

OPERATION MANUAL

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Safety requirements

Machine case disassembly is strictly forbidden unless done by personnel authorized by the company to prevent electric shock. Please don't use or install substitute parts on the product based on your own decision or execute any unauthorized amendments.

Return the product to the company's need to repair the maintenance department to ensure its security features

If there is any part inside the product that no operator that can handle properly, please consult trained professionals when maintenance is required.

Safety Logo

Please consult warnings or precautions items designated in this manual to avoid physical injury or product damage:



High-voltage warning



Note for a dangerous situation



Note for a general condition.



Ground protection



Operation instruction

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1 Unpacking and inspection

1.1 Notes for unpacking

- During the disassembling process, it is forbidden to tilt the machine case over 45 degree;
- Use a wrench or a claw hammer to remove the retaining screw or iron nail on the wooden box.

1.2 Inspection Content

- Inspect whether the product specification is in line with the order requirements;
- Inspect whether the products are damaged; if so, please contact the dealer for treatment; Inspect whether the standard accessories and materials are complete according to the packing list.

● 2 Overview

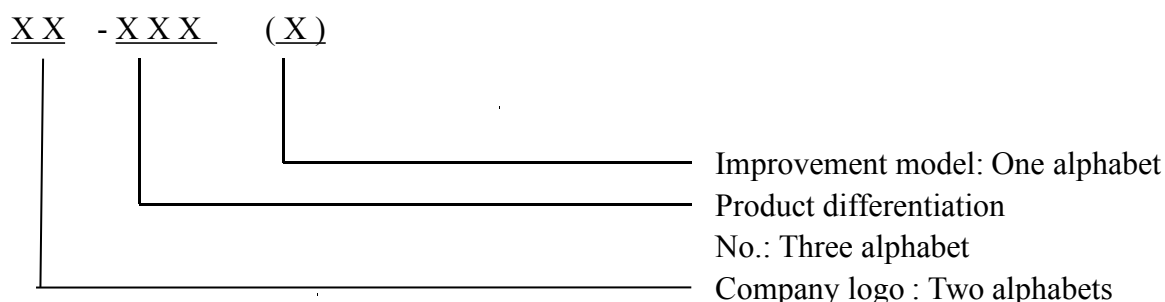
● 2.1 Product characteristics

- High-frequency SPWM hardware adjustment technology, with rapid response speed and stable output;
- High-power MOS/IGBT drive, with reliable operation and high over-load capacity;
- Applicable for various loads, such as resistive, inductive and rectifier loads;
- With over-heat, over-current and short-circuit abnormality protection functions;
- With parameter memory function and shortcut key operation mode, easy and convenient to operate;
- Power source voltage is adjustable on-line and output frequency is selectable;
- Adopting very bright LED display, which is clearly visible; with large viewing angle, suitable to be used for production line;
- Having RS 232 communication interface and the baud rate can reach 9600.

2.2 Main purpose and application scope

- Professional laboratory (EMI/EMC/safety certification);
- Manufacturer (quality assurance/life test);
- Export product test, power grid simulation for each country;
- Product development test.

2. 3 Model composition and representation



2. 3. 1 Power Logo

Composed of alphabet, As Example: AC11-XXX。

2. 3. 2 Product differentiation code

Composed of three digits, representing the output capacity (kVA) of variable-frequency power source, wherein, 000 represent 500VA power source.

