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IES900 Series
1500 V Power Conversion System

User Guide

Industrial Automation | Intelligent Elevator | New Energy Vehicle | Industrial Robot | Rail Transit

Data code PS00017016A02

Preface

Introduction

IES900 series 1500 V power conversion system (PCS) exchanges energy between the storage battery and the grid to charge and discharge the storage battery in a controlled way.

In a grid-connected system, the PCS implements load shifting, frequency modulation and peak-load regulation, active power reserve, and reactive power support. In addition, the PCS supports various charge and discharge modes, such as constant voltage, constant current, and constant power.

This guide describes the functions and correct use of IES900 series 1500 V PCS, including product model selection, device installation, fault diagnosis, and routine maintenance and servicing.

More Documents

Data Name	Data Code	Description
IES900 Series 1500 V Power Conversion System User Guide (this guide)	PS00017016	Describes the functions and correct use of the product, including product model selection, device installation, fault diagnosis, and routine maintenance and servicing.

Revision History

Date	Version	Description
September 2024	A02	Updated the allowable ambient temperature.
July 2024	A01	Added the 2.5 MW specification and updated the user guide.
June 2024	A00	First release

Access to the Guide

This guide is not delivered with the product. You can obtain the PDF version in the following ways:

- **Inovance website:** Visit *www.inovance.com*, go to "Support" > "Download", search by keyword, and then download the PDF file.
- **QR code**: Scan the QR code on the product with your smart phone.
- **My Inovance app:** Scan the QR code below to install the My Inovance app, and search for the file in the app.



Warranty

For faults and damage incurred during normal use in the warranty period, Inovance provides free repair service. (For details of the warranty period, see the purchase order.) A maintenance fee will be charged out of the warranty period.

Even in the warranty period, a maintenance fee will be charged for repair of the following damage:

- Damage caused by operations not following the instructions in the guide
- Damage caused by fire, flood, or abnormal voltage
- Damage caused by unintended use of the product
- Damage caused by use beyond the specified scope of application of the product
- Damage or secondary damage caused by force majeure (such as natural disaster, earthquake, and lightning strike)

The maintenance fee will be charged according to our latest Price List if not otherwise agreed upon.

For details, see the Product Warranty Card.

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Safety Precautions

Safety Disclaimer

- This chapter presents essential safety instructions for proper use of the equipment. Before operating the equipment, read through the user guide and comprehend all the safety precautions. Failure to comply with the safety precautions may result in equipment damage, severe physical injuries, or even death.
- "CAUTION", "WARNING", and "DANGER" items in the guide only indicate some of the instructions that need to be followed; they just supplement the safety instructions.
- Use this product in an environment that complies with the design specifications. Malfunctions or component damage caused by improper use is not covered by warranty.
- Inovance shall take no responsibility for any physical injury or property damage caused by noncompliance with this user guide or improper use of the equipment.

Safety Categories and Definitions



indicates that failure to comply with the notice will result in severe physical injuries or even death.



indicates that failure to comply with the notice may result in severe physical injuries or even death.



indicates that failure to comply with the notice may result in minor or moderate physical injuries or equipment damage.

Safety Warning Signs



To prevent misuse or accidents caused by approach of unrelated personnel during installation, daily maintenance, or inspection of the PCS, observe the following:

- Place clear signs at the switches upstream and downstream the PCS, to prevent accidents caused by accidental brake closing.
- Place warning signs or strips near the operation area.
- Remove the cabinet door key and keep it properly after maintenance and inspection.

Requirements for Escape Routes

DANGER

- During maintenance, inspection, or other operations of the PCS, ensure that the escape routes are clear.
- Never place obstacles in the escape routes or occupy the escape routes in any form.

Safety Precautions

- Some drawings in this guide show the equipment without covers or protective guards to display more details. Remember to install the covers and protective guards before using the equipment and operate it in accordance with the instructions.
- Drawings in the user guide are for illustration only and may be different from the equipment you purchased.
- Operators must take mechanical protective measures to protect personal safety. For example, wear and use necessary protective equipment, such as crush-resistant shoes, safety clothing, safety glasses, protective gloves, and sleeves.

Unpacking

WARNING

- Do not install the product if you find damage, rust, or signs of use on it or its accessories upon unpacking.
- Do not install the product if you find water seepage or any components being missing or damaged upon unpacking.
- Do not install the product if the packing list does not match the product you received.

CAUTION

- Before unpacking, check the package for any damage, water seepage, dampness, or deformation.
- Unpack the product layer by layer. Do not strike the package violently.
- Check the surfaces of the equipment and accessories for any damage, rust, and scratches.
- Check the equipment, accessories, and materials in the package against the packing list.

Storage and Transportation

WARNING

- Large-scale or heavy equipment must be transported by qualified professionals using specialized hoisting equipment. Failure to comply may result in physical injuries or equipment damage.
- Before hoisting the equipment, ensure the equipment components such as the front cover and terminal blocks are secured firmly with screws. Loosely-connected components may fall off and result in physical injuries or equipment damage.
- Never stand or stay below the equipment when the equipment is being hoisted.
- When hoisting the equipment with a steel rope, ensure the equipment is hoisted at a constant speed without suffering from vibration or shock. Do not turn the equipment over or let the equipment stay hanging in the air. Failure to comply may result in physical injuries or equipment damage.

CAUTION

- Handle the equipment with care and mind your steps. Failure to comply may result in physical injuries or equipment damage.
- Store and transport the equipment based on the storage and transportation requirements. Failure to comply will result in equipment damage.
- Avoid storage and transportation in environments with water splash, rain, direct sunlight, strong electric field, strong magnetic field, and strong vibration.
- Avoid storage for more than three months. Long-term storage requires stricter protection and necessary inspections.
- Pack the product properly before transportation by vehicle. Use an enclosed box for long-distance transportation.
- Never transport the product with devices or materials that may damage or negatively impact the product.

Installation

DANGER

- Installation must be carried out by technicians who have received relevant training on electrical equipment and have sufficient electrical expertise. Non-professionals are not allowed to operate the equipment.



- Read through the user guide and safety precautions before installation.
- Do not install the product in places with strong electric or magnetic fields.
- Before installation, check that the mechanical strength of the installation site can bear the weight of the equipment. Failure to comply will result in mechanical hazards.
- Do not wear loose clothes or accessories during installation. Failure to comply may result in an electric shock.
- When installing the equipment in a closed environment (such as a cabinet or casing), use a cooling device (such as a fan or air conditioner) to cool the environment down to the required temperature. Failure to comply may result in equipment over-temperature or fire.
- Do not modify the product.
- Do not fiddle with the bolts used to fix parts and components or the bolts marked in red.
- When the equipment is installed in a cabinet or final assembly, a fireproof enclosure providing both electrical and mechanical protections must be provided. The IP rating must meet IEC standards and local laws and regulations.
- If any equipment with strong electromagnetic interference, such as a transformer, is needed, install a shielding device to prevent malfunction of this product.
- Install the equipment on metal or other incombustible objects. Keep the equipment away from combustible objects. Failure to comply will result in fire.



- Cover the air inlet and outlet of the equipment with a piece of cloth or paper during installation. This is to prevent unwanted objects such as metal chippings, oil, and water from falling into the equipment and causing faults. After installation, remove the cloth or paper on the top of the equipment to prevent over-temperature caused by poor ventilation due to blocked ventilation holes.

Wiring



- Never allow non-skilled personnel to carry out installation, wiring, maintenance, inspection, or part replacement.
- Before wiring, cut off all the power supplies of the equipment. Wait for at least the time designated on the equipment warning label before further operations because residual voltage still exists after power-off. After waiting for the designated time, measure the DC voltage in the main circuit to ensure the DC voltage is within the safe voltage range. Failure to comply will result in an electric shock.
- Do not perform wiring, remove the equipment cover, or touch the circuit board while power is on. Failure to comply will result in an electric shock.
- Ensure that the equipment is well grounded. Failure to comply will result in an electric shock.



- Do not connect the input power supply to the output end of the equipment. Failure to comply may result in equipment damage or even fire.
- Use cables with required diameter and shield. Properly ground one end of the shield if a shielded cable is used.
- Fix the terminal screws with the tightening torque specified in the user guide. Improper tightening torque may overheat or damage the connecting part, resulting in fire.
- After wiring is done, check that all cables are connected properly and no screws, washers, or exposed cables are left inside the equipment. Failure to comply may result in an electric shock or equipment damage.



- Use shielded twisted pairs for the control circuit. Connect the shield to the grounding terminal of the equipment for grounding purpose. Failure to comply will result in equipment malfunction.

Power-on



- Before power-on, ensure that the equipment is intact and all cables are securely connected.
- Check that the power supply meets equipment requirements before power-on to prevent equipment damage or fire.
- After power-on, do not open the cabinet door or protective cover of the equipment, touch any terminal, or disassemble any unit or component of the equipment. Failure to comply will result in an electric shock.



- Perform a trial run after wiring and parameter setting to ensure the equipment operates safely. Failure to comply may result in physical injuries or equipment damage.
- Before power-on, check that the rated voltage of the equipment is consistent with that of the power supply. Failure to comply may result in fire.

Operation



- The equipment must be operated only by professionals. Failure to comply will result in physical injuries or even death.
- Do not touch any connecting terminals or disassemble any unit or component of the equipment during operation. Failure to comply will result in an electric shock.



- Do not touch the equipment casing, fan, or resistor to check the temperature. Failure to comply may result in burns.
- Prevent metal or other objects from falling into the equipment during operation. Failure to comply may result in fire or equipment damage.

Maintenance



- Never allow non-skilled personnel to carry out installation, wiring, maintenance, inspection, or part replacement.
- Do not maintain the equipment while power is on. Failure to comply will result in an electric shock.
- Before maintenance, cut off all the power supplies of the equipment and wait for at least the time designated on the equipment warning label.
- During maintenance, completely disconnect the PCS from the energy storage battery.



- Carry out daily and periodic inspection and maintenance on the equipment according to maintenance requirements and retain a maintenance record.

Repair



- Never allow non-skilled personnel to carry out installation, wiring, maintenance, inspection, or part replacement.
- Do not repair the equipment while power is on. Failure to comply will result in an electric shock.
- Before inspection or repair, cut off the equipment power supply and wait for at least the time designated on the equipment warning label, and use a multimeter to check that the energy storage capacitor has no voltage.
- During maintenance, completely disconnect the PCS from the energy storage battery.



- Submit the repair request according to the warranty agreement.
- When the fuse is blown or the circuit breaker or earth leakage current breaker (ELCB) trips, cut off all equipment power supplies, wait for at least the time designated on the equipment warning label before power-on or further operations. Before power-on, check for short circuits before power-on or further operations. Failure to comply may result in equipment damage, physical injuries, or even death.
- When the equipment is faulty or damaged, the troubleshooting and repair work must be performed by professionals that follow the repair instructions, with repair records kept properly.
- Replace quick-wear parts of the product according to the replacement instructions.
- Do not use damaged equipment. Failure to comply may result in further equipment damage, physical injuries, or even death.
- After equipment replacement, check the wiring and set parameters again.

Disposal



- Dispose of retired equipment in accordance with local regulations and standards. Failure to comply may result in property damage, physical injuries, or even death.
- Recycle retired equipment in accordance with waste disposal standards of the industry to avoid environmental pollution.

Safety Label

For safe equipment operation and maintenance, comply with the safety labels on the equipment. Do not damage or remove the safety labels. The following table describes the safety labels.

Safety Label	Description
	• The equipment must be serviced by qualified personnel only. • During power-on, connect the control power supply first, and then the main power supply. • During power-off, disconnect the main power supply first, and then the control power supply. • Before maintenance, cut off all power supplies for 60 minutes for complete discharge, and then open the cabinet door. • Read the maintenance guide before maintenance.
	During hoisting, wrap the straps with some flexible materials to avoid cabinet damage.
	Wear ear protector to prevent noise during equipment running.
	After installation and commissioning, ensure that the door screws are installed properly during product operation. Ensure personal safety.
	This is the protective earth (PE) terminal, which must be grounded firmly to ensure personnel safety.

1 Product Information

1.1 Model and Nameplate

IES 9 00 - 07 - 1725 - C N - S
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

① **Product family** IES: Inovance power conversion product	④ **Maximum DC voltage** 04: 1000 V 05: 1200 V 07: 1500 V	⑦ **Wiring type** Null: Three-phase three-wire N: Three-phase four-wire
② **Product series** 9: Integrated 6: Modular 3: For residential use	⑤ **Power rating** 1725: 1725 kW 2510: 2510 kW	⑧ **Wiring method** S: Single-way DC input D: Dual-way DC input
③ **Generation** 00: First generation 20: Second generation ...: ...	⑥ **Heat dissipation mode** Null: Forced air cooling C: Air and water cooling W: Water cooling	-

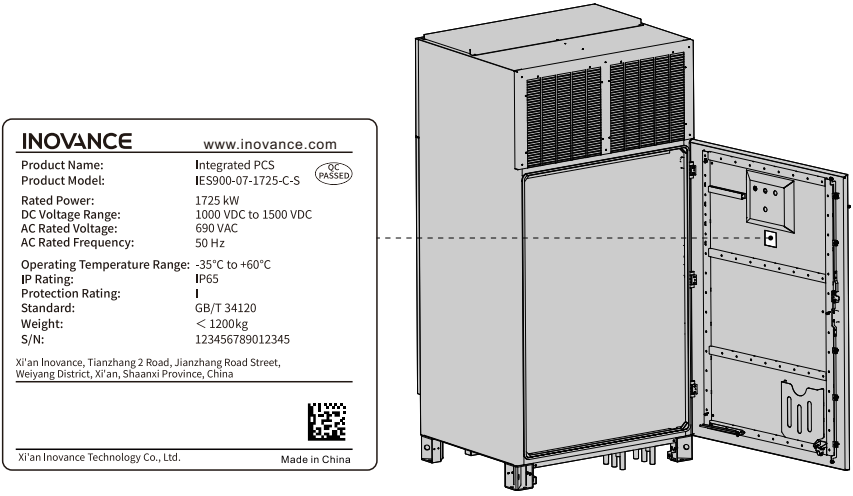


Figure 1-1 Nameplate (IES900-07-1725-C-S)

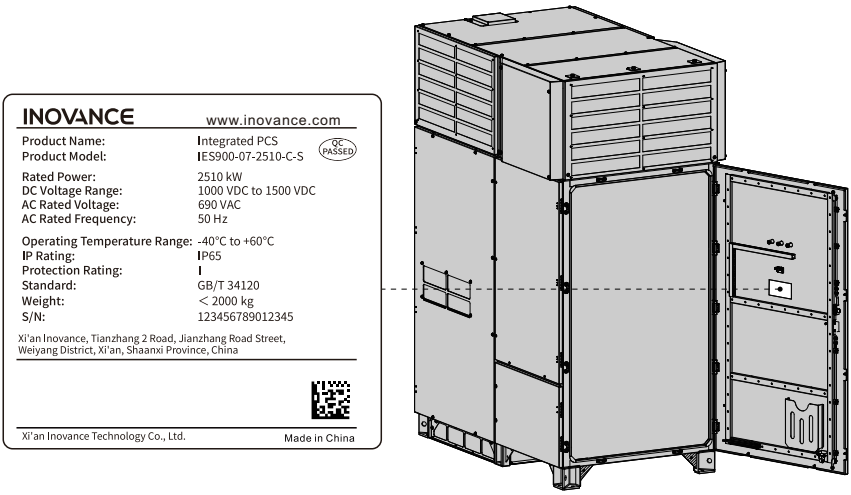


Figure 1-2 Nameplate (IES900-07-2510-C-S)

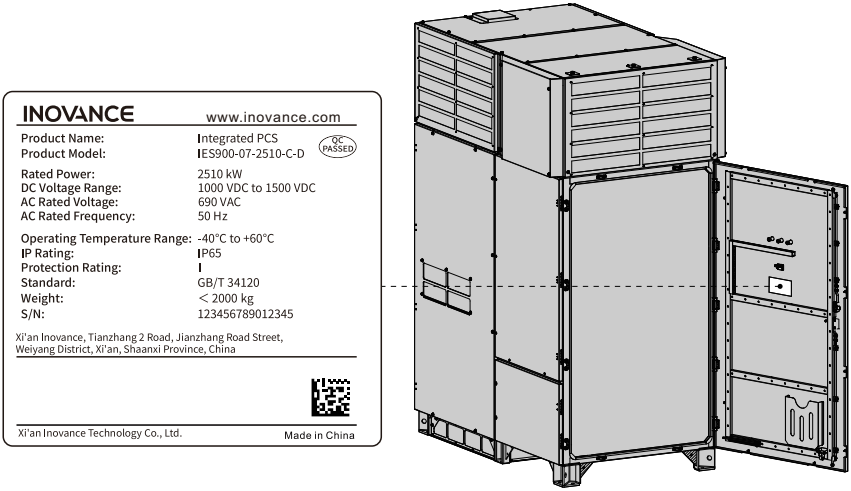


Figure 1-3 Nameplate (IES900-07-2510-C-D)

1.2 Technical Specifications

Table 1–1 Technical Parameters

Item		IES900-07-1725-C-S	IES900-07-2510-C-S	IES900-07-2510-C-D
DC side parameters	Maximum DC bus voltage (VDC)	1500		
	Maximum current on the DC side (A)	1807	2816	1408 x 2
	DC voltage working scope (VDC)	1000 to 1500		
AC parameters (grid-connected)	Rated Power (kW)	1725 (@45°C)	2510 (@50°C)	
	Maximum output power (kW)	1898 (@35°C)	2761 (@40°C)	
	Rated output current (A)	1444 (@45°C)	2100 (@50°C)	
	Maximum output current (A)	1588 (@35°C)	2310 (@40°C)	
	AC connection mode	Three-phase three-wire		
	Isolation mode	Non-isolation		
	Reactive power range	-105% to +105%		
	Rated grid voltage (VAC)	690		
	Allowable grid voltage (VAC)	621 to 759		
	Rated grid frequency (Hz)	50/60		
	Allowable grid frequency deviation (Hz)	±5		
	Total current harmonic distortion	< 3% (rated power)		
	AC-side DC component	< 0.5%		
	Charge and discharge switchover time (ms)	< 30		
AC parameters (grid-disconnected)	Rated output voltage (VAC)	690		
	Rated output power (kW)	1725 @45°C	2510 @50°C	
	Voltage variation	< 1%U_N (linear balanced load)		
	Voltage unbalance degree	< 2% or ⩽ 4% (short-term)		
	Total voltage harmonic distortion	< 3% (linear balanced load)		
	Rated output frequency (Hz)	50/60		

Item		IES900-07-1725-C-S	IES900-07-2510-C-S	IES900-07-2510-C-D
System	Cable inlet/outlet	Bottom-in on the DC side, and rear-out on the AC side		
	Overload capacity	Long-term operation available for 110% of rated load; 1-minute operation available for 120% of rated load (@35°C)	Long-term operation available for 110% of rated load; 1-minute operation available for 120% of rated load (@40°C)	
	Power control accuracy	Error < 1% (after correction)		
	Standby energy consumption	⩽ 0.5% x Rated power		
	No-load energy consumption	⩽ 0.8% x Rated power		
	Allowable ambient temperature (°C)	-35 to +60 Derating required for temperature above +45°C	-40 to +60 Derating required for temperature above +50°C	
	Allowable relative humidity (RH)	0% to 100% (non-condensing)		
	Transportation/Storage environment temperature (°C)	-40 to +70		
	Transportation/Storage relative humidity (RH)	20% to 95%		
	Maximum operating altitude (m)	5000 m (derating required for altitudes above 2000 m. The actual altitude must be set to obtain the running power curve. For details, contact our technical engineers.)		
	Noise (dB)	85		
	Dimensions (W x D x H, in mm)	1080 x 870 x 2175	1052 x 1726 x 2400	
	Weight (kg)	< 1200	< 2000	
	IP rating	IP65		
	Cooling mode	Air and water cooling		
Communication	Communication interface	RS485/CAN/Ethernet/DIDO		
	Communication statute	Standard: Modbus-RTU/CAN2.0B Optional: Modbus TCP/IEC61850/EtherCAT		

Caution

The insulation resistance test and dielectric strength test cannot be performed on field for the PCS; otherwise, the PCS may be damaged.

