

Static transfer switch

Static transfer switch (63-125A) single-phase

USER MANUAL

Revised records

NO.	Date	Revision version	Description	Author
1	2022.06.13	V1.0	first draft	Bob li
2				
3				
4				
5				
6				
7				
8				

**Please read this user manual carefully before installing and using
the product**

introduction

In many important occasions, the reliability of the load of electricity consumption is very important. In order to improve the reliability of the load, the general power supply system adopts dual power supply, such as dual main power, one main power and UPS. However, the more reliable method is to use dual UPS power supply, such as many IDC computer rooms, bank business outlets, telecommunications, mobile, and many important loads in the power systems. For dual power supply, how to safely, quickly and effectively switch directly affect load reliability, especially many equipment acceptable outage time is extremely demanding, such as: outage time cannot exceed 10ms, in the face of this requirement, ordinary ATS mechanical contacts is not bear, and high speed static no contact STS and rapid power detection can quickly, safely and effectively realize double power switch.

This manual provides the customer with the necessary installation, operation and maintenance technical information for STS. Read this manual before operating the machine, and keep it properly for further use.

- ◆ Do not install, operate, maintain, or check this product until you have carefully read this manual and can use it correctly
- ◆ Follow the warnings and instructions indicated in the product and the accompanying prints
- ◆ The front-stage power supply must be disconnected before wiring
- ◆ STS must be reliably grounded
- ◆ After the converter switch is cut off, there will still be high pressure inside. Do not open the chassis and touch the internal devices to avoid causing harm to the operator and the product
- ◆ Keep away from water, steam, other liquid substances, corrosive gases, dust, and flammable and explosive substances
- ◆ Installation cables must meet the requirements, please do not overload the work, to avoid fire and electric shock accidents
- ◆ This product must be used indoors

OOBA

STS has been strictly inspected before leaving the factory, but may be damaged during transportation. Therefore, please check whether the following items are complete, and confirm whether the model, capacity, input voltage are consistent with the content specified when ordering; if there is any abnormality or inconsistent contents, please contact the dealer or the manufacturer as soon as possible.

- ◆ Complete case
- ◆ Product use manual or electronic version
- ◆ Certificate and product specification label
- ◆ List of supporting parts and packing of products
- ◆ Other attachments as specified in the order

Statement: Due to the continuous update and improvement of products and technology, the content in this information may not be completely consistent with the actual product, please understand. To check the product updates, please contact the manufacturer.

catalogue

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1. STS (static transfer switch) introduction

1.1 General description

STS is a dual-input AC converter switch, and the other way is disconnected, and the one AC input is used to power the load. When the power supply supply is abnormal, STS will automatically switch to the other power supply to ensure that the load is continuously supplied by the other power supply.

The high-speed static contact-less switching principle design adopted by STS AC dual power switching device has the following characteristics

- ◆ Adopt full digital control, strong anti-interference ability, fast operation speed;
- ◆ Switch time $\leq 4\text{ms}$, high reliability;
- ◆ Strong overload capacity, can withstand the full load boot;
- ◆ With the input of under-pressure, over-current and other protection functions;
- ◆ The front panel is equipped with a display screen and an indicator light to intuitively understand the STS status information;
- ◆ Provide fire line, zero line can be switched simultaneously STS version, appearance structure, performance is exactly the same.

1.2 Function description

The high-speed static contact-less switch principle adopted by STS is designed to realize the safe and fast switching of AC power supply, ensuring the 4ms switching in the case of resistance load, perceptual or capacitance load.

The basic principle box of STS is shown in Figure 1-1. The input power loop I (hereinafter referred to as the main power supply) and the input power loop II (hereinafter referred to as the standby power supply) are respectively connected in parallel to the output end by the static switch. Two independent auxiliary power inputs are taken from I and II roads respectively, and they supply the logic circuit inside the device to ensure that the internal logic is not affected when any input power is lost.