2. 3. 3 Improvement model

Composed of one alphabet, representing the improvement model of products

2. 4 Working conditions

- Operating temperature: -10 ~ 40 °C
- Relative humidity: 10% ~ 90% RH

2. 5 Product characteristics and working principles

- Adopt hardware waveform synthesis and PID control to realize stable output waveform and high response speed;
- Adopt hardware & software combined power device protection mode to realize rapid and reliable protection;
- Working diagram is as follows:

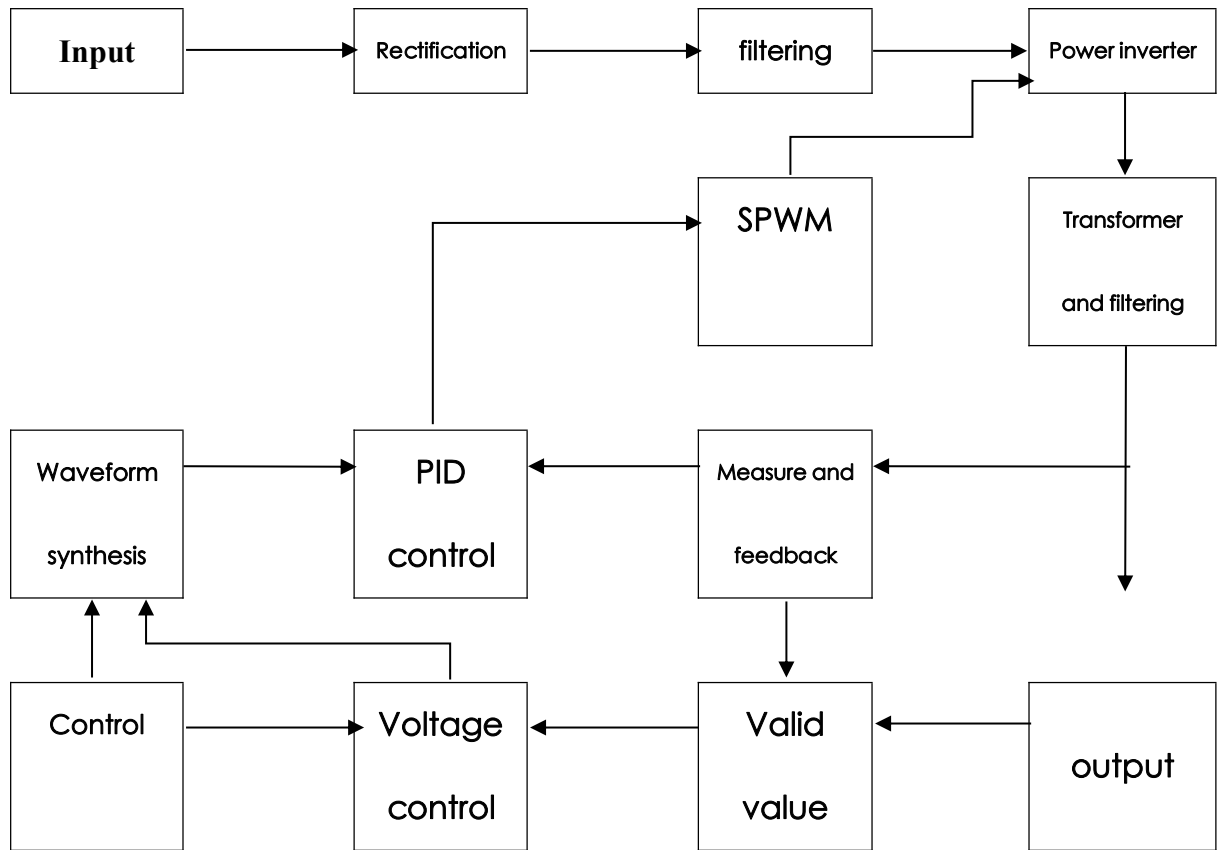


Fig.1 Working diagram

3 Technical characteristics

3.1 Technical specifications

Table 1 General technical specification

| | |
|-----------------------|--|
| Product model | AC11/31programcontrol variable frequency power supply |
| Input power source | $\leq 10\text{KVA}$: single-phase $220\text{V} \pm 10\%$; $50\text{Hz} \pm 5\text{Hz}$ $\geq 10\text{KVA}$: Three-phase $380\text{V} \pm 10\%$, three-phase fourwire + ground wire; $50\text{Hz} \pm 5\text{Hz}$ |
| Output voltage range: | Low gear $1.0 \sim 150.0\text{V}$, High gear $150.1 \sim 300.0\text{V}$ |
| Output frequency | $45\text{Hz} \sim 400\text{Hz}$, Resolution, 0.1Hz ; fixed-frequency output: 50Hz , 60Hz , 400Hz |
| Frequency stability | $\leq 0.1\%$ |
| Voltage stability | $\leq 1\%$ |
| Distortion degree | $\leq 2\%$ (THD) |
| Crest factor | 1.41 ± 0.10 |
| Source voltage effect | $\leq 1\%$ |
| Load effect | $\leq 1\%$ |
| Efficiency | $\geq 90\%$ (For 3kVA and the capacity below is $\geq 80\%$) |
| Frequency display | Four-digit LCD, resolution 0.1Hz ; |
| Voltage display | Four-digit LCD, resolution 0.1V ; |
| Current display | Four-digit LCD, resolution $0.001\text{A}/0.1\text{A}$; |
| Power display | Four-digit LCD, resolution $0.01\text{W}/0.1\text{kW}$; |
