

User Manual of STS100D Static Transfer Switch Cabinet

User Manual



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Table of Contents

1 About this Manual	3
1.1 Product Definition	3
1.2 Target Readers	3
1.3 Use of Symbols	4
1.4 Safety Precautions	4
1.4.1 Electrical safety	4
1.4.2 Transportation	5
1.4.3 Installation and wiring	6
1.4.4 Operation and maintenance	7
1.4.5 Product scrapping	9
2 Product Description	10
2.1 Product Overview	10
2.2 Exterior Design	10
2.2.1 Exterior view	10
2.2.2 Mechanical parameters	11
2.3 System Design	13
2.3.1 Layout of system equipment	13
2.3.2 Functions	14
3 Delivery and Storage	15
3.1 Scope of Supply	15
3.2 Integrity Check after Transportation	15
3.3 Storage	15
4 Mechanical Installation	16
4.1 Inspection before Installation	16
4.1.1 Inspection of deliverables	16
4.1.2 Inspection of equipment	16
4.2. Requirements for Installation Environment	16
4.2.1 Requirements for site selection	16
4.3 Transportation by Forklift	16
4.4 Requirements for Installation Space	17
5 Electrical Connection	19
5.1 Safety Precautions	19
5.1.1 General	19
5.1.2 Five safety rules	19
5.2 Wiring Overview	19

5.3 System Cables	21
5.4 Wiring Preparation	21
5.4.1 Preparation of installation tools	21
5.4.2 Cable preparation	22
5.4.3 Fabrication of terminal	22
5.4.4 Aluminum wire connection	22
5.4.5 Wiring guidelines and precautions	23
5.5 Earthing Connection	23
5.5.1 Introduction	23
5.5.2 External earthing	23
5.5.3 Earthing of internal equipment	24
5.7 Wiring and Waterproof Treatment	24
5.8 Completing Electrical Connections	24
6 Power-on and Power-off Operations	26
6.1 Inspection before Power-on	26
6.2 Power-on Operation	26
6.3 Power-off Operation	27
7 Troubleshooting	28
8 Routine Maintenance	29
8.1 Precautions before Maintenance	29
8.2 List of Cabinet Maintenance Items and Frequency	29
8.2.1 Maintenance work (semi-annual)	29
8.2.2 Maintenance (once every three months)	30
8.3 Other Maintenance Precautions	31
9 Appendix	32
9.1 Parameters of Single Unit Cabinet	32
9.2 Tightening Torque	32
9.4 Warranty	33
9.5 Contact Information	33

1 About this Manual

This Manual applies to STS100D Static Transfer Switch Cabinet (hereinafter referred to as STS100D or STS cabinet). It provides the description of the products and the instructions on transportation and storage, mechanical installation, electrical connection, power-on/off operation, and also specifies methods of troubleshooting and maintenance. Please read this Manual carefully before transporting and installing the product. Please keep this Manual and other materials in product components together to ensure easy access by relevant personnel at any time.

The contents of this Manual and the pictures, logos and symbols used in it are properties of the Company. No other than the Company's employees are allowed to publicize or replicate all or part of the contents without written authorization.

In order to continuously improve customer satisfaction, we are constantly improving and updating our products and product manuals. The discrepancy between the Manual and the product may be the result of product version upgrade. Please refer to the specific product. If you still have any questions, please contact us.

The User Manual is attached to the equipment. Before installing and operating the equipment, please read this Manual carefully and operate according to the requirements herein. This Manual does cover all possible situations during installation, operation, maintenance and overhaul. In case of any situation not mentioned in the Manual, please contact us promptly.

1.1 Product Definition

STS100D Static Transfer Switch Cabinet

- STS: static transfer switch
 - 100: 100KW
 - D: outdoor

1.2 Target Readers

This Manual is applicable to the operators of the product and electrical technicians with corresponding qualifications. Readers are expected to meet the following requirements:

- Have certain professional knowledge of electronics, electrical wiring and machinery, and be familiar with electrical and mechanical schematic diagrams.
- Be familiar with the composition and working principle of the product; be familiar with the composition and working principle of STS100D and its front- and back-end equipment.
- Have received professional training related to installation and trial operation of electrical equipment.
- Have the ability to respond to dangers or emergencies during installation or trial operation.
- Be familiar with the relevant standards and specifications in the country/region where the project is located.
- Be familiar with the contents of this Manual.

Only personnel who meet the requirements above are allowed to carry out installation, operation, maintenance and overhaul on the product. Unauthorized personnel are not allowed to perform any operation on the product, and shall keep a sufficient safe distance

from the product to avoid accidents.

1.3 Use of Symbols

To ensure the user's personal and property safety during product installation, and to use this product efficiently and optimally, this Manual provides relevant information and highlights them with appropriate symbols.

The symbols that may be used in this Manual are listed below. Please check carefully to make better use of this Manual.



Danger

"Danger" indicates a potential major hazard that, if not avoided, will lead to serious accidents such as casualties.



Warning

"Warning" indicates a potential moderate hazard that, if not avoided, may lead to serious accidents such as casualties.



Caution

"Caution" indicates a potential minor hazard that, if not avoided, may result in moderate or minor injury.

Note

It indicates a potential risk that, if not avoided, may result in equipment failure or property damage.

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

	This sign indicates high voltage inside the equipment, and touching it may cause electric shock.
	All external power connections must be disconnected before equipment maintenance!
	This sign indicates a temperature beyond the range acceptable by human body. Please do not touch for fear of personal injury.
	Maintenance, overhaul and other operations may only be carried out after the system is powered off for 10 minutes.
	There may be noise during equipment operation. Silent earplugs are recommended.
	This sign is set up at protective earth (PE) terminals and shall be firmly earthed to ensure operator's safety.

1.4 Safety Precautions

1.4.1 Electrical safety



Danger

- Danger! High voltage! Danger! Electric shock! Do not touch live parts!
- Before installation, please make sure that both the AC and DC sides do not carry live current.
- Do not place the STS cabinet on flammable surfaces.

 Danger

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

- Do not touch the terminal or conductor connected with the grid circuit.
- Pay attention to all instructions and safety precautions about connection with the grid.

 Danger

Lethal high voltage inside the product!

- Pay attention to and observe the warning signs on the product.
- Observe the safety precautions listed in this Manual and other relevant documents of this equipment.

 Danger

The damaged equipment or faulty system may cause electric shock or fire!

- Before operation, visually check the equipment for damage or other hazards.
- Check whether other external equipment or circuit connections are safe.
- Make sure that the equipment is in a safe state before operation.

 Warning

Before wiring, all equipment switches of the STS cabinet shall be disconnected.

 Danger

In case of faulty earthing of the STS cabinet, lethal high voltages may exist on otherwise uncharged parts. It is very dangerous if accidentally touched! Before operation, please make sure that no earthing fault occurs in the system and take relevant protective measures.

 Danger

High voltage exists in the STS cabinet equipment, and accidental contact may cause fatal electric shock. Therefore, during live measurement, be sure to:

- Take protective measures (such as wearing insulating gloves).
- Be accompanied to ensure personal safety.

Note

To prevent irrelevant personnel from approaching STS100D and to avoid misoperation or accidents, please observe the following precautions:

- Striking warning signs shall be placed around STS100D to prevent accidents caused by false switching.
- Warning signs or safety warning tapes shall be set up near the equipment.

1.4.2 Transportation

 Warning

- In the whole process of loading, unloading and transportation, it is necessary to abide by the safety regulations for outdoor complete cabinet operation in the country/region where the project

is located.



Warning

STS100D must be transported in strict accordance with the operating procedures of equipment transportation.



Warning

The following conditions shall be met for transporting and moving STS100D:

- The door of STS100D static switch cabinet shall be locked.
- Based on the site conditions, an appropriate forklift shall be adopted, which must have sufficient bearing capacity, arm length and turning radius.
- Warning signs and warning tapes must be set up to prevent irrelevant personnel from entering the transportation area and to avoid accidents.

1.4.3 Installation and wiring



Warning

In the whole process of mechanical installation, relevant standards and requirements of the region where the project is located must be strictly observed.



Warning

Failure of STS100D system caused by improper installation violating the design requirements given in this Manual will not be covered by warranty.