1.3 Components

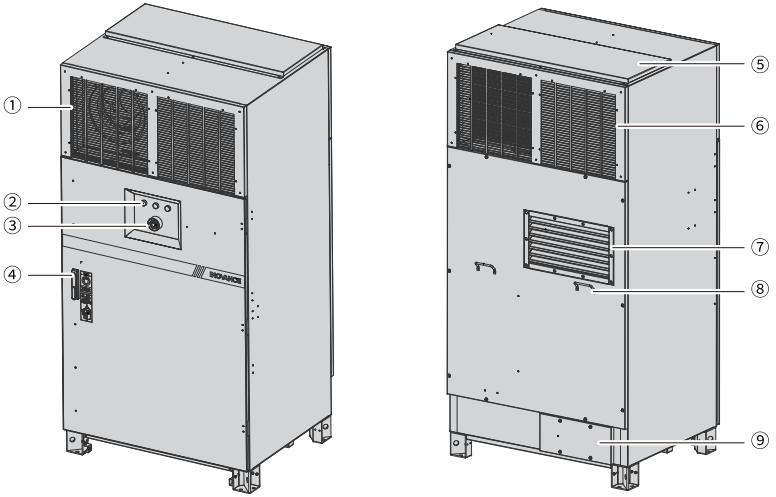


Figure 1-4 Components (applicable for the 1725 kW model)

Table 1–2 Components (Applicable for the 1725 kW Model)

No.	Name	Description
①	Fan front cover	Ventilate the fan and prevent incoming of foreign objects.
②	Indicator	• White: Power indicator. When any of the PCS battery voltage, bus voltage, and AC voltage is greater than 36 V, the indicator turns on, indicating that the PCS has been energized and there is an electric shock risk. • Green: Running indicator. When the PCS runs, the indicator turns on. • Red: Fault/warning indicator. When the PCS is abnormal, the indicator turns on, indicating that the PCS is faulty and you need to locate the fault according to *" Fault List" on page 85* and remove the fault according to *"Table 7–1 Troubleshooting" on page 85*.
③	Emergency stop switch	Press this switch in case of emergency to power off the PCS. After the fault is cleared, rotate the switch clockwise and release the emergency stop switch to power on the device again.
④	Door lock	Open and close the door.
⑤	Top cover	Top outlet
⑥	Fan rear cover	Ventilate the fan and prevent incoming of foreign objects.
⑦	Rear plate air inlet	Ventilate the device and prevent incoming of foreign objects.

No.	Name	Description
⑧	Handle	Handle and move the device.
⑨	AC-side cover	AC outlet

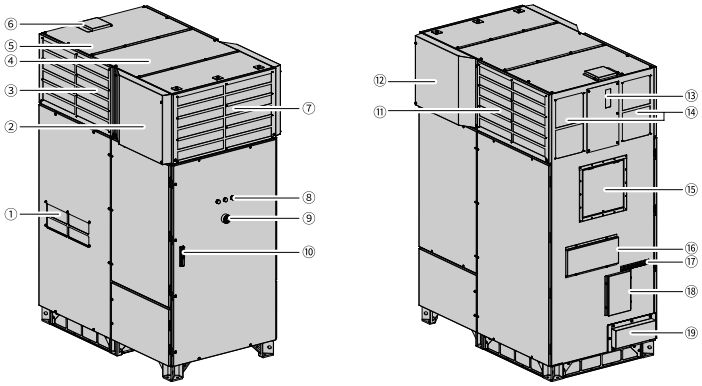


Figure 1-5 Components (applicable for the 2510 kW model)

Table 1–3 Components (Applicable for the 2510 kW Model)

No.	Name	Description
①	Reactor air outlet cover	Ventilate the fan and prevent incoming of foreign objects.
②	Left fan cover	Fan installation cover to form an air cabin
③	Left air outlet cover	Ventilate the fan and prevent incoming of foreign objects.
④	Top cover 2	Top outlet
⑤	Top cover 1	Top outlet
⑥	Liquid inlet cover	Fill in the coolant.
⑦	Fan front cover	Ventilate the fan and prevent incoming of foreign objects.
⑧	Indicator	• White: Power indicator. When any of the PCS battery voltage, bus voltage, and AC voltage is greater than 36 V, the indicator turns on, indicating that the PCS has been energized and there is an electric shock risk. • Green: Running indicator. When the PCS runs, the indicator turns on. • Red: Fault/warning indicator. When the PCS is abnormal, the indicator turns on, indicating that the PCS is faulty and you need to locate the fault according to *" Fault List" on page 85* and remove the fault according to *"Table 7–1 Troubleshooting" on page 85*.

No.	Name	Description
⑨	Emergency stop switch	Press this switch in case of emergency to power off the PCS. After the fault is cleared, rotate the switch clockwise and release the emergency stop switch to power on the device again.
⑩	Door lock	Open and close the door.
⑪	Right air outlet cover	Ventilate the fan and prevent incoming of foreign objects.
⑫	Right fan cover	Fan installation cover to form an air cabin
⑬	Liquid level window	Check the liquid level in the water tank
⑭	Rear ventilation plate	Ventilate the fan and prevent incoming of foreign objects.
⑮	Explosive pressure release plate	Automatically opened during explosive pressure release
⑯	Installation window 1	Observe the installation position during installation.
⑰	Reactor air filter liquid overflow port	Overflow liquid entering from the air outlet plate of the reactor.
⑱	Installation window 2	Observe the installation position during installation.
⑲	AC-side cover	AC outlet

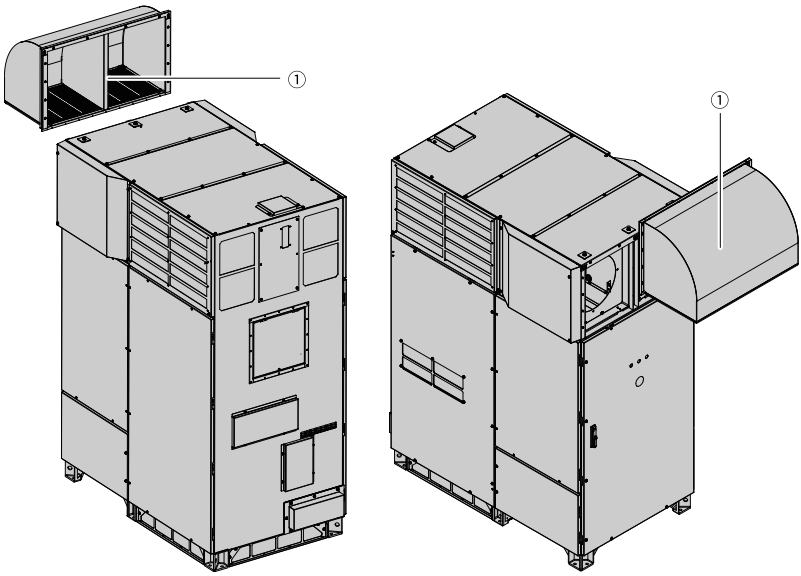


Figure 1-6 Components (applicable for the 2510 kW coast defense model)

Table 1–4 Components (Applicable for the 2510 kW Coast Defense Model)

No.	Name	Description
①	Windshield	Change the straight-in and straight-out air duct, and reduce the direct corrosion of salt fog to related components on the cabinet top.

1.4 Product Dimensions

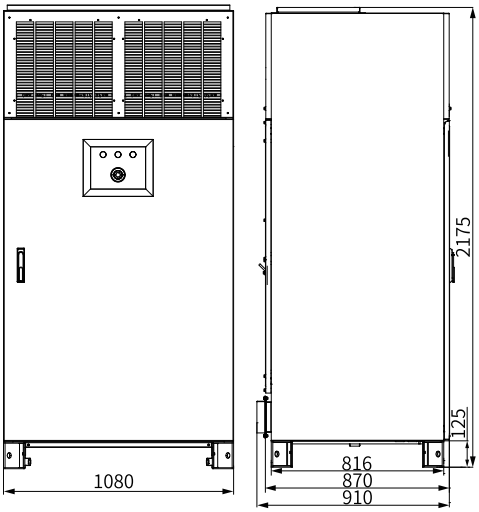


Figure 1-7 Product dimensions (unit: mm) (applicable for the 1725 kW model)

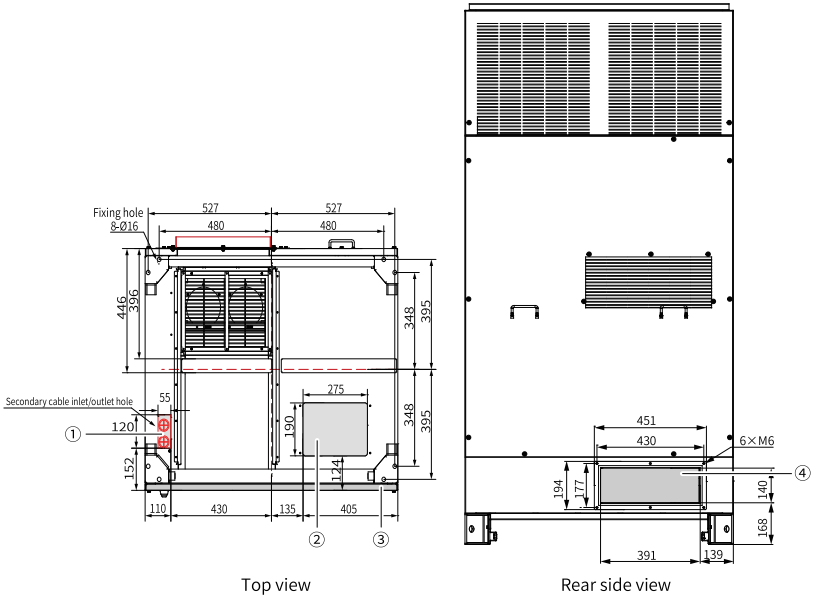


Figure 1-8 Bridging busbar mounting hole of DC cable inlet hole and AC cable inlet hole (unit: mm) (applicable for the 1725 kW model)

Table 1–5 Bridging Busbar Mounting Hole of DC Cable Inlet Hole and AC Cable Inlet Hole (Applicable for the 1725 kW Model)

No.	Name	No.	Name
①	Customer cable inlet hole	③	Front door
②	DC cable inlet hole	④	AC bridging busbar mounting hole[1]

Note

[1]: Remove the AC cable outlet cover before using the hole.

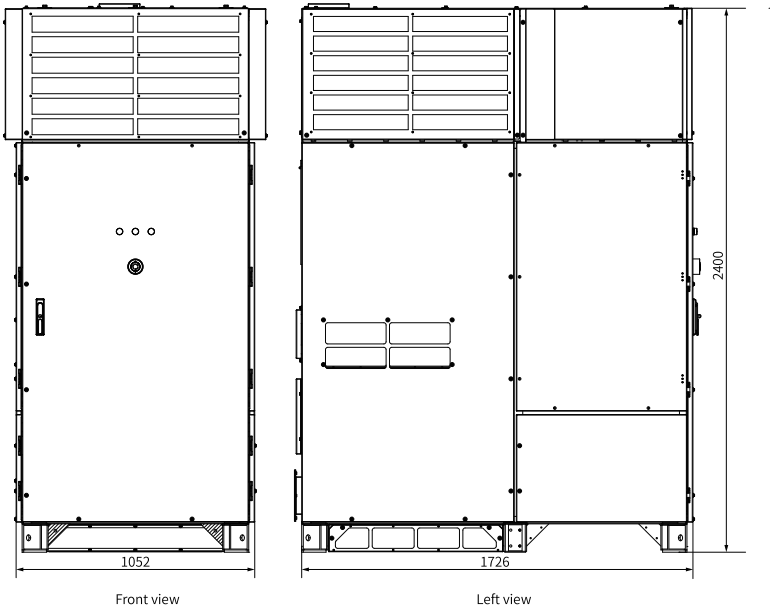
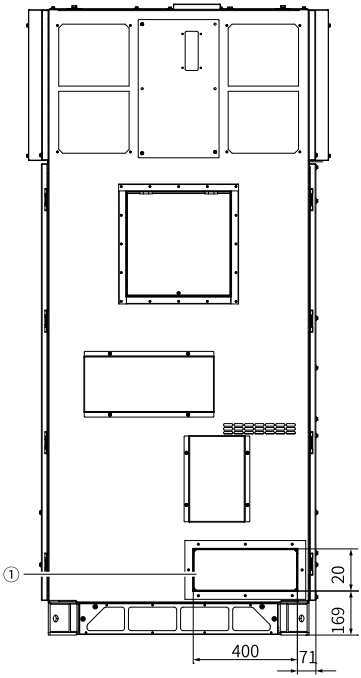
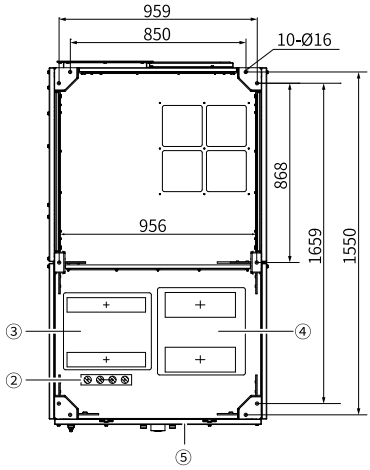


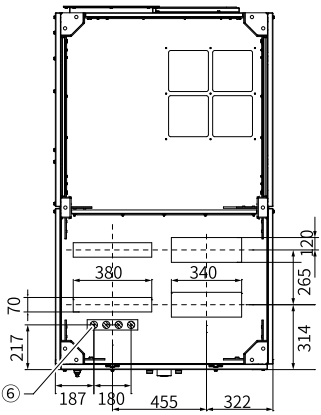
Figure 1-9 Product dimensions (unit: mm) (applicable for the 2510 kW model)



Rear view-AC output



Top view-Cabinet fixing position



Top view-Cable inlet position

Figure 1-10 Bridging busbar mounting hole of DC cable inlet hole and AC cable inlet hole (unit: mm) (applicable for the 2510 kW model)

Table 1–6 Bridging Busbar Mounting Hole of DC Cable Inlet Hole and AC Cable Inlet Hole (Applicable for the 2510 kW Model)

No.	Name	No.	Name
①	AC bridging busbar mounting hole[1]	④	Single-/Dual-way DC cable inlet hole
②	Secondary cable inlet/outlet hole	⑤	Front door
③	Dual-way DC cable inlet hole	⑥	Secondary cable inlet/outlet hole

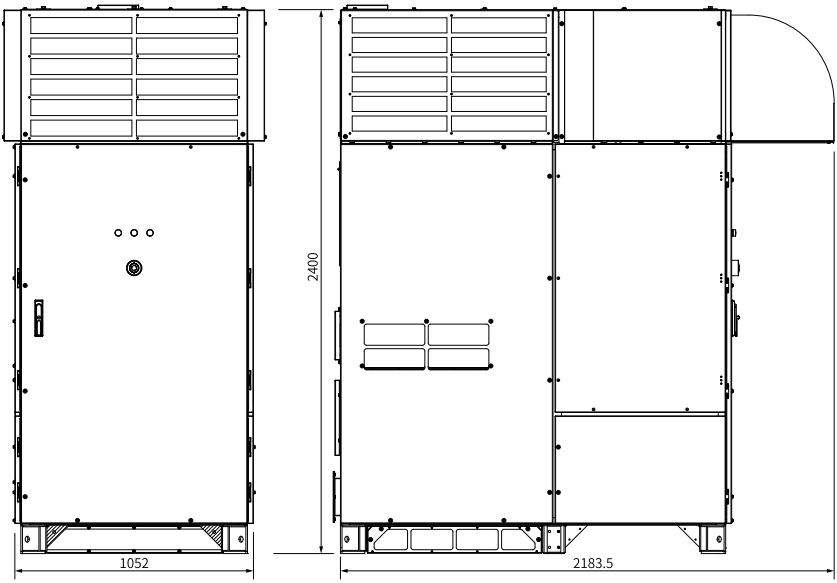


Figure 1-11 Product dimensions (unit: mm) (applicable for the 2510 kW coast defense model)

Note

[1]: Remove the AC cable outlet cover before using the hole.

1.5 Operating Principles

Main circuit principle

There is one input on the battery side and three-phase three-wire output on the output side. The schematic for the main power is shown below.

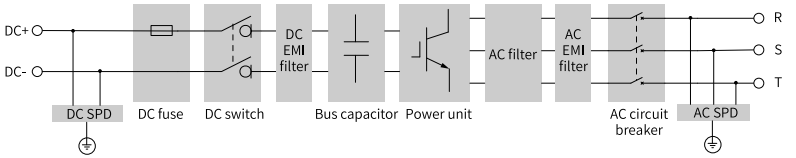


Figure 1-12 Power topology (applicable for the 1725 kW model)

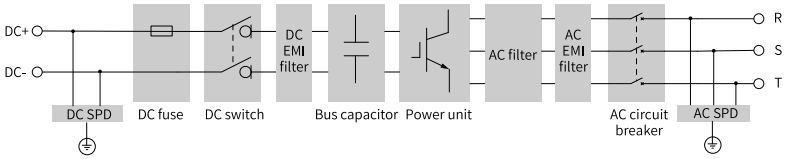


Figure 1-13 Power topology (applicable for the 2510 kW model)

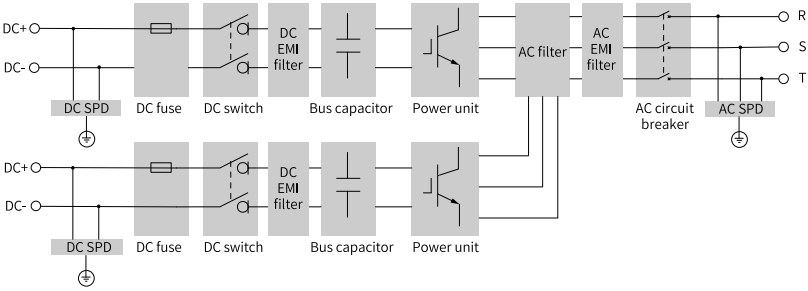


Figure 1-14 Power topology (applicable for the 2510 kW dual-branch model)

Operation mode

The IES900 series PCS can run in grid-connected and grid-disconnected modes.

- When the PCS runs in grid-connected mode, its AC side is connected to the grid and its DC side is connected to the storage battery. The PCS is used with the grid scheduling system for frequency modulation, voltage regulation, and load shifting. The PCS can charge and discharge the storage battery in constant voltage, constant current, or constant power mode.
- When the PCS runs in grid-disconnected mode, its AC side is connected to the storage battery. In this mode, the PCS can output three-phase AC voltage with a fixed frequency and an RMS value for continuous power supply to loads connected to its AC side.

1.6 System Overview

The PCS exchanges energy between the storage battery and the grid, and monitors and manages the exchange process. The following figure shows the system

composition. The system composition of the 2510 kW is the same as that of the 1725 kW model.

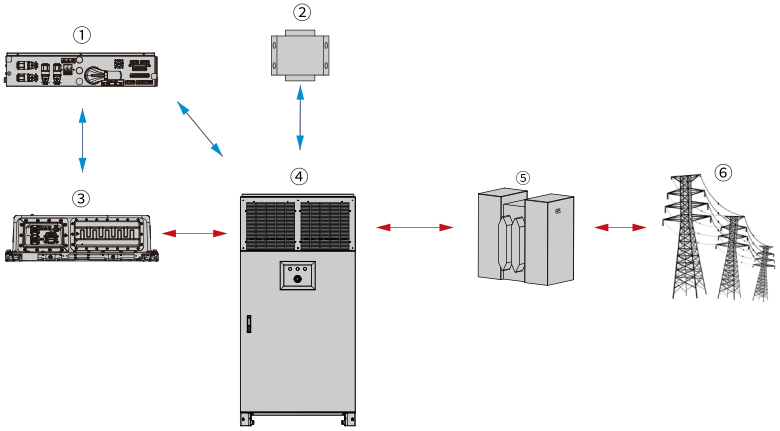


Figure 1-15 PCS diagram

Table 1–7 PCS details

No.	Name	Description
①	BMS	Battery management system, which manages, protects, and monitors the battery
②	EMS	Energy management system, which schedules and monitors energy of the overall system
③	Storage battery	Storage battery of various types
④	PCS	Power conversion system, which exchanges energy between the battery and the grid
⑤	Isolation transformer	Optional, which can be selected by the users based on their system demands
⑥	Grid	To run the PCS in grid-connected mode, the AC side must be connected to the grid, while the DC side can be connected to the storage battery.

Note

Red lines indicate power cables, whereas blue lines indicate monitoring and communication cables.

2 Unpacking and Handling

2.1 Unpacking

2.1.1 Precautions for Unpacking



- Do not remove the packaging of the PCS during storage. Only remove the packaging before installation.
- After receiving the equipment, inspect it carefully.
- Check every item received against the delivery list. In case of any missing components or damage, notify the forwarder immediately.

2.1.2 Unpacking Procedure

1. Remove the outer package. Do not shock or vibrate the PCS.
2. Remove the internal expanded polyethylene and tape package.
3. Remove the screws that fix the PCS to the wooden pallet.

