AiO Box IEC Installation Manual

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1. Any damage caused by improper installation, usage, or maintenance that does not follow the instructions in this manual.
2. The product must be used in an environment that complies with the specified design parameters. Failure to adhere to these environmental requirements may result in malfunctions or damage. Any performance issues or component failures arising from non-compliance are not covered under the product warranty.
3. Damage caused by improper handling during transportation, moving, storage, or unpacking.
4. Relocation and reinstallation of the product to a non-original location without prior consent.
5. Warranty has expired.
6. Damage or malfunction caused by natural disasters or other force majeure events (e.g., earthquakes, floods, fires, lightning or typhoons).
7. Corresponding Ground Fault Detection (GFD) equipment is not equipped.
8. Installation or repair performed by unauthorized service providers or

personnel.

9. Use of unauthorized or non-original software, interface devices, parts, or consumables leading to malfunction or damage.
10. Altered or tampered product serial numbers, or failure to provide the product for inspection, testing, or repair.
11. Normal wear and tear or aging, or surface defects, dents, or marks that do not affect product performance.
12. Minor noise or vibration that does not affect product performance.
13. Theft of the product or its components.
14. To avoid internal component damage, please refer to the instruction manual and ensure proper cables are connected to the correct ports. Any damage due to incorrect wiring is not covered under warranty.
15. Damage caused by improper cleaning methods (e.g., using chemical cleaners) is not covered under warranty scope.
16. Damage to fuses or DC/AC surge protectors is not covered under the product warranty scope.
17. The installation height must provide adequate wiring space and account for environmental risks such as flooding or snow accumulation. Any damage caused by failure to meet these requirements is not covered under warranty scope.
18. The company is not liable for consequential, indirect, incidental, or punitive damages arising from disputes related to this disclaimer. The maximum compensation is limited to the actual purchase price of the product.
19. Use in environments not compliant with the product manual (e.g., extreme temperatures, humidity, magnetic fields, static interference, or corrosive gases).
20. Environmental or safety incidents arising from failure to comply with relevant laws or regulations regarding use, recycle or disposal of product.
21. This product is not intended for use in life-support systems, medical equipment, aerospace systems, or other high-risk applications. The company is not responsible for any consequences arising from violation of this provision.
22. This product may contain chemicals identified by local regulations as carcinogenic, teratogenic, or harmful to reproduction. Avoid contact with

internal components. Wash hands if contact occurs.

23. The "DANGER," "WARNING," "CAUTION" and “NOTICE” in this manual are not exhaustive. They serve as a supplement to the complete set of safety instructions that should be followed.
24. Installation, wiring, maintenance, inspection, or replacement of parts must not be carried out by non-qualified personnel. The manufacturer assumes no warranty obligations or legal liability for personal injury or equipment damage arising from failure to comply with these requirements.
25. In case scenario is not addressed in this manual, please contact Delta customer support for guidance.

1 Information on this Document

This manual is an installation manual. For operation and maintenance, please refer to the Operation Manual and Maintenance Manual.

1.1 Validity

This document is valid for:

- AIOA279K125L
- AIOB279K125L
- AIOC279K125L

AIOC279K125L represents the top-tier configuration. AIOA279K125L is identical to the AIOC279K125L, except without the PV connection, AIOB279K125L is identical to the AIOC279K125L, except without the PV connection and has no PCS module. The PCS, HV Box, battery modules, liquid cooling unit and connecting wiring within AIOA279K125L are fully factory pre-assembled; The HV Box, battery modules, liquid cooling unit and connecting wiring within AIOB279K125L are fully factory pre-assembled; the PCS, HV Box, battery modules, DD module, liquid cooling unit and connecting wiring within AIOC279K125L are fully factory pre-assembled; AIOA279K125L, AIOB279K125L and AIOC279K125L are abbreviated as AiO Box.

Depending on the functions and selected options, individual sections may be irrelevant for installation and operation. Illustrations in this document are reduced to the essential information and may deviate from the real product. Delta reserves the right to make changes to the product.

1.2 Target Group

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

- Training in the installation of electrical devices.
- Knowledge of all applicable laws, standards and directives.
- Training in risk prevention when working with electrical installations.
- Knowledge of and compliance with this document and all safety information.
- Be familiar with local standards and relevant safety regulations of electrical systems.

1.3 Levels of warning messages

To ensure the safety of the users and their properties when they use the product and to make sure that the product is used in an optimal and efficient manner, this manual provides users with the relevant safety information highlighted by the following symbols.

Below is a list of symbols that are used in this manual. Review them carefully to make better use of this manual.

DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a moderately hazardous situation which, if not avoided, will result in death or serious injury.

CAUTION

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

NOTICE

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

1.4 Symbols in the Product

Sings on the product

Beware of dangerous voltage
The product operates at high voltages. All work on the product must only be performed as described in the documentation of the product.

Beware of incorrect operation
Personals must operate correctly, if not avoided, could result in serious personal injury or device damaged.

Beware of hot surface
The product can get hot during operation. Do not touch the product during operation.

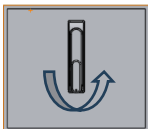
Beware of shock
Live parts! Do not touch them until 5 minutes after disconnection from the power sources.

Beware of extrusion
Don’t put hands in the movable and/or rotation parts of product.

Arc Flash Hazard
There is an arc flash hazard associated with all electrical equipment. There is an increased risk of arc flash with any equipment modification (e.g., open doors). Serious injuries can occur in arc flash incidents. Appropriate PPE and training as per local codes and regulations is required.

Fire Hazard
Fire is possible under certain, extreme fault conditions.

Beware of noise
The product generates loud noise. When working on the product, wear hearing protection.



Unlock direction

Unlock direction labels, which locate on the doors.

Centroid

Centroid label, which is on the enclosure of product.

1.5 Primary risks associated with AiO Box

The primary risks associated with the AiO Box system are:

1.5.1 Hazardous voltage

Hazardous Voltage

- High AC voltage at AiO Box input.
- 1200Vdc at battery side and 1500Vdc at PV interface side.

Consequence

Electrocution, Fire, Explosion.

Avoidance

- Only qualified and authorized person should only be allowed restricted access.
- Equipment barriers must remain in place.
- PPE must be appropriate for the task and equipment.

1.5.2 Arc fault

Arc fault

When insulation breakdown or accidental contact between high voltage conductors, an arc fault will be happened through the air gap between conductors.

Consequence

- Arc fault creates an electrical explosion.
- Light and heat emitted from the explosion is known as arc flash.
- Pressure wave caused by the tremendous temperatures of the arc flash is known as arc blast.

Avoidance

- Only qualified and authorized person should only be allowed restricted access.
- Restricted access.
- Equipment barriers must remain in place.
- PPE must be appropriate for the task and equipment.

1.6 Arc flash hazard boundary

The US National Fire Protection Association (NFPA) has developed specific approach boundaries designed to protect employees while working on or near energized equipment. These boundaries are:

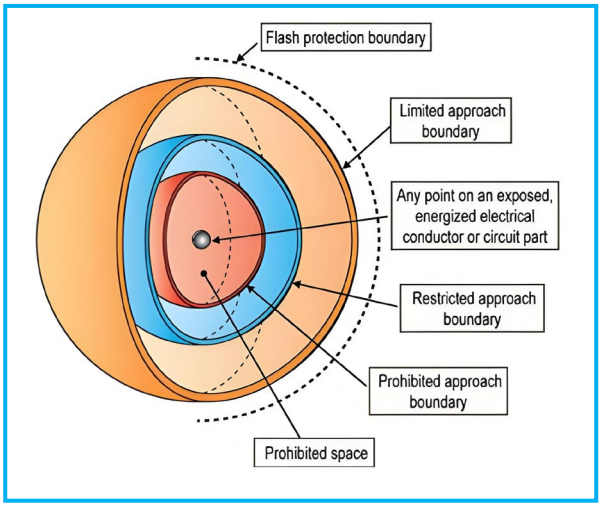


Figure 1-1: Arc flash boundaries (Refer to NFPA 70E)

- Flash Protection boundary (outer boundary) – this is the farthest established boundary from the energy source. If an arc flash occurred, this boundary is where an employee exposed to a curable second-degree burn. The issue here is the heat generated from a flash that results in burn.
- Limited approach – An approach limit at a distance from an exposed live part where a shock hazard exists.
- Restricted approach – An approach limit at a distance from an exposed live part which there is an increased risk of shock.
- Prohibited approach (inner boundary) – A distance from an exposed part which is considered the same as contacting the live part.

1.7 Arc flash label

According to “Maximum Power Method” in NFPA 70E, the estimated DC arc flash incident energy at the maximum power point can be calculated, and then the hazard boundary is defined as following Figure 1-2.

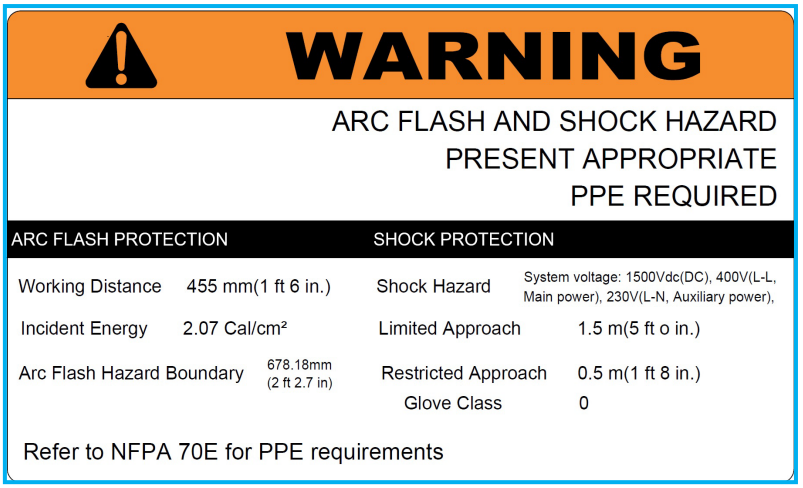


Figure 1-2: Arc flash label for reference

1.8 Personal protective equipment (PPE)

The PPE is determined by the incident energy which is the temperature produced (in cal/cm²) at a distance (usually eighteen inches) from an arc flash.

PPE requirement for AiO Box system operational precautions is category 1.

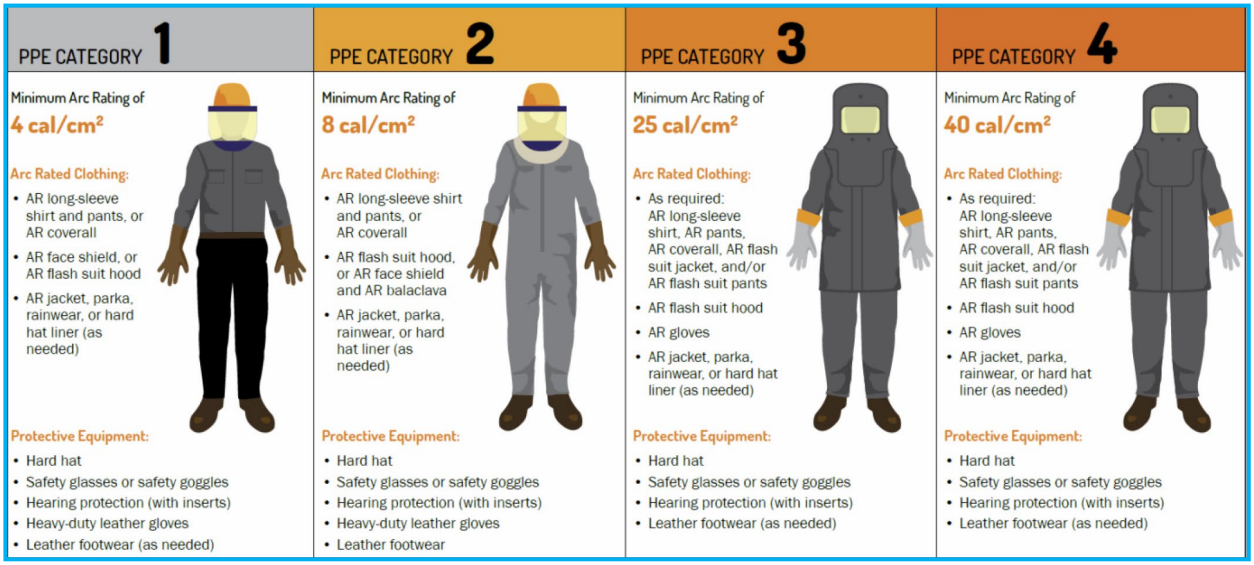


Figure 1-3: PPE category

1.9 LOTO procedure

1. Check the status of PCS and battery racks from EMS, make sure that the circuit breakers/contactors of PCS DC side are all disconnected, and the HV contactors of racks are disconnected.

2. PPE1 is required for operator.

3. Turn off the AC circuit breaker (QA1) which supplies the power of AiO Box. Apply

LOTO lock and tag to the handle of door to prevent it from being turned back on.

4. Switch off the isolation switch of the battery to “OFF” state. Pull out the LOTO ring of the isolation switch handle and apply LOTO lock and tag to the LOTO ring to prevent it from being turned back on.

5. Turn off the QB4 and QB6 which supplies the auxiliary power of AiO Box.

6. After 5 minutes, check, with a multi-meter, that the 220VAC auxiliary power input connection terminal QB6 reads 0V.

7. Check, with a multi-meter, that the DC bus bar reads 0V.

1.10 Term & Abbreviations

Term/Abbreviation	Explanation
PCS	Power Conditioning System
MCB	Main Circuit Breaker
MC	Main Contactor
SSC	Soft Start Contactor
HMI	Human Machine Interface
DC	Direct Current
AC	Alternating Current
PC	Computer
CT	Current Transformer
MCU	Main Control Unit
UPS	Uninterruptible Power Supply
PDU	Power Distribution Unit
ACB	Air Circuit Breaker
MPCB	Motor Protection Circuit Breaker
PF	Power Factor
OVP	Over Voltage Protection
UVP	Under Voltage Protection
OCP	Over Current Protection
BMU	Battery Management Unit
BMS	Battery Management System
BESS	Battery Energy Storage System
FSS	Fire Suppression System
MBMU	Master Battery Management Unit

SBMU	Slave Battery Management Unit
MSD	Manual Switch Disconnector
SOC	State of Charge
SOH	State of Health
TMS	Thermal Management System

2 General safety instruction

Important Safety Instructions

SAVE THESE INSTRUCTION

This manual contains important safety instructions for AiO Box that shall be followed during installation and maintenance of the inverter, if ignored, maybe result in personal injury or device damaged. So before starting installation, operation, commissioning or maintenance of AiO Box, read through the entire manual and note all **DANGER! WARNING! CAUTION!** and **NOTICE!** statements.

AiO Box is designed and tested to meet all applicable international safety standards. However, like all electrical and electronic equipment, safety precautions must be observed and followed during installation, operation and maintenance of AiO Box to reduce the risk of personal injury and to ensure installing safety.

Only qualified personal who are licensed and/or satisfy state and local jurisdiction can perform installation, commissioning and maintenance work, and must wear suitable safety protective equipment.

All installations must confirm with the local laws, regulations, codes and standards applicable in the jurisdiction of installation, even though it has conflict with this manual.

2.1 General Safety Rules

DANGER

Touching the terminals or contactors connected to the grid may lead to electric shock!

- Do not touch the terminals or conductors connected to the grid.
- Respect all safety instructions on the grid connection.

DANGER

Lethal voltages are present inside the device!

- Pay attention to and follow the warning signs on the device.
- Respect all safety instructions in this manual and other pertinent document.

DANGER

Electric shock or fire may occur due to device damage or system fault.

- Visually inspect the AiO Box for device damages or other hazards.
- Check if the external devices and circuit connections are safe.
- Only operate the device when it is safe to do so.

WARNING

All installations and operations on the AiO Box must be in full accordance with the national and local regulations and standards.

WARNING

Ensure that the installation environment (such as voltage, temperature, humidity, altitude, pollution level, water-proof and dust-proof level) is within the scope of equipment specifications.

WARNING

The installation, electrical connection, commissioning, maintenance, and troubleshooting must be carried out by professional electrical technicians conforming to local codes. Before performing operations, operators should have read this manual completely and mastered the safety issues related to the operation.

2.2 Ground Fault Protection

DANGER

If a ground fault occurs in the system, some parts that are supposedly voltage-free may carry lethal voltage. Accidental touch may cause serious damage. Make sure there is no system ground fault before performing operation and take proper protective measures.

2.3 Warning label setting

During on-site transportation, installation, repair, maintenance and other operations of the AiO Box, in order to prevent irrelevant personnel from approaching and mis-operation or accident, shall take the following precautions:

- Perform Lockout-Tagout procedure strictly.
- Set up warning signs or safety warning belts near the site operation area.

2.4 Live Line Measurement

DANGER

Before electrical connection, please ensure that the AiO Box and electrical equipment inside it are intact and hazard-free. All electrical connections must meet electrical standards of local country/region.

DANGER

High voltages are present inside the device. Death can result from burning and electric shock due to touching the live components of the AiO Box. During live line measurement:

• Use suitable protective equipment (e.g. wear insulated gloves, etc.).

• Accompanied by other persons.

2.5 Measuring Instrument

The instrument for measuring the electrical parameters should meet the following requirements:

WARNING

- The instrument for measuring the electrical parameters should be a high-quality instrument with sufficient measuring range.
- Make sure the connection and use of the instrument are correct to avoid arc and other dangerous situations.
- Use suitable protective equipment, for example, dielectric gloves during live line measurement.

2.6 Voltage-free Operations

Perform operations on the AiO Box only when all devices inside the AiO Box are completely voltage- free.

- Avoid any inadvertent re-connections.
- Verify that no voltage or current is present with appropriate testing devices.
- Ground and short-circuit whenever necessary.
- Cover possible live parts to avoid inadvertent touch.
- Ensure sufficient escape room.
- After the AiO Box stops, wait at least 10 minutes before operating it.
- Ensure that the AiO Box is completely voltage-free.

2.7 ESD Protection

⚠ CAUTION

Devices may be damaged irreversibly by electrostatic discharge (ESD).

- Avoid unnecessary touching of the printed circuit board (PCB).
- Observe all the ESD-related safety instructions. Wear proper personal protective equipment (PPE) such as wrist strap.

2.8 General Safety instruction

⚠ DANGER

- Pre-Installation & De-Energization

  Ensure the AiO Box is fully de-energized before installation.

  Maintain adequate safety clearance for operation and maintenance.
- Personal Protective Equipment (PPE)

  Always wear appropriate PPE before performing any work.

  Ensure PPE complies with local laws, regulations, and safety standards.
- High-Voltage (MV) Equipment Operation When operating MV equipment:
  - Stand on an insulated mat or stool.
  - Wear insulated gloves, shoes, and protective clothing.

  Direct contact with live parts is strictly prohibited, even when wearing PPE.
- Pre-Energization Testing

  Conduct and pass insulation tests and voltage withstand tests before energizing the system.
- Capacitor Discharge Safety

  AiO Box contains capacitors; ensure they are fully discharged and residual Voltage is below safety thresholds before handling.
- Weather Precautions

  Do not open equipment doors on rainy days to prevent water ingress, which may damage components or cause electric shock.

DANGER

- Equipment Startup Safety

  Never start equipment with doors open; ensure all enclosures are securely closed.
- Grounding Requirements

  All power cable trays and equipment must be properly grounded to an earth electrode.

  Grounding cables must comply with local safety standards.
- Printed Circuit Board (PCB) Safety

  When the AiO Box is energized, PCBs (especially AC/DC voltage sampling boards) may carry high voltage.

  Exercise caution when using test instruments (e.g., oscilloscopes) to avoid electric shock.
- Fault Condition Safety

  In case of a fault, main and auxiliary circuits may still carry hazardous voltage. Always measure voltage and ensure it is below safety limits before performing any operation.
- Lifting & Transportation Safety

  Use proper lifting tools and slings with sufficient capacity to prevent accidents. Some AiO Box components are extremely heavy; always use mechanical assistance to avoid injury.

WARNING

- The cooling fan may continue rotating after system shutdown. Never touch the blades or rotating components.
- Always wear protective gloves and safety glasses when disassembling AiO Box components to prevent injury from sharp edges.
- Avoid contact with heatsinks or heating surfaces immediately after shutdown due to burn risk. Allow sufficient cooling time before handling.
- Maintenance must be performed with a second person present to ensure personal safety at all times.

CAUTION

- Remove all conductive debris from the cabinet during equipment installation to prevent potential damage.
- Install the AiO Box using bolts with the specified strength ratings, in strict compliance with the installation requirements.
- Ensure adequate heat dissipation by confirming that all ventilation pathways remain clear and unobstructed.
- When handling fiber optic cables: Never grasp the fiber body directly; Avoid contact with fiber end faces; maintain a minimum bending radius of 35mm at all times.
- Under no circumstances open current transformer (CT) secondary wiring while the AiO Box is energized.
- All live bolted connections must be tightened to the exact torque values specified in this documentation.
- This equipment is designed exclusively for use with IT systems (IEC 60364 standard).
- Prolonged periods of non-operation may adversely affect the system's overall lifespan, particularly battery performance.

NOTICE

- All dimensions in this document are in millimeters (mm), unless otherwise specified.
- Do not remove or damage safety signs. Replace any damaged signs immediately to maintain compliance.

2.9 Disposal of Waste

When the AiO Box has come to the end of its service life, it cannot be disposed of together with household wastes. Some inside components can be recycled while some components can cause environmental pollution.

Please contact the local authorized collection point.

3 Transport and moving

3.1 Material and tools preparation

The following materials and tools need to be prepared by end user, these materials are used for external connection and mounting of the equipment. We recommend the following material list. But the all material and tools must conform with the local laws, regulations, codes and standards applicable, even though it has conflict with the following table. Especially the cable's technical data, which depends on the ambient temp, cable-laying type and so on, so you should according to local codes and standard to choose suitable cables.

Table 3-1 Material specification- AIOA279K125L

No.	Function	Material	Technical data	Qty
1	AC cable	Copper cable	Cross-section area: 95mm^2, Voltage≥600V, temp≥90℃	4 pcs
2	Grounding cable	Copper cable	Cross-section area: 50mm^2, Voltage≥600V, temp≥90℃	1 pc
3	For AC cable	Single-hole tubular lugs (95-8)	Single hole, 95mm^2, width=26mm，hoses:8.4 mm	4 pcs
4	For grounding cable	Single-hole tubular lugs (50-8)	Single hole, 50mm^2, width=20mm，hoses:8.4 mm	1 pc
5	For cable	Heat-shrinkable tubing	Φ30mm	1 meter
6	Signal cable	Twisted-pair shielded cable	22AWG 300Vac 105℃	12pcs
7	Auxiliary power cable	Three-core cable	8AWG 300Vac 105℃	1 pc
8*	Grounding cable	Copper cable	8AWG 300Vac 105℃	1pc
9*	Auxiliary power cable	Copper cable	10AWG 300Vac 105℃	2 pc
10*	Auxiliary power cable	Copper cable	14AWG 300Vac 105℃	2 pcs
11	Communication cable	Network cable with plug	CAT6, RJ45 plug, the length depends on site controller position	1 pc

12	Mount AiO Box	Expansion bolts	M12*120 with large size washer	6 pcs

Note: For the selection of auxiliary power supply wires, please select either No. 7 or No. 8* to 10*.

No.8* is for auxiliary grounding cable, No.9* is for TMS power source, NO.10* is for system auxiliary power source.

Table 3-2 Material specification- AIOB279K125L

No.	Function	Material	Technical data	Qty
1	DC cable	Copper cable	Cross-section area: 50mm^2, Voltage≥1500Vdc, temp≥90℃	2 pcs
2	Grounding cable	Copper cable	Cross-section area: 50mm^2, Voltage≥600V, temp≥90℃	1 pc
3	For DC cable	Single-hole tubular lugs (50-6)	Single hole, 50mm^2, width=20mm， hoses:6.4 mm	4 pcs
4	For grounding cable	Single-hole tubular lugs (50-8)	Single hole, 50mm^2, width=20mm， hoses:8.4 mm	1 pc
5	For cable	Heat-shrinkable tubing	Φ30mm	1 meter
6	Signal cable	Twisted-pair shielded cable	22AWG 300Vac 105℃	5 pcs
7	Auxiliary power cable	Three-core cable	8AWG 300Vac 105℃	1 pc
8*	Grounding cable	Copper cable	8AWG 300Vac 105℃	1 pc
9*	Auxiliary power cable	Copper cable	10AWG 300Vac 105℃	2 pcs
10*	Auxiliary power cable	Copper cable	14AWG 300Vac 105℃	2 pcs
11	Communication cable	Network cable with plug	CAT6, RJ45 plug, the length depends on site controller position	1 pc
12	Mount AiO Box	Expansion bolts	M12*120 with large size washer	6 pcs

Note: For the selection of auxiliary power supply wires, please select either No. 7 or No. 8* to 10*.

No.8* is for auxiliary grounding cable, No.9* is for TMS power source,

NO.10* is for system auxiliary power source.

Table 3-3 Material specification- AIOC279K125L

No.	Function	Material	Technical data	Qty
1	AC cable	Copper cable	Cross-section area: 95mm^2, Voltage≥600V, temp≥90℃	4 pcs
2	PV cable	Copper cable	Cross-section area: 35mm^2, Voltage≥1500Vdc, temp≥90℃	4 pcs
3	Grounding cable	Copper cable	Cross-section area: 50mm^2, Voltage≥600V, temp≥90℃	1 pc
4	For AC cable	Single-hole tubular lugs (95-8)	Single hole, 95mm^2, width=26mm，hoses:8.4 mm	4 pcs
5	For PV cable	Single-hole tubular lugs (35-6)	Single-hole tubular lugs (35-6)	4 pcs
6	For grounding cable	Single-hole tubular lugs (50-8)	Single hole, 50mm^2, width=20mm，hoses:8.4 mm	1 pc
7	For cable	Heat-shrinkable tubing	Φ30mm	2 meters
8	Signal cable	Twisted-pair shielded cable	22AWG 300Vac 105℃	12pcs
9	Auxiliary power cable	Three-core cable	8AWG 300Vac 105℃	1 pc
10*	Grounding cable	Copper cable	8AWG 300Vac 105℃	1 pc
11*	Auxiliary power cable	Copper cable	10AWG 300Vac 105℃	2 pcs
12*	Auxiliary power cable	Copper cable	14AWG 300Vac 105℃	2 pcs
13	Communication cable	Network cable with plug	CAT6, RJ45 plug, the length depends on site controller position	1 pc
14	Mount AiO Box	Expansion bolts	M12*120 with large size washer	6 pcs

Note: For the selection of auxiliary power supply wires, please select

either No. 9 or No. 10* to 12*.

