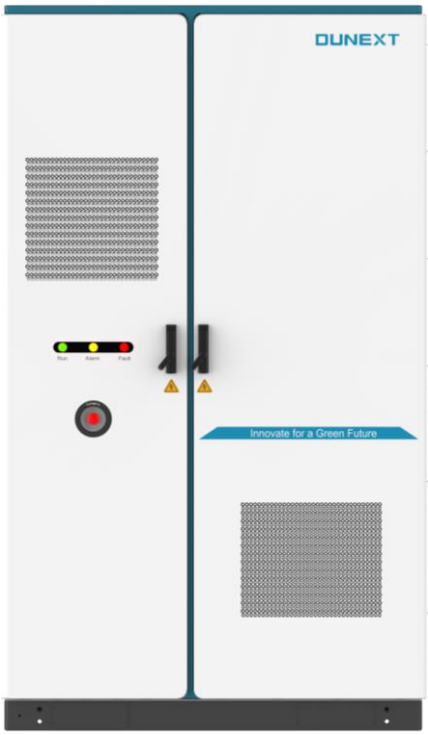

PCC-3/1

User Manual

V_1.0 Date 2025/10/24

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

Dunext reserves the right of final interpretation. This manual may be updated according to user' s or customer' s feedback. The information in this manual is subject to change without notice. Every effort has been made to ensure the accuracy of the contents of this manual, but nothing mentioned herein expresses or implies any other information.

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Contents

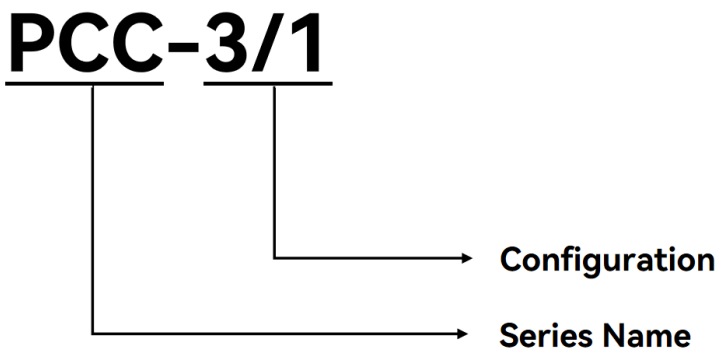
About This Manual III
1 Safety Precautions 1
1.1 Operator Requirements 1
2 Product Introduction 3
2.1 Overview 3
2.2 Appearance 3
2.3 Components 6
2.4 Parameters 7
3 Installation 9
3.1 Preparations before Installation 9
3.1.1 Installation Process 9
3.1.2 Installation Tools 9
3.1.3 Installation Environment Requirements 10
3.1.4 On-site Foundation Installation 10
3.1.5 Product Transportation 12
3.2 Fixation of Cabinet 14
3.3 External Wiring 15
3.3.1 Product Switch Position 16
3.3.2 Product Wiring 17
3.3.3 Communication Wiring 19
3.3.4 Grounding 21
3.4 Inspection after Installation 21
3.4.1 Wiring Inspection 21
3.4.2 Bolt Torque Check 21
4 Power-on Steps 22
4.1 Check Before Power-on 22
4.2 Power-on Process 22
4.3 Power-off Process 23

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	Configuration	3/1: 3 Inputs and 1 output

Intended Audience

This manual is intended for technical professionals for installation, commissioning and maintenance of the product. The technical personnel have 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' indicates a hazard with a high level of risk that, if not avoided, will result in death or serious injury.
	'Warning' indicates a hazard with a medium level of risk that, if not avoided, will result in death or serious injury.
	'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' 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 (2025-10-24)

This issue is used for first application

1 Safety Precautions

1.1 Operator Requirements

A qualified operator must have the necessary knowledge, professional training, and proven experience. Specifically, the operator must:

- Hold all certificates required by local laws and regulations.
- Protect and maintain equipment according to all relevant safety standards.
- Be capable of performing safe first aid.
- Follow all local regulations, standards, and management directives.

Operators must ensure the following:

- Before working on any circuit breaker, understand all information and instructions, especially the critical safety procedures for assembly and installation.
- Do not change the size or rating of any fuse.
- Use correct measuring devices and follow all standards and guides. Read the device manual before taking any measurements.
- Do not open the equipment during operation.
- Only authorized, certified personnel may operate machinery like forklifts or cranes on site.
- When equipment is connected to power, a safety officer must be assigned to prevent closed switches during maintenance.
- Wear required work clothing and personal protective equipment (PPE), and use dedicated tools as per local laws.
- Only dedicated operators are permitted to perform installation work.
- Only one operator at a time may connect a single wire during wiring.
- Inspect every completed item and perform a cross-check.
- Follow the installation sequence exactly. Do not skip any steps.
- Use safety barriers to prevent unauthorized site access during installation.

- Do not remove or change any nameplate.
- Do not open cabinet doors in the rain.
- Do not change the software, enclosure, or parts without manufacturer approval. Unauthorized changes void all liability and warranty.
- A surge protection device is mandatory on the energy storage side when the PCC is used alone or with other systems.
- Comply with the User Manual for all system operations. Damage caused by failure to follow its instructions will void all liability and warranty.