Warning

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

During electrical connection, the bolts must be tightened in strict accordance with the torque given in this Manual.



Warning

Only qualified electrical engineers and personnel with professional qualification are allowed to carry out operations related to electrical connection. Please observe the requirements given in safety instructions of this Manual. The Company will not assume any responsibility for personal injury or property loss caused by ignoring these safety instructions.



Warning

For cable laying, it is necessary to ensure electrical insulation and comply with EMC specifications. Power cables shall be laid in different lays from where the power supply and communication cables are laid. Where necessary, the cables shall be protected and supported to reduce stress on them.



Warning

Please wire according to wiring marks in the equipment strictly.



Warning

Only the STS cabinet that is complete and free of any damage shall be installed and put into trial operation! Before installation, please make sure that:

- The STS cabinet itself is intact and free from any damage.
- All equipment in the STS cabinet is intact and free from any damage.



Warning

- All electrical connections shall be made in strict accordance with the wiring schematic diagram.
- All electrical connections must be made with the equipment completely de-energized.



Warning

Only qualified electrical engineers are allowed carry out operations related to electrical connection. Please observe the requirements provided in safety instructions of this Manual. The Company will assume no responsibility for personal injury or property loss caused by ignoring these safety instructions.



Warning

STS100D is designed for installation and operation outdoors, and its installation position and foundation must meet the requirements.

In addition, the whole process of electrical connection must be carried out in strict accordance with the regulations.



Warning

The system shall only be put into operation after installation and confirmation by professionals and with permission from the local power department. Please throw in all distribution circuit breakers before start the equipment.

Note

- The installation design of STS100D must comply with the relevant standards or specifications of the country/region where the project is located.
- Failure of STS100D or system will not be covered by warranty if such failure is caused by non-compliance with the installation design requirements given in this Manual, or with the relevant electrical standards or specifications of the location where it is installed.



Caution

Before system commissioning, another throughout and detailed inspection of the installation must be carried out.

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

1.4.4 Operation and maintenance



Warning

If relevant operations are carried out when the equipment is live, please be sure to take insulation protection measures and make sure that at least two workers are on site at the same time.
STS100D is outdoor equipment, which is usually located in the wild environment away from the urban area. Corresponding field rescue facilities shall be arranged as required for application when needed.



Warning

Before working on the equipment, it is necessary to assess whether there is a risk of arcing in the operating area. If there is, operators need to receive relevant safety training in advance. Before operating in areas with risk of electric shock, protective equipment that meets the requirements must be worn, such as protective clothing, insulating gloves, insulating shoes and anti-scald gloves.



Warning

The improper operations below may cause electric arc, fire, explosion and other dangers inside the equipment:

- The equipment high-voltage cables on DC side are plugged or unplugged with power on.
- The power cable connection is loose, and parts such as screws accidentally fall into the power module.
- Incorrect operation is performed by untrained and unqualified operators.



Warning

Maintenance shall only be carried out when all equipment in STS100D is completely de-energized.

- Make sure that the inside of the equipment is completely de-energized and will not be re-energized accidentally.
- Use insulating cloth to insulate and cover possible live parts near the operating part.
- During the whole operation, it is necessary to ensure that the escape routes are clear.



Warning

During daily operation, it is necessary to ensure that the door of STS100D is closed and locked, and the key has been removed and handed over to a designated person for safekeeping so as to avoid accidents caused by unauthorized entry, rain or animal attacks on internal equipment.



Danger

To avoid casualties and equipment damage, this product must be operated in strict accordance with the requirements of this Manual. Improper operation may cause arc hazard and even other risks such as fire and explosion. The Company will not assume any responsibility for accidents such as electric arc, fire and explosion caused by failure to operate in accordance with the instructions on the equipment or the product manual.



Danger

- Premium measuring instruments with the range and service conditions suitable for the site conditions shall be adopted.
- It shall be ensured that the measuring instruments are connected and used in a correct and standardized manner to avoid dangers such as arc.
- In case of live measurement, protective measures shall be taken (such as wearing insulating

gloves).

Note

Do not tear or damage signs:

- Make sure that the warning signs on the equipment are legible at all times.
- Replace the warning signs on the equipment immediately once they are damaged or blurred.

Note

In case of severe weather such as sandstorm, thunderstorm, gale or hail during overhaul, or when the relative humidity of the surrounding environment is greater than 95%, please do not open the door of STS100D.



Caution

Contact with or improper handling of printed circuit boards or other static sensitive components may result in component damage.

- Avoid unnecessary circuit board contact.
- Observe the electrostatic protection specifications, such as wearing anti-static wrist straps.

1.4.5 Product scrapping

When the whole STS100D or any individual equipment thereof needs to be discarded, it shall be disposed of as regular waste. Some components inside the equipment may be recycled and reused, while some components cause environment pollution.

Please contact an authorized local professional recycling agency to properly dispose of the product and its components.

2 Product Description

2.1 Product Overview

STS100D produced by the Company is mainly used in industrial and commercial scenarios. The product, STS100D, is composed of its enclosure, transformer module, touch screen and electrical components. STS100D has an IP level of IP54 and shall be installed outdoors.

The typical application scenario of STS100D with 2 PCS is shown in Fig. 2-1.

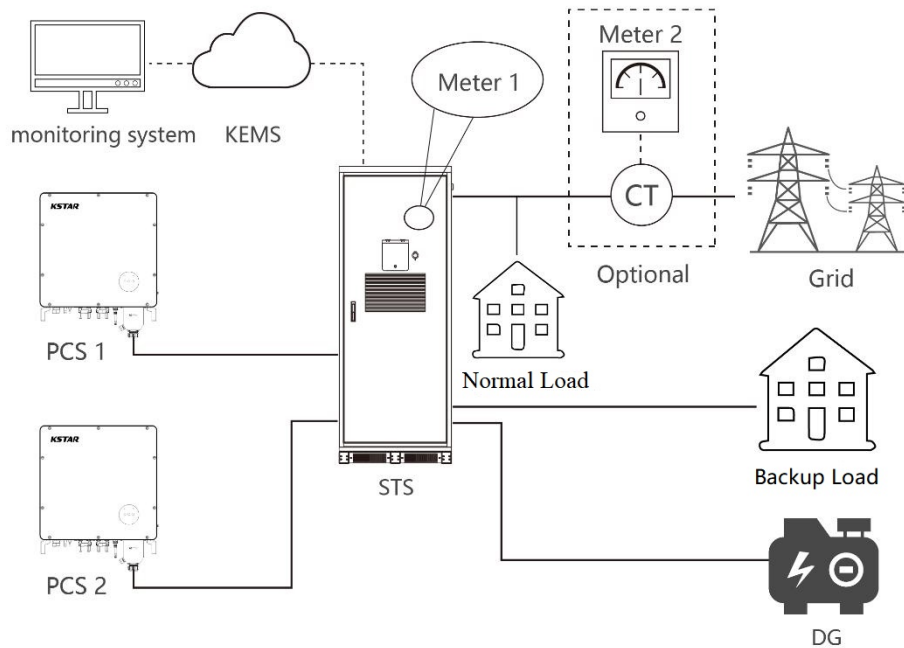


Fig. 2-1 Typical Application Scenarios with PCS

2.2 Exterior Design

2.2.1 Exterior view

The front view of STS100D STS cabinet is shown in Fig. 2-2. The figure below is for reference only. Please refer to the real product received!