No.10* is for auxiliary grounding cable, No.11* is for TMS power source, NO.12* is for system auxiliary power source.

Table 3-4 Tool list

No.	Tools	Technical data	Total
1	Fork-lift	load capacity≥5,000Kg	1set
2	Insulated torque wrench	0-100N·m	1 pc
3	Set of insulated wrenches and sockets	6-32mm	1set
4	Set of insulated spanners	6-32mm	1set
5	Set of insulated screwdrivers	Slotted head, phillips head and torx head	1set
6	Wire stripper		1 pc
7	Terminal crimping device		1 pc
8	Hot air blower		1 pc
9	Insulated Allen wrench	2-12mm	1set
10	Insulation resistance meter	Test voltage > 1000V	1set
11	Multi-meter		1set
12	Phase sequence meter		1set

3.2 Storage and transport

3.2.1 Storage

The AiO Box should be stored in a place without harmful gases, flammable or explosive products and corrosive chemicals nearby. Keep away from mechanical impact, heavy pressure and strong magnetic field. The distance to heat source should be far away.

The AiO Box must be stored within the range of optimum storage temperature, so that the service life of a battery can be extended, and the safety performance of a battery can be improved. The limitation of temperature should completely comply with various definitions in the specification, the installation space of the battery system should be well-ventilated.

The dimension of package is shown in figure 3-1.

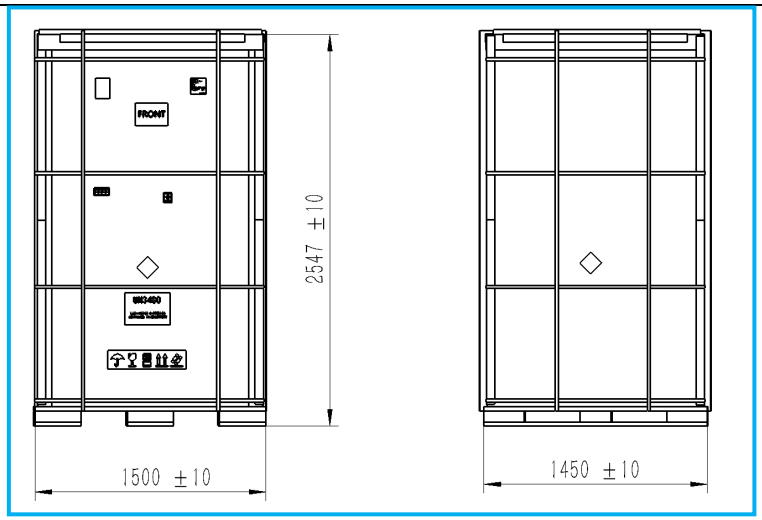


Figure 3-1 Outline dimension

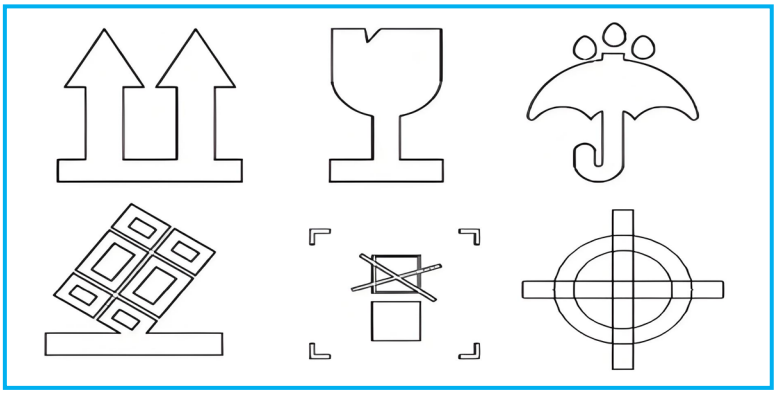


Figure 3-2 Package safety symble

3.2.2 Transportation process and requirements

➢ Requirements for AiO Box Transport

Based on battery features and with the purpose of maximizing the battery performance, the transport of AiO Box should meet the following requirements:

- Always keep the product in an upright position during transport.
- Do not stack anything on top of the product.
- Beware of dimension and weight as below:

Model	Dimension (W×D×H) (without package)	Weight (without package)	Dimension (W×D×H) (with package)	Weight (with package)
AIOA279K125L	(1400± 5)*(1300± 5)*(2400± 5)mm	3265±100kg	(1500±10)* (1450±10)* (2547±10) mm	3383±100kg
AIOB279K125L		2955±100kg		3073±100kg
AIOC279K125L		3325±100kg		3443±100kg

so, carrying vehicle space and load capacity shall fully meet this requirement.

- Allowable transport temperature: -30℃~ +60℃.
- Take appropriate protection measures to keep SOC level at below 30% and ensure that no short circuit happens, or no liquid is allowed into the AiO Box or soaked in liquids (e.g. water, oil, etc.).

➢ Transportation scheme: sea cargo and land carriage.

During loading and unloading, it should be handled with care to prevent throwing, rolling, and heavy pressure; during the transportation, external mechanical impact should be avoided.

➢ AiO Box transportation requirement for land carriage

1. Transport scheme for bulky cargo must be evaluated in advance.
2. The high-speed driving speed of the vehicle (truck) shall not exceed 80 km / hour & domestic legal requirement.
3. During the driving process, it is forbidden to make sudden braking and sharp turns.
4. Keep the cargo in good condition, check the vehicle's carrying status frequently, find and solve the problems in a timely manner.

➢ AiO Box transportation requirement for sea cargo.

Keep the cargo in good condition, check the vehicle's carrying status frequently, find and solve the problems in a timely manner.

3.3 Packing list

Each equipment has a packing list that is use to verify device quantity when receive the package. This table include device name, description and quantity.

Table 3-5 Packing list

Type	Description	QTY	Unit
Device	AiO Box (AIOA/B/C279K125L)	1	pc
Key	Key	1	pc
MSD	MSD for battery	6	pcs
Document	Packing List	1	pc
	Product Certificate	1	pc
	Factory Test Report	1	pc

4 Product installation

4.1 Site and environment requirements

AiO Box applies to general outdoor scenarios. AiO Box is only applicable for industrial or commercial installation. The installation in the residential areas is not allowed. In accordance with local laws and regulations, the site selection requirements are as follows:

1. Foundation described in this chapter is only for reference; please consult local professional project personnel before project construction, and design and construction shall comply with local laws and regulation.
2. The installation position of the node cannot be in a low-lying area, and the site level is higher than the highest historical water level in the area.
3. The soil condition is good and the ground is solid. No bad geological conditions such as rubber soil and soft soil layer are allowed. The ground that is easy to accumulate water and sink must be avoided.
4. Invest in a well-ventilated place.
5. Keep away from strong vibration, noise sources, and electromagnetic interference areas. Try to avoid places with existing underground facilities.
6. Keep away from places that produce dust, fume, harmful gases, and produce or store corrosive, flammable, and explosive materials. The distance from the airport, landfill, river bank, shore or dam should not be less than 6 kilometers for regular product; the high-salinity spray version of the product can be installed within 6 kilometers of the shore, provided that a windbreak is set up.
7. Keep at least 50m away from residential areas to avoid noise pollution.
8. Keep the system away from direct sunlight, rain or snow.
9. Keep the system away from children, pets or any possible animals.
10. Choose an open location according to the requirement of Figure 4-1, and ensure that there are no obstacles from the surrounding area.
11. For back-to-back arrangement, the minimum clearance between AiO Box is 600mm, and the recommended clearance between the front side of the two box is 3000mm.
12. For back-to-wall arrangement, the minimum clearance between the back side of box and the enclosure is 600mm, and the recommended clearance between the front side of box and the wall is

3000mm.

13. For side-to-side arrangement, the minimum clearance between AiO Box is 40mm (Remove package).
14. The minimum clearance between AiO Box and the wall is 2500mm.
15. The top clearance of AiO Box shall be no less than 1000mm.

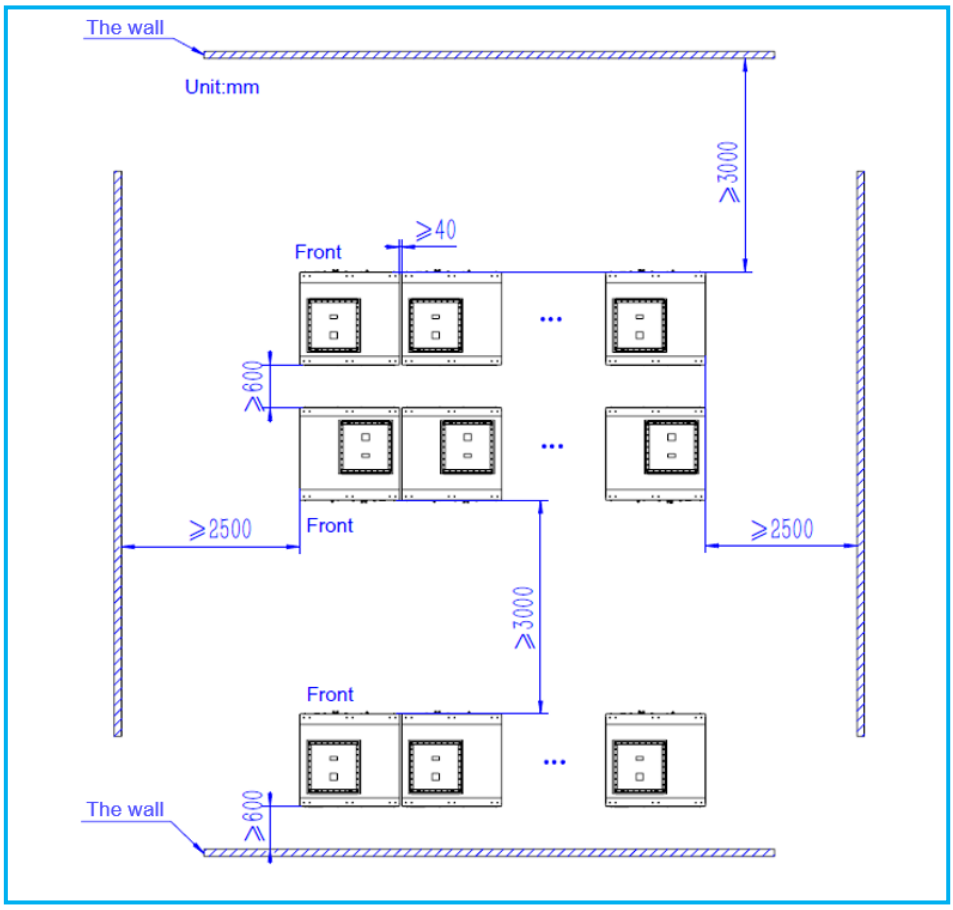


Figure 4-1 Space requirement

4.2 Foundation requirement

Before installing AiO Box, build the foundation and trench on the selected ground. The requirements for foundation construction are as follows:

1. The size of foundation meets the requirements of AiO Box installation and bearing capacity as following shown.

Ground type	Condition requirements	Note
Concrete parallel piers	Parallel piers should fulfill: Level deviation ≤±0.2 degree Flatness deviation ≤±0.2 degree	

2. Foundation requirement:
   a. Fix the bottom foot of the cabinet.
   b. The bottom foot of cabinet is fixed with M12*120 expansion anchor bolt. The torque of the torque wrenches is set to 60N·m.

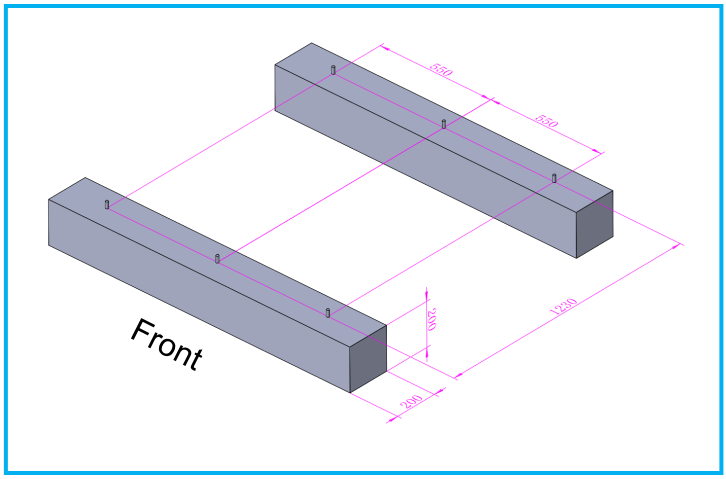


Figure 4-2 Mounting hole dimensions of AiO Box (unit: mm)

3. Bury the ground grid and reserve a ground bar at the ground position of the AiO Box. Connect one end of the ground grid to the embedded ground grid and the other end to the unit ground point. When the ground network is embedded, reserve enough length for the ground lug, then connect to AiO Box grounding bus through copper cable.
4. The grounding grid resistance of AiO Box is less than or equal to 4Ω.
5. The energy storage system uses underside cabling, so the cables need to be placed in cable tray.
6. Foundation construction should meet the local historical maximum rainfall drainage requirements. The discharged water shall be treated in accordance with local laws and regulations.

4.3 Preparation for installation

1. At first, unpacking AiO Box cabinet as following steps:

- Remove the packing belt and winding film on box.
- Remove the front and back Packaging panel from the front side and back side respectively. Then Remove the right side and left side panels.
- Unpacking completed.

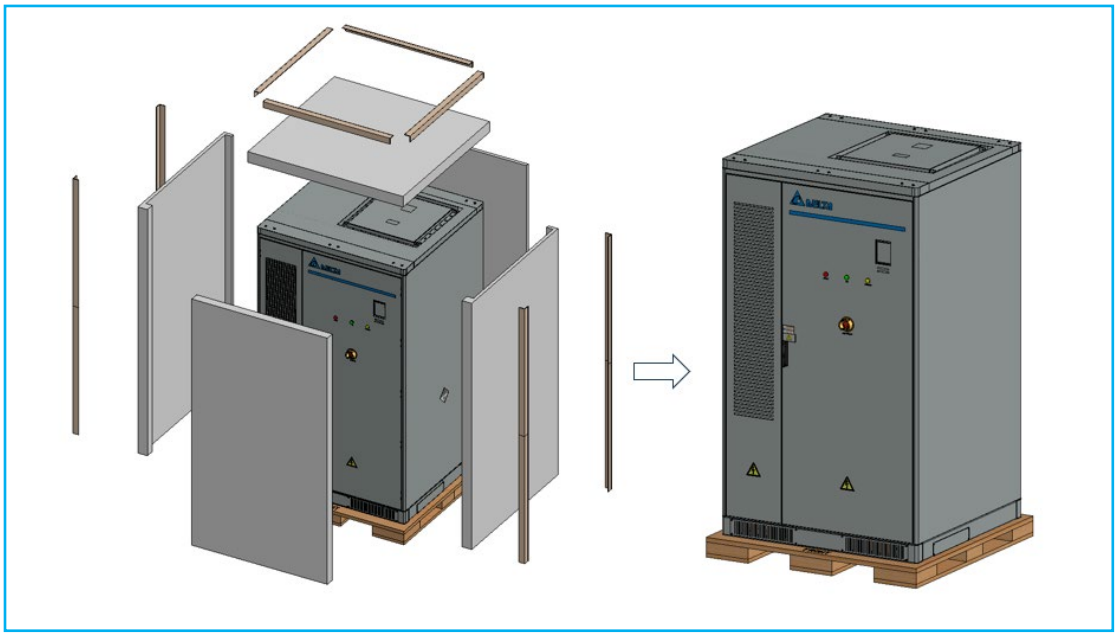


Figure 4-3 Unpacking

2. Remove the cover of bottom foot and reserve its retaining screws.

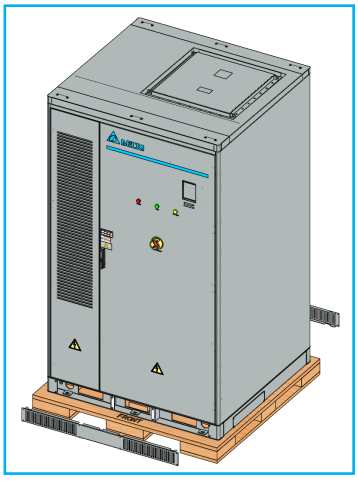


Figure 4-4 Remove cover of bottom foot

3. Unscrew six nuts on the wooden pallet, remove the bolt and washer.

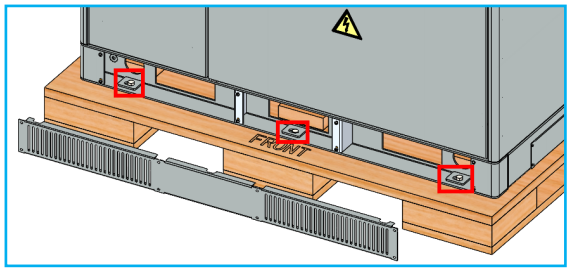


Figure 4-5 Unscrew fixing bolts of wood tray

4. The transport must be performed by qualified personnel. Qualified means the operators must have relevant training experience, especially safety-related knowledge and operation skill.
5. Local laws and regulations on the product transport and loading & unloading,

especially those safety instructions, should be always observed.

6. The dimension and total weight of AiO Box:

Model	Dimension (W × D × H) (without package)	Weight
AIOA279K125L	(1400±5)*(1300±5)*(2400±5)mm	3265±100kg
AIOB279K125L		2955±100kg
AIOC279K125L		3325±100kg

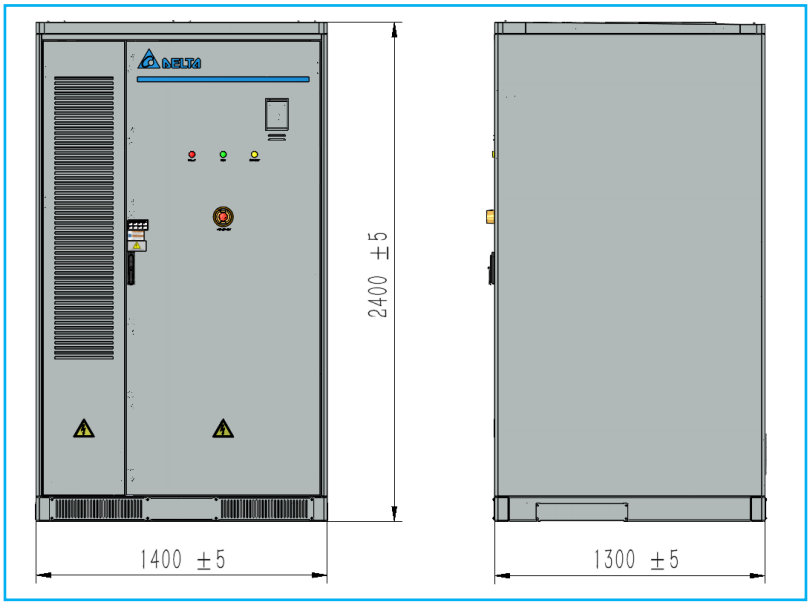


Figure 4-6 AiO Box outline dimension

4.3.1 Move with forklift

1. The forklift arm needs to be protected to avoid dirt pollution on the fork arm, or the forklift scrapes the bottom of the cabinet.
2. Before the forklift fork arm reaches into the bottom of the cabinet, make sure the height of the fork arm is lower than the bottom of the cabinet to avoid collision with the cabinet.

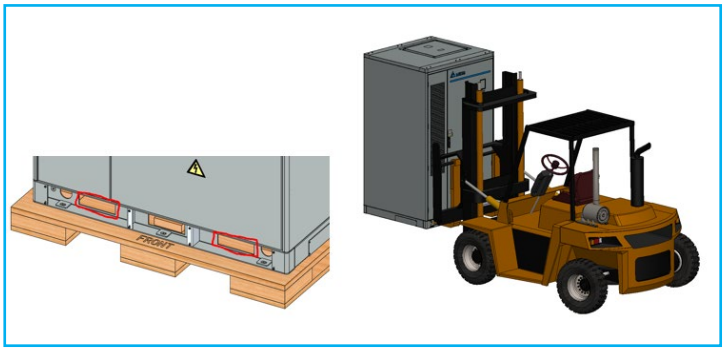


Figure 4-7 AiO Box moved by forklift

3. After the forklift fork arm reaches into the bottom of the cabinet, make sure

that the fork arm on the other side of the cabinet.

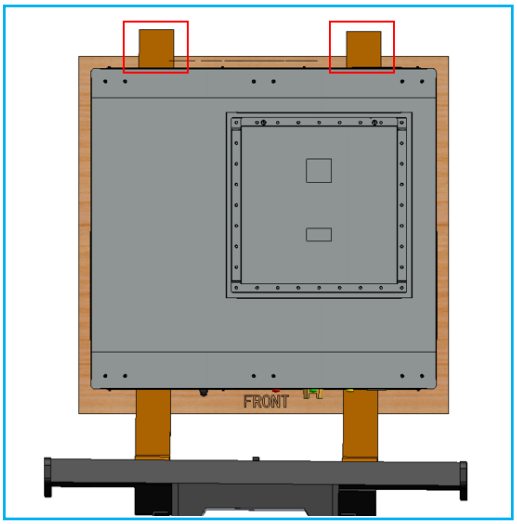
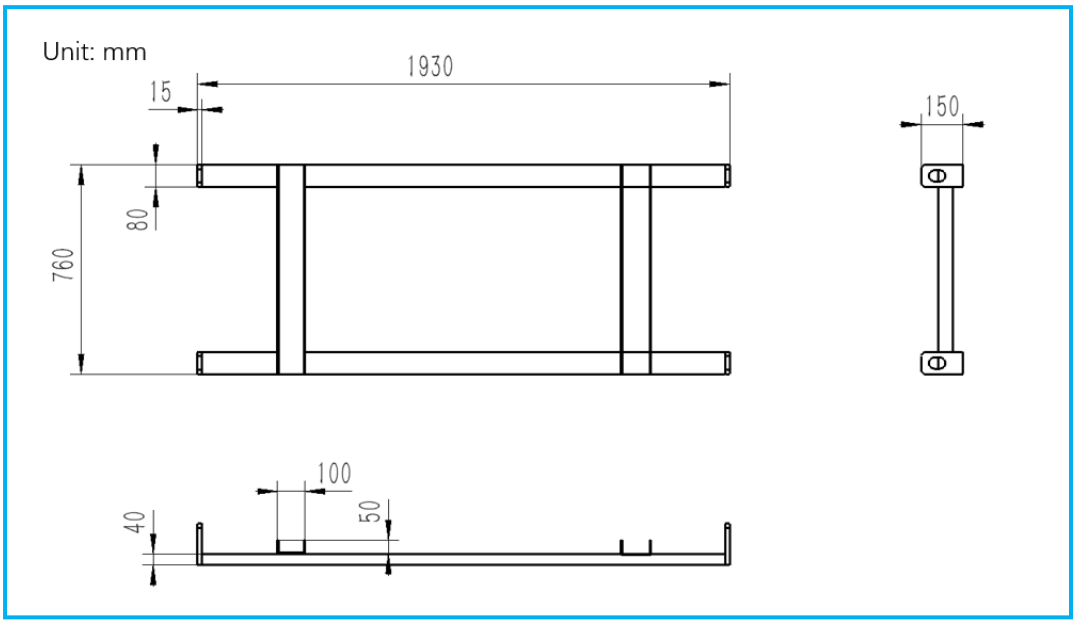


Figure 4-8 fork-lift arm position

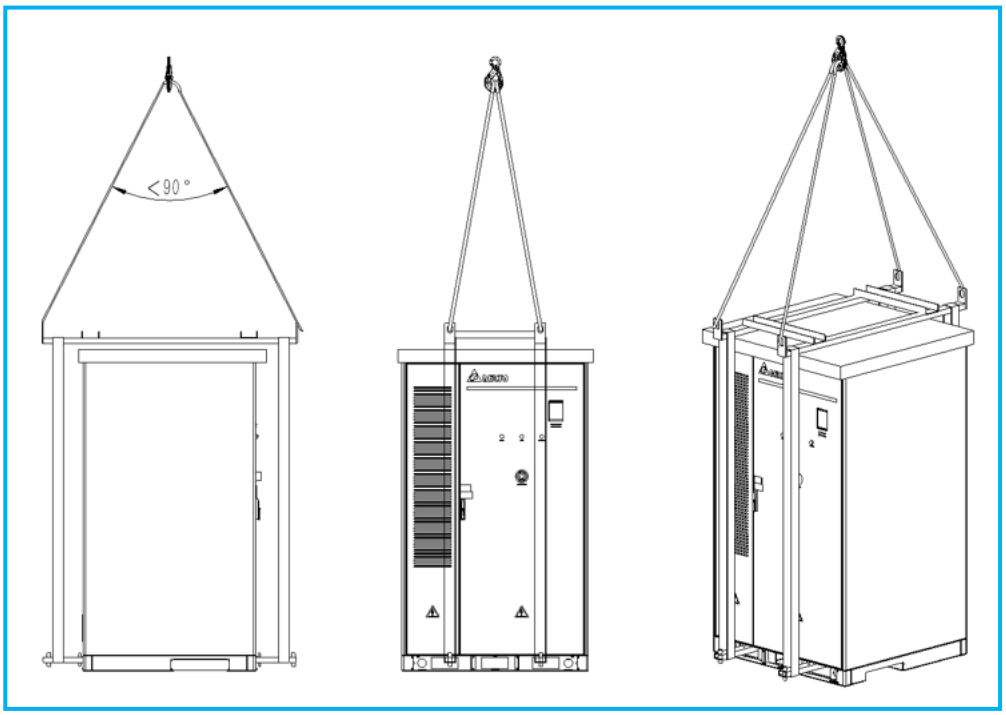
4. The center of the cabinet is high. Don't lift cabinet too high and keep cabinet upright, avoid the cabinet toppling over. Then move the cabinet out of the tray.
5. Don't close to cabinet while cabinet is lifted.
6. Forklift transport process should be maintained at a uniform speed.
7. Pay attention to the electric cabinet when transferring forklift truck.