2 Product Introduction

2.1 Overview

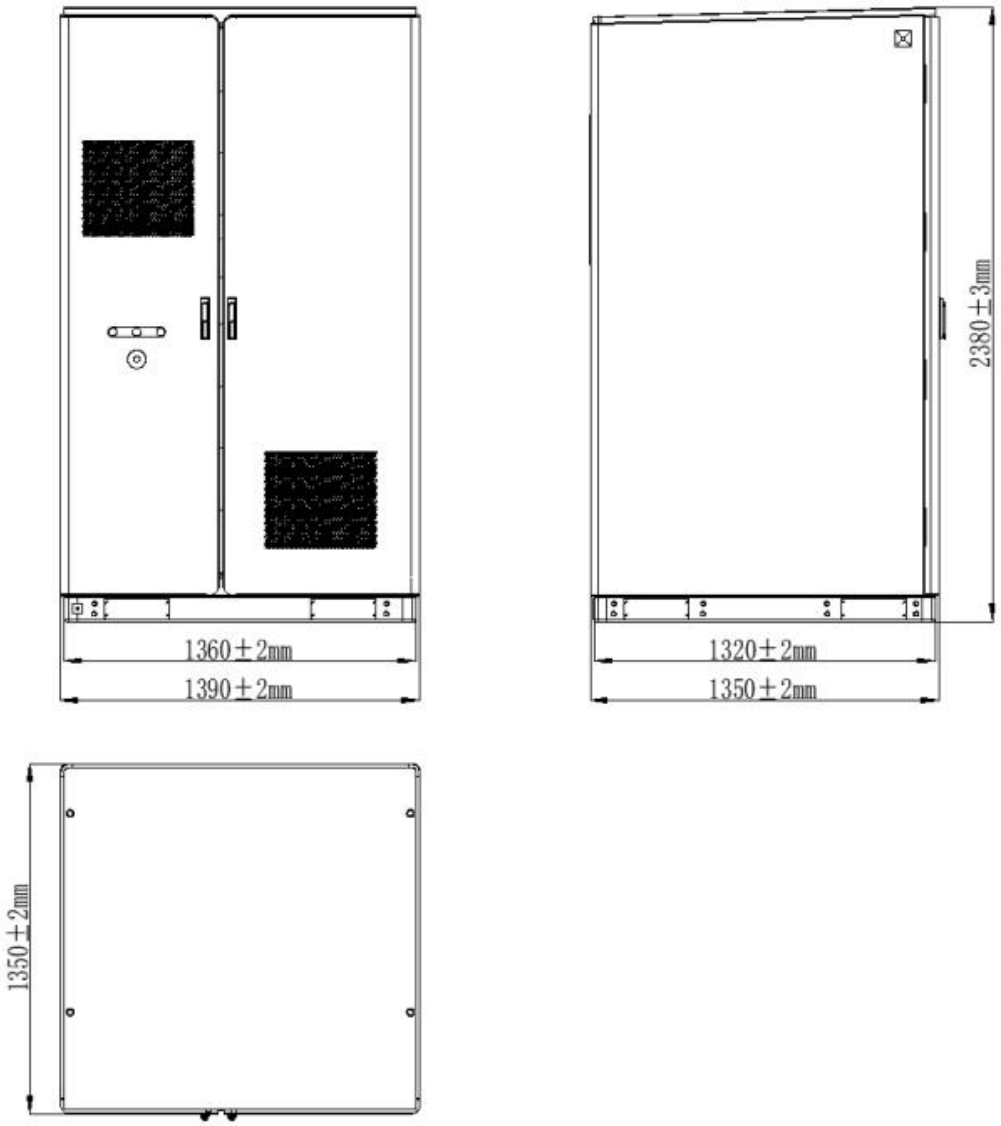
The PCC is used to control the on-grid and off-grid switching of the energy storage cabinet.

It contains STS (Static Transfer Switch), grid circuit breaker, bypass circuit breaker, load circuit breaker, etc.

- The STS works in conjunction with the PCS to perform automatic on-grid and off-grid switching.
- The grid circuit breaker acts as the main switch for the grid connection point.
- The load circuit breaker is connected to the load side to provide protection and isolation for the loads.
- The bypass circuit breaker is used to draw power from the grid in case of an STS or ESS failure.
- The bypass and load circuit breakers are interlocked, preventing them from being closed simultaneously.

2.2 Appearance

Figure 2-1 PCC dimensions



The specific length and width shall be subject to the parameter table.

Figure 2-2 Front view of PCC

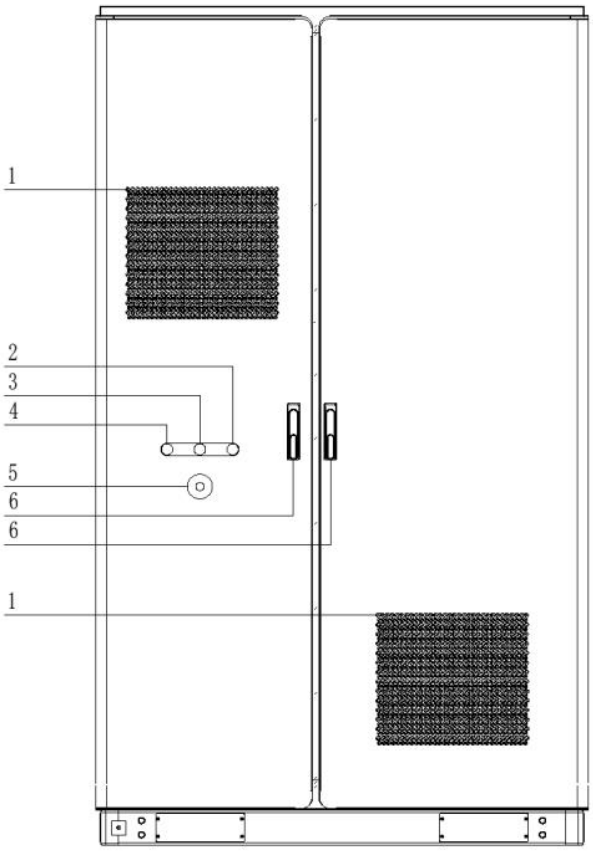


Table 2-1 Front view of PCC

No.	Name	Function
1	Air Inlet	Cabinet cooling air inlet
2	Fault indicator	Solid red indicates a system failure and the system stops running.
3	Off-grid indicator	Solid yellow indicates that the system is in the off-grid mode.
4	On-grid indicator	Solid green indicates that the system is in the on-grid mode.
5	Emergency stop	The system stops operating when the button is pressed
6	Door lock	Locking the cabinet door requires a specific key to open it

NOTE!	Do not operate the emergency stop button unless it is an emergency.

2.3 Components

Figure 2-3 Structure design of PCC front view (door opened)

