

STS250D Static Transfer Switch Cabinet User Manual

User Manual



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1 About this manual

This manual is applicable to the STS250D static transfer switch cabinet, mainly covering the product description, transportation and storage, mechanical installation, electrical connection, power-on and -off, troubleshooting and maintenance methods of the STS250D static transfer switch cabinet. Please read this manual carefully before transportation and installation of the product. Please store this manual and other documents of the product assembly together for view by relevant personnel at any time.

The content of this manual and the pictures, marks, symbols, etc. used herein are the properties of the Company. Personnel except the staff of the Company shall not publicly reprint the content in whole or in part without written authorization.

In order to continuously improve the customer satisfaction, the product and product manual of the Company will be subject to continuous improvement and upgrade. In case of any discrepancy between the manual and the product, it may be caused by the product version upgrade, and the actual production received by you shall prevail. If you still have questions, please contact us.

This manual is supplied together with the equipment. Before installation and operation of the equipment, please read this manual carefully and follow the requirements herein. This manual cannot cover all possible situations during installation, operation, maintenance, repair, etc. If you encounter any situation not covered in this manual, please contact us in time.

1.1 Product definition

STS250D static transfer switch cabinet

- STS: Static transfer switch
- 250: 250 kW
- D: Outdoor

1.2 Target reader

This manual is applicable to the product operators and qualified electrical technicians. The readers shall meet the following requirements:

- Have certain professional knowledge of electronics, electrical wiring and machinery, and know about electrical and mechanical diagrams.
- Understand the composition and working principle of the product; understand the composition and working principle of the STS250D static transfer switch cabinet and its upstream and downstream equipment.
- Receive professional training related to installation and trial operation of the electrical equipment.
- Have the capability of handling dangerous or unexpected emergencies during installation or trial operation.
- Know about the relevant standards and specifications of the country/region where the project is located.
- Know about the content described in this manual.

Only the personnel who meet the above requirements can perform the installation, operation, maintenance and repair of the product. Unauthorized personnel shall not perform any operation of the product, and shall keep a sufficient safe distance from the product to avoid accidents.

1.3 Use of symbols

This manual contains relevant information which is highlighted by appropriate symbols so that the user can maintain the personal and property safety when installing the product, or use the product in an efficient and optimal way.

The symbols that may be used in this manual are detailed below. Please read the details carefully for better use of this manual.



"Danger" indicates a high potential risk which, if not avoided, will result in serious accidents such as personal

injury or death.

Warning

"Warning" indicates a moderate potential risk which, if not avoided, may result in serious accidents such as personal injury or death.

Caution

"Caution" indicates a mild potential risk which, if not avoided, may result in moderate or slight personal injury.

Note

Indicates a potential risk which, if not avoided, may result in equipment malfunction or property loss.

Please always pay attention to the hazard warning signs on the cabinet, including:

	Electric shock hazards may be caused upon touching since high voltage is applied inside the cabinet.
	All external power supplies must be disconnected before maintenance of the equipment!
	The surface is so hot that the temperature cannot be borne by the human body. Do not touch such a surface without permission, so as to avoid personal injury.
	The maintenance and repair can be carried out only after the system is powered off for 10 min.
	Noise may be generated during equipment operation. It is recommended to wear noise-filtering earplugs.
	The protective grounding (PE) terminal shall be firmly grounded to ensure the safety of operators.

1.4 Safety precautions

1.4.1 Electrical safety

Danger

- High voltage! Electric shock hazard! Never touch the live parts!
- Before installation, make sure that the AC and DC sides are not energized.
- Do not place the static transfer switch cabinet on the surface of flammable materials.

Danger

Touching the power grid or the contacts and terminals connected to the power grid inside the equipment may cause an electric shock hazard!

- Do not touch the terminals or conductors connected to the power grid.

- Pay attention to all indications or safety instructions related to the power grid connection.

 Danger

The high voltage inside the product will result in death!

- Pay attention to the warning sign on the product and observe it.
- Follow the safety precautions listed in this manual and other relevant documents of the equipment.

 Danger

Any equipment damage or system fault may cause an electric shock or a fire!

- Visually check the equipment for damage or other hazards before operation.
- Check whether other external equipment or circuits are connected safely
- Confirm that the equipment is safe before operation.

 Warning

Turn off all equipment switches of the static transfer switch cabinet before wiring.

 Danger

In case of a grounding fault of the static transfer switch cabinet, the originally non-live part may be applied with a fatal high voltage. It is very dangerous to touch such a part accidentally! Before operation, please ensure that no grounding fault occurs in the system, and take relevant protective measures.

 Danger

High voltage is applied in the static transfer switch cabinet, which may cause a fatal electric shock hazard in case of unexpected touching. During measurement in the power-on state, be sure to:

- take proper protective measures (e.g. wear insulating gloves).
- arrange another person to be present on the site to ensure the personal safety.

Note

To prevent any misoperation or accident caused by the irrelevant personnel approaching the STS250D static transfer switch cabinet, please observe the following precautions:

- Place eye-catching warning signs around the STS250D static transfer switch cabinet to prevent accidents caused by unexpected closing.
- Set up warning signs or belts near the equipment.

1.4.2 Transportation

 Warning

- The operation safety regulations of the outdoor cabinet of the country/region where the project is located must be observed during handling and transportation.

 Warning

The STS250D static transfer switch cabinet must be transported in strict accordance with the operating procedures of the transportation equipment.

 Warning

In case of transportation or movement of the STS250D static transfer switch cabinet, the following conditions shall be met:

- The STS250D static transfer switch cabinet door shall be locked.
- Suitable forklifts shall be selected according to the site conditions, with the sufficient load-bearing capacity, boom length and rotation radius.
- Warning signs or belts shall be set up to prevent the personnel except the workers from entering the transportation area to avoid accidents.

1.4.3 Installation and wiring

 Warning

The relevant local standards and requirements must be strictly observed during mechanical installation.

 Warning

The STS250D static transfer switch cabinet system fault caused by failure to follow the installation design requirements in this manual will not be covered by the warranty.

 Warning

Failure to observe the torque requirements may cause a fire at the connection!

During electrical connection, the bolts must be tightened to the torque described in this manual.

 Warning

Only qualified electrical engineers or professional personnel can carry out the work related to electrical connection. The requirements defined in the safety instructions of this manual shall be observed. In case of failure to follow the safety instructions, the Company will not bear any responsibilities for the resulting personal injury or death or property loss.

 Warning

It is necessary to ensure the electrical insulation and comply with EMC specifications during laying of cables. The power cables and communication cables shall be laid in layers. If necessary, the cables shall be protected and supported so that the stress applied to them will be reduced.

 Warning

The wiring operation shall be performed in strict accordance with the wiring signs inside the equipment.

Warning

Only the intact and undamaged static transfer switch cabinet can be installed and put into trial operation! Before installation, make sure that:

- the static transfer switch cabinet is intact and undamaged.
- all equipment in the static transfer switch cabinet are intact and undamaged.

Warning

- The electrical connection shall be carried out in strict accordance with the wiring diagram.
- The electrical connection must be carried out when the equipment is powered off.

Warning

Only qualified electrical engineers can carry out the work related to electrical connection. The requirements defined in the safety instructions of this manual shall be observed. In case of failure to follow the safety instructions, the Company will not bear any responsibilities for the resulting personal injury or death or property loss.

Warning

When the STS250D static transfer switch cabinet is installed and put into operation outdoors, the installation position and foundation must meet the requirements. In addition, the electrical connection must be carried out in strict accordance with the regulations.

Warning

The system can be put into operation only after being confirmed by professionals and approved by the local power department. All circuit breakers shall be closed before operation of the equipment.

Note

- The installation and design of the STS250D static transfer switch cabinet must comply with the relevant standard or specifications of the country/region where the project is located.
- The STS250D static transfer switch cabinet or system fault caused by failure to follow the installation design requirements in this manual or the relevant local electrical standards or codes will not be covered by the warranty.

Caution

Before trial operation of the system, a thorough inspection of the installation must be carried out again.

- Check the installation.
- Check that no tools or parts are left inside the equipment.
- Check the system parameters.

1.4.4 Operation and maintenance

Warning

If the relevant operation is performed when the equipment is powered on, the insulation protection shall be provided, and at least two workers shall be appointed to be present on the site.

The STS250D static transfer switch cabinet is generally installed in an outdoor area far away from the urban area. Therefore, the corresponding field rescue facilities shall be prepared as required for use if necessary.