2.1.3 Check After Unpacking

Check the following items after unpacking.

Table 2–1 Post-unpacking checklist

No.	Item	Checked
1	The exterior of the product is not damaged, scratched, or concaved.	☐
2	Options ordered for the product are complete.	☐
3	The nameplate is consistent with the ordered product model.	☐
4	Warning labels are free of damage and scratches and are legible.	☐

2.2 Storage

Table 2–2 Storage requirements

Item	Storage Requirements
Package	The PCS must be stored with package.
Foundation	The PCS must be placed on a level and stable floor for storage.
	The floor must be stable without shaking and capable of bearing the weight of the PCS.
Space	Protect the PCS during storage to prevent collision.
Time	Power on the PCS once every three months.
	Check the PCS once every three months.
	Replace the desiccant once every six months.
Storage temperature	–40°C to +70°C
Storage humidity	20%RH to 95%RH (non-condensing)

2.3 Handling

2.3.1 Precautions for Handling

Handling with a forklift

Caution

- Perform trial forking and adjust the forks as necessary. Then, lift the PCS and transport it to the designated position.
- Ensure that the tilting angle of the PCS is lower than 10° during handling and the relief height is as low as possible.
- Never transport the PCS on a hydraulic vehicle for a long distance or on a slope. Failure to comply may result in damage to the hydraulic vehicle.
- Handle the equipment slowly and steadily during lifting or landing to avoid shock or oscillation. Mind your feet when the forklift is lowered down.
- Arrange some people to hold the PCS when moving it. Move the cabinet on a flat ground.
- The PCS is high and may block the driver's sight, and thus the driver should be guided if necessary.

Handling with a crane

Caution

- Lift the PCS once for trial to ensure that the straps can bear the weight of the PCS and the PCS is not tilted.
- The hook must be at the center of gravity.
- Ensure that the PCS inclines less than 10° after being lifted.
- Before handling, ensure that the front door of the cabinet has been locked. Opening of the door during handling may result in physical injury.
- Handle the equipment slowly and steadily during lifting or landing to avoid shock or oscillation.

2.3.2 Handling Before Unpacking

Note

The wooden crate is optional for the package of this product.

Handling method

Packed PCS can be handled by a forklift or a crane. Tools required are as follows.

Equipment	Specifications
Forklift	The load bearing capacity of the forklift must be 2.5 tons or above, and the length of the forklift body must be longer than 1.2 m.
Crane	The load bearing capacity of the crane must be 2.5 tons or above.
Flexible strap or strap	The length of a single strap must be about 8 m.

Handling with a forklift

Adjust the width of the forklift feet so that the center of the forklift is in the center of the forklift feet. Insert the cabinet to the position shown in the figure below.

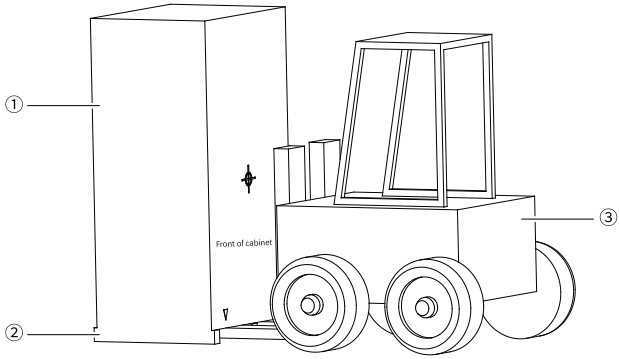


Figure 2-1 Handling with a forklift

Table 2–3 Handling with a forklift

No.	Name
①	Packaging box
②	Crosstie
③	Forklift

Handling with a crane

Use flexible sling or strap for handling the packed PCS by a crane.

Tie the package tightly with straps, protect the cabinet with flexible materials to avoid damage to the cabinet, and handle the cabinet as follows.

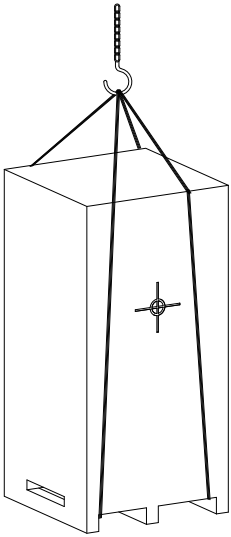


Figure 2-2 Handling packed PCS with a crane

Caution

The distance from the hook to the top of the cabinet must be greater than 1.5 m, and the inclination angle between the cabinet and the ground should be less than 10° during hoisting.

2.3.3 Handling After Unpacking

Handling method

Unpacked PCS can be handled by a forklift or a crane.

Equipment	Specifications
Forklift	The load bearing capacity of the forklift must be 2.5 tons or above, and the length of the forklift body must be longer than 1.2 m.
Crane	The load bearing capacity of the crane must be 2.5 tons or above.
Flexible strap or strap	The length of a single strap must be about 8 m.

Handling with a forklift

1. Adjust the width of the forklift feet.

2. Let the center of the PCS in the center of the forklift feet, as shown in the following figure.

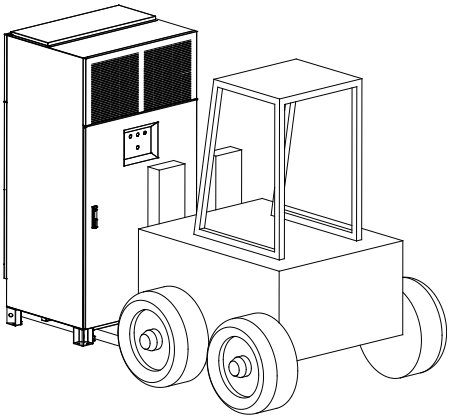
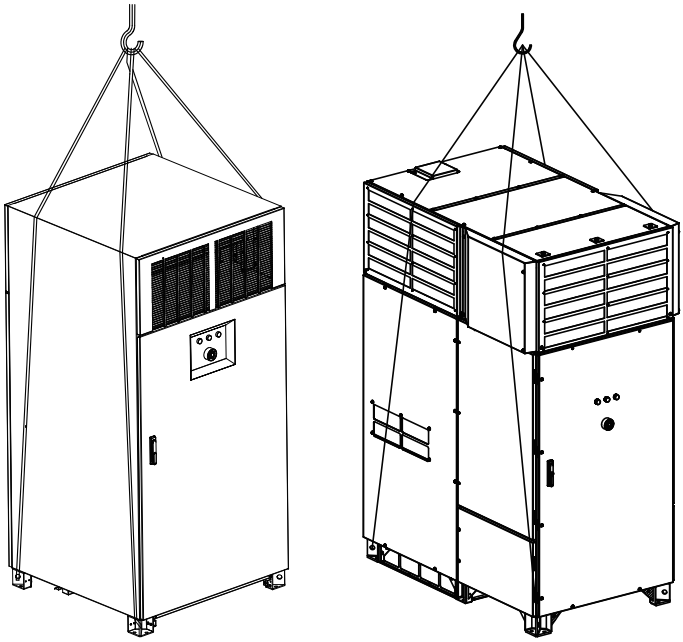


Figure 2-3 Handling unpacked PCS with a forklift

Handling with a crane

Use flexible sling or strap for handling the unpacked PCS by a crane.

Tie the cabinet with straps and follow the figure below.



1725 kW PCS　　2510 kW PCS

Figure 2-4 Handling unpacked PCS with a crane

Caution

The distance from the hook to the top of the cabinet must be greater than 1.5 m, and the inclination angle between the cabinet and the ground should be less than 10° during hoisting.

2.4 Long-Distance Transport

Danger

- The operators must be trained on product operation and safety.
- During unloading and transportation, national/local safe operation instructions must be observed.
- All tools used for the product and operation must be maintained.

Caution

- During transportation, lock all cabinet doors.
- After product integration and during long-distance transportation, use ropes to fix the cabinet and skid-mounted chassis in all directions to prevent excessive impact and tilting of the integrated device during uphill or downhill or due to sudden braking during transportation, which may cause component damage.

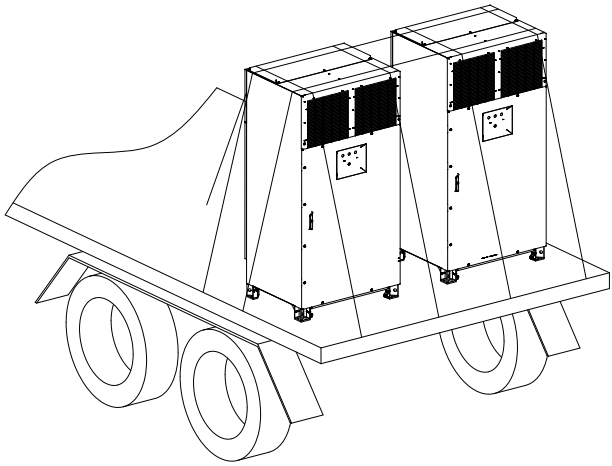


Figure 2-5 Load of long-distance transport (applicable for the 1725 kW model)

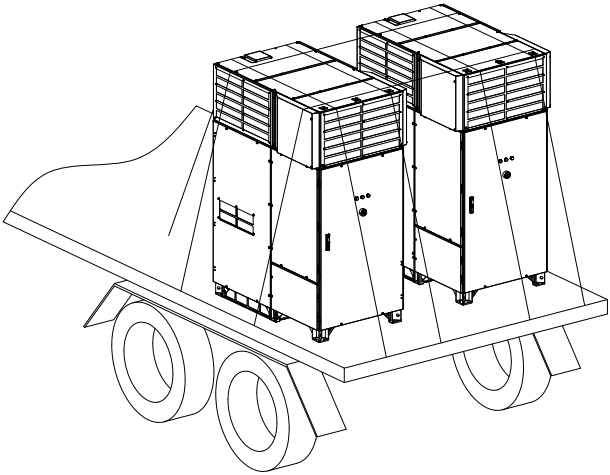


Figure 2-6 Load of long-distance transport (applicable for the 2510 kW model)

3 Mechanical Installation

3.1 Safety Precautions

Failure to comply with the following safety precautions for installation may result in device damage, physical injuries, severe accidents, or even death. Strictly observe the following safety precautions.



- The equipment must be properly installed by professionals, taking into consideration all the warning notices provided.
- Before installation, check that the mechanical strength of the installation site can bear the weight of the equipment. Failure to comply will result in mechanical hazards.
- Do not wear loose clothes or accessories during installation. Failure to comply may result in an electric shock.



- The cabinet frame must be strong enough to withstand the weight of the components, control circuits and other equipment installed in it.
- The cabinet must meet the requirements for dust and humidity.
- For ease of installation and maintenance, reserve sufficient space around the equipment.

3.2 Preparations Before Installation

3.2.1 Installation Environment Requirements

Table 3–1 Environment requirements

Item	Environment Requirements
Installation site	Install the PCS outdoors and ensure sufficient ventilation.
	Take professional rain-proof, wind-proof, and dust-proof measures in the air inlet and outlet.
	Take necessary fireproof, waterproof, and rodent-proof measures.
Foundation	The mounting surface must be flat and dry.
	The floor must be stable without shaking and capable of bearing the weight of the PCS.
Space	Reserve sufficient clearance around the PCS for the purpose of ventilation, maintenance, and evacuation.
Altitude	The PCS can work at an altitude no more than 5000 m. Derating is required when the PCS works at an altitude above 2000 m. The actual altitude must be set to obtain the running power curve. For details, contact our technical engineers.
Temperature	See the technical specifications in *"Table 1–1 " on page 14*.
Humidity	100%RH (non-condensing)



Moisture entry may damage the PCS. To ensure normal operation of the PCS:

- Do not open the cabinet door when the air humidity reaches 95% RH.
- Do not open the cabinet door for maintenance or service under rainy or humid weather conditions.

3.2.2 Installation Site Requirements

Install the PCS on the concrete or non-inflammable floor. Ensure that the floor is level, solid and even, capable of bearing the weight of the PCS, and free from depression or slope.

When constructing the foundation, you need to take cable outlet into consideration. The cable trench or other cable outlet holes must be reserved.

The PCS adopts bottom outlet mode for the DC cables and secondary cables through the cable trench. Therefore, a trench is required in the installation site. The trench must meet the following requirements.

- The trench must be waterproof and moisture-proof to avoid cable aging and short circuit. Failure to comply may affect the normal operation of the PCS.
- Take the cross-sectional area of the cable into consideration when designing the trench as the PCS power is high and the cables needed by the PCS are usually thick.
- The number of cable carriers needed can be determined based on customer needs. Take the equipment weight and dimensions into account when determine the number of cable carriers.
- Route the communication cables and power cables separately. Route the DC circuit and AC circuit separately with a distance of at least 300 mm between the routes.

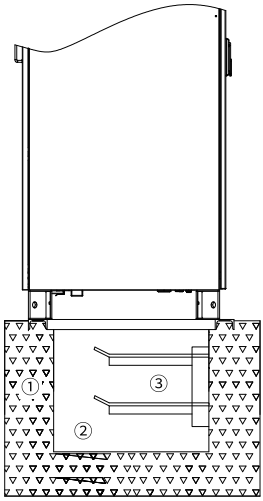


Figure 3-1 Cross-sectional area of the trench

Table 3–2 Cross-sectional area of the trench

No.	Name
①	Foundation
②	Trench
③	Cable carrier

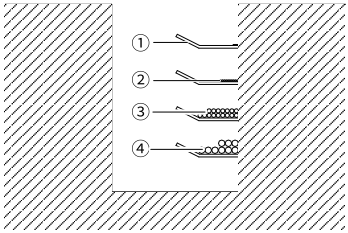


Figure 3-2 Cable carrier

Table 3–3 Cable carrier

No.	Name
①	Cable carrier
②	Control cable
③	DC cable
④	AC cable

3.2.3 Installation Clearance Requirements

Reserve sufficient clearance around the PCS for the purpose of installation, maintenance, dissipation, and evacuation.

The PCS supports the following two installation methods:

Standalone installation (applicable for the 1725 kW model)

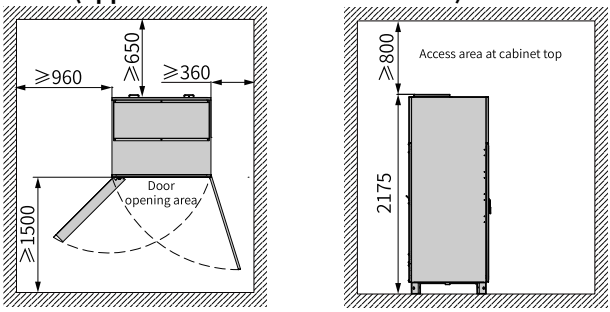


Figure 3-3 Installation clearance required for a single PCS (unit: mm)

Standalone installation (applicable for the 2510 kW model)

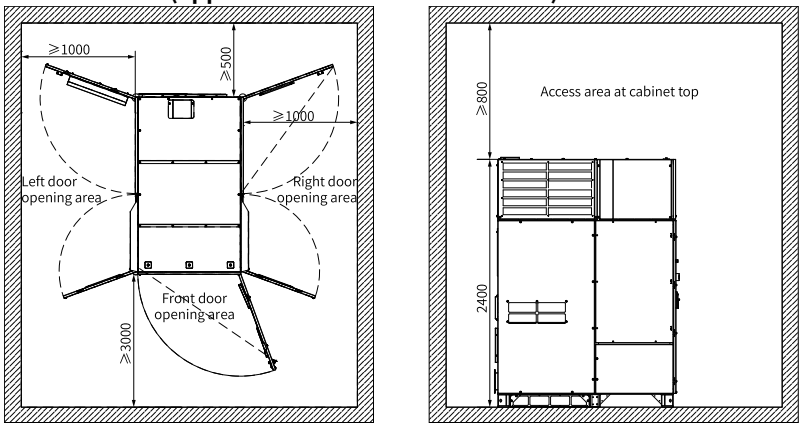


Figure 3-4 Installation clearance required for a single PCS (unit: mm)

Parallel installation in a cabinet (applicable for the 1725 kW model)

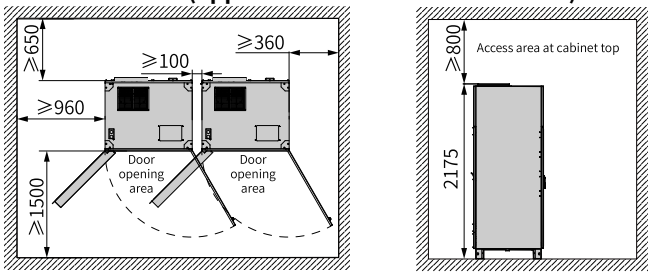


Figure 3-5 Clearance required for installing multiple PCSs in parallel in a cabinet (unit: mm)

Parallel installation in a cabinet (applicable for the 2510 kW model)

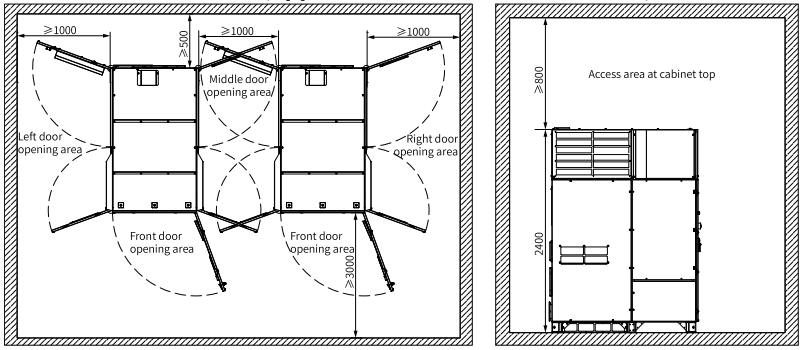


Figure 3-6 Clearance required for installing multiple PCSs in parallel in a cabinet (unit: mm)

3.2.4 Ventilation Requirements

The PCS generates a large amount of heat during operation, which may lead to overtemperature, reduce the electrical performance of the system, and damage the system. To allow proper heat dissipation, install the PCS in a place that meets the following requirements.

Caution

- Install the PCS in a well-ventilated environment.
- Ensure plenty of fresh air at the air inlet.
- Separate the ventilation system of the PCS from other ventilation systems in the control room.
- If overtemperature occurs on the PCS, check whether the air vent is blocked.
- Take waterproof, dustproof, and insect-proof measures for the AC outlet bridge, ensure sufficient ventilation at the outlet bridge bottom, and keep the air in the outlet bridge area from interaction with the PCS.

The system adopts front/rear-in and rear-out ventilation mode. The following figure shows the air inlet/outlet positions.

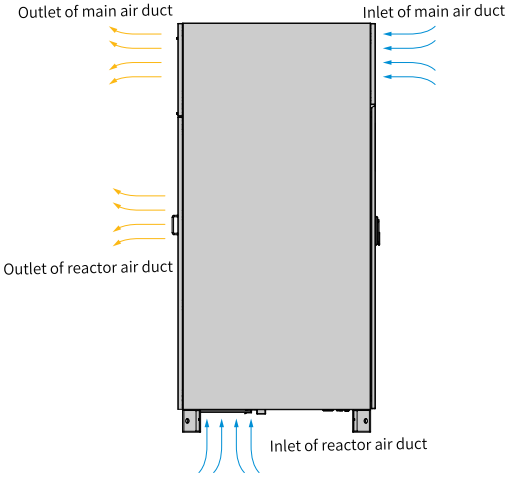


Figure 3-7 Air inlet/outlet positions (applicable for the 1725 kW model)

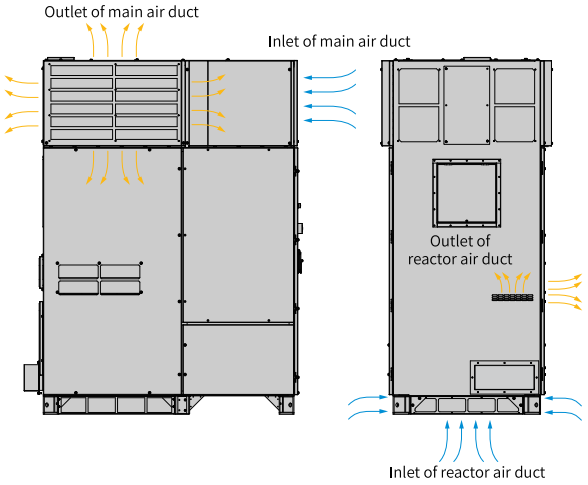


Figure 3-8 Air inlet/outlet positions (applicable for the 2510 kW model)

Caution

To avoid abnormal temperature rise of the PCS and reactor, do not block the bottom of the PCS.