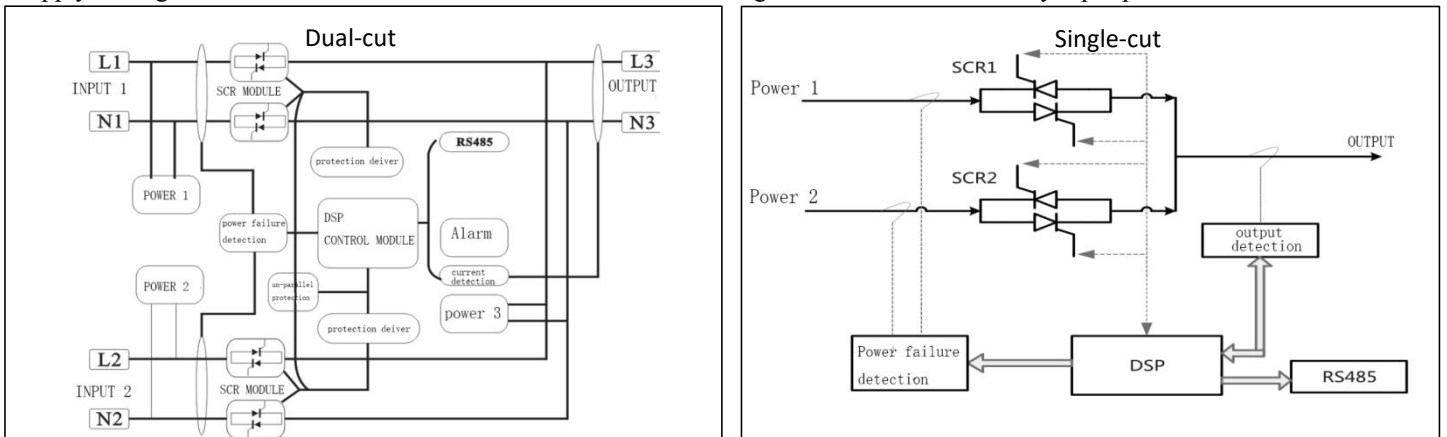


Figure 1-1 Block diagram of the STS principle

(Note: The single cut static switch is only switching the fire wire, the co-zero line.)

When the STS is working normally, the DSP core control unit monitors that the main power input is normal, the static switch of the control main power circuit is closed, the static switch of the standby circuit is turned off, and the main power output supplies power to the load.

When the STS is working normally, when the DSP core control unit monitors that the main power supply input is abnormal, and also monitors that the standby power supply input is normal, the static switch of the control main power supply circuit is disconnected, the static switch of the standby circuit is closed, and the standby power supply output supplies power to the load.

When STS works normally, if the main power supply is lost or under-voltage, the DSP core control unit monitors the main power input and the control unit automatically seeks to switch, if the static switch of the standby power circuit is disconnected, the static switch of the main power circuit is closed, and restore the main power output to the load.

Model 2 description

ST5125 S M

1 2 3

- (1) ST5125: represents the STS rated output current of 125A, this series of STS includes 63A / 80A / 100A / 125A. Customers can customize the current specifications.
- (2) S: Two-road input co-zero line, can only switch the fire line;
D: Fire wire and zero line can be switched at the same time;
Default is S, only switch the fire wire.
- (3) M: LCD display, blank is no display, UP-ST5 125 series STS by default have display

The main models of the UP-ST5 125 series static converter switch are shown in the following table:

model	Rated output current (A)	Allow the output current (A)	output power (VA/W)	Rated input voltage (VAC)
UP-ST5 063SM UP-ST5 063DM	63	69	15000	220
UP-ST5 080SM UP-ST5 080DM	80	88	19000	220
UP-ST5100SM UP-ST5100DM	100	110	24000	220
UP-ST5125SM UP-ST5125DM	125	125	27500	220