Warning

Before operation of the equipment, it is necessary to assess whether there is a risk of electric arc in the operation area. If there is a risk of electric arc, the operator shall receive the relevant safety training in advance. Before operation in areas where an electric shock may occur, it is necessary to wear satisfactory personal protective equipment, such as protective clothing, insulating gloves, insulating shoes and heat-resistant gloves.

Warning

The following improper operation may cause electric arc, fire, explosion and other hazards inside the machine:

- Connection or disconnection of the high voltage cable on the DC side of each equipment in the power-on state.
- Loose connection of the power cable, and unexpected falling of the parts such as screws into the power module.
- Incorrect operation by untrained and unqualified operators, etc.

Warning

The maintenance can be conducted only when the equipment in the STS250D static transfer switch cabinet is powered off.

- Ensure that the internal equipment is powered off and will not be accidentally powered on again.
- Insulate and cover the possible live parts adjacent to the operation position with cloth of insulating material.
- Keep the escape routes unblocked during operation.

Warning

During daily operation, ensure that the STS250D static transfer switch cabinet door is closed and locked and the key is removed and kept by a special person so as to prevent accidents caused by entry of unauthorized personnel and protect the internal equipment from being exposed to rain or attacked by animals.

Danger

To avoid unnecessary personal injury and equipment damage, the product must be operated in strict accordance with the requirements in this manual. Any improper operation may result in electric arc hazards and other risks such as fire and explosion. The Company will not bear any responsibilities for the accidents such as electric arc, fire and explosion caused by failure to follow the warning signs on the machine or the product manual.

 Danger

- Select the high-quality measuring equipment with the range and conditions meeting the site requirements.
- Ensure that the measuring equipment is connected and used correctly in a standard way to avoid dangers such as electric arc.
- In case of measurement in the power-on state, take proper protective measures (e.g. wear insulating gloves).

Note

Do not tear or damage the signs:

- Ensure that the warning signs on the cabinet are always **legible**.
- Once the warning signs on the cabinet are damaged or blurred, be sure to replace them immediately.

Note

Do not open the STS250D static transfer switch cabinet door under severe weather conditions such as sandstorm, thunderstorm, strong wind or hail or at the ambient relative humidity of more than 95% during maintenance.

 Caution

Any contact with or improper operation of the printed circuit board or other electrostatic sensitive components will damage the components.

- Avoid unnecessary circuit board contact.
- Observe the electrostatic protection regulations, e.g. wear an anti-static wrist strap.

1.4.5 Product scrapping

In case of scrapping, the STS250D static transfer switch cabinet or its internal independent equipment shall not be disposed of as the conventional waste. Some internal components and parts can be recycled and reused, while others may pollute the environment.

Please contact the local authorized professional recycling organization to properly dispose of the product and its internal components and parts.

2 Product description

2.1 General introduction

Our STS250D static transfer switch cabinet is mainly intended for use in industrial and commercial scenarios and composed of STS250D static transfer switch outdoor cabinet, transformer module, touch screen and electrical components. The STS250D static transfer switch cabinet is rated at IP54 and can be installed outdoors.

The typical application scenario of the STS250D static transfer switch cabinet with 5 sets of PCS is shown in Figure 2-1.

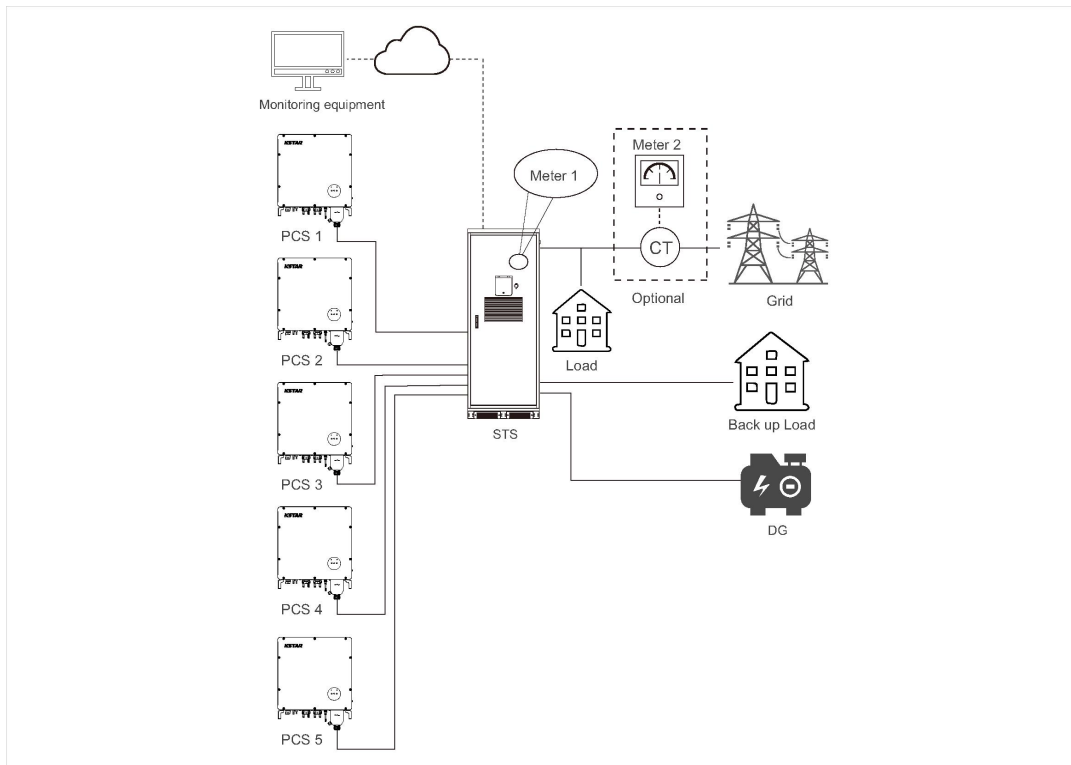


Figure 2-1 Typical Application Scenario of PCS

2.2 Design patent

2.2.1 Cabinet appearance

The front of the STS250D static transfer switch cabinet is shown in Figure 2-2. The figure is for reference only, and the actual product received by you shall prevail!

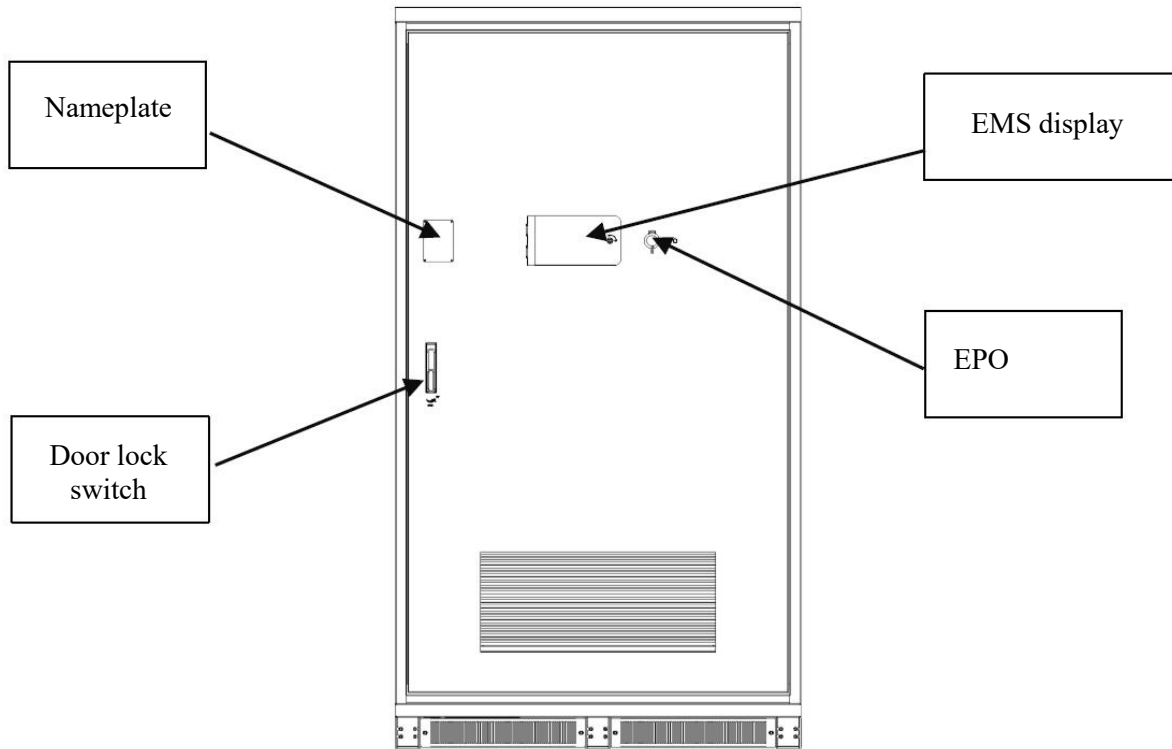


Figure 2-2 Front of STS250D Static Transfer Switch Cabinet

2.2.2 Mechanical parameters

The overall dimensions of the STS250D static transfer switch cabinet are shown in Figure 2-3.