3.2.5 Preparation of Installation Tools

Table 3–4 Required installation tools

Tool	Qty	Description
Forklift	1	Used for transporting the PCS indoor and outdoor. The load bearing capacity of the forklift must be 2.5 tons or above, and the length of the forklift body must be longer than 1.2 m.
Crane	1 set	The load bearing capacity of the crane must be 2.5 tons or above.
Strap	4 m	Soft strap, steel rope or strap are required for crane lifting.
Socket and wrench	1 set	Used for fixing. The maximum torque must be greater than 70 N·m.

Note

The preceding tools are for installing one PCS. It is recommended to prepare more tools to accelerate the installation process with multiple installation personnel.

3.2.6 Tightening Torque of Common Screws and Bolts

Table 3–5 Tightening Torque

Screw/Bolt	Strength Grade	Max. Torque (N·m)
M3	4.8	0.5
M4	4.8	1.2
M5	4.8	2.8
M6	4.8	4.8
M8	8.8	20
M10	8.8	40
M12	8.8	70
M16	8.8	180

3.3 Inspection Before Installation

Before installation, check the following items listed in the table below and tick the checked items in the "Checked" column.

No.	Item	Checked
1	The packing box is intact and free of damage and damp.	☐
2	After unpacking, the PCS module housing is intact without distortion, peeling, or crack, and there is no water stain.	☐
3	All ordered accessories and options are delivered.	☐

3.4 Installing the PCS

1. Check whether the fixing holes on the installation plane are consistent with mounting holes at the bottom of the PCS. For the positions of these holes, see *"Figure 3–9 Cabinet installation (unit: mm)" on page 43*.
2. Move the PCS to the mounting position, align the screw holes, and secure the PCS to the steel channel or foundation with M12 bolts.
   You can also weld the PCS to the metal floor of the channel steel or prefabricated container. Take care to avoid burning during welding and take anti-rust measures.

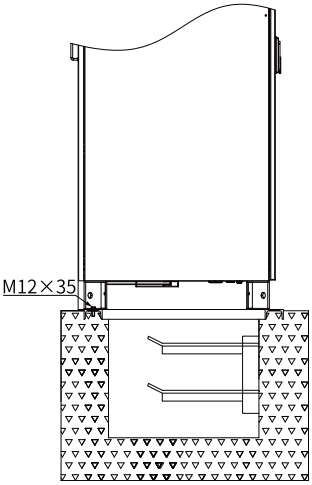


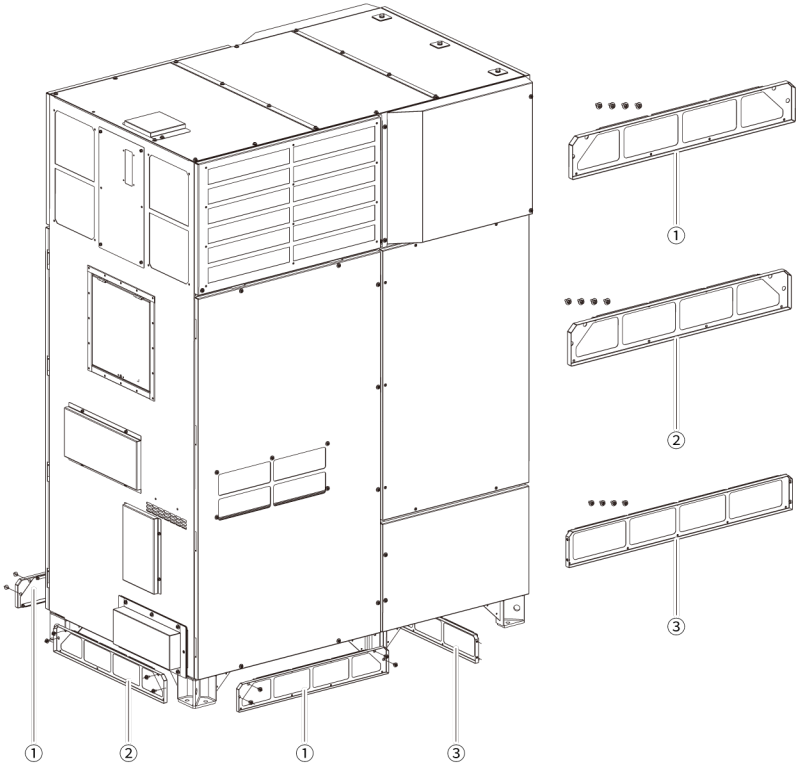
Figure 3-9 Cabinet installation (unit: mm)

Note

- Handle the PCS slowly and steadily. Check whether there is depression on the mounting plane or check for other signs that indicate insufficient bearing capacity of the mounting surface.
- The PCS needs to be fixed to the mounting plane with M12x35 bolts (with large flat washers, recommended). Reserve proper holes according to the bolts. See *"Figure 1–8 " on page 20* for the mounting hole positions.

3.5 Installing the Duckboard

1. Check that the cabinet is installed on the skid-mounted chassis or base.
2. Use four M6x16 stainless steel screws with large washers to fix the duckboard to the base support unit according to the figure.



3.6 Inspection After Installation

After installation, check the following items listed in the table below and tick the checked items in the "Checked" column.

Table 3–6 Post-installation checklist

No.	Item	Solution	Checked
1	The fasteners are tightened.	If any fastener is loose, tighten the screws again.	☐
2	The installation clearance meets the requirements.	If the installation clearance is insufficient, redesign the cabinet and install it again.	☐
3	The air filter is not blocked and has no foreign objects.	Clear foreign objects if any and locate the cause if the air filter is blocked.	☐

4 Electrical Installation

4.1 Electrical Connection Diagram

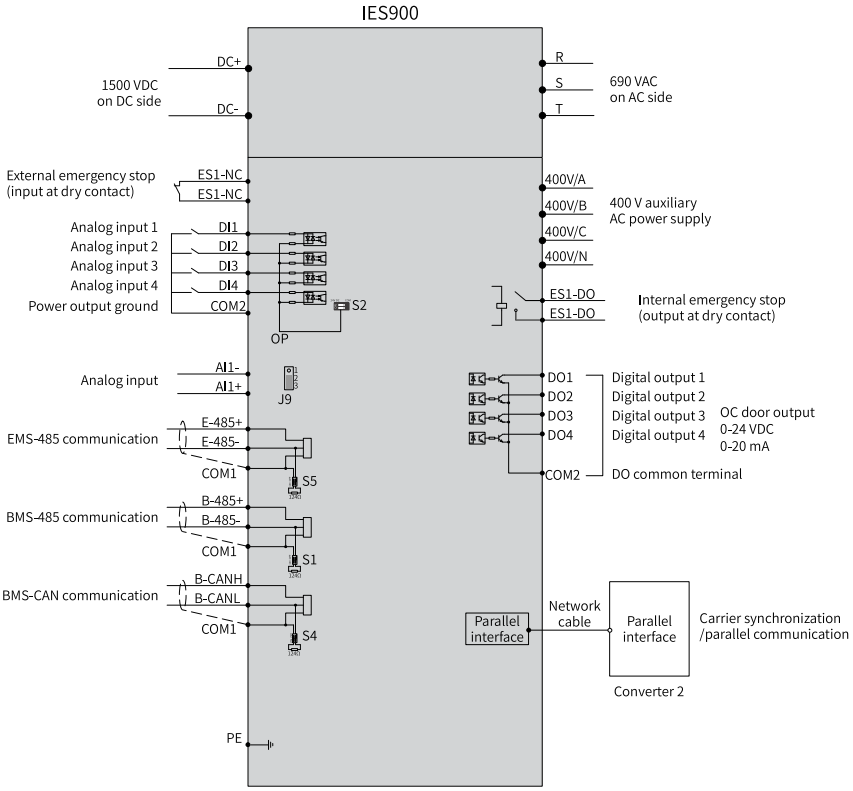


Figure 4-1 Electrical connection

For ease of wiring, some ports of the PCS are at the cabinet bottom. Use the correct port during wiring. For the corresponding relationship, see *"Table 4–10 " on page 62*.

4.2 Safety Precautions

Take necessary safety protection measures during electrical installation to protect the safety of installation personnel. Observe the following requirements during electrical installation.

Danger

- The PCS must be installed by skilled personnel in strict accordance with the user guide.
- During installation, the installation personnel must comply with local electrical operation regulations.
- Ensure that all cables and modules are de-energized before performing any operation (when a control power supply is used, the bus capacitor has a voltage of about 60 V).
- Place a warning sign at the disconnection part to prevent power-on during installation.
- Do not install the PCS while the power is on. Failure to comply will result in an electric shock.
- Conduct grounding and short circuit connections if necessary.
- Use insulating materials to isolate live parts to prevent physical injuries.

4.3 Preparation Before Wiring

4.3.1 Preparation of Installation Tools

Table 4–1 Required installation tools

Tool	Qty	Description
Socket and wrench for fixing	1 set	The maximum torque must be greater than 180 N·m.
Phillips screwdriver	1	Used for fixing the M6 screws.
Straight screwdriver	1	Used for fixing the M3 screws.
Wire stripper	1	Used for cable making.
Crimping tool	1	Used for cable making.
Clamp meter	1	Used for measuring the current and voltage on the input and output sides.

Note

The preceding tools are for installing one PCS. It is recommended to prepare more tools to accelerate the installation process with multiple installation personnel.

4.3.2 Cable Preparation

Power cable configuration requirements

Prepare power cables in accordance with specifications in the following table.

Table 4–2 Cable configuration specifications (applicable for the 1725 kW model)

Power	Terminal	Max. Voltage	Max. Current	Number of Screw Holes	Screw Specification	Recommended Specification	Cable Terminal Selection	Remarks
1725 kW	DC+, DC–	1500 VDC	1807 A	4 for each terminal	M16x50	For each terminal: 185 mm^2 x 6/240 mm^2 x 5/300 mm^2 x 4	Ø16 O-type terminal	Keep the cable specification and length the same on both sides.
	R, S, T	690 VAC	1588 A	4 for each phase	M16x50	Copper busbar connection: 80 mm x 8 mm	-	
				5 for each phase	M16x50	Cable connection[1]: For each terminal: 185 mm^2 x 5/240 mm^2 x 5/300 mm^2 x 4	Ø16 O-type terminal	
External auxiliary power supply cable		400 VAC	8 A	1 group (3 phases + N)	-	2.5 mm^2	Tubular terminal	Match the terminal with the cable.

Table 4–3 Cable configuration specifications (applicable for the 2510 kW model)

Power	Terminal	Maximum voltage	Maximum current	Number of Screw Holes	Screw	Recommended Specification	Cable Terminal Selection	Remarks
2510 kW	DC+, DC–	1500 VDC	2816 A	6 for each terminal	M16x50	For each terminal: 185 mm^2 x 10/240 mm^2 x 8/300 mm^2 x 8	Ø16 O-type terminal	Keep the cable specification and length the same on both sides.
	R, S, T	690 VAC (rated voltage)	2310 A	4 for each phase	M16x50	Copper busbar connection: 100 mm x 12 mm	-	
External auxiliary power supply cable		400 VAC	16 A	1 group (3 phases + N)	-	4.0 mm^2	Tubular terminal	Match the terminal with the cable.
External auxiliary power supply cable in internal/external power supply switchover plan		400 VAC	16 A	1 group (3 phases)	-	4.0 mm^2	Tubular terminal	Match the terminal with the cable.

Table 4–4 Cable configuration specifications (applicable for the 2510 kW dual-branch model)

Power	Terminal	Maximum voltage	Maximum current	Number of Screw Holes	Screw	Recommended Specification	Cable Terminal Selection	Remarks
2510 kW	DC+, DC–	1500 VDC	1408 A x 2	5 for each terminal	M16x50	For each terminal: 185 mm^2 x 5/240 mm^2 x 4/300 mm^2 x 4	Ø16 O-type terminal	Keep the cable specification and length the same on both sides.
	R, S, T	690 VAC (rated voltage)	2310 A	4 for each phase	M16x50	Copper busbar connection: 100 mm x 12 mm	-	
External auxiliary power supply cable		400 VAC	16 A	1 group (3 phases + N)	-	4.0 mm^2	Tubular terminal	Match the terminal with the cable.
External auxiliary power supply cable in internal/external power supply switchover plan		400 VAC	16 A	1 group (3 phases)	-	4.0mm^2	Tubular terminal	Match the terminal with the cable.

Caution

[1]: For wiring on the AC side, use a cable-copper busbar adapter and reserve a large space at the rear of the cabinet.

Note

- The maximum cross-sectional area of the output cable on the DC side is 300 mm^2.
- Cable recommendation in the table is made assuming that 70°C thermoplastic DCC insulated copper cables are used. To use cables of other models, configure the cables by referring to the local wiring regulations, application environment (including the temperature and physical support media), and Table 24 in IEC62109-1.
- DC cable recommendation is applicable only to unipolar input. In the case of multiple inputs, configure the cables based on the maximum input current of each input and by referring to the local wiring regulations, application environment (including the temperature and physical support media), and Table 24 in IEC62109-1.
- Select cable terminals that match the cables. The models in the table are applicable to recommended cables. If recommended cables are not used, use other appropriate terminals.

Communication and I/O cable configuration requirements

Prepare communication and I/O cables in accordance with specifications in the following table.

Table 4–5 Cable configuration specifications

Terminal		Installation Port	Recommended Cable	Cable Terminal Selection
Emergency stop signal port	ES1-NC, ES1-DO	Terminal block	Twisted pair	Tubular terminal
AI terminal	AI–/AI+			
Digital input and output ports	DI, ES1-NO, OP, DO, COM5, HDI, HDO	Terminal block	Single-conductor cable	Tubular terminal
	COM2, HDI, HDO	Network port	Shield LAN cable	RJ45
Communication port	EMS-485, BMS-485, BMS-C AN, PE, COM1	Terminal block	Shielded twisted pair	Tubular terminal
	EMS_Ethernet, BMS_ Ethernet	Network port	Shield LAN cable	RJ45

Note

You can configure the corresponding cable according to the requirements. In principle, the cross-sectional area of the cable cannot be lower than 0.5 mm^2, but cannot be greater than 2.5 mm^2 allowed by the wiring terminal.

RJ45 cable preparation

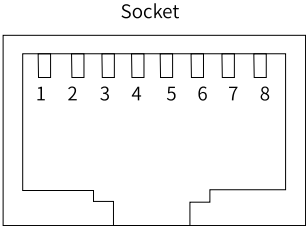


Figure 4-2 RJ45 interface

Table 4–6 RJ45 interface (carrier synchronization LAN cable)

Pin	Signal Name	Description
1	PANEL_CANH	CAN signal
2	PANEL_CANL	CAN signal
3	GND	-
4	HDO_1+	Carrier synchronization signal
5	COM2	-
6	GND	-
7	HDO_2+	Carrier synchronization signal
8	COM2	-

Table 4–7 RJ45 interface (communication expansion card LAN cable)

Pin	Signal Name	Description
1	TX+	Data sending positive
2	TX–	Data sending negative
3	RX+	Data receiving positive
4	NC	Empty
5	NC	Empty
6	RX–	Data receiving negative
7	NC	Empty
8	NC	Empty

Prepare the LAN cable as follows:

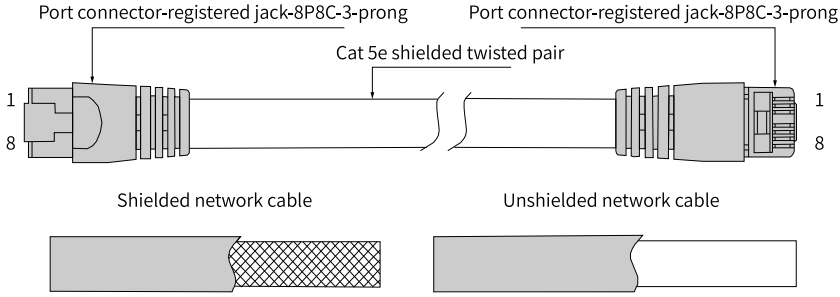


Figure 4-3 LAN cable

Table 4–8 Recommended LAN cable specifications

Item	Specifications
Cable type	Flexible crossover cable, S-FTP Use Cat 5e shielded twisted pair cables, with injection molded and iron shelled connector.
Compliance	EIA/TIA568A EN50173 ISO/IEC11801 EIA/TI AbulletinTSB EIA/TIA SB40-A&TSB36
Number of pairs	4

4.4 Cable Inlet Holes

"Figure 1–8 " on page 20 shows the positions of the base mounting holes and cable outlet holes.

4.5 Wiring of Main Circuit Busbar

4.5.1 Ports of Main Circuit Busbar

The PCS DC-side cables take the bottom-in mode and the wiring position at the front of the cabinet. The AC-side cables take the rear-in mode and the busbar connection position is at the rear of the cabinet.

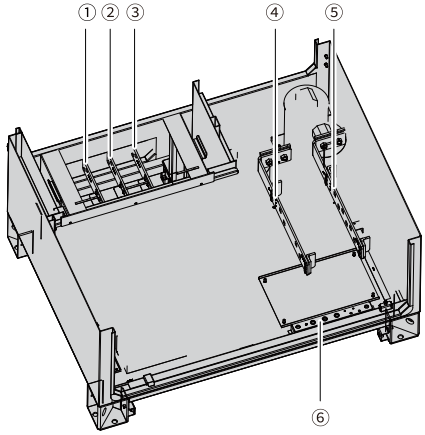


Figure 4-4 Wiring terminal and busbar layout (applicable for the 1725 kW model)

No.	Name	No.	Name
①	R-phase busbar on AC side	④	Positive terminal busbar on DC side
②	S-phase busbar on AC side	⑤	Negative terminal busbar on DC side
③	T-phase busbar on AC side	⑥	Grounding busbar

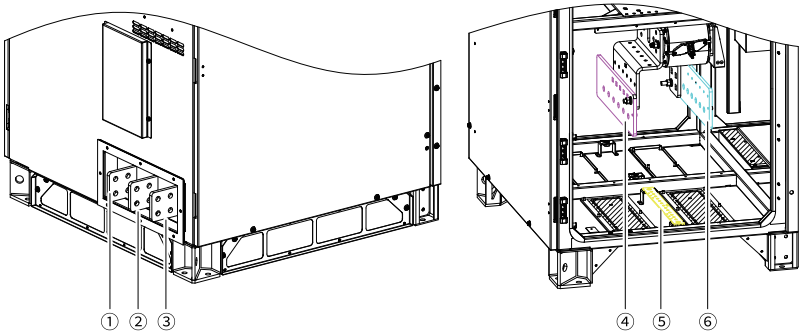


Figure 4-5 Wiring terminal and busbar layout (applicable for the 2510 kW model)

No.	Name	No.	Name
①	R-phase busbar on AC side	④	Positive terminal busbar on DC side
②	S-phase busbar on AC side	⑤	Grounding busbar
③	T-phase busbar on AC side	⑥	Negative terminal busbar on DC side

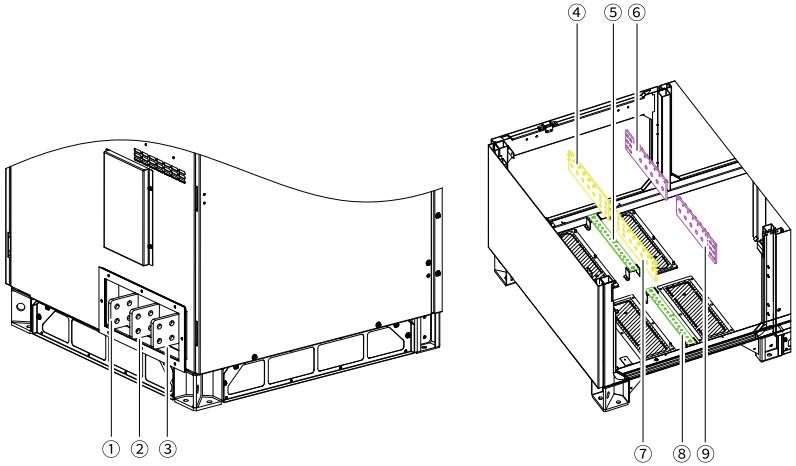


Figure 4-6 Wiring terminal and busbar layout (applicable for the 2510 kW dual-input model)

No.	Name	No.	Name
①	R-phase busbar on AC side	⑥	Negative terminal busbar on DC side of the main circuit
②	S-phase busbar on AC side	⑦	Grounding busbar of positive terminal busbar on DC side of the secondary circuit
③	T-phase busbar on AC side	⑧	Grounding busbar of the secondary circuit
④	Positive terminal busbar on DC side of the main circuit	⑨	Negative terminal busbar on DC side of the secondary circuit
⑤	Grounding busbar of the main circuit	-	-