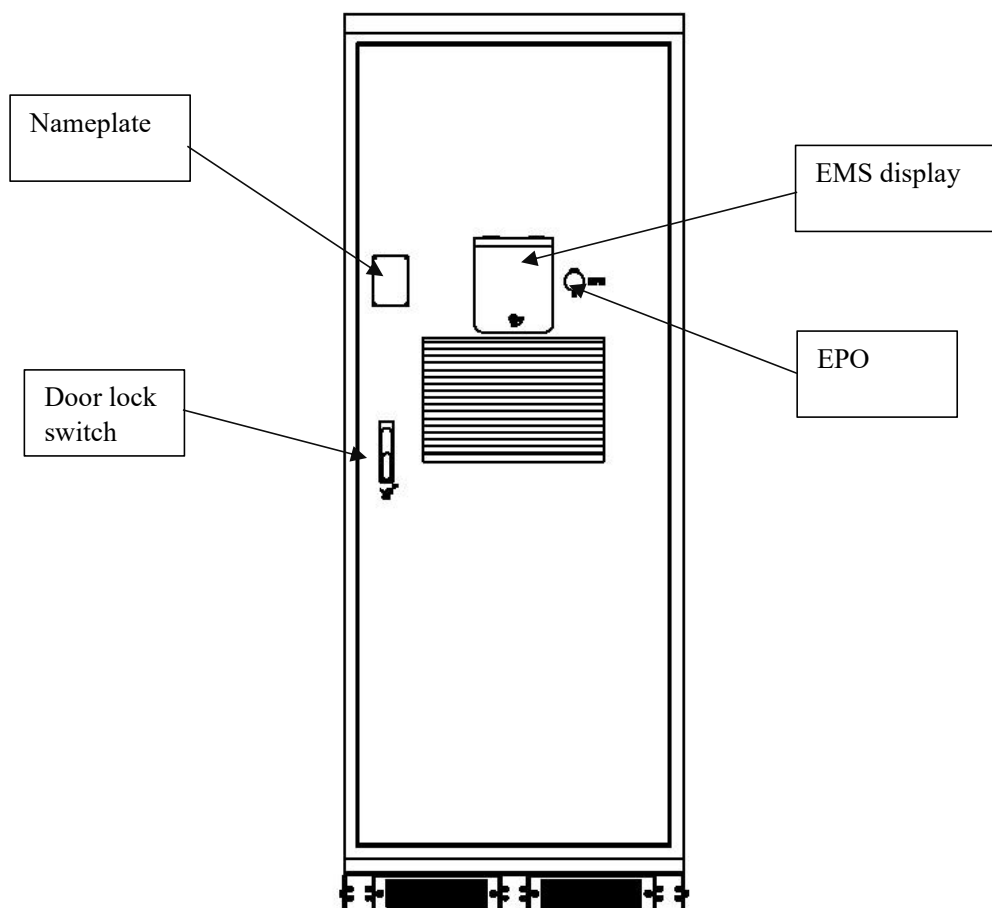


Fig. 2-2 Front Exterior View of STS100D

2.2.2 Mechanical parameters

The external dimensions of STS100D are shown in Fig. 2-3 below.

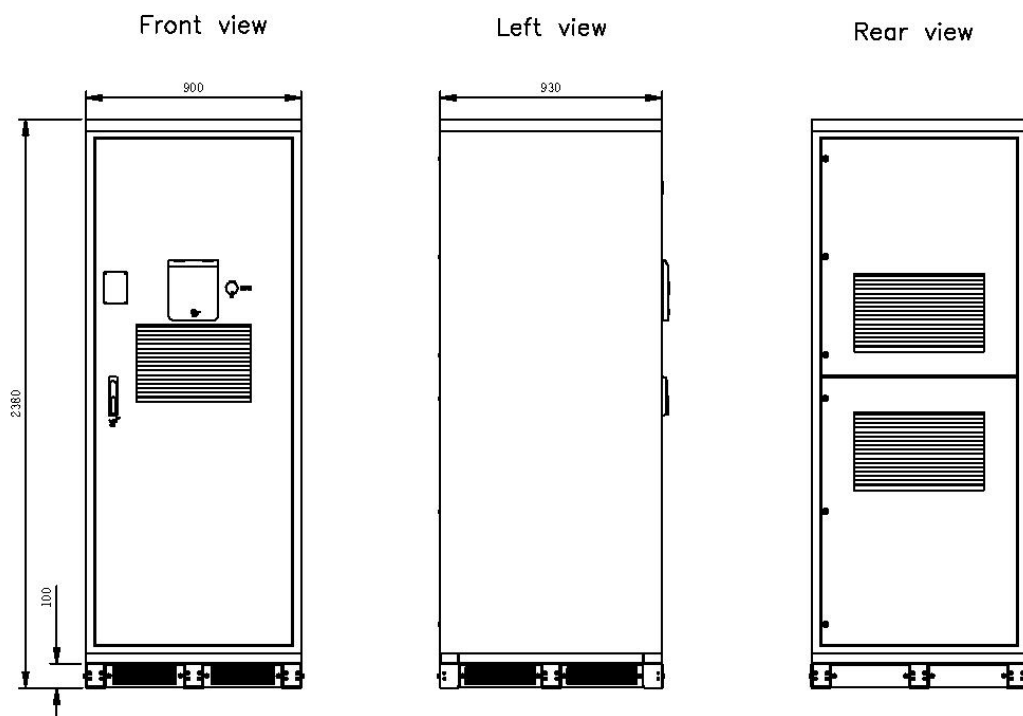


Fig. 2-3 Dimensions of STS100DD

* The figure above only sets STS100DD as an example for reference. Please refer to the real product received!

2.3 System Design

2.3.1 Layout of system equipment

The layout of electrical components in STS100D is shown in Fig. 2-4.

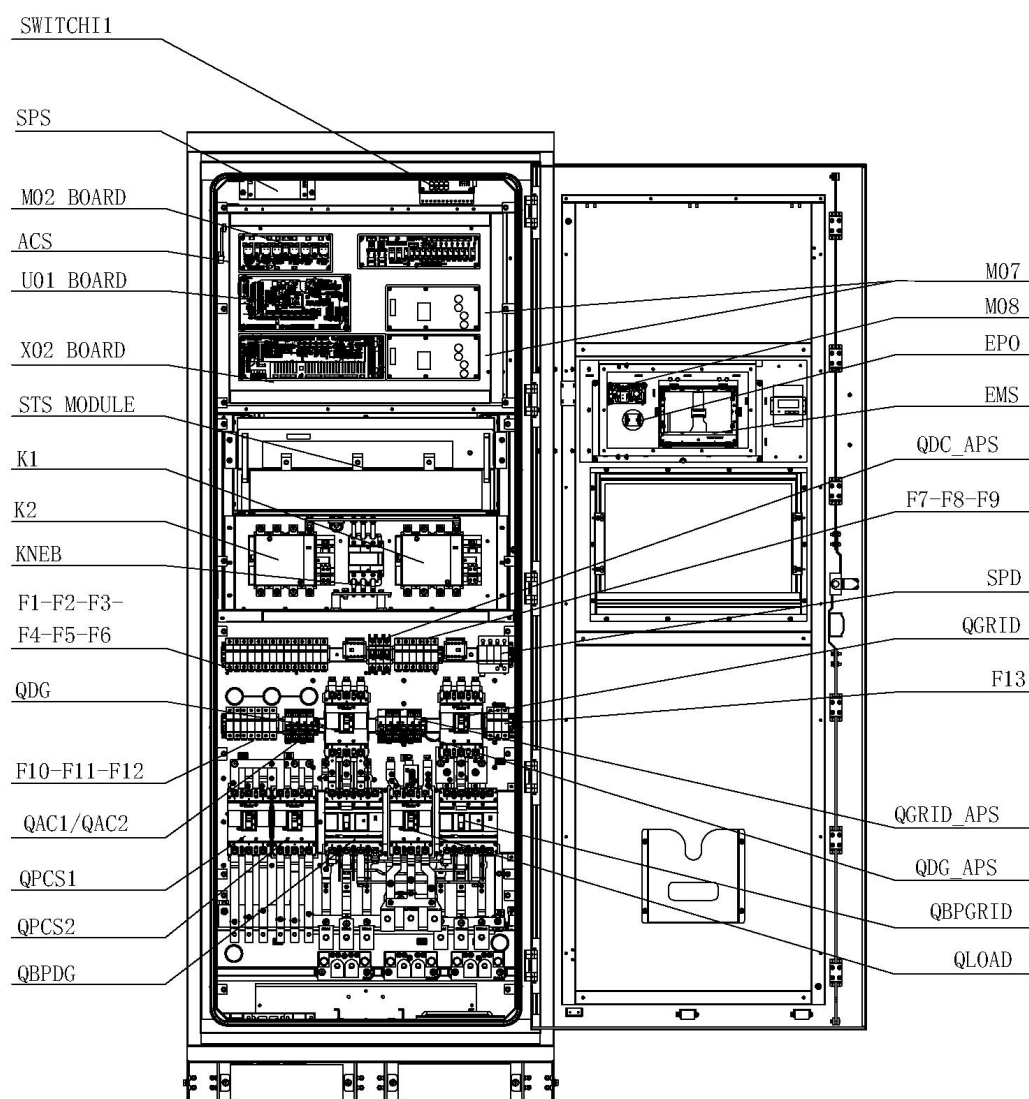


Fig. 2-4 Positional Overview of Electrical Components

* The figure above only sets STS100D as an example for reference. Please refer to the real product received!

