



ENERGITEKNIK
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energy Storage System
ESI215-100K-M

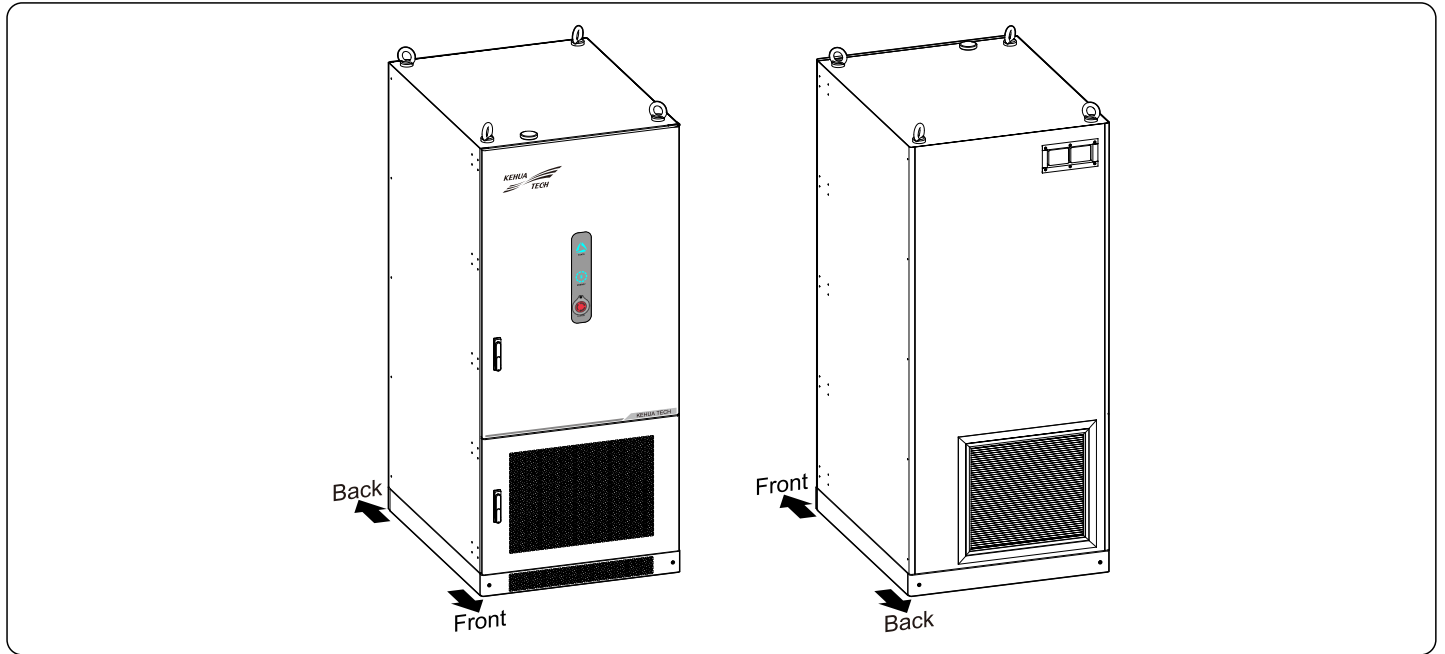
Installation Guide

1 Product Intro

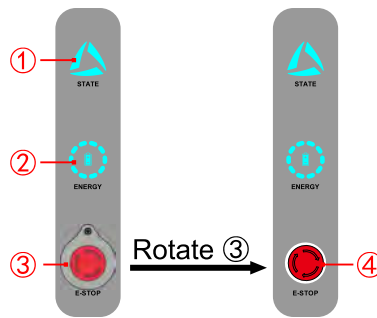
This document is suitable for the following model:

- ESI215-100K-M

1.1 Appearance



1.2 Operation Panel



No.	Silk screen	Name	No.	Silk screen	Name
①	STATE	Running status indicator	③	–	Anti-misoperation cover
②	ENERGY	Charge & discharge status and battery capacity indicator	④	E-STOP	E-STOP emergency stop button

WARNING

- E-STOP button is just for the use of energy storage system in fault or in emergency. When normal operation, please perform the OFF operation via APP.
- Improper use of E-STOP button may cause damage to the energy storage system. If the E-STOP button is used under load, it will bring high pressure to the related components of energy storage system. Frequent use may damage the button.

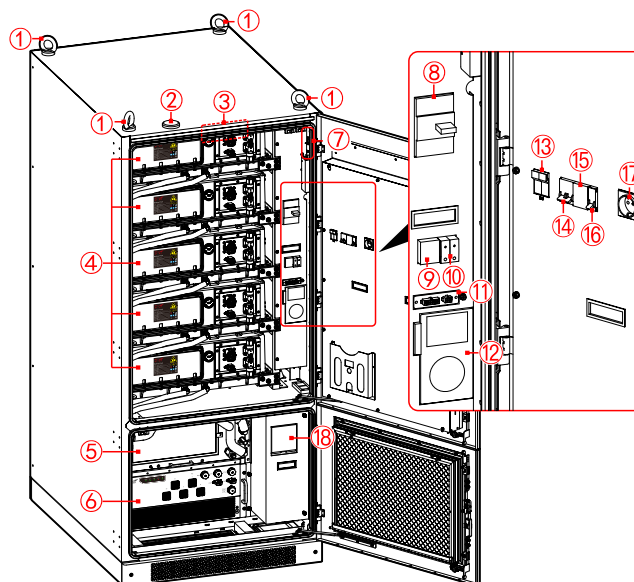


NOTE

- In order to avoid misoperation, E-STOP designs an anti-misoperation cover. When it needs to be operated, please rotate the cover to left (or right) and then press the E-STOP button.
- There are 10 grids around the ENERGY indicator, with 10% battery capacity as one grid. The grid of existing electricity is always on.
 - During charging, the existing battery capacity light on, and the remaining position to be charged is displayed in a cyclic manner with marquee indicator.
 - During discharging, the grid corresponding to the highest remaining power is dynamically displayed in the form of a breathing indicator (frequency: 1s), and the grid indicator without power goes out.
- The indicator status illustration of the energy storage system is as follows.

Indicator	Status	Illustration
	Blue indicator on	Energy storage system is running.
	Flickers in blue (frequency: 1s)	Energy storage system standby or OFF.
	Red indicator on	Energy storage system abnormal and with import alarm.
	Off	AC and DC power has been disconnected.
	Blue flow indicator	<ul style="list-style-type: none"> • Charging. • Shows the battery capacity.
	Blue breathing indicator	<ul style="list-style-type: none"> • Discharging. • Shows the battery capacity.

1.3 Structure Layout



NOTE

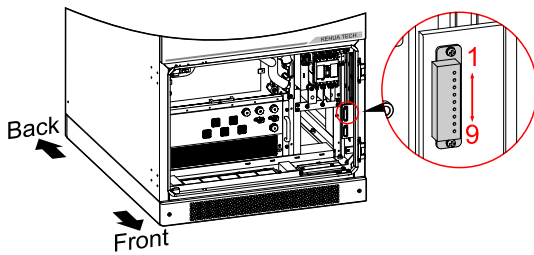
The energy storage system adopts compartment design, the upper is battery cabin, the bottom is electric cabin. The fire extinguishing of cabinet adopts aerosol, and equips with smog sensor and leak detection controller. The structure layout is shown above, corresponding component illustration is shown below.

No.	Name	No.	Name	No.	Name
①	Lifing ring	⑦	Aerosol fire extinguishing device	⑬	Fuse
②	Antenna	⑧	DC breaker	⑭	External power supply breaker
③	Illuminating lamp	⑨	Leak detection controller	⑮	External power supply SPD
④	Battery pack	⑩	Signal SPD	⑯	Breaker of socket
⑤	Liquid cooling unit	⑪	Wiring terminals	⑰	Socket
⑥	PCS host	⑫	Dehumidifier	⑱	AC breaker

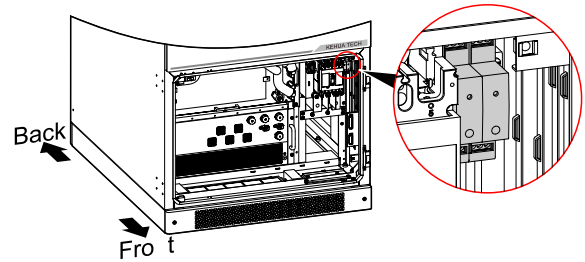
1.4 Communication Ports

NOTE

The energy storage system has one 9 pins' external communication port (as below left) to realize the communication of logger and BMS. And it also provides 2 network signal SPD LAN ports (as below right) to communicate with upper-computer. User can obtain the running data of energy storage system via communication port.



