuits or other risks, do not drill holes into buried pipes or cables.
- When drilling holes, the equipment should be shielded and protected to prevent debris from falling into the equipment, and debris should be cleaned up in time after drilling.

2 Product Description

2.1 Production Introduction

PCC on/off grid switching cabinet is used to control the on-grid and off-grid switching of the energy storage cabinet in the energy storage system. It includes isolation transformer, PCC controller, switching contactor, grid circuit breaker, bypass circuit breaker, load circuit breaker, etc.

- The isolation transformer acts to isolate and increase the short circuit impedance and is used to isolate the PCS from the grid.
- The PCC controller is the core of the PCC on/off grid switching cabinet and mainly controls the grid connection and disconnection of the PCS.
- The switching contactor is used to connect or disconnect the power grid.
- The grid circuit breaker is connected to the grid side to protect the breaking load and the energy storage system.
- The bypass circuit breaker connects the grid and the load and is used when the energy storage system or PCC fails to ensure that the load is powered directly from the grid.
- The load circuit breaker is connected to the load side to protect the breaking load.

NOTE

This user manuel only includes PCC on/off grid switching cabinet.

2.2 Appearance Introduction

Figure 2-1 Appearance and dimensions of PCC

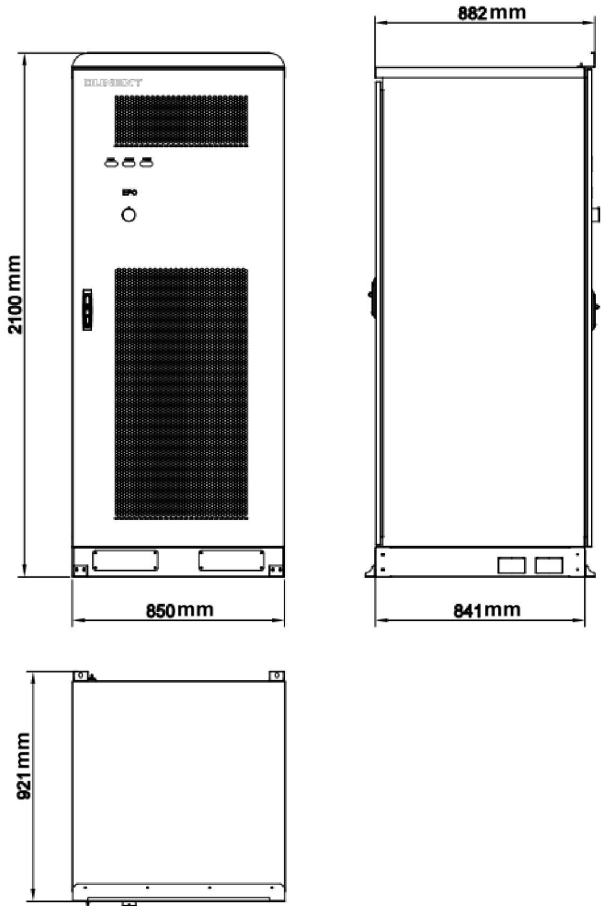
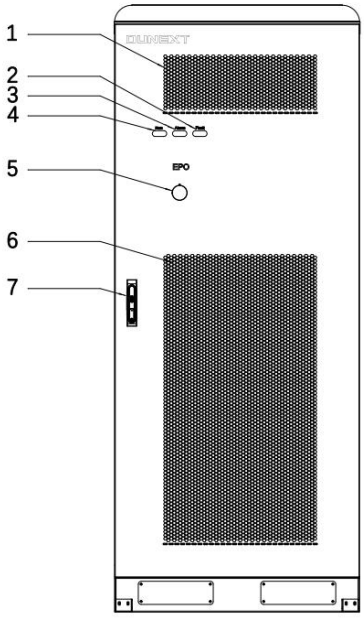


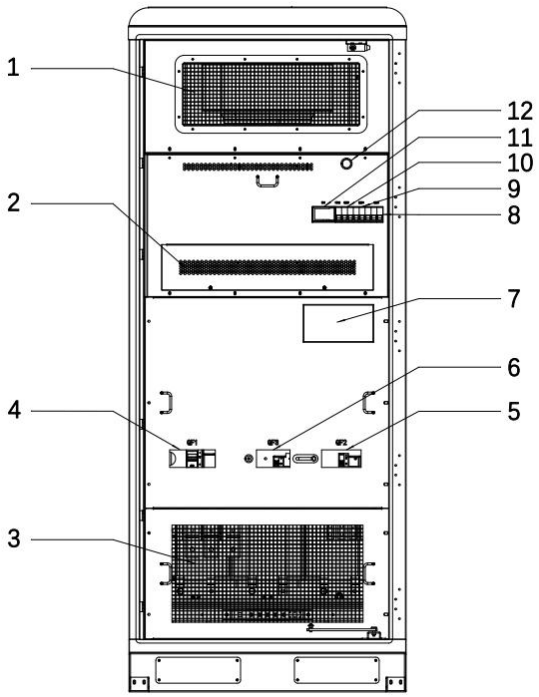
Figure 2-2 Front view of PCC



No	Name	Function
1	Air outlet	Cabinet heat dissipation outlet.
2	Fault indicator	Solid red indicates a system failure and the system stops running.
3	Alert indicator	Solid yellow indicates that a system alarm has occurred, but it does not affect system operation.
4	Operation indicator	Solid green indicates operation, flashing indicates standby
5	Emergency stop	The system stops when the button is pressed
6	Air Inlet	Cabinet cooling air inlet
7	Door lock	Locking the cabinet door requires a specific key to open it