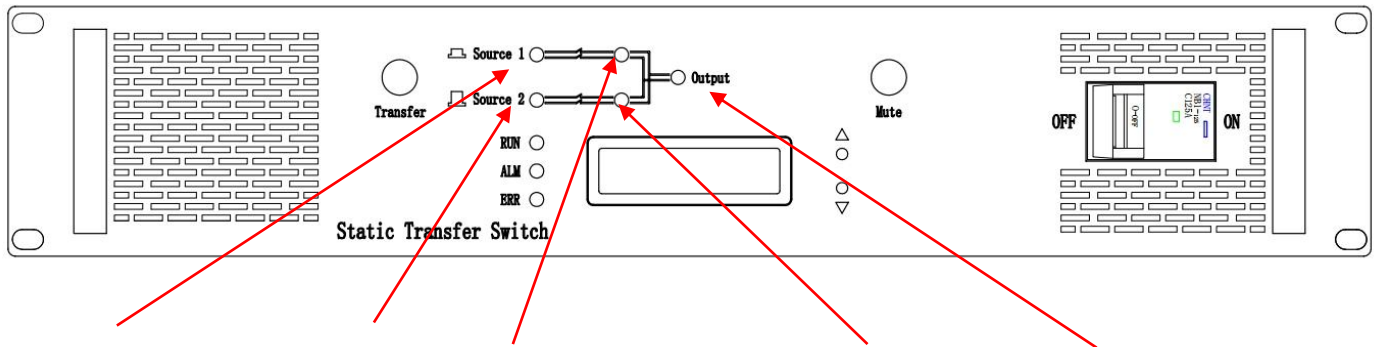
3. main technical parameters

Items		Technical Parameters
Switch time	Priority switching	$\leq 4\text{ms}$
AC INPUT	Rated voltage (VAC)	220
	Input voltage range (VAC)	190~260
	rated frequency (Hz)	50
	power factor	1
	Auto convert threshold voltage	$\leq 190\text{Vac} \pm 5\text{Vac}$ or $\geq 260\text{Vac} \pm 5\text{Vac}$
	Auto convert threshold frequency	$\leq 45\text{Hz} \pm 0.2\text{Hz}$ or $\geq 65\text{Hz} \pm 0.2\text{Hz}$
	Over-limit protection shutdown threshold voltage	160Vac or 265Vac, return $\pm 5\text{V}$
	Over-limit protection shutdown threshold frequency	45Hz or 65Hz, with differential $\pm 0.2\text{Hz}$

	overload capacity	Load current is 110%, operating continuously Load current > 110%, immediately shut-off;
Environment	insulation strength	2KVAC, 1min
	Noise (1m)	≤55dB
	operating ambient temperature	-25~50°C
	Transport and storage temperature	-40~70°C
	humidity	0~90%, with no condensation
	levels of protection	IP20
	height (m)	≤3000 2000~3000m Output reduction of 2% per 100m increase
defensive function		Input under voltage, over voltage protection, output overload protection, over temperature protection, short circuit protection

4. Description of front and rear panels

4.1 LED (indicator lamp) display



Thread-1 input power status indicator lamp	Thread-2 input power status indicator lamp	Thread-1 power supply work indicator lamp	Thread-2 power supply work indicator lamp	Output indicator light
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- ◆ Thread-1 power status indicator lamp (normally green.)
- ◆ Thread-1 power supply work indicator lamp (power supply state green light on, Route 2 state light off)
- ◆ Thread-2 input power status indicator lamp (normally green.)
- ◆ Thread-2 power supply work indicator lamp (power supply status green light on, Route 1 state light off)
- ◆ STS output indicator (green light when STS has output, red light when no output)

4.2, Front panel, schematic diagram

The front panel is shown in Figure 4-2.