4.3.2 Crane lifting

Make the lifting gear according to the following dimensions.



Crane lifting demonstration is as follow.



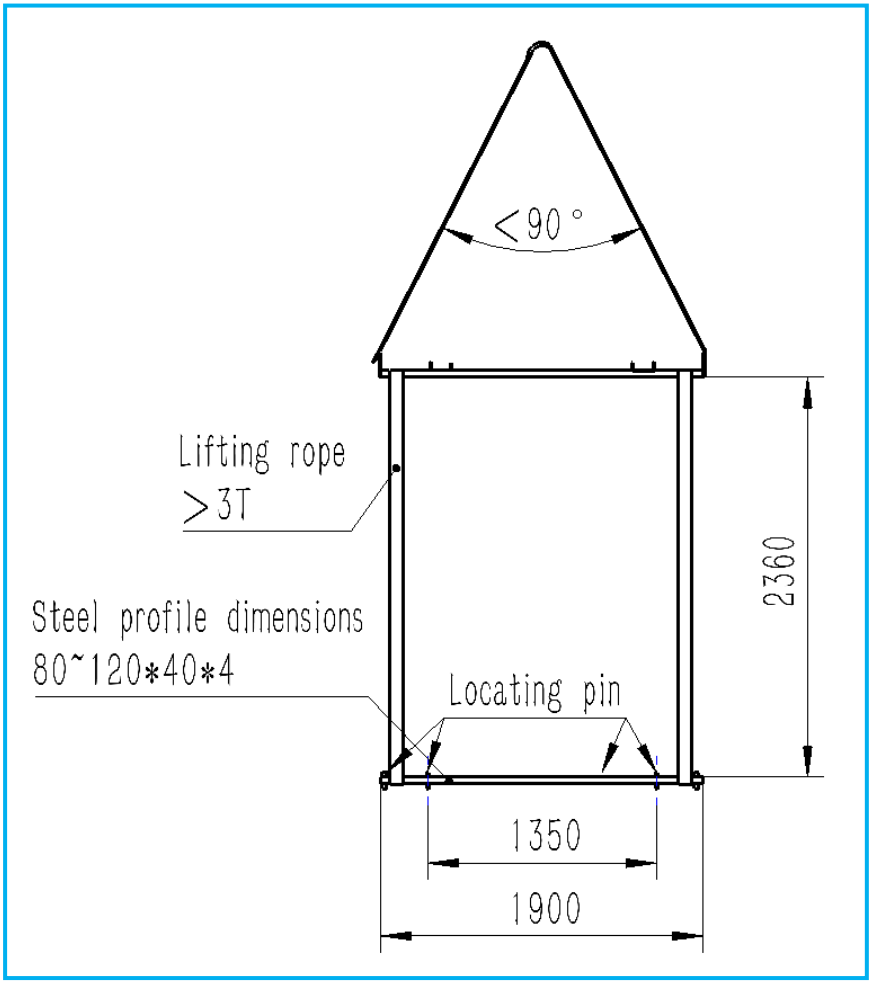


Figure 4-9 Crane lifting

4.4 Anti-vibration and anti-collision requirement for installation

In the AiO Box, the management system and a variety of sensing devices are installed. The AiO Box must be installed firmly and reliably without any loosening or shaking. An anti-collision device with sufficient strength must be installed on the periphery of the installation space of battery system to ensure that no safety accident (e.g. direct short circuit, overheating and combustion) will be caused by general collision which will not directly harm the battery system and batteries.

4.5 Mounting

Once the unit is at the final position, should fasten it on the concrete platform. There are six elliptical holes in the base as shown in figure 4-10, recommend to use M12*120 bolts with big size flat washer to secure the base to the concrete platform, and the tolerance of anchor holes center point is ±3mm.

1. Drill the anchor holes on concrete parallel piers according to following drawing.

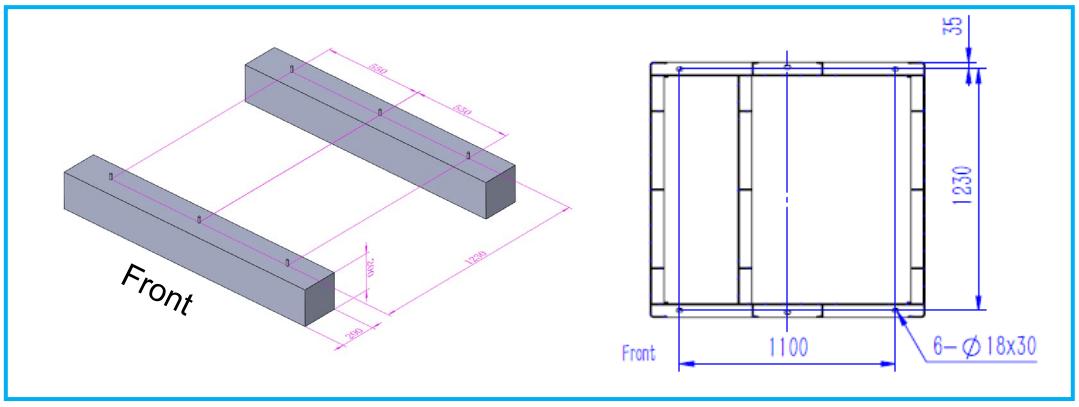


Figure 4-10 Anchor point location

2. Insert the expansion bolt into the hole.

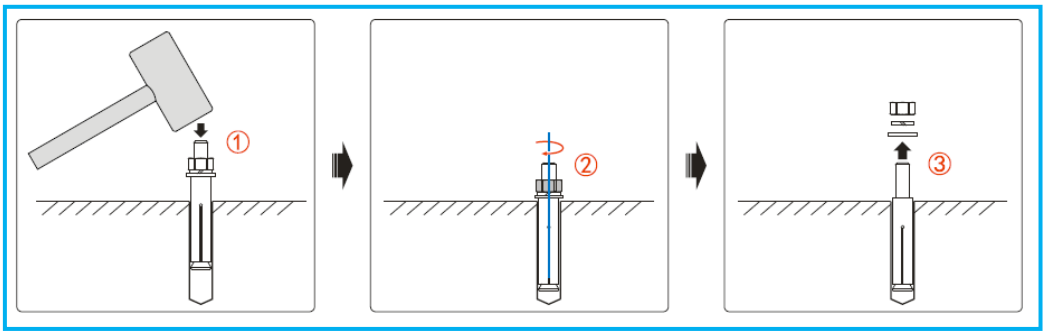


Figure 4-11 The expansion bolt install

3. Move the cabinet to concrete parallel piers and align anchor holes with cabinet bottom foot holes.

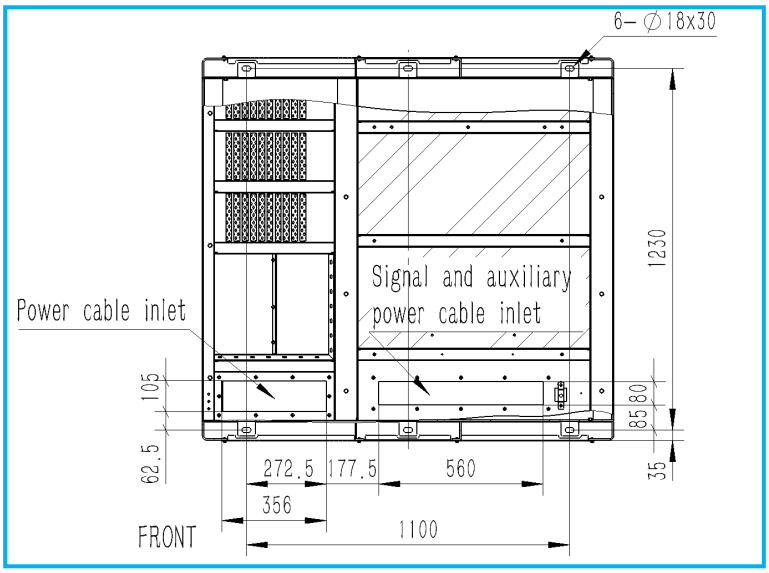


Figure 4-12 Dimension of base

4. Screw the nut with spanner to fasten the bottom foot on the concrete parallel piers. Torque: 60N·m.

5 Wiring

The AiO Box has three application types: AIOA279K125L, AIOB279K125L and AIOC279K125L.

⚠ DANGER

- Ensure DC load switch of HV box is open and no DC voltage output.
- Ensure AC grid is de-energized.
- Do not touch the live part of the components.
- Make sure the AC and DC sides are voltage-free before installation.
- Strictly carry out LOTO process.
- The AIOC279K125L must not be connected to a PV string that requires positive or negative grounding.

⚠ WARNING

- Observe all the country-specific standards and regulations.
- Connect AiO Box to public grid only after receiving authorization from the local network operator.
- Only professional electricians can perform the operations described in this chapter.
- Observe all the instructions to connect the wires.
- All input and output circuits are isolated from the enclosure.
- Fasten the bolts strictly follow the torque requirements during electrical connection.
- Ensure the electrical insulation is satisfied before laying the cables.
- Follow the EMC regulation and lay the power cable and communication cable in different layers.
- Provide support and protection to the cables to reduce the stress of the cables when necessary.

5.1 Wiring Paths and Interfaces

As for AiO Box output cables layout, can refer to following illustration to perform it. But should note that control and communication cables and power cables can’t be put together to avoid signal interference.

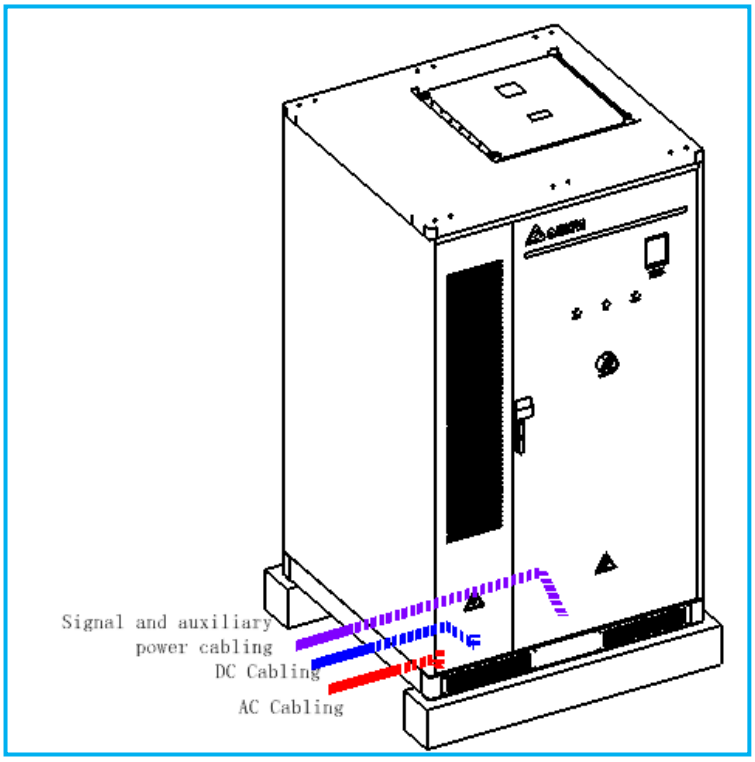


Figure 5-1 Wiring paths of AiO Box

The dimension of cable entry and glands for external wiring.

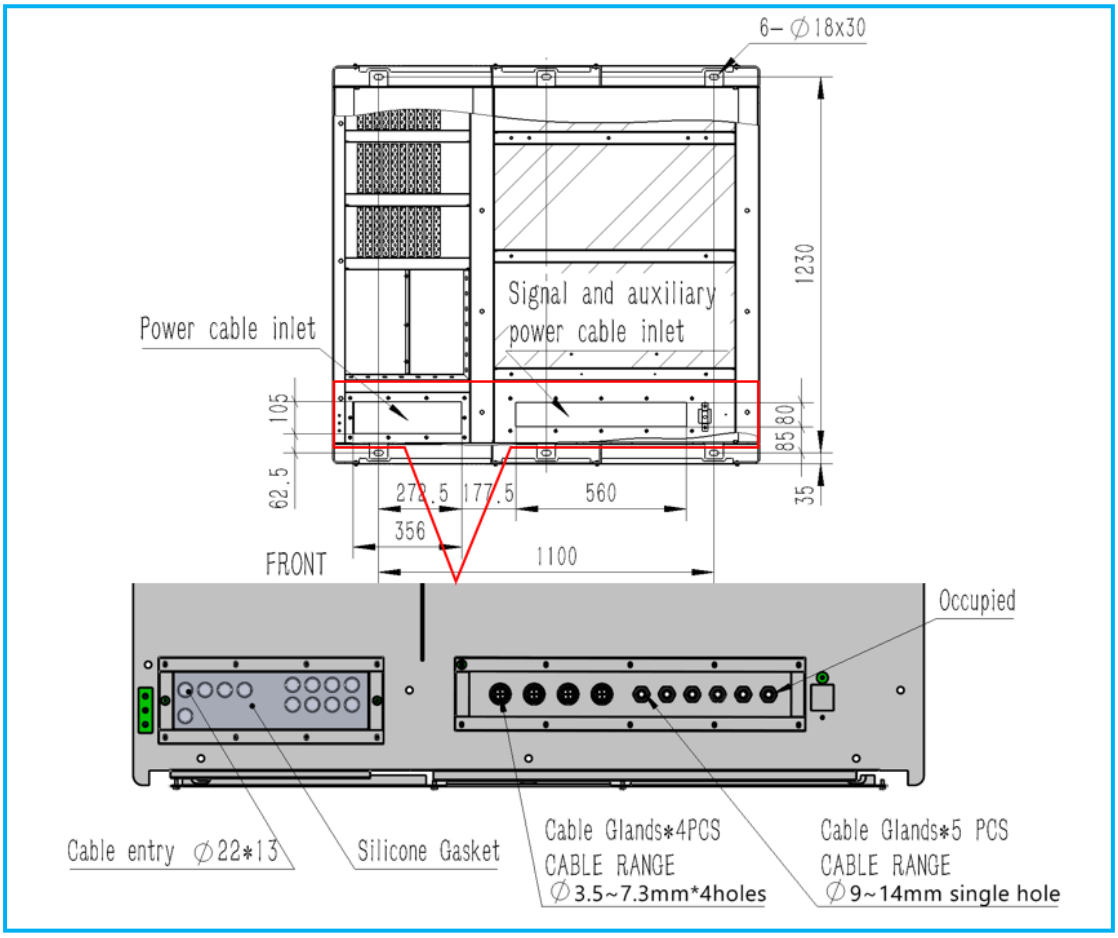
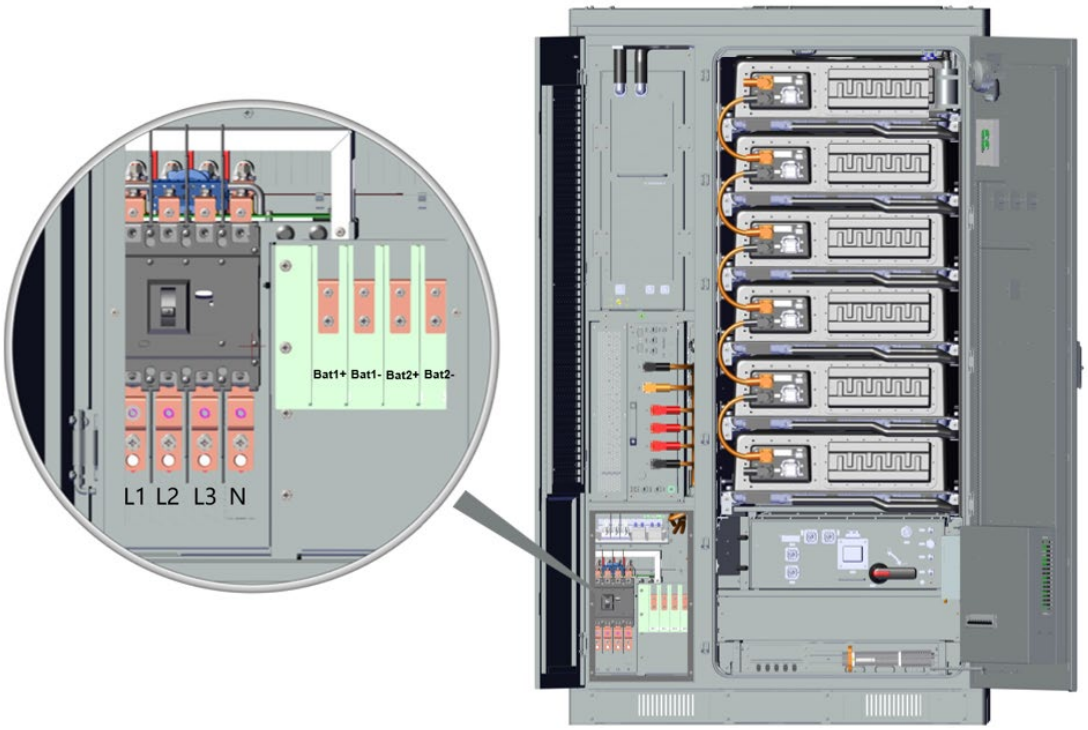
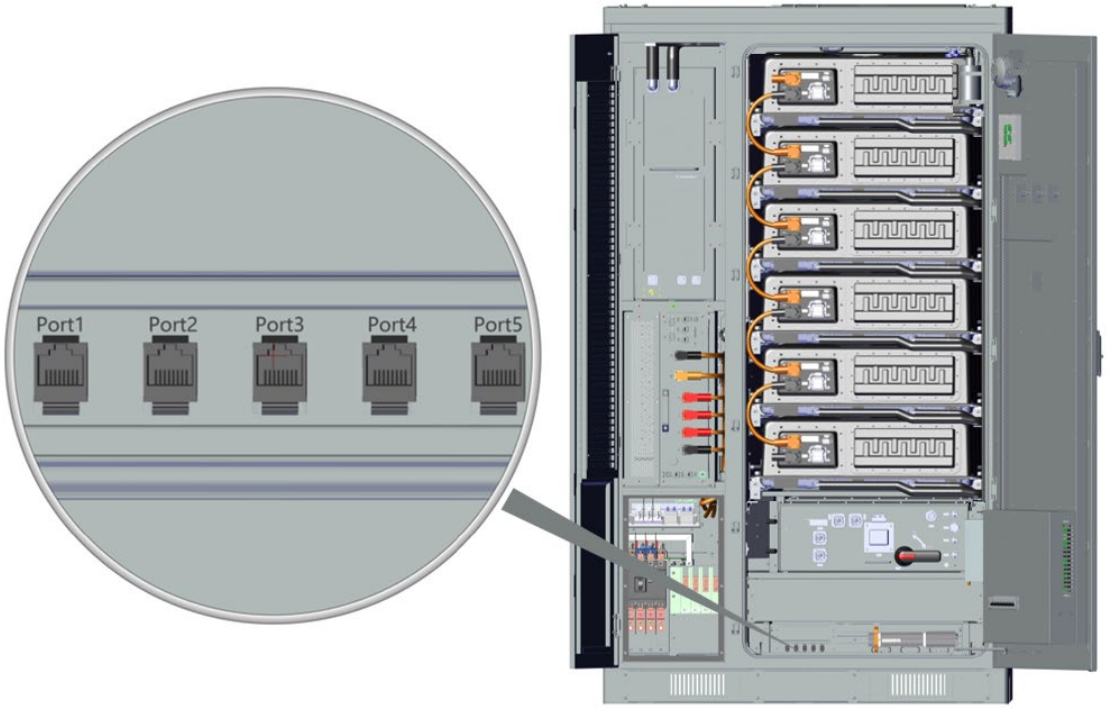


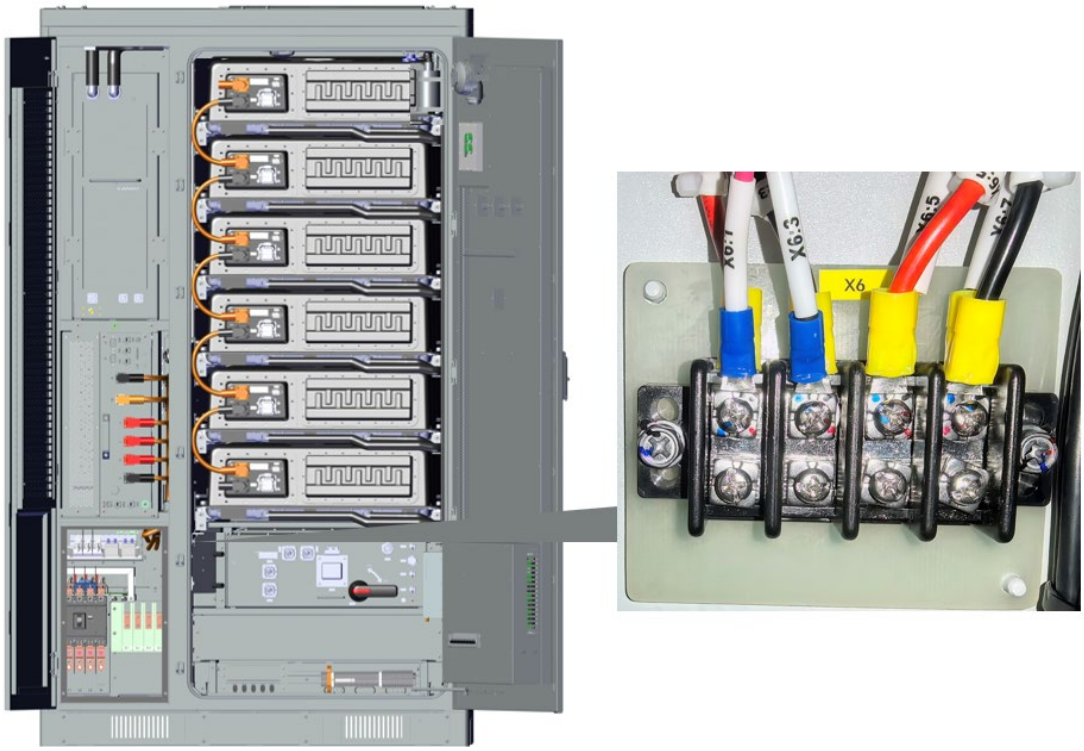
Figure 5-2 Cable entry dimension of AiO Box

Table 5-1(a) Description of External Port Information_AIOA279K125L

No.	Port/Terminal Location	Explanation
1	L1	to AC grid
2	L2	to AC grid
3	L3	to AC grid
4	N	to AC grid
5	GND	for grounding
6	BAT1+	Battery Input 1+
7	BAT1-	Battery Input 1-
8	BAT2+	Battery Input 2+
9	BAT2-	Battery Input 2-
10	X6	External Auxiliary Power Input
11	Port1	Parallel Communication Ethernet Port
12	Port2	Parallel Communication Ethernet Port
13	Port4	External HMI
14	Port5	DRM function
15	X3:1-2	System DI1 port
16	X3:3-4	System DI2 port
17	X3:5-6	System DO port
18	X4:9-10	Seamless-DI
19	X4:11-12	Seamless-DO
20	X4:13-14	Fault DO
21	X4:37-38	FSS Fault (Level I) Output port
22	X4:39-40	FSS Fault (Level II) Output port