| Power factor display | Three-digit LCD, resolution 0.01 ; |
| Pre-setting function | Preset output voltage, output frequency and fluctuation percentage interval of output voltage, Upper limit of output current |
| Short-cut function | Common voltage, frequency conversion; |
| Alarming function | The protective device functions to generate alarming (audio & video) signals and display fault code; |
| Over-load capacity | 15s , 5s over-load protection; |
| Over-heat protection | The temperature of power device is higher than $85^\circ\text{C} \pm 5^\circ\text{C}$ |

| | |
|---|--|
| External communication interface (Optional match) | RS-232C |
| Protection degree of enclosure | IP20 |
| Machine case structure | Desk-top (500VA、1kVA), cabinet-type (with casters) |
| Working environment | Temperature: -10 °C ~ +40 °C ; relative humidity: 10% ~ 90% (40°C) |

Table 2 Single-phase input and single-phase output product specification

| Model | AC11--50 0VA | AC11--1K VA | AC11--2K VA | AC11--3K VA | AC11--5K VA | AC11--10 KVA | |
|-------------------------|-----------------|----------------|----------------|----------------|----------------|-----------------|-------|
| Capacity (kVA) | 0.5 | 1 | 2 | 3 | 5 | 10 | |
| Maximum load current(A) | High gear | 2.08 | 4.16 | 8.33 | 12.5 | 20.83 | 41.66 |
| | Low gear | 4.16 | 8.33 | 16.66 | 25.0 | 41.66 | 83.33 |

Table 3 Three-phase input and single-phase output product specification

| Model | AC31--15 KVA | AC31--20 KVA | AC31--30 KVA | AC31--45 KVA | AC31--60 KVA | AC31--100 KVA | |
|--------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|-------|
| Capacity (kVA) | 15 | 20 | 30 | 45 | 60 | 100 | |
| Maximum load current (A) | High gear | 62.5 | 83.3 | 125.0 | 187.5 | 250.0 | 416.6 |
| | Low gear | 125.0 | 166.7 | 250.0 | 375.0 | 500.0 | 833.3 |