2.3 Components Introduction

Figure 2-3 Structure design of PCC



No	Name	Function
1	Fan	Heat dissipation
2	Internal terminal block	PCC control circuit terminal block
3	External interface	Interface at grid side, load side and PCS side
4	Grid side circuit breaker	Access to the power grid
5	Load side circuit breaker	Connect to the load
6	Bypass circuit breaker	Used in case of failure of PCC or PCS
7	Transformer temperature display	Display the three-phase temperature of the transformer winding
8	Auxiliary power supply circuit breaker	Auxiliary power supply on/off and protection
9	Fan circuit breaker	Fan protection
10	Battery Breaker	Battery protection
11	Load meter	Metering of load power consumption
12	Battery activation button	Activate the battery

Table 2-1 Technical parameters of PCC

Parameter model	PCC-75	PCC-125	PCC-250	PCC-375
Basic parameters				
Rated power	75kVA	125kVA	250kVA	375kVA
Wiring mode	3P4W+PE			
Rated voltage	AC400V			
Voltage range	AC400V±15%			
Rated frequency	50/60Hz			
Frequency range	50/60(±2.5)Hz			
Long-term overload capacity	110%			
Off-grid to On-grid switching time	5~27ms	30~80ms	33~120ms	33~120ms
On-grid to Off-grid switching time	≤20ms			
Rated output current	86A	172A	344A	516A
Allowable maximum current	100A	200A	400A	600A
Maximum efficiency	99%			

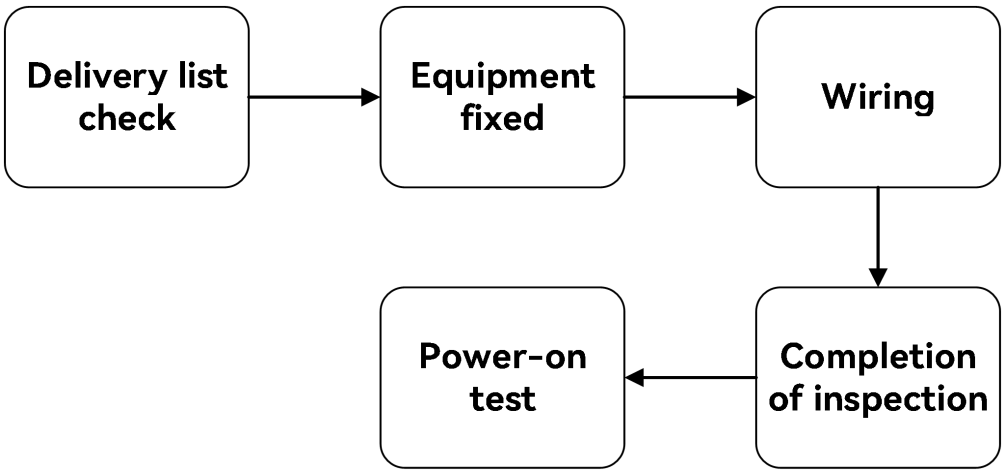
Automatic protection function	Grid side over-voltage, under-voltage, over-frequency, under-frequency protection, over-temperature, emergency stop, output overload	
General parameters		
Isolation transformer	Integrate	
Degree of protection	IP54	
Cooling method	Forced air cooling	
Corrosion protection grade	C3	
Operating temperature	-20℃ ~ 50℃	
Relative humidity	0-95% (non-condensing)	
Operating altitude	< 2000m	
Noise	≤75dB	
Dimension (W * D * H)	850mm*900mm*2100mm	1100mm*900mm*2100mm
Maximum weight	1000kg	1200kg
Communication interface	RS 485, CAN	
Communication protocol	Modbus-RTU, CAN2.0B	

3 Installation

3.1 Preparation for Installation

3.1.1 Installation Process

Figure 3-1 Installation process

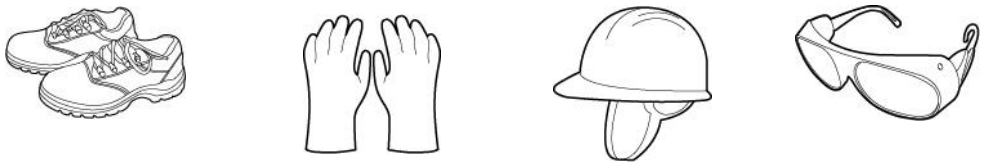


3.1.2 Tools Needed

Installation tools need to be prepared in advance when on-site installation is carried out at the project site.

Wear protection:

Figure 3-2 Protective tools



Safety shoes Insulating gloves Helmet Goggles

Table 3-1 List of Recommend tools

NO.	Item	Quantity	Description
1	Electric forklift	1 set	Rated load ≥ 2 T; For unloading and handling
2	Impact drill bit and M12 drill bit	Group 1	Drilling holes in the ground; Position the expansion screw (4-M12)
3	Hammer	1	Drive the expansion bolt into the fixed position
4	Socket tool	Group 1	M12 sleeve: used to fasten the expansion bolt
5	Insulated torque wrench	1	M8 sleeve: terminal fixing.
6	Adjustable wrench	1	Check and mark the torque values
7	Diagonal pliers	1	Tighten the bolts for the cable connections.
8	Slotted screwdriver/crowbar	1	Cut the nylon tie off the bag.