Port1
Port2
Port3
Port4
Port5


X6

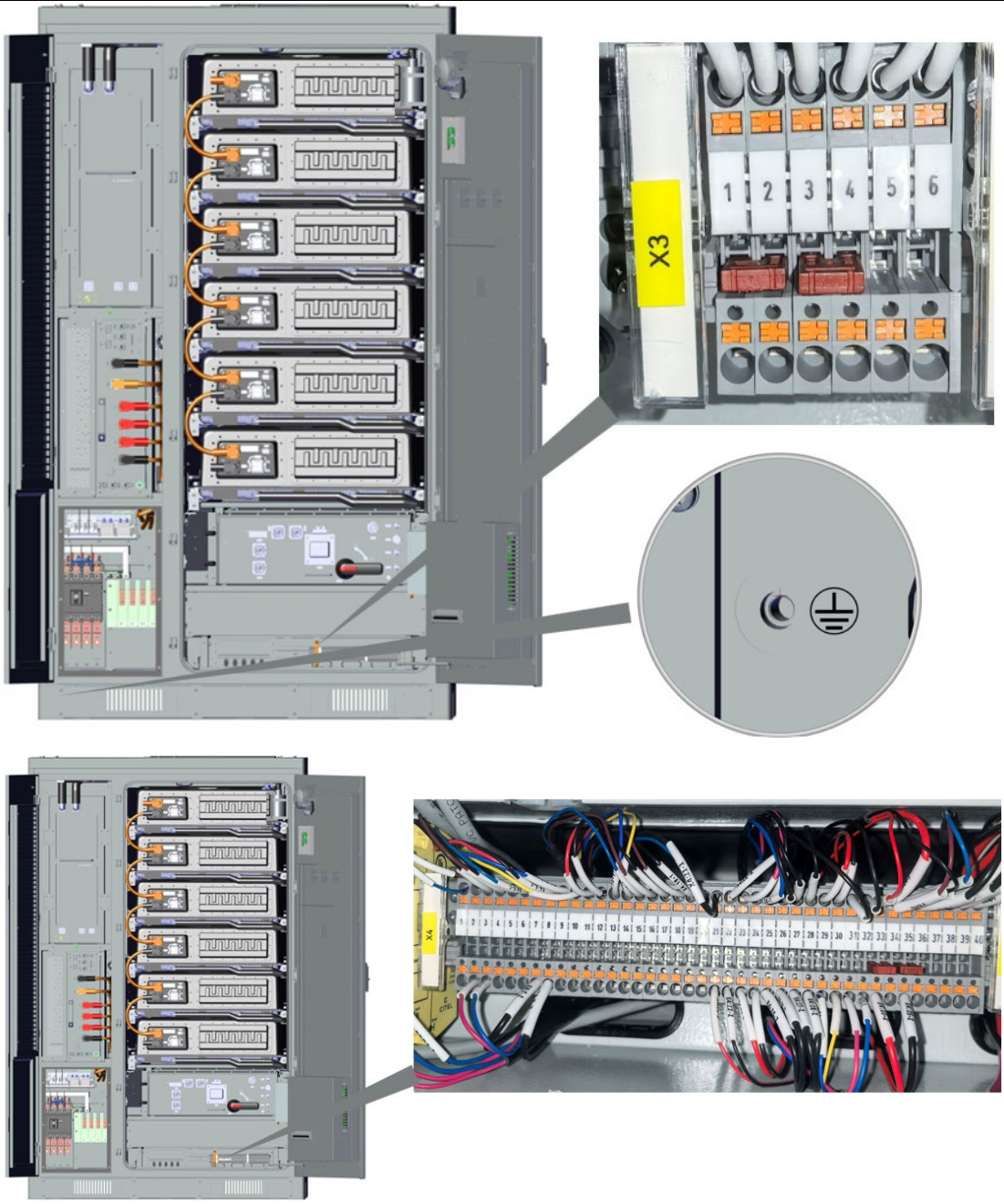
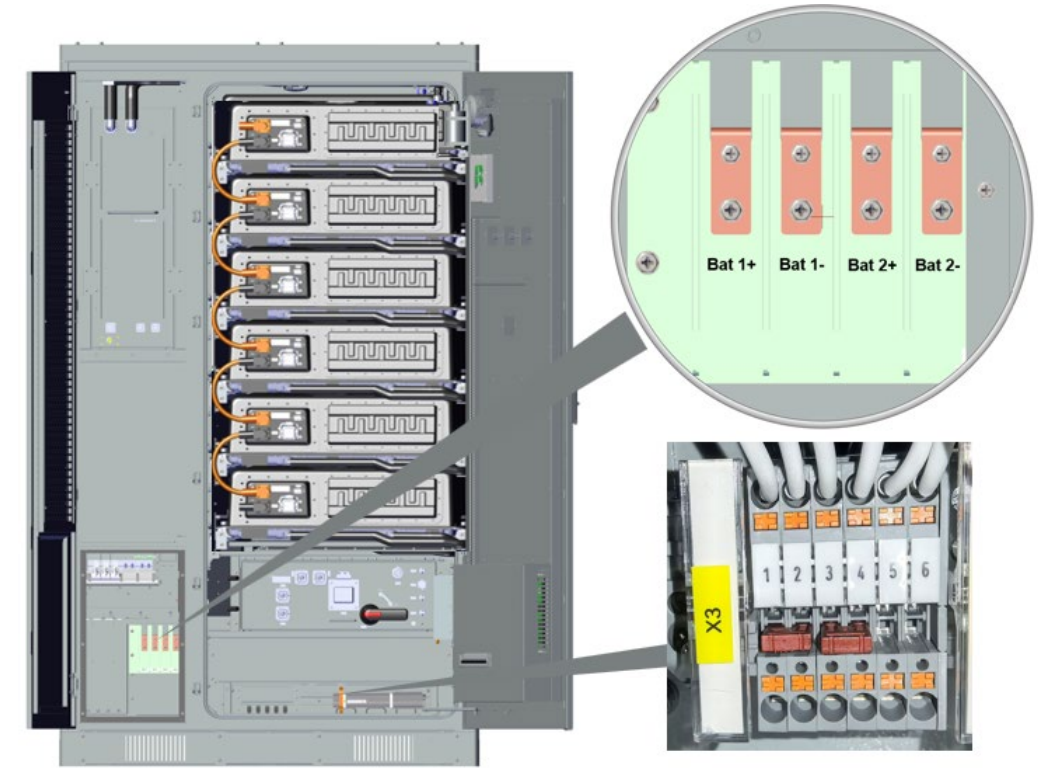


Table 5-1(b) Description of External Port Information_AIOB279K125L

No.	Port/Terminal Location	Explanation
1	GND	for grounding
2	BAT1+	Battery Input 1+
3	BAT1-	Battery Input 1-
4	BAT2+	Battery Input 2+
5	BAT2-	Battery Input 2-
6	X6	External Auxiliary Power Input
7	Port3	External Communication port
8	X3:1-2	System DI1 port
9	X3:3-4	System DI2 port

10	X3:5-6	System DO port
11	X4:13-14	Fault DO
12	X4:37-38	FSS Fault (Level I) Output port
13	X4:39-40	FSS Fault (Level II) Output port



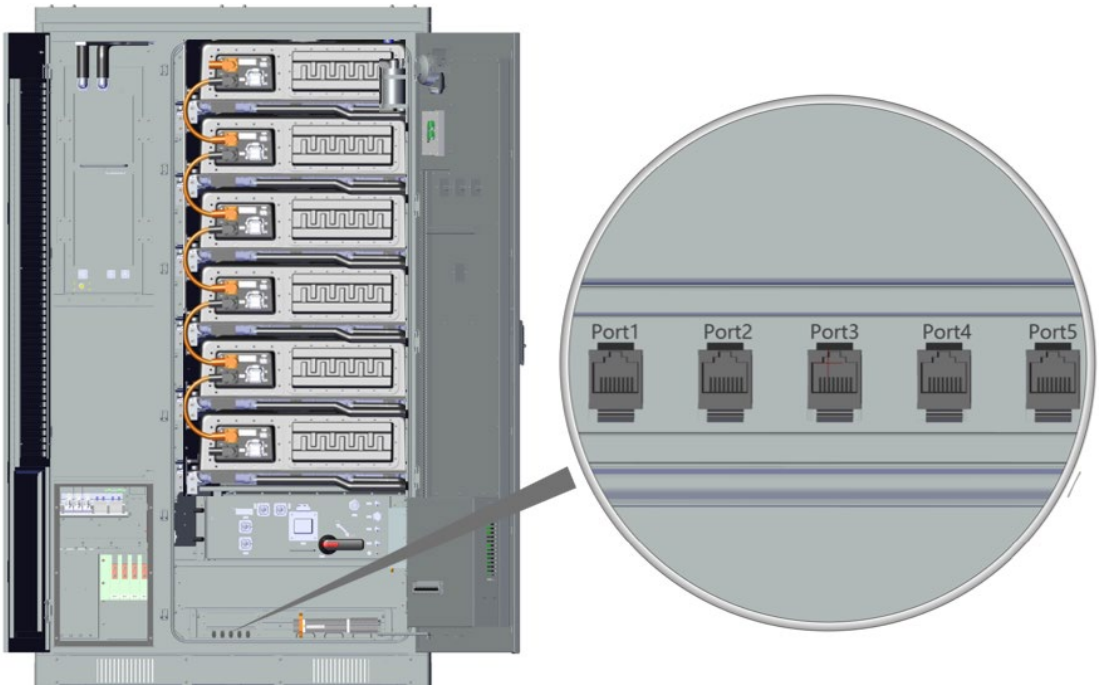
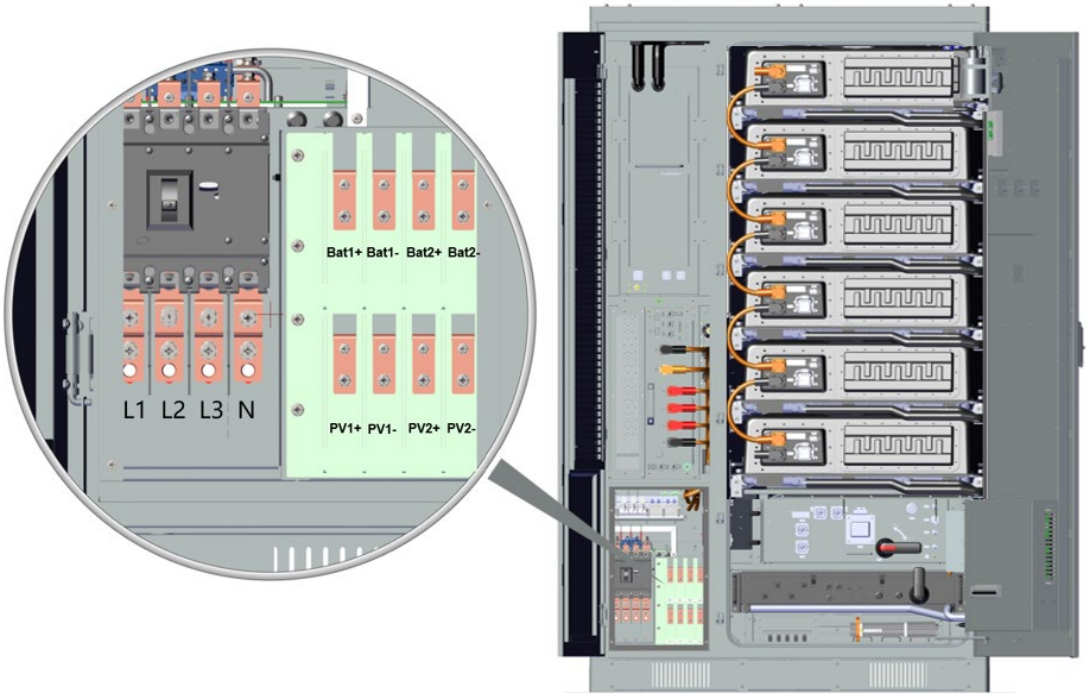
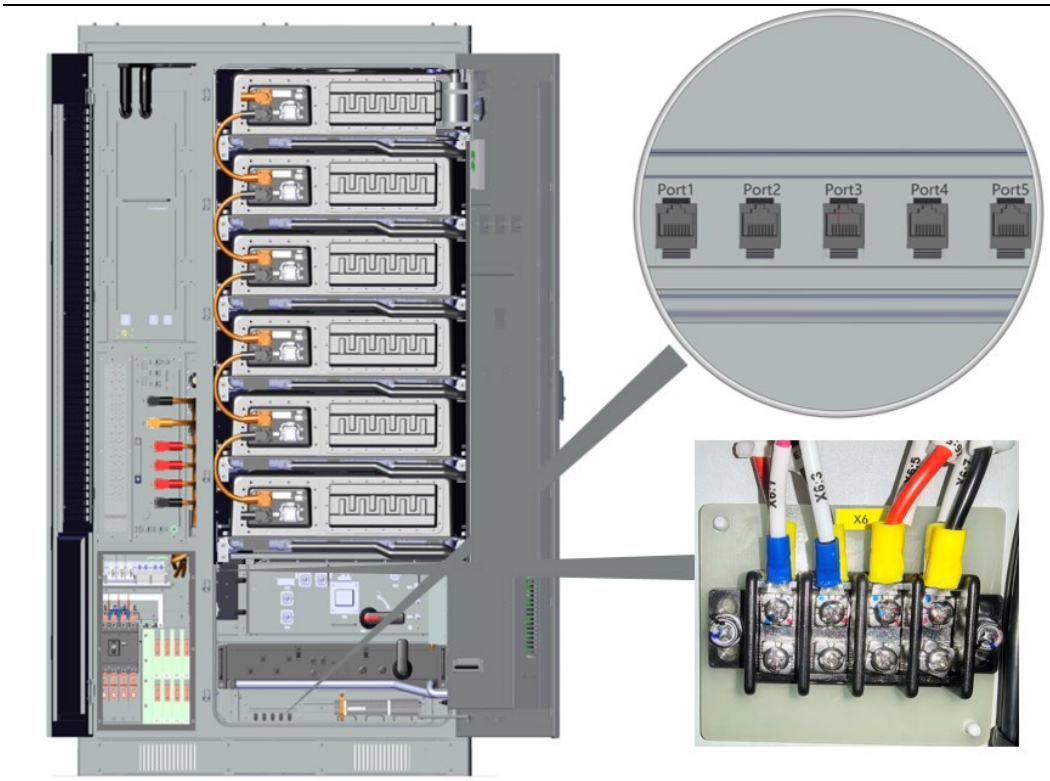


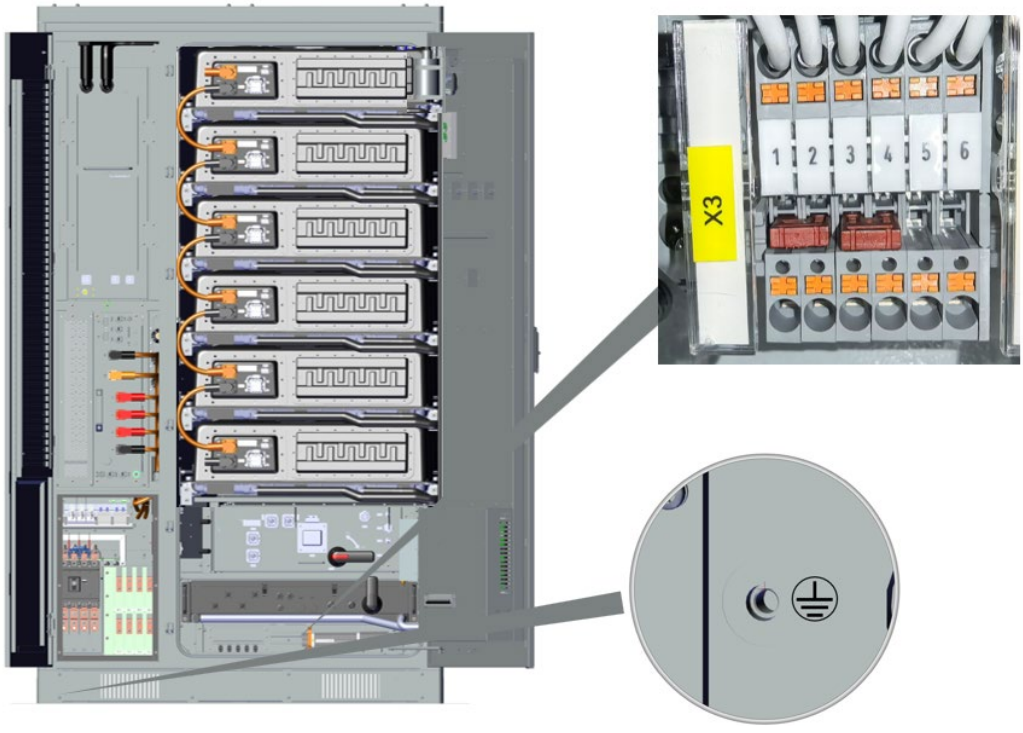
Table 5-1(c) Description of External Port Information_AIOC279K125L

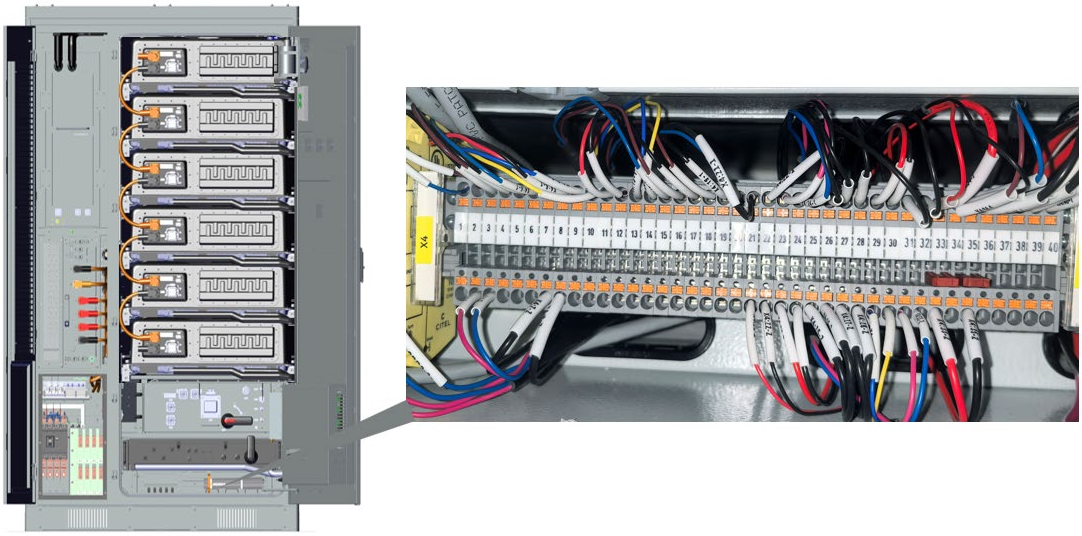
No.	Port/Terminal Location	Explanation
1	L1	to AC grid
2	L2	to AC grid
3	L3	to AC grid
4	N	to AC grid
5	GND	for grounding
6	BAT1+	Battery Input 1+
7	BAT1-	Battery Input 1-
8	BAT2+	Battery Input 2+

9	BAT2-	Battery Input 2-
10	PV1+	PV Input 1+
11	PV1-	PV Input 1-
12	PV2+	PV Input 2+
13	PV2-	PV Input 2-
14	X6	External Auxiliary Power Input
15	Port1	Parallel Communication Ethernet Port
16	Port2	Parallel Communication Ethernet Port
17	Port4	External HMI
18	Port5	DRM function
19	X3:1-2	System DI1 port
20	X3:3-4	System DI2 port
21	X3:5-6	System DO port
22	X4:9-10	Seamless-DI
23	X4:11-12	Seamless-DO
24	X4:13-14	Fault DO
25	X4:37-38	FSS Fault (Level I) Output port
26	X4:39-40	FSS Fault (Level II) Output port



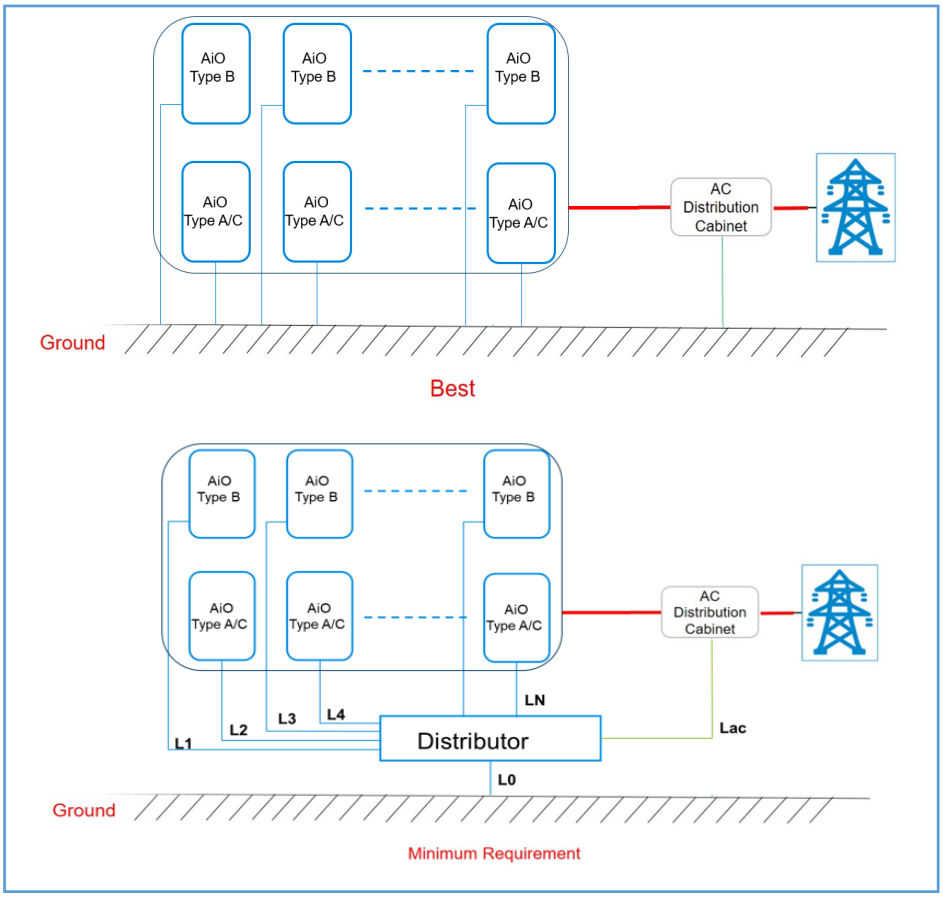

Port1
Port2
Port3
Port4
Port5
X6


X3
1
2
3
4
5
6



5.2 Grounding requirement

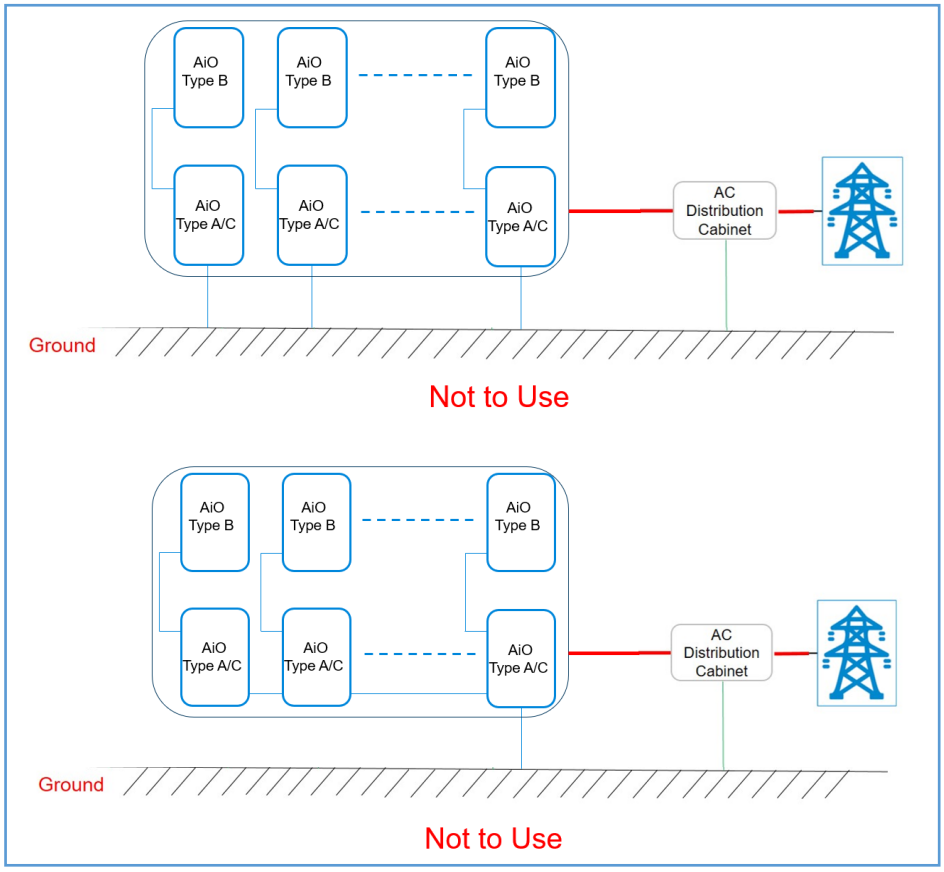
Grounding requirement for AiO Box as below:



Note：

An equipment grounding conductor or a grounded, metal, and permanent wiring system is required for the AiO connection. This should run with circuit conductors and connected to the equipment grounding connection on the AiO. the resistance of AiO grounding should be required to less than 4ohm. If choose

second grounding method, the length of L0 shall be less than one fifth of L1~LN. And we recommend each electrical equipment grounding independently to avoid mutual interference, so don't conduct grounding as below third illustration, which will produce series interference and lead to equipment communication loss.



5.3 Wiring connector and tubular lug

Following dimension of AC connector, PV connector and Battery connector.

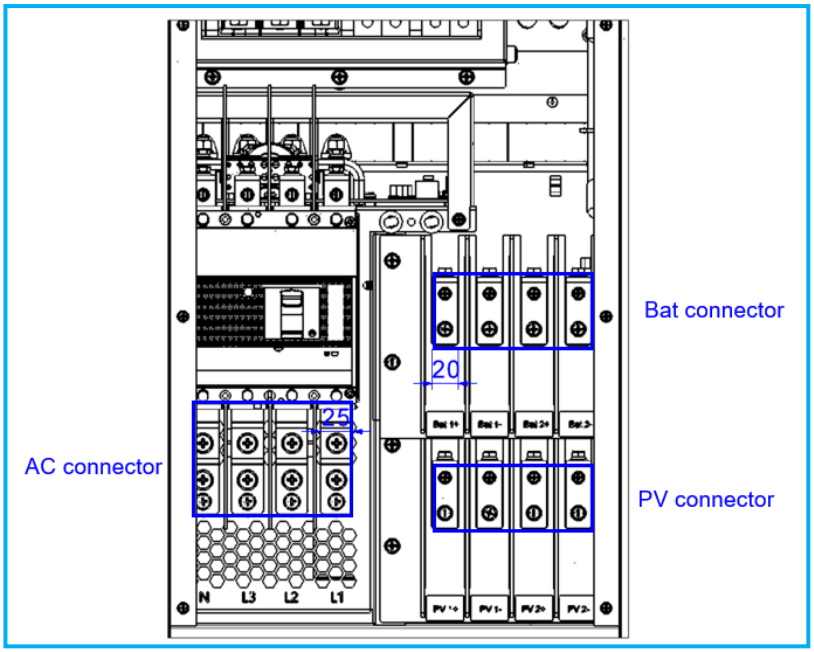


Figure 5-3 Dimension of connectors

Following table is datasheet of tubular lug for reference, also customer can select appropriate cable lug in accordance with local laws and regulation.