2.3.2 Functions

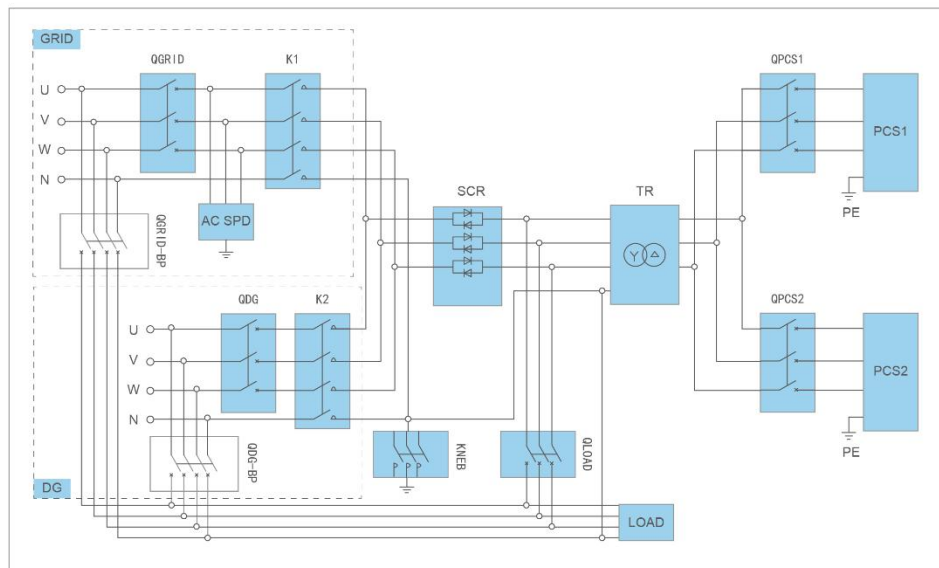


Fig. 2-6 Wiring Schematic Diagram of STS100D

The wiring schematic diagram of STS100D is shown in Fig. 2-6. The basic principle of product operation is based on STS100D, which may be externally connected with four major sections:

- The grid switch is connected to the grid.
- The diesel generator switch is connected to the diesel generator.
- The load switch is connected to the load.
- The PCS switch is connected to the power conversion system (PCS), and the user may determine the number of PCS according to the actual situation ($PCS \leq 2$).

Circuit breaker switches are arranged on the grid side and load side inside STS100D. The grid bypass maintenance switch is for power supply from the grid side to the load side during maintenance, while the diesel generator bypass maintenance switch is for power supply from the diesel generator side to the load side during maintenance. STS100D mainly functions for on-grid/off-grid switching among PCS, grid and diesel generator, so as to ensure that PCS supplies power to the load when the grid side fails and the diesel generator supplies power to the load when the PCS battery is low. Two working modes:

- On-grid mode: The load is powered by the combination of the grid or the diesel generator with the PCS through STS cabinet.
- Off-grid mode: When the grid side fails or is disconnected, the cabinet switches to off-grid mode. In this case, the load is powered by the external energy storage battery through PCS (DC/AC) and load switch.

3 Delivery and Storage

3.1 Scope of Supply

STS100D is shipped with a packing list as follows:

Table 3-1 Scope of Supply

Item	Quantity	Unit	Remarks
STS100D	1	PCS	Standard configuration
User Manual	1	PCS	Standard configuration
Certificate of Conformity	1	PCS	Standard configuration
Warranty Card	1	PCS	Standard configuration
Key	2	PCS	Standard configuration
Delivery Inspection Report	1	PCS	Standard configuration
EMS Operation Manual	1	PCS	Standard configuration
Fireproof mud	4	PCS	Standard configuration

3.2 Integrity Check after Transportation

Before leaving the factory, STS100D has been carefully inspected by our staff and firmly packed. Nevertheless, there is still a possibility of collision or even damage to the equipment during transportation.

After receiving the equipment, the first thing is to check the completeness and integrity of the equipment after transportation. The following items should be carefully checked as a minimum:

- Check the components received against the "Scope of Supply" to make sure whether all components are delivered.
- Check and make sure that the model of STS100D received and equipment thereof are consistent with that of your order.
- Carefully check the STS100D and all equipment thereof for damage caused in transportation. In case of any problem or doubt during the inspection, please contact the carrier or the Company in time.

3.3 Storage

If STS100D will not be installed immediately after the delivery is successfully completed, please store it properly as described in this subsection.

- To prevent condensation inside STS100D or submersion of the cabinet bottom during rainy season, STS100D shall be stored in an indoor environment, such as a large warehouse or workshop building.
- If it must be stored outdoors due to site conditions, the cabinet base must be lifted for a height to be reasonably determined according to the geological and meteorological conditions of the site. In addition, heading shall be provided for the equipment inside the cabinet in case of excessively low ambient temperatures.

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%, without condensation.

- STS100D shall be stored on a dry, flat and solid ground with sufficient bearing capacity and without any vegetation coverage. The ground for storage must be flat and free from standing water, unevenness or undulations.

- During storage, the door of STS100D shall remain locked.
- Effective measures must be taken to prevent rainwater, sand and dust from entering the inside of STS100D. At least the air inlet and outlet of STS100D shall be effectively guarded.
- Regular patrol inspection. Patrol inspection shall be carried out at least once every half month to check whether the cabinet and internal equipment are in good condition.

4 Mechanical Installation



Warning

In the whole process of mechanical installation, relevant standards and requirements of the region where the project is located must be strictly observed.

4.1 Inspection before Installation

4.1.1 Inspection of deliverables

Check the deliverables for completeness against the packing list attached.

4.1.2 Inspection of equipment

In case of any problem or doubt, please contact the carrier or the Company in time.



Warning

Only complete and undamaged equipment shall be installed. Before installation, please make sure that:

- The cabinet actually received is of the model ordered, and the cabinet itself is intact and without any damage.
- All equipment in the cabinet is intact and free of any damage.

4.2. Requirements for Installation Environment

4.2.1 Requirements for site selection

When selecting the installation site, the following principles should be observed at least:

- The climatic environment, geological conditions (such as stress wave emission and groundwater level) and other characteristics of the site at which STS100D is about to be installed shall be fully considered.
- The surrounding shall be dry and well ventilated, away from flammable and explosive areas.
- The soil at the installation site shall have a certain degree of compactness. It is recommended that the relative soil compactness at the installation site be $\geq 98\%$. If the soil is loose, be sure to take measures to ensure a firm foundation.
- Keep away from areas with concentrated toxic and harmful gas; keep away from inflammable, explosive and corrosive articles.

4.3 Transportation by Forklift

If the installation site is flat, a forklift may be used to move the STS100D. The cabinet has fork holes specially used for forklift transportation at its bottom. The front fork holes may be used to move the STS100D.

If a forklift is used for moving, the following requirements shall be met:

- The door of STS100D shall remain locked.
- The pin length shall be 1100mm as a minimum.

The pins shall be inserted into the forked holes at the bottom of the workstation (see Fig. 4-2 below for location of the forked holes). The depth of the pin inserted into the chainage shall be that of the chainage, i.e. 1100mm.

- STS100D shall be transported, moved and lowered slowly and stably.
- STS100D shall only be placed on a stable place. The area shall be well drained and free from any obstructions or bulges.