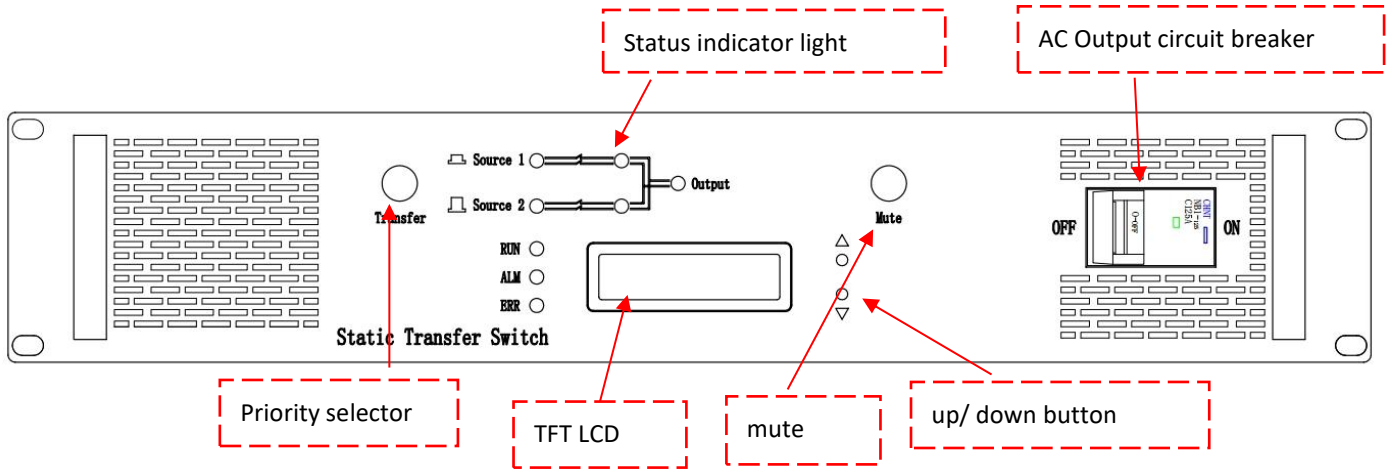


Figure 4-2, schematic diagram of front panel

RS485 terminal definition: from left to right, then, RS485 +, RS485-, the basic definition is as follows:

No.	name	definition
1	Communication protocol	MODBUS
2	Baud rate	9600bps
3	address	The default is 0x50 (16 x) and can be set via the display

4.3 Operation instructions of the display screen

(1) The display panel diagram of the module is shown in Figure 4-2 above.

Specific functions of the keys:

up: Press the "▲" and release it quickly

down: Press the "▼" and release it quickly

Confirm: Hold down the "▼" above 1s and release

Enter or exit the add or subtract mode: press "▲" button 1s, release

Add: In add and subtract mode, press "▲" and release it quickly

Reduction: In add or subtraction mode, press "▼" and release quickly

(2) After startup, the display screen is kept in the first main interface, and displays the basic output information of the module, as shown in Figure 4-3.

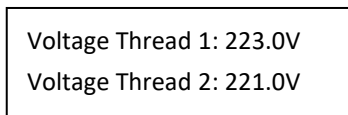


Fig. 4-3. Main interface

(3) There are 5 information display interfaces of the module, which can be switched through the "up" and "down" functions. Switched successively to the interface shown in Figures 4-4,4-5,4-6,4-7.

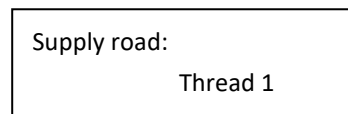


Fig 4-4

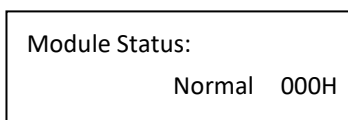


Fig 4-5

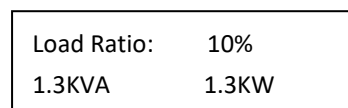


Fig 4-6

Output voltage: 222.3V
Output current: 006.0A

Fig 4-7

For the MODBUS communication address page, see Figure 4-8, and you can change the address on this page.

