



# STS100 Static Transfer Switch (STS) Cabinet

User Manual



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## 1. About This Manual

This manual is applicable to STS100D and mainly describes the product, transportation and storage, mechanical installation, electrical connections, power on and off operations, troubleshooting and maintenance methods of STS100D static transfer switch cabinet. Please read this manual carefully before transporting and installing this product. Keep this manual and materials about the product components properly to ensure that relevant personnel can access them at any time.

The content of the manual as well as the pictures, logos and symbols used are all owned by KSTAR. It is not allowed to publicly reproduce all or part of the content without written authorization of KSTAR.

Our products and product manuals are subject to improvement and upgrading in order to continuously improve customer satisfaction. If there is a discrepancy between the manual and the product, please refer to the specific product. If you still have questions, please contact KSTAR.

The User Manual is delivered with the equipment. Before installing and operating the equipment, please read the manual carefully and follow the requirements in the manual. This manual cannot cover all possible situations during installation, operation, maintenance, inspection, etc. If you encounter a situation that cannot be explained in the manual, please contact KSTAR in time.

### 1.1 Product Definition

#### STS100D static transfer switch cabinet

- STS: Static transfer switch
  - 100: 100KW
  - D: Outdoor

### 1.2 Applicable Personnel

This manual is intended for operators of this product and electrical technicians with corresponding qualifications. Readers must at least meet the following requirements:

- Have certain electronic, electrical wiring and mechanical expertise, 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 the STS100D static transfer switch cabinet and its front and back level equipment.
- Have received professional training related to electrical equipment installation and commissioning.
- Have emergency response capabilities for dangerous or unexpected situations that arise during installation or trial operation.
- Be familiar with the relevant standards and codes of the country where the project is located.
- Be familiar with what is described in this manual.

Only personnel who meet the above requirements can perform installation, operation and maintenance, inspection and other operations on the product. Unauthorized personnel should not

perform any operations on the product, and should keep a sufficient safe distance from the system to avoid accidents.

### 1.3 Use of Symbols

In order to ensure the user’s personal and property safety when installing this product, or to use this product efficiently and optimally, relevant information is provided in the manual and highlighted with appropriate symbols.

The symbols that may be used in this manual are listed below. Please read carefully to use this manual better.






**⚠ DANGER**  
 “Danger” indicates a high potential hazard, which will result in serious accidents such as personal injury or death if not avoided.

**⚠ WARNING**  
 “Warning” indicates a moderate potential hazard, which may lead to serious accidents such as personal injury or death if not avoided.

**⚠ CAUTION**  
 “Caution” indicates a hazard with a low level of potential hazard which could result in moderate or minor injury if not avoided.

**ATTENTION**  
 Indicates a potential risk, which could result in the equipment not operating normally or cause property damage if not avoided.

Please always pay attention to the danger warning signs on the machine, including:

	This mark indicates that the internal body contains high voltage, which may cause electric shock hazard if touched.
	All external power connections must be disconnected before maintenance work on the equipment!
	This symbol indicates that the temperature here is higher than the acceptable range of the human body. Do not touch it to avoid personal injury.
	Maintenance, inspection and other operations can only be carried out after the system is powered off for 10 minutes.
	During equipment operation, noise may be generated. It is recommended to wear mute earplugs.



This symbol indicates that this is the protective earth (PE) terminal, which needs to be firmly grounded to ensure the safety of operators.

## 1.4 Safety Precautions

### 1.4.1 Electrical Safety

#### **DANGER**

- High voltage! Risk of electric shock! It is strictly prohibited to touch live parts!
- Before installation, please make sure that the AC and DC sides are de-energized.
- Do not place the static transfer switch cabinet on a flammable surface.

#### **DANGER**

There is a risk of electric shock if you touch the power grid or the contacts and terminals connected to it inside the equipment!

- Do not touch terminals or conductors connected to the grid circuit.
- Observe all instructions or safety documentation regarding connection to the mains.

#### **DANGER**

Lethal high voltages exist inside the product!

- Note and abide by the warning signs on the product.
- Observe the safety precautions listed in this manual and other documents related to this equipment.

#### **DANGER**

Damaged equipment or system failure may cause electric shock or fire!

- Perform an initial visual inspection of the equipment for damage or other hazards prior to operation.
- Check whether other external devices or circuit connections are secure.
- Confirm that this equipment is in a safe state before operating it.

#### **WARNING**

Before wiring, all equipment switches in the static transfer switch cabinet need to be disconnected.

#### **DANGER**

When a ground fault occurs in the static transfer switch cabinet, fatal high voltages may exist in the originally unenergized parts. It is extremely dangerous if touched accidentally! Before operation, please ensure that there is no ground fault in the system and take relevant protective measures.

**⚠ DANGER**

There is high voltage in the static transfer switch cabinet. Accidental contact may cause fatal electric shock. Therefore, during live measurements, you should:

- Take protective measures (such as wearing insulating gloves, etc.).
- There must be an accompanying person to ensure personal safety.

**ATTENTION**

To prevent unauthorized personnel from misoperation or accidents when approaching the STS100D static transfer switch cabinet, please observe the following precautions:

- Place conspicuous warning signs around the STS100D static transfer switch cabinet to prevent accidents caused by incorrect closing.
- Set up warning signs or safety warning belt near the equipment.

### 1.4.2 Lifting and Transportation

**⚠ WARNING**

- During the whole process of loading, unloading and transportation, the outdoor cabinet operation safety regulations of the country/region where the project is located must be
- When lifting the STS100D static transfer switch cabinet, follow the procedures for working at heights.

**⚠ WARNING**

The STS100D static transfer switch cabinet must be transported strictly in accordance with the operating procedures of the transportation equipment.

**⚠ WARNING**

The following conditions must be met to transport the STS100D static transfer switch cabinet:

- The STS100D static transfer switch cabinet door is locked tightly.
- Select a suitable forklift with sufficient load capacity, arm length and radius of rotation according to site conditions.
- Be sure to set up warning signs or warning tapes to prevent non-workers from entering the lifting and transporting area to avoid accidents.

### 1.4.3 Installation and Wiring

 **WARNING**

During the whole process of mechanical installation, the relevant standards and requirements of the project location must be strictly followed.

 **WARNING**

If the installation is not carried out in accordance with the installation design requirements given in this manual, the system failure of the STS100D static transfer switch cabinet will not be covered by the warranty.

 **WARNING**

Failure to observe the torque requirements may result in fire at the connection!  
During electrical connection, bolts must be tightened strictly according to the torque described in this manual.

 **WARNING**

Only qualified electrical engineers may carry out work related to electrical connections. Please abide by the requirements given in the Safety Instructions in this manual. KSTAR shall not be liable for personal injury or property damage caused by ignoring these safety instructions.

 **WARNING**

When laying cables, ensure electrical insulation and comply with EMC regulations. Power cables, power supply and communication cables should be laid in layers. When necessary, provide protection and support for the cables to reduce the stress them.

 **WARNING**

Please perform wiring operations strictly according to the wiring identification inside the equipment.

 **WARNING**

Only the static transfer switch cabinet that is complete and without any damage can be installed and tested! Before starting the installation please make sure:

- The static transfer switch cabinet is intact.
- All equipment in the static transfer switch cabinet is intact.

### **WARNING**

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

### **WARNING**

Only qualified electrical engineers may carry out work related to electrical connections. Please abide by the requirements given in Safety Instructions in this manual. The company does not assume any responsibility for personal injury or property damage caused by ignoring these safety instructions.

### **WARNING**

STS100D static transfer switch cabinet is installed and operated outdoors, so its installation location and foundation must meet the requirements. In addition, during the entire process of electrical connection, the procedures must be strictly followed.

### **WARNING**

The system can only be put into operation after being installed and confirmed by professionals and approved by the local power department. Please close all power distribution circuit breakers before the equipment is in operation.

## **ATTENTION**

- The installation design of the STS100D static transfer switch cabinet must comply with the relevant standards or specifications of the country/region where the project is located.
- If the installation design requirements given in this manual are not followed, or the installation is not carried out in compliance with the relevant electrical standards or specifications of the installation location, resulting in failure of STS100D static transfer switch cabinet or the system, it will not be covered by the warranty.

### **CAUTION**

Before commissioning the system, the installation must be thoroughly and carefully checked again.

- Check installation.
- Check whether any tools or parts are left inside the equipment.
- Check system parameters.

## 1.4.4 Operation and Maintenance

### WARNING

If related operations are carried out while the equipment is live, insulation protection must be taken, and at least two workers should be on site at the same time.

STS100D static transfer switch cabinet is outdoor equipment and is usually located in a field environment away from the urban area, and the corresponding field rescue facilities should be prepared according to the needs, so that they can be carried out when needed.

### WARNING

Before working on the equipment, the area of operation must be pre-assessed for arc risk. If there is a risk of arcing, operators must have received relevant safety training in advance. Wear protective equipment that meets the requirements, such as protective clothing, insulating gloves, insulating shoes and anti-scald gloves, before working in areas of potential electric shock.

### WARNING

The following improper operations may cause arc, fire, explosion and other dangers inside the machine:

- Plug and unplug the DC side high-voltage cables of each device under power.
- The power cable connection is loose and screws and other parts are accidentally dropped into the power module.
- Improper operation by untrained and unqualified operators, etc.

### WARNING

Maintenance operations can only be performed on the STS100D static transfer switch cabinet when all the equipment in the cabinet is completely de-energized.

- Ensure that powered-off equipment won't be powered back on accidentally.
- Use an insulating cloth to insulate and cover the adjacent potentially live parts of the operating part.
- Keep the escape routes free during the entire operation.

### WARNING

During daily operation, ensure that the STS100D static transfer switch cabinet door is closed and locked, and the keys have been pulled out and handed over to a designated person for safekeeping, so as to avoid accidents caused by unauthorized entry, internal equipment being exposed to rain or animal intrusion, etc.

**⚠ DANGER**

In order to avoid unnecessary casualties and equipment damage, the product must be operated strictly according to the description in this manual. If the operation is improper, it may cause an arc hazard, and may even cause fire, explosion and other risks. The company will not be liable for any accidents such as arcs, fires, explosions and other accidents caused by failure to operate in accordance with the signs or product manual.

**⚠ DANGER**

- Select high-quality measuring equipment that meets the requirements of the site, such as measuring range and usable conditions.
- Make sure that the connection and use of the measuring equipment are correct and standardized, so as to avoid dangers such as electric arcs.
- For live measurement, take appropriate protection (such as wearing insulating gloves, etc.).

**ATTENTION**

Never tear or damage the signs,

- Ensure body warning signs are legible at all times.
- Once the warning signs on the body are damaged or blurred, be sure to replace them immediately.

**ATTENTION**

In case of sandstorms, thunderstorms, strong winds, hail and other severe weather during maintenance, or when the relative humidity of the surrounding environment is greater than 95%, do not open the door of the STS100D static transfer switch cabinet.

**⚠ CAUTION**

Touching or improper handling of printed circuit boards or other static sensitive components can damage the device.

- Avoid unnecessary board contact.
- Comply with electrostatic protection regulations, such as wearing ESD wrist straps.