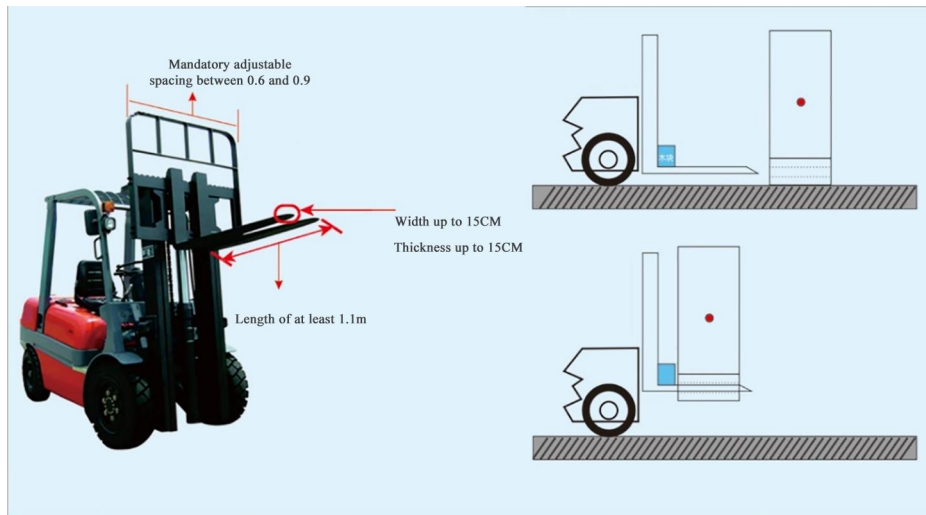


Fig. 4-3 Schematic Diagram of Forklift Transportation



Warning

- Move the STS cabinet through the front fork holes at the bottom.
- Under no circumstances shall a cabinet be moved by inserting the pins into positions other than the fork holes.



Before delivery, the holes of the cabinet are exposed. It is recommended that the holes be sealed up with sealing plates in accessories after on-site installation.

4.4 Requirements for Installation Space

To ensure better heat dissipation and maintenance of the equipment, it is recommended enough space be reserved around the cabinet's installation position.

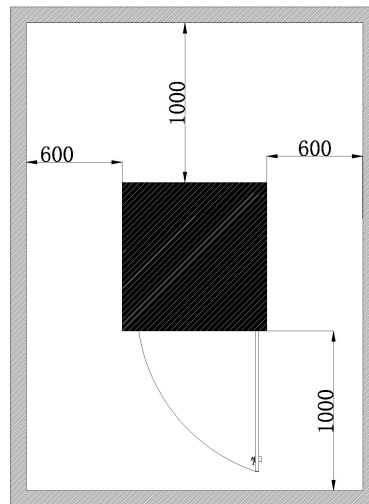


Fig. 4-4 Schematic Diagram of Recommended Installation Space for a Single Unit (Top View)

Note: The figure above are for reference only, and the specific installation shall be carried out based on the user's own needs.

After confirming that the foundation construction meets the requirements and is dry, firm and flat enough, move the STS100D to the predetermined position. Fix the STS100D on the foundation with fastening bolts. After the cabinet is fixed, measures, such as application of anti-rust paint, shall be taken for the U-shaped angle steel. The base dimensions of STS100D are shown in Fig. 4-5 below, and the specific installation position and direction shall be determined by the demander.

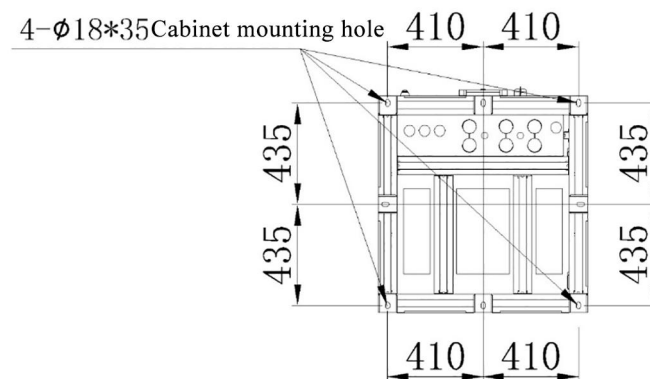


Fig. 4-5 Dimensions of Equipment Base (Top View)

Note: The base is fixed with 4 screws (M12*50), and the specific installation position and direction are determined by the demander.

*The figures above are for reference only. Please refer to the real product received!

5 Electrical Connection

5.1 Safety Precautions

5.1.1 General



Danger

- Danger! High voltage! Danger! Electric Shock! Do not touch live parts!
- Before installation, please make sure that both AC and DC sides do not carry live current.
- Do not place the STS cabinet on a flammable surface.



Warning

- The entry of sand and moisture may damage the electrical equipment in the STS cabinet and affect its operation performance.
- In windy and sandy season, or when the relative humidity in the surrounding environment is greater than 95%, operations for electrical connecting shall be avoided.
- The operations shall be resumed when the sandstorm stops and the weather is sunny and dry.

Note

- **The installation design of the STS cabinet must comply with relevant standards or specifications in the country/region where the project is located.**
- **Failure of the STS cabinet or system, caused by failure to comply with the installation design requirements given in this Manual, or failure to comply with the relevant electrical standards or specifications in the local area of the project, will not be covered by the warranty.**

5.1.2 Five safety rules

The following five safety rules shall be observed during the entire electrical connection process and all other operations on the STS100D:

- Disconnect all external connections of the STS100D and the power supply inside the equipment.
- Make sure there are no disconnected points re-energized by any chance.
- Use a multimeter to check and confirm that the inside of the equipment is completely de-energized.
- Implement necessary earthing connections.
- Cover the possible live parts near the operating part with an insulating cloth.

5.2 Wiring Overview

The wiring diagram of STS100D is shown in Fig. 5-1 below:

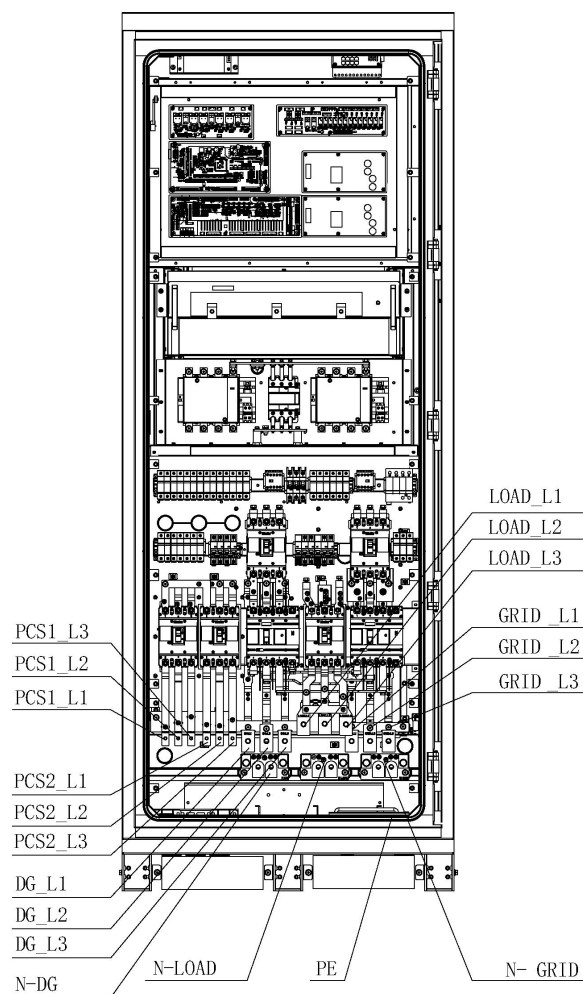


Fig. 5-1 Wiring Diagram of STS100D

The schematic diagram of external wiring is shown in Fig. 5-1, which only describes the wiring principle and is for reference only. See 5.4.5 for the schematic diagram of system wiring.

Note: The transfer terminal and communication terminal are equipped with labels. Please connect them in sequence according to the labels.



Warning

- All electrical connections shall be made in strict accordance with the wiring schematic diagram.
- All electrical connections must be made with the equipment completely de-energized.



Warning

Only qualified electrical engineers are allowed carry out operations related to electrical connection. Please observe the requirements provided in safety instructions of this Manual. The Company will assume no responsibility for personal injury or property loss caused by ignoring these safety instructions.

Note

- The installation design of STS100D must comply with the relevant standards or specifications of the country/region where the project is located.
- Failure of STS100D system caused by improper installation violating the design requirements

given in this Manual will not be covered by warranty.