Module Address:
0x0050

Fig 4-8

4.4, rear panel

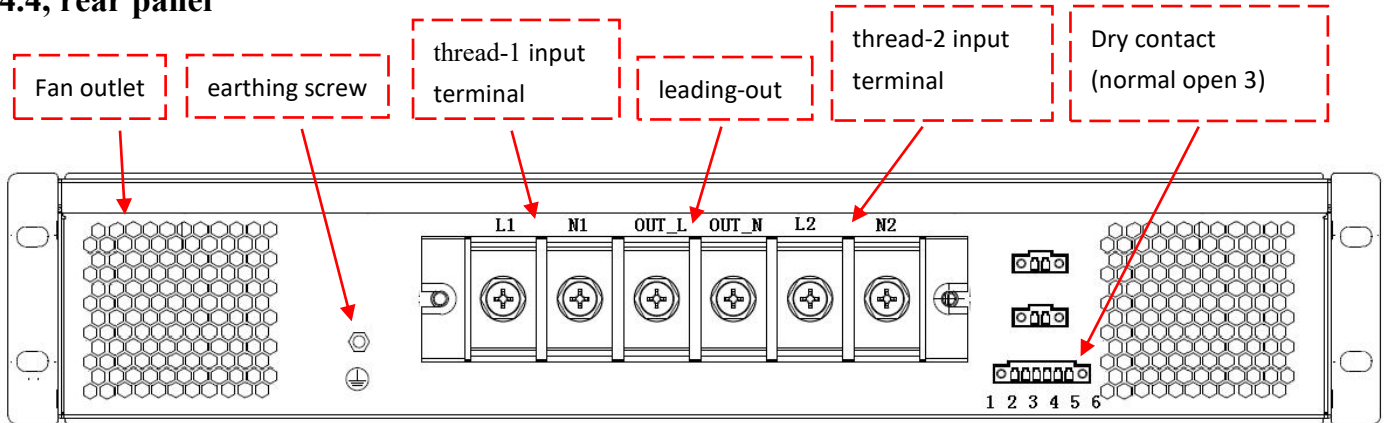


Figure 4-9 schematic diagram of rear panel

4.5 Wiring instructions

The terminal schematic diagram is shown in Figure 4-9 above. When the STS is a single cut fire wire version, ensure that two AC input use common zero lines before wiring.

Connect to the input and output lines according to the terminals of Figure 4-9. Fire wire and zero line can not be wrong, and the ground wires need to be reliably connected.

The dry contact is defined as follows:

order No.	Terminal serial No.	definition
1	1, 2	Open dry contact 1 (thread-1 input alarm, alarm when closed)
2	3, 4	Open dry contact 2 (thread-2 input alarm, alarm when closed)
3	5, 6	Open dry contact 3 (no output alarm, alarm when closed)