External communication port



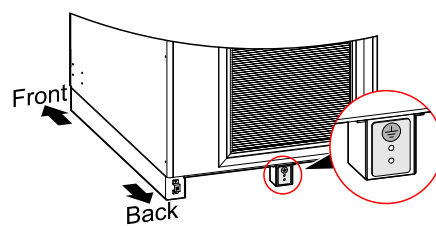
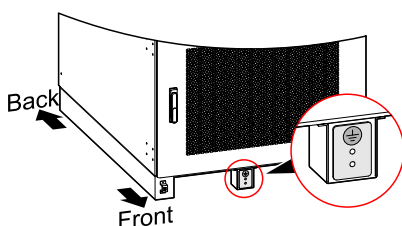
Network signal SPD LAN ports

No.	Name	Illustration	No.	Name	Illustration
①	BMS:CAN2-H	BMS external communication port (reserved for debugging)	⑥	GND	Reserved grounding terminal
②	BMS:CAN2-L		⑦	PCS_CAN_H	Reserved inner parallel port
③	GND	Reserved Grounding terminal	⑧	PCS_CAN_L	
④	KC541:COM3-A	Reserved RS485 communication port of Keh'a's meter (optional)	⑨	GND	Reserved grounding terminal
⑤	KC541:COM3-B		-	-	-

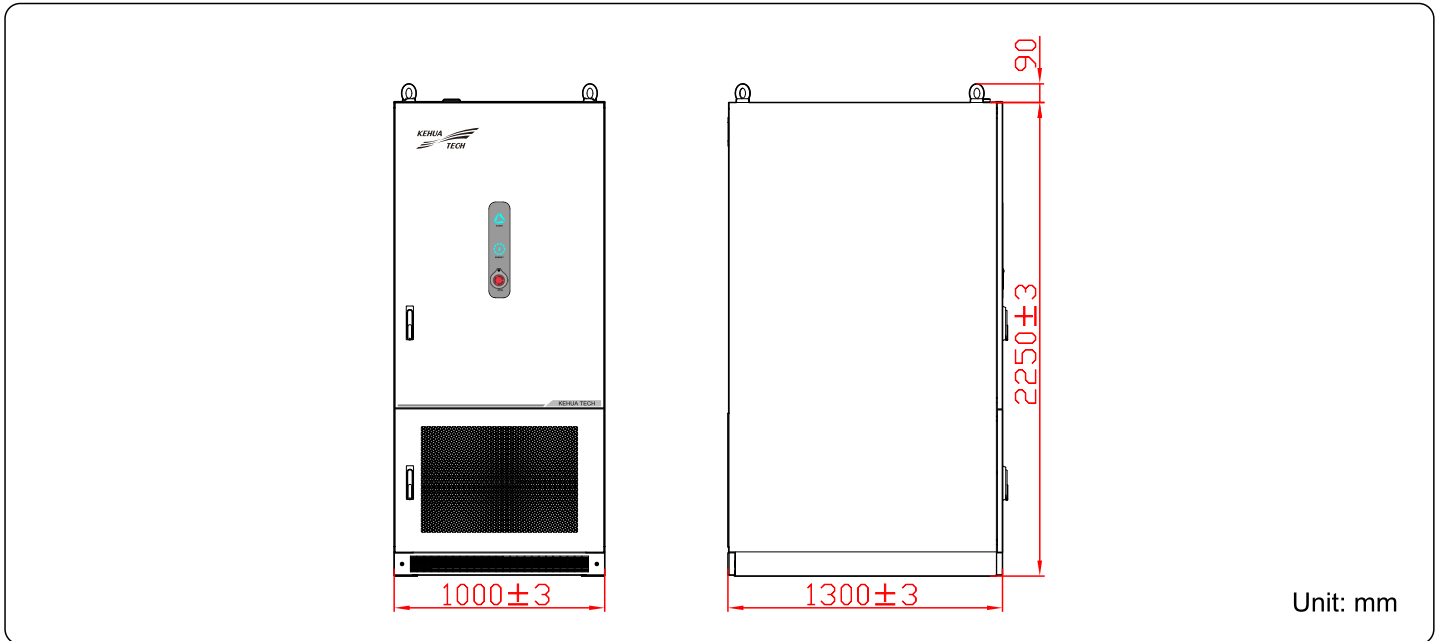
1.5 Grounding Design

NOTE

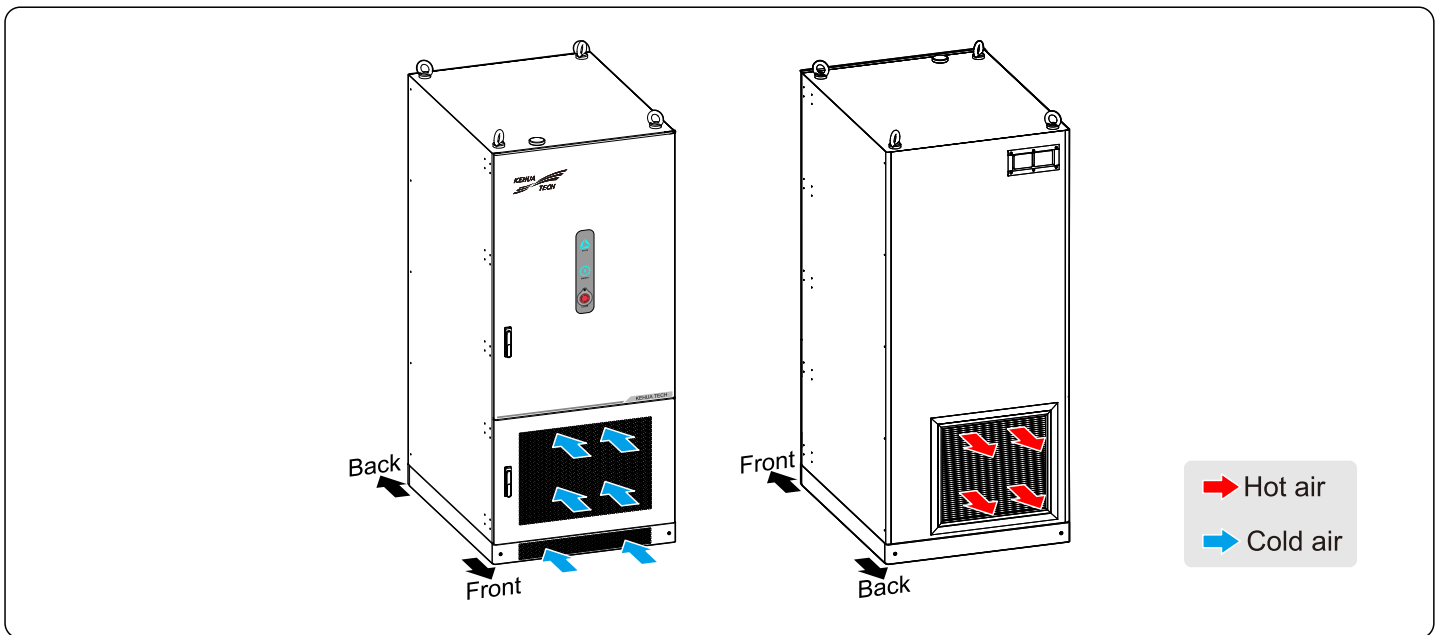
There are 2 external grounding terminals at the front and back of energy storage system, as follows.



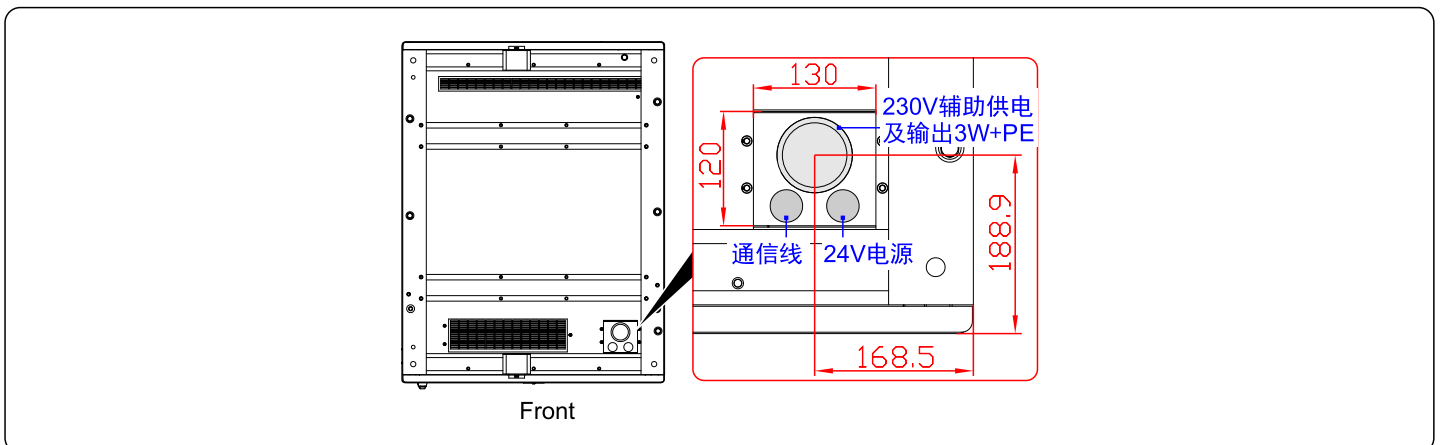
1.6 Size



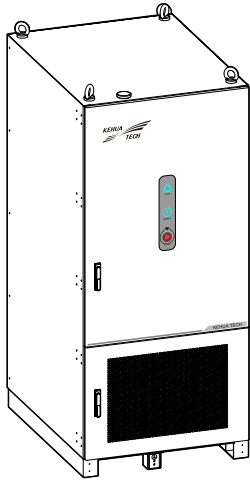




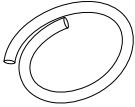


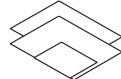





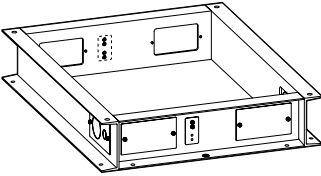
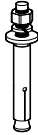



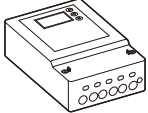
1.7 Heat Dissipation Design




1.8 Wiring Hole s Design



2 Packing list

 <p>Energy storage system*1</p>	 <p>Flat screw (M6)*4</p>	 <p>Combination bolts (M6)*8</p>	 <p>Fasten parts of cover plate*4</p>	 <p>Ring (M10)*2</p>	 <p>liquid drain pipe*1</p>	
	 <p>Front cover plate*1</p>	 <p>Wiring plate*1</p>	 <p>Document*1(set)</p>	 <p>Exhaust tube*1</p>		
	 <p>Rear cover plate*1</p>	 <p>Key*4</p>	 <p>Key*2</p>	 <p>MSD plug*1</p>		
 <p>U-steel*1(optional)</p>	 <p>Stainless steel expansion bolt (M12)*8</p>	 <p>Stainless steel bolt (M16)*4</p>	 <p>Stainless steel flat gasket (M16)*8</p>	 <p>Stainless steel spring gasket (M16)*8</p>	 <p>Meter*1 (optional)</p>	

 **NOTE**

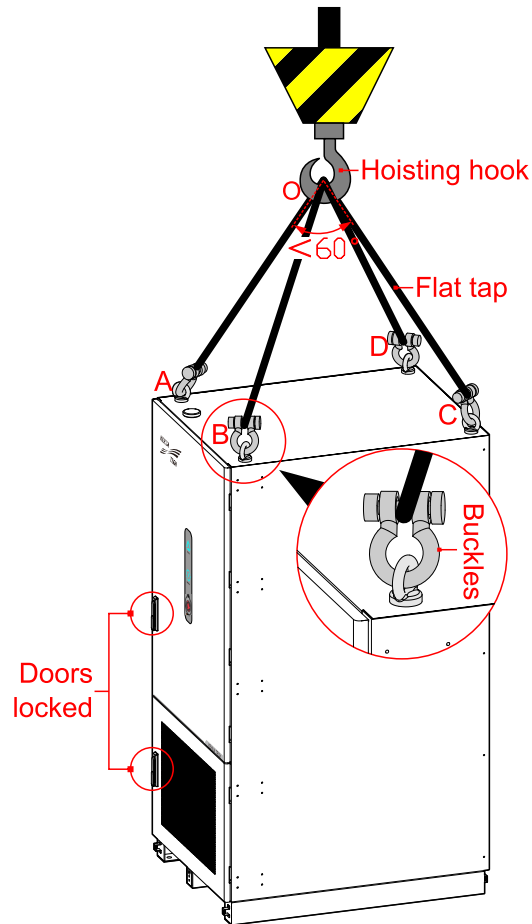
- Unpack the package, check if the types of the accessories are complete and correct. If there is any discrepancy, take notes and contact the manufacturer immediately.
- The deliverables in the dotted frame are the accessory of U-steel (optional).