5.3 System Cables

For STS100D, conductors are selected according to the 150KW capacity configuration requirements. It is recommended that the current passing through the 1mm^2 conductor should not be more than 5A, and the connecting wires on the same side should be conductors of the same specification and type. The Company has given reference requirements for the sizes of various wires and cables, and the wire/cable length depends on the site installation environment. Users can design relevant cables according to the cable diameter in Table 5-1. For cable designing, the description in this section and local wiring regulations shall be followed, and environmental conditions, laying methods, etc. shall be considered for cable selection. When the control cable must pass through the power cable, the included angle between the two cables shall be kept at 90° as far as possible.

Table 5-1 Cable Specification of STS100D

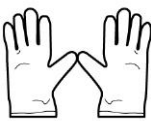
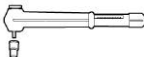
Grid side input cables (150KW)	DG input cables (150KW)	PCS side cables (50KW×2)	Load side cables (100KW)
$\geq 70\text{mm}^2 \times 4$	$\geq 70\text{mm}^2 \times 4$	$\geq 25\text{mm}^2 \times 3$	$50\text{mm}^2 \times 4$
PE cables	A/C power supply cables	DC-bus power supply cables	Parallel communication cables
25mm^2	Single 3-core conductor, $\geq 2.5\text{mm}^2 \times 2$	$1\text{mm}^2 \times 2$	Shielding twisted pair, Single 8-core conductor

5.4 Wiring Preparation

Before delivery, the cable connection between electrical equipment inside the STS100D has been completed. After delivery, the external cables of STS100D shall be provided by the user and installed under the guidance of professional electrical engineers with qualifications.

5.4.1 Preparation of installation tools

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

			
Safety gloves	Safety shoes	Crimping pliers	Heat gun
			
Multimeter	Wire stripper	Cross screwdriver	Socket (M6/M8/M10/M12/M16)
			

Heat shrink tube	Insulated adjustable wrench		
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Fig. 5-2 Schematic Diagram of Installation Tools

5.4.2 Cable preparation



Warning

Before electrical connection, check to ensure the integrity and insulation of cables used. In case of any damaged cables, replace them in time. The poor insulation or cable damage may cause danger.

The cables used must meet the following conditions:

- Sufficient current-carrying capacity. Factors that affect the current-carrying capacity of conductors include, but are not limited to: environmental conditions, type of conductor insulation material, laying method of cables, cable materials, and cross-sectional area.
- The diameter of the cable must be selected according to the maximum current-carrying capacity, and the cable must be longer than the necessary length.
- Be sure to choose flame-retardant cables.

The cables used shall meet the requirements of local laws and regulations. The cable colors involved in this Manual are for reference only. Please select cables according to local cable standards.

5.4.3 Fabrication of terminal

According to the steps shown below, select appropriate terminals and cables to make wiring terminals.

	Step 1: Peel off the insulation at the end of the cable. The length of the insulation removed at the end of the cable shall be the depth of the crimping hole of the wiring copper lug plus about 5mm.
	Step 2: Crimp the wiring copper lug. Put the exposed copper core part of the stripped wire end into the crimping hole of the wiring copper lug. Then use a terminal crimping machine to press the wiring copper lug tightly. Crimping shall be carried out more than twice.
	Step 3: Install the heat shrink tube. ① Select the heat shrink tube that is in line with the cable size, and it shall be about 2cm longer than the crimping tube of the wiring copper lug. ② Fit the heat shrink tube onto the wiring copper lug, to completely cover the crimping hole of the wiring copper lug. ③ Use a hot air blower to shrink the heat shrink tube.

If multi-core cables are used, it is recommended to add cable finger sleeves at the branching point to prevent cracking of the outer insulation.

5.4.4 Aluminum wire connection

If the aluminum wire is used for access, the connection sequence of wiring parts is shown in Fig. 5-3 below.

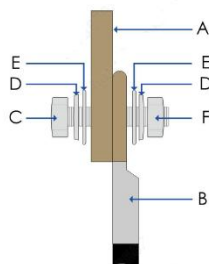


Fig. 5-3 Connection Sequence of Transition Terminals

No.	Item
A	Copper bar
B	Copper-aluminum transition terminal
C	Bolt
D	Spring washer
E	Flat washer
F	Nut

Note: The cable connecting STS and external equipment enters the inside from the bottom cable inlet of the cabinet, and the foundation is designed with reserved trunking.

5.4.5 Wiring guidelines and precautions



Warning

- Before wiring, the phase sequence of all input cables must be checked to ensure that each input phase sequence is correct.
- In the process of electrical installation, do not pull the cable or conductor forcedly, to avoid damaging the insulation performance.
- For all cables and conductors, a certain curved space shall be ensured.
- Necessary auxiliary measures shall be taken to reduce the stress on cables or conductors.
- After each wiring step, check carefully to ensure that the wiring is correct and firm.

Refer to the system wiring manual for system wiring

5.5 Earthing Connection

5.5.1 Introduction



Warning

The earthing connection must comply with the earthing standards and specifications of the country/region where the project is located.

Note

During earthing, please note that the earthing connection between the equipment and the earthing electrode must be reliably fixed.

The earthing of STS100D is divided into external earthing and internal earthing.

5.5.2 External earthing



Warning

Cable connection shall be carried out in strict accordance with the wiring identification of equipment.

Please install the external earthing according to the actual situation of the project site and the instructions of the power station staff, and connect the PE cable to the PE wire copper bar

according to the identification. The earthing resistance must be measured after the earthing connection is completed.



The earthing resistance value shall not be greater than 4Ω , or refer to the relevant standards of the country/region where the project is located.



Warning

In the process of earthing connection, please contact relevant staff in time if you have any questions. Failure to follow the installation specifications or unauthorized installation and modification may lead to safety accidents or equipment damage. The Company shall not be liable for any loss caused thereby.

5.5.3 Earthing of internal equipment

Before delivery, the wiring from the main electrical equipment inside STS100D to the earthing terminal has been completed. The connection of the STS100D to earth shall be made on site, where the following operations are to be performed:

- Check and confirm the effectiveness of each internal earthing by measuring the conductivity of the earthing of each piece of equipment to the main earthing copper bar.
- The shielding layer and protective layer of each cable connected to the outside of STS100D shall also be earthed at a suitable place in STS100D.

5.7 Wiring and Waterproof Treatment

- According to the design of incoming and outgoing line holes on the base of STS100D, cables shall be laid in the space between STS100D and the PCS side, and introduced into each piece of equipment through the incoming and outgoing line holes on the side of the cabinet. At the same time, appropriate cables shall be chosen according to the requirements of each piece of equipment inside STS100D.
- Electrical insulation shall be ensured and EMC specifications shall be complied with during wiring. Power cables, power supply and communication cables shall be laid in layers. Where necessary, the cables shall be protected and supported to reduce stress on them.
- After confirming that all wiring is correct and firm, the gaps of cable inlet and outlet holes of STS100D shall be blocked with bricks or fireproof mud. At the same time, waterproof treatment is required for the whole installation foundation of STS100D.

5.8 Completing Electrical Connections



Warning

After the electrical connection, it is necessary to check the connection of all cables. Make sure that all connections are correct and tight.

After all electrical connections are completed, the wiring shall be thoroughly and carefully checked.

- The incoming and outgoing line holes of outdoor cabinets and the gaps around them shall be tightly sealed with fireproof and waterproof materials.
- Check that all air inlets and outlets are not covered or blocked by foreign matters.
- Restore the protective cover completely and firmly.



Warning

Failure to seal properly may result in the introduction of moisture into internal equipment and could allow entry by animals.

After all operations are completed, the cabinet door and container door shall be locked.

6 Power-on and Power-off Operations



Warning

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



Warning

If the STS cabinet has been turned off for a long time, the user shall, before powering it on, thoroughly and carefully check it, and shall not power it on until all indicators meet the requirements.