5. mechanical specifications

5.1 Overall dimensions

Height: 86mm

Width: 486.8mm

Deep: 338mm

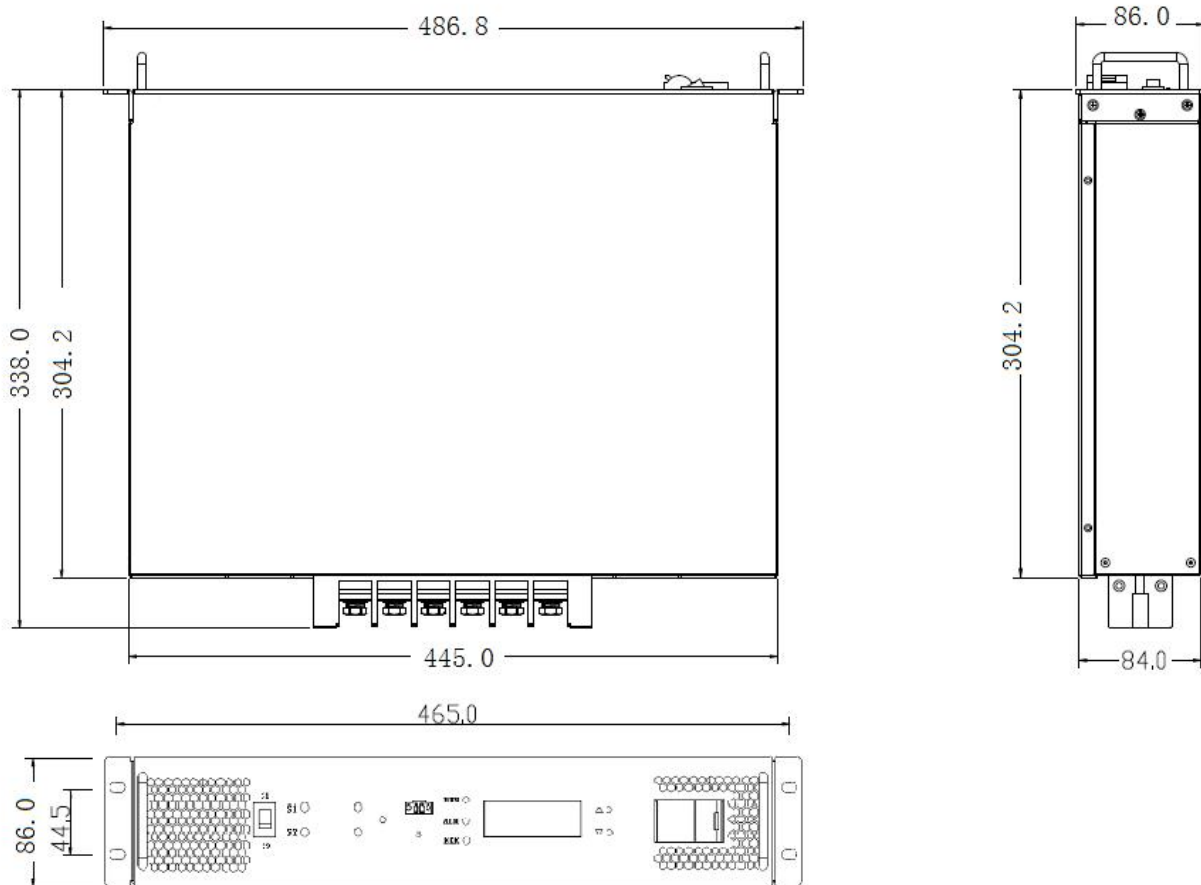


Figure 1-10 Overall dimensions diagram

5.2 module Weight

UP-ST5 125S series STS weight: approximately 5.5KG

UP-ST5 125D series STS weight: approximately 6.8KG

6. environmental conditions

6.1 Working temperature

UP-ST5 125 series STS runs 100% continuously with a maximum ambient temperature of 40°C.

6.2 Non-working temperature

Transport temperature: -20~ + 75°C, but storage is not recommended.

6.3 Working humidity

0~90% relative humidity, no condensation.

6.4 Work height

The elevation is 3,000 m. Above 2000 m, the maximum ambient temperature decreases 1°C per 100 m increase from 40°C (30°C at 3000 m).

6.5 Noise

Less than 60dBA.

6.6 Cooling

Force air cooling. The air inlet of UP-ST5 125 series STS is in the front panel, and the air outlet is located in the back panel of the chassis;

7. User installation and use



The following hazardous operations shall be carried out by professional person.