3 Transportation

CAUTION

- In the process of loading, uploading and transporting, the operation safety regulations of the country/region where the project is located must be observed.
- Please select suitable transportation device according to the weigh (<2.5t) and size (1000mm×1300mm×2250mm (W×D×H), without rings) of energy storage system. Improper transporting operations may result in the device damage or personnel injury.
- The energy storage system must be carried by trained professionals and should be directed by a professional on site at all times.
- Do not tilt or lay the energy storage system down during handling. Otherwise, the internal components will bear great stress, which may cause damage to the components and adversely affect the performance. If the energy storage system is damaged due to improper operation, it is not covered by the warranty.

3.1 Lifting Transportation



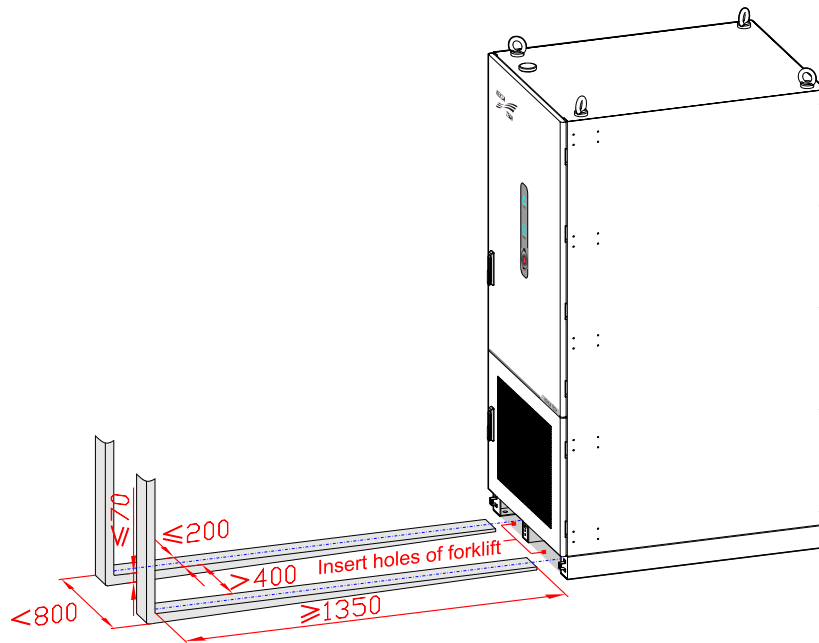
CAUTION

- The selected lifting crane must have sufficient load carrying capacity (lifting tools are provided by user, and with a safety factor of 4 times, that is, the maximum lifting weight > 10 tons) as well as enough arm length and rotation radius.
- The vertical height from the hook to the top of the system should be more than 5 meters. ensure that each flat tapes connected to the ring are equal in length, to avoid uneven lifting, which could result in the device toppling over.
- Within 5m~10m of the operation area, it is strictly prohibited to stand, especially under the lifting arm and the lifting or moving machine, to avoid casualties.
- The energy storage system shall be lifted vertically without dragging on the ground or any other surface.
- After the device has been lifted 20-30mm off the ground, it should be suspended and the connection between the rings and the lifting device should be rechecked to make sure that the connection is secure before lifting.
- The whole lifting process should be carried out slowly, pay attention to the balance of the energy storage system, and do not tilt or move too fast to ensure it is lifted stably.
- Ensure that the ground on which the device is placed is solid, flat, well-drained, and free of obstacles or protrusions.
- In case of bad weather conditions, such as strong wind, heavy rain, fog, etc., the lifting work should be stopped.

WARNING

Do not put the energy storage system outside the vertical landing area through shaking the hooks.

3.2 Forklift Transportation



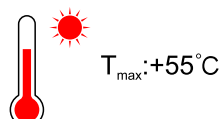
Unit: mm

CAUTION

- Forklift should have a safety factor of at least 2 times weight of the energy storage system.
- When lifting the energy storage system, keep the centre of gravity of the energy storage system at the center of the two forks and keep the handling process slow and smooth.
- Pay attention to the width and inserted depth between the fork arms to prevent instability or tipping.
- Pay attention to the distance between the forklift and the device to avoid damage to the appearance, door locks and louvers.
- During moving, the tilt angle of the energy storage system should not exceed 10° , do not put it down or lift it up suddenly, and pay attention to the turning, up ramps and down ramps to avoid collision of the device.

4 Installation Preparation

4.1 Installation Environment Requirements



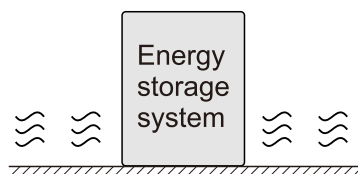
$T_{max}: +55^\circ\text{C}$



$T_{min}: -35^\circ\text{C}$



RH: 0%~95%
(non-condensing)



With good ventilation



No flammable materials

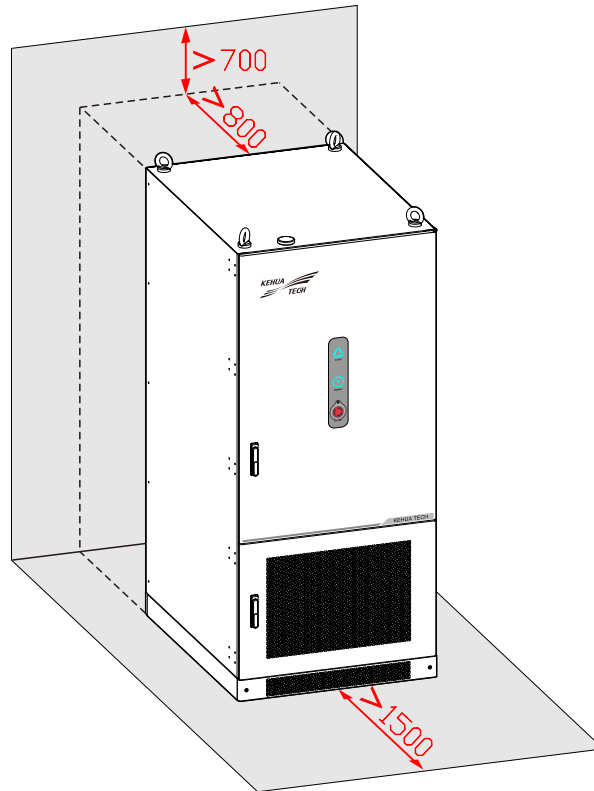


No explosive materials



No corrosive material, salty

4.2 Installation Space



Unit: mm



NOTE

The size of energy storage system is 1000mm×1300mm×2340mm (W×D×H), and the minimum air inlet volume requirement is 2000m³/h.

If multiple energy storage systems are deployed, refer to the standard GB51048 or local national regulations.

4.3 External Fire-fighting Suggestion



NOTE

- A fire-fighting water supply system should be provided at the installation site of the energy storage system.
- Municipal water supply is preferred as the water source of fire-fighting, and fire-fighting water or natural water supply may also be used. When natural water sources are used, reliable water intake settings should be set.
- The designed flow of fire-fighting water supply shall be determined according to the sum of the maximum designed flow of water extinguishing systems that need to act simultaneously. The water consumption for fire-fighting shall be calculated according to the number of fires at the same time and the maximum water consumption required for extinguishing a fire.
- External fire hydrant system design shall meet the following requirements:
 - Fire hydrants should be evenly arranged along the roadside of the site. The distance between the fire hydrants and the energy storage system should be not greater than 20m.
 - Each energy storage system is recommended to configure at least one fire hydrant, and the water consumption of the fire hydrant should not be less than 20L/s.
 - Anti-freezing measures should be taken against outdoor fire hydrants in cold areas.
 - Outdoor fire hydrants should be provided with permanent fixed markings.
 - Spray guns should be provided near the power distribution unit area.
 - The station area should be set up with a dedicated fire room (box) equipped with a fire hose, water gun and fire-fighting wrench.

5 Mechanical Installation



WARNING

The energy storage system can only be installed without damage or fault.



CAUTION

- Only trained professionals are allowed to install the energy storage system. Improper installation may result in injury.
- Wear suitable protective equipment for personal protection in case of accidents during operating.

5.1 Foundation Installation



CAUTION

The energy storage system is heavy (<2.5t). Before building the foundation, the installation site conditions (mainly geological conditions and environmental climate conditions, etc.) should be investigated in detail. And then the design and construction of the foundation can be performed.