### 1.4.5 Product Scrapping

When the STS100D static transfer switch cabinet or internal individual equipment needs to be discarded, it shouldn't be treated as conventional waste. Some components of the internal machine can be recycled and reused, and some components will pollute the environment. Please contact a local authorized professional recycling agency to properly dispose of the product and internal components.

## 2. Product Description

### 2.1 Introduction

This STS100D static transfer switch cabinet produced by KSTAR is mainly used in industrial and commercial scenarios. It consists of outer cabinet, transformer module, touch screen and electrical components. It has a protection grade of IP54 and can be installed outdoors.

The typical application scenario of two PCSs in the STS100D static transfer switch cabinet is shown in Figure 2-1.

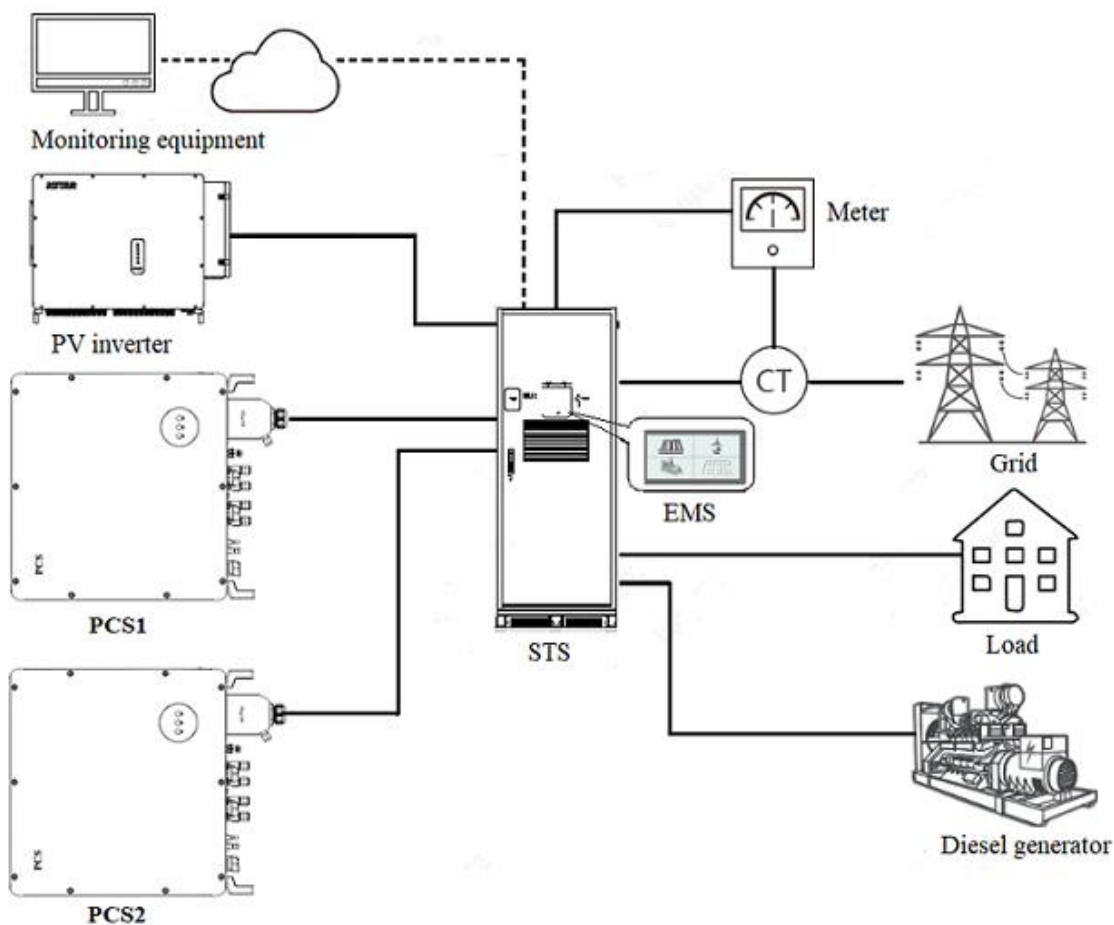


Figure 2-1 Typical application scenarios of PCS

### 2.2 Appearance Design

#### 2.2.1 Cabinet Appearance

The front view of the STS100D static transfer switch cabinet structure is shown in Figure 2-2. The picture is for reference only. Please refer to the actual item received!

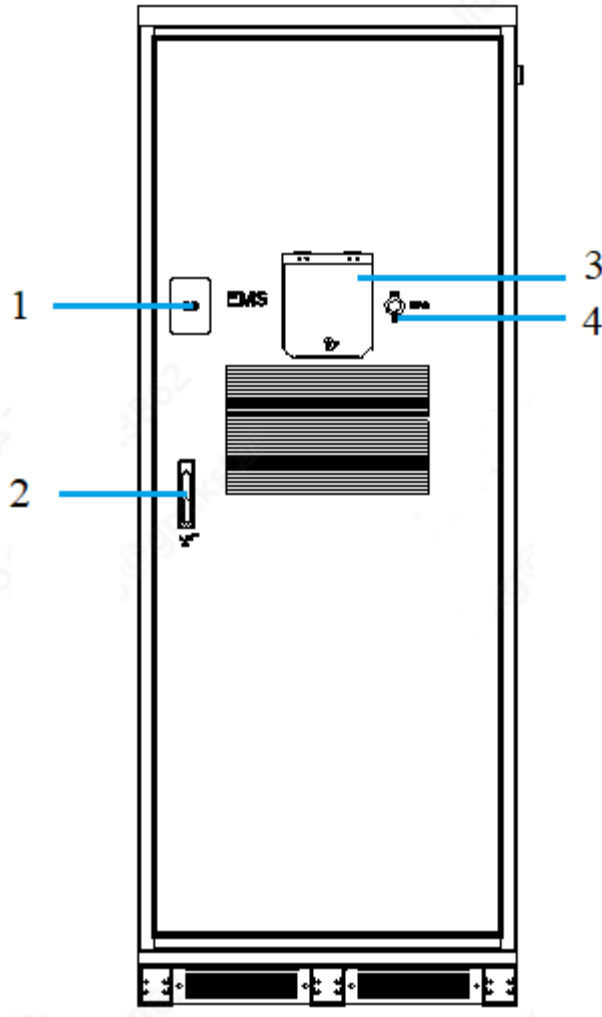


Figure 2-2 Front view of STS100D static transfer switch cabinet

No.	Name
1	Nameplate
2	Door lock switch
3	EMS display
4	EPO

### 2.2.2 Mechanical Parameters

The appearance dimensions of the STS100DD static transfer switch cabinet are shown in Figure 2-3 below.

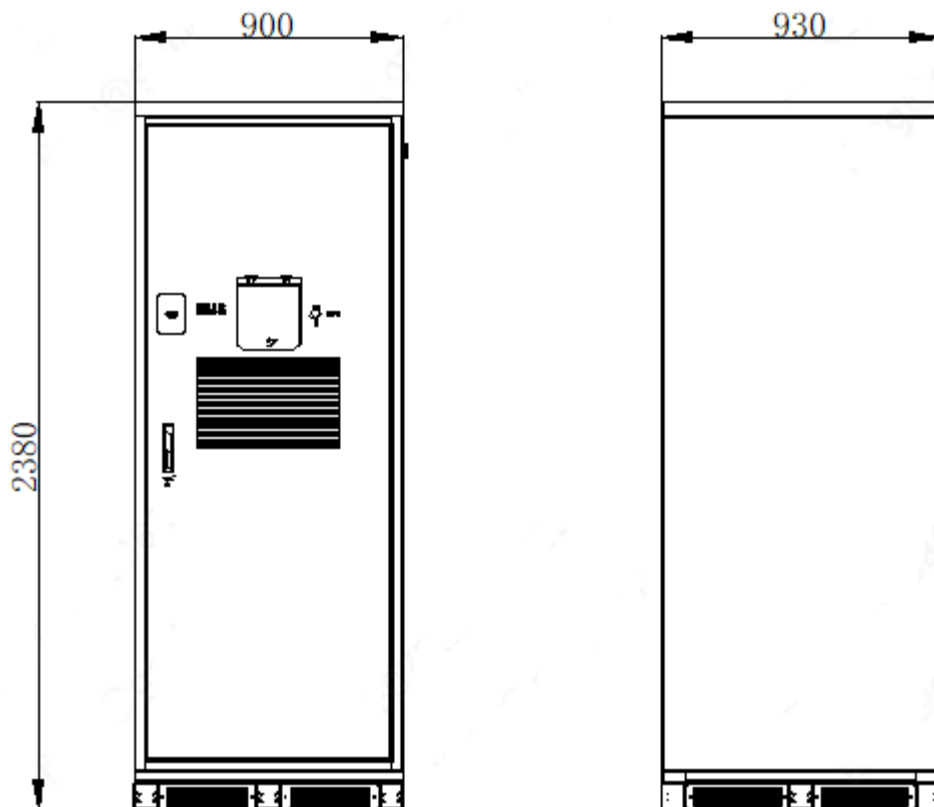


Figure 2-3 Dimensional drawing of STS100DD static transfer switch cabinet

\*The above picture takes STS100DD static transfer switch cabinet as an example. It is for reference only. Please refer to the actual product received!

## 2.3 System Design

### 2.3.1 System Equipment Layout

The overall location distribution of electrical components in the STS100DD static transfer switch cabinet system is shown in Figure 2-4.

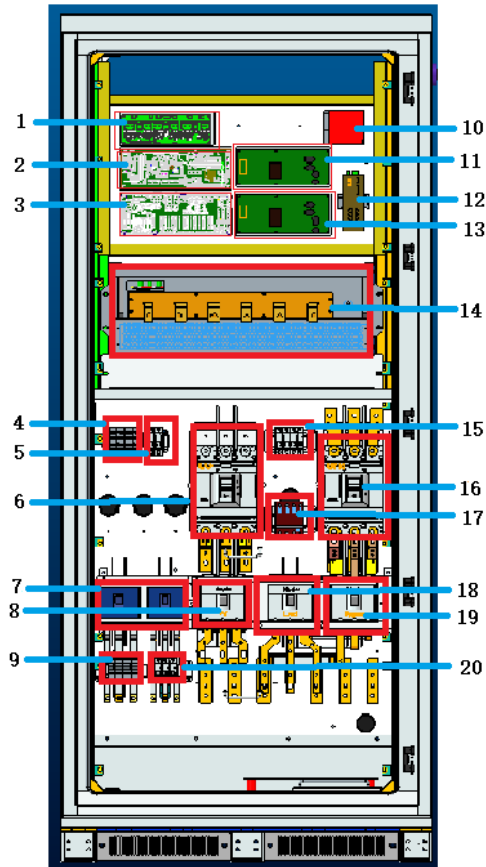


Figure 2-4 Overview of the location of electrical components

No.	Name	Abbreviation
1	M02 board	M02
2	U01 board	U01
3	X02 board	X02
4	AC auxiliary power fuse box	F1, F2...
5	AC auxiliary power switch	APS
6	Oil engine circuit breaker	DG
7	PCS switch 1 and PCS switch 2	PCS1, PCS2
8	PV inverter/load circuit breaker	PV INV/LODA
9	DC auxiliary power fuse box	Bus1+/1-, Bus2+/2-
10	24V switching power supply	/
11	Auxiliary circuit board 1	M07
12	Switch	/

No.	Name	Abbreviation
13	Auxiliary circuit board 2	M08
14	STS thyristor module	STS
15	Lightning protection circuit breaker	SPD-KS
16	Grid circuit breaker	GRID
17	Lightning arrester	SPD-AC
18	Load breaker	LOAD
19	Maintenance switch	BYPASS
20	Air conditioning switch 1, air conditioning switch 2	Air Conditioner 1/2

\*The above picture takes STS100DD static transfer switch cabinet as an example. It is for reference only. Please refer to the actual product received!