Table 4 Over-load protection characteristics

| Power source specification | Over-load protection conditions |
|----------------------------|--|
| (0.5~5) kVA | Continuous operation condition: $P \text{ output} \leq 1.0P \text{ rated}$ / $I \text{ output} \leq 1.0I \text{ rated}$ |
| | Shut-off output within 15 seconds: $1.0P \text{ rated} < P \text{ output} \leq 1.2P \text{ rated}$ / $1.0I \text{ rated} < I \text{ output} \leq 1.2I \text{ rated}$ |
| | Shut-off output within 5 seconds: $1.2P \text{ rated} < P \text{ output} \leq 2.0P \text{ rated}$ / $1.2I \text{ rated} < I \text{ output} \leq 2.0I \text{ rated}$ |
| | Immediate shut-off output: $2.0I \text{ rated} < I \text{ output}$ |
| 10kVA above | Continuous operation condition: $P \text{ output} \leq 1.0P \text{ rated}$ / $I \text{ output} \leq 1.0I \text{ rated}$ |
| | Shut-off output within 15s: $1.0P \text{ rated} < P \text{ output} \leq 1.1P \text{ rated}$ / $1.0I \text{ rated} < I \text{ output} \leq 1.1I \text{ rated}$ |
| | Shut-off output within 5s: 10kVA~20kVA: $1.1P \text{ rated} < P \text{ output} \leq 1.5P \text{ rated}$ / $1.1I \text{ rated} < I \text{ output} \leq 1.5I \text{ rated}$ 30kVA 及以上: $1.1P \text{ rated} < P \text{ output} \leq 1.2P \text{ rated}$ / $1.1I \text{ rated} < I \text{ output} \leq 1.2I \text{ rated}$ |
| | Immediate shut-off output: $1.5I \text{ rated} < I \text{ output}$ (10kVA~20kVA) $1.2I \text{ rated} < I \text{ output}$ ($\geq 30\text{kVA}$) |