The foundation should be constructed according to the following requirements at least:

- The foundation must ensure the stability and safety of the installation of the energy storage system.
 - The foundation must have sufficient bearing capacity to effectively support the energy storage system.
 - The soil at the installation site needs to be compact. If the soil is loose, take measures to ensure that the foundation is stable.
 - The bottom foundation pit must be tamped and filled up.
 - The upper surface of the foundation must be at the same level (no more than 5 mm).
- The foundation should be higher than the natural floor to avoid erosion of the bottom and interior of the energy storage system after rain or snowmelt water.
- Construct corresponding drainage measures according to local geological conditions.
- Build a cement foundation with sufficient cross-sectional area and height. The height of the foundation is to be determined by the construction party according to the geology on site.
- The requirements for pre-buried cable conduits as follows:
 - The inner diameter of the cable conduit must be at least 1.5 times of the outer diameter of the cable, and the bending radius of the cable must be at least 10 times of the outer diameter of the cable.
 - The signal cable should be separately from the power cable to avoid electromagnetic interference.
 - Block the both ends of the pre-buried cable conduit temporarily to avoid other objects entering and affecting cable laying.
- When constructing the foundation, the grounding flat steel should be reserved, and the grounding with the energy storage system needs to be bolted firmly.
 - The grounding system should be constructed by the user according to the geological conditions of the installation place and relevant regulations. No matter what kind of grounding method, the grounding resistance should be no more than 0.1Ω .



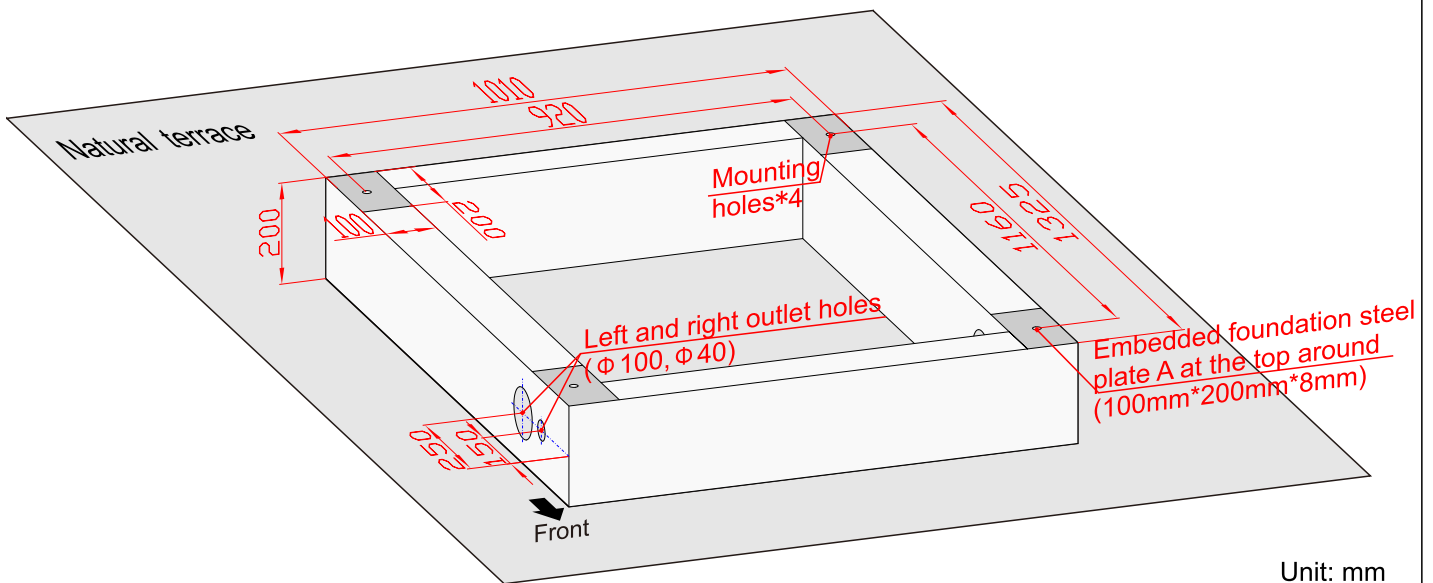
NOTE

- The dregs excavated during the construction of the foundation should be cleared immediately so as not to affect the subsequent lifting of the energy storage system.
 - When designing the direction of the air outlet, the wind direction of the installation site should be considered.
- Prepare the following materials after foundation construction.

Name	Specification	Quantity	Use	Source
Stainless steel expansion bolt	M16	4	Fasten the system to the ground.	Provided by user
Antirust paint	/	0.3kg	Paint on the bolts to avoid corrosion.	

Step1

Construct the foundation according to the bottom installation holes of the energy storage system.



Unit: mm

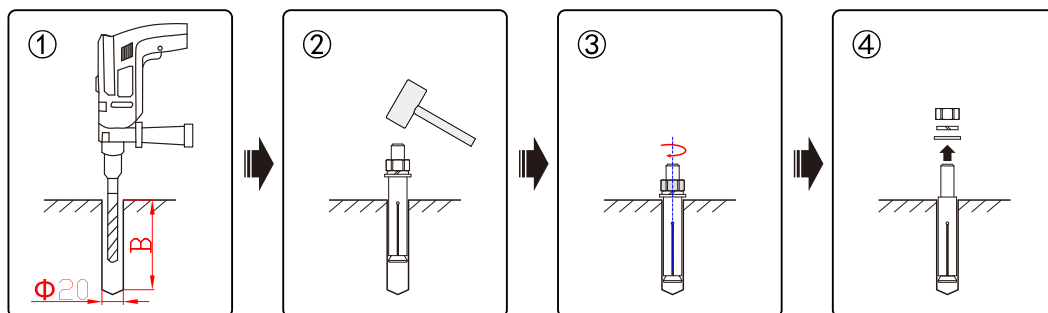


NOTE

The foundation can be constructed according to the recommended foundation diagram above, or be designed by yourself, but it should meet the installation and maintenance requirements.

Step2

Drill holes and install stainless steel expansion bolts (M16).



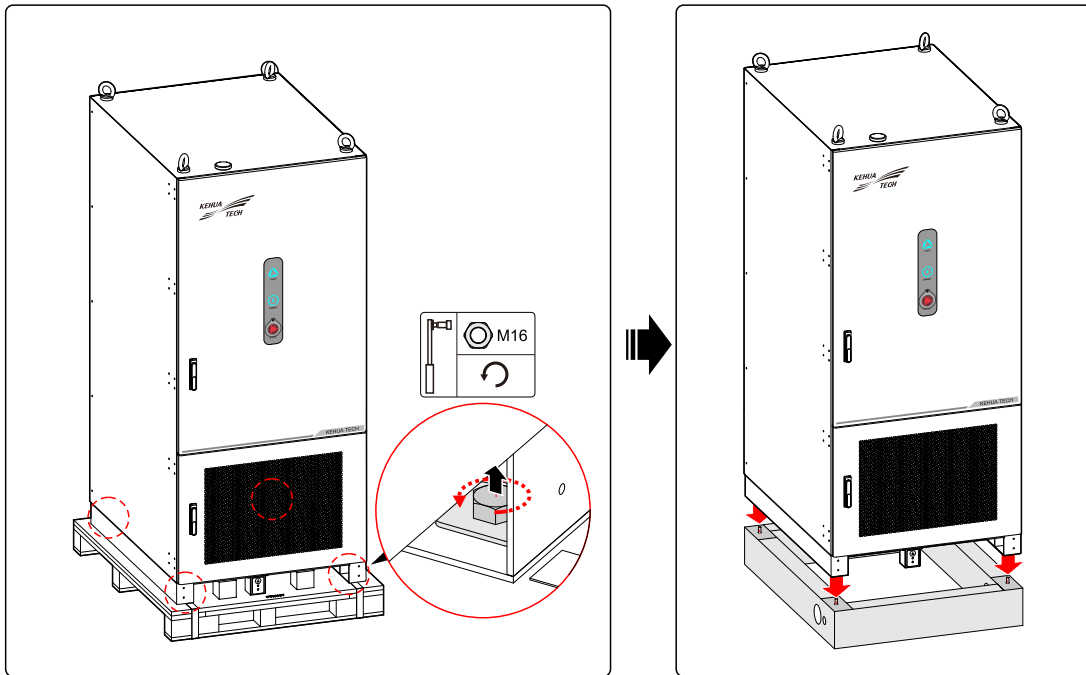
Unit: mm



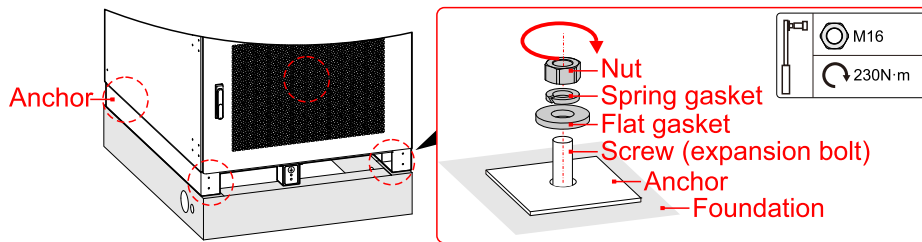
NOTE

The drilling hole depth of expansion bolt M16 is: $B = \text{the length of expansion tube} + 5\text{mm}$.

Step3 Move the energy storage system to the installation site.



Step4 Fasten the energy storage system and do anti-corrosion treatment.



5.2 U-steel Installation

NOTE

Customers can purchase the U- steel by themselves or choose from Kehua Company. When installing with Kehua's U-steel, the following materials should be prepared before installation.

Name	Specification	Quantity	Use	Source
Stainless steel expansion bolt	M12	8	Fasten the U-steel to the ground	Delivered with the U-steel
Stainless steel bolt	M16	4	Fasten the system with U-steel	
Stainless steel flat gasket	M16	8	Match with stainless steel bolt M16 to use	
Stainless steel spring gasket	M16	8		
Anti-corrosion paint	/	0.3kg	Paint on the bolts to avoid corrosion.	Provided by user

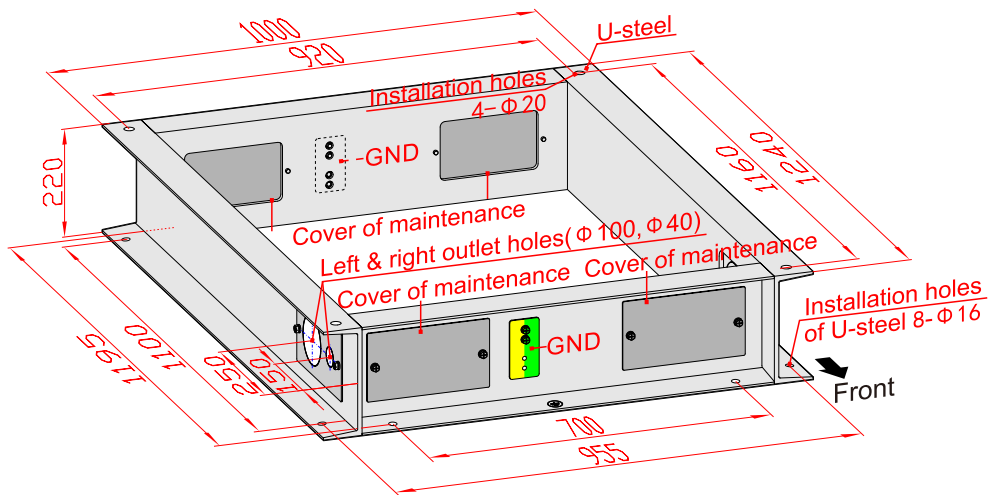


CAUTION

The U-steel installation floor must ensure the stability and safety of the installation position of the energy storage system.