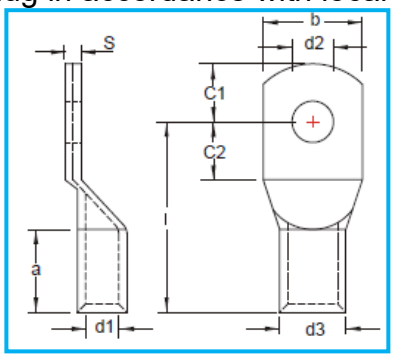


Figure 5-4 Single-hole tubular lug for AC power cable

Wire range	Dimension(mm)								
	a	b	C1	C2	d1	d2	d3	l	S
95mm^2	25	26	12	12	13.5	8.4	18	48	4.2

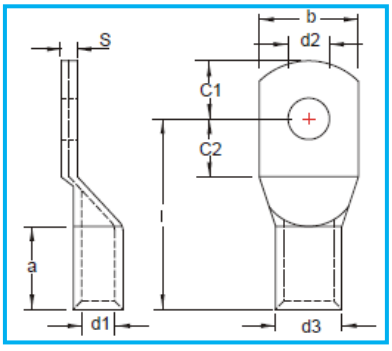


Figure 5-5 Single-hole tubular lug for grounding cable

Wire range	Dimension(mm)

	a	b	C1	C2	d1	d2	d3	l	S
50mm^2	19	20	10	10	10	8.4	14	37	3.7

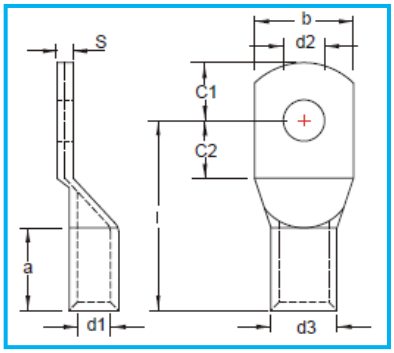


Figure 5-6 Single-hole tubular lug for DC cable

Wire range	Dimension(mm)								
	a	b	C1	C2	d1	d2	d3	l	S
50mm^2	19	20	10	10	10	6.4	14	37	3.7

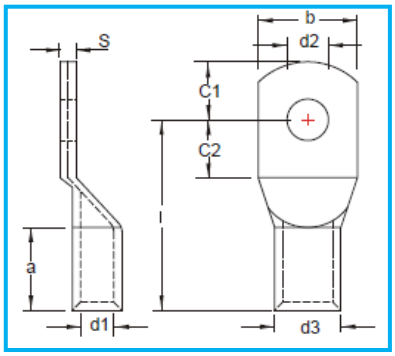


Figure 5-7 Single-hole tubular lug for PV cable

Wire range	Dimension(mm)								
	a	b	C1	C2	d1	d2	d3	l	S
35mm^2	17	17	7.5	7.5	8.5	6.4	12	32	3.2

Cable Pre-fabrication

1) Run the cable through the gland or protective sleeve following the wiring route first.
2) Strip off the insulation cover of the cable with a trimmed length of 5mm longer than the depth of the cable lug.
3) Insert the heat-shrinkable tubing into the cable, the tubing with length 20mm longer than the depth of the cable lug is recommended.
4) Put the stripped cable inside the cable lug.
5) Crimp the cable lug with relevant tools.

6) Shrink the tubing with hot air blower.

5.4 AIOA279K125L wiring

5.4.1 Material list

No.	Function	Cross-section area (1 cable)	Amount	Explanation
1	AC breaker to grid (L1)	95mm^2	1	AC power cable
2	AC breaker to grid (L2)	95mm^2	1	AC power cable
3	AC breaker to grid (L3)	95mm^2	1	AC power cable
4	AC breaker to grid (N)	95mm^2	1	AC power cable
5	Grounding cable	50mm^2	1	Grounding cable
6	Single-hole tubular lugs (95-8)	95mm^2	4	For AC cable
7	Single-hole tubular lugs (50-8)	50mm^2	1	For PE cable
8	Twisted-pair shielded cable	22AWG	3	For I/O signal
9	Three-core cable	8AWG	1	For Auxiliary power
10	Copper cable	8AWG	1	Grounding
11	Copper cable	10AWG	2	220V for TMS
12	Copper cable	14AWG	2	220V-L/N
13	Communication	RJ45 with shield	1	Network cable
14	Heat-shrinkable tubing	Φ30mm		1 meter
**** No.10 is for auxiliary grounding cable, No.11 is for TMS power source, No.12 is for system auxiliary power source.***				

5.4.2 AC cable wiring

NOTICE

- AiO Box AC cables must connect in correct sequence (positive sequence), otherwise AiO Box will occur phase sequence fault.
- PCS unit should be grounded via equipotential connection device, and the grounding resistance should be less than 4Ω.

Residual Current Monitoring Device

AiO product will disconnect immediately from the mains power once a fault

current with a value exceeding the limit is detected by integrated a universal current-sensitive residual current monitoring unit. If an external residual current device (RCD) (type A is recommended) is mandatory, the switch must be triggered at the residual current. The other specifications of RCD can also be used according to local standard.

Recommended residual current is as below:

Type	Recommended residual current
AIOA279K125L	1250mA

1. Open the door of AiO Box cabinet, remove the protective plate.

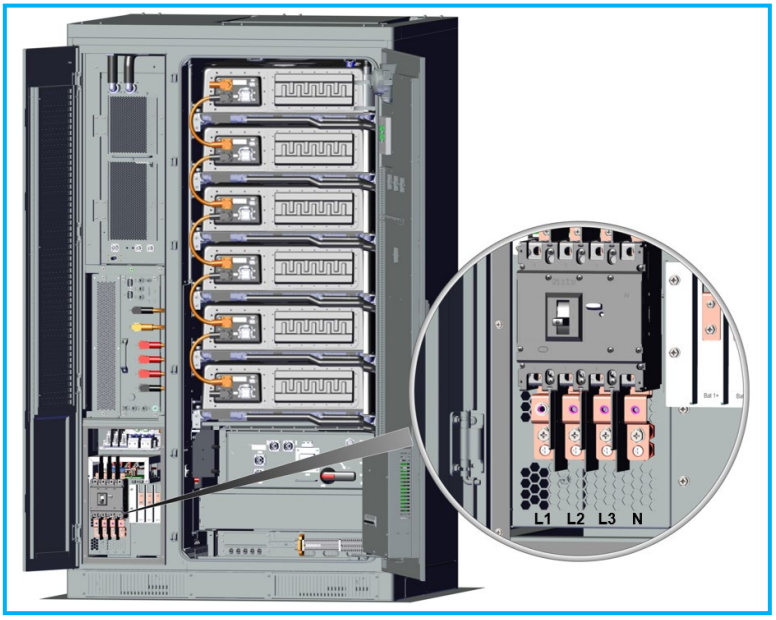


Figure 5-8 Open the door

2. Cut off the silicone pad within the red-marked area.

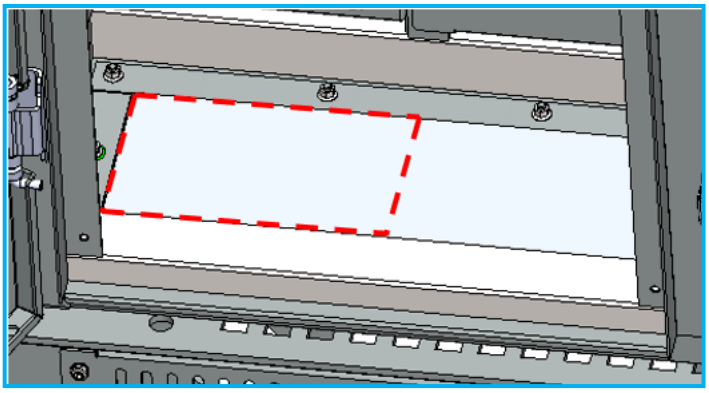


Figure 5-9 Cut off the silicone pad

3. AC power cables run through the bottom plate, remove the bolts from terminal.
   1) Strip off the insulation cover of the cable with a trimmed length of 5mm longer than the depth of the cable lug.

2) Insert the heat-shrinkable tubing into the cable, the tubing with length 20mm longer than the depth of the cable lug is recommended.
3) Put the stripped cable inside the cable lug.
4) Crimp the cable lug with relevant tools.
5) Shrink the tubing with hot air blower.

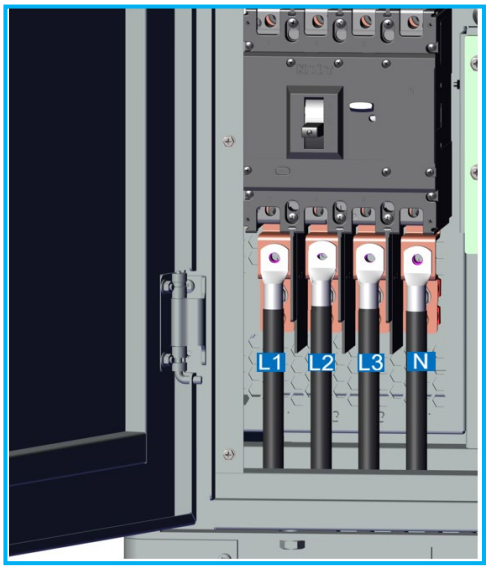


Figure 5-10 Cable Routing

4. Secure cable lug to AC connector, and fasten fixing bolts(M8*25). Torque:12N·m.

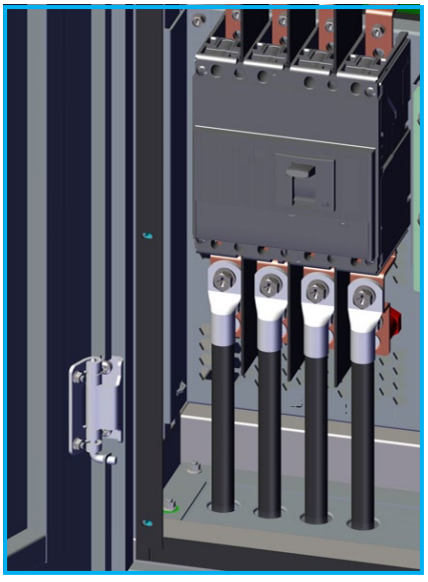


Figure 5-11 Fasten power cable

5. Apply fire-rated sealing compound to the cable entry base and compact it to achieve a complete seal.

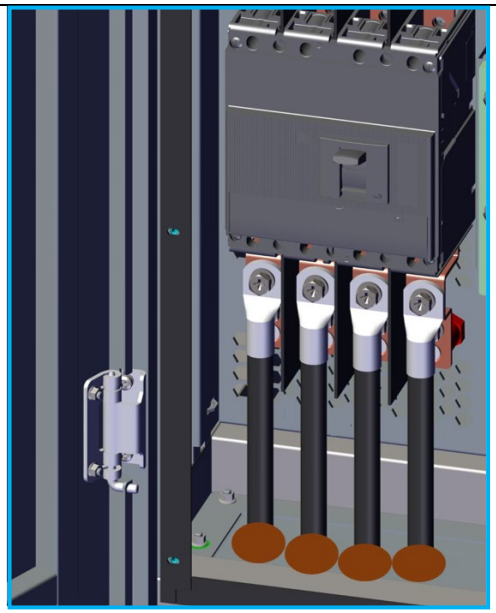


Figure 5-12 Seal cable entry\

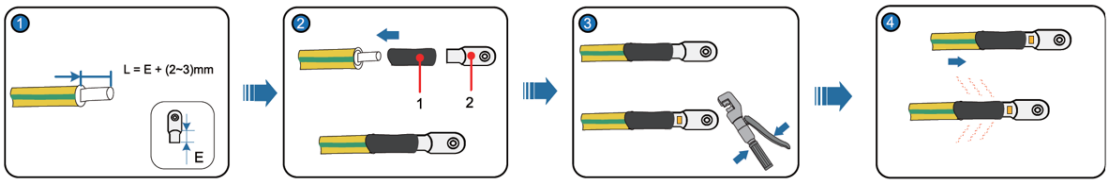
5.4.3 Battery cable wiring (for A+B+B)

Connect the free end of AIOB279L125L battery cable to AIOA279L125L battery connection port. Refer to Section 5.5.6.

5.4.4 Grounding cable wiring

Each corner of cabinet base has one earthing point, grounding cable connection can be connected one of them according site situation.

The grounding cable shall be prepared as follows.



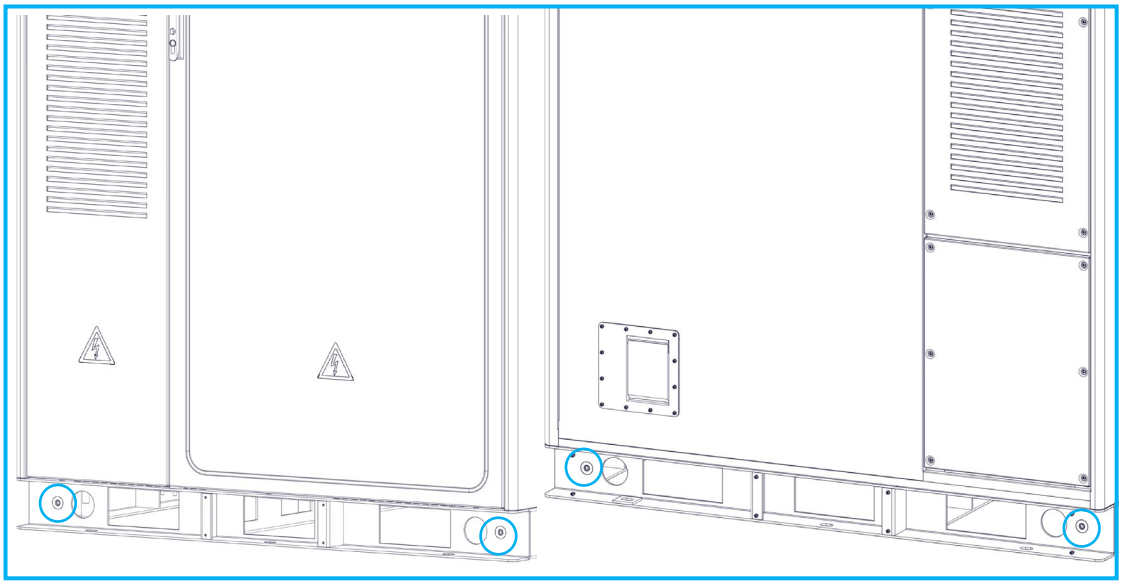


Figure 5-13 Grounding point

1. Remove bottom foot front cover.

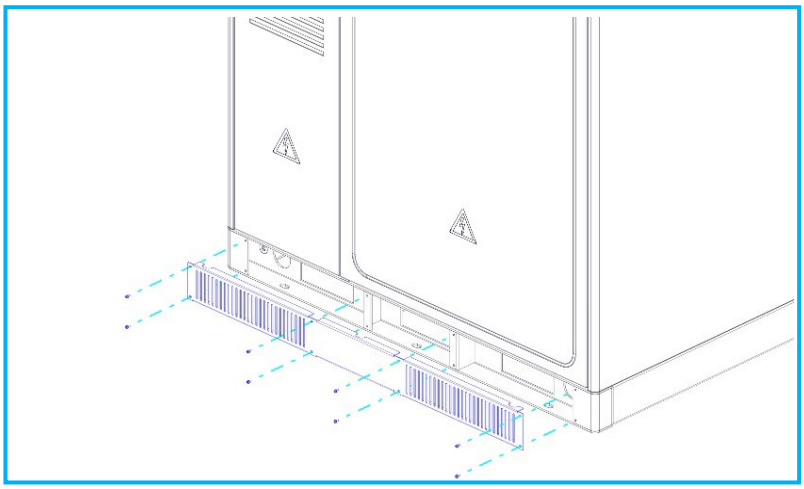


Figure 5-14 Open bottom cover

2. Run cable from underside to grounding point, then secure cable tubular lug to grounding point with bolts(M8*30). Torque:15N·m.

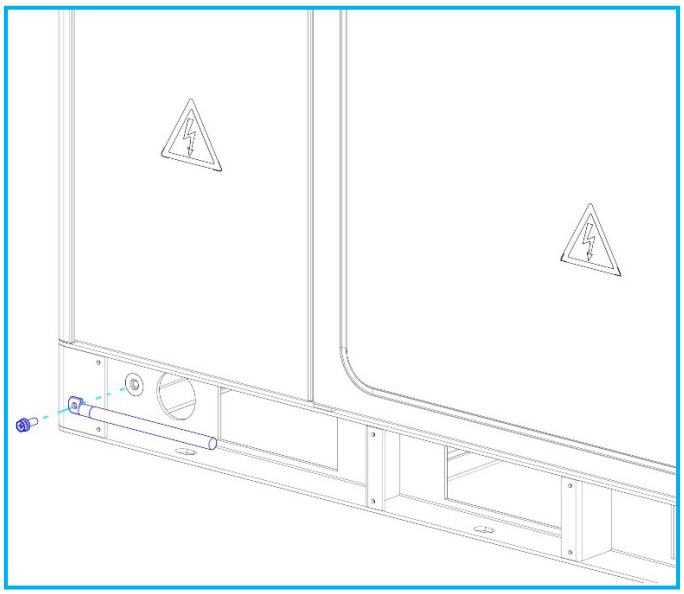


Figure 5-15 Connect grounding cable

3. At last, re-install the bottom foot cover.

5.4.5 Auxiliary power supply wiring

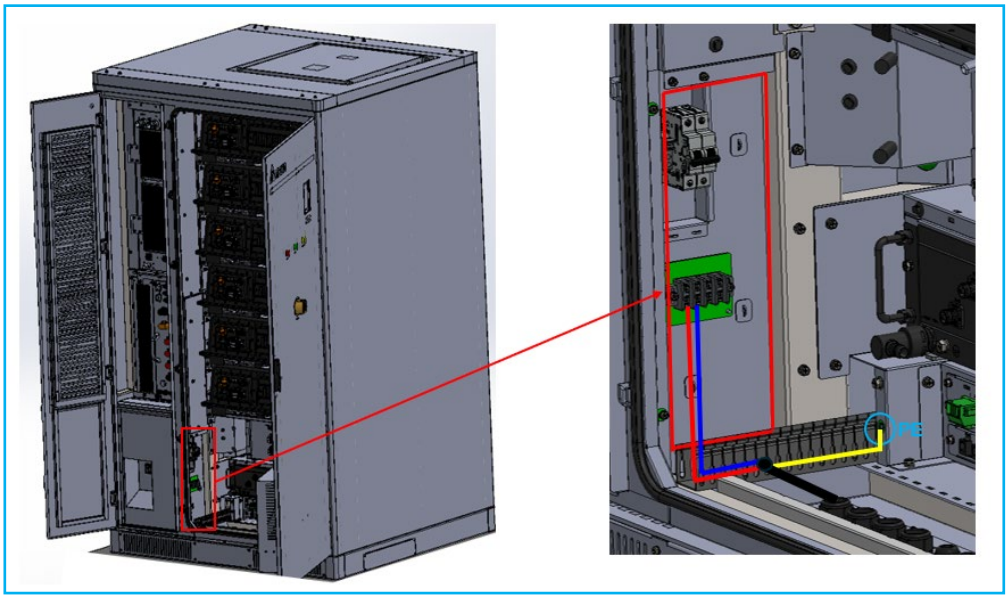
The external single-phase auxiliary AC supply mainly powers the internal cooling system, dehumidifier and switching power supply of AiO Box.

There are two installation types for the auxiliary power supply of this unit. Please select the appropriate wiring method according to the actual cabinet configuration and your specific requirements.

The first category:

Terminal block X6 serves as the interface for the external auxiliary power supply.

Auxiliary power supply port	X6:2 (L) X6:4 (N)	Auxiliary power supply，220Vac/50Hz，⩾23A

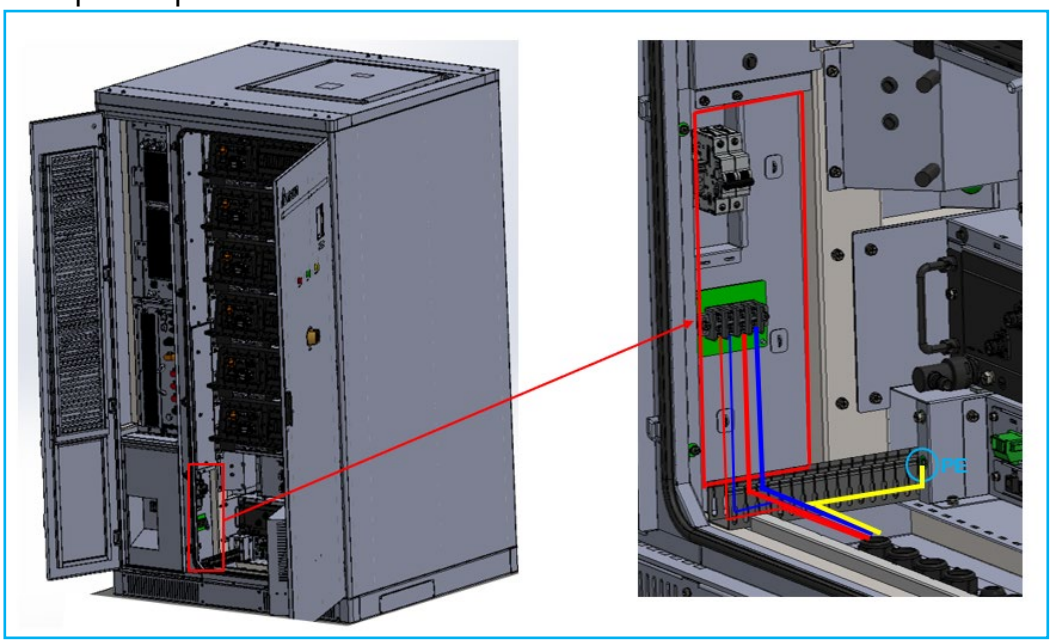


Wiring grounding cable on PE point, three-core cable must fix at the wire binding hole with a cable tie and leave an appropriate length.

The second category:

Terminal block X6 serves as the interface for the external auxiliary power supply.

Remove the two original jumper wire on upper terminal block X6(X6:1&X6:5, X6:3&X6:7). TMS and system auxiliary power supply provide with separate power source.



Auxiliary power supply port	X6:2 (L) X6:4 (N) X6:6(TMS:L) X6:8(TMS:N)	X6:2(L) X6:4(N), 220Vac/50Hz≥7A X6:6(TMS:L) X6:8(TMS:N), 220Vac/50Hz ≥16A

Wiring grounding cable on PE point, the cables must fix at the wire binding hole with a cable tie and leave an appropriate length.

5.4.6 Communication and I/O cable connecting

The internal communication port (JX1) of BMS and AiO Box is displayed as follows, which enables data interaction between the BMS and AiO Box.

Remove the inner protective housing of the door panel, lead the all cables through the glands at first refer to figure 5-16. Then install cables to the corresponding connection port in the table and diagram.

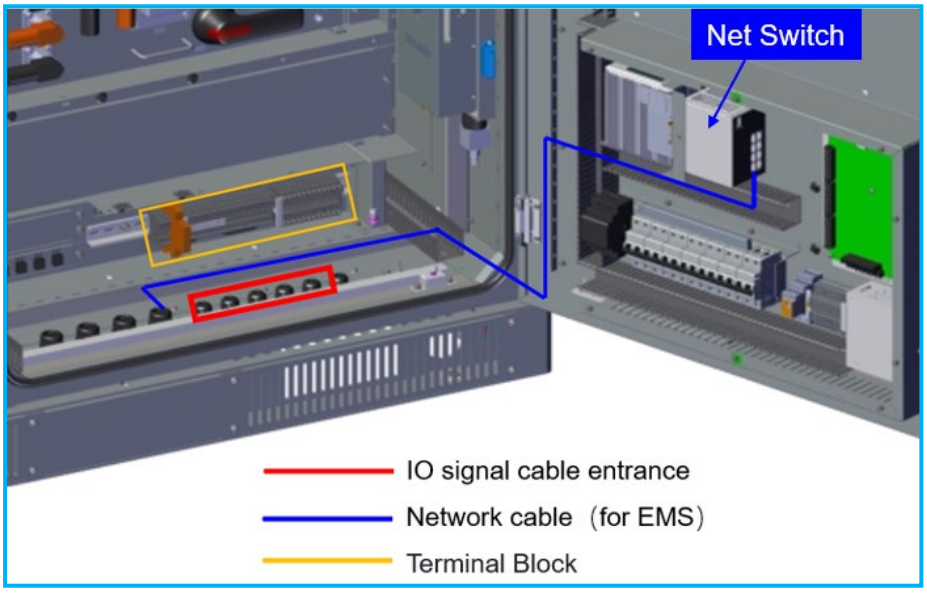


Figure 5-16 Communication and I/O cable path

Table 5-2 I/O signal

No.	Item	Terminals	Explanation
1	System DI1 port	X3:1-2	Dry contact signal from

		X3:2-2	external device
2	System DI2 port	X3:3-2 X3:4-2	Dry contact signal from external device
3	System DO port	X3:5-2 X3:6-2	Dry contact signal from Battery cabinet to external device
4	Fault DO	X4:13-2 X4:14-2	Dry contact signal from PCS to external device
5	FSS Fault (Level I) Output port	X4:37-2 X4:38-2	Dry contact signal from Battery cabinet to external device
6	FSS Fault (Level II) Output port	X4:39-2 X4:40-2	Dry contact signal from Battery cabinet to external device
7	Communication cable	Net Switch port	Communication with EMS

I/O signal cable and network cable must fix at the wire binding hole with a cable tie and leave an appropriate length.

5.4.7 DRM function

AiO Box (AIOA/C279K125L) supports all the demand response modes (DRMs) defined in the standard AS/NZS 4777.2. The CNR12 connector is an RJ45 socket that can be connected to a demand response enabling device (DRED).