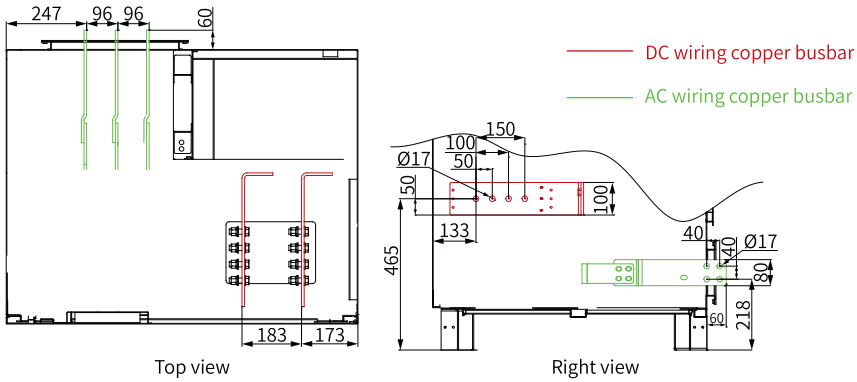


Figure 4-7 Wiring busbar dimensions (unit: mm) (applicable for the 1725 kW model)

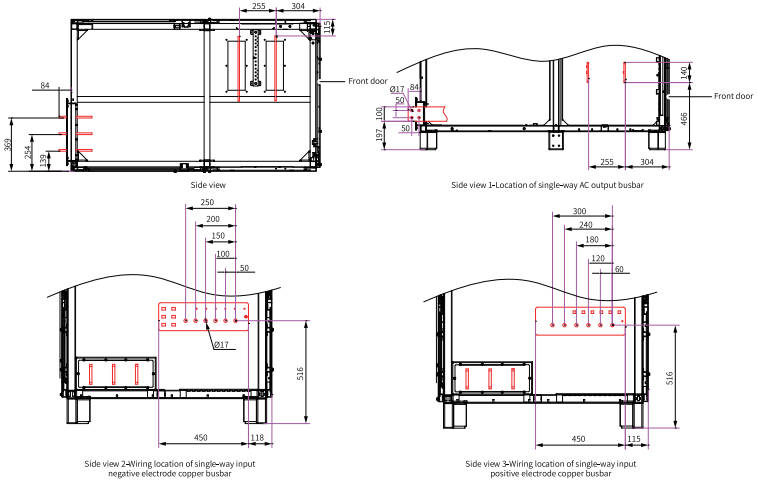


Figure 4-8 Wiring busbar dimensions (unit: mm) (applicable for the 2510 kW single-input model)

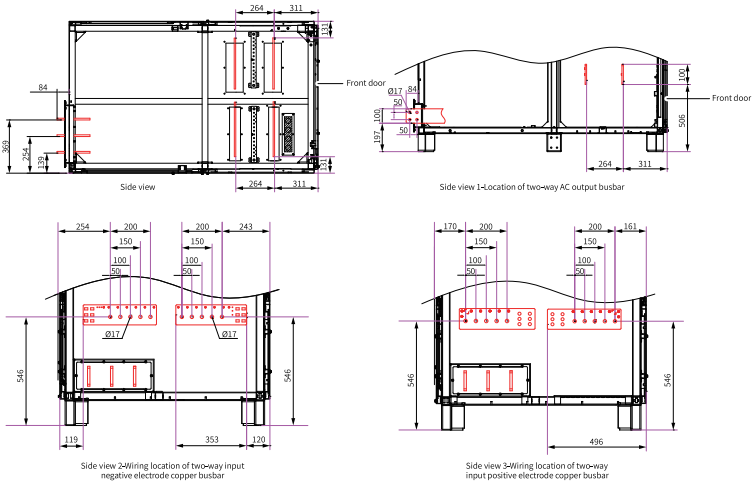


Figure 4-9 Wiring busbar dimensions (unit: mm) (applicable for the 2510 kW dual-input model)

4.5.2 Wiring of Grounding Busbar

Caution

- Ensure that the PCS is de-energized before wiring (when a control power supply is used, the bus capacitor has a voltage of about 60 V).
- Measure the grounding resistance and ensure that it is less than 0.1 Ω.
- The cables must meet requirements of the specified insulation class and be provided with necessary protection to avoid scratches on the insulated leather.

Wiring of grounding busbar of the 1725 kW PCS

As shown in the following figure, connect the grounding cables to the corresponding busbars through the corresponding wiring holes. Tighten the screws through a wrench with a tightening torque of 70 N·m.

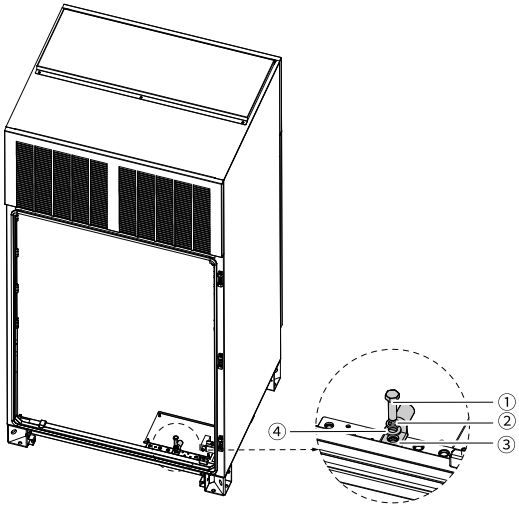


Figure 4-10 Wiring of grounding busbar

No.	Name	No.	Name
①	M12 hexagon bolt	③	Cable lug
②	Spring washer	④	Flat washer

Wiring of grounding busbar of the 2510 kW PCS

As shown in the following figure, connect the grounding cables to the corresponding busbars through the corresponding wiring holes. Tighten the screws through a wrench with a tightening torque of 20 N·m.

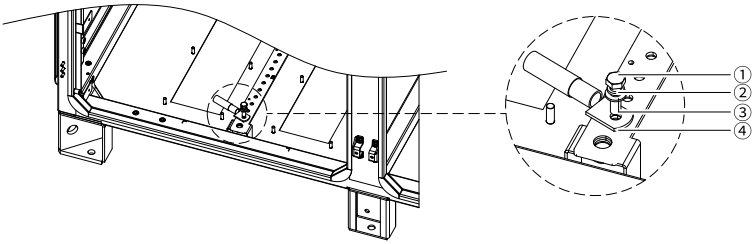


Figure 4-11 Wiring of grounding busbar

No.	Name	No.	Name
①	M8 hexagon bolt	③	Flat washer
②	Spring washer	④	Cable lug

4.5.3 Wiring of Busbar on DC Side

Caution

- The accumulator voltage must not exceed 1500 VDC, which is the maximum allowable DC voltage of the PCS. Otherwise, the PCS may be damaged.
- In the case of ground faults, rectify the faults before wiring.
- An incorrect wiring sequence may result in a fire.
- Fasten the cables. Otherwise, a fire may occur.
- Incorrect wiring may result in PCS failure and even equipment burnout.
- The cables must meet requirements of the specified insulation class and be provided with necessary protection to avoid scratches on the insulated leather.

1. Ensure that the PCS and the cables are de-energized.
2. Confirm and mark the positive and negative terminals of the cable.
3. Measure the resistance between every two of the positive terminal, negative terminal, and the PE terminal. The resistance values must be megohms. Otherwise, check the circuits.
4. As shown in the following figure, connect the cables on the positive and negative terminals to the corresponding positive and negative busbars through corresponding wiring holes. Tighten the screws through a wrench with a tightening torque of 180 N·m.

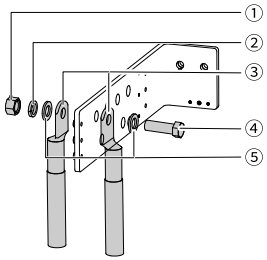


Figure 4-12 Single-cable wiring on the DC side

No.	Name	No.	Name
①	M16 hexagon nut	④	M16 standard hexagon bolt
②	Spring washer	⑤	Flat washer
③	Cable lug	-	-

4.5.4 Wiring of Busbar on AC Side

Danger

- Incorrect voltage may cause damage to the PCS.
- An incorrect wiring sequence may result in poor contact and even a fire.
- Fasten the cables. Otherwise, a fire may occur.
- An incorrect phase sequence may cause PCS failure.
- The cables must meet requirements of the specified insulation class and be provided with necessary protection to avoid scratches on the insulated leather.

1. Ensure that the PCS and the cables are de-energized.
2. Mark phases R, S, and T of the cable.
3. Confirm the phase sequence of the AC output wiring busbar of the PCS. Connect the bridging busbar to the wiring busbar in the correct phase sequence.
4. As shown in the following figure, connect the bridging busbar with the AC busbar correctly.
5. Tighten the screws through a wrench with a tightening torque of 180 N·m (M16 bolt).

Copper busbar connection

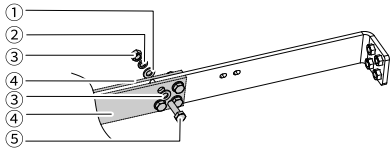


Figure 4-13 Single-cable wiring on the AC side

Table 4–9 Single-Cable Wiring on the AC Side

No.	Name	No.	Name
①	Flat washer	④	Bridging busbar
②	Spring washer	⑤	M16/M12 outer hexagon bolt
③	M16/M12 outer hexagon nut	-	-

Cable connection (applicable for the 1725 kW)

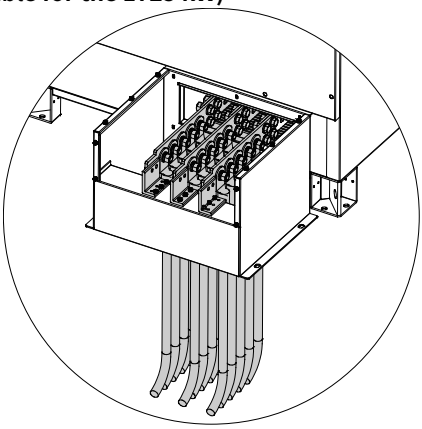


Figure 4-14 Wiring on the AC side

For wiring on the AC side, use a cable-copper busbar adapter and reserve a large space at the rear of the cabinet. For details, see the figure below.

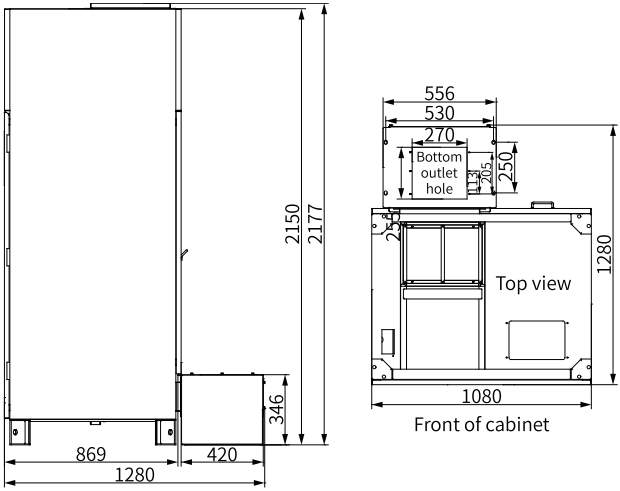


Figure 4-15 Product dimensions for cable wiring

4.6 Wiring of Communication and I/O Ports



- Communication and I/O cables are thin and must be fixed to prevent stress that may pull the cables apart.
- The cables must meet requirements of the specified insulation class and be provided with necessary protection to avoid scratches on the insulated leather.

4.6.1 Communication and I/O Terminals

Note

All external communication and I/O wiring ports of the PCS are distributed on the communication board, and some cables are connected to the control cable terminals and user adapter board at the left bottom of the device. During wiring, you need to connect relevant cables to the communication board, control cable terminal, or user adapter board as required. For the operating principles, see *"4.1 Electrical Connection Diagram" on page 45*.

Boards

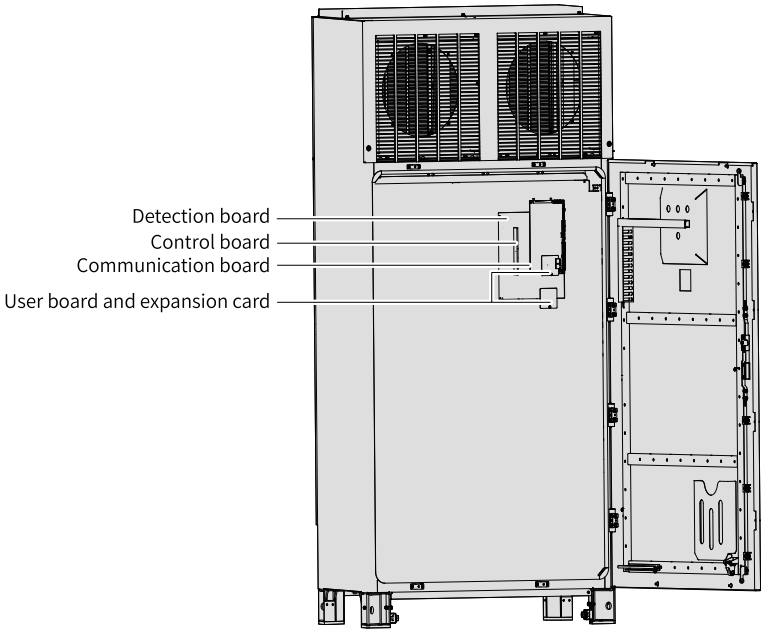


Figure 4-16 Boards

Note

The communication board has three slots for up to three communication expansion cards, among which, two slots are optional for Ethernet or 61850 cards and one slot is optional for the EtherCAT card. You can select a card as required for EMS or BMS communication.

Control cable terminals XT2 and XT3

The control terminals are mainly connected to the control cable terminals XT2 and XT3 and the user adapter board. For their locations, see *"4.6.2 Wiring of External Control Power Supply" on page 73*. The following table lists the wiring relationship of relevant communication boards.

Table 4–10 Correspondence between control cable terminals XT2 and XT3 and the communication board (applicable for the 1725 kW model)

Control Cable Terminal			Communication Board		Terminal	Function
XT	Pin No.	Name	Pin No.	Name		
XT2	1	ES1-NC	J33-10	EPO_DI1	Remote emergency stop input	Remote emergency stop switch (normally closed)
	2	ES1-NC	J33-1	user_COM4_1	Common terminal of remote emergency stop	
	3	DI1	J11-15	DI1	Digital input 1	DI (optional functions: start, stop, standby, and discharge)
	4	DI2	J11-17	DI2	Digital input 2	
	5	DI3	J11-19	DI3	Digital input 3	
	6	DI4	J11-21	DI4	Digital input 4	
	7 to 10	DI_COM	J23-10	COM2	24 VDC battery grounding	
	11	ES1-DO	-	-	Emergency stop output signal	Emergency stop output terminal
	12	ES1-DO	-	-	Common terminal of emergency stop output signal	
	13	AI–	J12-11	AI1–	Analog input negative	AI terminal 1
	14	AI+	J12-12	AI1+	Analog input positive	
	15	E-485+	J11-9	E485_+	EMS_485+	EMS-RS485 communication
	16	E-485–	J11-11	E485_–	EMS_485–	
	17	COM1	J11-10	COM1	COM1	
	18	PE	-	-	-	
	19	B-485+	J11-5	B485_+	BMS_485+	BMS-RS485 communication
	20	B-485–	J11-7	B485_–	BMS_485–	
	21	COM1	J11-6	COM1	COM1	
	22	PE	-	-	-	
	23	B-CANH	J11-1	BCANH	BCANH	BMS-CAN communication
	24	B-CANL	J11-3	BCANL	BCANL	
	25	COM1	J11-2	COM1	COM1	
	26	PE	-	-	-	

Control Cable Terminal			Communication Board		Terminal	Function
XT	Pin No.	Name	Pin No.	Name		
XT3	1	DO1	J12-1	DO1	Digital output 1	DO output
	2	DO2	J12-3	DO2	Digital output 2	
	3	DO3	J12-5	DO3	Digital output 3	
	4	DO4	J12-7	DO4	Digital output 4	
	5 to 8	DO_ COM	J12-8	COM2	DO common terminal/24 VDC power grounding	

Table 4–11 Correspondence between control cable terminals XT2 and XT3 and the communication board (applicable for the 2510 kW single-branch model)

Control Cable Terminal			Communication Board		Terminal	Function
XT	Pin No.	Name	Pin No.	Name		
XT2	1	ES1-NC	DB1-J33-1	GND	Common terminal of remote emergency stop	Remote emergency stop switch (normally closed) Terminals 1 and 4 are shorted upon delivery.
	2	ES1-NC	DB2-J33-1	GND	-	
	3	ES1-NC	DB2-J33-10	EPO_DI1 DI1	-	
	4	ES1-NC	DB1-J33-10	EPO_DI1 DI1	Remote emergency stop input	
	5	DI1	CNB1-J11-15	DI1	Digital input 1	DI (optional functions: start, stop, standby, and discharge)
	6	DI2	CNB1-J11-17	DI2	Digital input 2	
	7	DI3	CNB1-J11-19	DI3	Digital input 3	
	8	DI4	CNB1-J11-21	DI4	Digital input 4	
	9 to 12	DI_COM	CNB1-J11-13	COM2	24 VDC battery grounding	
	13	ES1-DO	-	-	Emergency stop output signal	Emergency stop output terminal
	14	ES1-DO	-	-	Common terminal of emergency stop output signal	

Control Cable Terminal			Communication Board		Terminal	Function
XT	Pin No.	Name	Pin No.	Name		
XT2	15	AI+	CNB1-J12-11	AI1+	Analog input positive	AI terminal 1
	16	AI–	CNB1-J12-12	AI1–	Analog input negative	
	17	E-485+	CNB1-J11-9	E485_+	EMS_485+	EMS-RS485 communication
	18	E-485–	CNB1-J11-11	E485_–	EMS_485–	
	19	COM1	CNB1-J11-10	COM1	COM1	
	20	PE	-	-	-	
	21	B-485+	CNB1-J11-5	B485_+	BMS_485+	BMS-RS485 communication
	22	B-485–	CNB1-J11-7	B485_–	BMS_485–	
	23	COM1	CNB1-J11-6	COM1	COM1	
	24	PE	-	-	-	
	25	B-CANH	CNB1-J11-1	BCANH	BCANH	BMS-CAN communication
	26	B-CANL	CNB1-J11-3	BCANL	BCANL	
	27	COM1	CNB1-J11-2	COM1	COM1	
	28	PE	-	-	-	
XT3	1	DO1	CNB1-J12-1	DO1	Digital output 1	DO output
	2	DO2	CNB1-J12-3	DO2	Digital output 2	
	3	DO3	CNB1-J12-5	DO3	Digital output 3	
	4	DO4	CNB1-J12-7	DO4	Digital output 4	
	5 to 8	DO_COM	CNB1-J12-8	COM2	DO common terminal/24 VDC power grounding	

Table 4–12 Correspondence between control cable terminals XT2 and XT3 and the communication board (applicable for the 2510 kW dual-branch model)

Control Cable Terminal			Communication Board		Terminal	Function
XT	Pin No.	Name	Pin No.	Name		
XT2	1	ES1-NC	DB1-J33-1	GND	Common terminal of remote emergency stop	Remote emergency stop switch (normally closed) Terminals 1 and 4 are shorted upon delivery.
	2	ES1-NC	DB2-J33-1	GND	-	
	3	ES1-NC	DB2-J33-10	EPO_DI1 DI1	-	
	4	ES1-NC	DB1-J33-10	EPO_DI1 DI1	Remote emergency stop input	
	5	DI1	CNB1-J11-15	DI1	Digital input 1	Master DI (optional functions: start, stop, standby, and discharge)
	6	DI2	CNB1-J11-17	DI2	Digital input 2	
	7	DI3	CNB1-J11-19	DI3	Digital input 3	
	8	DI4	CNB1-J11-21	DI4	Digital input 4	
	9 to 12	DI_COM	CNB1-J11-13	COM2	24 VDC battery grounding	
	13	ES1-DO	-	-	Emergency stop output signal	Master emergency stop output terminal
	14	ES1-DO	-	-	Common terminal of emergency stop output signal	