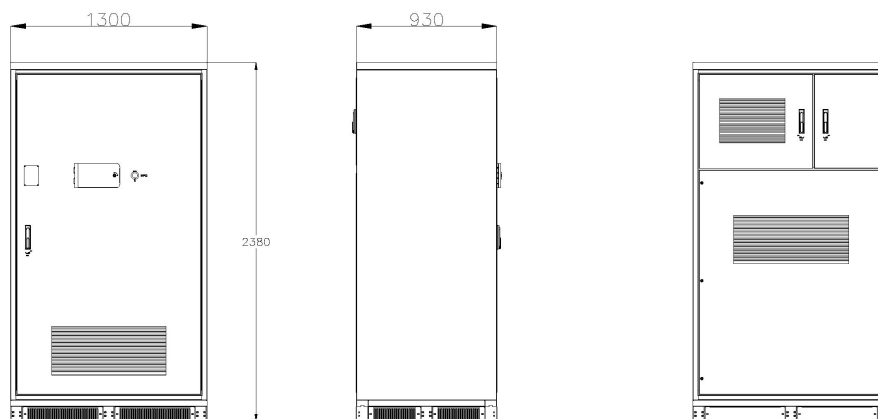


Figure 2-3 Dimensions of STS250DD Static Transfer Switch Cabinet

* The figure shows the STS250DD static transfer switch cabinet for reference only, and the actual product received by you shall prevail!

2.3 Function description

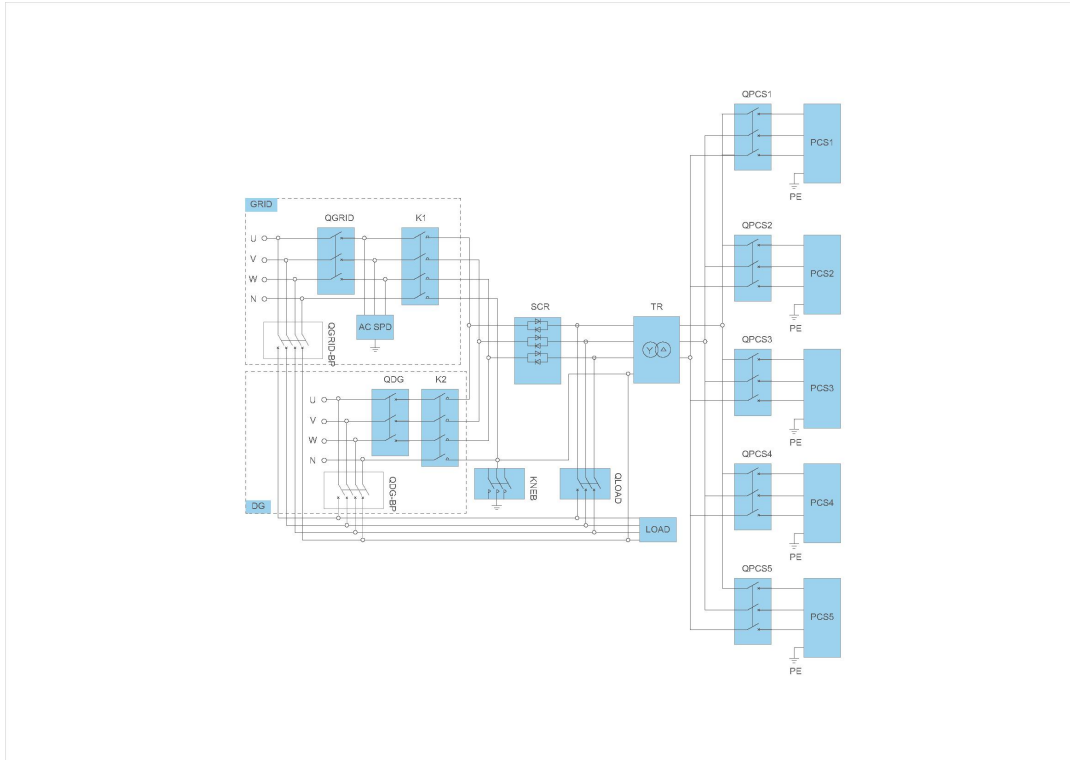


Figure 2-6 Wiring of STS250D Static Transfer Switch Cabinet

The wiring of the STS250D static transfer switch cabinet is shown in Figure 2-6. Based on the basic operation principle, the STS250D static transfer switch cabinet can be connected to four external parts as follows:

- The power grid switch QGRID is connected to the power grid.
- The diesel generator switch QDG is connected to the diesel generator.
- The load switch QLOAD is connected to the load.
- The PCS switch QPCS is connected to the power conversion system (PCS) of which the quantity ($PCS \leq 5$) can be selected by the user according to the actual situation.

The circuit breaker switches QGRID and QLOAD are provided on the internal power grid side and load side of the STS250D static transfer switch cabinet. The power grid bypass service switch QGRIDBP is used to supply power to the load side from the power grid side during maintenance, and the diesel generator bypass service switch QDGBP is used to supply power to the load side from the diesel generator side during maintenance. The STS250D static transfer switch cabinet is mainly used to achieve on-grid and off-grid switching among PCS, power grid and diesel generator to ensure that the PCS can supply power to the load in case of a fault on the power grid side and the diesel generator can supply power to the load when the battery power on the PCS side is insufficient. Two operating modes are available:

- On-grid mode: The power is supplied to the load from the power grid or diesel generator and PCS via the STS switch cabinet.
- Off-grid mode: When the grid side is faulty or disconnected, the system switches to the off-grid mode. In this mode, the power is supplied to the load from the external energy storage battery via the PCS (DC/AC) and load switch QLOAD.

3 Delivery and storage

3.1 Scope of supply

The packing list of the delivered STS250D static transfer switch cabinet is given as follows:

Table 3-1 Scope of Supply

Name	Qty	Unit	Description
STS250D static transfer switch cabinet	1	PCS	Configured as standard
User Manual	1	PCS	Configured as standard
Qualification Certificate	1	PCS	Configured as standard
Warranty card	1	PCS	Configured as standard
Key	2	PCS	Configured as standard
Delivery inspection report	1	PCS	Configured as standard
EMS operation manual	1	PCS	Configured as standard
Fireproof mud	4	PCS	Configured as standard

3.2 Inspection of integrity after transportation

The STS250D static transfer switch cabinet has been carefully checked by our staff and securely packed before delivery. However, the equipment may be impacted or damaged during transportation.

The integrity and intactness of the equipment after transportation shall be checked upon reception. At least the following items shall be carefully checked:

- Check whether all shipped components are complete according to the content in the "Scope of supply".
- Confirm that the models of the received STS250D static transfer switch cabinet and its internal equipment are consistent with the ordered models.
- Carefully check the STS250D static transfer switch cabinet and its internal equipment for damage during transportation. Contact the transportation service provider or the Company immediately in case of any faults or questions during inspection.

3.3 Storage

If the STS250D static transfer switch cabinet is not installed immediately after successful delivery, it shall be stored properly as described in this section.

- To prevent condensation inside the STS250D static transfer switch cabinet or soaking of the bottom of the cabinet in rainwater in rainy seasons, the STS250D static transfer switch cabinet shall be stored indoors, e.g. in a large warehouse or workshop.
- In case of outdoor storage due to the site condition restrictions, the base of the STS250D static transfer switch cabinet must be raised to a certain height which shall be reasonably determined according to the on-site geological and meteorological conditions. The internal equipment of the STS250D static transfer switch cabinet shall also be heated at a too low ambient temperature.

Ambient temperature for storage: -40°C~70°C; Recommended temperature for long-term storage: 20°C~30°C; Relative humidity of storage environment: 0~95%, no condensation.