7.1 Safety precautions

- ◆ This equipment has a potential threat of electric shock or burns. Only fully trained and familiar personnel can install, operate and maintain equipment in the field;
- ◆ To minimize electrical shocks or burns, the required grounding operations and procedures should be strictly followed;
- ◆ All tools and equipment contacting the electrical components shall be insulated or grounded in accordance with the relevant standards;
- ◆ During the installation process, all the power supply of the equipment should be cut off to prevent the electric shock;
- ◆ Ground or discharge the equipment for any operation before having physical contact with the electrical components or wires of the equipment;
- ◆ The use environment of the product shall meet the requirements of GB / T 2421 Electrical and Electronic Products Environmental Test (IEC 60068-1), at least not beyond the scope of this manual, and shall not be flammable, explosive, corrosive gases or articles around;
- ◆ The chassis shell and grounding terminal must be reliably grounded, it is best to directly connect with the special secondary equipment grounding network of the equipment room (or through the special copper row of the screen cabinet), the contact site should be far away from the primary equipment contact site, especially far away from the lightning rod (device) contact site;
- ◆ The input and output terminals of the product have high voltage or high current. Ensure the correct connection and tighten the terminals before formal commissioning. When measuring, instruments and tools should be used carefully to avoid short circuit, grounding and open circuit.

7.2 Unpacking inspection

- ◆ After opening the package, check whether the STS is intact and missing terminals.
- ◆ Check whether the qualification certificate, supporting documents, accessories and spare parts of STS are consistent with the order requirements, and whether they are consistent with the model, name and quantity described in the packing list.
- ◆ Contact the equipment manufacturer if questions.

7.3 Installation and commissioning

(1) Prepare before installation

Product specification labels are generally labeled with rated voltage, power and other data, users must carefully check the load power when using, so as not to cause overload. The actual power of the load equipment in the general operation state,

especially in the standby state, is lower than the marked power, and the user should use the nominal power of the equipment, while considering the impact current of the equipment when starting, it is best to leave 30% of the power margin to ensure the reliable power supply of the switching module.

(2) Installation

- ◆ The device shall be firmly fixed on the screen (cabinet), and each connecting screws shall be fastened;
- ◆ The device shall be reliably connected to the screen (cabinet) with the grounding wire and the grounding busbar and the system earth;
- ◆ The unit wiring shall meet the wiring diagram (see the attached page).

(3) Check before the power-on

- ◆ Check whether the input and output terminals of the device are correct;
- ◆ Verify that the voltage range of the input power supply meets the device requirements;
- ◆ Verify that the input empty is in the disconnected position and the output load is disconnected;

(4) Power-on inspection of the device

- ◆ Close the main power supply and then open it empty. Observe the indicator light on the device panel, the main power supply indicator light green light and the main power supply operation indicator light light green light;
- ◆ Close the standby power supply, the standby power indicator is on green, the standby power working light is off;
- ◆ Measure whether the output voltage amplitude and polarity are normal;
- ◆ Output end with load, measuring whether the output voltage is normal;
- ◆ Test whether the dual-circuit power switching function is normal according to the method in Section 8.4, Regular Annual Inspection;
- ◆ The power-up process ends.



7.4 Regular annual inspection

The AC dual-power switching device has extremely high reliability requirements. Once the failure occurs, it often causes serious consequences. Therefore, the user is required to conduct a function test every certain time (generally limited to 1 year).

Functional inspection methods are as follows:

- ◆ Determine the device input is dual normal voltage, output with normal load;
- ◆ Observe the state of the panel indicator light, disconnect the main power supply, the device should immediately switch to the backup power supply, the main power supply indicator light flashing red, the main power supply working light is off, the standby power supply working light is green;
- ◆ Measuring the output voltage, 1~2V lower than the input voltage is in the normal range;
- ◆ Close the main power supply, the main power supply indicator light, the main power supply work indicator light, the standby power supply working light is off, the output power supply is switched from the standby power supply to the main power supply;
- ◆ Measure whether the output voltage is in the normal value;
- ◆ Disconnect the standby power supply, the standby power indicator flashing red, the device has no switching action;
- ◆ Measure whether the output voltage is in the normal value again;
- ◆ Close the standby power supply and end the inspection process.

During the whole test, the device should be switched reliably, with no abnormal conditions in the load equipment and no abnormal alarm status in the panel.