Connector	Description
DRM	Interface for DRM function RJ45 connector

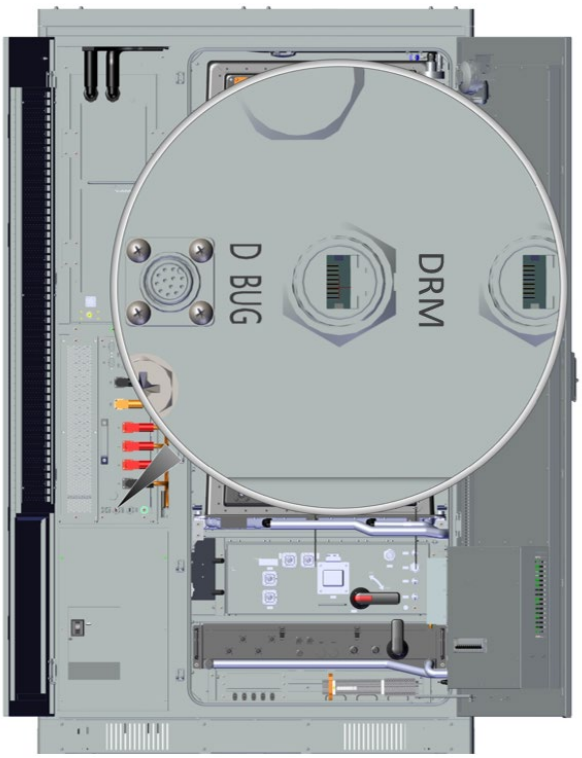


Table 5-3 DRM mode definition

Mode	Requirement
DRM 0	Operate the disconnection device
DRM 1	Do not consume power
DRM 2	Do not consume at more than 50 % of rated power
DRM 3	Do not consume at more than 75 % of rated power AND supply reactive power if capable
DRM 4	Increase power consumption (subject to constraints from other active DRMs)
DRM 5	Do not generate power
DRM 6	Do not generate at more than 50 % of rated power
DRM 7	Do not generate at more than 75 % of rated power AND absorb reactive power if capable
DRM 8	Increase power generation (subject to constraints from other active DRMs)
NOTE Demand response modes of Table 3.1 are as described in AS/NZS 4755.3 series of Standards.	

DRM function can be used or reserved. other DRMs can be reserved, but not DRM 0.

If the DRM function is not used, keep the RJ45 terminal which has a settled resistor as shown in the following figure connected to DRM of PCS in AiO Box.

If the DRM function is used, an RJ45 terminal which is complied with the standard should be connected to DRM.

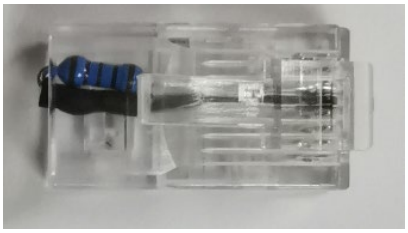


Figure 5-17 DRM connector with Terminal resistor

Table 5-4 DRM Pin Assignment

Item	Pin Assignment	Notes
DRM	1: DRM1/5	FOR DRM function
	2: DRM2/6	
	3: DRM3/7	
	4: DRM4/8	
	5: REF GEN/0	
	6: COM LOAD/0	
	7: Shorted to PIN 8	
	8: Shorted to PIN 7	

5.4.8 Earth Fault

The AiO Box has the earth fault detection and complies with the IEC62109-2 specification.

When the earth fault is triggered, the AiO Box will stop immediately and the red fault indicator light will remain on clearly on the cabinet door, in the meantime a dry contact will actuate automatically that can be used to trigger external devices such as buzzers.

5.4.9 Parallel connection

Multiple AiO Boxes are parallel connected, AC power cables must be connected to one AC distributor cabinet. As below illustration.

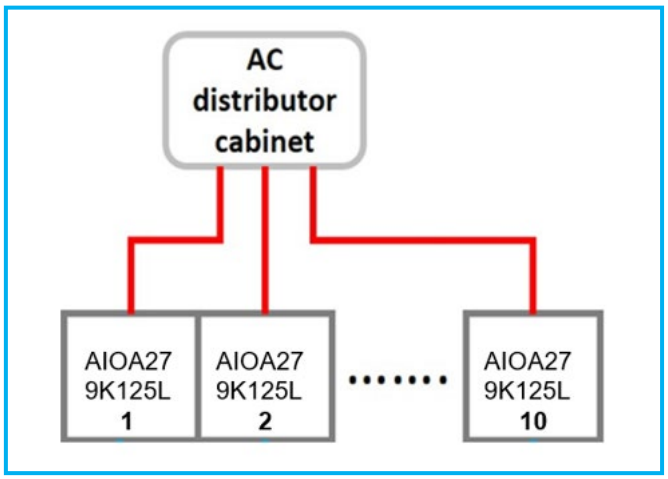


Figure 5-18 Parallel AC cables connection

Parallel communication network cable connection.

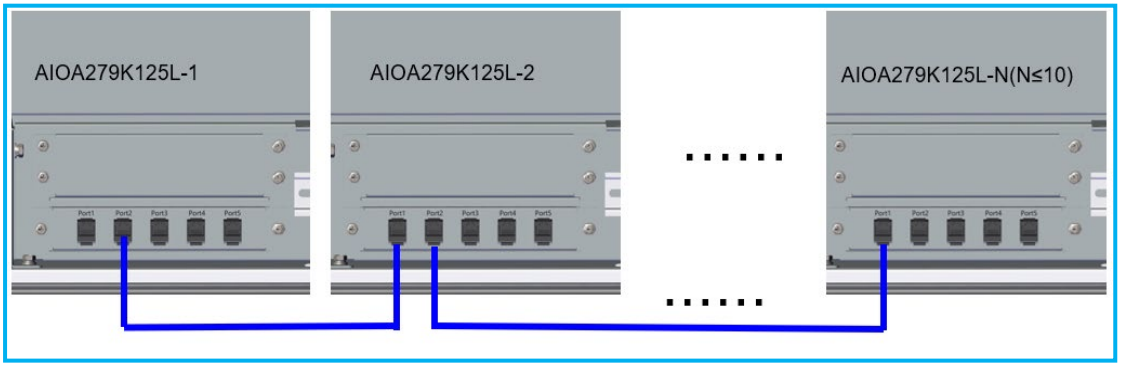


Figure 5-19 Parallel ethernet cables connection

5.5 AIOB279K125L wiring

5.5.1 Material list

No.	Function	Cross-section area (1 cable)	Amount	Explanation
1	Grounding cable	50mm^2	1	Grounding cable
2	Battery cable	50mm^2	2	Battery cable
3	Single-hole tubular lugs (50-8)	50mm^2	1	For PE cable
4	Single-hole tubular lugs (50-6)	50mm^2	4	For battery cable
5	Twisted-pair shielded cable	22AWG	5	For I/O signal
6	Three-core cable	8AWG	1	For Auxiliary power
7*	Copper cable	8AWG	1	Grounding
8*	Copper cable	10AWG	2	220V for TMS
9*	Copper cable	14AWG	2	220V(L/N)
10	Communication	RJ45 with shield	1	Network cable
11	Heat-shrinkable tubing	Φ30mm		1 meter
No.7* is for auxiliary grounding cable, No.8* is for TMS power source, NO.9* is for system auxiliary power source.				

5.5.2 Battery cable wiring

1. Open the door of AiO Box cabinet, remove the protective plate.

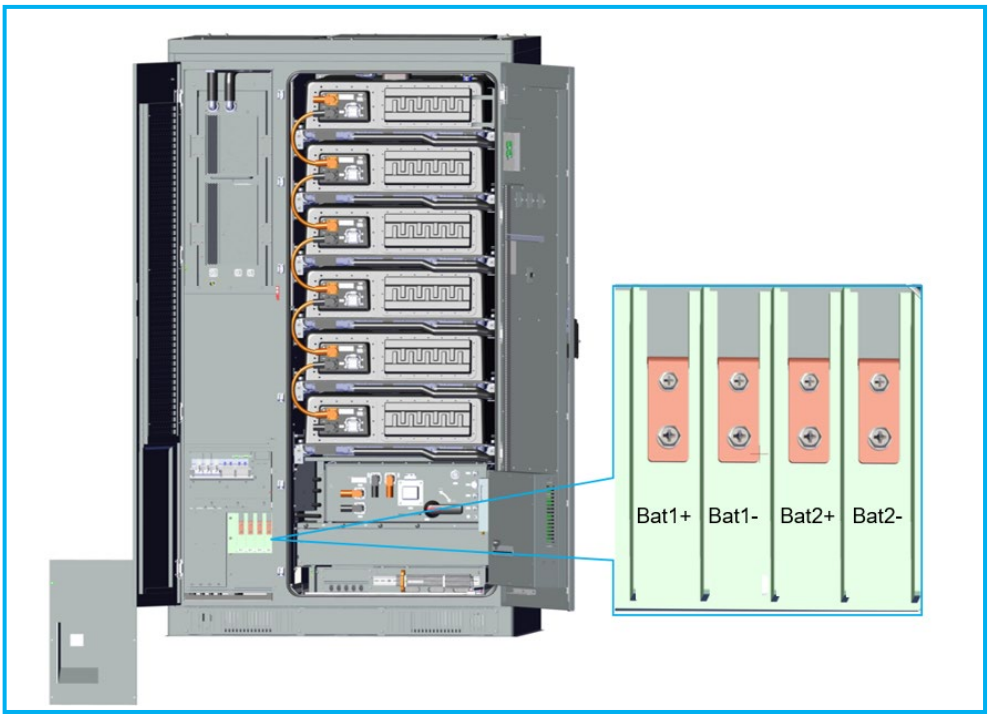


Figure 5-20 Open the door

2. Cut off the silicone pad within the red-marked area.

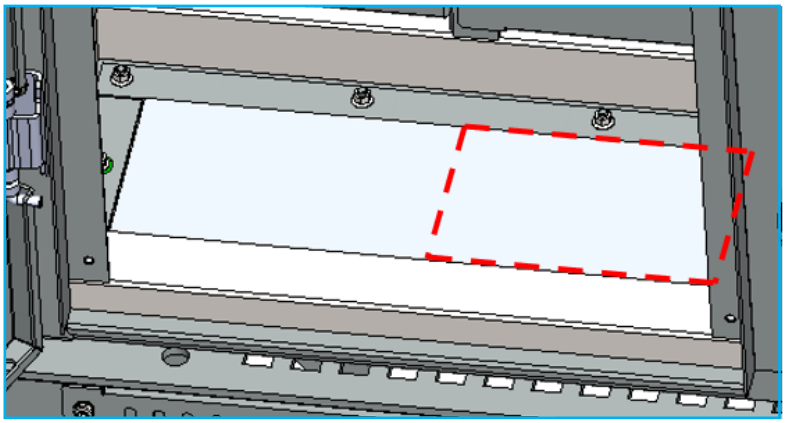


Figure 5-21 Cut off the silicone pad

3. Battery cables run through the bottom plate, remove the bolts from terminal.
   1) Strip off the insulation cover of the cable with a trimmed length of 5mm longer than the depth of the cable lug.
   2) Insert the heat-shrinkable tubing into the cable, the tubing with length 20mm longer than the depth of the cable lug is recommended.
   3) Put the stripped cable inside the cable lug.
   4) Crimp the cable lug with relevant tools.
   5) Shrink the tubing with hot air blower.

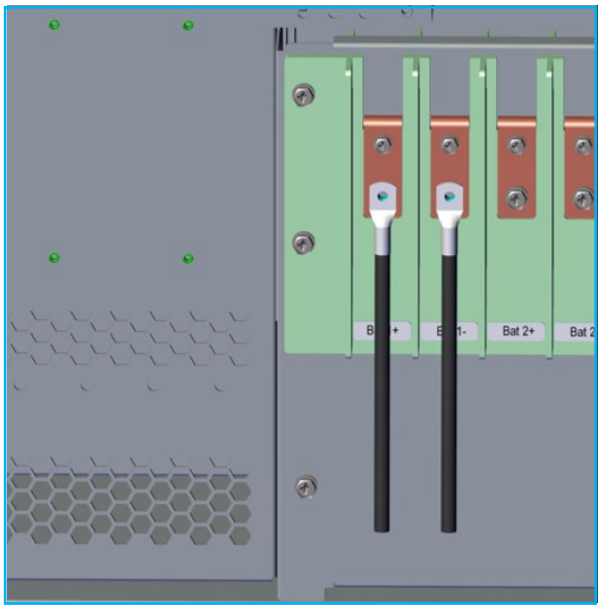


Figure 5-22 Cable Routing

4. Secure cable lug to Bat connector, and fasten fixing bolts. Torque: 6N·m.

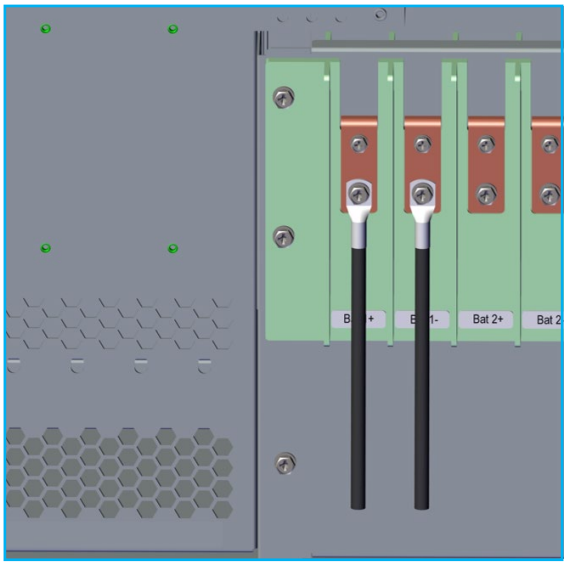


Figure 5-23 Fasten power cable

5. Apply fire-rated sealing compound to the cable entry base and compact it to achieve a complete seal.

5.5.3 Grounding cable wiring

Each corner of cabinet base has one earthing point, grounding cable connection can be connected one of them according site situation.

The grounding cable shall be prepared as follows.

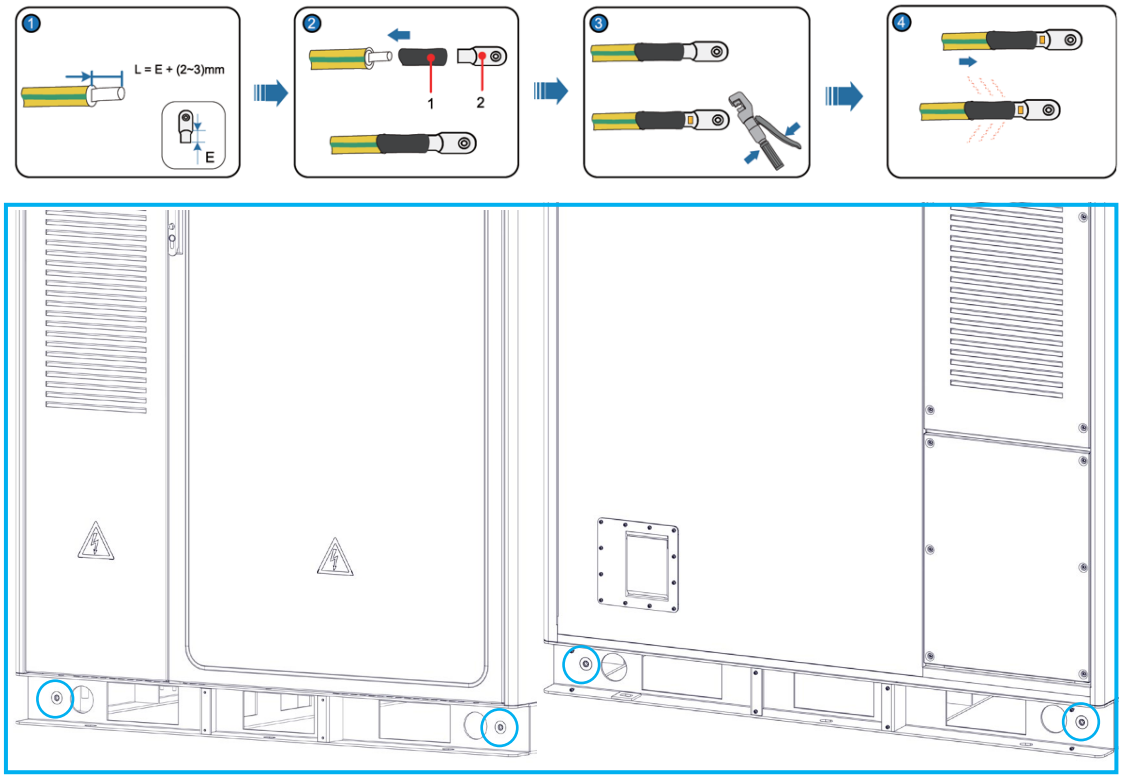


Figure 5-24 Grounding point

1. Remove bottom foot front cover.

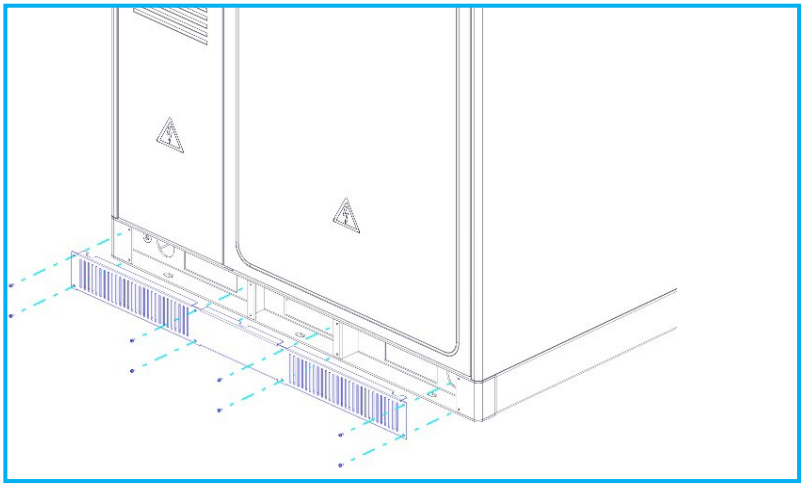


Figure 5-25 Open bottom cover

2. Run cable from underside to grounding point, then secure cable tubular lug to grounding point with bolts(M8*30). Torque:15N·m.

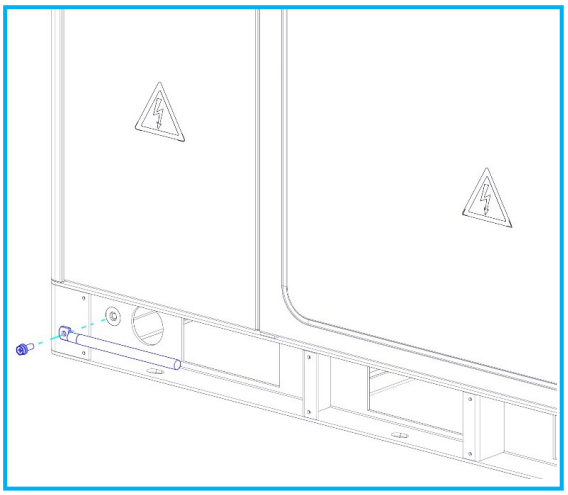


Figure 5-26 Connect grounding cable

3. At last, re-install the bottom foot cover.

5.5.4 Auxiliary power supply wiring

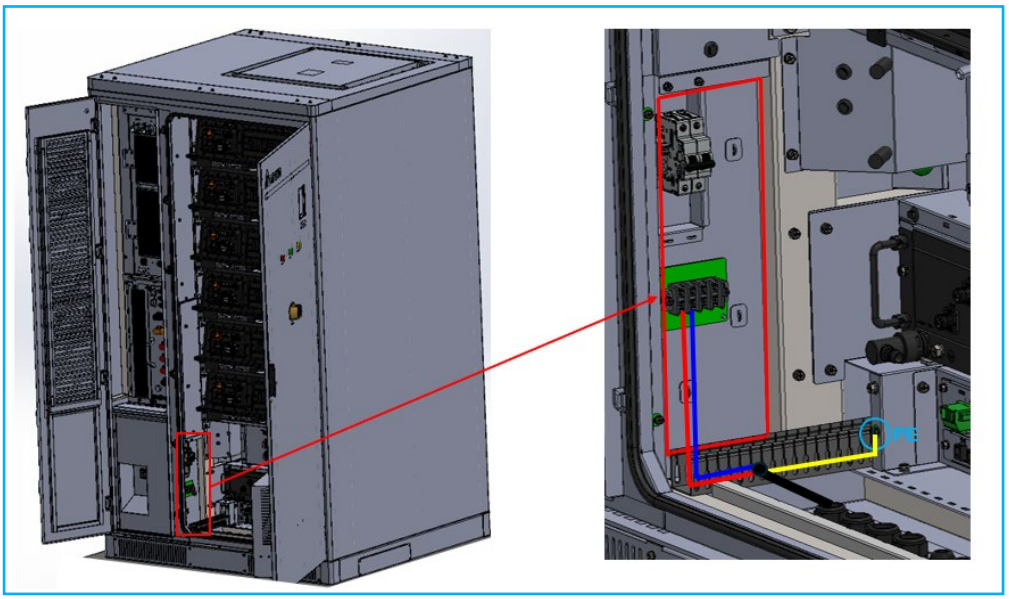
The external single-phase auxiliary AC supply mainly powers the internal cooling system, dehumidifier and switching power supply of AiO Box.

There are two installation types for the auxiliary power supply of this unit. Please select the appropriate wiring method according to the actual cabinet configuration and your specific requirements.

The first category:

Terminal block X6 serves as the interface for the external auxiliary power supply.

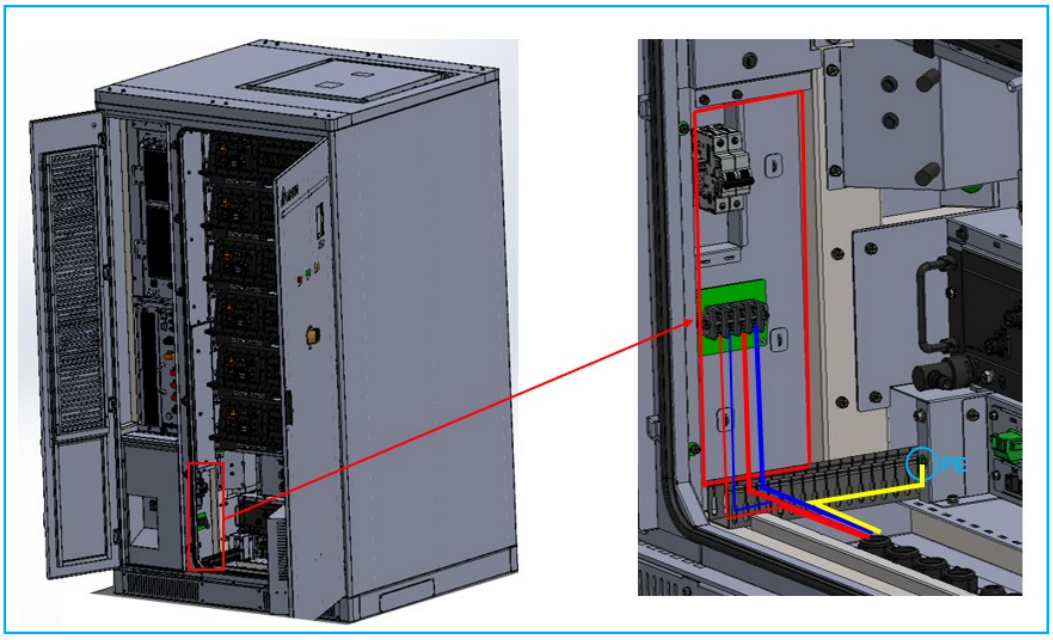
Auxiliary power supply port	X6:2 (L) X6:4 (N)	Auxiliary power supply，220Vac/50Hz，≥23A



Wiring grounding cable on PE point, three-core cable must fix at the wire binding hole with a cable tie and leave an appropriate length.

The second category:

Terminal block X6 serves as the interface for the external auxiliary power supply. ***Remove the two original jumper wire on upper terminal block X6(X6:1&X6:5, X6:3&X6:7)***. TMS and system auxiliary power supply provide with separate power source.



Auxiliary power supply port	X6:2 (L) X6:4 (N) X6:6(TMS:L) X6:8(TMS:N)	X6:2(L) X6:4(N); 220Vac/50Hz, ≥7A X6:6(TMS:L) X6:8(TMS:N); 220Vac/50Hz, ≥16A

Wiring grounding cable on PE point, the cables must fix at the wire binding hole

with a cable tie and leave an appropriate length.

5.5.5 Communication and I/O cable connecting

The internal communication port (JX1) of BMS and AiO Box is displayed as follows, which enables data interaction between the BMS and AiO Box.

Remove the inner protective housing of the door panel, lead the all cables through the glands at first refer to figure 5-27. Then install cables to the corresponding connection port in the table and diagram.