- The STS250D static transfer switch cabinet shall be stored on a dry, flat and solid ground with a sufficient bearing capacity and no vegetation. The ground on which the static transfer switch cabinet is stored shall be flat, without water or unevenness.
- The STS250D static transfer switch cabinet door shall be locked during storage.
- Effective measures must be taken to prevent ingress of rain, sand and dust into the STS250D static transfer switch cabinet. At least the air inlet and outlet of the STS250D static transfer switch cabinet shall be effectively protected.
- The regular inspection shall be performed at least once every half month to verify if the cabinet and its internal equipment are in good condition.

4 Mechanical installation

Warning

The relevant local standards and requirements must be strictly observed during mechanical installation.

4.1 Pre-installation inspection

4.1.1 Inspection of deliverables

The completeness of the deliverables shall be checked based on the packing list supplied together with the product.

4.1.2 Equipment inspection

Contact the transportation service provider or the Company immediately in case of any faults or questions.

Warning

Only the intact and undamaged equipment can be installed. Before installation, be sure to:

- check whether the model of the received cabinet is consistent with the ordered model, and whether the cabinet is intact and undamaged.
- check that all equipment in the cabinet are intact and undamaged.

4.2 Requirements for installation environment

4.2.1 Requirements for site selection

The installation site shall be selected based on the following principles:

- The climatic and geological conditions (such as stress wave emission and groundwater level) of the installation site of the STS250D static transfer switch cabinet shall be fully considered.
- The surrounding environment shall be dry, well ventilated and far away from the areas with flammable and explosive materials.
- The soil at the installation site shall be compacted, with the recommended relative compactness greater than or equal to 98%. If the soil is loose, be sure to take the corresponding measures to ensure that the foundation is solid.
- The product shall be kept away from areas full of toxic and harmful gases, and flammable, explosive and corrosive materials.

4.3 Transportation by forklift

If the installation location is flat, the STS250D static transfer switch cabinet can be moved by forklift. The STS250D static transfer switch cabinet is provided with bottom holes for transportation by forklift. The STS250D static transfer switch cabinet can be moved through the front holes.

In case of transportation by forklift, the following requirements shall be met:

- The STS250D static transfer switch cabinet door shall be locked.
- The length of the forks shall be at least 1,100 mm.

The forks shall be inserted into the holes on the bottom of the workstation (see Figure 4-2 for hole positions). The depth of the forks inserted into the holes shall be equal to that of the holes, i.e. 1,100 mm.

- The STS250D static transfer switch cabinet shall be transported, moved and lowered slowly and stably. Trial transportation is recommended.
- The STS250D static transfer switch cabinet can only be placed in a smooth and well-drained area without any obstacles or bumps.

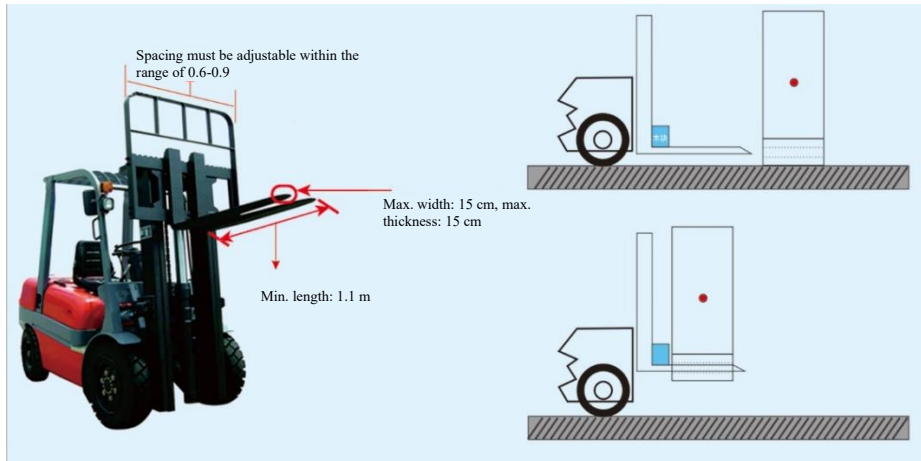


Figure 4-3 Transportation by forklift

Warning

- The static transfer switch cabinet shall be moved through the front holes on the bottom.
- The static transfer switch cabinet shall not be transported through insertion of the forks into any positions other than the holes in any case.



The holes on the cabinet are exposed before delivery and should be sealed with the supporting sealing plates after on-site installation.

4.4 Requirements for installation space

In order to ensure better cooling and maintenance of the equipment, it is recommended to reserve enough space around the installation location of the cabinet.

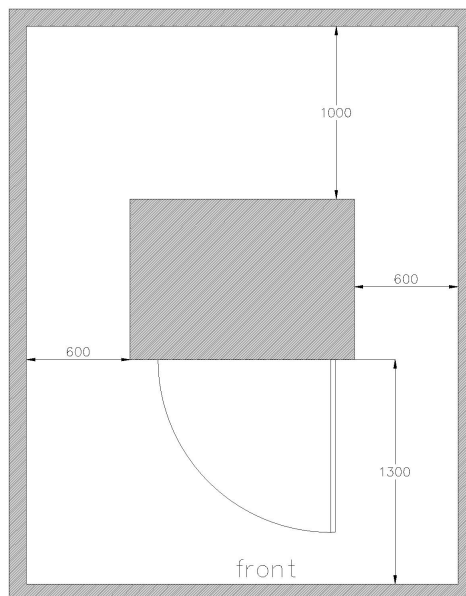


Figure 4-4 Recommended Installation Space for Single Cabinet (Top View)

Note: The figure is for reference only, and the installation details shall be determined according to the user's need.

After it is confirmed that the foundation is constructed in strict accordance with the requirements and kept dry, solid and flat enough, the STS250D static transfer switch cabinet shall be moved to the predetermined position

and fixed on the foundation with fastening bolts. After fixing, the U-shaped angle steel shall be subject to anti-rust treatment through application of anti-rust paint. The dimensions of the base of the STS250D static transfer switch cabinet are shown in Figure 4-5, and the specific installation position and direction shall be determined by the buyer.

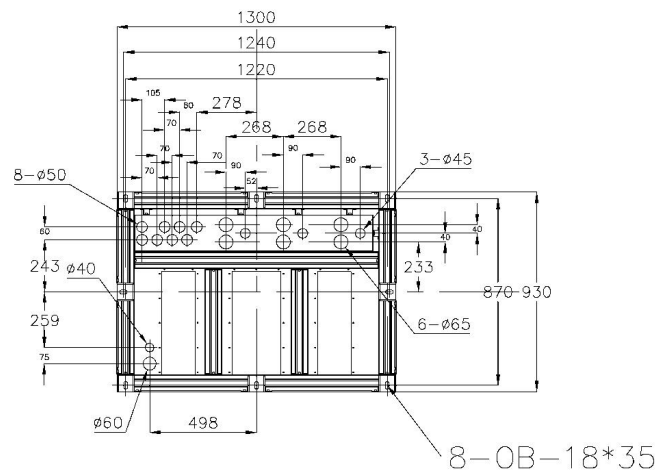


Figure 4-5 Dimensions of Equipment Base (Top View)

Note: The base shall be fixed with 8 screws (M18*35), and the specific installation position and direction shall be determined by the buyer.

* The figure is for reference only, and the actual product received by you shall prevail!

5 Electrical connection

5.1 Safety precautions

5.1.1 General

Danger

- High voltage! Electric shock hazard! Never touch the live parts!
- Before installation, make sure that the AC and DC sides are not energized.
- Do not place the static transfer switch cabinet on the surface of flammable materials.

Warning

- The entry of sand and moisture may damage the electrical equipment in the static transfer switch cabinet, thus affecting the operation performance of the equipment.
- The electrical connection shall not be performed in case of sandstorms or at the ambient relative humidity of more than 95%.
- The connection can be performed on sunny and dry days without sandstorms.

Note

- **The installation and design of the static transfer switch cabinet must comply with the relevant standard or specifications of the country/region where the project is located.**
- **The static transfer switch cabinet or system fault caused by failure to follow the installation design requirements in this manual or the relevant local electrical standards or codes will not be covered by the warranty.**

5.1.2 Five safety rules

The following five safety rules shall be observed during electrical connection and all other operations of the STS250D static transfer switch cabinet:

- Disconnect the STS250D static transfer switch cabinet from all external equipment and the internal power supply.
- Ensure that the disconnected equipment will not be accidentally powered on again.
- Use a multimeter to check that the inside of the equipment is de-energized.
- Perform necessary grounding.
- Insulate and cover the possible live parts adjacent to the operation position with cloth of insulating material.