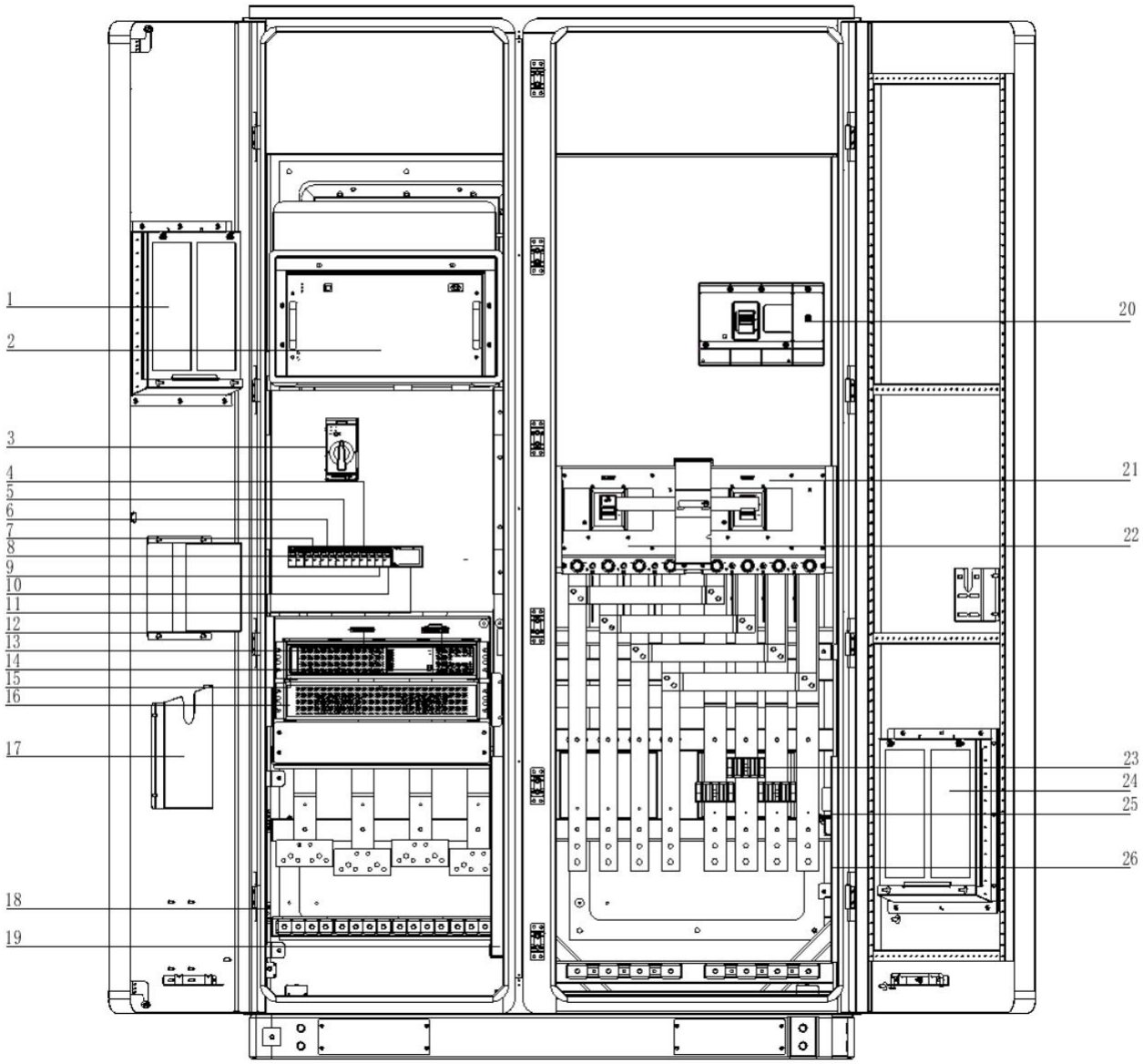


Table 2-2 Structure design of PCC front view (door opened)

No.	Name	Function	Remarks
1	Air Inlet	Cabinet cooling air inlet	/
2	STS	Automatic on/off-grid switching in conjunction with the PCS.	/
3	Automatic transfer switch	Automatic transfer switch for the auxiliary circuit. Primary source: Grid; Backup source: C&I ESS.	/
4	Circuit breaker for	Circuit breaker for meter voltage sampling	/

No.	Name	Function	Remarks
	meter voltage sampling		
5	24V power supply circuit breaker	24V power supply circuit breaker	/
6	UPS battery circuit breaker	UPS battery circuit breaker	/
7	UPS 230V output circuit breaker	UPS 230V output circuit breaker	/
8	230V input circuit breaker	230V input circuit breaker	/
9	Heater circuit breaker	Heater circuit breaker	/
10	Cooling fan circuit breaker	Cooling fan circuit breaker	/
11	Energy meter	Measures the grid-side energy consumption	/
12	Wiring cover	Shields and protects the wiring harness.	/
13	-01-X37 terminal block	UPS and heater power distribution terminal block.	/
14	-01-X38 terminal block	UPS battery power distribution terminal block.	/
15	UPS	Provides backup power for the control system.	/
16	UPS battery	UPS battery module	/
17	Document holder	Stores documents related to the PCC	/
18	Switch	Enables parallel communication for the EMS.	/
19	Reserved port	Reserved port for communication and UPS power supply.	/
20	Grid circuit breaker	Grid circuit breaker	/
21	Bypass circuit breaker	Bypasses power in case of a PCC or ESS failure.	/
22	Load circuit breaker	Load circuit breaker	/
23	CT	Measures grid-side current	/
24	Air Inlet	Cabinet cooling air inlet	/
25	AC backup fuse	AC backup fuse for load and grid side protection.	Spec: SFD2-8EC-20 AC500V, 40A
26	AC surge protective device	Surge protective device for load and grid side.	/

2.4 Parameters

Detailed parameters of PCC are shown in the table below:

Item	Parameters
Rated power	500kVA
Rated voltage	AC400V
Rated frequency	50Hz
Long-term overload capacity	110%
Rated grid-side output current	722A
Maximum allowable grid-side current	794A
IP rating	IP54, supports outdoor use
Cooling method	Forced air cooling
Anti-corrosion level	C3
Operating temperature	-25℃ ~ 55℃
Relative humidity	0~95%RH (non-condensing)
Operating altitude	2000m (Derated above 200 meters)
Dimension (W * D * H)	1390mm*1350mm*2380mm
Maximum weight	< 1000kg
Grid connection parameters	1 inputs, 3P4W+PE, ≤500KW
ESS connection parameters	3 inputs, 3P4W, 105KW*3
Load connection parameters	1 inputs, 3P4W+PE, ≤400KW

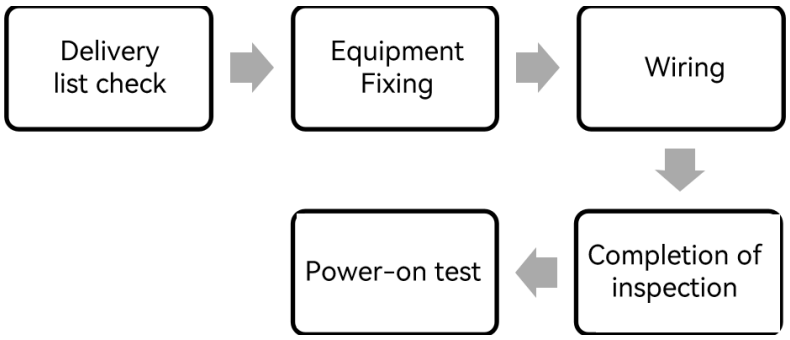
3 Installation

3.1 Preparations before Installation

Please refer to the packing list for details of the shipment contents.

3.1.1 Installation Process

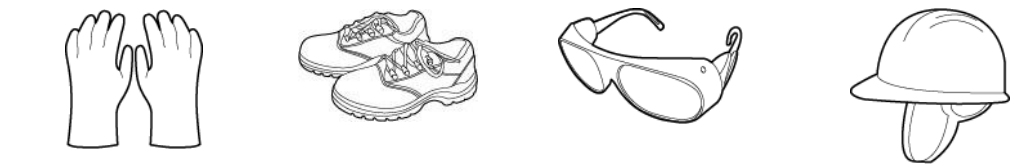
Figure 3-1 Installation process



3.1.2 Installation Tools

Prior to on-site installation, ensure all required tools are gathered.