3.1.3 Environmental Requirements for Installation Site

The environmental requirements of the installation site are shown in the following table:

Table 3-2 Environmental requirements

NO.	Item	Description
1	Electric forklift	Rated load ≥ 2 T; For unloading and handling
2	Impact drill bit and M12 drill bit	Drilling holes in the ground; Position the expansion screw (4-M12)
3	Hammer	Drive the expansion bolt into the fixed position

4	Socket tool	M12 sleeve: used to fasten the expansion bolt
5	Insulated torque wrench	M8 sleeve: terminal fixing.

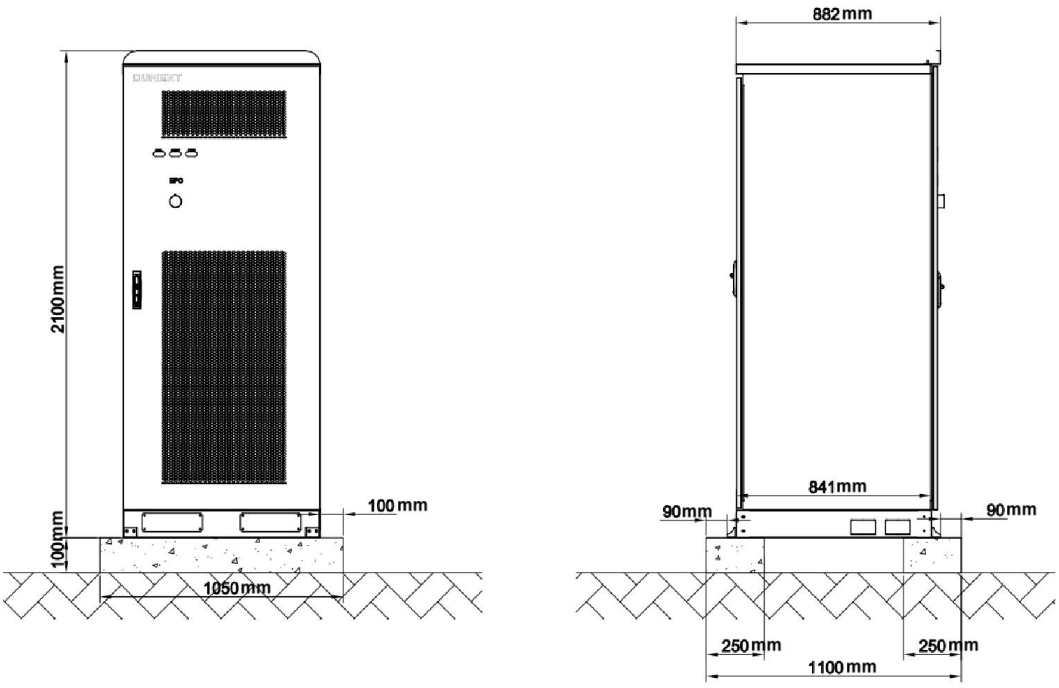
NOTE

Do not install and commission the PCC on-off grid switching cabinet in the rain.

3.1.4 Site Installation Foundation

This PCC cabinet shall be fixed on a concrete foundation. Please build the installation foundation in advance according to the following figure.

Figure 3-3 Site installation foundation



Front View Side View

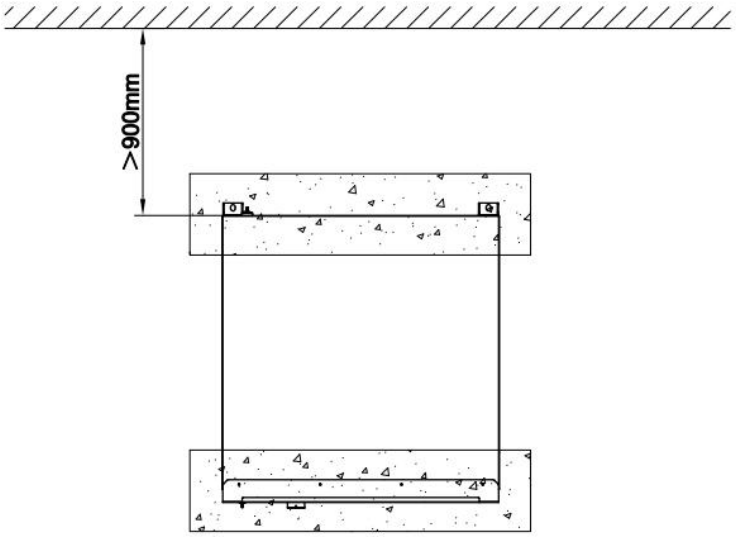
Table 3-3 Installation base requirements

NO.	Item	Description
1	Minimum Hardening Area	L≥1100mm, W≥1050mm
2	Installation foundation height	H ≥ 100 mm (higher than the highest historical flood level)
3	Bearing capacity of	Bearing capacity > 1.5 t/m²

	mounting base	
4	Foundation service life	≥ 20 years
5	Foundation levelness	3mm/m²

Site Requirements for Single PCC Cabinet Installation:

Figure 3-4 Installation of single PCC on-off grid switching cabinet



3.1.5 Transportation of PCC on-off Grid Switching Cabinet

DANGER!	In the process of transportation, it is necessary to check the surrounding sites and set up obvious safety warning lines for safety protection. During the transportation, no irrelevant personnel shall enter the transportation danger zone.

Table 3-4 Forklifts requirements:

NO.	Item	Description
1	Specification for forklift trucks	The maximum weight of PCC on-off grid switching cabinet is about 1.2 tons, and the electric forklift with rated load ≥ 2 tons shall be equipped.