5.2 Wiring overview

The wiring of the STS250D static transfer switch cabinet is shown in Figure 5-1:

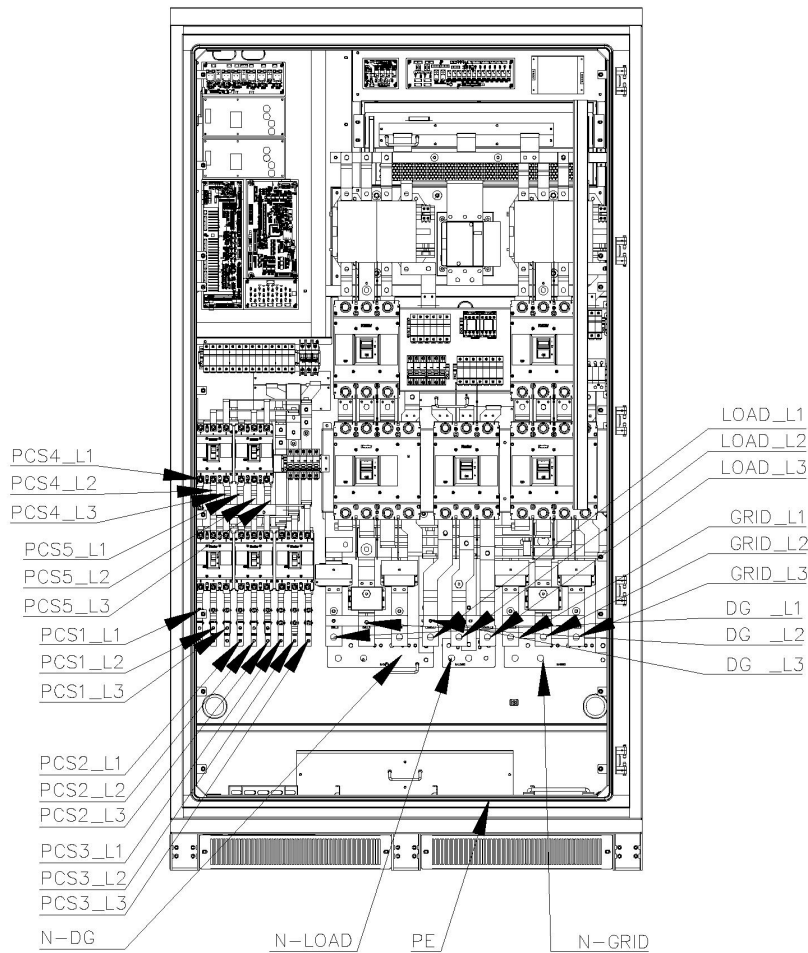


Figure 5-1 Wiring of STS250D Static Transfer Switch Cabinet

The external wiring is shown in Figure 5-1. The figure only shows the wiring principle for reference only. The system wiring diagram is provided in 5.4.5.

Note: The conversion terminal, communication terminal, etc. shall be attached with labels. The connection can be performed as shown on the labels.

Warning

- The electrical connection shall be carried out in strict accordance with the wiring diagram.
- The electrical connection must be carried out when the equipment is powered off.

Warning

Only qualified electrical engineers can carry out the work related to electrical connection. The requirements

defined in the safety instructions of this manual shall be observed. In case of failure to follow the safety instructions, the Company will not bear any responsibilities for the resulting personal injury or death or property loss.

Note

- The installation and design of the STS250D static transfer switch cabinet must comply with the relevant standard or specifications of the country/region where the project is located.
- The STS250D static transfer switch cabinet system fault caused by failure to follow the installation design requirements in this manual will not be covered by the warranty.

5.3 System cables

For the STS250D static transfer switch cabinet, the wires (e.g. copper wires) shall be selected according to the 370 kW capacity configuration requirements. The current through the 1 mm² **1mm²** wire should not be higher than 5

A. The wires on the same side shall be of the same specifications and type. The reference requirements for the sizes of various cables are provided. The cable length shall be determined according to the on-site installation environment conditions. The user can design the relevant cables with reference to the cable diameters given in Table 5-1. The instructions in this section and the local wiring regulations shall be followed during the cable design, and the environmental conditions, laying methods, etc. shall be considered for selection. When the control cable needs to be laid across the power cable, the angle between these two cables shall be kept at 90°.

Table 5-1 Specifications of Cables (Copper Wires) for STS250D Static Transfer Switch Cabinet

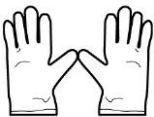
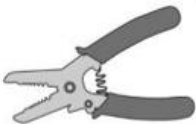
Input cable on grid side (370 kW)	Input cable on DG side (370 kW)	PCS side (50 kW)	Load side (370 kW)
≥150 mm ² ×4	≥150 mm ² ×4	≥25 mm ² ×3	150mm ² ×4
PE	A/C power supply	DC-Bus power supply	Parallel communication cable
50mm ²	Single 3-core cable, ≥2.5 mm ² × 2	1 mm ² ×2	Shielded twisted pair, single 8-core cable

5.4 Preparation before wiring

The cables between the internal electrical equipment of the STS250D static transfer switch cabinet have been connected before delivery. After delivery, the external cables of the STS250D static transfer switch cabinet shall be provided by the user and installed under the guidance of a professional electrical engineer.

5.4.1 Preparation of installation tools

At least the following tools and parts shall be prepared before installation:

			
Safety gloves	Safety boots	Crimping pliers	Heat gun
			

Multimeter	Wire stripper	Phillips screwdriver	Socket (M6/M8/M10/M12/M16, M18, M20, M22)
			
Heat-shrinkable sleeves	Insulating adjustable wrench		

Figure 5-2 Installation Tools

5.4.2 Preparation of cables

Warning

The integrity and insulation of the cables used shall be checked before electrical connection. The damaged cable shall be replaced in time. In case of improper insulation or cable damage, hazards may be caused.

The selected cables must meet the following conditions:

- The cables shall have a sufficient current carrying capacity. The current carrying capacity of the conductor will be affected by the factors including but not limited to: environmental conditions, conductor insulation type, cable laying method, cable material and cross-sectional area.
- The cable diameter must be selected according to the maximum current carrying capacity, and the length margin must be reserved.
- Flame-retardant cables shall be selected.

The cables used shall comply with the local laws and regulations. The cable colors involved in the instructions are for reference only. The cables shall be selected according to the local cable standards.

5.4.3 Making of terminals

The appropriate terminals and cables shall be selected to make the terminal blocks according to the following steps.

	Step 1: Strip off the insulation layer at the end of the cable according to the length that is equal to the depth of the wiring copper lug crimping hole plus about 5 mm.
	Step 2: Crimp the wiring copper lug. Put the copper core with the end exposed in the crimping hole of the wiring copper lug. Press the wiring copper lug firmly more than twice with a terminal press.
	Step 3: Install the heat-shrinkable sleeves. ① Select the heat-shrinkable sleeves suitable for the cable size, with a length exceeding the wiring copper plug crimping tube by 2 cm.

- ② Put the heat-shrinkable sleeves on the wiring copper plug in such a way that the crimping hole of the wiring copper plug is completely covered.
- ③ Shrink the heat-shrinkable sleeves with a heat gun.

If a multi-core cable is used, it is recommended to add a cable protective sleeve at the bifurcation to prevent the outer insulation layer from cracking.

5.4.4 Connection via aluminum cables

In case of connection via aluminum cables, the parts to be wired shall be connected as shown in Figure 5-3.

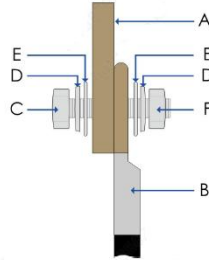


Figure 5-3 Connection Sequence of Transitional Terminals

No.	Name
A	Copper bar
B	Copper-aluminum transitional terminal
C	Bolt
D	Spring washer
E	Plain washer
F	Nut

Note: The cable for connection of the STS and the external equipment shall be introduced from the bottom cable inlet of the cabinet. The foundation shall be reserved with a trunking.

5.4.5 Wiring guidelines and precautions

Warning

- Before wiring, the phase sequence of all input cables must be checked to ensure that the phase sequence of each input is correct.
- Do not pull the cable or wire forcibly during electrical installation, so as to avoid affecting the insulation performance.
- All cables and wires shall be reserved with certain space for bending.
- Necessary supporting measures shall be taken to reduce the stress on the cable or wire.
- After wiring operation in each step, an inspection shall be performed carefully to ensure correct and firm wiring.

Refer to the system wiring manual for system wiring

5.5 Grounding connection

5.5.1 Introduction

Warning

The grounding connection must comply with the grounding standards and specifications of the country/region

where the project is located.