- The foundation should have sufficient bearing capacity to effectively support the energy storage system.
- The soil at the installation site needs to be compact. If the soil is loose, take measures to ensure that the foundation is stable.
- The upper surface of the floor must be at the same level (no more than 5 mm).

Step1 Mark the bottom installation holes of U-steel.



Unit: mm

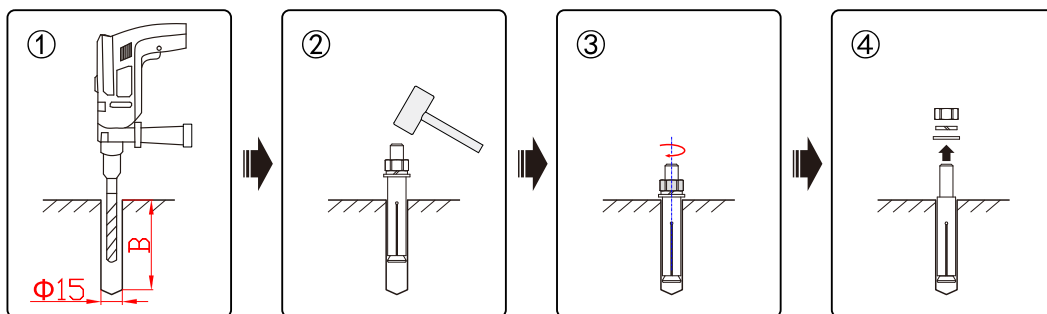


NOTE

When designing or purchasing U-steel, the following requirements must be met:

- Material: Q235.
- Specification: 22#b, height * width * waist thickness=220 mm *79 mm *9 mm.
- The surface of U-steel should be painted to prevent rusting, and the painting should meet the outdoor use conditions of the energy storage system.
- The flatness of installation surface on the U-steel should be less than 5mm.

Step2 Drill holes and install expansion bolts (M12).



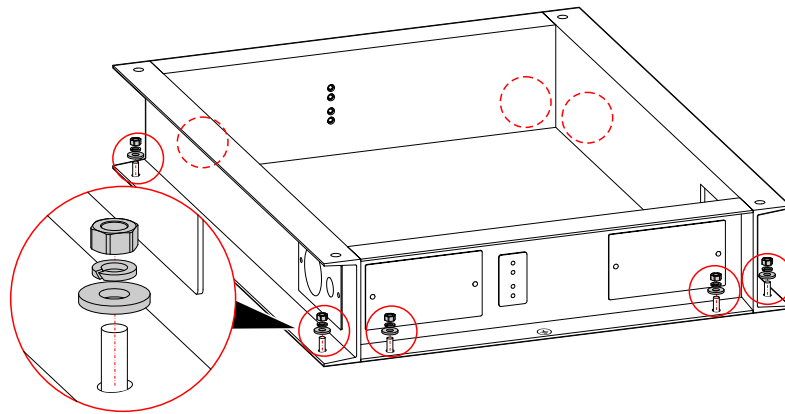
Unit: mm



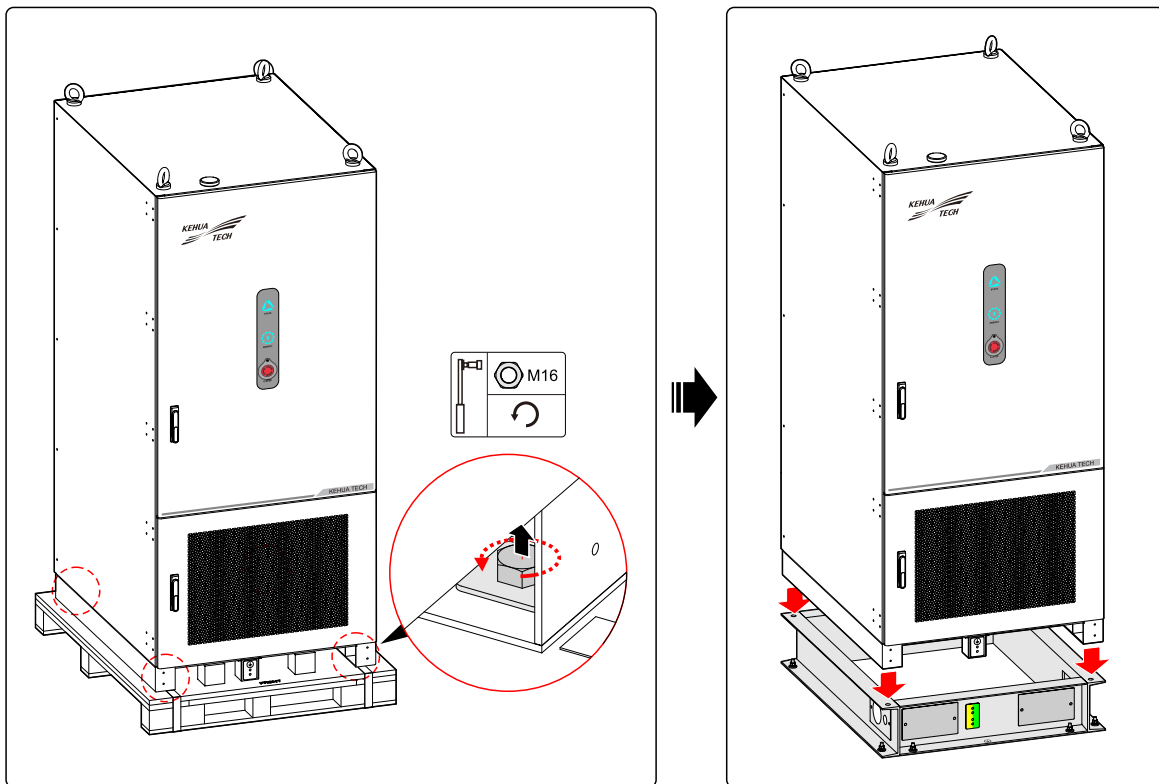
NOTE

The drilling hole depth of expansion bolt M12 is: B=the length of expansion tube + 5mm.

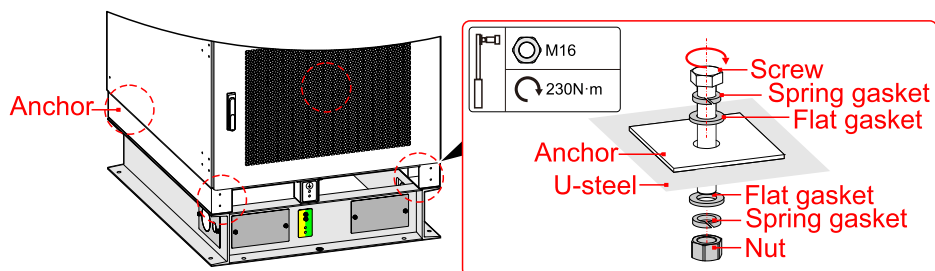
Step3 Fasten the U-steel.



Step4 Move the energy storage system to the installation site.

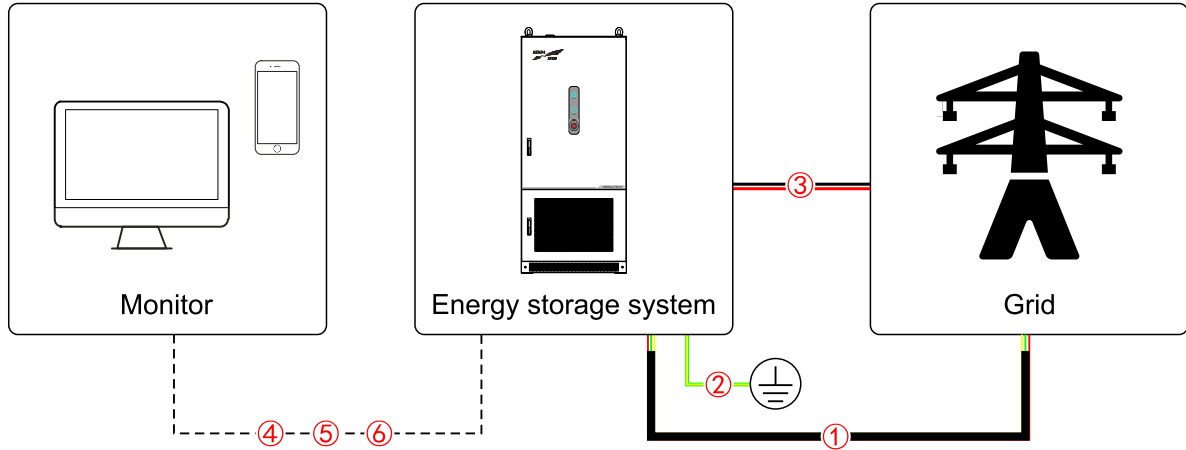


Step5 Fasten the energy storage system and do anti-corrosion treatment.