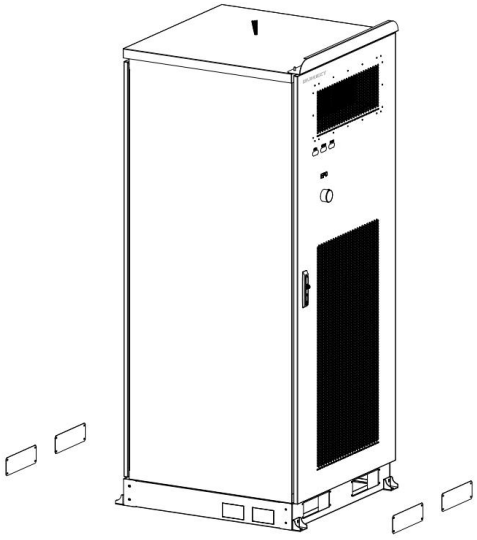
2	Fork length	As the width and depth of the PCC on-off grid switching cabinet are close to 1m, it is recommended to use a shift fork with a length of > 1.2m.
3	Width of fork processing hole	The forklift hole of this product is 225 mm wide and the distance between the centers of the two holes is 425 mm. For this reason, a wide pitch fork is recommended.
4	The position of the fork	Adjust the position of the shift fork to make the distance between the shift fork and the rear side of the cabinet body < 50mm, and the distance between the far shift fork and the right side of the cabinet body > 50mm; Slowly lift the fork, put down the fork after the product reaches the required position, and move it out of the base. The entry position of the fork is the back of the cabinet without air conditioning.

- The PCC on-off grid switching cabinet can only be transported by forklift.
- When handling this product, please use an electric forklift with movable forks. Manual forklifts are not recommended.
- When handling with a forklift, protection shall be provided to avoid damage to the surface of the equipment.
- When the forklift is used for transportation, the cabinet body shall be fixed on the forklift with a belt/safety rope.

Transport scheme: front insertion

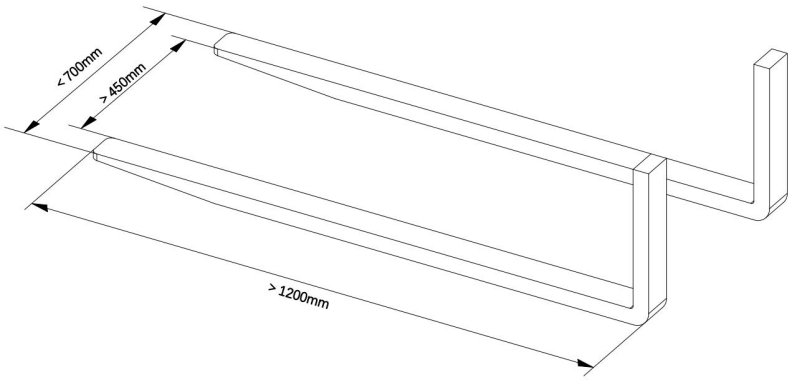
1. Remove the fork hole cover plate and confirm the fork hole.