Note

During grounding, attention shall be paid to reliable grounding connection between the equipment and the grounding electrode.

The STS250D static transfer switch cabinet is configured with the external grounding and internal grounding modes.

5.5.2 External grounding

Warning

The cable connection shall be performed in strict accordance with the wiring signs inside the equipment.

External grounding shall be performed under the guidance of the power station staff according to the actual conditions of the project site, and the PE cable shall be connected to the PE ground wire copper bar according to the cable mark. The ground resistance shall be measured after grounding connection.



The ground resistance shall not be higher than 4 Ω , or shall be in accordance with the relevant standards of the country/region where the project is located.

Warning

If you have any questions during grounding connection, please contact the relevant staff in time. If the installation specifications are not followed, or the installation or modification is carried out without permission, safety accidents or equipment damage may be caused. The Company will not bear any responsibilities for the resulting loss.

5.5.3 Internal equipment grounding

The wiring from the main electrical equipment inside the STS250D static transfer switch cabinet to the grounding terminal has been completed before delivery. The connection between the STS250D static transfer switch cabinet and the ground shall be completed on site as follows:

- The conductivity of the circuit between the equipment grounding terminal and the main grounding copper bar shall be measured to ensure the effectiveness of internal grounding connection.
- The shielding layer, protective layer, etc. of external cables of the STS250D static transfer switch cabinet shall also be grounded in appropriate positions on the STS250D static transfer switch cabinet.

5.7 Wiring and waterproofing

- According to the design features of the cable inlet and outlet on the base of the STS250D static transfer switch cabinet, the cables shall be laid between the STS250D static transfer switch cabinet and the PCS side and introduced into the equipment via the cable inlet and outlet on the side of the cabinet. The appropriate cables shall be selected according to the requirements for the internal equipment of the STS250D static transfer switch cabinet.
- It is necessary to ensure the electrical insulation and comply with EMC specifications during wiring. The power cables and communication cables shall be laid in layers. If necessary, the cables shall be protected and supported so that the stress applied to them will be reduced.

- After correct and firm wiring, the gaps at the cable inlet and outlet of the STS250D static transfer switch cabinet shall be sealed with bricks or fireproof mud. The mounting foundation of the STS250D static transfer switch cabinet shall be waterproofed as a whole.

5.8 End of electrical connection

Warning

After electrical connection, the connection of all cables shall be checked. All connections shall be correct and firm.

After electrical connection, the wiring shall be checked thoroughly.

- Seal cable inlet and outlet and their surrounding gaps of the outdoor cabinet tightly with fireproof and waterproof materials.
- Check that all air inlets and outlets are not blocked by foreign matters.
- Reinstall all protective covers firmly.

Warning

In case of improper sealing, moisture or animals may enter the internal equipment.

The cabinet door and box door shall be locked after operation.

6 Power-on and -off

Warning

The STS static transfer switch cabinet can be put into operation only after being confirmed by professionals and approved by the local power department.

Warning

In case of long-time shutdown of the STS static transfer switch cabinet, the equipment must be checked thoroughly to ensure that all indicators meet the requirements before power-on.

6.1 Inspection before power-on

The items of inspection before power-on and their acceptance criteria are detailed as follows:

S/N	Inspection item	Acceptance criteria
1	Equipment installation	The equipment shall be installed correctly, firmly and reliably
2	Cable layout	The cables shall be laid reasonably in accordance with the user's requirements
3	Reliable grounding	The ground wire shall be connected correctly, firmly and reliably
4	Switch OFF	All switches shall be turned off
5	Cable connection	The AC output cable, DC input cable, signal cable, etc. shall be connected correctly, firmly and reliably
6	Sealing of unused terminals and interfaces	The unused terminals and interfaces shall be equipped with waterproof covers
7	Installation environment	The installation space shall be reasonable, and the installation environment shall be clean and tidy, without construction residues

After all external cables and equipment are connected to the STS250D static transfer switch cabinet, that is, the external wiring is conducted correctly, the STS250D static transfer switch cabinet shall be powered on and off for verification to ensure stable operation.

6.2 Power-on

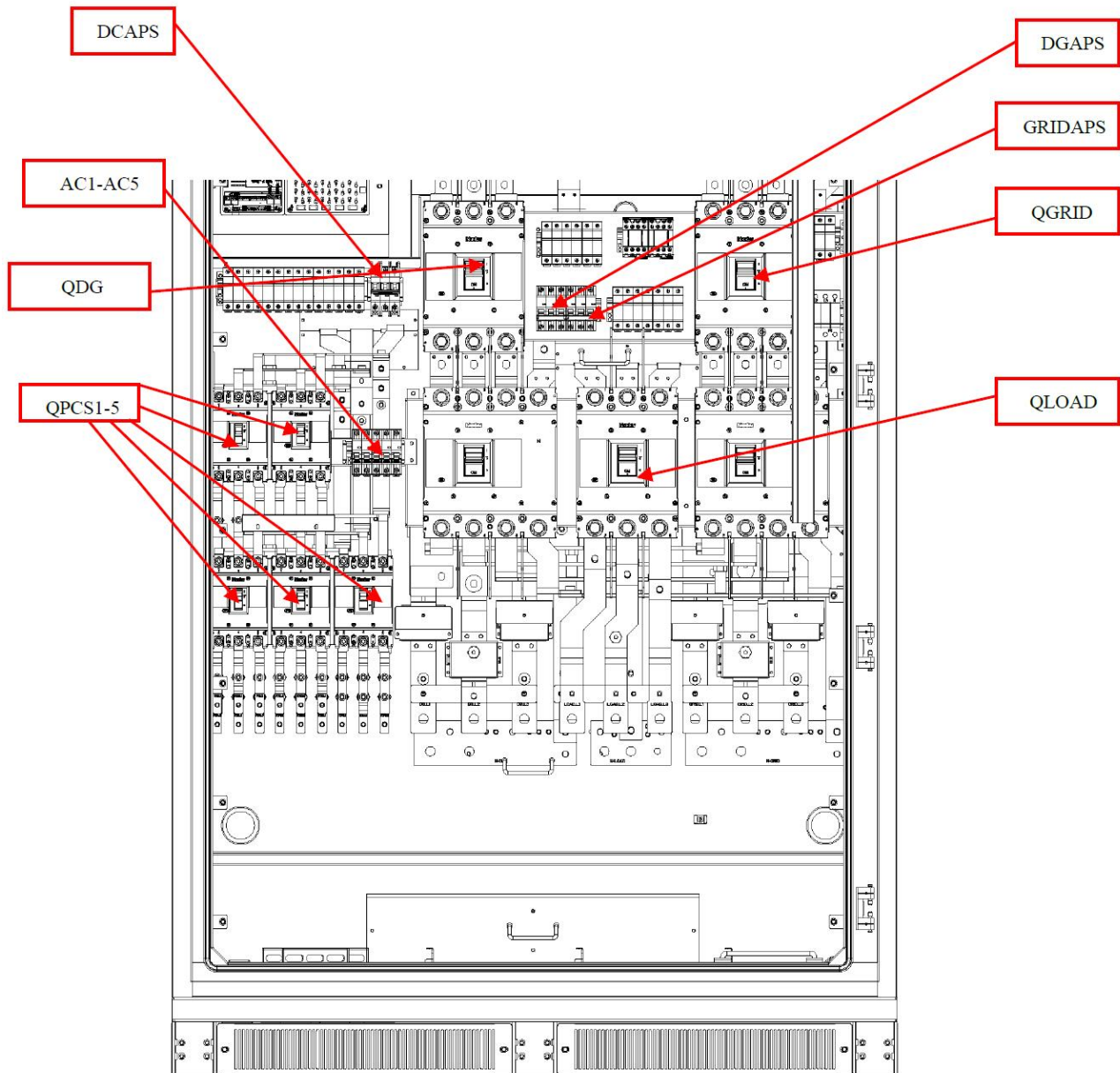
Power-on sequence:

Step 1: Check that all switches of the electrical equipment in the STS250D static transfer switch cabinet are turned off;

Step 2: Turn on the three auxiliary power switches QDCAPS, QDGAPS and QGRIDAPS, and check whether the fault alarm is shown on the alarm interface of the display;

Step 3: In the on-grid mode, close the power grid circuit breaker QGRID, and check whether the power grid voltage shown on the EMS display is normal;

Step 4: If the power grid is normal, after the EMS display shows that the contactor is closed, close the PCS circuit breakers QPCS1, QPCS2, QPCS3, QPCS4 and QPCS5 and the load circuit breaker QLOAD, and turn on the A/C power switches AC1, AC2, AC3, AC4 and AC5. Check the relevant parameters shown on the EMS display. If all the parameters are normal and no fault occurs, click "Start". The power-on is completed.