6 Electrical Connection

6.1 Cables Preparation



No.	Cable name	Cable type	Specifications (mm ²)	Terminal	Source
①	AC output	L1/L2/L3	Outdoor multi-core cable Copper core cable: 3×70+1×35 Aluminum core cable: 3×120+1×70	Copper core cable: DT-70 Aluminum core cable: DTL-120	Provided by user
②	Grounding	PE		Copper core cable: DT-35 Aluminum core cable: DTL-70	
③	230V auxiliary power	L/N	Outdoor two-core cable 2×4	CE040010	
④	Communication	LAN	Standard network cable /	RJ45 plug	
⑤		RS485	Twisted-pair shielded cable 0.5	E0508	



NOTE

- The cable specification in above table are based on standard UL1015/UL10269/UL11627, please refer to the standards for reasonable replacement if other cables are used.
- The selection of cable specification should be in accordance with local cable standards.
- If single-core cables are used for AC output and grounding, the wire specification of each cable is the same as the recommended specification of the single wire diameter in the multi-core cable.
- The factors that affect the selection of a cable include: rated current, cable type, laying method, ambient temperature, and maximum expected line loss.
- Cable ①②③ are required, cable ④⑤ are connected according to needs.
- Copper-aluminum conversion terminals are required when aluminum cables are used.
- It is not recommended to use hard cables such as armored cables to avoid poor contact with terminals due to bending stress.
- Please select flame retardant cables.
- If the recommended terminal is not used, please confirm with our company.

6.2 Wiring Requirements



NOTE

- Power cables and communication cables should be routed separately. In order to reduce electromagnetic interference, avoid long-distance parallel wiring of power cables and communication cables.
- When the communication cables and the power cables cross, ensure that the two cables are perpendicular to each other as far as possible.
- The distance requirement between shielding communication cables and power cables in parallel is 0.3m.



CAUTION

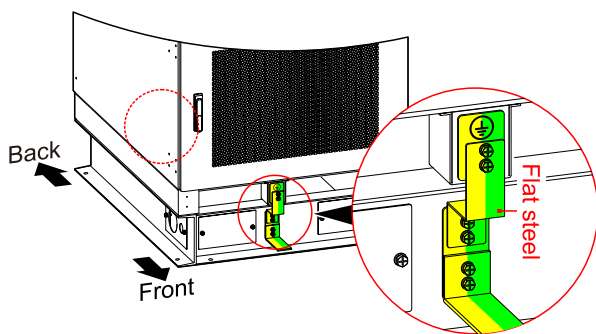
Protection is required for the wiring of communication and power cables.

- Protection for communications cable
 - Communication cables are thin and easily damaged. Therefore, when wiring, route the power cables first, then route the communication cables.
 - Communication cables should be laid in the cable trench and tied with cable ties.
 - Do not route cables with heat sources or strong electromagnetic fields.
- Protection for power cables
 - The power cable has a strong electromagnetic field. Ensure their insulation layer is not scratched or damaged.
 - Properly fix power cables.

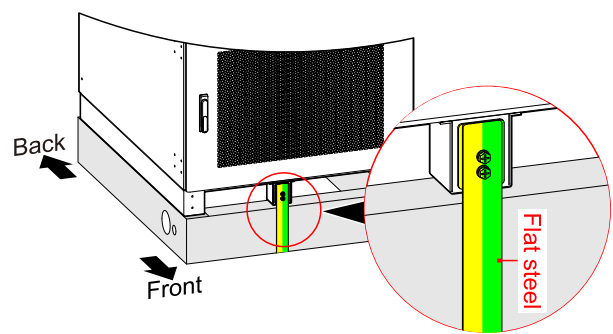
6.3 External Grounding Connection

Step1

Connect the grounding terminal at the bottom of the energy storage system to the grounding point on the U-steel or pre-buried in the foundation, and make anticorrosion treatment.



U-steel installation



Foundation installation

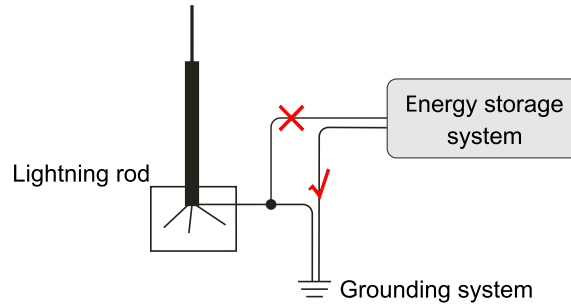


NOTE

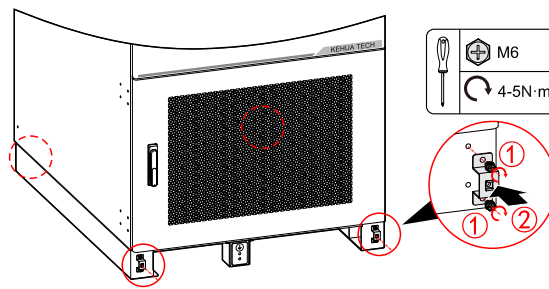
- The grounding flat steel should be provided by user. The recommended size of the grounding flat steel or cable should be 35mm² and above.
- There are two external grounding locations reserved at the bottom of the energy storage system, you can connect either of them.

CAUTION

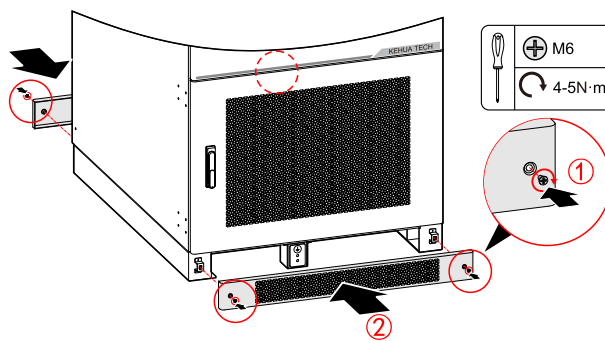
- When installing the energy storage system, it must be grounded first; when dismantling the energy storage system, the grounding cables must be removed last.
- The grounding of the energy storage system must not be the same as the grounding of the lightning rod of the building where it is installed, they must be separated (as follows). The grounding of the energy storage system should be directly connected to the grounding system, and the impedance should be less than 0.1Ω .



Step2 Install the fasten parts of cover plate.



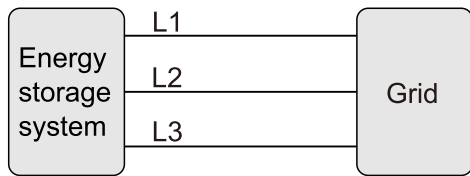
Step3 Install the cover plates.



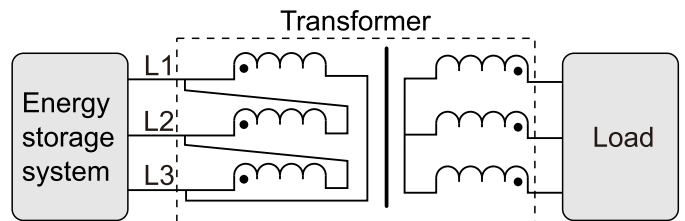
6.4 AC Output Connection

WARNING

Only allowed by local power supply department, the energy storage system can be connected to the grid.



AC output connection (grid-tied mode)

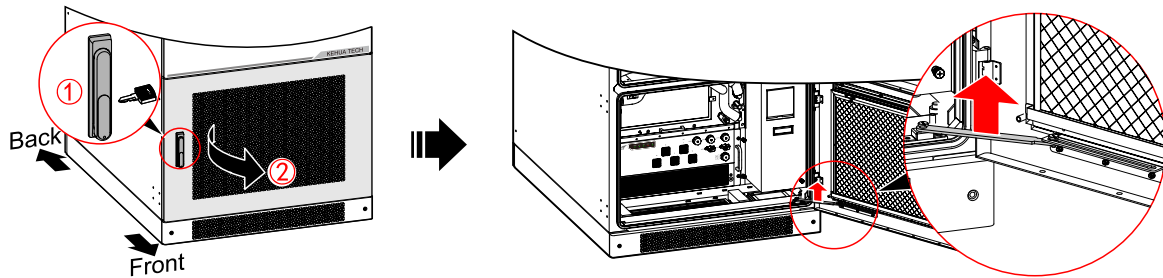


AC output connection (off-grid mode)

CAUTION

The grid has high voltage, before wiring, ensure that the AC distribution breaker and all breakers of the energy storage system are disconnected. Ensure that the copper bars and wiring terminals of user side without electricity.

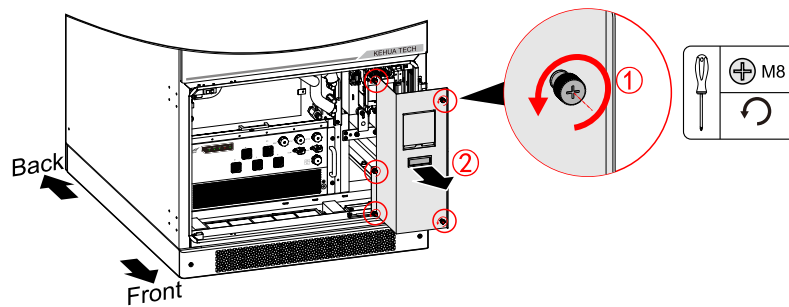
Step1 Open the front door of the energy storage system.



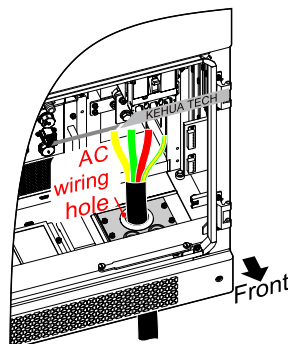
NOTE

- The doors of the energy storage system are equipped with a limiting device. When the door is opened, the limiting device will be locked automatically to prevent the door from shaking due to strong winds or external forces.
- When the door needs to be closed, uplift the limiting device, then the door can be closed, as shown above.

Step2 Unscrew the loose screws of AC wiring plate by screwdriver, and dismantle the wiring plate.