The schematic diagram of the location of the external wiring terminals is shown in Figure 2-5.

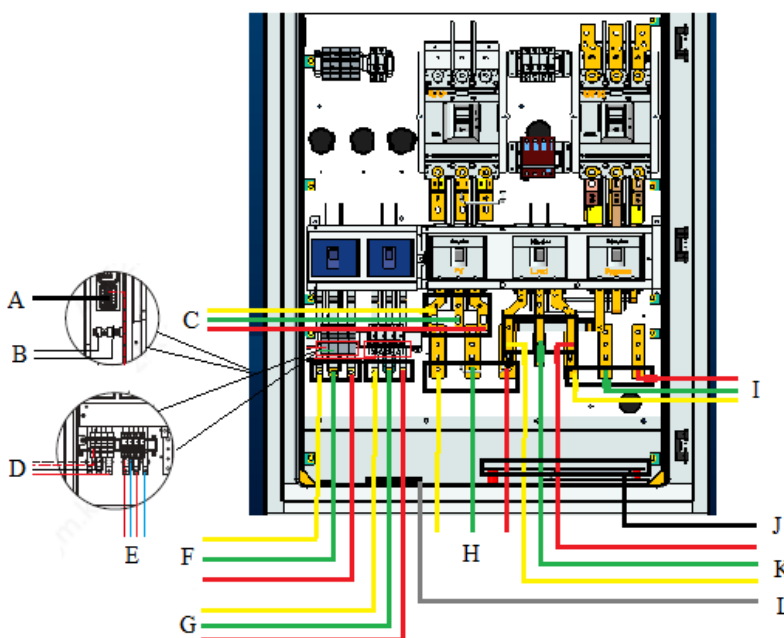


Figure 2-5 Overview of terminal location

No.	Name	Abbreviation
A	Parallel communication terminal	Parallel Port
B	Network cable terminal	/
C	inverter terminal	INV U, INV V, INV W
D	DC auxiliary power terminal	Bus1+/1-, Bus2+/2-
E	Air conditioner power terminal	Air Conditioner +/-
F	PCS1 terminal	PCS1 U, PCS1 V, PCS1 W
G	PCS2 terminal	PCS2 U, PCS2 V, PCS2 W
H	Oil engine terminal	DG U, DG V, DG W
I	Grid terminal	GRID U, GRID V, GRID W

No.	Name	Abbreviation
J	N line copper bar	N
K	Load terminal	LOAD U, LOAD V, LOAD W
L	Ground copper bar	GND

Note: The internal wiring has been completed before leaving the factory. Please connect the external input wiring in order according to the label.

### 2.3.2 Function Introduction

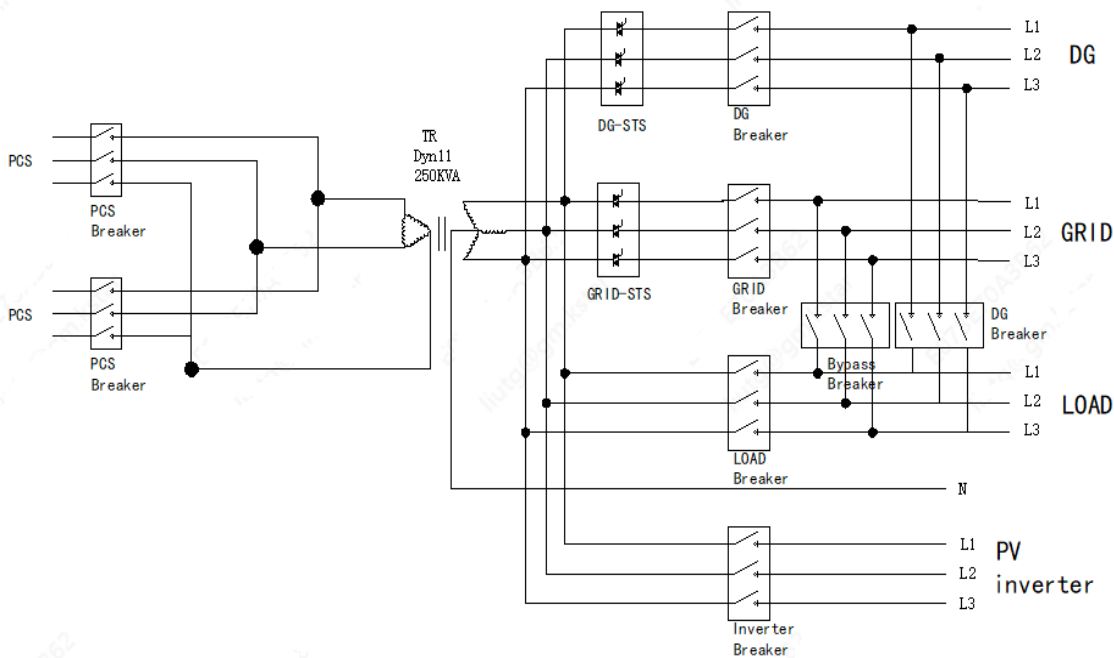


Figure 2-6 STS100D static transfer switch cabinet wiring schematic diagram

The wiring schematic diagram of the STS100D static transfer switch cabinet is shown in Figure 3-5. The grid-tied inverter PCS needs to be provided by the user. The basic principle of the product operation is based on the STS100D static transfer switch cabinet, and five external parts can be connected:

- The grid switch is connected to the grid.
- The oil engine switch is connected to the fuel generator.
- The PV inverter switch is connected to the three-phase power of the inverter.
- The load switch is connected to the load.
- The PCS switch is connected to the PCS, and the user can select the number of PCS according to the actual situation ( $PCS \leq 2$ ).

The STS100D static transfer switch cabinet is equipped with circuit breaker switches on the grid side and the load side. The grid bypass maintenance switch is used to facilitate power supply from the grid side to the load side during maintenance. The oil engine bypass maintenance switch is used to facilitate power supply from the oil engine side to the load side during maintenance. The main function of the STS100D static transfer switch cabinet is the on-grid and off-grid switching among the PCS, the power grid and the oil engine. It ensures that the PCS can provide power to the load when the grid side fails, and also ensures that when the battery on the PCS side is insufficient, the oil engine supplies power to the load. There are two working modes:

- Grid-tied mode: The power grid or oil engine and PCS jointly provide power to the load through the STS switch cabinet.
- Off-grid mode: When a fault or disconnection occurs on the grid side, it switches to the off-grid mode. At this moment, the electric energy of the load is passed through the PCS inverter (DC/AC) by the external energy storage battery and supplied to the load through the load switch.

### 3. Delivery and Storage

#### 3.1 Scope of Supply

When shipped, the shipping list of the STS100D static transfer switch cabinet is as follows:



\*The above pictures are for reference only. Please refer to the actual product received!

Figure 3-1 Illustration of delivery list of static transfer switch cabinet

Table 3-1 Scope of supply

Name	Quantity	Unit	Description
STS100D Static Transfer Switch Cabinet	1	PCS	Standard
User Manual	1	PCS	Standard
Certificate of conformity	1	PCS	Standard
Warranty Card	1	PCS	Standard
Keys	2	PCS	Standard
Test Report	1	PCS	Standard
EMS Operation Manual	1	PCS	Standard
Connection Harness	1	Set	Standard
OT terminal	18	PCS	Standard
Spare screws	/	/	/

#### 3.2 Checking Transportation Integrity

The STS100D static transfer switch cabinet has been carefully inspected by our staff and packaged securely before leaving the factory. However, there is still a chance that the equipment may be bumped or even damaged during transportation.

After receiving the equipment, first check the completeness and integrity of the transportation. At a minimum, the following items should be carefully checked:

- Check whether all delivered components are complete against the “scope of supply”.
- Confirm that the STS100D static transfer switch cabinet and internal equipment models received are consistent with the model you ordered previously.
- Carefully check the STS100D static transfer switch cabinet and internal equipment to see if there is any damage during transportation. If you find any problems or have questions, please contact the transporter or our company in time.

### 3.3 Storage

If it is not installed immediately after the delivery work is successfully completed, please store the STS100D static transfer switch cabinet properly as described in this section.

- In order to prevent condensation inside the cabinet, or the bottom of the cabinet from being soaked by rainwater during abundant rainy seasons, STS100D should be stored in an indoor environment, such as a large warehouse or workshop.
- If it must be stored outdoors due to site conditions, the base of the STS100D must be elevated. The specific elevation should be reasonably determined based on site geology, meteorology and other conditions. Heating should also be provided for the internal equipment of the STS100D when the ambient temperature is too low.

Storage environment temperature:  $-40^{\circ}\text{C}\sim 60^{\circ}\text{C}$ ; recommended long-term storage temperature:  $20^{\circ}\text{C}\sim 30^{\circ}\text{C}$ ; storage environment relative humidity:  $0\sim 95\%$ , no condensation.

- Store the STS100D on a dry, flat, solid ground with sufficient load-bearing capacity and free of any vegetation. The storage floor must be flat, without water accumulation or unevenness.
- When storing, ensure that the door of STS100D is locked.
- Effective measures must be taken to prevent rain, sand or dust from intruding into the interior of the STS100D. At least the air inlet and outlet of STS100D must be effectively protected.
- Regular inspections. Inspect at least once every half month to check whether the cabinet and internal equipment are intact.

## 4. Mechanical Installation

### WARNING

During the entire process of mechanical installation, the relevant standards and requirements of the project location must be strictly followed.

### 4.1 Inspection before Installation

#### 4.1.1 Checking the Deliverables

Check whether the delivery is complete against the accompanying packing list.

#### 4.1.2 Checking Equipment

If you find problems or have questions, please contact the transporter or our company in time.

### WARNING

Only complete equipment without any damage can be installed. Before installation, please make sure:

- Check whether the cabinet actually received is consistent with the model ordered and has no damage.
- All equipment in the cabinet is intact.

### 4.2 Installation Environment Requirements

#### 4.2.1 Site Selection Requirements

When choosing an installation site, please follow at least the following principles:

- The climate environment, geological conditions (such as stress wave emission, groundwater level) and other characteristics of the installation site of the STS100D should be fully considered.
- The surrounding environment should be dry, well ventilated, and away from flammable and explosive areas.
- The soil at the installation site needs to have a certain degree of compactness. It is recommended that the relative compactness of the soil at the installation site is  $\geq 98\%$ . If the soil is loose, be sure to take steps to ensure a stable foundation.
- Keep away from areas where toxic and harmful gases are concentrated; keep away from flammable, explosive and corrosive items.