6.3 Power-off

Power-off sequence:

Step 1: Control the cloud platform or touch screen interface to shut down the system

Step 2: Turn off the PCS switches QPCS1, QPCS2, QPCS3, QPCS4 and QPCS5 of the STS250D static transfer switch cabinet, the A/C power switches AC1, AC2, AC3, AC4 and AC5, the power grid circuit breaker switch QGRID and the auxiliary power switches QDCAPS, QDGAPS and QGRIDAPS in turn;

The power-off is completed.

7 Troubleshooting

Table 7-1 Common Faults and Troubleshooting Methods

Fault	Solution
EPO fault	Check whether the EPO switch is turned on
Power grid bypass circuit breaker open	Check whether the power grid bypass circuit breaker is open
Diesel generator bypass circuit breaker open	Check whether the diesel generator bypass circuit breaker is open
Remote shutdown failure	Check whether the alarm is issued after shutdown and the normal state is recovered after remote startup
Post-upgrade shutdown failure	Wait until the upgrade is completed or contact the after-sales customer service
Abnormal sampling offset	Contact the after-sales customer service
15-min continuous shutdown failure	Power off and power on the equipment again or contact the after-sales customer service
Overload	Shut down the equipment, and check for excessive load or short circuit
Severe overload	Shut down the equipment, and check for excessive load or short circuit
STS overload	Shut down the equipment, check whether the STS input and output are short-circuited or overloaded, or contact the after-sales customer service
STS severe overload	Shut down the equipment, check whether the STS input and output are short-circuited or overloaded, or contact the after-sales customer service
STS overcurrent	Shut down the equipment, and contact the after-sales customer service
Power grid SCRA short circuit	Shut down the equipment, and contact the after-sales customer service
Power grid SCRB short circuit	Shut down the equipment, and contact the after-sales customer service
Power grid SCRC short circuit	Shut down the equipment, and contact the after-sales customer service
N-to-ground contactor open circuit	Shut down the equipment, and contact the after-sales customer service
Parallel communication fault	Check the wiring
STS transformer overtemperature	Shut down the equipment, and contact the after-sales customer service
No module	Check whether the PCS is faulty or whether the PCS circuit breaker is closed
Power grid SCRA open circuit	Shut down the equipment, and contact the after-sales customer service
Power grid SCRB open circuit	Shut down the equipment, and contact the after-sales customer service
Power grid SCRC open circuit	Shut down the equipment, and contact the after-sales customer service
STS SCR overtemperature	Shut down the equipment, and contact the after-sales customer service
STS N line overcurrent	Shut down the equipment, and contact the after-sales customer service
Diesel generator phase A overvoltage	Shut down the equipment, check the diesel generator for overvoltage, or contact the after-sales customer service
Diesel generator phase B overvoltage	Shut down the equipment, check the diesel generator for overvoltage, or contact the after-sales customer service
Diesel generator phase C overvoltage	Shut down the equipment, check the diesel generator for overvoltage, or contact the after-sales customer service

Diesel generator phase A undervoltage	Shut down the equipment, check the diesel generator for undervoltage, or contact the after-sales customer service
Diesel generator phase B undervoltage	Shut down the equipment, check the diesel generator for undervoltage, or contact the after-sales customer service
Diesel generator phase C undervoltage	Shut down the equipment, check the diesel generator for undervoltage, or contact the after-sales customer service
Diesel generator phase loss	Shut down the equipment, check the diesel generator for phase loss, or contact the after-sales customer service
Diesel generator circuit breaker open	Shut down the equipment, check the diesel generator circuit breaker, or contact the after-sales customer service
Diesel generator contactor open circuit	Shut down the equipment, and contact the after-sales customer service
Diesel generator phase sequence fault	Shut down the equipment, check the diesel generator voltage phase sequence, or contact the after-sales customer service
Diesel generator overfrequency	Shut down the equipment, check the diesel generator voltage frequency, or contact the after-sales customer service
Diesel generator underfrequency	Shut down the equipment, check the diesel generator voltage frequency, or contact the after-sales customer service
Power grid UV overvoltage	Shut down the equipment, check the power grid for overvoltage, or contact the after-sales customer service
Power grid VW overvoltage	Shut down the equipment, check the power grid for overvoltage, or contact the after-sales customer service
Power grid WU overvoltage	Shut down the equipment, check the power grid for overvoltage, or contact the after-sales customer service
Power grid UV undervoltage	Shut down the equipment, check the power grid for undervoltage, or contact the after-sales customer service
Power grid VW undervoltage	Shut down the equipment, check the power grid for undervoltage, or contact the after-sales customer service
Power grid WU undervoltage	Shut down the equipment, check the power grid for undervoltage, or contact the after-sales customer service
Power grid phase loss	Shut down the equipment, check the power grid for phase loss, or contact the after-sales customer service
Power grid circuit breaker open	Shut down the equipment, check the power grid circuit breaker, or contact the after-sales customer service
Power grid contactor open circuit	Shut down the equipment, and contact the after-sales customer service
Power grid phase sequence fault	Shut down the equipment, check the grid voltage phase sequence or contact the after-sales customer service
Power grid overfrequency	Shut down the equipment, check the grid voltage frequency, or contact the after-sales customer service
Power grid underfrequency	Shut down the equipment, check the grid voltage frequency, or contact the after-sales customer service
485 communication fault	Check the wiring or contact the after-sales customer service
N-to-ground contactor short circuit	Shut down the equipment, and contact the after-sales customer service
Power grid contactor short circuit	Shut down the equipment, and contact the after-sales customer service
Diesel generator contactor short circuit	Shut down the equipment, and contact the after-sales customer service
PV-Load overcurrent	Check for excessive load or short circuit
Contactor and circuit breaker open	Shut down the equipment, and contact the after-sales customer service

Access control alarm	Deactivate the access control system
Lightning protection disabling	Contact the after-sales customer service
STS fan alarm	Contact the after-sales customer service
Load circuit breaker open	Check whether the load circuit breaker is closed
PCS1 circuit breaker open	Check whether the PCS1 circuit breaker is closed
PCS2 circuit breaker open	Check whether the PCS2 circuit breaker is closed
Auxiliary power alarm	Check the auxiliary power board
STS internal overtemperature	Shut down the equipment, and contact the after-sales customer service
STS transformer overtemperature	Shut down the equipment, and contact the after-sales customer service
SCR fan 1 alarm	Shut down the equipment, and contact the after-sales customer service
SCR fan 2 alarm	Shut down the equipment, and contact the after-sales customer service
SCR fan 3 alarm	Shut down the equipment, and contact the after-sales customer service
SCR fan 4 alarm	Shut down the equipment, and contact the after-sales customer service
SCR fan 5 alarm	Shut down the equipment, and contact the after-sales customer service
PCS3 circuit breaker open	Check whether the PCS3 circuit breaker is closed
PCS4 circuit breaker open	Check whether the PCS4 circuit breaker is closed
PCS5 circuit breaker open	Check whether the PCS5 circuit breaker is closed

8 Routine maintenance

8.1 Notes for operation before maintenance

Warning

- Do not open the battery outdoor cabinet door during maintenance in rainy, humid or windy weather. If such maintenance cannot be avoided, the Company will not bear any responsibilities for the resulting loss, and the switches on the AC and DC sides shall be turned off.
- The cabinet door shall not be opened under the high humidity condition on rainy, snowy or foggy days. The sealing strips around the door shall not be curled after the cabinet door is closed.

Warning

After the static transfer switch cabinet is powered off, wait for at least 10 min before maintenance and repair so that the internal capacitor on the STS side is discharged completely. Before dust removal, check that the inside of the machine is de-energized through measurement with a multimeter to avoid electric shocks.



The ground resistance shall not be higher than 4 Ω , or shall be in accordance with the relevant standards of the country/region where the project is located.

8.2 Cabinet maintenance items and intervals

The maintenance intervals are recommended for the following maintenance items, and shall be adjusted according to the specific installation environment conditions of the product. The maintenance intervals of the product will be affected by the factors such as the site environment. In case of heavy sandstorm or dust in the operating environment, it is necessary to shorten the maintenance intervals and increase the maintenance frequency. If the STS250D static transfer switch cabinet is installed in a desert area, its inside and outside should be carefully checked and thoroughly cleaned after each sandstorm.