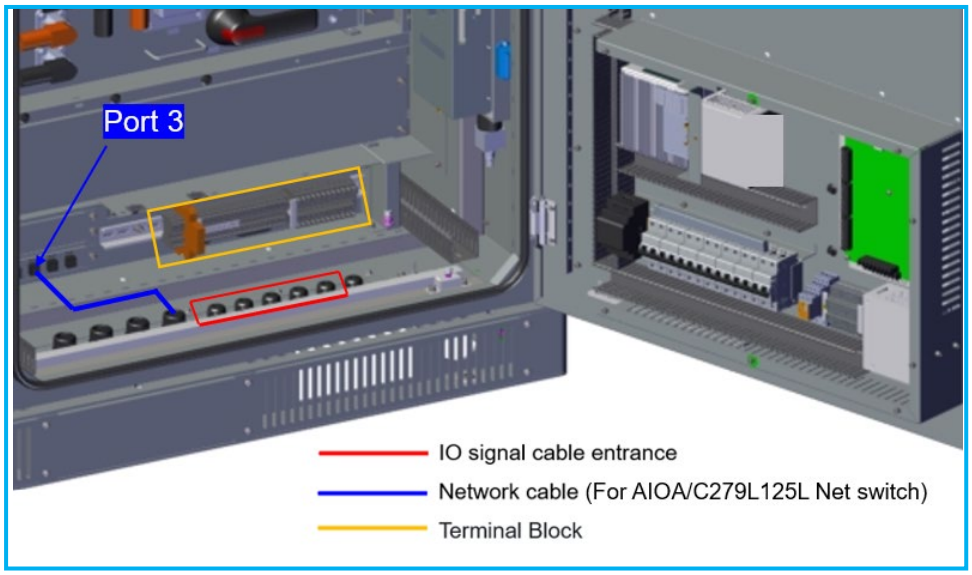


Figure 5-27 Communication and I/O cable path

Table 5-5 I/O signal

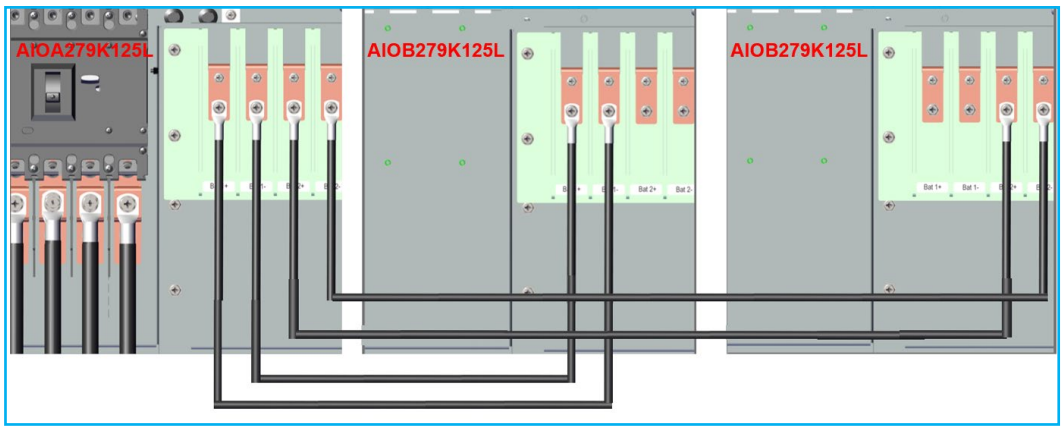
No.	Item	Terminals	Explanation
1	System DI1 port	X3:1-2 X3:2-2	Dry contact signal from external device
2	System DI2 port	X3:3-2 X3:4-2	Dry contact signal from external device
3	System DO port t	X3:5-2 X3:6-2	Dry contact signal from Battery cabinet to external device
4	FSS Fault (Level	X4:37-2	Dry contact signal from Battery

	I) Output port	X4:38-2	cabinet to external device
5	FSS Fault (Level II) Output port	X4:39-2 X4:40-2	Dry contact signal from Battery cabinet to external device
6	Communication cable	Port 3	Communication with AiO Box

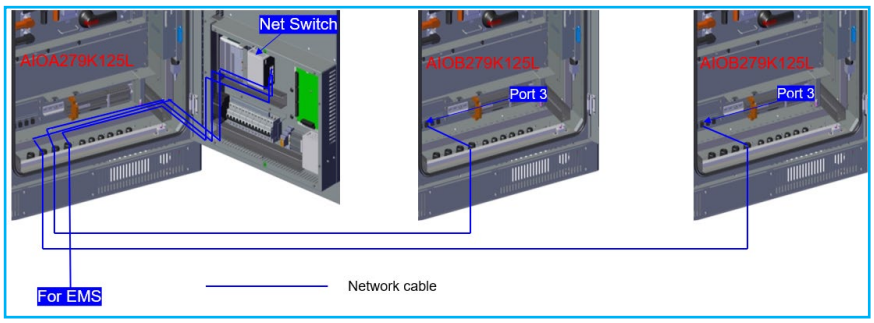
I/O signal cable and network cable must fix at the wire binding hole with a cable tie and leave an appropriate length.

5.5.6 Combined Wiring

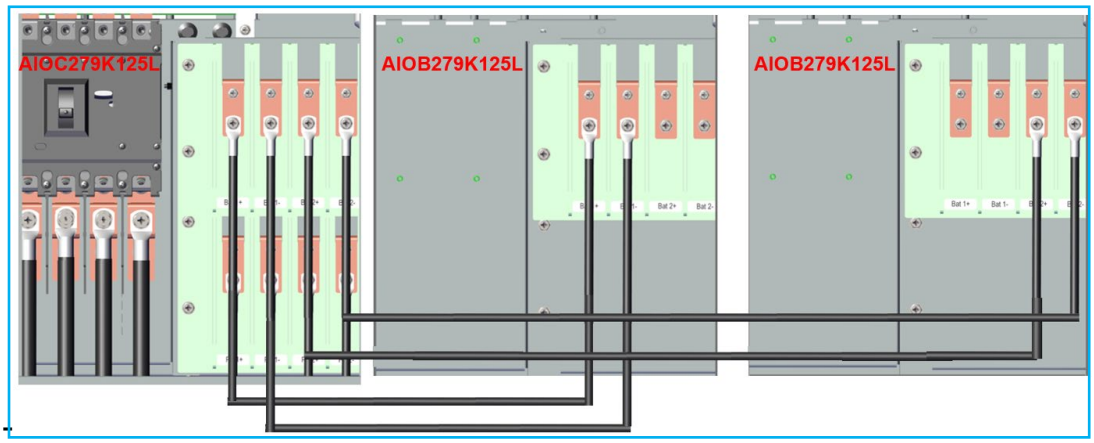
AIOA279K125L+ AIOB279K125L+ AIOB279K125L is called A+B+B, as follow:



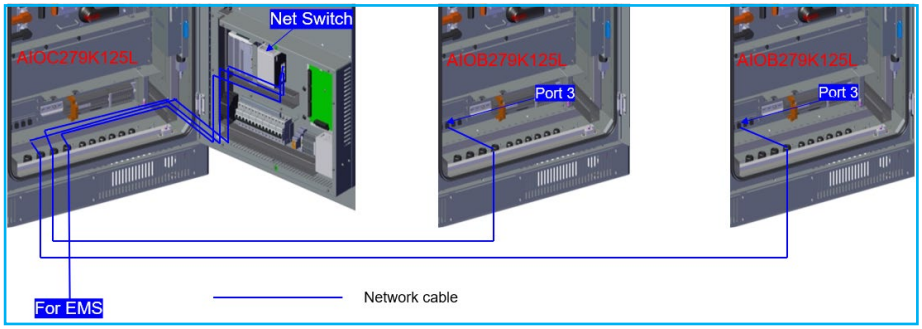
The communication connections for AIOA279K125L+ AIOB279K125L+ AIOB279K125L are as follows:



AIOC279K125L+ AIOB279K125L+ AIOB279K125L is called C+B+B, as follow:



The communication connections for AIOA279K125L+ AIOB279K125L+ AIOB279K125L are as follows:



5.5.7 Parallel connection

Multiple Type A/C+B+B units are parallel connected; AC power cables must be connected to one AC distributor cabinet. as below illustration

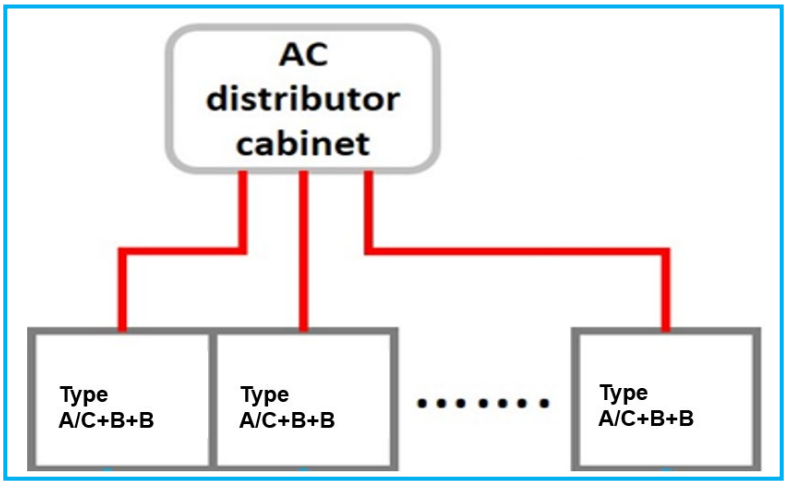


Figure 5-28 Parallel AC cables connection

Parallel communication network cable connection.

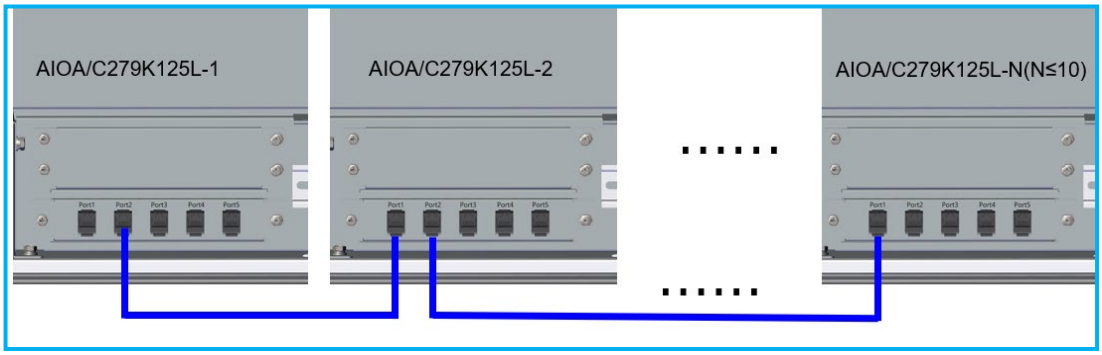


Figure 5-29 Parallel ethernet cables connection

5.6 AIOC279K125L wiring

5.6.1 Material list

No.	Function	Cross-section area (1 cable)	Amount	Explanation
1	AC breaker to grid (L1)	95mm^2	1	AC power cable

2	AC breaker to grid (L2)	95mm^2	1	AC power cable
3	AC breaker to grid (L3)	95mm^2	1	AC power cable
4	AC breaker to grid (N)	95mm^2	1	AC power cable
5	Grounding cable	50mm^2	1	Grounding cable
6	PV cable	35mm^2	4	PV cable
8	Single-hole tubular lugs (95-8)	95mm^2	4	For AC cable
9	Single-hole tubular lugs (50-8)	50mm^2	1	For PE cable
10	Single-hole tubular lugs (35-6)	35mm^2	4	For PV cable
11	Twisted-pair shielded cable	22AWG	12	For I/O signal
12	Three-core cable	8AWG	1	For Auxiliary power
13	Copper cable	8AWG	1	Grounding
14	Copper cable	10AWG	2	220V for TMS
15	Copper cable	14AWG	2	220V (L/N)
16	Communication	RJ45 with shield	1	Network cable
17	Heat-shrinkable tubing	Φ30mm		2 meters

**** No.13 is for auxiliary grounding cable, No.14 is for TMS power source, NO.15 is for system auxiliary power source.***

5.6.2 AC cable wiring

NOTICE

- AiO Box AC cables must connect in correct sequence (positive sequence), otherwise AiO Box will occur phase sequence fault.
- PCS unit should be grounded via equipotential connection device, and the grounding resistance should be less than 4Ω.

Residual Current Monitoring Device

AiO product will disconnect immediately from the mains power once a fault current with a value exceeding the limit is detected by integrated a universal current-sensitive residual current monitoring unit. If an external residual current device (RCD) (type A is recommended) is mandatory, the switch must be triggered at the residual current. The other specifications of RCD can also be used according to local standard.

Recommended residual current is as below:

Type	Recommended residual current
AIOC279K125L	1250mA

1. Open the door of AiO Box cabinet, remove the protective plate.

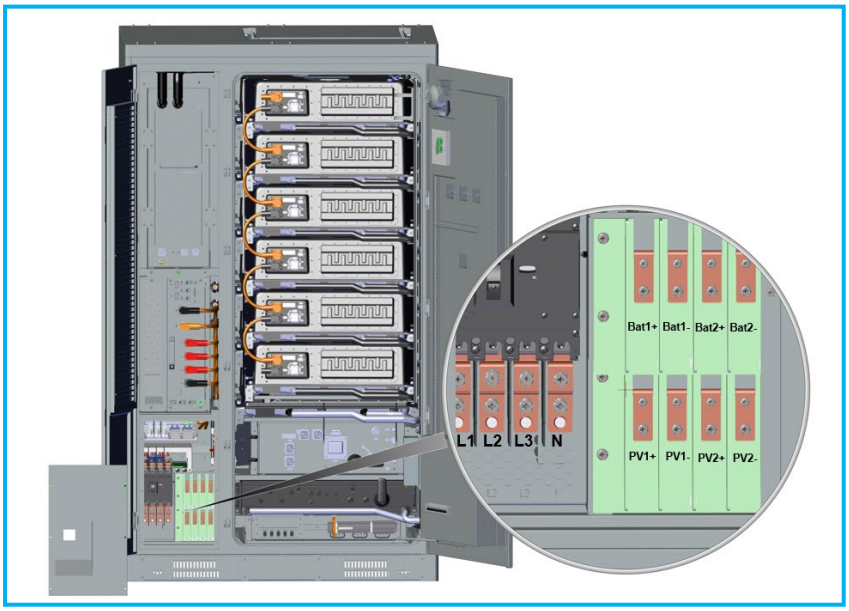


Figure 5-30 Open the door

2. Cut off the silicone pad within the red-marked area.

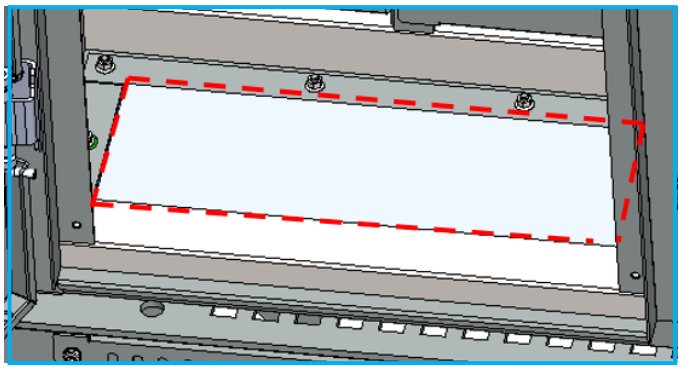


Figure 5-31 Cut off the silicone pad

3. AC power cables run through the bottom plate, remove the bolts from terminal.

1) Strip off the insulation cover of the cable with a tripped length of 5mm longer than the depth of the cable lug.
2) Insert the heat-shrinkable tubing into the cable, the tubing with length 20mm longer than the depth of the cable lug is recommended.
3) Put the stripped cable inside the cable lug.
4) Crimp the cable lug with relevant tools.
5) Shrink the tubing with hot air blower.

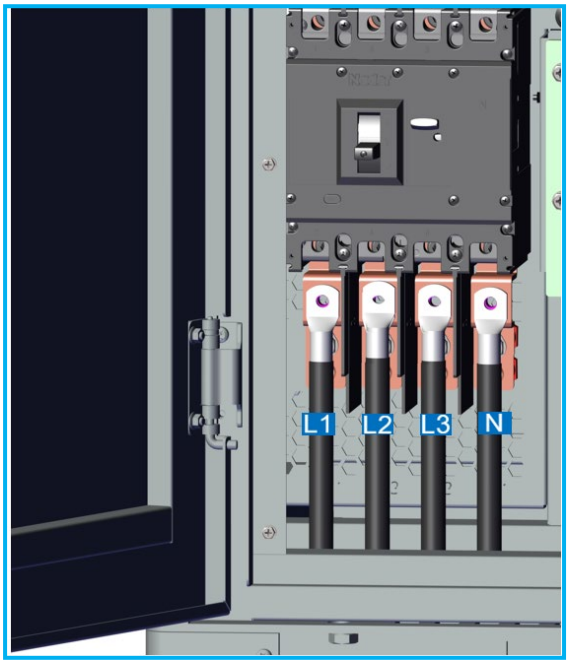


Figure 5-32 Cable Routing

4. Secure cable lug to AC connector, and fasten fixing bolts(M8*25). Torque:12N·m.

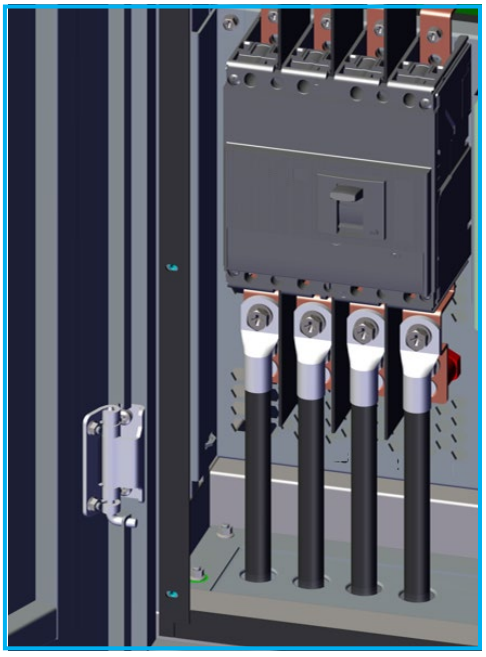


Figure 5-33 Fasten power cable

5. Apply fire-rated sealing compound to the cable entry base and compact it to achieve a complete seal.

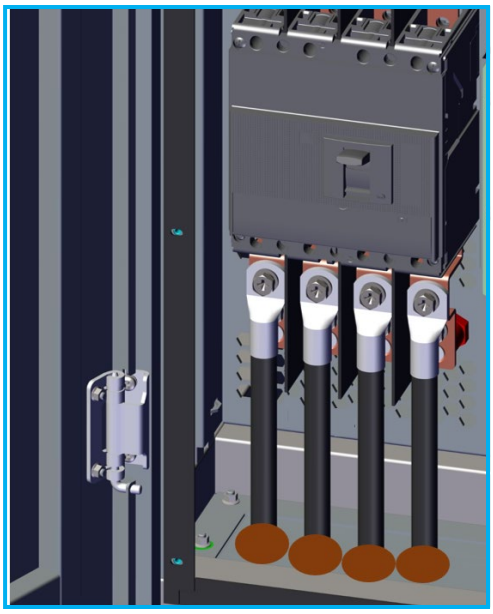


Figure 5-34 Seal cable entry

5.6.3 Battery cable wiring (for C+B+B)

Connect the free end of AIOB279L125L battery cable to AIOC79L125L battery connection port. Refer to Section 5.5.6.

5.6.4 PV cable wiring

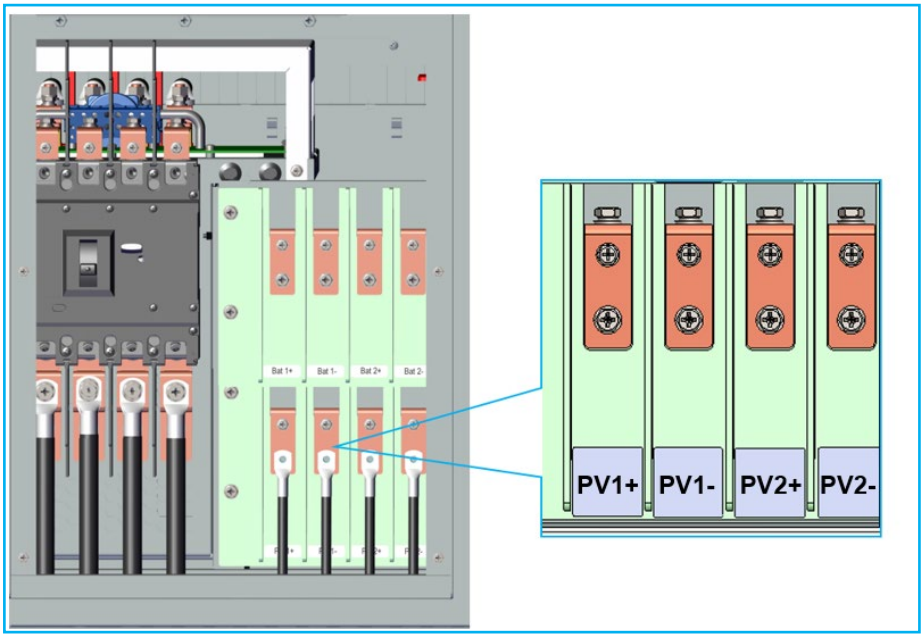
AIOC279K125L accepts PV input. This unit does not come with a built-in load break switching device, so a compatible external load break switching device must be installed and shall satisfy the requirements below:

1. Minimum utilization category of DC-PV1;
2. Electrical ratings: 1500 Vdc, 250 A, 2-pole;
3. Certified to AS 60947.3;
4. Registered as Level 3 equipment under the Electrical Equipment Safety System (EESS).
5. Delta PV COMBINER BOX-120 is available as an optional accessory, which is equipped with a compliant load break switching device. The same model of switch can also be used for separate external mounting.

DC Switch for PV input (1pcs)	Zhejiang Benyi New Energy Co., Ltd	BH-250-2P-A	1500Vdc, 250A, 2P, DC- PV2	AS 60947.3 AS/NZS IEC 60947.1	AZ69028681
Alt.	SOCOMEC SAS	INOSYS LBS 250A	1500Vdc, 250A, 2P, DC-PV2	AS 60947.3 AS/NZS IEC 60947.1	CS11284N

1. PV cables run through the bottom plate, remove the bolts from terminal.
   1) Strip off the insulation cover of the cable with a trimmed length of 5mm longer than the depth of the cable lug.

2) Insert the heat-shrinkable tubing into the cable, the tubing with length 20mm longer than the depth of the cable lug is recommended.
3) Put the stripped cable inside the cable lug.
4) Crimp the cable lug with relevant tools.
5) Shrink the tubing with hot air blower.



2. Secure cable lug to PV connector, and fasten fixing bolts(M8*6). Torque:6 N.m.

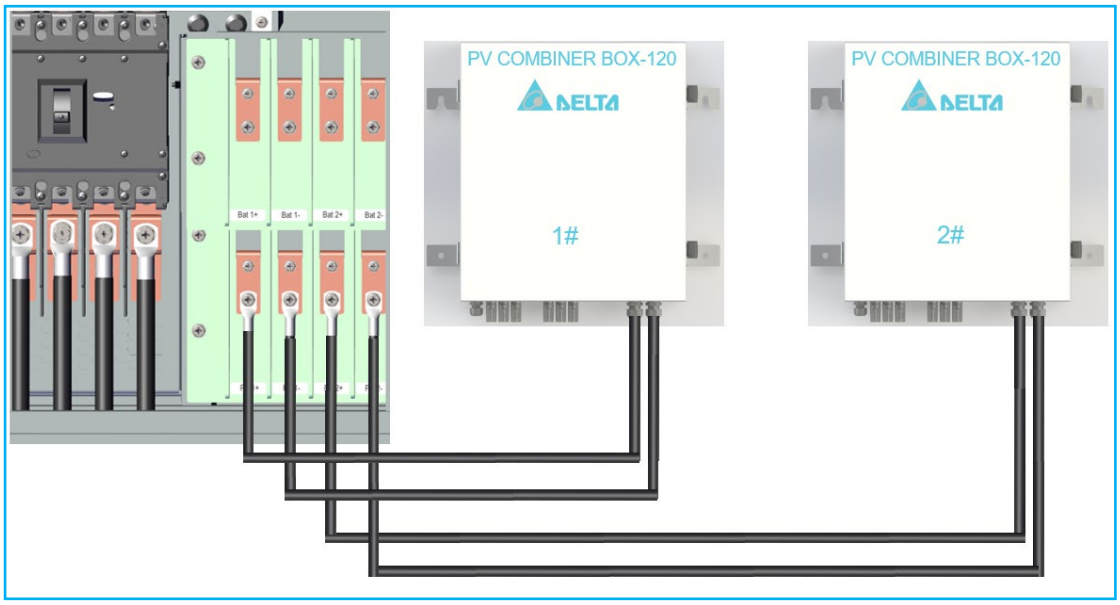


Figure 5-36 PV cable wiring

3. Apply fire-rated sealing compound to the cable entry base and compact it to achieve a complete seal.

5.6.5 Grounding cable wiring

Each corner of cabinet base has one earthing point, grounding cable

connection can be connected one of them according site situation.

The grounding cable shall be prepared as follows.