#### 4.2.2 Foundation Requirements Reference

### WARNING

The overall equipment is relatively heavy. Before building the foundation, various conditions of the installation site (mainly geological conditions, environmental and climate conditions, etc.) should be carefully inspected. Only on this basis can the design and construction of the foundation begin.

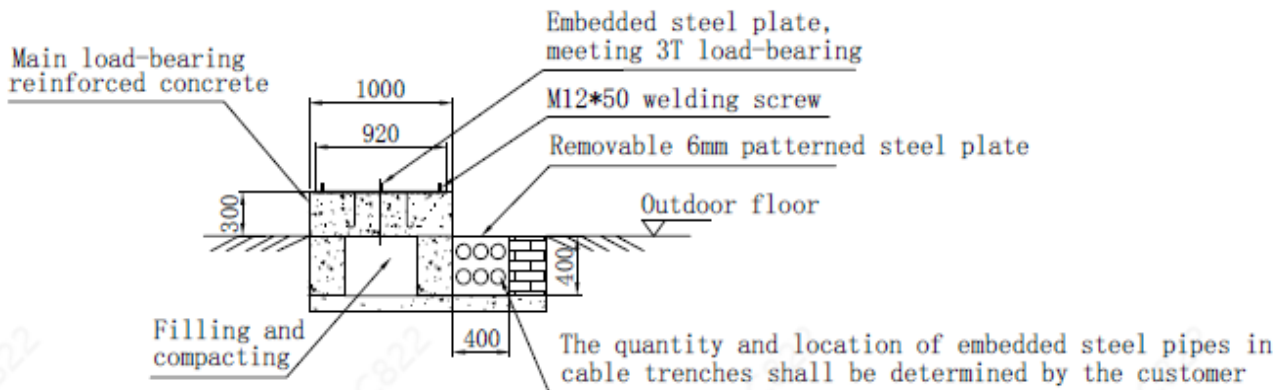


Figure 4-1 Front view of reference foundation

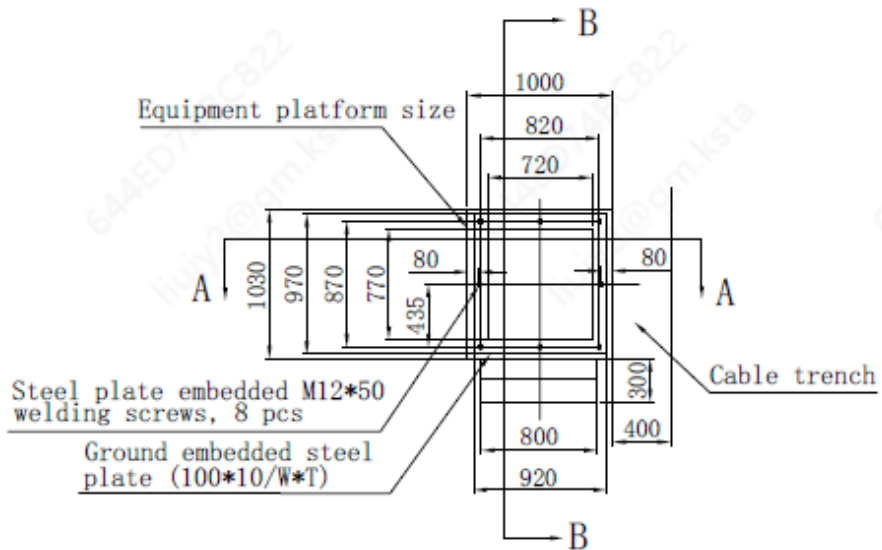


Figure 4-2 Top view of reference foundation

Unreasonable foundation construction plans will cause great difficulties or troubles in the placement of equipment, opening and closing doors, and later operation. Therefore, the installation foundation of equipment must be designed and constructed in advance according to certain standards to meet the requirements of mechanical support, cable routing, and subsequent maintenance and inspection.

When constructing the foundation, at least the following requirements should be met:

- The bottom of the foundation pit for building the foundation must be compacted and filled.

- The foundation shall be made according to the reference foundation drawing provided by KSTAR, or the foundation drawing confirmed by our company. The upper surface tolerance of the foundation shall be  $\pm 5\text{mm}$ .
- The foundation must be sufficient to provide effective load-bearing support for STS100D.
- Raise the cabinet to prevent rainwater from corroding the base and interior of the cabinet. It is recommended that the foundation be approximately 300mm above the level of the installation site.
- Corresponding drainage measures need to be constructed based on local geological conditions.
- Construct a cement foundation of sufficient cross-sectional area and height. The height of the foundation is determined by the construction party based on the site geology.
- Cable routing should be considered when building the foundation.



The dregs excavated during the construction of the foundation should be cleared immediately to avoid affecting the hoisting and transportation of subsequent equipment.

- The maintenance platform is built around the foundation to facilitate later maintenance.
- According to the location and size of the cable inlet and outlet on STS100D, sufficient space should be reserved for the cable trough during foundation construction and the cable duct should be embedded in advance.
- Determine the specifications and quantity of perforation tubes based on the cable model and the number of incoming and outgoing wires.
- Both ends of all embedded pipes are temporarily sealed to prevent impurities from entering; otherwise, later wiring will be inconvenient.
- After all cables are connected, cable inlets and outlets and joints are sealed with refractory putty or other suitable material to prevent rodent entry.



Pre-embed grounding units according to relevant standards of the country/region where the project is located.

### 4.3 Forklift Transportation

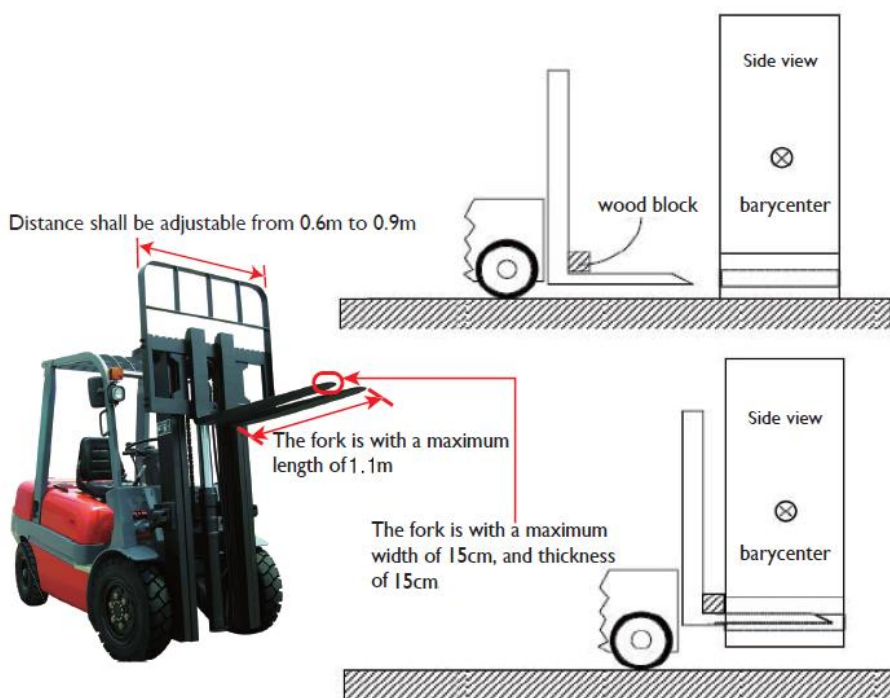
If the installation site is flat, you can use a forklift to move the STS100D. The bottom of STS100D is equipped with fork holes specially used for forklift transportation. Move the STS100D through the front fork hole.

If forklift transportation is used, the following requirements should be met:

- The door of STS100D is locked tightly.
- The length of the pins should be at least 1100mm.

The prongs should be plugged into the fork jack in the bottom of the workstation (see Figure 4-2 below for the location of the fork jack). The depth of the prongs inserted into the chainage should be the depth of the chainage, which is 1100mm.

- STS100D should be transported, moved and put down slowly and steadily. It is recommended to try shipping.
- STS100D can only be placed in a stable place, where should be well-drained and free of any obstructions or bulges.



The spacing must be adjustable in the range of 0.6-0.9

The maximum width is 15cm

The maximum thickness 15cm

The length is at least 1.1m

Figure 4-3 Schematic diagram of forklift transportation

**WARNING**

- Move the static transfer switch cabinet through the bottom front forks.
- Under no circumstances may the switchgear be statically switched by inserting the prongs into a position other than the fork holes.



The sockets of the cabinet are exposed before delivery. It is recommended that the sockets be sealed with accessory sealing plates after on-site installation.

### 4.4 Installation Space Requirements

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

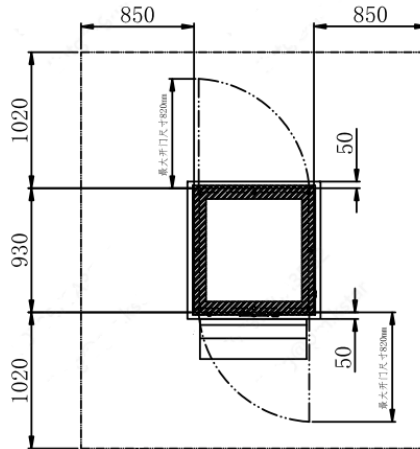


Figure 4-4 Recommended installation space diagram for a single unit

Note: The above picture is for reference only, and the specific installation is based on the user's own needs.

After confirming that the foundation construction meets the requirements and is sufficiently dry, strong, and flat, STS100D can be hoisted to the predetermined position. Use fastening bolts to fix STS100D to the foundation. After fixation, carry out anti-rust treatment on the U-shaped angle steel, such as spraying anti-rust paint, etc. The dimensions of the base of STS100D are shown in Figure 4-5 below. The specific installation position and direction are determined by the customer.

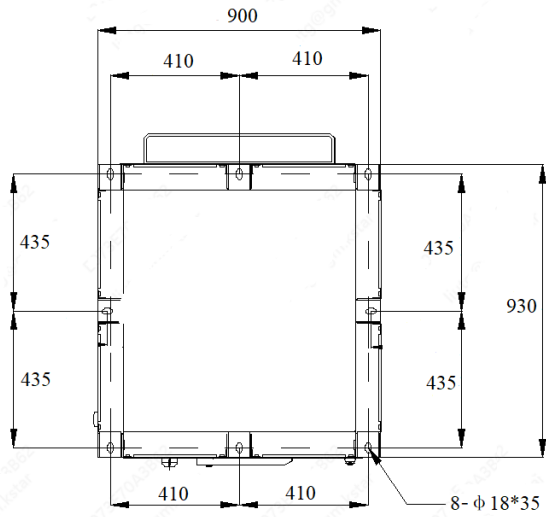


Figure 4-5 Dimensional drawing of equipment base

Note: The base is fixed with 8 screws (M12\*50). The specific installation position and direction are determined by the customer.

\*The above pictures are for reference only. Please refer to the actual item received!

## 5. Electrical Connections

### 5.1 Safety Precautions

#### 5.1.1 General

##### DANGER

- High voltage! Risk of electric shock! It is strictly prohibited to touch live parts!
- Before installation, please make sure that the AC and DC sides are not powered.
- Do not place the static transfer switch cabinet on a flammable surface.