6.1 Inspection before Power-on

The inspection items and acceptance criteria before power-on are shown in the following table:

S/N	Inspection item	Acceptance criteria
1	Equipment installed in place	Correct, firm and reliable installation
2	Reasonable cable layout	Reasonable wiring, meeting user requirements
3	Reliable earthing	The earth cable is connected correctly, firmly and reliably.
4	Switches turned off	All switches are off.
5	Cables connected in place	The AC output cable, DC input cable and signal cable are connected correctly, firmly and reliably.
6	Sealing of unused terminals and interfaces	Unused terminals and interfaces shall be equipped with waterproof covers.
7	Compliance of the installation environment with the requirements	Reasonable installation space, clean and tidy installation environment, no remaining material left from construction

After the STS100D is connected with all external cables and wires, that is, after the external wiring is confirmed as accurate, the power-on and power-off operations of the STS100D shall be verified to ensure stable operation of the product.

6.2 Power-on Operation

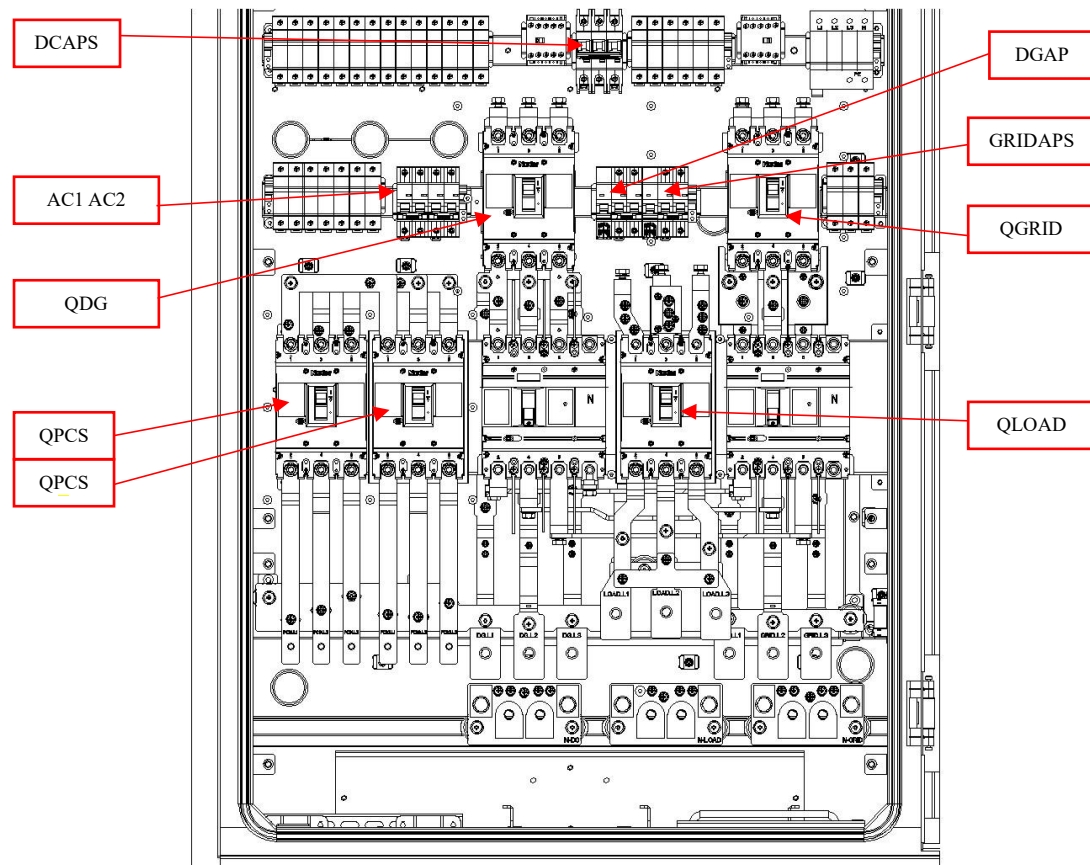
Power-on sequence:

Step 1: Check the switch status of each piece of electrical equipment in STS100D, confirming all switches are off;

Step 2: Connect the three auxiliary power switches QDCAPS, QDGAPS and QGRIDAPS, and then check whether there is any abnormal alarm fault through the alarm interface of the screen;

Step 3: Connect the grid circuit breaker switch QGRID during operation in grid-connected mode, and check whether the grid voltage on the EMS screen is normal;

Step 4: If there is a normal grid, after the contactor on the EMS display screen is connected, connect PCS circuit breakers QPCS1 and QPCS2, load circuit breaker QLOAD, and air conditioner switches AC1 and AC2. At this moment, check if relevant parameters on the EMS display screen are normal. If there is no fault, click to start up. After that, power-on is completed.



6.3 Power-off Operation

Power-off sequence:

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

Step 2: Disconnect PCS switches QPCS1 and QPCS2 of the STS100D, then disconnect air conditioner power switches AC1 and AC2 and grid circuit breaker switch QGRID in turn, and finally disconnect auxiliary power switches QDCAPS, QDGAPS and QGRIDAPS.

After that, power-off is completed.

7 Troubleshooting

Table 7-1 Common Fault Types and Handling Methods

Fault type	Handling method
Parallel communication fault	Check the wiring or contact after-sales service
No module fault	Please contact after-sales service
EPO fault	Check whether the EPO button is closed
EMS communication fault	Contact after-sales service
Abnormal sampling bias fault	Contact after-sales service
15-min continuous fault shutdown	Contact after-sales service
Slave carrier synchronization fault	Check the wiring or contact after-sales service
Slave zero-crossing synchronization fault	Check the wiring or contact after-sales service
Slave bus voltage fault	Check the wiring or contact after-sales service
Slave communication fault	Shut down, check whether the wiring is normal or contact after-sales service
Grid UV high voltage fault	Shut down, check whether the grid voltage is too high or contact after-sales service
Grid VW high voltage fault	Shut down, check whether the grid voltage is too high or contact after-sales service
Grid WU high voltage fault	Shut down, check whether the grid voltage is too high or contact after-sales service
Grid UV low voltage fault	Shut down, check whether the grid voltage is too low or contact after-sales service
Grid VW low voltage fault	Shut down, check whether the grid voltage is too low or contact after-sales service
Grid WU low voltage fault	Shut down, check whether the grid voltage is too low or contact after-sales service
Grid high frequency fault	Shut down, check the grid voltage and frequency or contact after-sales service
Grid low frequency fault	Shut down, check the grid voltage and frequency or contact after-sales service
STS overcurrent fault	Shut down and contact after-sales service
STS transformer over-temperature fault	Shut down and contact after-sales service
STS overload fault	Shut down, check STS input and output for any short circuit or overload, or contact after-sales service
STS SCR open circuit fault	Shut down and contact after-sales service
STS SCR short circuit fault	Shut down and contact after-sales service
STS fan alarm	Check whether the fan runs normally or contact after-sales service
Grid circuit breaker trip alarm	Check whether the grid circuit breaker is disconnected and contact after-sales service
Bypass circuit breaker trip alarm	Check whether the bypass circuit breaker is disconnected

8 Routine Maintenance

8.1 Precautions before Maintenance



Warning

- Please do not open the door of the outdoor battery cabinet for maintenance in rainy, humid or windy weather. Otherwise, the Company will not bear any responsibility.
- Avoid opening the cabinet door in rainy, snowy or foggy days, to prevent exposure to high humidity. At the same time, it is necessary to confirm that the sealing strip around the door does not curl after the cabinet door is closed.



Warning

After the STS cabinet is completely powered off, it is necessary to wait for at least 10 minutes before repair and maintenance, so that the discharging of the internal capacitor on the STS side can be finished. Before dust removal, please use a multimeter to measure and confirm that the inside of the equipment is completely free of electricity to avoid electric shock.



In sunny days, it is recommended to open the cabinet door for ventilation and dehumidification.

8.2 List of Cabinet Maintenance Items and Frequency

The following maintenance items are recommended, and the actual maintenance period shall be adjusted according to the specific installation environment of the product. Factors such as the site environment will affect the maintenance period of the product. It is necessary to shorten the maintenance period and increase the maintenance frequency in windy or dusty operating environments. If the STS100D is installed in a desert area, it is recommended that the inside and outside of the STS100D be carefully inspected and thoroughly cleaned after each sandstorm.