Figure 3-5 Schematic diagram of front sealing plate removal



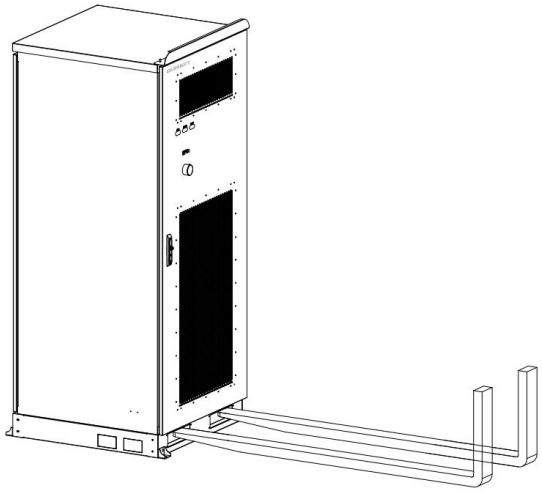
2. Fork arm requirements

Figure 3-6 Dimension Requirements of Fork Arm



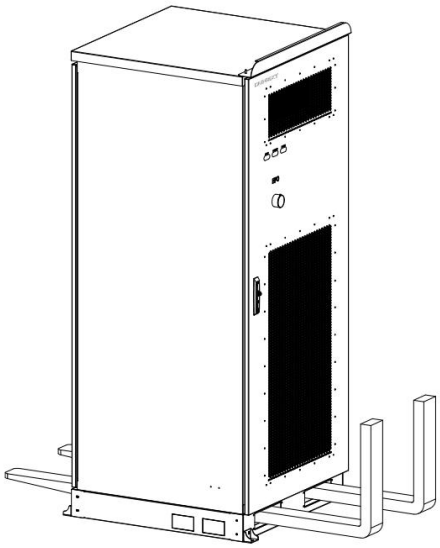
3. Fork entrance

Figure 3-7 Fork arm front fork



4. Transportation

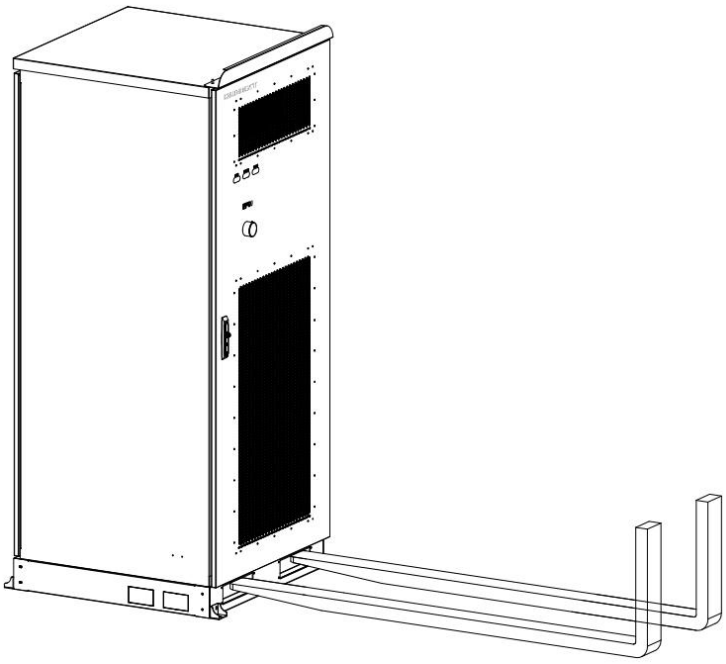
Figure 3-8 Front Handling of Fork Arm



NO.	Item	Description
1	Specification for forklift trucks	Forklift shall enter from the side adjacent to the air conditioner, so that the distance between the fork and the rear side of the cabinet is less than 50mm.
2	Fork length	The end of the forklift shall extend out of the cabinet for at least 50mm.

5. Drop the fork and exit.

Figure 3-9 Front Exit of Fork Arm



3.2 Fixation of Cabinet

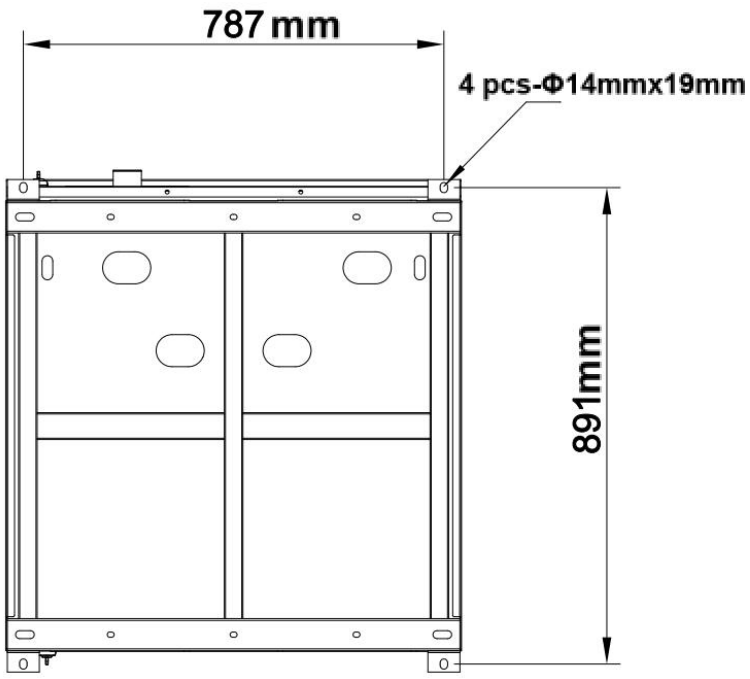
Before fixing the PCC on-off grid switching cabinet, please recheck whether the PCC on-off grid switching cabinet is placed in a qualified position according to the requirements of Section 3.1.4 Site Installation Foundation.

- Prepare M12 impact drill and check the specification and quantity of expansion screws;
- Ground drilling: align the percussion drill with the center of the fixed installation base hole, and drill holes according to the following fixed hole positions (4 holes in the front and back of the equipment), with a depth of 120mm;

NOTE

Holes need to be punched before PCC cabinet placement as the external backbone will block the percussion drill.

Figure 3-10 Fixing hole at the bottom of the battery



Bolt installation:

After removing the hole slag, put the expansion bolts (4) into the corresponding holes, hammer them to the bottom with a hammer, install the nuts + gaskets and fasten them with sleeves, and confirm the torque with a torque wrench (M12: 96 N. M);

Figure 3-11 Diagram of Expansion Bolt

3.3 External Wiring

For the cabling of this PCC on-off grid switching cabinet system, follow the instructions in this chapter to properly connect all cabling.

	● Wiring shall be done by a qualified electrician. The electrician shall verify that all cables are properly connected. ● At least two operators are required for wiring operations. One operator operates the wire, and the other operator monitors and reminds to avoid misoperation. ● Make sure that all switches are closed before wiring. ● Any damage or accident caused by improper operation shall be borne by the operator. ● PCC on-off grid switching cabinet is connected to the power grid system, and the power grid system shall be provided with lightning protection measures.

3.3.1 Switch Position of PCC On-off Grid Switching Cabinet

	● Make sure that all switches are closed before wiring. ● During connection, protective equipment, goggles, insulating gloves and protective shoes must be worn.