##### WARNING

- The entry of sand and moisture may damage the electrical equipment in the static transfer switch cabinet and affect the operating performance of the equipment.
- Electrical connection work should be avoided during sandstorm seasons or when the relative humidity in the surrounding environment is greater than 95%.
- Start all connection work when there is no wind and sand and the weather is clear and dry.

##### ATTENTION

- **The installation design of the static transfer switch cabinet must comply with the relevant standards or specifications of the country/region where the project is located.**
- **If the installation design requirements given in this manual are not followed, or the installation is not carried out in compliance with the relevant electrical standards or specifications of the installation location, resulting in cabinet or system failure, it will not be covered by the warranty.**

#### 5.1.2 Five Safety Rules

During the entire process of electrical connection, as well as all other operations performed on the STS100D static transfer switch cabinet, the following five safety rules must be observed:

- Disconnect all external connections of STS100D and the internal power supply of the equipment.
- Make sure that all disconnected points won't be accidentally re-energized.
- Use a multimeter to make sure there is no electricity inside the unit.
- Perform necessary grounding.
- Use insulating cloth to insulate and cover possible live parts near the operating part.

#### 5.2 Wiring Overview

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

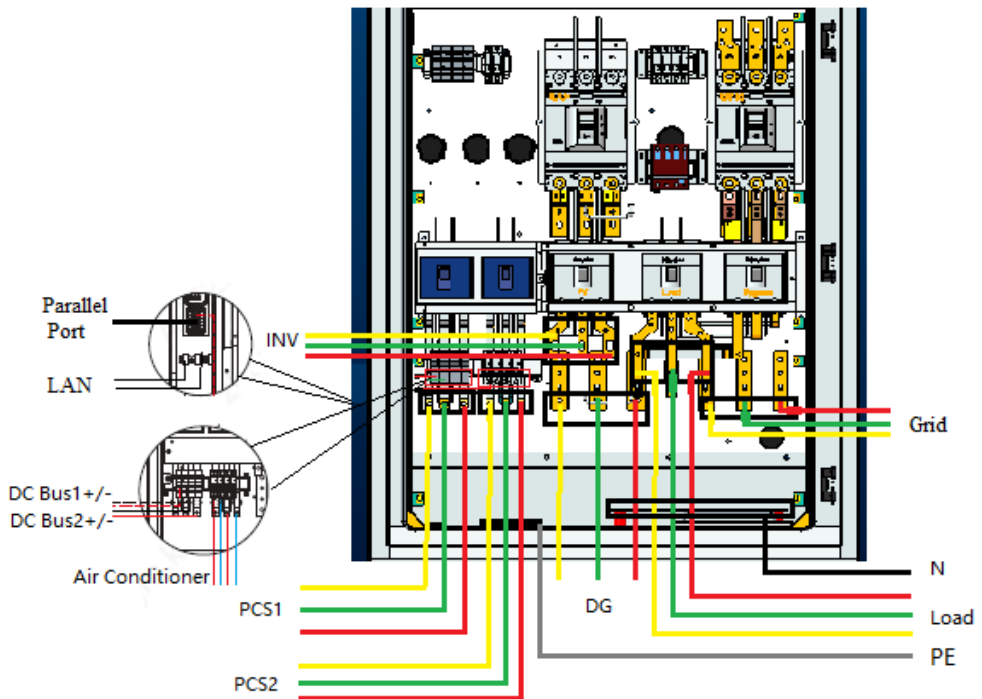


Figure 5-1 STS100D static transfer switch cabinet wiring diagram

The schematic diagram of the external wiring principle is shown in 5-1. It only describes the wiring principle and the picture is for reference only.

Note: The miniature circuit breakers for the fuse, auxiliary power and air conditioning switch are equipped with labels. Please connect them in order according to the labels.

**WARNING**

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

**WARNING**

Only qualified electrical engineers should perform work related to electrical connections. Please comply with the requirements given in the *Safety Instructions* in this manual. The company does not assume any responsibility for personal injury or property damage caused by ignoring these safety instructions.

**ATTENTION**

- The installation design of the STS100D static transfer switch cabinet must comply with the relevant standards or specifications of the country/region where the project is located.
- If the installation is not carried out in accordance with the installation design requirements given in this manual, causing system failure of the STS100D static transfer switch cabinet, it will not be covered by the warranty.

### 5.3 System Wires

The wires of STS100D static transfer switch cabinet should be selected according to the requirements of 100KW capacity configuration. It is recommended that the current passing through the 1mm<sup>2</sup> wires should not be greater than 5A. The connecting wires on the same side should be of the same specifications and types. KSTAR has provided the reference requirements for the sizes of various types of cables, and the cable lengths are determined according to the on-site installation environment. You can design relevant cables based on the cable diameters in Table 5-1. When designing cables, please follow the instructions in this section and local wiring regulations, and consider environmental conditions, laying methods, etc. When the control cable must pass through the power cable, ensure that the angle between the two cables is kept at 90°.

Table 5-1 STS100D static transfer switch cabinet cable specifications

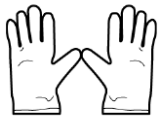



Model capacity	Grid side input wire	DG input wire	PV inverter input wire	PCS side	Load side
100KW	≥95mm <sup>2</sup> ×4	≥95mm <sup>2</sup> ×3	95mm <sup>2</sup> ×3	≥25mm <sup>2</sup> ×3	95mm <sup>2</sup> ×3
Model capacity	PE	Air conditioner power supply	DC-Bus power supply	Parallel communication line	
100KW	25mm <sup>2</sup>	Single 3-core wire, ≥2.5mm <sup>2</sup> ×2	1 mm <sup>2</sup> ×2	Shielded twisted pair, single 8-core wire	

### 5.4 Preparation before Wiring

Before delivery, the cable connections between the electrical equipment inside the STS100D static transfer switch cabinet have been completed. After delivery, the external cables of STS100D must be provided by the user and installed under the guidance of professional and qualified electrical engineers.

#### 5.4.1 Preparing Installation Tools

Before installation, prepare at least the tools and parts as shown below:

			
Safety gloves	Safety shoes	Crimping pliers	Heat gun




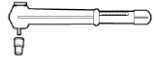


			
Multimeter	Wire stripper	Phillips screwdriver	Socket (M6/M8/M12/M16)
			
Heat shrink tubing	Insulated adjustable wrench		

Figure 5-2 Schematic diagram of installation tools

## 5.4.2 Preparing Cables

### WARNING

Before making electrical connections, check and ensure the integrity and insulation of the cables used. If there are damaged cables, replace in time. Poor insulation or damaged cables can be dangerous.




The cables selected must meet the following conditions:

- Have sufficient current carrying capacity. Factors that affect the current carrying capacity of a conductor include but are not limited to: environmental conditions, conductor insulation material type, cable laying method, cable material and cross-sectional area.
- The diameter of the cable must be selected according to the maximum current carrying capacity, and the length must be left with margin.
- Be sure to choose flame-retardant cables.

The cables used should comply with local laws and regulations. The colors of the cables in the illustrations in this guide are for reference only. Please select cables according to local cable standards.

## 5.4.3 Making Terminals

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

	<p>Step 1: Peel off the insulation at the end of the cable. The length of the insulation peeled off should be the depth of the wiring copper nose crimping hole plus 5mm.</p>
 <p>Crimp at least twice</p>	<p>Step 2: Crimp wiring copper nose. First put the exposed copper core of the stripped wire into the crimping hole of the wiring copper nose. Then use a terminal crimping machine to tighten the wiring copper nose. The number of crimps should be more than two.</p>
	<p>Step 3: Install the heat shrink tubing.</p> <ol style="list-style-type: none"> <li>① Select a heat shrink tubing with appropriate cable size. The length should be 2cm longer than the wiring copper nose crimping pipe.</li> <li>② Put the heat shrink tubing on the copper wiring nose, and it is appropriate to completely cover the crimping hole of the copper wiring nose.</li> <li>③ Use a heat gun to tighten the heat shrink tubing.</li> </ol>

If multi-core cables are used, it is recommended to add cable protection covers at the bifurcation to prevent the outer insulation from cracking.

### 5.4.4 Copper Wire Connection

If copper wire connection is selected, the connection sequence of wiring components is as shown in Figure 5-3 below.

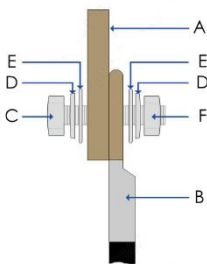


Figure 5-3 Transition terminal connection sequence

No.	Name
A	Copper bar
B	Copper aluminum transition terminal

No.	Name
C	Bolt
D	Spring washer
E	Flat washer
F	Nut

Note: The cables connecting the STS and external equipment enter the interior from the cable entrance at the bottom of the cabinet, and the foundation is designed with reserved cable troughs.

#### 5.4.5 Wiring Guidelines and Precautions

##### **WARNING**

- Before wiring, check the phase sequence of all input cables to ensure that the phase sequence of each input is correct.
- During electrical installation, never pull the cables or conductors to avoid damaging their insulation properties.
- All cables and conductors should have some space for bending.
- Take necessary auxiliary measures to reduce the stress on cables or wires.
- After each wiring operation is completed, careful inspection is required to ensure that the wiring is correct and secure.

##### ① Grid/oil engine/N cable wiring steps

Please follow the steps below to connect the power grid/oil engine /N cables:

Step 1: Use a multimeter to measure and confirm that the equipment is in power-off state.

Step 2: Use wire strippers to peel off the protective layer of the cable to expose the copper core.

Step 3: Crimp with OL95-10 terminal; refer to 5.4.3 Making Terminals to make the wiring terminal.

Step 4: Insert the grid/oil engine cable from the bottom of the STS cabinet into the cable entry hole and into the wiring area inside the STS cabinet.

Step 5: Make sure the connection sequence of grid/oil engine /N cable is correct.

Step 6: Use M10 bolts to fix the OL95-10 terminal to the wiring hole, tightening torque 34~40 N•m. Refer to the connection sequence in 5.4.4 Copper Wire Connection for installation.

Step 7: After the wiring is completed, gently pull the cable to ensure that there is margin.

-- Finish

##### ② PV/load wiring steps

Step 1: Use a multimeter to measure and confirm that the equipment is in power-off state.

Step 2: Use wire strippers to peel off the protective layer of the cable to expose the copper core.

Step 3: Crimp with OL50-10 terminal; refer to 5.4.3 Making Terminals.

Step 4: Insert the PV/load cable from the bottom of the STS cabinet into the cable entry hole and into the wiring area inside the STS cabinet.

Step 5: Make sure the PV/load connection sequence is correct.

Step 6: Use M10 bolts to fix the OL25-10 terminal to the wiring hole, tightening torque 34~40 N•m. Refer to the connection sequence in 5.4.4 Copper Wire Connection for installation.

Step 7: After the wiring is completed, gently pull the cable to ensure that there is margin.

-- Finish

### ③ PCS wiring steps

Please follow the steps below to connect the PCS cable:

Step 1: Use a multimeter to measure and confirm that the equipment is in power-off state.