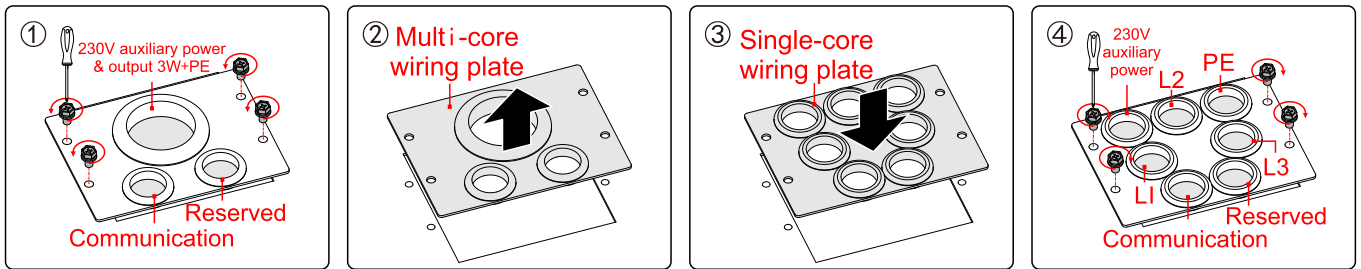


Step3 Lead the AC output cables go through the bottom wiring hole.

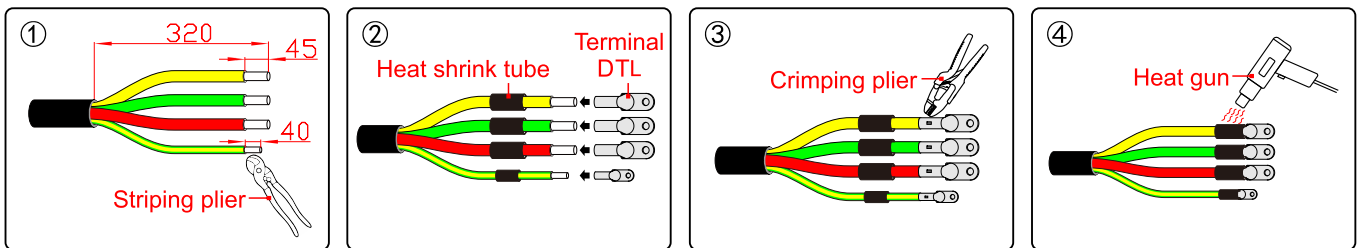


NOTE

The wiring plate is configured for multi-core cables as standard. If single-core cables are used, dismantle the standard multi-core wiring plate and replace it with delivered single-core cables wiring plate before routing the cables, as follows.

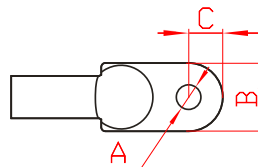


Step4 Crimp the AC output cables.



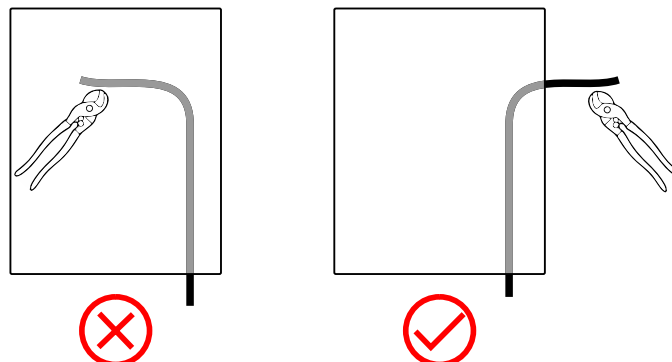
NOTE

- The stripping length in above figure is recommended based on the AC output L1/L2/L3/PE using multi-core aluminum wires, terminal DTL120 for L1/L2/L3 and DTL70 for PE. If other terminals are used, the corresponding stripping length = the actual internal length of the terminal + (1~2) mm.
- The size of provided AC terminals (as below) should meet the following requirements: $12.5\text{mm} < A < 14.5\text{mm}$; $26\text{mm} < B < 34\text{mm}$; $13\text{mm} < C < 17\text{mm}$.

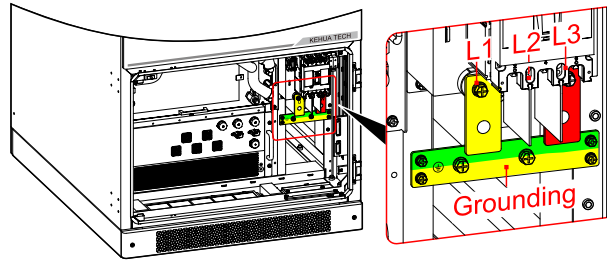


CAUTION

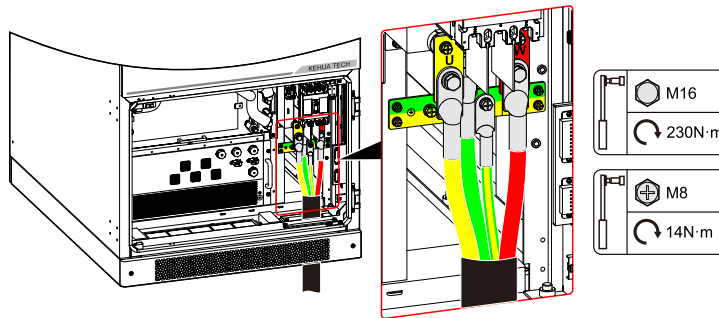
When stripping the cable, please pull the cables out of the cabinet to avoid the cable skin, metal core, etc. left inside the cabinet and affecting the normal operation of the device, as follows.



Step5 Connect the crimped AC cables to corresponding copper bars in the order of PE, L2, L1 and L3.



AC copper bars diagram

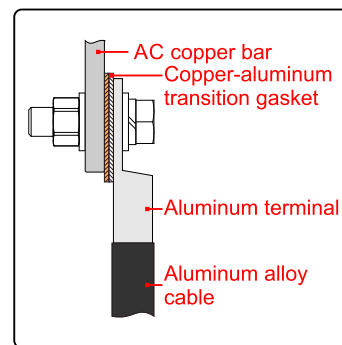
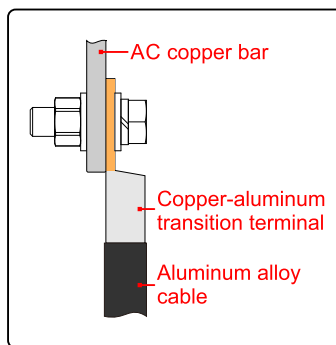
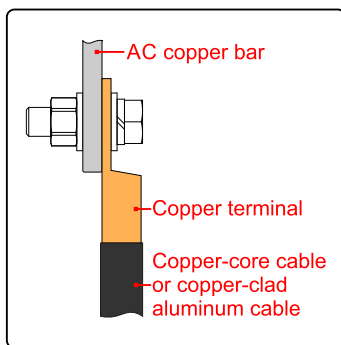


AC wiring diagram

NOTE

When connecting terminals and cables of different specifications, make sure:

- When adopt copper core cables or copper-clad aluminum cables, please use copper terminals.
- When adopt aluminum alloy cables, please use copper-aluminum transition terminals.

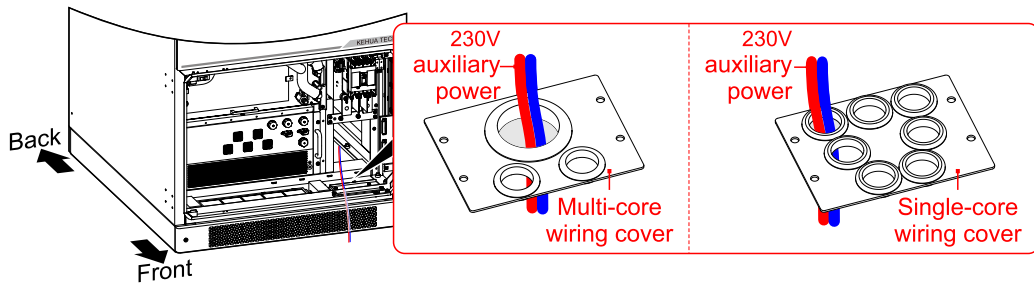


CAUTION

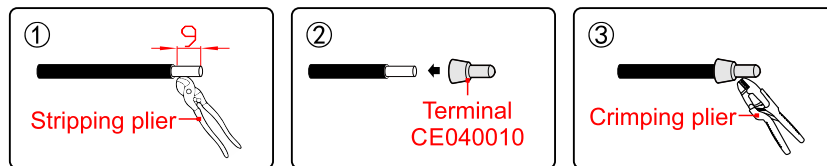
- DO NOT connect aluminum terminals directly to the AC copper bar. Otherwise, electrochemical corrosion may occur and the connection reliability may be affected.
- Copper-aluminum transition gaskets are not allowed to use.
- When copper-aluminum transition terminals are used, they must comply with the requirements of IEC61238-1.
- Reserve a certain allowance for the length of the protective grounding cable to ensure that it can withstand the stress when the AC output cable bears the tension due to force majeure.
- Make sure that the AC output cables are connected tightly. Otherwise, the device may not operate, or the terminals may be damaged by generated heat after operation due to unreliable connection.

6.5 230V Auxiliary Power Connection

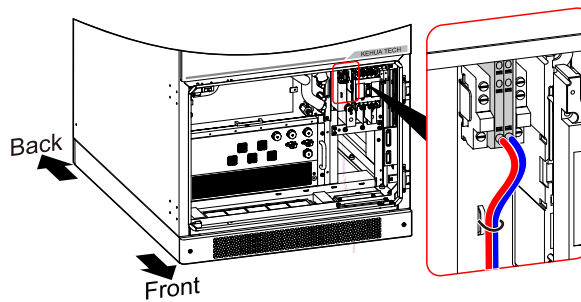
Step1 Lead the 230V auxiliary power supply cable go through the bottom wiring hole.



Step2 Crimp the 230V auxiliary power supply cables.



Step3 Connect the crimped 230V auxiliary power cables to corresponding terminals of the energy storage system.



NOTE

The cable colors in above figure are only for clear display, the actual cable colors should be decided according to the conditions on site.