Figure 3-12 Front inner surface of PCC on-off grid switching cabinet

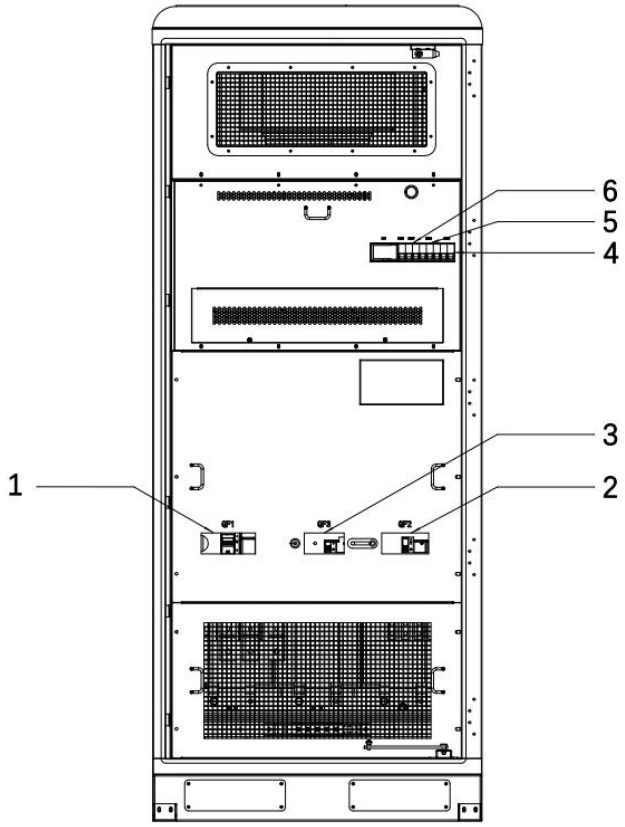


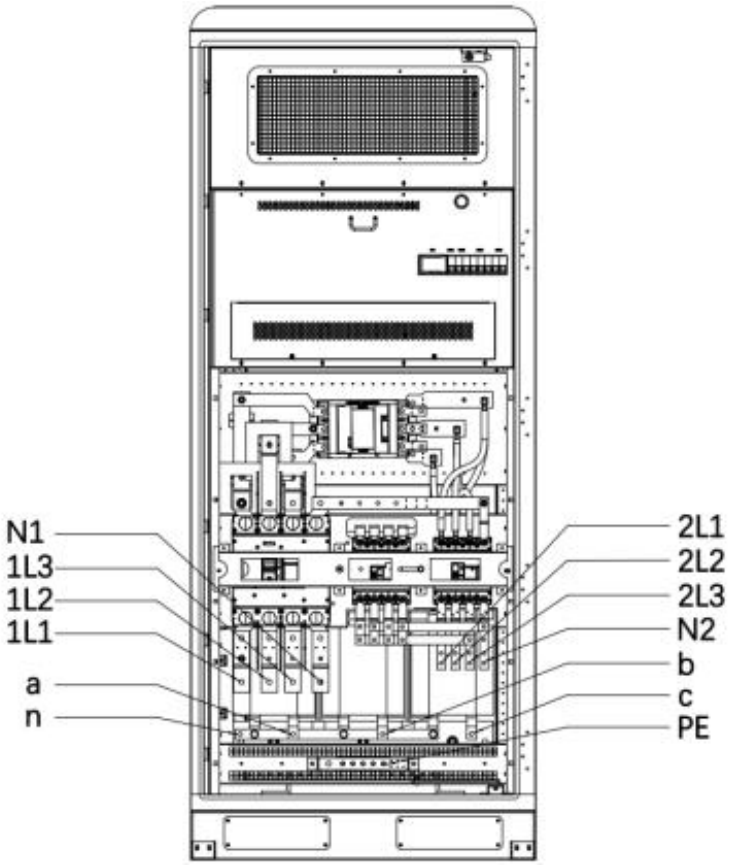
Table 3-4 Switches of PCC:

NO.	Item	Shipment status	Function
1	Grid Circuit Breaker	OFF	Power supply from the grid
2	Load circuit breaker	OFF	Load supply
3	Bypass circuit breaker	OFF	Bypass
4	Micro circuit breaker for control circuit	OFF	Control power supply
5	Fan micro circuit breaker	OFF	Fan power supply
6	Battery Miniature Circuit Breaker	OFF	Battery on and off

3.3.2 Wiring of PCC On-off Grid Switching Cabinet

All external interfaces are arranged in the PCC on-off grid switching cabinet. Details are as follows:

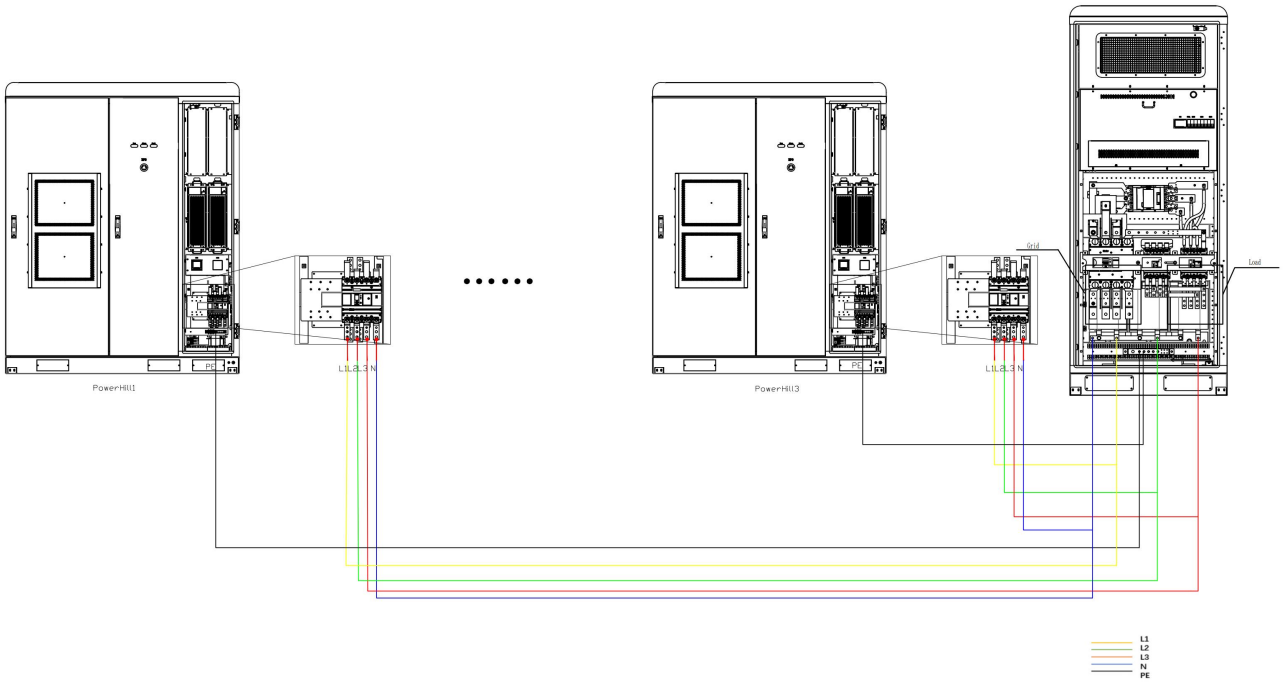
Figure 3-13 Wiring Location Diagram



NO.	Item	Function	Remark
1	N1	Power grid N	Customer Self-access
2	1L3	Grid L3	Customer Self-access
3	1L2	Grid L2	Customer Self-access
4	1L1	Grid L1	Customer Self-access
5	a	Connect PCS	Customer Self-access
6	n	Connect PCS	Customer Self-access
7	PE	Grounding	The shipment has been wired, and the system ground wire is connected by the customer.

8	c	Connect PCS	Customer Self-access
9	b	Connect PCS	Customer Self-access
10	N2	Load N	Customer Self-access
11	2L3	Load L3	Customer Self-access
12	2L2	Load L2	Customer Self-access
13	2L1	Load L1	Customer Self-access

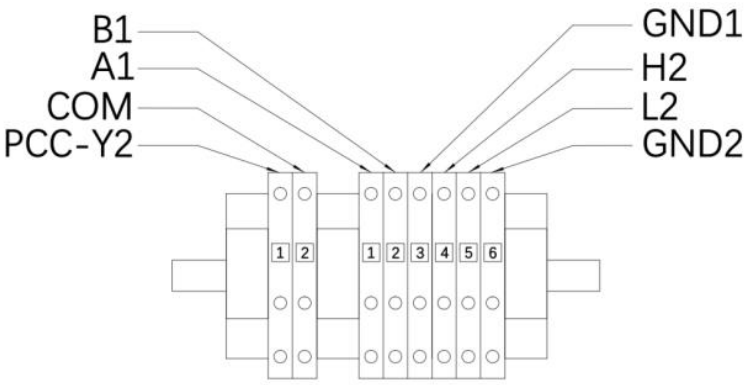
Figure 3-14 Power cable connection with PowerHill



3.3.3 Communication Wiring

External signal and communication wiring of PCC on-off grid switching cabinet is shown in the figure below:

Figure 3-15 Diagram of signal and external communication interface



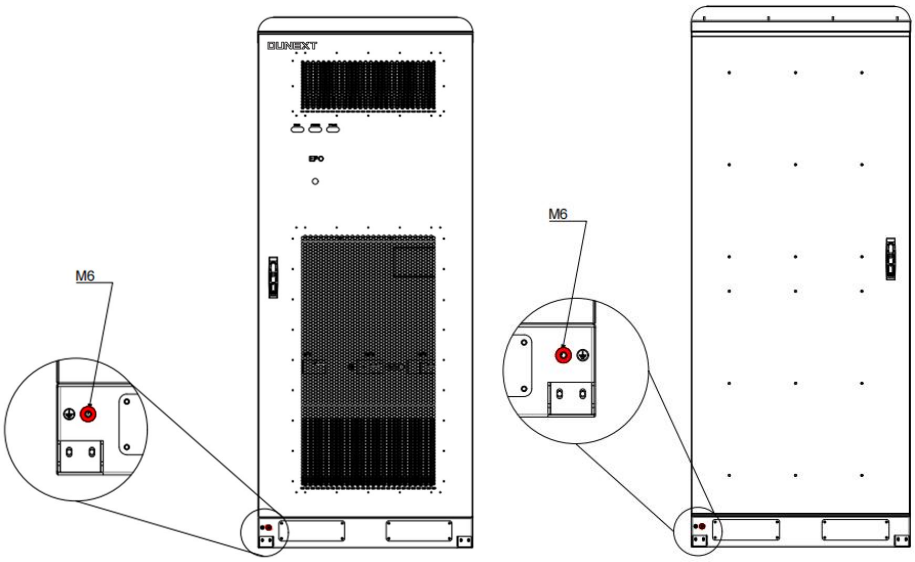
NO.	Item	Function	Remark
1	PCC-Y2	Parallel off-grid signal	Disconnect is off-grid, and connect is grid-connected
2	COM	Parallel off-network common terminal	Common terminal of parallel off-network signal
3	A1	485 Communication A	Communicate with the PowerHill
4	B1	485 Communication B	Communicate with the PowerHill
5	GND1	485 ground	Shield ground
6	H2	CAN communication H2	Communicate with the PowerHill
7	L2	CAN communication L2	Communicate with the PowerHill
8	GND2	CAN ground	Shield ground

3.3.4 Grounding

The front and back of the PCC shell are designed with ground connection points, and a ground point should be selected according to the actual installation environment.