Step 2: Use wire strippers to peel off the protective layer of the cable to expose the copper core.

Step 3: Crimp with OL25-6 terminal; refer to 5.4.3 Making Terminals.

Step 4: Insert the PCS cable from the bottom of the STS cabinet into the cable entry hole and into the wiring area inside the STS cabinet.

Step 5: Make sure the PCS cables are connected in the correct order.

Step 4: Use wire strippers to peel off the protective layer of the cable to expose the copper core.

Step 6: Use M6 bolts to fix the OL25-10 terminal to the wiring hole, tightening torque 7~8N•m. Refer to the connection sequence in 5.4.4 Copper Wire Connection for installation.

Step 7: After the wiring is completed, gently pull the cable to ensure that there is margin.

-- Finish

### ④ Air conditioner wiring

The air conditioner wiring is shown in Figure 5-4. Please follow the steps below to connect the air conditioner cables:

Step 1: Use a multimeter to measure and confirm that the equipment is in power-off state.

Step 2: According to the air-conditioner circuit breaker label, lead the air-conditioner cable from the STS cabinet into the cable entry hole and into the internal wiring area of the STS cabinet.

Step 3: Connect the air conditioner cable to the air conditioner circuit breaker according to the wire mark, and connect the ground wire to the ground copper bar.

-- Finish

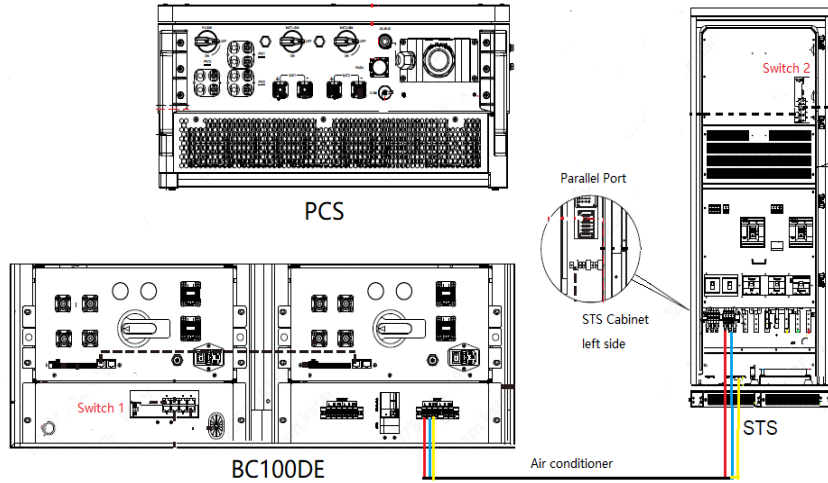


Figure 5-4 Air conditioner wiring diagram

⑤ Communication wiring

The communication connection terminal is at the lower left of the STS, and the communication port is shown in Figure 5-5 below.

Step 1: According to the communication label, lead the (CAN+485) communication and TCP communication cables from the STS cabinet into the cable entry hole and into the internal wiring area of the STS cabinet.

Step 2: Connect the communication cable to the corresponding communication interface according to the wire mark.

-- Finish

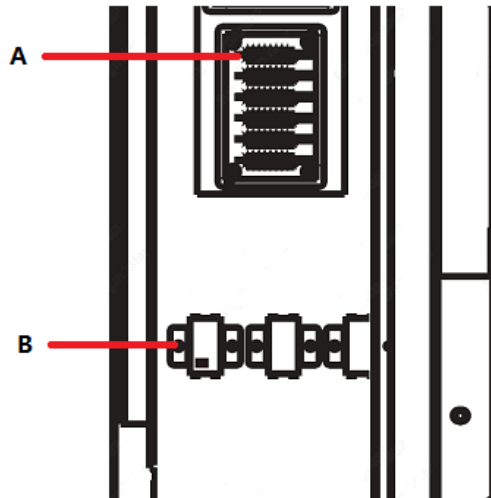


Figure 5-5 Communication interface diagram

No.	Name
A	Parallel communication port
B	TCP port

(CAN+485) Communication: For communication between PCS and STS, the communication cable is already equipped at the factory, but the user needs to connect it with a flat-blade screwdriver in the order of the wire markings. The parallel port labels from left to right are: 1, 2, 3, 4, 5, 6, 7, 8.

TCP communication: The communication between BC100DE and STS is TCP communication. The cables are already installed at the factory, and the user needs to connect them according to the labels.

The communication wiring diagram is shown in Figure 5-6.

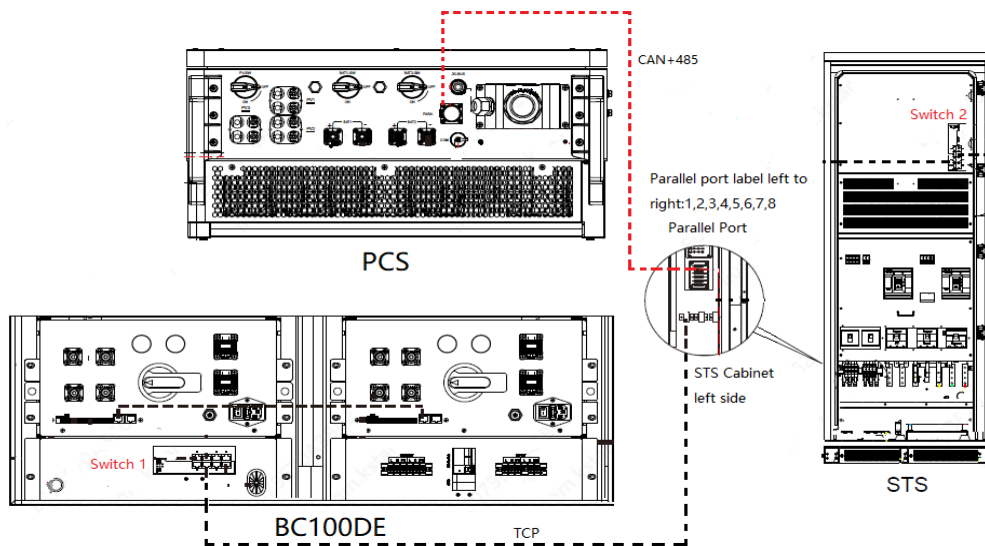


Figure 5-6 Communication wiring diagram

## ⑥ DC power cable

### DC power wiring steps:

Step 1: According to the DC power supply label, lead the DC power supply cable from the STS cabinet into the cable entry hole and into the internal wiring area of the STS cabinet.

Step 2: Use a flat-blade screwdriver to connect the DC power cables in the order labeled.

-- Finish

The DC power cable is between the PCS and STS and is factory-equipped. As shown in Figure 5-7, use a flat-blade screwdriver to connect the cables in the order labeled.

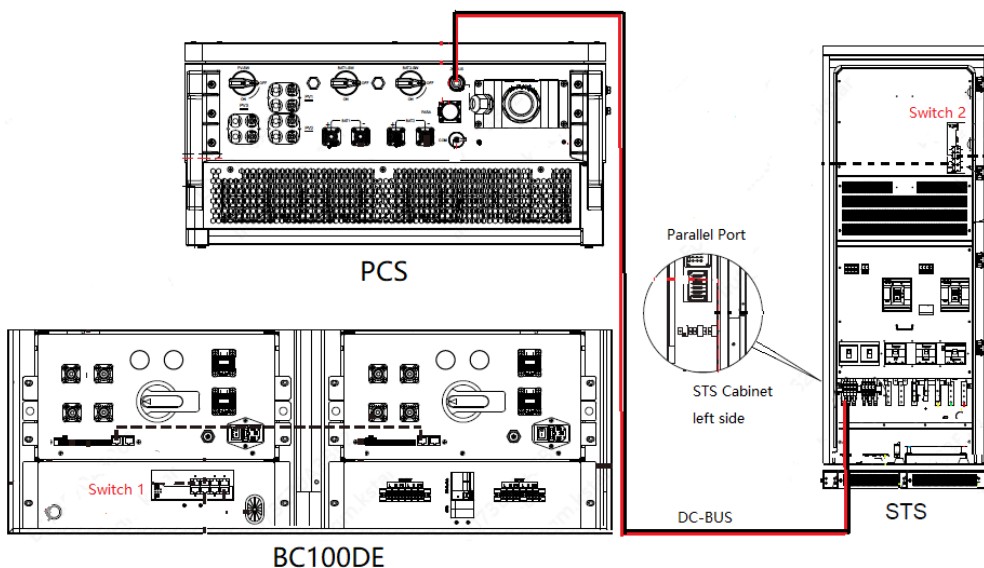


Figure 5-7 DC power wiring diagram

## 5.5 Ground Connection

### 5.5.1 Introduction

#### **WARNING**

Ground connections must comply with the grounding standards and regulations of the country where the project is located.

#### **CAUTION**

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

STS100D static transfer switch cabinet is divided into external grounding and internal grounding.

### 5.5.2 External Grounding

#### **WARNING**

Connect cables strictly in accordance with the wiring markings of the equipment.

Please install the external grounding according to the actual conditions of the project site, follow the instructions of the power station staff, and connect the PE cable to the PE ground copper bar

according to the line mark. The ground resistance must be measured after the ground connection is completed.



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

**WARNING**

During the grounding connection process, if you have any questions, please contact relevant staff in time. Failure to follow installation specifications, or unauthorized installation or modification may result in safety accidents or equipment damage. KSTAR does not assume any responsibility for any losses caused by this.

### 5.5.3 Internal Equipment Grounding

Before delivery, the wiring of the main electrical equipment inside the STS100D static transfer switch cabinet to the grounding terminal has been completed. The connection between STS100D and the earth must be completed on site, and the following operations must be performed on site:

- Ensure the effectiveness of each internal ground connection by measuring the conductivity from the ground terminal of each device to the main ground copper bar.
- The shielding layer AND protective layer of each cable connected to STS100D should also be grounded at a suitable location in STS100D.