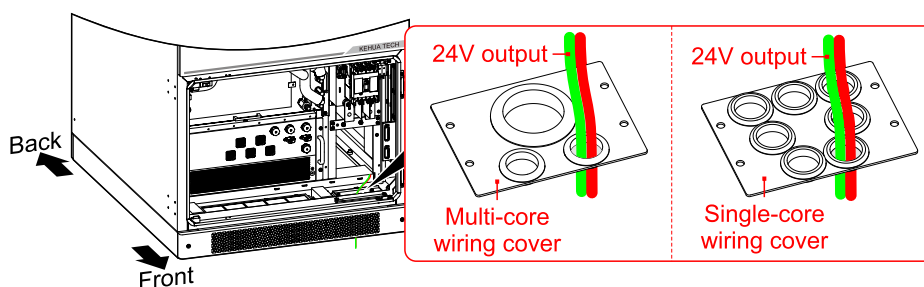
6.6 24V Output Connection



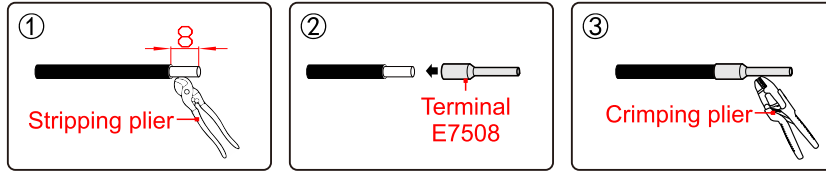
NOTE

When the energy storage system is used with a switch cabinet or station control box, the 24V output cable also needs to be connected. If the energy storage system is used alone, this section is not required.

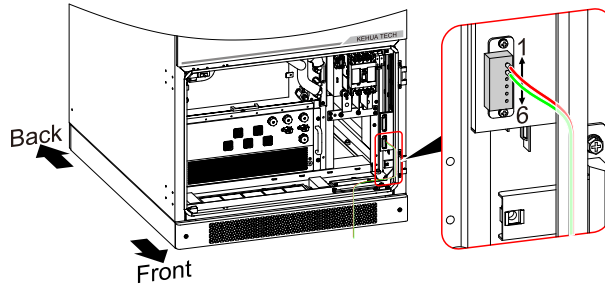
Step1 Lead the 24V output cables go through the bottom wiring hole.



Step2 Crimp the 24V output cables.



Step3 Connect the crimped 24V output cables to corresponding terminals of the energy storage system.



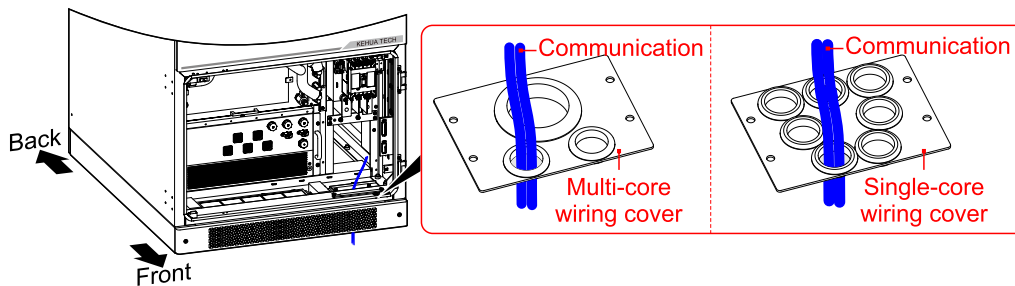
NOTE

The cable colors in above figure are only for clear display, the actual cable colors should be decided according to the conditions on site.

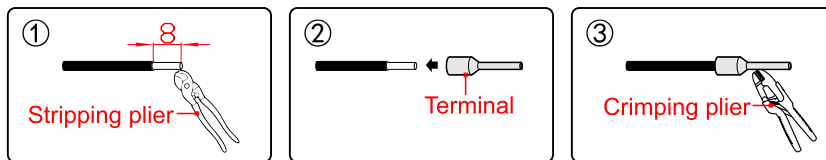
Pin definition: pin1: 24Vdc (+); pin2: 24Vdc (-).

6.7 External Communication Connection

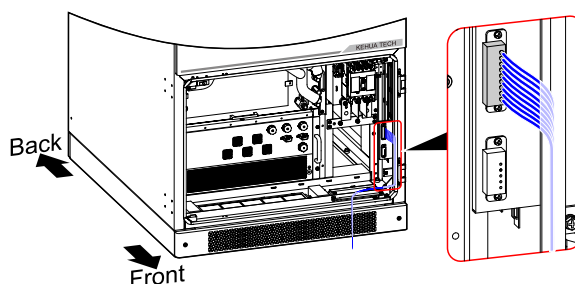
Step1 According to actual needs, lead the external communication cables go through bottom wiring hole.



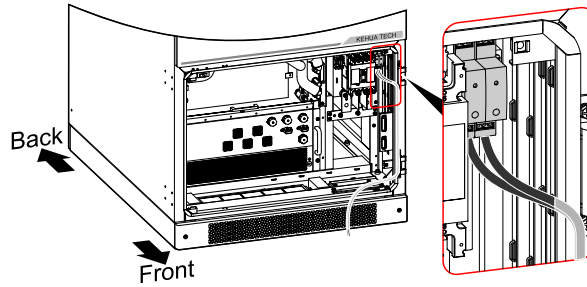
Step2 Crimp the external communication cables.



Step3 Connect the crimped external communication cables to corresponding terminals of the energy storage system.



Step3 Connect the crimped Network signal SPD LAN cables to the corresponding communication port of the energy storage system.



CAUTION

Seal the gaps between the cables and the energy storage system by fireproof mud after wiring.

Step4 Reinstall the wiring plate and close the door.

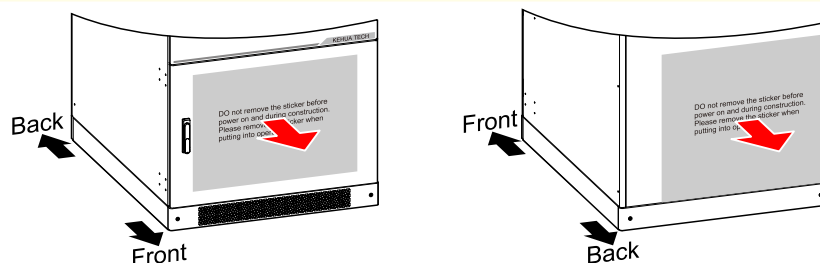
CAUTION

Before installing the wiring plate, please check the correctness and firmness of all the connection, and clean up any construction debris in the wiring compartment.

7 Startup

CAUTION

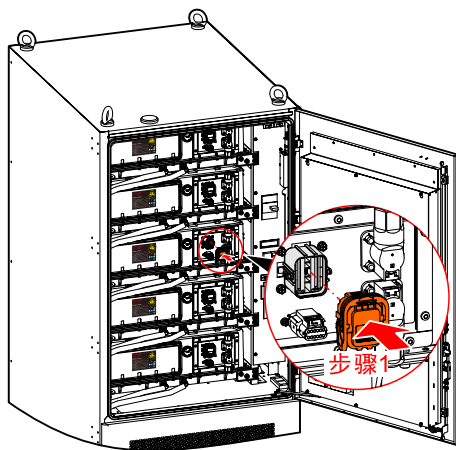
- Confirm that the AC voltage meets the allowed voltage range of the energy storage system.
- Grid-tied operation needs to be allowed by local power supply department and operate by professional electrician.
- When first use, before startup, please remove the stickers on the front and rear air inlet and outlet holes.



Step1 Open the upper door and install the MSD plug to the middle lithium module.

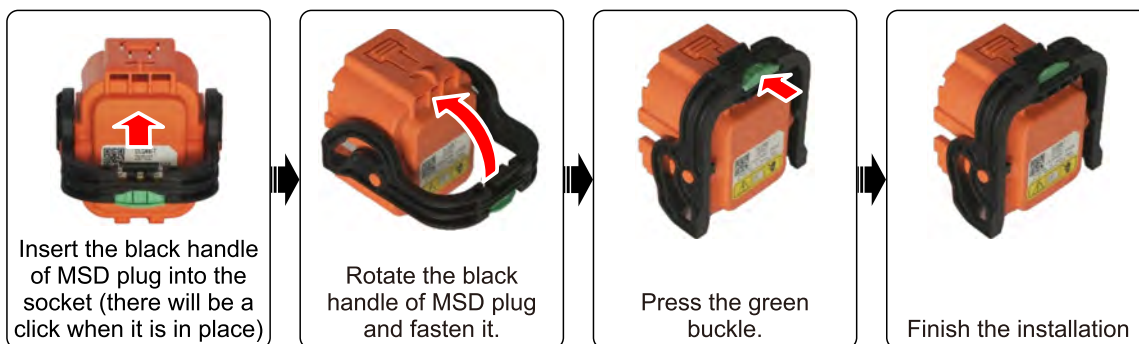
NOTE

Only the MSD plug of middle lithium module is not installed, the other MSD plugs have been installed before delivering, and they don't need to be operated.



CAUTION

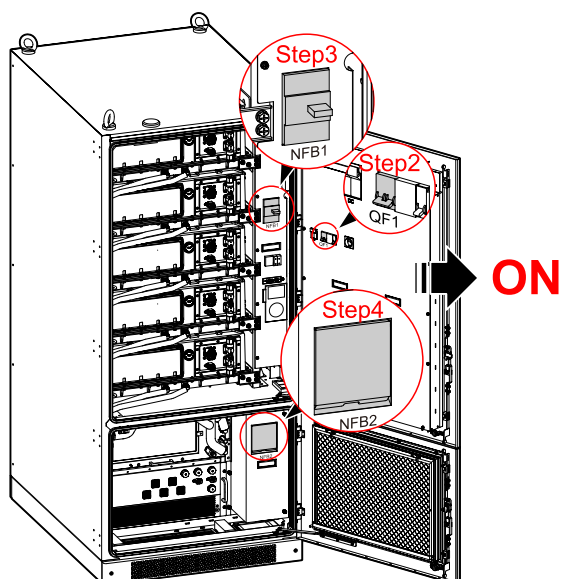
The MSD should not be assembled by force, please operate it as follows.



Step2 Power on the external power supply, close the external power supply breaker QF1.

Step3 Close DC breaker NFB1, DC side is connected.

Step4 Close the AC breaker NFB2, the AC side is connected.



Step5 Power on the energy storage system via APP .



NOTE

WiseSolar+ APP can build the connection with energy storage system by WIFI to realize the near-end and far-end maintenance for the energy storage system.



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