Control Cable Terminal			Communication Board		Terminal	Function
XT	Pin No.	Name	Pin No.	Name		
XT2	15	AI+	CNB1-J12-11	AI1+	Analog input positive	Master AI terminal 1
	16	AI–	CNB1-J12-12	AI1–	Analog input negative	
	17	E-485+	CNB1-J11-9	E485_+	EMS_485+	Master EMS-RS485 communication
	18	E-485–	CNB1-J11-11	E485_–	EMS_485–	
	19	COM1	CNB1-J11-10	COM1	COM1	
	20	PE	-	-	-	
	21	B-485+	CNB1-J11-5	B485_+	BMS_485+	Master BMS-RS485 communication
	22	B-485–	CNB1-J11-7	B485_–	BMS_485–	
	23	COM1	CNB1-J11-6	COM1	COM1	
	24	PE	-	-	-	
	25	B-CANH	CNB1-J11-1	BCANH	BCANH	Master BMS-CAN communication
	26	B-CANL	CNB1-J11-3	BCANL	BCANL	
	27	COM1	CNB1-J11-2	COM1	COM1	
	28	PE	-	-	-	

Control Cable Terminal			Communication Board		Terminal	Function
XT	Pin No.	Name	Pin No.	Name		
XT2	29	ES1-DO	DB2-J34-8	-	Emergency stop output signal	Slave emergency stop output terminal
	30	ES1-DO	DB2-J34-16	-	Common terminal of emergency stop output signal	
	31	E-485+	CNB2-J11-9	E485_+	EMS_485+	Slave EMS-RS485 communication
	32	E-485–	CNB2-J11-11	E485_–	EMS_485–	
	33	COM1	CNB2-J11-10	COM1	COM1	
	34	PE	-	-	-	
	35	B-485+	CNB2-J11-5	B485_+	BMS_485+	Slave BMS-RS485 communication
	36	B-485–	CNB2-J11-7	B485_–	BMS_485–	
	37	COM1	CNB2-J11-6	COM1	COM1	
	38	PE	-	-	-	
	39	B-CANH	CNB2-J11-1	BCANH	BCANH	Slave BMS-CAN communication
	40	B-CANL	CNB2-J11-3	BCANL	BCANL	
	41	COM1	CNB2-J11-2	COM1	COM1	
	42	PE	-	-	-	
	43	DI1	CNB2-J11-15	DI1	Digital input 1	Slave DI
	44	DI2	CNB2-J11-17	DI2	Digital input 2	
	45-46	COM2	CNB2-J11-13	COM2	24 VDC battery grounding	

Control Cable Terminal			Communication Board		Terminal	Function
XT	Pin No.	Name	Pin No.	Name		
XT3	1	DO1	CNB1-J12-1	DO1	Digital output 1	Master DO
	2	DO2	CNB1-J12-3	DO2	Digital output 2	
	3	DO3	CNB1-J12-5	DO3	Digital output 3	
	4	DO4	CNB1-J12-7	DO4	Digital output 4	
	5 to 8	DO_COM	CNB1-J12-8	COM2	DO common terminal/24 VDC power grounding	
	9	DO1	CNB2-J12-1	DO1	Digital output 1	Slave DO
	10	DO2	CNB2-J12-3	DO2	Digital output 2	
	11-12	DO_COM	CNB2-J12-8	COM2	DO common terminal/24 VDC power grounding	

Terminals on the communication board

- **AI terminals**

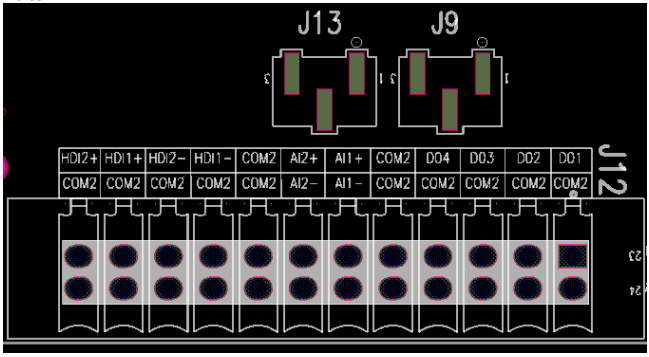


Figure 4-17 AI terminals (J12)

Table 4–13 AI terminals

Pin No.	Name	Terminal	Current/voltage signal selection terminal[1]	Function
12	AI1–	Analog input 1	J13	Wiring by twisted pair • Current input: ±20 mA; input impedance: 500 Ω • Voltage input: ± 10 VDC; input impedance: 200 kΩ
11	AI1+			
14	AI2–	Analog input 2	J9	
13	AI2+			

Note

When J13 and J9 are shorted to pins 1 and 2, the AI terminal inputs the voltage signal. No matter whether pin 2 or 3 is shorted, the AI terminal inputs the current signal.

- **DI/DO terminals**

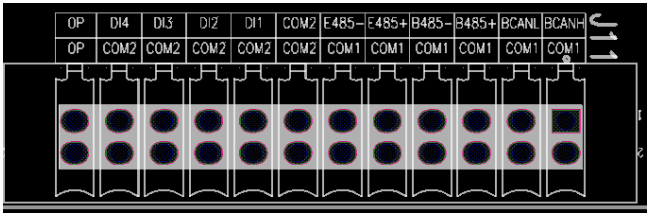


Figure 4-18 DI/DO terminals (J11)

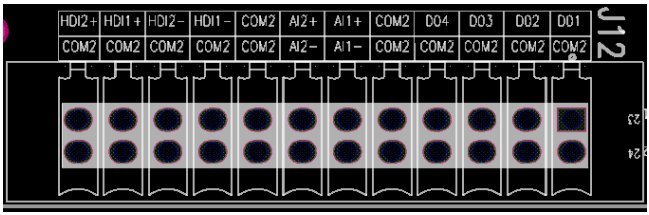


Figure 4-19 DI/DO terminals (J12)

Table 4–14 DI/DO terminals

Pin No.	Name	Terminal	Description	Function
J11-13 to J11-14	COM2	COM2	24 VDC battery grounding	-
J11-23 to J11-24	OP	OP	DI common terminal	DI interface: • Input impedance: 2.0 kΩ • Input frequency: 0 Hz to 100 Hz • Imax: 15 mA • 24 VDC logic level: 0: < 5 V; 1: > 15 V • The S2 jumper is driven by an external or internal power supply. ON indicates it is driven by an internal power supply. OFF indicates it is driven by an external power supply. DO interface: • Output type: OC • Output frequency: 0 Hz to 100 Hz • Maximum load: 20 mA • Output voltage range: Based on the external input 24 VDC power supply
J12-1	DO1	DO1	Digital output 1	
J11-15	DI1	DI1	Digital input 1	
J12-3	DO2	DO2	Digital output 2	
J11-17	DI2	DI2	Digital input 2	
J12-5	DO3	DO3	Digital output 3	
J11-19	DI3	DI3	Digital input 3	
J12-7	DO4	DO4	Digital output 4	
J11-21	DI4	DI4	Digital input 4	
J11-16 and J11-18	COM2	COM2	24 VDC battery grounding	-
J11-20 and J11-22	COM2	COM2	24 VDC battery grounding	-
J12-9 to J12-10	COM2	COM2	24 VDC battery grounding	They are internal control cables of the PCS and their wirings cannot be modified. Incorrect wiring may cause PCS error. These cables are connected to the user adapter board and can realize carrier synchronization and parallel CAN communication through the parallel interface J8 on the user adapter board.
J12-15 to J12-16	COM2	COM2	24 VDC battery grounding	
J12-17	HDI1	HDI_1–	-	
J12-19	HDI2	HDI_2–	-	
J12-21	HDO1	HDO_1+	-	
J12-23	HDO2	HDO_2+	-	

- **Terminals for communication with HMI**

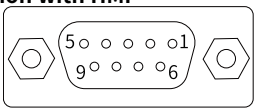


Figure 4-20 Terminals for communication with HMI (J11)

Table 4–15 Terminals for communication with HMI

Pin No.	Name	Terminal
1	HMI_485–	RS485– connecting HMI
2	HMI_485+	RS485+ connecting HMI
3 to 6, and 9	-	-
7	HMI_485–	RS485– connecting HMI

Pin No.	Name	Terminal
8	HMI_485+	RS485+ connecting HMI
10 to 11	PE1	Grounding terminal

Note

Pins 1 and 2 are connected to the IT6000 series touch screen of Inovance. Pins 7 and 8 are connected to the IT7000 series touch screen of Inovance.

- **Communication terminals**

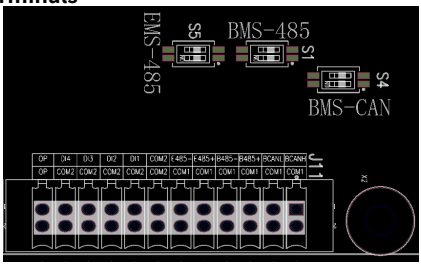


Figure 4-21 Communication terminals and DIP switch

Table 4–16 Pins of communication terminal

Pin No.	Name	Terminal	Description	Function	Termination resistor switch (turned on when the switch is set to ON)
1	BCANH	BMS_CANH_A	BMS_CANH_A bus high level	Max. transmission distance: 1200 m Bus: CAN2.0 bus Level: 5 VDC standard level Bus termination resistor: 124 Ω Max. communication rate: 1 Mbps Max. number of nodes: 32 (without relay)	S4 (twisted pair)
2 and 4	COM1	COM1	Reference ground		
3	BCANL	BMS_CANL_A	BMS_CANL_A bus low level		
5	B485+	BMS_485+	BMS RS485 bus positive	Max. transmission distance: 1200 m Bus: RS485 bus Level: 5 VDC standard level Bus termination resistor: 124 Ω Max. communication rate: 112.5 kbps Max. number of nodes: 32 (without relay)	S1 (twisted pair)
6 and 8	COM1	COM1	Reference ground		
7	B485–	BMS_485–	BMS RS485 bus negative		

Pin No.	Name	Terminal	Description	Function	Termination resistor switch (turned on when the switch is set to ON)
9	E485+	EMS_485+	EMS RS485 bus positive	Max. transmission distance: 1200 m Bus: RS485 bus Level: 5 VDC standard level Bus termination resistor: 124 Ω Max. communication rate: 115.2 kbps Max. number of nodes: 32 (without relay)	S5 (twisted pair)
10 and 12	COM1	COM1	Reference ground		
11	E485–	EMS_485–	EMS RS485 bus negative		

4.6.2 Wiring of External Control Power Supply

The PCS adopts internal and external power supplies as the AC control power supply. This section describes how to wire the external control power supply.

Caution

- Ensure that the PCS is de-energized (when a control power supply is used, the bus capacitor has a voltage of about 60 V).
- Measure the grounding resistance and ensure that it is less than 0.1 Ω.

As shown in the figure below, connect the external cable to the corresponding terminal block on the cabinet through the hole at the bottom of the cabinet. Ensure that the power cable is connected properly.

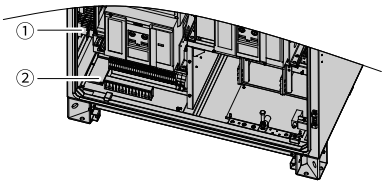


Figure 4-22 Wiring of external control power supply (applicable for the 1725 kW model)

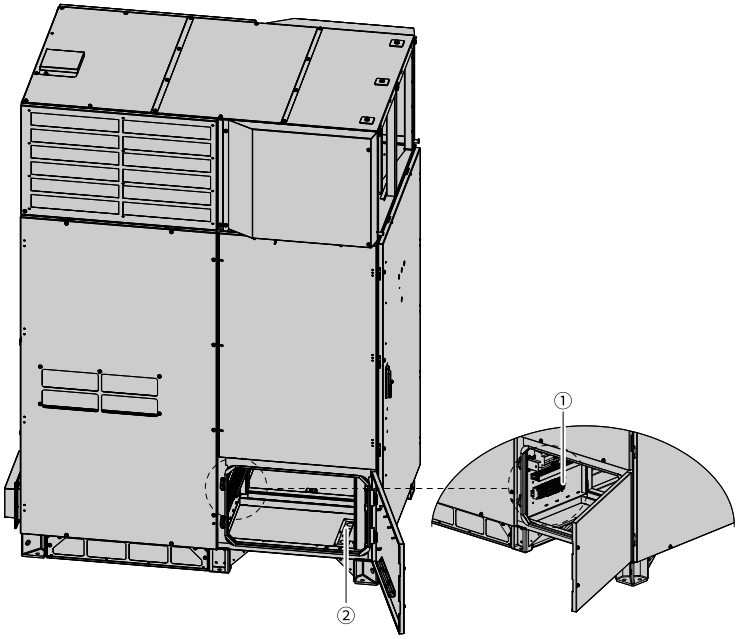


Figure 4-23 Wiring of external control power supply (applicable for the 2510 kW model)

Table 4–17 Wiring of external control power supply

No.	Name
①	External control power supply cable socket XT1
②	External control power supply cable hole at the bottom of the cabinet

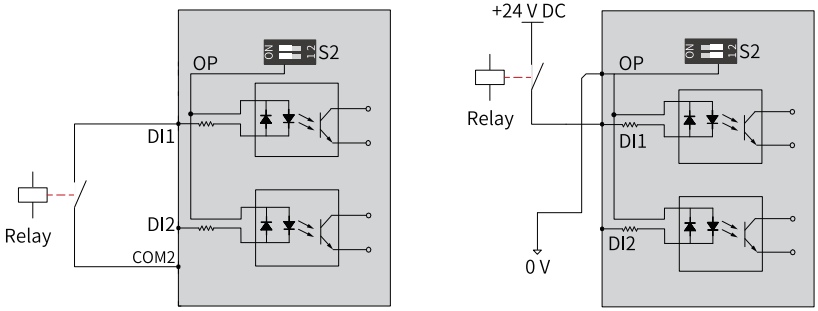
4.6.3 Wiring of DI and DO Terminals

Note

- The following takes wiring on the communication board as an example. For how to wiring on the control cable terminal, see the **correspondence between control cable terminals XT2 to XT3 to terminals on the communication board** of section *"4.6.1 Communication and I/O Terminals" on page 60*, and perform wiring correctly.
- COM2 on the communication board corresponds to 5/6/7/8 (DO_COM) of the control cable terminal XT3.

Wiring of DI1 to DI4

- **Wiring of relay dry contacts**
  The relay dry contacts can be connected to the internal 24 VDC power supply of the PCS through the OUT port or to an external 24 VDC power supply.
  - The internal 24 VDC power supply of the PCS is most commonly used for wiring. In this mode, you need to turn the S2 DIP switch of the PCS to the ON position.
  - When an external 24 VDC power supply is used, the relay dry contacts need to be connected to the OP terminal on the communication board.



Using an internal 24 V power supply　　Using an external 24 V power supply

Figure 4-24 Wiring of relay dry contacts

- **Sink wiring**
  In this mode, the internal 24 VDC power supply of the PCS is used for wiring. You need to turn the S2 DIP switch of the PCS to the ON position, and connect the COM2 terminal to the 0 V terminal of the external controller.

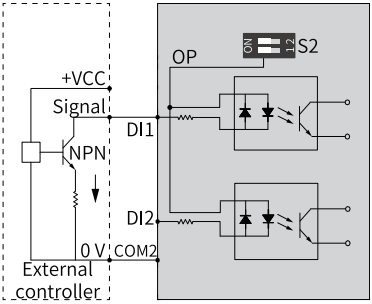
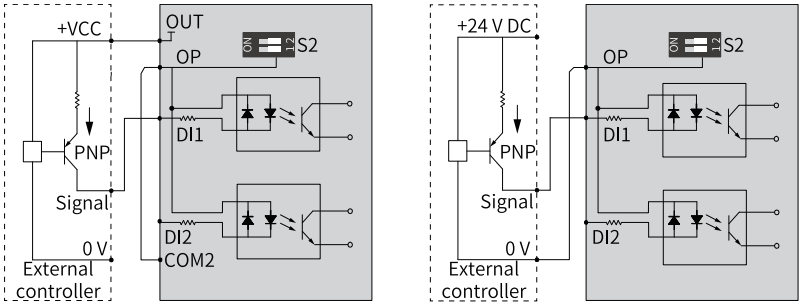


Figure 4-25 Sink wiring

- **Source wiring**

In this mode, you need to turn the S2 DIP switch of the PCS to the OFF position. Connect the contacts to the internal 24 VDC power supply of the PCS through the OUT port or to an external 24 VDC power supply.



Using an internal 24 V power supply

Using an external 24 V power supply

Figure 4-26 Source wiring

Note

OP and OUT terminals are not connected to XT2, so the source wiring mode is used. If it is necessary to connect to the OP or OUT terminal, connect them on the communication board.

Wiring of DO terminals

- **Load being relay**

Caution

To use the DO terminal to drive a relay, connect a snubber diode to both ends of the relay coil. Otherwise, the 24 VDC power supply will be damaged immediately once there is digital output. The drive voltage should be less than 24 VDC and the current should be less than 20 mA.

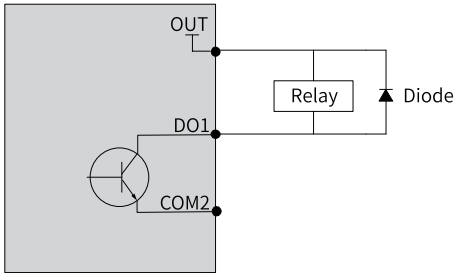


Figure 4-27 Wiring of DO terminals

- **Load being photocoupler**

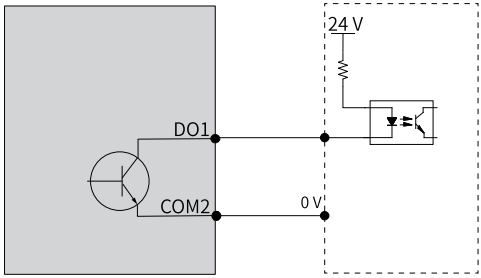


Figure 4-28 Wiring of connecting DO terminals to a photocoupler

4.6.4 Wiring of AI Terminals

Note

The following takes wiring on the communication board as an example. For how to wiring on the control cable terminal, see the **correspondence between control cable terminals XT2 to XT3 to terminals on the communication board** of section *"4.6.1 Communication and I/O Terminals" on page 60*, and perform wiring correctly.

The PCS has two AIs and their wiring method is the same. The following describes how to wire the AI1 terminal.

- **Voltage signal as input**
  Short J9 to pins 2 and 3.

  Weak analog voltage signals are prone to external interference. Therefore, a shielded cable is required, and the wiring distance must be as short as possible (no longer than 5 m), as shown in *"Figure 4–30 Wiring when AI input is current signal" on page 78*. In scenarios where analog signals experience severe external

interference, install a filter capacitor or a ferrite core on the analog signal source. Connect the shield of the AI terminal to the PE terminal on the power supply side.

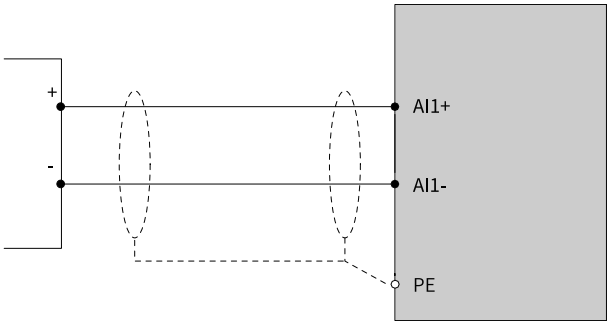


Figure 4-29 Wiring when AI input is voltage signal

- **Current signal as input**
  Short J19 to pins 1 and 2. AI1+ is current input and AI1– is current output.

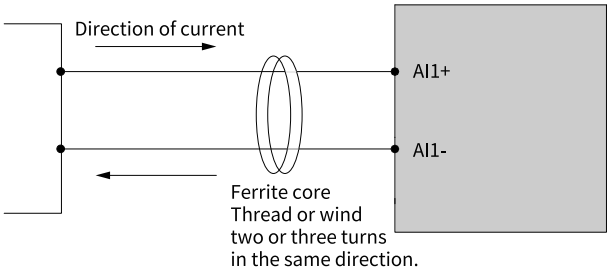


Figure 4-30 Wiring when AI input is current signal

4.6.5 Wiring of HDI and HDO Terminals

Caution

HDI and HDO are internal control terminals of the PCS and their wirings cannot be modified. Incorrect wiring may cause PCS error.