### 5.6 EMS Interface Definition

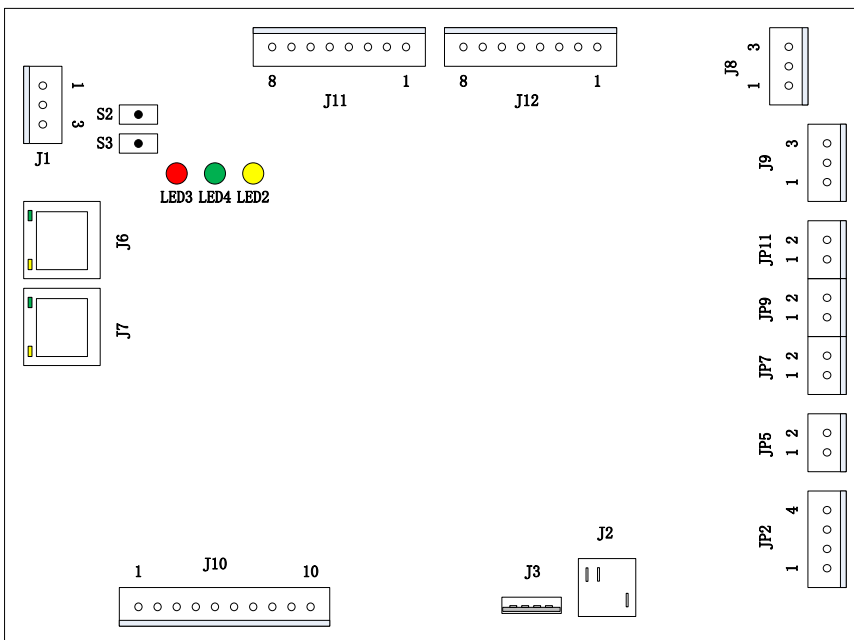


Figure 5-8 EMS-HMI interface diagram

Bit number	Interface name	Pin number	Pin definition	Pin description	Remarks
J1	Power supply input interface	1	GND	Negative pole of power supply	Power supply range is 9-20VDC
		2	PE	Ground pin	
		3	V+	Positive pole of power supply	
J6	Ethernet port 1	/	/	/	10/100M Ethernet port (reserved)
J7	Ethernet port 2	/	/	/	10/100M Ethernet port
J10	Digital input interface	1	AGND	Digital common terminal	8-channel isolated digital input detection port
		2	DI1+	Digital input channel 1 (reserved)	
		3	DI2+	Digital input channel 2 (reserved)	
		4	DI3+	Digital input channel 3 (reserved)	
		5	DI4+	Digital input channel 4 (reserved)	
		6	DI5+	Digital input channel 5 (smoke signal)	
		7	DI6+	Digital input channel 6 (water immersion signal)	
		8	DI7+	Digital input channel 7 (emergency stop signal)	
		9	DI8+	Digital input channel 8 (screen calibration)	
		10	AGND	Digital common terminal	
J3	USB-A standard interface	/	/	To 4G network card	Supports USB1.1 and USB2.0 device access
J2	MICRO-SD card interface	/	/	Used for EMS local upgrade, etc.	Supports MICRO-SD card access
JP2	CAN interface	1	L2	CAN2 differential signal L	Isolated CAN interface 1, connected to X2
		2	H2	CAN2 differential signal H	
		3	L1	CAN1 differential signal L	Isolated CAN interface 2 (reserved)
		4	H1	CAN1 differential signal H	
JP5	RS485 interface 1	1	A1	Channel-1 RS485 signal A	Isolated RS485 interface 1, connects to X2
		2	B1	Channel-1 RS485 signal B	

JP7	RS485 interface 2	1	A2	Channel-2 RS485 signal A	Isolated RS485 interface 2, reserved
		2	B2	Channel-2 RS485 signal B	
JP9	RS485 interface 3	1	A3	Channel-3 RS485 signal A	Isolated RS485 interface 3, reserved
		2	B3	Channel-3 RS485 signal B	
JP11	RS485 interface 4	1	A4	Channel-4 RS485 signal A	Isolated RS485 interface 4, reserved
		2	B4	Channel-4 RS485 signal B	
J9	RS232 interface	1	TXD2	Channel-2 RS232 interface transmission terminal	Isolated RS232 interface, connects to external equipment (reserved)
		2	RXD2	Channel-2 RS232 interface receiving terminal	
		3	GCOM	Channel-2 RS232 interface ground terminal	
J8	RS232 interface - for debugging	1	TXD1	Channel-1 RS232 interface transmission terminal	This isolated RS232 interface is dedicated for debugging. It is not recommended for external equipment (reserved)
		2	RXD1	Channel-1 RS232 interface receiving terminal	
		3	GCOM	Channel-1 RS232 interface ground terminal	
J12	Digital output interface 2	1	COM8	Channel-8 relay output common terminal (4G module enable interface)	Channel 5-8 relay switching output, Normally open output, Capacity is 2A 30VDC/0.5A 125VAC
		2	NO8	Channel-8 relay output normally open terminal (4G module enable interface)	
		3	COM7	Channel-7 relay output common terminal	
		4	NO7	Channel-7 relay output normally open terminal	
		5	COM6	Channel-6 relay output common terminal	
		6	NO6	Channel-6 relay output normally open terminal	
		7	COM5	Channel-5 relay output common terminal	
		8	NO5	Channel-5 relay output normally open terminal	

J11	Digital output interface 1	1	COM4	Channel-4 relay output common terminal	Channel 1-4 relay switching output, Normally open output,  Capacity is 2A 30VDC/0.5A 125VAC
		2	NO4	Channel-4 relay output normally open terminal	
		3	COM3	Channel-3 relay output common terminal	
		4	NO3	Channel-3 relay output normally open terminal	
		5	COM2	Channel-2 relay output common terminal	
		6	NO2	Channel-2 relay output normally open terminal	
		7	COM1	Channel-1 relay output common terminal	
		8	NO1	Channel-1 relay output normally open terminal	
LED3	Fault indicator light	/	/	/	Controllable fault indicator light
LED4	Running indicator light	/	/	/	Controllable running indicator light
LED2	Power indicator light	/	/	/	Power indicator light

Note: When calibrating the screen, short-circuit DI8 and the EMS screen will restart.

Follow the instructions on the screen and click the cursor to perform calibration.

Note: For details on the content distribution and operation methods of the LCD interface, please refer to the EMS operation manual, which is included.

### 5.7 Cabling and Waterproofing

- According to the design of the inlet and outlet holes at the base of the STS100D static transfer switch cabinet, the cables must be laid in the space between STS100D and PCS side, and led into each device through the inlet and outlet holes on the side of the cabinet. In addition, appropriate cables should be selected according to the requirements of each device inside the static transfer switch cabinet.
- Ensure electrical insulation and comply with EMC regulations when wiring. Power cables, power supply and communication cables should be laid in layers. When necessary, provide protection and support for cables to reduce the stress on the cables.
- After confirming that all wiring is correct and secure, the gaps in the cable entry and exit holes of STS100D need to be sealed with bricks or fire clay. The entire installation foundation of STS100D needs to be waterproofed.

## 5.8 Ending Electrical Connections

### **WARNING**

After the electrical connections are completed, the connections of all cables need to be checked. Make sure all connections are correct and tight.

After all electrical connections are made, the wiring should be thoroughly and carefully inspected.

- Use fireproof and waterproof materials to seal tightly the entrance and exit holes of outdoor cabinets and the gaps around them.
- Check that all air inlets and outlets are not blocked by foreign objects.
- Replace all protective covers securely.

### **WARNING**

Failure to seal properly can allow moisture to enter the internal equipment, potentially allowing animals to enter.

After all operations are completed, the cabinet doors and box doors need to be locked.

## 6. Power on/off Operations

### WARNING

Only after confirmation by professionals and permission from the local power department can the STS static transfer switch cabinet be put into operation.

### WARNING

For STS static transfer switch cabinets that have a long downtime, the equipment must be comprehensively and carefully inspected before powering on to ensure that all indicators meet the requirements.

### 6.1 Inspection before Power-on

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

No.	Inspection items	Acceptance criteria
1	Equipment installed in place	The installation is correct, firm and reliable.
2	Reasonable cable layout	The wiring is reasonable and meets user requirements
3	Reliable grounding	The ground wire is connected correctly, firmly and reliably
4	Disconnect switch	All switches are disconnected
5	Cables connected in place	AC output lines, DC input lines, and signal lines are connected correctly, firmly and reliably
6	Seal unused terminals and connectors	Install waterproof covers on unused terminals and connectors
7	Installation environment meets the requirements	The installation space is reasonable, the installation environment is clean and tidy, and there are no construction residues

After all external cable equipment of STS100D is connected, that is, after the external wiring is accurate, the power on and off operation of STS100D must be verified to ensure that the product can operate stably.

### 6.2 Power-on Operation

Grid-tied mode:

Power on sequence:

Step 1: Check and ensure that the switches of all electrical equipment in the STS100D static transfer switch cabinet are disconnected;

Step 2: Close the AC auxiliary power switch, and then check the alarm interface on the screen to see if there are any faults;

Step 3: Close the grid circuit breaker switch and check whether the grid voltage on the EMS screen is normal;

Step 4: If there is a normal power grid, after the contactor of the EMS display screen is closed, close the PCS circuit breaker, the load circuit breaker, and the air conditioner switch. At this moment, check the relevant parameters of the EMS display screen. If they are all normal, click power on;

----Finish

### 6.3 Power-off Operation

Step 1: First, control the cloud platform or touch screen interface to shut down the system,

Step 2: First turn off the PCS switch of STS100D, then turn off the air conditioner power switch, grid switch, grid circuit breaker switch, and finally turn off the AC auxiliary power switch;

Now, the power off is complete.

## 7. Troubleshooting

Table 7-1 Common Fault Types and Solution

Type	Solution
Parallel communication failure	Check whether the parallel communication cable connection is normal
No module fault	Check whether the inverter module is properly connected to the STS cabinet
EPO fault	Manually shut down
EMS communication failure	Check whether the communication cable between the inverter and EMS is normal
Abnormal sampling offset	Replace the main control board
Continuous fault shutdown for 15Min	Manually power on after troubleshooting
Carrier sync failure of slave 1	Check whether the parallel board wiring is correct
Zero-crossing sync failure of slave	Check whether the parallel board wiring is correct
Busbar voltage failure of slave 1	Check whether the parallel board wiring is correct
Communication failure of slave 1	Shut down the machine and check whether the inverter communication cable is normal
Carrier sync failure of slave 2	Check whether the parallel board wiring is correct
Zero-crossing sync failure of slave 2	Check whether the parallel board wiring is correct
Busbar voltage failure of slave 2	Check whether the parallel board wiring is correct
Communication failure of slave 2	Shut down the machine and check whether the inverter communication cable is normal
Carrier sync failure of slave 3	Check whether the parallel board wiring is correct
Zero-crossing sync failure of slave 3	Check whether the parallel board wiring is correct
Busbar voltage failure of slave 3	Check whether the parallel board wiring is correct
Communication failure of slave 3	Shut down the machine and check whether the inverter communication cable is normal
Carrier sync failure of slave 4	Check whether the parallel board wiring is correct
Zero-crossing sync failure of slave 4	Check whether the parallel board wiring is correct
Busbar voltage failure of slave 4	Check whether the parallel board wiring is correct
Communication failure of slave 4	Shut down the machine and check whether the inverter communication cable is normal
Carrier sync failure of slave 5	Check whether the parallel board wiring is correct
Zero-crossing sync failure of slave 5	Check whether the parallel board wiring is correct

Busbar voltage failure of slave 5	Check whether PCS5 is running normally
Communication failure of slave 5	Shut down the machine and check whether the inverter communication cable is normal
Grid UV voltage too high fault	Shut down the machine and check the voltage at the grid connection point
Grid VW voltage too high fault	Shut down the machine and check the voltage at the grid connection point
Grid WU voltage too high fault	Shut down the machine and check the voltage at the grid connection point
Grid UV voltage too low fault	Shut down the machine and check the voltage at the grid connection point
Grid VW voltage too low fault	Shut down the machine and check the voltage at the grid connection point
Grid WU voltage too low fault	Shut down the machine and check the voltage at the grid connection point
Grid frequency too high fault	Shut down the machine and check the grid voltage
Grid frequency too low fault	Shut down the machine and check the grid voltage
STS overcurrent fault	Shut down the machine and check whether the STS input and output are short-circuited or overloaded
STS transformer over-temperature fault	Shut down the machine and check whether the STS transformer temperature is too high
STS overload fault	Shut down the machine and check whether the STS input and output are short-circuited or overloaded
STS thyristor open circuit fault	Check whether the thyristor has open circuit
STS thyristor short circuit fault	Check whether the thyristor has short circuit
STS fan alarm	Check whether the fan is running normally
Grid circuit breaker tripping alarm	Check whether the grid circuit breaker is disconnected
Bypass circuit breaker tripping alarm	Check whether the bypass circuit breaker is disconnected

## 8. Routine Maintenance

### 8.1 Instructions before Maintenance

#### WARNING

- Please do not open the outdoor cabinet for maintenance in rainy, humid or windy weather. If it cannot be avoided, KSTAR will not be responsible for any losses caused by disconnecting the AC and DC side switches.
- Avoid opening the cabinet door when the humidity is high in rain, snow or fog. After closing the cabinet door, make sure that the sealing strips around the door do not curl.