8.2.1 Maintenance work (semi-annual)

List of Maintenance Items	Inspection method
Outside of the cabinet	Check the following items and immediately correct those that do not meet the requirements: • Check for any flammable objects on 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 and oxidation. • Check whether the sealing strips are well fixed.
Inside of the cabinet	Check the following items and immediately correct those that do not meet the requirements: • Check the inside of the STS cabinet for foreign objects, dust, dirt, and condensate water; clean if any. • Check whether the STS cabinet and internal equipment are damaged or deformed. • Check whether there is any abnormal noise during the operation of internal equipment. • Check whether the temperature in the STS cabinet is too high.
Air inlet and outlet	Check the temperature and dust conditions of the radiator. If necessary, clean the heat release module with a vacuum cleaner.
Wiring and cable layout	The inspection can be started only after the internal equipment of the system in the STS cabinet is completely powered off! During the inspection, once any non-conformance is

List of Maintenance Items	Inspection method
	found, please correct it immediately. • Check whether the cable layout is standardized and whether there is any short circuit. Immediately correct any anomalies. • Check whether all incoming and outgoing line holes of the STS cabinet are well sealed. • Check whether there is water seepage inside the STS cabinet. • Inspect whether the power cable connection gets loose; if so, tighten it according to the torque specified previously. • Inspect whether the power cables and control cables are damaged, especially the cut marks on the sheath that is in contact with the metal surface. • Check whether the insulation wrapping tape of any power cable terminal falls off.
Earthing and equipotential bonding	• Check whether the earthing connection is correct, and the earthing resistance value shall not be greater than 4Ω. • Check whether the equipotential connection inside the energy storage integration system is correct. In case of anomalies, it is necessary to correct and replace the relevant parts in time.
Fan	• Check the running status of the fan. • Check whether the fan is blocked in any way. • Check whether there is any abnormal noise when the fan is running. If the fan cannot rotate or its blades are damaged, replace it.
Warning sign	Check whether the warning signs and labels are clearly visible without any stain or damage. Replace them if necessary.
Earthing of cable shielding layer	• Earthing of cable shielding layer: Check whether the cable shielding layer is in good contact with the insulating sleeve. • Check whether the earthing copper bar is fixed in place. In case of anomalies, it is necessary to correct and replace the relevant parts in time.
Lightning protection equipment and fuses	Check whether the lightning protection equipment and fuses are well fastened. In case of anomalies, it is necessary to correct and replace the relevant parts in time.
Corrosion	Check whether there is oxidation or rust inside the STS cabinet. In case of anomalies, it is necessary to correct and replace the relevant parts in time.
Door lock and hinge check	Check whether the door locks and hinges of the energy storage integration system can be used normally and whether they are in good condition. If necessary, the door lock holes and hinges shall be properly lubricated.
Sealing strip check	The sealing strip in good condition is an important guarantee for the effective prevention of water seepage inside the container, so careful inspection is required and if there is any damage, replace the sealing strip immediately.
Screw	Check for any falling screw inside the STS cabinet. In case of anomalies, it is necessary to correct and replace the relevant parts in time.
Others	• Regularly check for pungent smell in STS cabinet and burning smell at high-voltage connections. In case of anomalies, it is necessary to identify and eliminate the cause promptly. • Regularly check relevant parameters such as voltage and temperature monitored by EMS for any abnormality, and check the alarm column for suspicious alarm. In case of any problem, fix it immediately.

8.2.2 Maintenance (once every three months)

List of Maintenance Items	Inspection method
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List of Maintenance Items	Inspection method
Safety function	• Check the stop function of emergency stop button. • Simulate shutdown. • Check the warning signs and other signs on the equipment. In case of any problem, please fix it in time. • Check the air inlet and outlet of STS cabinet for blockage.
Inspection of internal components	• Check the cleanliness of circuit boards and components. • Check the exterior, status and function of switching circuit breakers for any abnormality. If necessary, replace the circuit breakers with qualified ones. • Check the radiator temperature and check for dust. If necessary, clean the heat release module with a vacuum cleaner. • Replace the air filter if necessary. Note! The air inlet must be checked for proper ventilation; otherwise, excessive heat will cause fault to the equipment if the module is not cooled effectively.
Component maintenance	• Routinely check all metal components for corrosion (every six months). • Check the contactors annually (auxiliary switches and microswitches) to ensure good mechanical operation. • Check operating parameters (especially voltage, insulation, etc.).

8.3 Other Maintenance Precautions

For safe and effective maintenance of the system, maintenance personnel shall read and observe the following safety requirements carefully:

- 1 An electrician certificate issued by SAWS is required, and personnel shall only take up their posts after receiving professional training.
- 2 Relevant safety precautions must be observed, necessary tools must be used and personal protective equipment must be worn.
- 3 All high and low voltage switches must be disconnected before maintenance.
- 4 During cleaning, it is strictly prohibited to wash with water. A vacuum cleaner shall be used when necessary.
- 5 Standard operation is required for plugging and unplugging cables. Operation with brute force or violence shall be avoided.
- 6 Tools and materials shall be put away and organized timely, and the inside and top of the equipment shall be checked for any metal objects left.
- 7 The status and alarm indicators of STS cabinet shall be checked on a regular basis for normal function.
- 8 In case of any questions about the operation and maintenance of the equipment, please contact the Company's customer service center. Unauthorized operation is strictly prohibited.



Warning

During routine maintenance, inspection and other operation on the equipment inside the STS cabinet, the non-conformance found shall be correct immediately. In case of any doubt, please contact the Company immediately.

9 Appendix

9.1 Parameters of Single Unit Cabinet

(Consistent with validated parameters, Table)

Model	STS100D
Parameter	
Rated grid voltage	400 V
Rated grid current	217A
Grid voltage range	340~440V
Rated input power	150KVA
Rated grid frequency	50Hz/60 Hz
Switching time of grid switch	≤20ms
PCS circuit breaker (rated current)	125A*2
Grid circuit breaker (rated current)	250A
Diesel generator circuit breaker (rated current)	250A
Diesel generator bypass circuit breaker (rated current)	250A
Load circuit breaker (rated current)	250A
Grid bypass circuit breaker (rated current)	250A
Transformer	100K
Transformer bonding mode	DYN11
Cabinet dimension (W×H×D)	900*2380*930mm
Weight	950kg
IP level	IP54
Lightning protection level	Level II
Anti-corrosion grade	C4
Communication	Ethernet, RS485, CAN
Operating humidity range	0%~95% (no condensation)
Operating temperature range	-25℃~+60℃
Cooling mode	Air cooled
Operating altitude	≤3000m
Installation method	Floor mounting

9.2 Tightening Torque

To prevent poor contact caused by looseness of the wiring copper lug under stress, or heat or even fire caused by increased contact resistance, it shall be ensured that the following torque requirements are met when tightening the screws of the wiring copper lug:

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

Note: 1 N·m≈10kgf.cm.

To reduce the stress on the wiring copper lug, the cable shall be fixed at an appropriate position.

9.4 Warranty

If case of any fault occurs to the product during the warranty period, the Company will repair the product or replace it with a new one free of charge. The Company will need the customer to present the invoice and date of purchase for any service during the warranty period. In addition, the product shall carry a legible logo for warranty service; otherwise, the Company shall have the right to refuse to provide such service.

- Defective products collected from replacement shall be handled by the Company.
- The customer shall reserve reasonable time for the Company to repair any faulty equipment.

The Company has the right not to perform the warranty under following circumstances:

- The whole unit or any part thereof has been out the free warranty period.
- The product is damaged during transportation.
- The fault is caused by incorrect installation, modification or use.
- The product runs in severe environment beyond that described in this Manual.
- The equipment fault or damage is caused by installation, repair, modification or disassembly performed by others than the Company's service departments and personnel.
- The product is installed or used beyond the scope specified by relevant international standards.
- The damage is caused by abnormal natural environment.

If the customer requires maintenance services due to product faults caused by any conditions above, the Company may provide such services for charge upon assessment by the Company's service department.

In case of any change in product dimensions and parameters, the latest information of the Company shall prevail without further notice.

9.5 Contact Information

In case of any questions about this product, please contact us. To serve you faster and better, we need your assistance in providing the following information:

- Equipment model
- Equipment serial number
- Fault code/name
- Brief description of fault phenomenon