Figure 3-2 Protective tools



Insulated Gloves　Safety Shoes　Goggles　Safety Helmet

Table 3-1 Tool list

No.	Recommended Tools	Quantity	Description
1	Electric forklift	1	Rated load ≥ 2 T; used for unloading and handling
2	Hammer drill bit & M22 drill bit	1 set	Drill holes in the ground, and place expansion bolts (8-M18)
3	Hammer	1	Drive the expansion bolts into place
4	Socket	1 set	M8 socket: used to tighten expansion bolts M10 socket: Terminal securing.
5	Insulated torque wrench	1	Check and mark the torque value
6	Adjustable wrench	1	Tighten the bolts for the cable connections.
7	Diagonal pliers	1	Cut the cable tie on the packaging bag.
8	Flat-head screwdriver / pry bar	1	Unpacking operation

3.1.3 Installation Environment Requirements

The installation site environment requirements are shown in the following table:

Table 3-2 Installation environment requirements

No.	Item	Requirement
1	Ambient temperature range	-25℃ ~ 55℃
2	Permissible altitude	< 2000m (derated above 2000m)
3	Permissible humidity	0 ~ 95%RH (non-condensing)
4	Installation foundation requirements	For specific requirements, see 3.1.4
5	Installation space requirements	For specific requirements, see 3.1.4

 **WARNING!**	Do not install or commission the PCC when it is raining.

3.1.4 On-site Foundation Installation

The PCC must be secured to a concrete foundation. Construct the foundation in advance as shown in the figure below.

Figure 3-3 On-site foundation installation

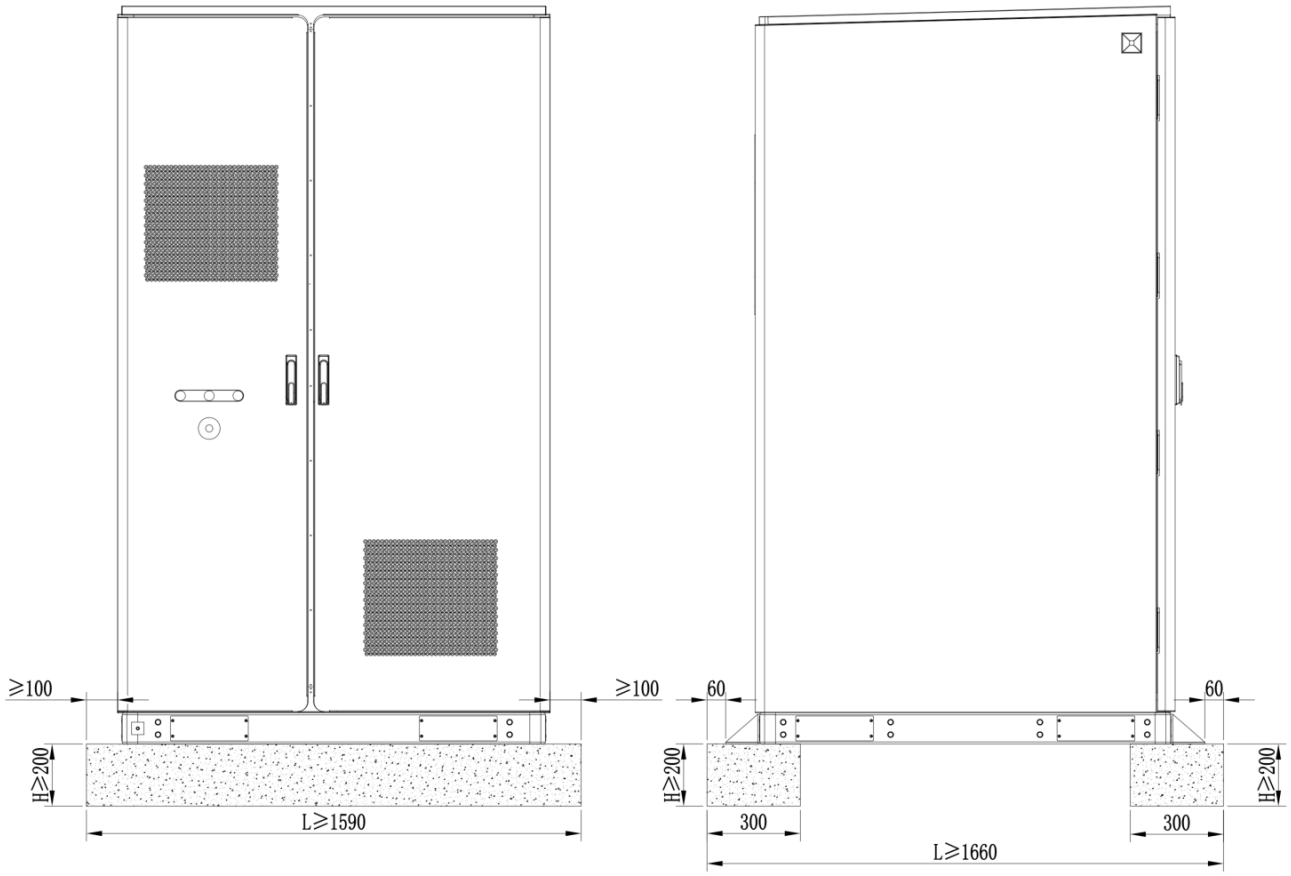
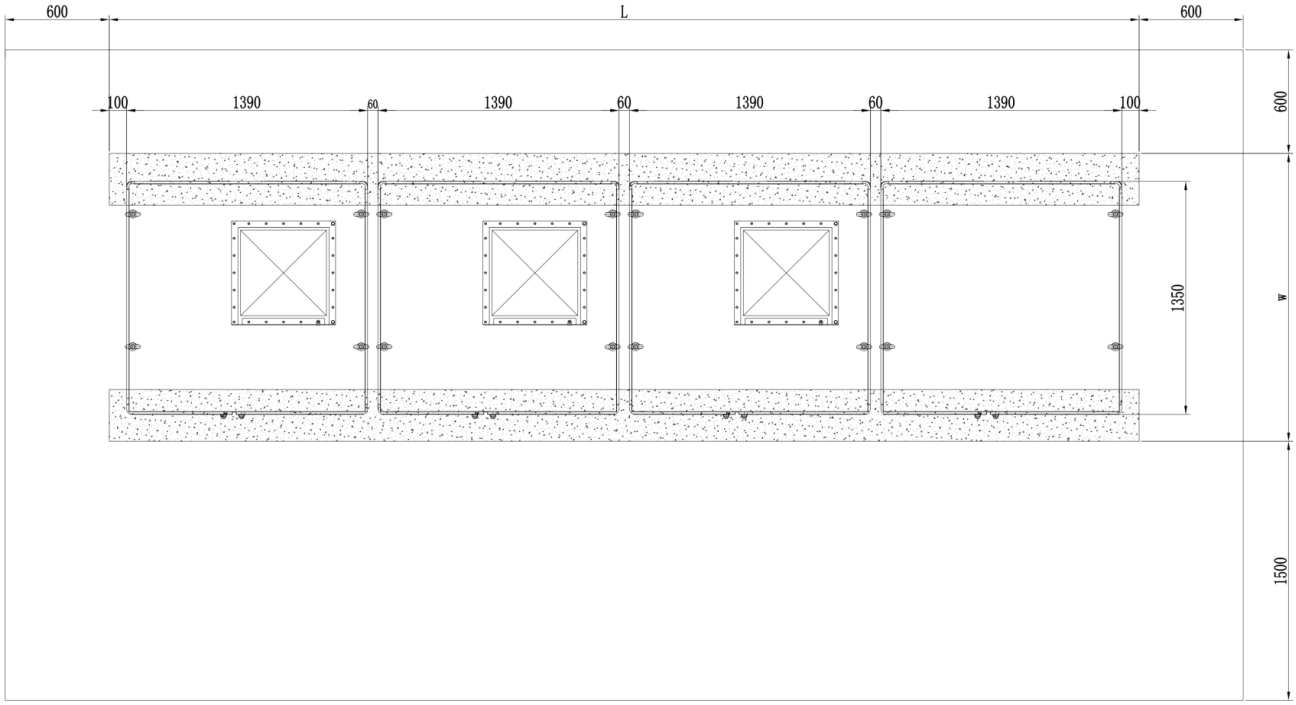