8.2.1 Maintenance work (once every 6 months)

Item	Inspection method
Outside of the cabinet	Check the following items. If any non-conforming item is found, correct it immediately: • Check whether there are flammable materials on the top of the STS cabinet. • Check whether the welding point between the STS cabinet and the foundation steel plate is firm without rust. • Check the STS cabinet for damage, paint peeling, oxidation, etc. • Check whether the sealing strips are fixed properly.
Inside of the cabinet	Check the following items. If any non-conforming item is found, correct it immediately: • Check whether there are foreign matters, dust, dirt and condensate inside the STS cabinet, and clean the inside. • Check the STS cabinet and internal equipment for damage or deformation. • Check whether any abnormal noise is heard during operation of the internal equipment. • Check whether the temperature in the STS cabinet is too high.
Air inlet and outlet	Check the radiator temperature and check for dust. If necessary, use a vacuum dust collector to clean the cooling module, etc.
Wiring and cable laying	Power off the internal equipment of the STS cabinet before inspection! If any non-conforming item is found during inspection, correct it immediately.

Item	Inspection method
	• Check whether the cable is laid in a standard way and check for short circuit, etc. If any abnormal item is found, correct it immediately. • Check whether all cable inlets and outlets of the STS cabinet are sealed properly. • Check for water seepage inside the STS cabinet. • Check whether the power cable is connected loosely, and re-tighten it to the specified torque. • Check the power cable and control cable for damage, especially check whether there are cutting marks on the skin in contact with the metal surface. • Check the insulation tie of the power cable terminal blocks for falling-off.
Grounding and equipotential bonding	• Check whether the grounding connection is correct, and check that the ground resistance is not higher than 4 Ω. • Check whether the internal equipotential bonding of the integrated energy storage system is correct. In case of any abnormality, correct or replace the abnormal part in time.
Fan	• Check the running status of the fan. • Check whether the fan is blocked. • Check whether any abnormal noise is heard during operation of the fan. In case of rotation failure or blade damage, replace the fan.
Warning sign	Check whether the warning signs and labels are visible and free of damage. Replacement is required if necessary.
Cable shielding layer grounding	• Check whether the cable shielding layer is in good contact with the insulating sleeve. • Check whether the grounding copper bar is fixed in place. In case of any abnormality, correct or replace the abnormal part in time.
Lightning protection equipment and fuse	Check whether the lightning protection equipment and fuse are fastened properly. In case of any abnormality, correct or replace the abnormal part in time.
Corrosion	Check the inside of the STS cabinet for oxidation or rust. In case of any abnormality, correct or replace the abnormal part in time.
Door lock and hinge	Check whether the door lock and hinge of the integrated energy storage system can be used normally and whether they are in good condition. Lubricate the door lock hole, hinge, etc. properly if necessary.
Sealing strip	A normal sealing strip is an important guarantee for effective prevention of water seepage inside the container. Carefully check the sealing strip, and replace it immediately in case of damage.
Screws	Check whether the screws inside the STS cabinet fall off. In case of any abnormality, correct or replace the abnormal part in time.
Others	• Regularly check for a pungent smell in the STS cabinet and a burning smell at the high voltage connection. In case of any abnormality, find out the cause and correct the problem in time. • Regularly check whether the EMS monitoring voltage, temperature and other relevant parameters are normal, and whether the alarm for abnormality is shown in the alarm column. In case of any problem, solve it immediately.
Component maintenance	• Routinely check all metal components for rust. • Perform the annual inspection of the contactor (auxiliary switch and microswitch) to ensure proper mechanical operation. • Check the operation parameters (especially voltage, insulation, etc.).

8.2.2 Maintenance work (once every 3 months)

Item	Inspection method
Safety function	• Check the function of the emergency stop button. • Simulate the shutdown. • Check the warning signs and other equipment labels on the cabinet. If any problem is found, correct it in time. • Check whether the air inlets and outlets of the STS cabinet are blocked.
Inspection of internal components and parts	• Check the cleanliness of circuit boards and components and parts. • Check whether the appearance, state and function of the circuit breaker are normal. If necessary, replace the circuit breaker with the one meeting the requirements. • Check the radiator temperature and check for dust. If necessary, use a vacuum dust collector to clean the cooling module, etc. • If necessary, replace the air filter. Note! The ventilation condition of the air inlet must be checked. If the module cannot be effectively cooled, a fault will occur due to overheating.

8.3 Other maintenance precautions

In order to maintain the system safely and effectively, the maintenance personnel shall carefully read and observe the following safety requirements:

- 1 The maintenance personnel must hold the electrician certificate issued by the safety supervision bureau and pass the professional training before taking up their posts.
- 2 It is necessary to comply with the relevant safety precautions, use necessary tools and wear personal protective equipment.
- 3 All high and low voltage switches shall be turned off before maintenance.
- 4 The equipment shall not be directly cleaned with water. A dust collector may be used for cleaning if necessary.
- 5 The cable shall be connected and disconnected in a standard way rather than forcibly or violently.
- 6 It is necessary to clean up the tools and materials in time and check whether any metal objects are left inside or on the top of the equipment after maintenance.
- 7 It is required to regularly check whether the STS static transfer switch cabinet and alarm indicator lamp are in good condition and whether the function is normal.
- 8 If you have any questions about the equipment operation and maintenance, be sure to contact our customer service center, and note that any unauthorized operation is strictly prohibited.

 Warning

If any non-conforming item is found during routine maintenance, inspection, etc. of the internal equipment of the static transfer switch cabinet, correct it immediately. If you have any questions, please contact us immediately.

9 Appendix

9.1 Single cabinet parameters

(Certification parameter conformity table)

Model	STS250D
Parameters	
Rated power grid voltage	400 V
Rated power grid current	536A
Grid voltage range	340~440V
Rated input power	250KVA
Rated power grid frequency	50Hz/60 Hz
Power grid switch changeover time	≤20 ms
PCS circuit breaker (rated current)	125A*5
Power grid circuit breaker (rated current)	630A
Diesel generator circuit breaker (rated current)	630A
Diesel generator bypass circuit breaker (rated current)	630A
Load circuit breaker (rated current)	630A
Power grid bypass circuit breaker (rated current)	630A
Transformer	250K
Transformer coupling mode	DYN11
Cabinet dimensions (W×H×D)	1300*2380*930mm
Weight (kg)	1550kg
IP rating	IP54
Lightning protection level	Level II
Anti-corrosion grade	C4
Communication	Ethernet, RS485, CAN
Operating humidity range	0%~95% (non-condensing)
Operating temperature range	-25℃~+60℃
Cooling mode	Air-cooled
Operating altitude	≤3,000 m
Installation method	Tower type

9.2 Tightening torque

In order to prevent improper contact due to looseness of the wiring copper lug under stress, or heating or even fire due to the increase in the contact resistance, the screws of the wiring copper plug shall be tightened in accordance with the following torque requirements:

Unit: (N·m)

Screw specification	Torque	Screw specification	Torque
M3	0.7~1	M8	18~23
M4	1.8~2.4	M10	34~40
M5	4~4.8	M12	60~70

M6	7~8	M16	119~140
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Note: 1 N·m≈10 kgf.cm.

In order to reduce the stress on the wiring copper plug, the cable shall be fixed in an appropriate position.

9.4 Warranty

If the product is faulty within the warranty period, the Company will provide free repair or replacement service. The Company shall have the right to request the customer to present the invoice and date of purchase of the product within the warranty period. The trademark on the product shall be visible, otherwise the warranty service will not be provided.

- After replacement, non-conforming products will be handled by the Company.
- The customer shall allow reasonable time for the company to repair the faulty equipment.

The Company will not provide the warranty service in the following cases:

- Expiration of the free warranty period of the equipment and its components
- Damage during transportation
- Incorrect installation, modification or use
- Operation in very harsh environments not covered in this manual
- Machine fault or damage not related to the installation, repair, modification or removal by the service provider or personnel appointed by the Company
- Beyond the installation and operation ranges specified in the relevant international standards
- Damage caused by abnormal natural environment conditions

For the product fault in any of the above cases, if the customer requires the maintenance service, the paid maintenance service will be provided after judgment by the service provider appointed by the Company.

The product dimensions and parameters will be changed without notice, and the latest information of the Company shall prevail.

9.5 Contact information

If you have any questions about the product, please contact us. In order to provide you with faster and better service, we need your assistance in providing the following information:

- Equipment model
- Equipment S/N
- DTC/fault name
- Description of fault symptom