Wiring method in parallel mode:

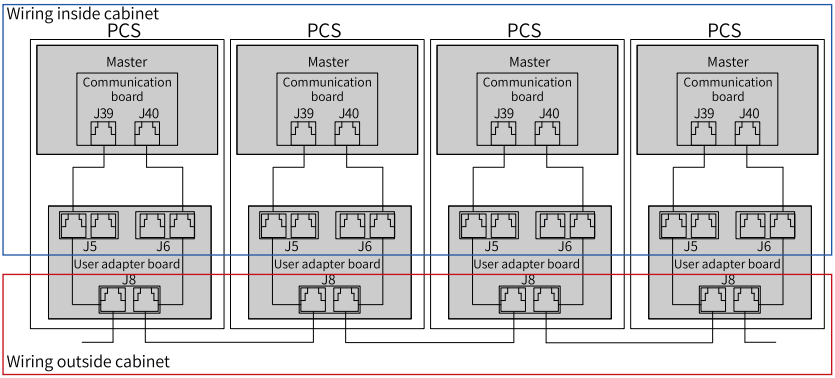


Figure 4-31 Carrier synchronization connection (applicable for the 1725 kW model)

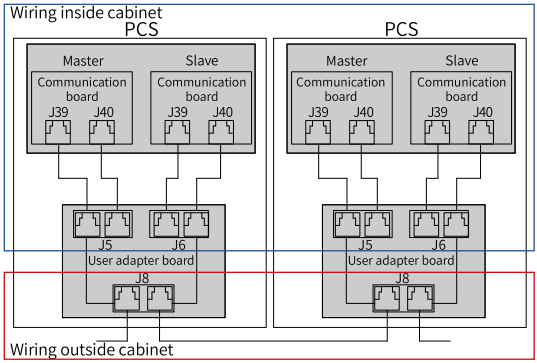


Figure 4-32 Carrier synchronization connection (applicable for the 2510 kW model)

4.7 Wiring of External Socket

For commissioning convenience, the PCS provides a 300-W socket for computer commissioning.

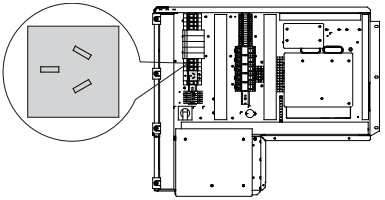


Figure 4-33 External socket

Caution

The connected load must be less than 300 W; otherwise, the PCS may fail.

4.8 Blocking Cable Outlet Holes

After the cable installation is completed, block the cable outlet holes (including secondary inlet holes and DC inlet holes) with fire-resistance mud. The fire-resistance mud is pressed tightly around the cable without any gap to prevent small animals or air from entering the cabinet to generate condensation.

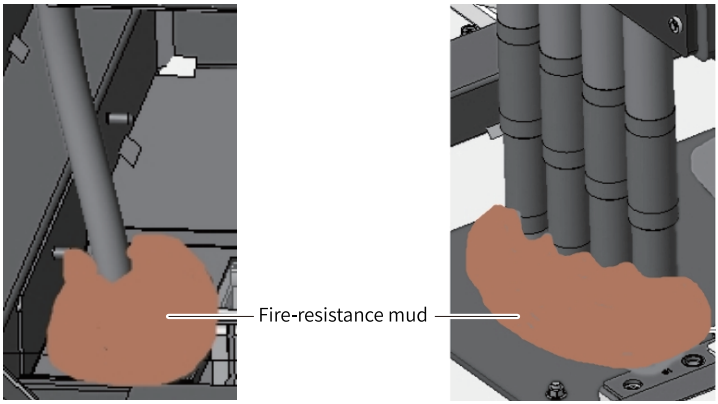


Figure 4-34 Blocking cable outlet holes

Caution

Check the fire-resistance mud periodically. If the mud falls off, small animals or air may enter the cabinet to generate condensation, which will damage the PCS.

4.9 Inspection After Wiring

After installation, check and measure the following items to avoid equipment damage and property loss.

Table 4–18 Post-wiring inspection checklist

No.	Item	Checked
1	Before measurement, the switches on the battery side and the grid side are turned off to ensure that the DC side and AC side of the PCS are de-energized.	☐
2	The polarity of connection and the AC phase sequence between the storage battery and the PCS are correct and the wiring is secured. The inter-phase resistance must be megohms. Otherwise, check the circuits.	☐
3	The external control cable, grounding cable, and communication cable are secured.	☐
4	The grounding cable is intact, free of damage or crack. The grounding resistance is less than 0.1 Ω.	☐
5	The installation area is free of tools or foreign matters.	☐
6	The fire-resistance mud is pressed tightly around the cable without any gap to prevent small animals or air from entering the cabinet to generate condensation.	☐

5 Initial Power-on and Operation

5.1 Inspection Before Initial Power-on

To ensure the PCS safety, upon initial power-on or after repair, check the following items.

Table 5–1 Installation checklist

No.	Item	Checked
1	The installation and operation environments meet the requirements. See *"3.2.1 Installation Environment Requirements" on page 36* and *"3.2.2 Installation Site Requirements" on page 36*.	☐
2	The PCS is fixed properly on the floor. See *"3.4 Installing the PCS" on page 42*.	☐
3	The PCS is grounded properly.	☐
4	The grounding busbar, DC positive and negative electrode busbar, and AC-side busbar are connected properly and fixed firmly.	☐
5	The cable trench bracket is installed properly and the cable layout meets the requirements.	☐
6	There is no tool, foreign object, or drilling debris left inside the cabinet.	☐
7	The voltage across the storage battery is less than 1500 VDC. According to the corresponding specifications and models, the voltage across the storage battery is within the DC voltage range, and the positive and negative polarity connections are correct.	☐
8	According to the corresponding specifications and models, the AC-side voltage is within the range. For details, see *"1.2 Technical Specifications" on page 14*.	☐
9	The cables are not damaged or scratched, and the filter screen of the air vent is in good condition.	☐
10	The emergency stop switch of the PCS is released.	☐
11	The entire path of the battery connected to the DC input side of the PCS is detected through insulation test to ensure that there is no ground fault.	☐
12	The circuit breakers on both the AC side and DC side have been disconnected, that is, they are all in the "OFF" position.	☐
13	All internal baffle plates have been installed.	☐
14	All device outer covers are closed.	☐



- During power-on of the PCS, connect the control power supply first, check the PCS for any fault, and then connect the main power supply.
- During power-off, disconnect the main power supply first and then the control power supply; otherwise, the device may be damaged.

5.2 Power-on Procedure

The PCS can be powered by a 400 VAC power supply, a grid, or a DC battery. Connect the AC side and DC side of the PCS correctly.

1. Set PCS parameters and running mode through the EMS.
2. Power on the PCS. By default, the PCS is in the stop state and the main switches on the AC side and DC side are off. Send a "Standby" command on the EMS. Then, switches on the AC side and DC side of the PCS are automatically turned on and the PCS is powered on. Send a "Run" command on the EMS. The PCS automatically runs based on the current mode without the need of manual control.



Start the PCS in strict accordance with the preceding steps. Failure to comply may result in PCS damage or failure.

6 Stop Procedure



- Before removing the protective baffle, ensure that the PCS is de-energized (when a control power supply is used, the bus capacitor has a voltage of about 60 V).
- In normal situations, turn off the PCS in accordance with the normal stop procedure.
- In case of emergency, turn off the PCS in accordance with the emergency stop procedure to ensure rapid intervention and protect the PCS and peripheral equipment.

6.1 Normal Stop Procedure

The normal stop procedure is as follows:

1. The EMS delivers the "Stop" command and the PCS stops.
2. If the PCS is powered by an external power supply, disconnect the external power supply.



Place a warning sign at the disconnection part to prevent accidental power-on.

6.2 Emergency Stop Procedure

In case of emergency, stop the PCS as follows:

1. Press the emergency stop switch on the cabinet door to switch off the PCS, with the AC switch and DC switch inside the PCS being disconnected automatically.
2. If the PCS is powered by an external power supply, disconnect the external power supply.

Note

The emergency stop switch can be used only in emergency. Use the stop command sent by the EMS during normal operation.

7 Fault List

IES900 series 1500 V PCS provides comprehensive protection and warning functions. Once a fault occurs, the fault information can be viewed through the HMI software. Before taking any measures, record the information displayed on the HMI software.

Before asking Inovance engineers for help, you may try troubleshooting by referring to the following table. Do not disassemble any parts during troubleshooting. If the fault persists, contact Inovance's agent or Inovance directly.

Troubleshooting levels and definition:

- Fault: A fault indicates that the PCS, grid, battery, or other external conditions fail and manual troubleshooting is needed. In this case, the PCS automatically stops.
- Warning: A warning indicates that the PCS, grid, battery, or other external conditions fail and manual troubleshooting is needed. In this case, the PCS does not automatically stop.

Fault reset is classified into auto reset and manual reset.

- Auto reset means that the system automatically clears faults at a specified interval. If the fault conditions are cleared, the system exits the fault state. If the fault conditions persist, the system reports the fault again. A parameter can be set to specify the limit of auto reset attempts. After the auto reset attempts for a fault reach the limit, the fault will not be automatically reset. In this case, manual reset is needed and the limit of auto reset attempts will also be reset.
- Manual reset means that the user must manually press the reset button after clearing the fault cause to resume operation of the PCS.

Table 7–1 Troubleshooting

Fault Description	Possible Cause	Troubleshooting
Energy storage battery inversely connected	The battery and PCS are connected inversely.	Check whether the battery is connected in the correct polarity.
DC-side half bus hardware overvoltage	• The half bus voltage is too high. • The bus voltage is not balanced between the positive half and the negative half of the bus.	• Check whether the battery voltage is normal. • Check whether the grid voltage is normal.
AC hardware overcurrent	• The AC side is short-circuited. • Impact load occurs.	Contact Inovance.
IGBT A-phase fault	IGBT-Desat protection takes effect because the IGBT A-, B-, or C-phase is short-circuited.	Contact Inovance[1].

Fault Description	Possible Cause	Troubleshooting
IGBT B-phase fault	IGBT-Block protection because an error occurs during power-on self-test of the IGBT A-, B-, or C-phase.	Contact Inovance[1].
IGBT C-phase fault	IGBT-OT takes effect because the IGBT A-, B-, or C-phase temperature exceeds the temperature protection threshold.	Contact Inovance[1].



- [1]: In case of IGBT faults, stop the device and contact the provider technicians. Do not reset the product without authorization; otherwise, the product may be damaged.
- In case of an IGBT B-phase self-test error, check the IGBT fault location based on the brightest red indicator on the adapter board. For other faults, the fault signal indicator on the adapter board cannot be used for reference.

Fault Description	Possible Cause	Troubleshooting
AC-side phase-A Hall disconnected	The terminal is disconnected.	Contact Inovance.
AC-side phase-B Hall disconnected	The terminal is disconnected.	Contact Inovance.
AC-side phase-C Hall disconnected	The terminal is disconnected.	Contact Inovance.
DC-side Hall disconnected	The terminal is disconnected.	Contact Inovance.
Fuse fault	• The fuse contact is not connected properly. • The fuse is blown.	• Check whether the fuse is loose. • Replace the fuse.
DC-side switch fault	• The switch contact is stuck. • The switch feedback signal cable is disconnected. • The switch control signal cable is disconnected.	• Check whether the switch contact is not stuck. • Check whether the switch control signal and feedback signal connections are normal.
DC-side full bus software overvoltage	• The grid voltage is too high. • High battery voltage	• Check whether the battery voltage is within the normal range. • Check whether the grid voltage is normal.

Fault Description	Possible Cause	Troubleshooting
DC-side full bus software undervoltage	• The bus voltage is too low during running. • Low battery voltage	• Check whether the battery voltage is within the normal range. • Check whether the grid voltage is normal.
Large voltage deviation on half bus	• Deviation occurs between positive and negative half bus voltages. • The bus capacitor is aged.	Contact Inovance.
DC-side software overcurrent	• The DC side is short-circuited. • The DC load is too heavy.	Contact Inovance.
AC overvoltage in the grid	The grid voltage is greater than the AC overvoltage threshold.	Check whether the grid voltage is normal.
AC undervoltage in the grid	The grid voltage is less than the AC undervoltage threshold.	Check whether the grid voltage is normal.
AC overvoltage in off-grid mode	The grid-disconnected AC voltage is greater than the AC overvoltage threshold.	Contact Inovance.
AC undervoltage in off-grid mode	The grid-disconnected AC voltage is less than the AC undervoltage threshold.	Contact Inovance.
AC overfrequency in grid-connected mode	The grid frequency is greater than the overfrequency threshold.	Check whether the grid voltage is normal.
AC underfrequency in grid-connected mode	The grid frequency is less than the underfrequency threshold.	Check whether the grid voltage is normal.
Overfrequency in AC software	• The AC side is short-circuited. • The AC load is too heavy.	Contact Inovance.
Output phase loss	• The main circuit output cables are loose. • The main circuit output is short-circuited to ground.	Check whether the three-phase output wiring is normal.
SPD fault	The SPD is damaged.	• Check whether the SPD is wired properly. • Check whether the SPD is damaged.
Silo fault	Power load operates in isolation after it is disconnected from the grid.	Contact Inovance.
Large current control deviation	• The terminal is disconnected. • The control loop is saturated. • The main circuit voltage is abnormal.	Contact Inovance.

Fault Description	Possible Cause	Troubleshooting
Unbalanced grid voltage	• The amplitude of the three-phase grid voltage exceeds the allowed range. • Grid input phase loss occurs.	• Check whether the grid voltage is normal. • Check whether grid voltage phase loss occurs.
AC-side DC component out of limit	• The DC component in the three-phase current is out of limit. • DC deviation occurs in current sampling.	Contact Inovance.
High ambient temperature	• The ambient temperature exceeds the protection threshold. • The fan is faulty. • The air filter is blocked.	• Check whether the fan works properly. • Check whether the air filter is blocked. • Check whether the temperature sensor works properly.
Low ambient temperature	The ambient temperature is lower than the protection threshold.	Check whether the temperature sensor works properly.
IGBT over-temperature	• The ambient temperature is too high. • The current is excessive.	• Check whether the fan works properly. • Check whether the air filter is blocked. • Check whether the current is within the normal range. • Check whether the temperature sensor works properly.
Incorrect voltage after AC switch closing	• The battery voltage does not match the grid voltage. • There is voltage from the grid in grid-disconnected mode.	Contact Inovance.
Reactor over-temperature	• Ambient temperature too high • The current is excessive. • The sensor is disconnected during temperature sampling.	• Check whether the fan works properly. • Check whether the air filter is blocked. • Check whether the current is within the normal range. • Check whether the temperature sensor works properly.
Large AD zero drift	The zero drift is excessively large.	Contact Inovance.

Fault Description	Possible Cause	Troubleshooting
Low insulation resistance	The insulation resistance is too low.	• Check whether the main circuit is short-circuited to ground. • Contact Inovance.
Insulation detection fault	The insulation detection switch command is different from the feedback.	Check whether the insulation detection circuit is wired properly.
BMS communication fault	The communication cable between the communication board and the BMS unit is disconnected.	Check whether the communication cable between the communication board and the BMS unit is properly connected.
Parallel communication fault	The communication between the control board and other PCSs fails.	Check whether the communication cable between the current PCS and other PCSs is connected properly.
DC-side pre-charge contactor fault	• The contactor contact is stuck. • The contactor feedback signal cable is disconnected. • The contactor control signal cable is disconnected.	• Check whether the contactor contact is stuck. • Check whether the contactor control signal and feedback signal connections are normal.
AC-side pre-charge contactor fault	• The contactor contact is stuck. • The contactor feedback signal cable is disconnected. • The contactor control signal cable is disconnected.	• Check whether the contactor contact is stuck. • Check whether the contactor control signal and feedback signal connections are normal.
CBC overcurrent	The current is excessive.	• Check whether any system circuit is short-circuited. • Use the clamp meter to measure the current and check whether the current is excessive.
Equipment overload	The PCS runs in overcurrent mode for too long.	Check whether the operating power of the PCS is within the allowed range.
Grid voltage reversed	The grid wiring is reversed.	Swap any two phases in the three-phase connection.
Bus soft start fault	• The pre-charge contactor fails. • The air switch of the pre-charge circuit is open. • Bus undervoltage • The sampling cable is disconnected.	• Check whether the air switch of the pre-charge circuit is closed. • Check whether the pre-charge circuit contactor is normal. • Check the bus voltage. • Check the sampling cable.

Fault Description	Possible Cause	Troubleshooting
AC-side switch fault	• The switch contact is stuck. • The switch feedback signal cable is disconnected. • The switch control signal cable is disconnected.	• Check whether the switch contact is not stuck. • Check whether the switch control signal and feedback signal connections are normal.
Carrier synchronization fault	The carrier synchronization cable is disconnected.	Check the carrier synchronization wiring.
EMS communication fault	EMS communication is disconnected.	Check whether the EMS communication cable is properly connected.
Three-phase fan fault	• Three-phase fan locked-rotor occurs. • Check whether the three-phase fan power cable is not connected.	• Check whether the fan blades are stuck. • Check whether the fan power cable is connected properly.
Water cooling hydraulic fault	The water tank leaks.	• Check whether the water tank leaks. • Check whether the liquid level in the water tank is too low.
Water pump fault	• The water pump idles. • The water pump locked-rotor occurs. • The water pump does not receive the PWM speed governing signal.	• Check the coolant in the water tank. • Check whether the water pump blades are stuck. • Check the water pump wiring.
Cabinet door fault	The cabinet door is opened.	Check the cabinet door state.
Inner cavity over-temperature	• The inner cavity temperature exceeds the protection threshold. • The fan is faulty. • The air filter is blocked.	• Check the temperature protection threshold. • Check whether the fan is normal. • Check whether the air filter is blocked.
Inner cavity temperature low	• The inner cavity temperature is lower than the protection threshold. • The sensor is disconnected during temperature sampling.	• Check the temperature protection threshold. • Check the temperature sampling cable.
Filter capacitor over-temperature	• The filter capacitor temperature exceeds the protection threshold. • The fan is faulty. • The air filter is blocked.	• Check the temperature protection threshold. • Check whether the fan is normal. • Check whether the air filter is blocked.

Fault Description	Possible Cause	Troubleshooting
Filter capacitor temperature low	• The filter capacitor temperature is lower than the protection threshold. • The sensor is disconnected during temperature sampling.	• Check the temperature protection threshold. • Check the temperature sampling cable.
High battery voltage	The battery voltage is greater than the battery overvoltage threshold.	Check the battery voltage.
Abnormal shutdown of the master	The slave detects that the master stops running.	Contact Inovance.
Inspection board model mismatch	The inspection board model does not match the model code.	Check whether the inspection board model matches the model code.
BMS system fault	A fault occurs on the BMS side.	Check the BMS fault information.
Hardware overcurrent on DC side	• The DC side is short-circuited. • Impact load occurs.	Contact Inovance.
Grid voltage mismatch	The amplitude of the three-phase grid voltage or frequency before startup exceeds the allowed range.	Check whether the grid voltage is normal.
AC/DC voltage mismatch	The AC voltage does not match the DC voltage.	Check whether the battery voltage and grid voltage are normal.
Auxiliary transformer over-temperature	• The auxiliary transformer temperature exceeds the protection threshold. • The fan is faulty. • The air filter is blocked.	• Check the temperature protection threshold. • Check whether the fan is normal. • Check whether the air filter is blocked.
Auxiliary transformer temperature low	• The auxiliary transformer temperature is lower than the protection threshold. • The sensor is disconnected during temperature sampling.	• Check the temperature protection threshold. • Check the temperature sampling cable.
Reactor temperature low	• The ambient temperature is too low. • The sensor is disconnected during temperature sampling.	• Check the temperature protection threshold. • Check the temperature sampling cable.

Fault Description	Possible Cause	Troubleshooting
Circulating fan fault	• More than two DC fans are blocked. • More than two DC fans are disconnected. • The sensor is disconnected during temperature sampling.	• Check whether the DC fan is blocked. • Check whether the DC fan is disconnected.
Internal communication fault	The internal CAN communication is abnormal.	Check whether the communication cable between the control board and the CAN unit is normal.
HMI communication fault	Communication between the PCS and the HMI is abnormal.	Check whether the communication cable between the PCS and the HMI is normal.
EEPROM fault	The E2P drive is abnormal or the E2P is damaged.	Contact Inovance.
FPGA data exchange exception	The SEMC drive is abnormal or the FPGA is damaged.	Contact Inovance.
Leakage current fault	• The disconnection or leakage current Hall sensor is abnormal. • The AC side is short-circuited.	• Check the leakage current sampling cable. • Check the leakage current Hall sensor. • Check the wiring on the AC side.
Emergency stop fault	The local emergency stop button is triggered.	Check whether the local emergency stop button is pressed.
Phase-PE short circuit fault	The phase-PE is short-circuited.	Contact Inovance.
Capacitor voltage resonance fault	Resonance occurs on the AC side.	Contact Inovance.
Humidity too high	• The humidity exceeds the protection threshold. • The heater fails.	• Check the humidity protection threshold. • Check whether the heater is disconnected.
Humidity detection disconnection	The humidity sampling circuit is disconnected.	• Check whether the sampling circuit of the temperature/ humidity module is disconnected. • Check whether the pins 2 and 3 of J14 and J29 on the communication board are short-circuited.