Table 3-3 Installation foundation requirements

No.	Category	Parameters
1	Minimum hardening area	L≥1590 mm, W≥1660 mm
2	Installation foundation height	H≥200 mm (higher than the highest flood level in history)
3	Mounting base load capacity	Load capacity >2 t/m²
4	Foundation service life	≥20 years
5	Foundation levelness	3mm/m²

Figure 3-4 Clearance requirements for multiple PowerHill in parallel with PCC



3.1.5 Product Transportation

- Before transportation, the work area must be inspected and clearly marked with safety barriers.
- Unauthorized personnel shall not enter the designated danger zone during transport operations.

Table 3-4 Forklift requirements

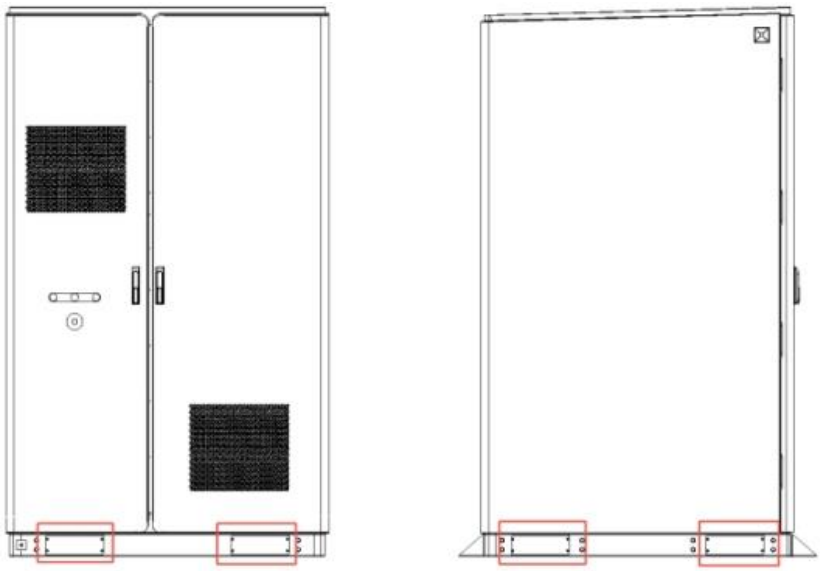
Item	Description
Forklift specifications	The PCC has a maximum weight of approximately 1t and shall be handled by an electric forklift with a rated capacity of 1.5t or greater.
Fork length	Given that the cabinet's width and depth are each about 1.35m, a forklift with a minimum fork length of 1.5m must be used for safe handling.
Width of forklift hole	The forklift holes on this product are 220mm wide with a center-to-center distance of 800 mm. Therefore, a wide-spaced fork shall be used for safe handling.
Fork position	Position the forks as follows: ensure the clearance between the forks and the rear of the cabinet is less than 50mm, while the protrusion of the far fork beyond the right side of the cabinet exceeds 50mm. Gently raise the forks until the product is in the designated position. Subsequently, lower the forks and retract the base. Note: The fork enters from the cabinet's rear side where there is no air conditioner.

WARNING!	• The PCC can be transported using a forklift or a crane. • Use an electric forklift with adjustable forks to move the cabinet. Manual forklift is not recommended. • During forklift transportation, adequate protection must be provided to prevent damage to the cabinet's surface. • Secure the cabinet to the forklift using belts or safety straps before transport.

Transportation method: front insertion

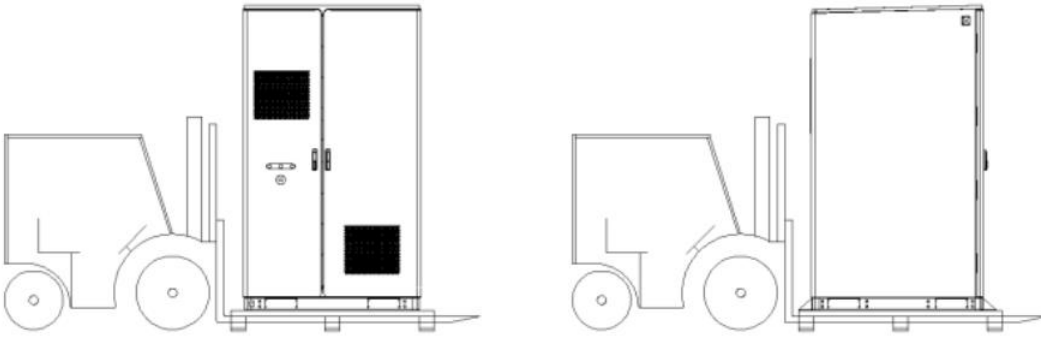
1. Remove the bottom pallets and confirm the fork hole

Figure 3-5 Bottom pallets position



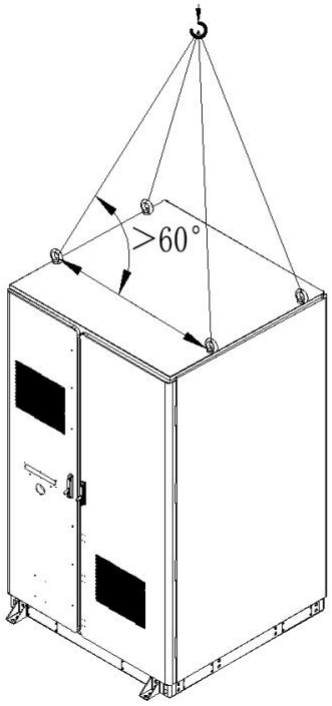
2. Transportation

Figure 3-6 Moving the PCC using a forklift



3. Lifting

Figure 3-7 Lifting angle



The lifting device must be properly connected to the PCC.