#### WARNING

After the static transfer switch cabinet is completely powered off, you need to wait for at least 10 minutes before repair and inspection, so that the internal capacitor on the STS side can be discharged. Before removing the dust, please use a multimeter to measure and confirm that the inside of the machine is completely de-energized to avoid electric shock.



When the weather is fine, it is recommended to open the cabinet door to ventilate and dehumidify the equipment.

### 8.2 List of Cabinet Maintenance Items and Cycle

The following maintenance items are recommended maintenance cycles. The actual maintenance cycle should be adjusted based on the specific installation environment. Factors such as the on-site environment will affect the maintenance cycle. If the operating environment is sandy or dusty, it is necessary to shorten the maintenance cycle and increase the frequency. If STS100D is installed in a desert area, it is recommended that the inside and outside of STS100D be carefully inspected and thoroughly cleaned after each sandstorm.

#### 8.2.1 Maintenance Work (Annual)

Item	Method
Cabinet exterior	Check the following items. If they do not meet the requirements, correct immediately: <ul style="list-style-type: none"> <li>• Check the top of the STS cabinet for flammable objects.</li> <li>• Check whether the welding joints between the STS cabinet and the foundation steel plate are firm and whether there is any corrosion.</li> <li>• Check the STS cabinet body for damage, peeling paint, oxidation, etc.</li> <li>• Check whether sealing strips are properly fixed.</li> <li>• Check whether the air inlet and outlet of the STS cabinet are</li> </ul>

Item	Method
	blocked.
Cabinet interior	<p>Check the following items. If they do not meet the requirements, correct immediately:</p> <ul style="list-style-type: none"> <li>• Check whether there are foreign objects, dust, dirt and condensation inside the STS cabinet, which need to be cleaned.</li> <li>• Check whether the STS cabinet and internal equipment are damaged or deformed.</li> <li>• Check whether there are any abnormal noises from the internal equipment during operation.</li> <li>• Check whether the temperature inside the STS cabinet is too high.</li> </ul>
Air inlet and outlet	Check the radiator temperature and dust. If necessary, use a vacuum cleaner to clean the cooling module, etc.
Wiring and cable arrangement	<p>It is necessary to wait until the internal equipment of the system in the STS cabinet is completely powered off before starting the inspection work! If any non-compliance is found during inspection, correct it immediately.</p> <ul style="list-style-type: none"> <li>• Check whether the cable arrangement is standardized and whether there are short circuits, etc. If there are any abnormalities, correct immediately.</li> <li>• Check whether all cable entry and exit holes of the STS cabinet are well sealed.</li> <li>• Check whether there is water leakage inside the STS cabinet.</li> <li>• Check whether the power cable connections are loose and retighten to the previously specified torque.</li> <li>• Check whether the power cables and control cables are damaged, especially whether there are cuts on the skin in contact with the metal surface.</li> <li>• Check whether the insulation wrapping tape of the power cable terminal block is peeled off.</li> </ul>
Grounding and equipotential bonding	<ul style="list-style-type: none"> <li>• Check whether the grounding connection is correct. The grounding resistance should not be greater than <math>4\Omega</math>.</li> <li>• Check whether the equipotential connections within the integrated energy storage system are correct.</li> </ul> <p>If any abnormality occurs, it needs to be corrected and replaced in a timely manner.</p>
Fan	<ul style="list-style-type: none"> <li>• Check the operating status of the fan.</li> <li>• Check to see if the fan is blocked.</li> <li>• Check whether there is any abnormal noise when the fan is running.</li> </ul> <p>If it cannot rotate or the fan blades are damaged, the fan needs to be replaced.</p>

Item	Method
Warning signs	Check whether warning signs and labels are clearly visible and not defaced. Replace if necessary.
Grounding of cable shielding layer	<ul style="list-style-type: none"> <li>• Check the grounding of cable shielding layer is grounded. Check whether the cable shielding layer and the insulating sleeve are in good contact.</li> <li>• Whether the grounding copper bar is fixed in place.</li> </ul> If any abnormality occurs, it must be corrected and replaced in a timely manner.
Lightning protection equipment and fuses	Check whether the lightning protection equipment and fuses are properly tightened. If any abnormality occurs, it must be corrected and replaced in a timely manner.
Corrosion	Check whether there is oxidation or rust inside the STS cabinet. If any abnormality occurs, it must be corrected and replaced in a timely manner.
Check door locks and hinges	Check whether the door locks and hinges of the integrated energy storage system can be used normally and are in good condition. If necessary, properly lubricate the door lock hole, hinges, etc.
Check sealing strips	The sealing strip in good condition is an important guarantee for effectively preventing water seepage inside the container. It should be carefully checked. If there is any damage, replace it immediately.
Screws	Check whether there are any loose screws inside the STS cabinet. If any abnormality occurs, it must be corrected and replaced in a timely manner.
Other situations	<ul style="list-style-type: none"> <li>• Regularly check whether there is a pungent smell in the STS cabinet and whether there is any burning at the high-voltage connection part.</li> <li>• Regularly check whether the EMS monitoring voltage, temperature and other related parameters are normal, and whether there are any abnormal alarms in the alarm column. If there is a problem, troubleshoot it first.</li> </ul>

### 8.2.2 Maintenance Work (Semi-annual)

Item	Method
Safety features	<ul style="list-style-type: none"> <li>• Check the function of emergency stop button.</li> <li>• Simulated shutdown.</li> <li>• Check the warning signs on the machine body and other equipment signs. If any problems are found, correct them in time.</li> </ul>
Internal component inspection	<ul style="list-style-type: none"> <li>• Check the cleanliness of the circuit board and components.</li> <li>• Check whether the appearance, status and function of the switch and circuit breaker are normal. If necessary, replace the circuit breaker that meets the requirements.</li> <li>• Check radiator temperature and dust. If necessary, use a vacuum</li> </ul>

Item	Method
	cleaner to clean the cooling module, etc. • If necessary, replace the air filter. Note! Ventilation of the air inlets must be checked. If the module cannot be effectively cooled, it will fail due to overheating.
Device maintenance	<ul style="list-style-type: none"> <li>• Routinely inspect all metal components for corrosion (every six months).</li> <li>• Annually inspect the contactors (auxiliary switches and micro switches) to ensure their mechanical operation in good condition.</li> <li>• Check operating parameters (especially voltage and insulation, etc.).</li> </ul>

### 8.3 Other Maintenance Precautions

In order to maintain the system safely and effectively, maintenance personnel are required to carefully read and comply with the following safety requirements:

1. Only personnel holding an electrician certificate issued by the Work Safety Supervision Bureau and having passed professional training can start work.
2. Comply with relevant safety precautions, use necessary tools, and wear personal protective equipment.
3. Before performing maintenance, disconnect all high- and low-voltage switches.
4. When cleaning, it is strictly forbidden to use water to clean directly. If necessary, use a vacuum cleaner.
5. When plugging and unplugging cables, do not apply brute force or violence.
6. After maintenance, please clean tools and materials in time and check whether there are any metal objects left inside or on top of the equipment.
7. Regularly check whether the status of the STS static transfer switch cabinet and the alarm indicator light are intact and whether the functions are normal.
8. If you have any questions about the operation and maintenance of the equipment, please contact the KSTAR Customer Service Center. Unauthorized operation is strictly prohibited.



#### **WARNING**

When performing routine maintenance, inspection and other work on the internal equipment of the static transfer switch cabinet, once any non-compliance is found, please correct it immediately. If you have any questions, please contact KSTAR immediately.

## 9. Appendix

### 9.1 Single Cabinet Parameters

(Authentication parameters are consistent, table)

Model	STS100D
Parameters	
Rated grid voltage	400 V
Rated grid current	144A
Grid voltage range	340~440V
Rated power	100KVA
Maximum current (charge + load)	288A
Rated grid frequency	50Hz/60 Hz
Grid switch switching time	≤20ms
PCS circuit breaker (rated current)	125A*2
Grid circuit breaker (rated current)	400A
Oil engine circuit breaker (rated current)	400A
PV inverter circuit breaker (rated current)	200A
Load circuit breaker (rated current)	200A
Bypass circuit breaker (rated current)	200A
Transformer	100K
Isolation method	Isolation
Cabinet size (W×H×D)	900*2380*930mm
Weight	852kg
Protection level	IP54
Lightning protection level	II
Anti-corrosion level	C4
Communication	Ethernet, RS485, CAN
Operating humidity range	0%~100% (no condensation)
Operating temperature range	-25°C~+60°C
Cooling method	Air cooling
Working altitude	≤3000m
Installation method	Tower type

## 9.2 Tightening Torques

In order to prevent the wiring copper nose from loosening due to force, causing poor contact, or increasing contact resistance, causing heat or even fire, it is necessary to ensure that the following torque requirements are met when tightening the screws of the wiring copper nose:

**Unit: (N·m)**

Screw size	Torque	Screw size	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 nose, the cables should be fixed at appropriate position.

## 9.4 Quality Assurance

For products that fail during the warranty period, Shenzhen Kstar New Energy Co., Ltd. (the "Company") will repair or replace new products free of charge. During the warranty period, the Company will ask the customer to show the invoice and date of purchase of the product. In addition, the trademark on the product should be clearly visible, or we have the right not to provide quality assurance.

- Replaced defective products shall be handled by our company
- Customers should allow us reasonable time to repair malfunctioning equipment

In the following situations, the warranty is invalid:

- Free warranty period of the machine and components has expired
- Transport damage
- Improper installation, modification or use
- Operation in very harsh environments beyond those described in this manual
- Machine failure or damage caused by installation, repair, modification or disassembly by unauthorized service agencies or personnel
- Beyond the installation and use scope specified in relevant international standards
- Damage caused by abnormal natural environment

If the product failure occurs due to the above conditions and the customer requires maintenance services, we can provide charged maintenance services after confirmation by our service organization.

The product dimensions and parameters are subject to change without prior notice.

## 9.5 Contact

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

- Equipment model
- Serial number
- Fault code/name
- Brief description of the fault

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※The product dimensions and parameters are subject to change without prior notice.