In the power distribution system, the PCC should be repeatedly grounded with a grounding impedance of 4Ω.

Figure 3-16 Diagram of ground connection point



3.4 Completion of Inspection

Symbol	Description
 **WARNING!**	Another operator needs to check the wiring again to make sure all cables are connected correctly

3.4.1 Line Inspection

Ensure that all cables are correctly connected according to Section 3.3 External Wiring.

NOTE

In order to prevent the communication quality from being affected, the field communication cable shall not be too long, and the external connection wiring shall be protected by pipes.

3.4.2 Bolt Torque Inspection

Ensure that all bolts are tightened as follows. After confirming the torque, make a red mark on the bolt as identification.

Table 3-4 Bolt torque:

NO.	Item	Location	Fastener	Specify a value
1	PCC on-off grid switching cabinet	PCC on-off grid switching cabinet and ground fixing	4-M12*60	96±5N·m
2		Grounding cable	M8 hexagon nut	10±1N·m

4 Power-on Steps

4.1 Inspection before Power-on

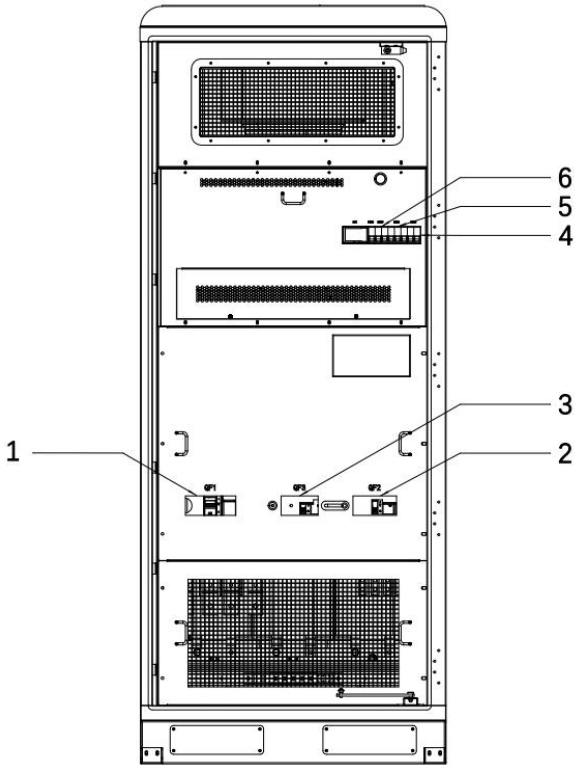
Step 1: Ensure that the wiring inspection in Section 3.4 is completed;

Step 2: Confirm the cabinet is installed vertically to the ground;

Step 3: Check the internal wiring of PCC on-off grid switching cabinet is reliable and free from looseness and falling off;

4.2 Power-on Process of PCC On-off Grid Switching Cabinet

Symbol	Description
DANGER!	• Make sure that the pre-power-on inspection is completed before power-on. • At least two operators are required for power-up operation. One operator is responsible for power-on operation, and the other operator is responsible for



Power on the PCC on-off grid switching cabinet is divided into three steps:

1. The first step is to close the power grid circuit breaker (No.1);
2. The second step is to close the load circuit breaker (No.2);
3. And 3, closing the control circuit micro circuit breaker (No.4), the fan micro circuit breaker (No.5) and the battery micro circuit breaker (No.6).

The steps are operated in sequence. If the PCC on-off grid switching cabinet is in normal state, the operation indicator light, fault indicator light and alarm indicator light will be on in turn after the PCC on-off grid switching cabinet is powered on, and then the operation indicator light will flash.

The PCC on-off grid switching cabinet is automatically connected to and disconnected from the grid. The PCC controller will automatically detect whether the front-end grid is energized and control the contactor to switch automatically.

After the grid is energized, if the PCS in PowerHill does not operate, the switching contactor will be closed after about 2 minutes. If the PCS is in off-grid operation, the switching contactor will be closed after about 5 minutes. After the closing, the PCS is in grid-connected mode, and the operation indicator light is always on.

After the grid is connected, if the grid is powered off, the switching contactor will be automatically and immediately disconnected, and it is in off-grid mode.

4.3 Power-down Process of PCC On-off Grid Switching Cabinet

Power-down of PCC on-off grid switching cabinet is divided into 3 steps:

- Step1: Turn off the control circuit micro circuit breaker(No.4), the fan micro circuit break (No.5) and the battery micro circuit breaker(No.6);
- Step2: Turn off the power grid circuit breaker(No.1);
- Step3: Turn off the load circuit breaker(No.2).

The PCC on-off grid switching cabinet indicator is off after following the steps:

When the PowerHill fails or the PCC control circuit fails and needs to be overhauled, and the load needs to supply power, after the power grid circuit breaker and the load circuit breaker are turned off, the middle push-pull rod of the circuit breaker is moved to the left, at this time, the bypass circuit breaker can be turn on, and the power of the power grid is directly supplied to the load by the bypass circuit breaker.

NOTE

If the battery is not used for power supply, just turn off the battery micro circuit breaker.

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