Table 3-5 Lifting methods

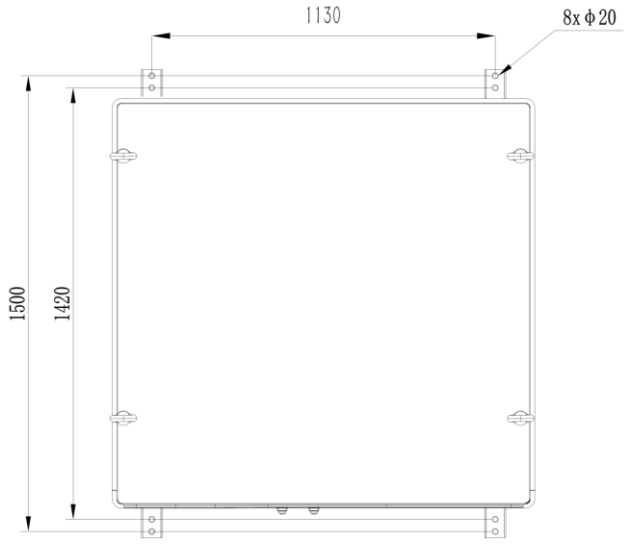
Lifting Point	Hoisting Hook	Shackle
Connection Diagram		
Precautions	Hooks must be connected from the inside out. Connecting from the outside in is strictly prohibited.	The shackle pin must be fully tightened.

3.2 Fixation of Cabinet

After verifying that the foundation is compliant, sufficiently dry, firm, and level, hoist the outdoor cabinet to its designated position.

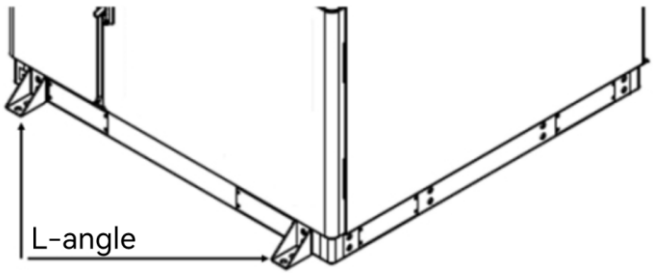
Secure the L-angles at the base of the cabinet to the foundation using anchor bolts. The required locations for these angles are illustrated in the diagram below.

Figure 3-8 Fixing hole at the bottom of PCC



Each L-angle features two slotted holes sized ϕ20, and M16 bolts are specified for the installation.

Figure 3-9 Angle support



After fastening, apply an anti-rust treatment, such as anti-rust paint, to all L-angles.

3.3 External Wiring

Refer to this chapter for instructions to ensure all wiring is correctly connected for the PCC

DANGER!	• Only qualified electricians may perform wiring and must confirm all connections are correct. • The wiring operation requires at least two personnel: one to perform the physical connection, and the other to provide supervision and assistance to prevent errors. • Ensure that all switches are off before wiring.

	• The operator shall bear all consequences of any damage or accident caused by improper operation. • The power grid system connected to the PCC must have lightning protection.

3.3.1 Product Switch Position

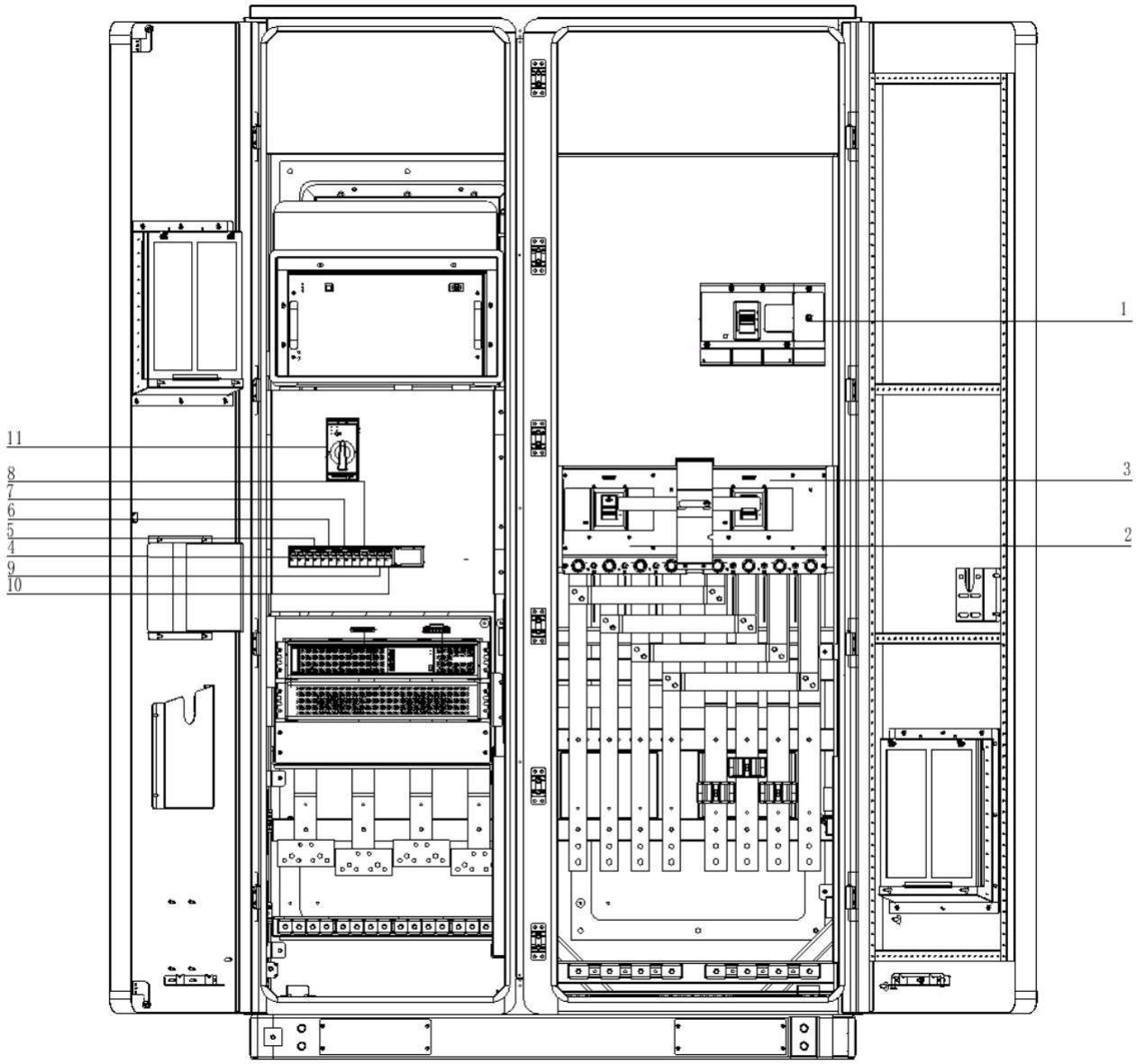
	• Ensure that all switches are off before wiring. • Personnel must wear the required Personal Protective Equipment (PPE) during connection work: safety goggles, insulating gloves, and safety shoes.

The table below lists all switches in the PCC.