Fault Description	Possible Cause	Troubleshooting
Sampling disconnection on the DC side	• Midpoint sampling disconnection on the DC side • The voltage sampling circuit on the DC side is disconnected.	• Check the midpoint sampling circuit on the DC side. • Check the voltage sampling circuit on the DC side.
Excessive zero sequence loop current	The zero sequence loop current is too large.	Contact Inovance.
Fault on the FPGA side	An OC/OV/CBC/emergency stop/ IGBT fault occurs on the FPGA side.	Contact Inovance.
Heater contactor fault	The heater contactor feedback cable is disconnected.	Check whether the heater contactor feedback cable is disconnected.
Master-slave fault	• The software versions of the master and slave are inconsistent. • Failed to identify the master and slave. • The master and slave roles are conflicting. • The active or reactive power or DC power of the master and salve is inconsistent.	• Check whether the software versions of the master and slave are consistent. • Check whether the master and slave identified by the hardware are consistent. • Check whether the devices are all masters or all slaves. • Check whether the active or reactive power of the master and slave is consistent.
Stop upon external fault	• Check the input level and the set active level. • Compare the input level duration with the set filter time.	• Check whether the input level and the set active level are consistent. • Check whether the input level duration is greater than the set filter time.
Fault of parallel devices in cabinet	• The master inside the cabinet reports that the slave is faulty. • The slave inside the cabinet reports that the master is faulty.	• Master: Check whether the slave has a fault. • Slave: Check whether the master has a fault.
Optical fiber communication fault	• The optical fiber communication is interrupted. • A CRC error occurs during optical fiber communication.	Check whether the optical fiber communication cable is disconnected or reversed.
Inconsistent control mode (dual DCs)	The master and slave control modes are inconsistent.	Check whether the master and slave control modes are consistent.

Fault Description	Possible Cause	Troubleshooting
Reactor fan fault	• The reactor fan is blocked. • The reactor fan cable is disconnected.	• Check whether the blades are stuck. • Check whether the fan power cable is connected properly.
Capacitor harmonic overlimit	The capacitor current harmonic is too large.	Contact Inovance.
IGBT low-temperature	The ambient temperature is too low.	Check whether the temperature sensor works properly.
Water pump power cable fault	The water pump power cable is disconnected.	Check the water pump wiring.
IGBT temperature sampling exception	NTC sampling failed.	Contact Inovance.

Table 7–2 Troubleshooting of Warnings

Fault Description	Possible Cause	Troubleshooting
Low storage battery voltage	Low battery voltage	Check whether the battery voltage is too high or too low.
Inner cavity over-temperature warning	• The inner cavity temperature exceeds the warning threshold. • The fan is faulty. • The air filter is blocked.	• Check the temperature warning threshold. • Check whether the fan is normal. • Check whether the air filter is blocked.
Filter capacitor over-temperature warning	• The filter capacitor temperature exceeds the warning threshold. • The fan is faulty. • The air filter is blocked.	• Check the temperature warning threshold. • Check whether the fan is normal. • Check whether the air filter is blocked.
Auxiliary transformer over-temperature warning	• The auxiliary transformer temperature exceeds the warning threshold. • The fan is faulty. • The air filter is blocked.	• Check the temperature warning threshold. • Check whether the fan is normal. • Check whether the air filter is blocked.
High ambient temperature warning	• The ambient temperature exceeds the warning threshold. • The fan is faulty. • The air filter is blocked.	• Check the temperature warning threshold. • Check whether the fan is normal. • Check whether the air filter is blocked.

Fault Description	Possible Cause	Troubleshooting
IGBT over-temperature warning	• The IGBT temperature exceeds the warning threshold. • The fan is faulty. • The air filter is blocked.	• Check the temperature warning threshold. • Check whether the fan is normal. • Check whether the air filter is blocked.
Reactor over-temperature warning	• The reactor temperature exceeds the warning threshold. • The fan is faulty. • The air filter is blocked.	• Check the temperature warning threshold. • Check whether the fan is normal. • Check whether the air filter is blocked.
Inner cavity fan fault	• The inner cavity fan is blocked. • The inner cavity fan is disconnected.	• Check whether the blades are stuck. • Check whether the fan power cable is connected properly.
RTC error	• The RTC crystal oscillator is abnormal. • The RTC drive is abnormal.	• Check the crystal oscillator. • Check whether the button battery is installed.
IGBT fan fault	• The IGBT fan is blocked. • The IGBT fan is disconnected.	• Check whether the blades are stuck. • Check whether the fan power cable is connected properly.
Heat exchanger fan fault	• The heat exchanger fan is blocked. • The heat exchanger fan is disconnected.	• Check whether the blades are stuck. • Check whether the fan power cable is connected properly.
DC circuit breaker fan fault	• The DC circuit breaker fan is blocked. • The DC circuit breaker fan is disconnected.	• Check whether the blades are stuck. • Check whether the fan power cable is connected properly.
AC circuit breaker fan fault	• The AC circuit breaker fan is blocked. • The AC circuit breaker fan is disconnected. •	• Check whether the blades are stuck. • Check whether the fan power cable is connected properly.
Temperature too high (temperature/ humidity module)	• The temperature exceeds the warning threshold. • The fan is faulty. • The air filter is blocked.	• Check the temperature warning threshold. • Check whether the fan is normal. • Check whether the air filter is blocked.

Fault Description	Possible Cause	Troubleshooting
Temperature detection circuit disconnected (temperature/ humidity module)	The temperature detection circuit is disconnected.	• Check whether the sampling circuit of the temperature/ humidity module is disconnected. • Check whether the pins 2 and 3 of J14 and J29 on the communication board are short-circuited.
EEPROM warning	An EEPROM read/write warning occurs on the ARM side.	Contact Inovance.
Black box exception	A Flash or read/write fault occurs.	Contact Inovance.

8 Maintenance

The influence of the ambient temperature, humidity, dust, and vibration will cause aging of components inside the PCS, which may result in potential faults or shorten the service life of the PCS. Therefore, it is necessary to carry out routine and periodic maintenance.



- Only allow qualified professionals to maintain the PCS.
- The maintenance personnel must comply with local electrical operation regulations.
- The input and output voltages of the PCS are high. Before maintenance, take necessary safety measures.
- Strictly follow correct procedures for maintenance.
- The PCS is completely discharged 60 minutes after its main power supply and control power supply are cut off. Ensure that all cables and the PCS are de-energized before performing any operation (when a control power supply is used, the bus capacitor has a voltage of about 60 V).
- Place a warning sign at the disconnection part to prevent accidental power-on during maintenance.
- During maintenance, the maintenance personnel must wear insulating protective equipment to prevent accidents.

8.1 Daily Inspection Items

Perform daily inspection according to the following checklist.

Table 8–1 Daily inspection checklist

No.	Item	Checked
1	Designate observers to monitor the input and output voltage and current and operation status of the PCS in real time, check the PCS at specified positions, and perform maintenance in time in case of PCS failure or voltage or current exception.	☐
2	• The PCS does not make abnormal noise. • The PCS does not produce odor. • Use a temperature detector to detect the interior temperature of the PCS and ensure that the temperature is normal. • Check that surrounding ventilation, ambient temperature, humidity, and dust of the PCS meet the requirements.	☐

No.	Item	Checked
3	Check that the surface is free of damage. Clean dirt on the surface with water or alcohol, and repaint the surface in case of paint damage. For how to repair the paint of the PCS, see *"8.4 Paint Repair Operation Instructions" on page 106*.	☐
4	• Check the insulation layer of the cable for aging, damage, or other defects. If any defect is detected, enhance the insulation or replace the cable. • Check the wiring bolts for aging, burn, or other defects, and shake them by hand to confirm that they are in a tightened state. • Check internal tubes for aging, crack, or leakage, and supplement the coolant in time or replace the tubes.	☐
5	Check whether the ventilation holes of air-air heat exchanger, water-air heat exchanger, and reactor are blocked, and use compressed gas or strong dust scrubber to remove dust in time.	☐
6	Check whether the PCS filter screen needs to be cleaned or replaced. For details, see *"8.3.2 Replacing (Cleaning) the Filter Screen" on page 104*.	☐
7	Check the fault mark on the surge protection device (SPD). If it is in red, the SPD is damaged and needs to be replaced immediately. If it is in green, the SPD is normal. The position of the SPD is shown in *"Figure 8–1 SPD position (applicable for the 1725 kW model)" on page 99*.	☐

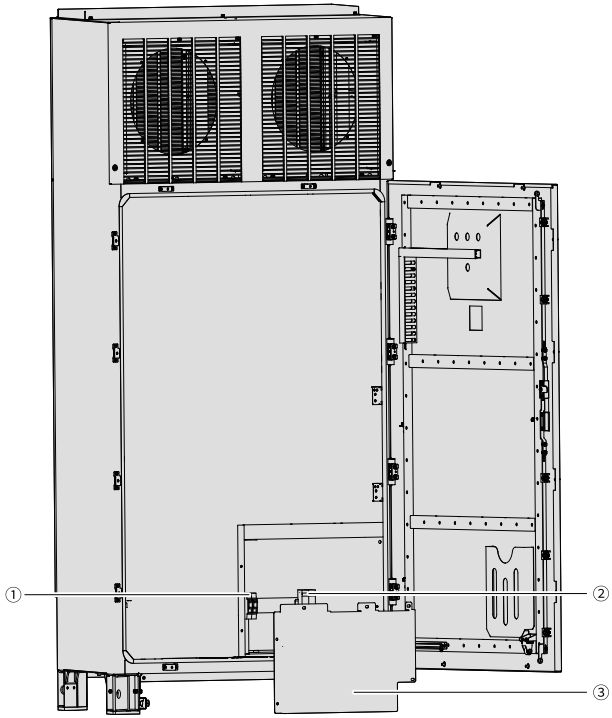


Figure 8-1 SPD position (applicable for the 1725 kW model)

Table 8–2 SPD position (applicable for the 1725 kW model)

No.	Name	No.	Name
①	DC SPD	③	PC protective plate
②	AC SPD	-	-

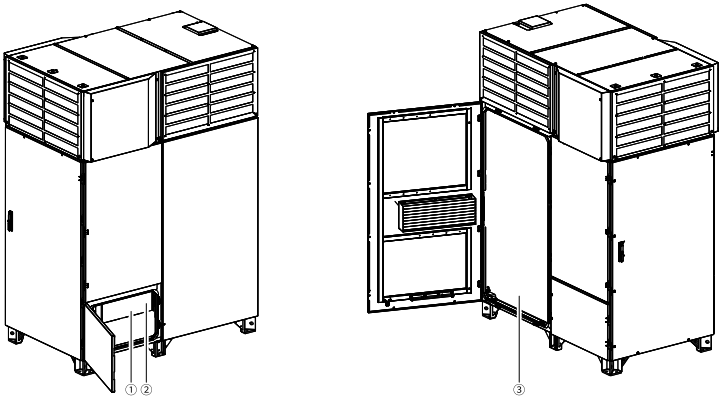


Figure 8-2 SPD position (applicable for the 2510 kW model)

Table 8–3 SPD position (applicable for the 2510 kW model)

No.	Name	No.	Name
①	DC SPD	③	AC SPD
②	PC protective plate	-	-

8.2 Periodic Inspection Items

The PCS has a high IP rating and can be used outdoors. However, long-term operation in harsh environment will age the PCS or damage its internal devices. Regular maintenance and inspection of the PCS and replacement of aged and damaged devices will effectively prolong the service life of the PCS and improve the performance of its internal devices.

Periodic inspection items are those that are difficult to inspect during daily inspection and operation. Check the following items, and take correction measures immediately if any item does not meet the requirements.



- The maintenance periods in the table are recommended only for the routine maintenance of the product. The actual maintenance period depends on the product installation environment. The maintenance period is also affected by the power station scale, location, and ambient environment. If the device runs in windy and dusty environments, shorten the maintenance period and increase the maintenance frequency.
- When the device runs in sandstorm and bad weather, other areas/time periods prone to flocculent pollutants or small mosquitoes, clean the filter screen and water-air heat exchanger in time to ensure normal ventilation of the device.
- When the device runs in desert or other areas with poor environment, shorten the maintenance period. Increase the frequency of exterior cleaning and corrosion and rust removal.
- In desert, check the inside and outside of the PCS carefully and clean it completely after each sandstorm.

Check Item	Item	Cycle
System cleaning	Check whether the humidity and gray scale of the PCS are within their normal ranges. Clean the PCS if necessary.	Half a year
	Check whether the PCS and its internal devices are damaged or deformed.	
	Check whether there is abnormal noise during operation of internal devices.	
	Check whether the temperature inside the PCS is too high.	
	Check whether the air inlet and outlet of the PCS are blocked.	
Internal components	Check whether the circuit board and components are clean.	
Dust removal	Check the heatsink temperature and check for dust. If necessary, use a vacuum cleaner to clean the heat dissipation module.	
Fire-resistance mud	Check whether the fire-resistance mud is pressed tightly around the cable without any gap to prevent small animals or moisture from entering the cabinet and damage the product.	

Check Item	Item	Cycle
Exterior of the cabinet	Check whether the PCS top has any flammable materials.	One year
	Check whether the welding point between the PCS and the foundation steel plate is firm and whether there is corrosion.	
	Check whether the PCS housing is damaged, de-painted or oxidized.	
	Check whether the monitoring window and cabinet door can be opened flexibly.	
	Check whether the sealing strip is fixed properly.	
Inside the cabinet	Check whether there are foreign objects, dust, dirt, and condensed water inside the PCS.	
Air inlet and outlet	Check the heatsink temperature and check for dust. If necessary, use a vacuum cleaner to clean the heat dissipation module.	
Wiring and cable layout	Check whether the cable layout meets the requirements and whether there is a short circuit. In case of any exception, correct it immediately.	
	Check whether all inlet and outlet holes of the PCS are well sealed.	
	Check whether water enters the PCS.	
	Check whether the power cable is loose, and if yes, tighten it according to the specified torque.	
	Check whether the power cable and control cable are damaged, especially whether the skin in contact with the metal surface has cut marks.	
	Check whether the insulation wrapping tape of the power cable terminal falls off.	
Grounding and equipotential bonding	Check whether the grounding connection is correct. The grounding resistance shall not be greater than 4 Ω.	
	Check whether the equipotential connection inside the PCS is correct.	
Fan	Check the running status of the fan.	
	Check whether the fan is blocked.	
	Check whether there is abnormal noise when the fan is running.	
Screw	Check whether there are screws falling inside the PCS.	
Warning sign	Check whether warning signs and labels are clearly visible and free from contamination. Replace them if necessary.	Two years
Cable shield grounding	Check whether the cable shield is in good contact with the insulation sleeve, and whether the grounding copper busbar is fixed properly.	
Corrosion	Check whether there is oxidation or corrosion in the PCS that affects the safe operation of the system.	

8.3 Part Replacement

8.3.1 List of Maintainable Components

Table 8–4 List of maintainable components

No.	Name
1	Filter screen

8.3.2 Replacing (Cleaning) the Filter Screen

Caution

When the device runs in sandstorm weather, other areas/time periods prone to flocculent pollutants or small mosquitoes, clean the filter screen and water-air heat exchanger in time to ensure normal ventilation of the device.

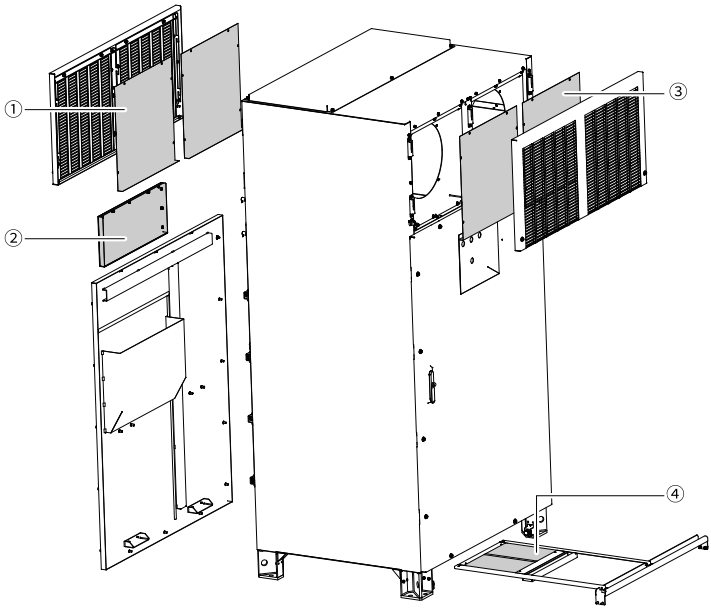


Figure 8-3 Replacing the filter screen (applicable for the 1725 kW model)

Table 8–5 Replacing the filter screen mark (applicable for the 1725 kW model)

No.	Name	No.	Name
①	Fan front filter screen	③	Filter screen of rear air outlet
②	Filter screen of bottom air outlet	④	Fan rear filter screen

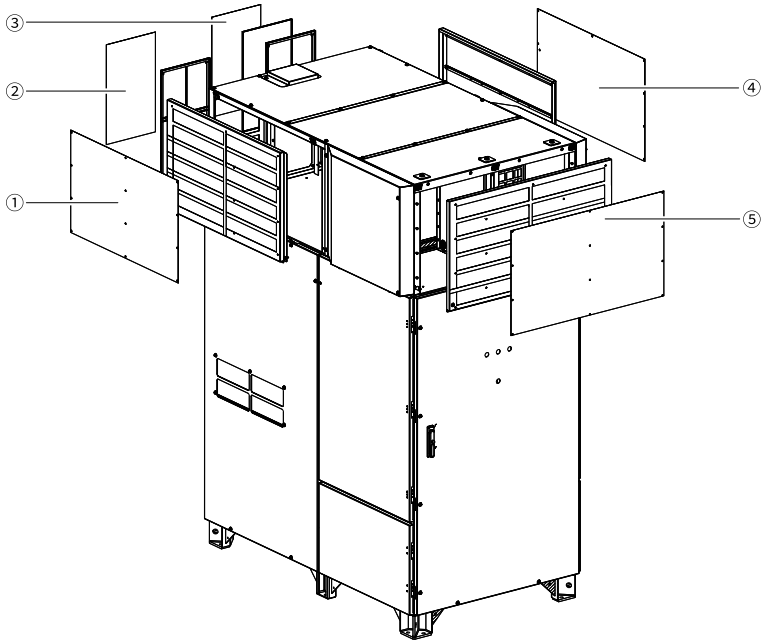


Figure 8-4 Replacing the filter screen (applicable for the 2510 kW model)

Table 8–6 Replacing the filter screen mark (applicable for the 2510 kW model)

No.	Name	No.	Name
①	Filter screen 1 of side air outlet	④	Filter screen 2 of side air outlet
②	Filter screen 1 of rear air outlet	⑤	Fan front filter screen
③	Filter screen 2 of rear air outlet	-	-

Replacing the front and rear filter screens of the fan

1. Remove the front and rear covers.
2. Remove the filter screens to be replaced.
3. Install the new filter screen and the removed cover.

Replacing the filter screen of rear air outlet

1. Remove M5 screws from the rear cover.
2. Remove the rear cover and filter screen.
3. Install the new filter screen and the removed cover.

Replacing the filter screen of bottom air outlet

1. Remove the M6 screws from the bottom cover and support unit.
2. Remove bottom cover and support unit.
3. Remove the filter screen.
4. Install the new filter screen and the removed cover.

Note

Clean the filter screen in the similar procedure of replacing it.

8.4 Paint Repair Operation Instructions

- **Only when the surface is dirty**
  Clean it with a rag dipped in water or 97% alcohol.
- **When the finishing paint is damaged**

  1. Use sandpaper to smooth the surface of the damaged part.
  2. Clean the surface with 97% alcohol.
  3. Wait until the surface is dry, apply paint to the damaged part in a uniform and beautiful way.

- **When the paint surface is damaged and the substrate is exposed**

  1. Use sandpaper to smooth the surface of the damaged part.
  2. Clean the surface with 97% alcohol.
  3. After the surface is dry, spray zinc-rich primer on the damaged part.
  4. After the primer is dry, apply the finishing paint in a uniform and beautiful way.

8.5 Fluid Replacement Operation Instructions

1. Open the top cover of the PCS.
2. Unscrew the cover of the liquid inlet of the water tank.
3. Add new antifreeze into the water tank.



After the coolant is completely drained and refilled, the PCS can run with load only after the water pump runs for 15 min without covering the water tank cover.

4. Close the cover of the liquid inlet and reset the top cover.

Note

When the water pump is powered on to exhaust, it will automatically stop intermittently and speed up the exhaust. This is a normal phenomenon, and the system will run with load during this period.

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