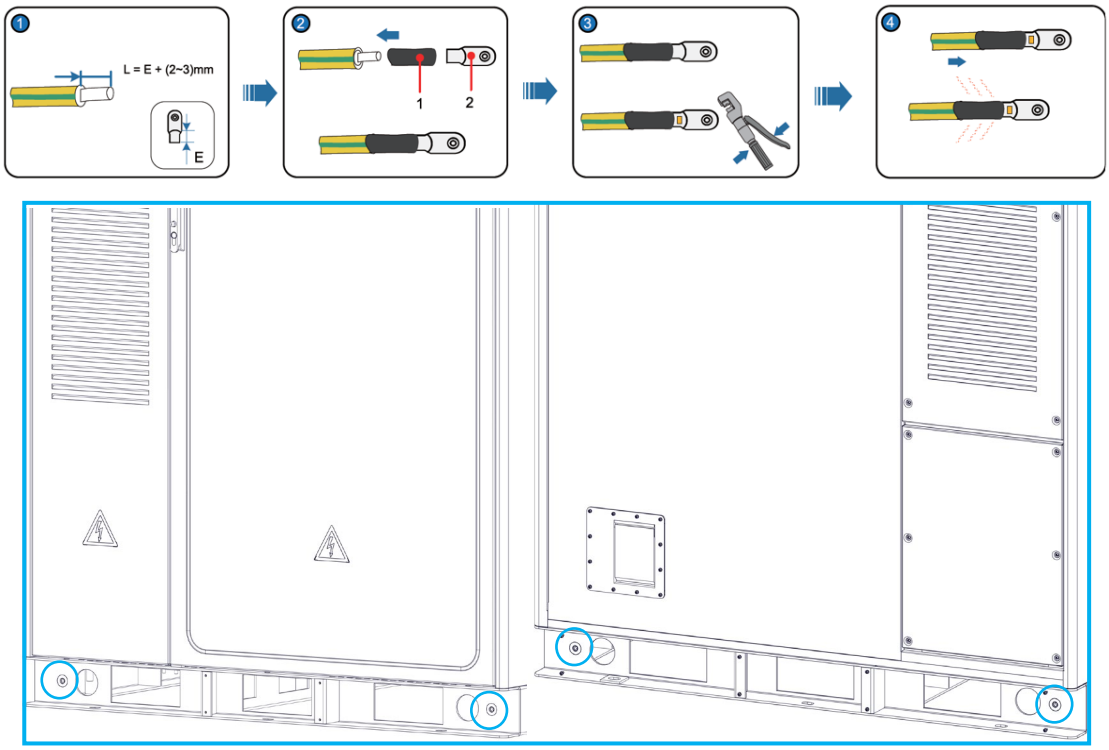


Figure 5-37 Grounding point

1. Remove bottom foot front cover.

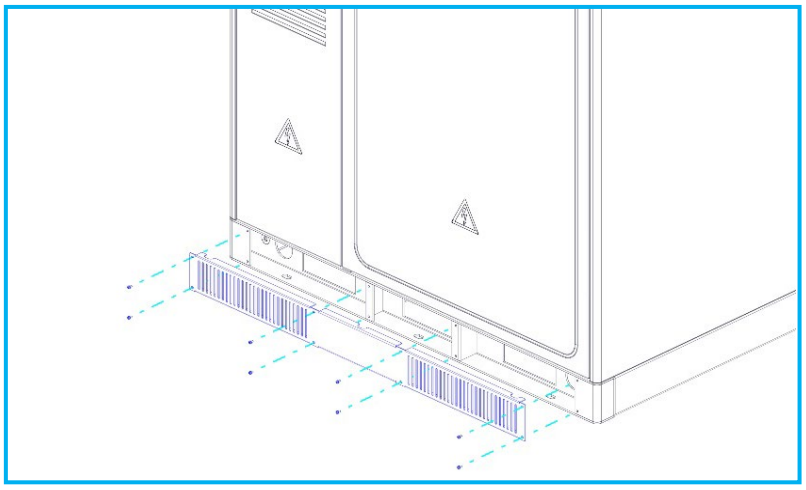


Figure 5-38 Open bottom cover

2. Run cable from underside to grounding point, then secure cable tubular lug to grounding point with bolts(M8*30). Torque:15N·m.

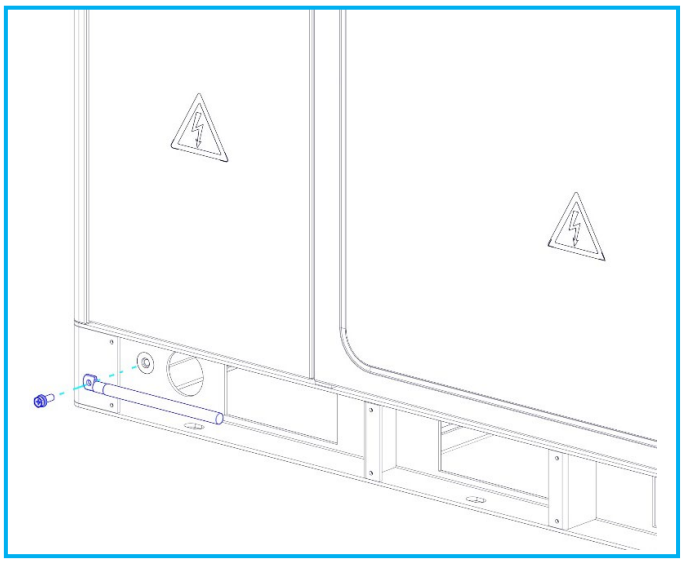


Figure 5-39 Connect grounding cable

3. At last, re-install the bottom foot cover.

5.6.6 Auxiliary power supply wiring

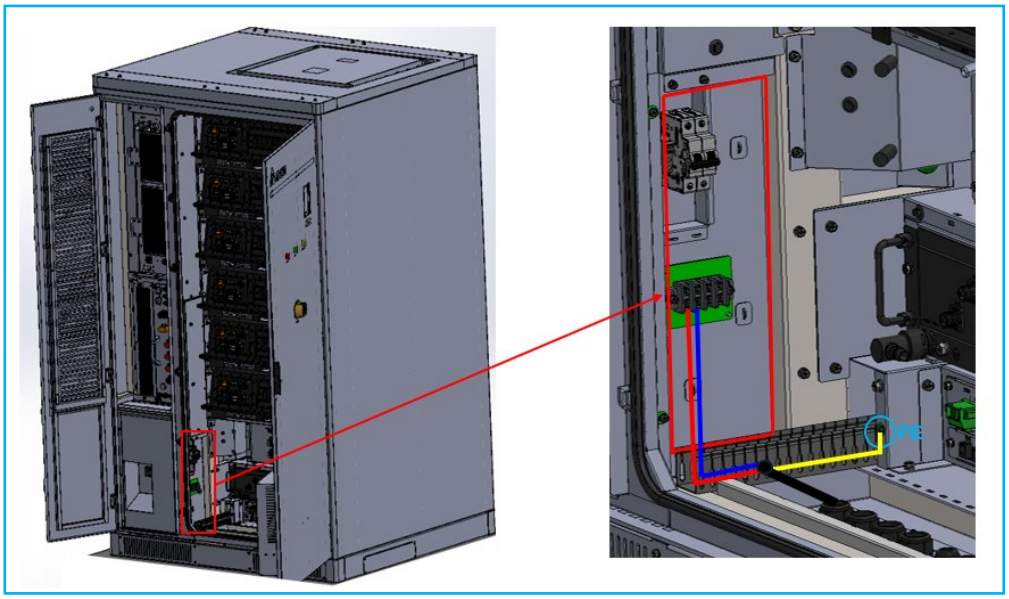
The external single-phase auxiliary AC supply mainly powers the internal cooling system, dehumidifier and switching power supply of AiO Box.

There are two installation types for the auxiliary power supply of this unit. Please select the appropriate wiring method according to the actual cabinet configuration and your specific requirements.

The first category:

Terminal block X6 serves as the interface for the external auxiliary power supply.

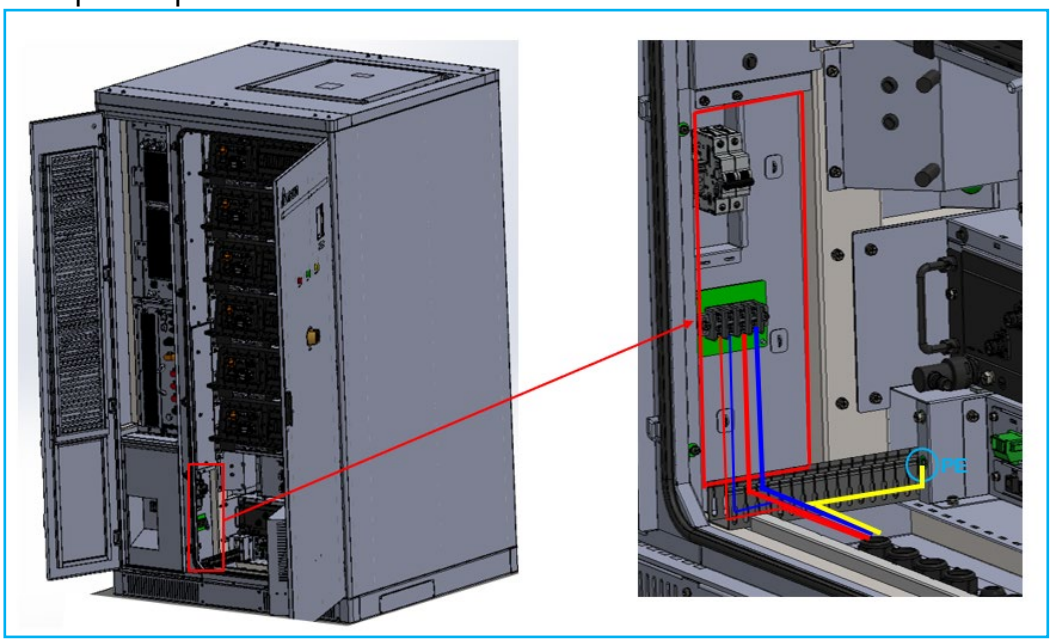
Auxiliary power supply port	X6:2 (L) X6:4 (N)	Auxiliary power supply，220Vac/50Hz，≥23A



Wiring grounding cable on PE point, Three-core cable must fix at the wire binding hole with a cable tie and leave an appropriate length.

The second category:

Terminal block X6 serves as the interface for the external auxiliary power supply. ***Remove the two original jumper wire on upper terminal block X6(X6:1&X6:5, X6:3&X6:7)***. TMS and system auxiliary power supply provide with separate power source.



Auxiliary power supply port	X6:2(L) X6:4(N) X6:6(TMS:L) X6:8(TMS:N)	X6:2(L) X6:4(N); 220Vac/50Hz, ⩾7A X6:6(TMS:L) X6:8(TMS:N); 220Vac/50Hz,⩾16A

Wiring grounding cable on PE point, the cables must fix at the wire binding hole with a cable tie and leave an appropriate length.

5.6.7 Communication and I/O cable connecting

The internal communication port (JX1) of BMS and AiO Box is displayed as follows, which enables data interaction between the BMS and AiO Box.

Carefully remove the inner protective housing of the door panel, lead the all cables through the glands at first refer to figure 5-40. Then install cables to the corresponding connection port in the table and diagram.

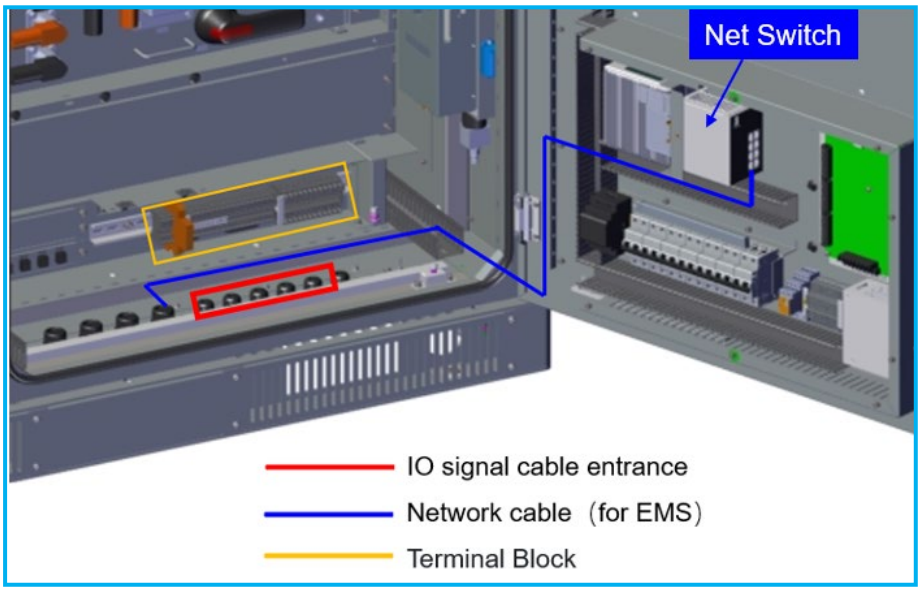


Figure 5-40 Communication and I/O cable path

Table 5-6 I/O signal

No.	Item	Terminals	Explanation
1	System DI1 port	X3:1-2 X3:2-2	Dry contact signal from external device
2	System DI2 port	X3:3-2 X3:4-2	Dry contact signal from external device
3	System DO port t	X3:5-2 X3:6-2	Dry contact signal from Battery cabinet to external device
4	Fault DO	X4:13-2 X4:14-2	Dry contact signal from PCS to external device
5	FSS Fault (Level I) Output port	X4:37-2 X4:38-2	Dry contact signal from Battery cabinet to external device
6	FSS Fault (Level II) Output port	X4:39-2 X4:40-2	Dry contact signal from Battery cabinet to external device
7	Communication cable	Net Switch port	Communication with EMS

I/O signal cable and network cable must fix at the wire binding hole with a cable tie and leave an appropriate length.

5.6.8 DRM function

DRM function of AIOC279K125L is the same as AIOA279K125L, for wiring details, please refer to 5.4.6.

5.6.9 Earth fault

The AiO Box has the earth fault detection and complies with the IEC62109-2 specification.

When the earth fault is triggered, the AiO Box will stop immediately and the red fault indicator light will remain on clearly on the cabinet door, in the meantime a dry contact will actuate automatically that can be used to trigger external devices such as buzzers.

5.6.10 Parallel connection

Multiple AIOC279K125L units are parallel connected, AC power cables must be connected to one AC distributor cabinet, as below illustration.

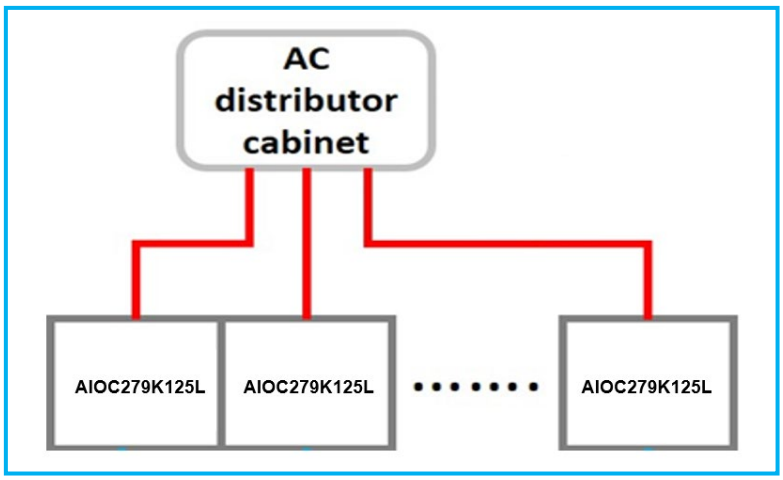


Figure 5-41 Parallel AC cables connection

Parallel communication network cable connection.

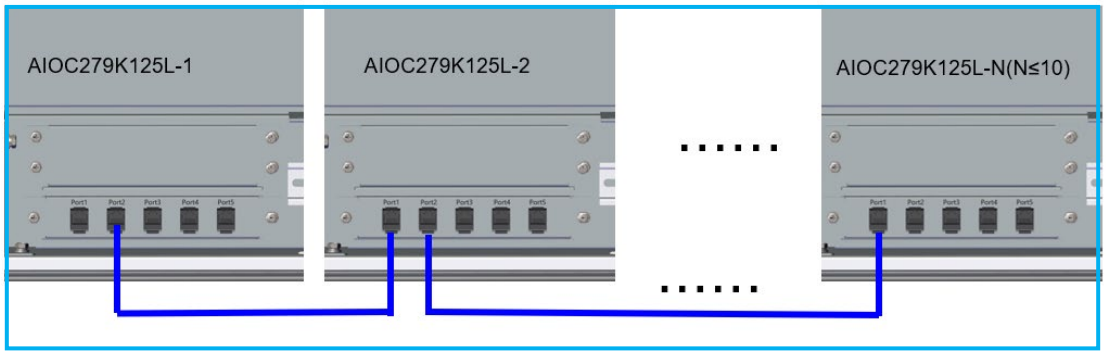


Figure 5-42 Parallel ethernet cables connection

5.7 FIS (Fire Information System)

5.7.1 AiO Box external fire signal

1. When either the smoke sensor or gas sensor is triggered (any single sensor):

(1) X4:37 & X4:38 change from normally open to normally closed state.

2. When both smoke sensor and gas sensor are triggered simultaneously:

(1) X4:37 & X4:38 change from normally open to normally closed state;

(2) X4:39 & X4:40 change from normally open to normally closed state.

3. When aerosol is triggered:

(1) X4:37 & X4:38 change from normally open to normally closed state;

(2) X4:39 & X4:40 change from normally open to normally closed state.

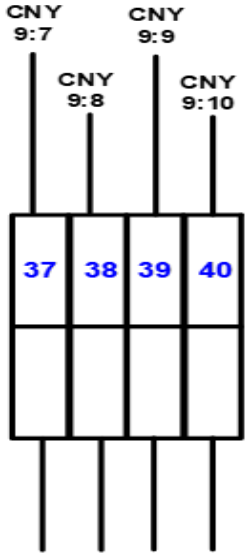


Figure 5-43 The external wiring of X4 terminal

5.7.2 AiO Box Fire Control Host and Sound and Light Alarm (Recommended model, provided by the customer)

Fire control Panel

- The control unit of Fire Suppression System.
- Fire Control Panel is provided by customer, the models shown are only for recommendation and reference.

Item	Specification
Certification	AS
Web Site	www.fusion.com.au
Model	Fusion EX-3001

Sound and light alarm device

- The alarm unit of the Fire System.
- Sound and light alarm device is provided by customer, the models shown are only for recommendation and reference.

Item	Specification
Supply voltage	24V
Supervisory current	112mA
Certification	UL
Model	WHEC24-75WR

6 External and ancillary equipment

To enable the Generation Limit and Export Limit Control function, the external equipment shall be installed as illustrated in the figure below:

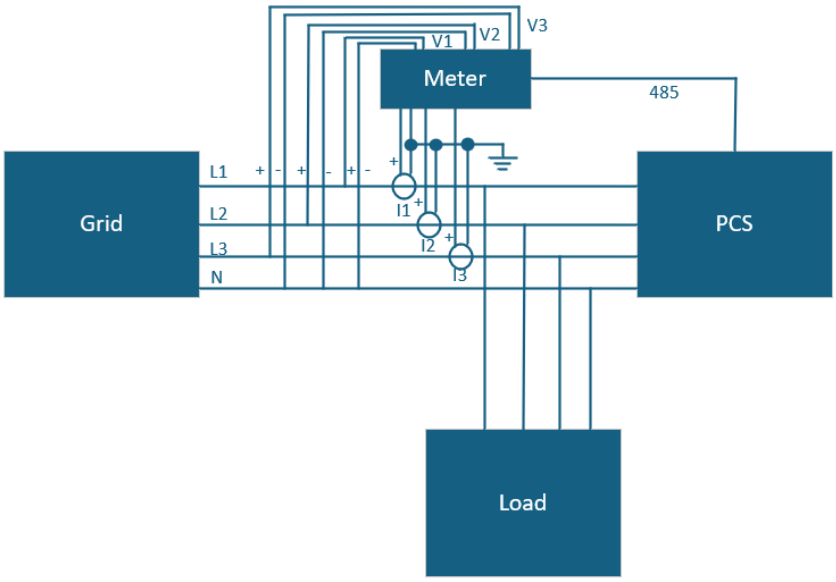
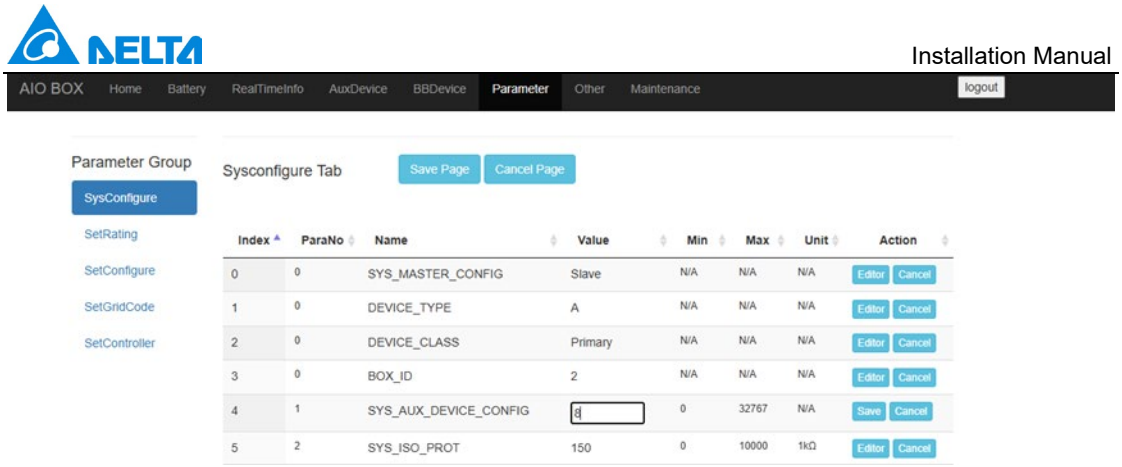


Figure 6-1 Meter image

After connecting the electricity meter to the BOX via the RS485 communication cable, set register 0x611 to 8 to activate the Generation Limit and Export Limit Control function. The corresponding position on the HMI screen is shown in the figure below:



Set register 0x611 to 0 to disable the Generation Limit and Export Limit Control function.

Contact

If you have technical problems with our products, please contact the Delta Service. The following data is required in order to provide you with the necessary assistance:

- Company name.
- Product type.
- Serial number of the product.
- Site location of product (Address / Geographic coordinates).
- A description of the requirement or issue faced.
- Current log files If available.

Appendix 1 Technical data

Model Name	AIOA279K125L	AIOB279K125L	AIOC279K125L
System Configuration			
Rated Input Rating	125KVA/125KW		
Battery Capacity (BOL)	279.5KWh		
AC Connection			
Rated Grid Voltage	400Vac (3P-N-PE or 3P-PE)	/	400Vac (3P-N-PE or 3P-PE)
Rated Grid Frequency	50/60Hz	/	50/60Hz
Rated AC Active Power	125KVA/KW	/	125KVA/KW
Rated AC Current	180.4 A	/	180.4 A
Current THD	< 3%	/	< 3%
DC Current Injection	< 0.5% of rated current	/	< 0.5% of rated current
Power Factor	>0.99(0 to -1 leading,0 to 1, lagging)	/	>0.99(0 to -1 leading,0 to 1, lagging)
Overvoltage category	III	/	III
Maximum AC Short Circuit Current	1.88KA		
Battery Information			
Type of Battery	LFP		
DC Voltage Range (Full load)	873.6~1123.2Vdc		
Rated Discharge / Charge Power	128KW/122KW		

Max. Continuous Discharge / Charge Current	148A /140A		
Prate	0.5P		
Overvoltage category	II		
Maximum input source backfeed current to input source	0A		
Maximum Battery Short Circuit Current	12.2KA d.c		
DC Connection (PV Side)			
Number of MPP trackers	/	/	2
Min input voltage/ Feed-in Start Voltage	/	/	400Vdc/550Vdc
MPPT voltage range	/	/	400V~1500Vdc
PV DC Full Power MPPT Range	/	/	550V~1350Vdc
Max. input current (Idc max)	/	/	100A
Max. Short Circuit Current Per MPPT	/	/	150A
Max. power PV system PV1 (Pdc max, PV1)	/	/	110KWp
Max. power PV system PV2 (Pdc max, PV2)	/	/	110KWp
Overvoltage category	/	/	II

Standalone Operation			
Rated Output Voltage **(1)**	400 Vac	/	400 Vac
Rated Output Power	125KVA/KW	/	125KVA/KW
Rated Output Current	180.4A	/	180.4A
Output Voltage THD	< 3% @ rated linear load	/	< 3% @ rated linear load
Overvoltage category	III	/	III
Environment			
Maximum Altitude	4,000 m, de-rating > 2,000 m		
Operating Temperature	-25 ºC to +55 ºC, de-rating > 45 ºC		
Humidity	0 to 95% RH, non-condensing		
Cooling	Liquid cooling for Battery / Forced air cooling with speed control for PCS		
Enclosure Rating	Control Box of Liquid Chiller: IP55 Battery modules: IP66 PCS module: IP65 AiO Box: IP55	Control Box of Liquid Chiller: IP55 Battery modules: IP66 AiO Box: IP55	Control Box of Liquid Chiller: IP55 Battery modules: IP66 PCS module: IP65 AiO Box: IP55
General			
Protective Class	Class I		
User Interface	LED, Ethernet		
Communication	Ethernet, Modbus TCP		
Dimensions (W x D x H)	1400 mm × 1300 mm × 2400 mm		

Protection	DC reverse protection, OVP, UVP, OCP, DC insulation detection, Flood sensor, Residual current protect	DC reverse protection, OVP, UVP, OCP, DC insulation detection, Flood sensor	DC reverse protection, OVP, UVP, OCP, DC insulation detection, Flood sensor, Residual current protect
Fire Suppression device	Aerosol, Smoke detector, flammable gas detector, exhausting system and deflagration panel		
Net Weight	~3,265kg	~2,955kg	~3,325kg
Certification (in Progress)	Safety: IEC 62477-1 Grid code: AS/NZS4777.2:2020 Amd 2:2024 Battery: IEC 62619, UL9540A	Safety: IEC 62477-1 Battery: IEC 62619, UL9540A	Safety: IEC62109-1/2 Grid code: AS/NZS 4777.2:2020 Amd 2:2024 Battery: IEC 62619, UL9540A

*Specifications are subject to change without prior notice.

***(1)** In Standalone mode, (a) single AiO can operates in 3P4W without a transformer; (b) multiple AiOs in parallel can operate in 3P3W by adding a transformer.

Icc declaration (r.m.s. value, Icp,mr, device)

Characteristics of SCPD					
Ports	Icc*	Icp,mr*	Type	Location	Specification
AC	50KA	10KA	NDM3-250	QA1	400Vac, 250A, 4P, 70KA
DC	50KA	10KA	RSZ307-3-RAZ-400A1500V	HV box	1500Vd.c./400A,Breaking capacity:250KA,

*$I_{CC:}$ conditional short-circuit current;

*$I_{CP,mr:}$ minimum required prospective short-circuit current.

Note: The following BESS model numbers AIOA279K125L and AIOC279K125L with 3P+PE (400Vac) without Neutral wiring configuration are only suitable to install in the IT (Isolated Terra) grid distribution systems. This installation wiring configuration was not part of the CEC listed scope and assessment, which may

require additional approval from the local grid distribution network service provider. Please contact Delta Electronics, Inc for details.