Table 3-6 Switches in PCC

No.	Switch Name/Type	Shipment Status	Function
1	Grid circuit breaker (QF1)	OFF	Grid supply
2	Load circuit breaker (QF2)	OFF	Load supply
3	Bypass circuit breaker (QF3)	OFF	Bypass
4	230V input circuit breaker (QF4)	OFF	230V input supply
5	UPS 230V output circuit breaker (QF5)	OFF	UPS 230V output supply
6	UPS battery circuit breaker (QF6)	OFF	UPS battery
7	24V power supply circuit breaker (QF7)	OFF	24V power supply
8	Circuit breaker for meter voltage sampling (QF8)	OFF	Meter voltage sampling
9	Heater circuit breaker (QF9)	OFF	UPS heater supply
10	Cooling fan circuit breaker (QF10)	OFF	Cooling fan supply
11	Automatic transfer switch (ATS)	Auto mode, no operation required	230V main/backup power switching

Figure 3-10 Switches in PCC



3.3.2 Product Wiring

All external ports are housed within the PCC, as detailed below:

Figure 3-11 Wiring location in PCC

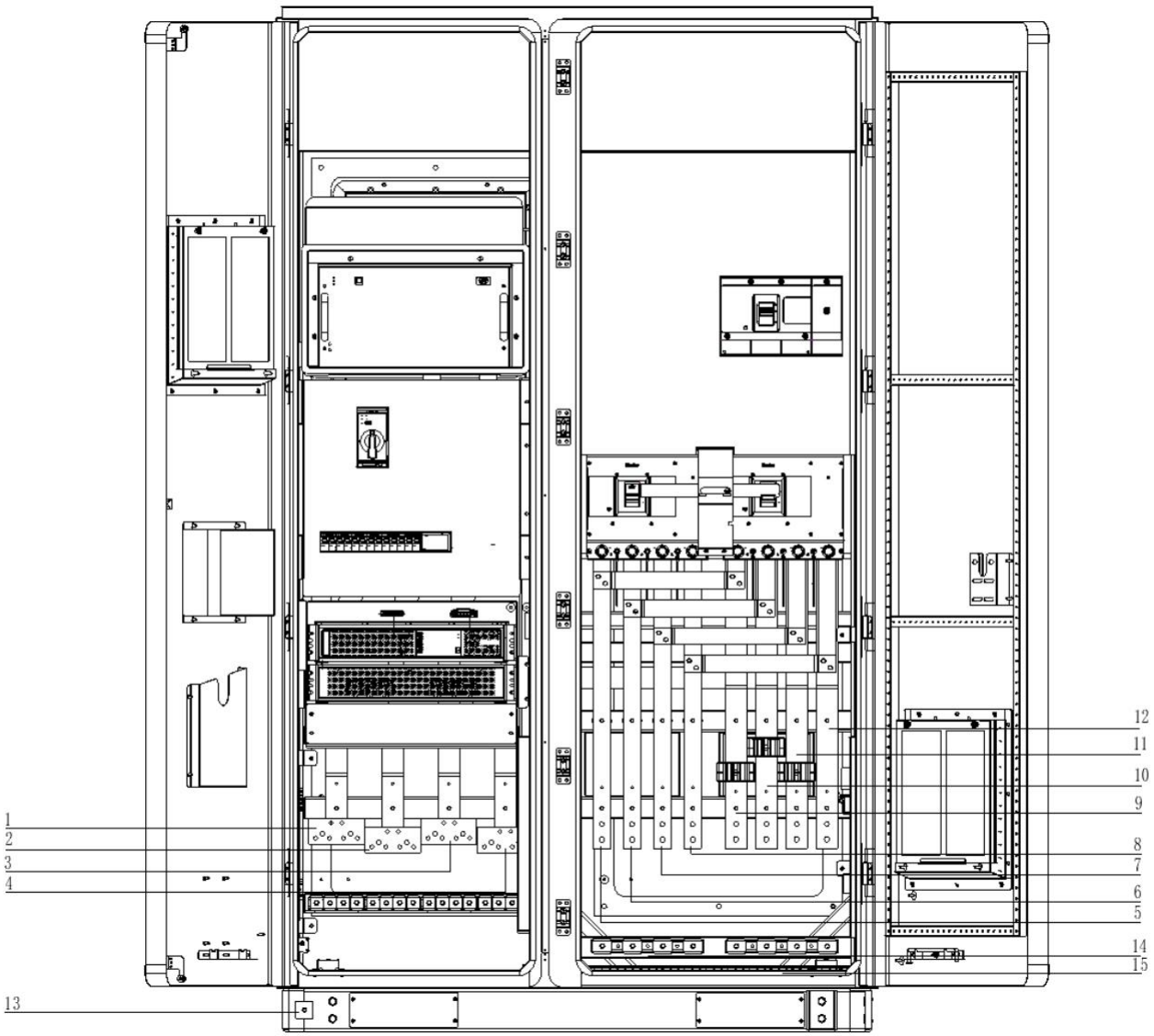


Table 3-7 Wiring location in PCC

No.	Name/Function	Remarks
1	BESS Input L1	Connect to ESS
2	BESS Input L2	
3	BESS Input L3	
4	BESS Input N	
5	Load L1	Connect to loads
6	Load L2	
7	Load L3	
8	Load N	
14	Load PE	

No.	Name/Function	Remarks
9	Grid L1	Connect to the grid
10	Grid L2	
11	Grid L3	
12	Grid N	
15	Grid PE	
13	PE	Grounding

3.3.3 Communication Wiring

The external signal and communication wiring of the PCC are shown in the figure below:

Figure 3-12 Signal and external communication ports

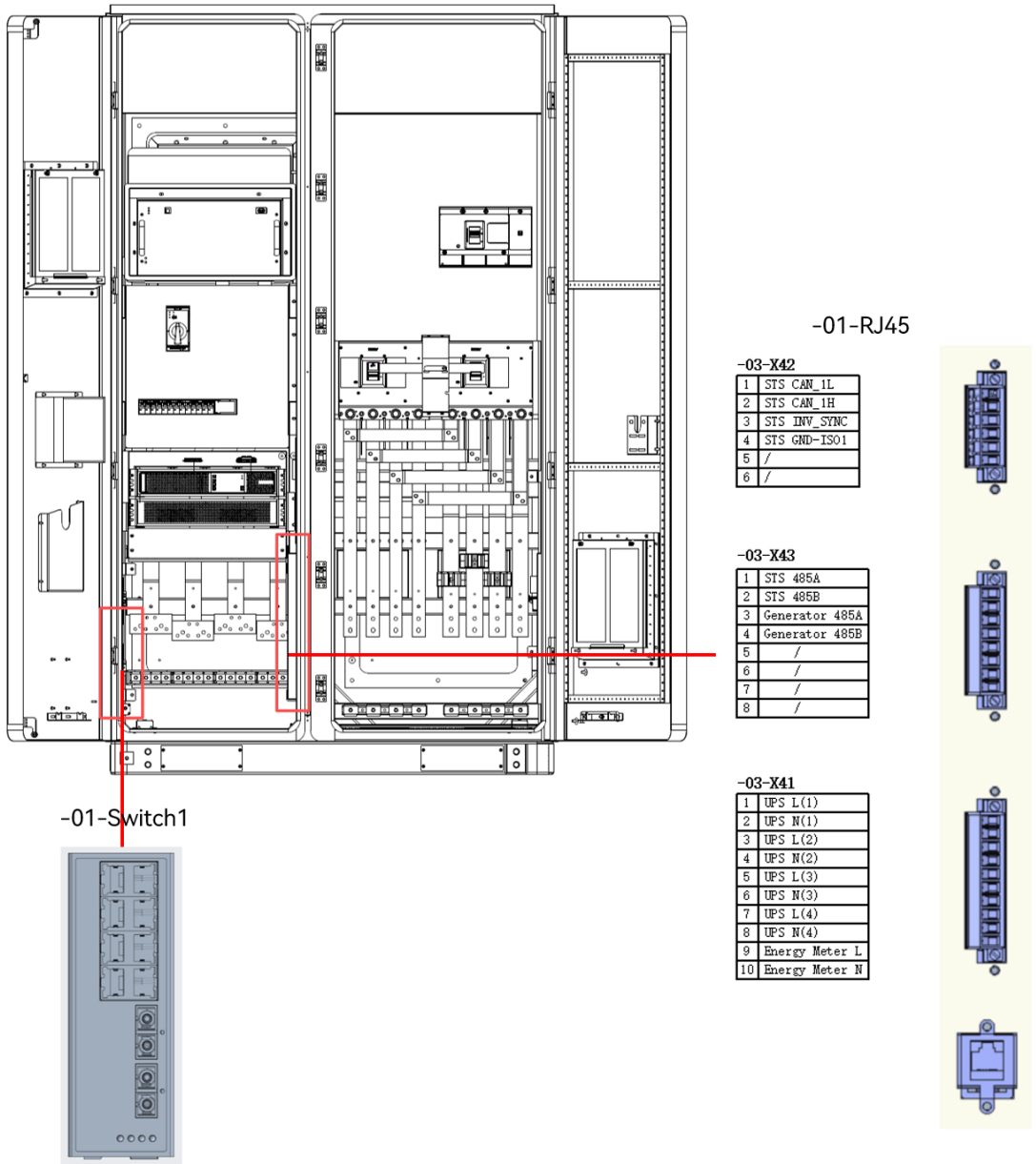


Table 3-8 Signal and external communication ports

Position	Terminal block	Name	Function	Remarks
-03-X41	1	UPS L (1)	230V power supply L (ESS 1)	Reserved UPS power supply for ESS 1
	2	UPS N (1)	230V power supply N (ESS 1)	
	3	UPS L (2)	230V power supply L (ESS 2)	Reserved UPS power supply for ESS 2
	4	UPS N (2)	230V power supply N (ESS 2)	
	5	UPS L (3)	230V power supply L (ESS 3)	Reserved UPS power supply for ESS 3
	6	UPS N (3)	230V power supply N (ESS 3)	
	7	UPS L (4)	230V power supply L (reserved)	Reserved UPS power supply
	8	UPS N (4)	230V power supply N (reserved)	
	9	Energy Meter L	Energy meter 230V power supply (L)	Reserved energy meter UPS supply
	10	Energy Meter N	Energy meter 230V power supply (N)	
-03-X42	1	STS CAN_1L	CAN communication (L)	STS-PCS communication
	2	STS CAN_1H	CAN communication (H)	
	3	STS INV_SYNC	Sync control signal (+)	
	4	STS GND-ISO1	Sync control signal (-)	
-03-X43	1	STS 485A	RS-485 communication (A)	STS-EMS communication
	2	STS 485B	RS-485 communication (B)	
	3	Generator 485A	RS-485 communication (A)	Reserved diesel generator communication
	4	Generator 485B	RS-485 communication (B)	
-01-Switch1	1~8	LAN1~LAN8	Ethernet port	Parallel communication for EMS
-01-RJ45	/	IO	Ethernet port	IO-EMS communication

3.3.4 Grounding

The grounding terminal on the PCC is an M8 nut, and the required cross-sectional area for the grounding cable must be selected from the table below.

Table 3-9 Cross-sectional area of PE cables

Cross-sectional Area for Main Circuit Conductor S (mm^2)	External Protective Earth Conductor Sp (mm^2)
S≤16	S
16 < S≤35	16
35 < S	S/2

3.4 Inspection after Installation

Another operator needs to double-check the wiring to confirm that all cables are connected correctly.

3.4.1 Wiring Inspection

Please refer to Section 3.3 to ensure that all cables are connected correctly.

For optimal communication performance, cable lengths must be kept as short as possible. It is mandatory to route all external cables through protective conduits.

3.4.2 Bolt Torque Check

Ensure all bolts are torqued according to the following requirements. After torque verification, each bolt shall be identified by a red marking.

Table 3-10 Bolt torque requirements

No.	Location	Fastener	Value
1	PCC and ground fixing	4-M18*150	140±5N·m
2	Grounding bolt	2-M8*20 hexagonal nut	18±1N·m

4 Power-on Steps

4.1 Check Before Power-on

Step 1: Complete the wiring inspection detailed in Section 3.4.

Step 2: Verify that the cabinet is vertically plumb.

Step 3: Inspect all internal wiring within the PCC to ensure all connections are secure, tight, and free from any looseness or disconnection.

4.2 Power-on Process

- Ensure all pre-energization inspections are completed.
- The wiring operation requires at least two personnel: one to perform the physical connection, and the other to provide supervision and assistance to prevent errors.
- The operator shall bear all consequences of any damage or accident caused by improper operation.

The power-on sequence for the PCC consists of three steps (for switch details and locations, refer to Section 3.3.1):

Step 1: Close the grid circuit breaker QF1;

Step 2: Close QF4 to QF10 in order;

Step 3: Close the load circuit breaker QF2.

Proceed with the following steps in sequence.

If the PCC is in normal condition, it will automatically complete the on/off-grid switching after power-on. The STS will communicate in real-time with the PCS inside the energy storage cabinet, and the STS will automatically detect whether the grid is energized.

When the grid is connected, if both the STS and PCS are powered on and communication is normal, the STS will close and connect to the grid after 3 minutes, at which point the on-grid indicator will light up.

When the grid power is lost, the STS will open, and the PCS will simultaneously switch to off-grid mode to supply power to the load, at which point the off-grid indicator will light up. When grid power is restored, the STS will detect the recovery of grid voltage. If communication between the STS and PCS remains normal, the STS will reconnect to the grid after another 3 minutes, and the PCS will simultaneously switch back to on-grid mode.

 NOTE!	For extended storage, keep the UPS battery breaker open and recharge the battery every three months to avoid over-discharging.

4.3 Power-off Process

The power-off sequence for the PCC consists of three steps (for switch details and locations, refer to Section 3.3.1):

Step 1: Open load circuit breaker QF2;

Step 2: Open the grid circuit breaker QF1;

Step 3: Open QF10 to QF4 in order;

Upon completion of this sequence, the indicator light on the PCC should turn off.

To keep loads powered during ESS or PCC maintenance, open the grid and load breakers, move the central rod left, and close the bypass breaker for a direct grid supply.

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