3. 2 Panel description

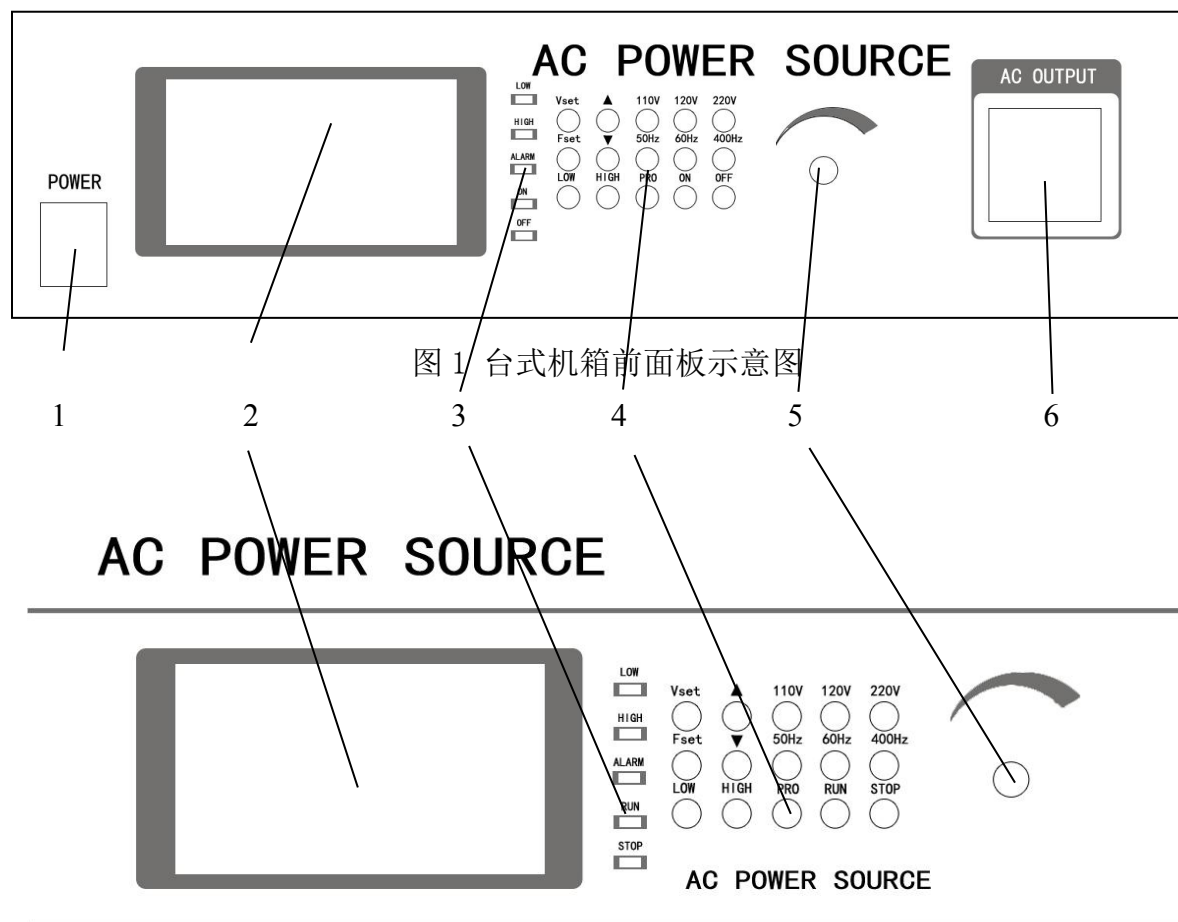


图 1 台式机箱前面板示意图

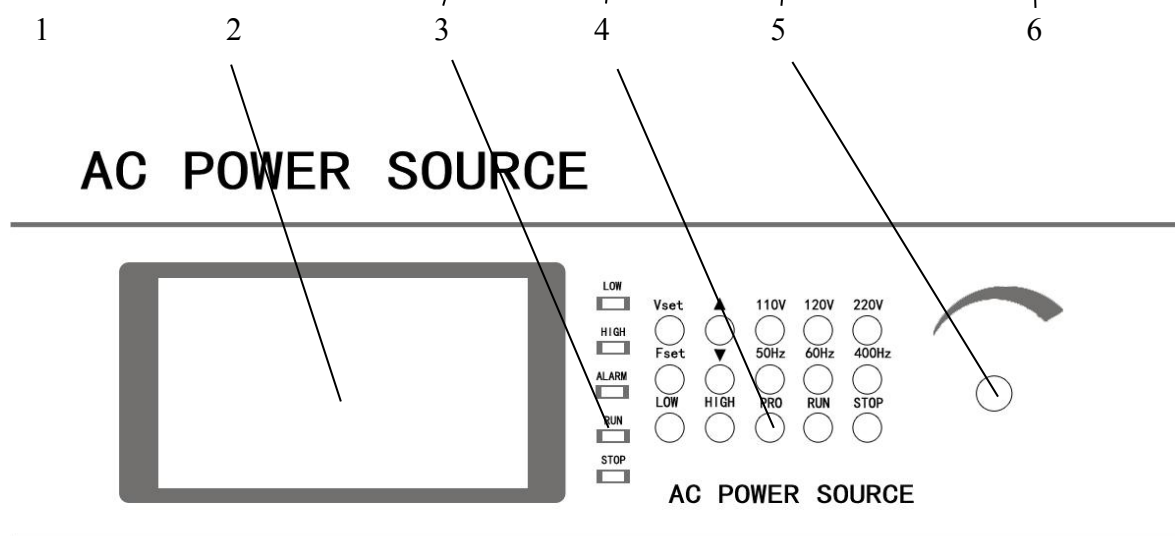


Figure 2 Schematic diagram of the front panel

- 1— power switch (desktop chassis)
- 2— voltage、current、frequency、power、PF etc display window, display setting parameters and output parameters
- 3— output satatues indication
- 4— 15pieces button setting
- 5— output adjustment Shuttle knob
- 6— output socket (desktop chassis)

4 Installation, commissioning

- Connect the variable frequency power source to the electric supply power source which is equipped with protective grounding to ensure the safety of the operators;



- Ensure that the input voltage is in line with the requirements of technical specifications;
- Ensure a clearance of 200mm on both sides and rear side of the power source and ensure proper ventilation;
- In thunderstorm weather, stop the operation of power source and it's better to unplug the power cord as well;
- Avoid direct sunlight exposure, rain or moisture;
- Keep away from fire source and high temperature to prevent over-heating of the machine.

5 Usage, operation

5.1 Basic operation instruction (Take desktop power source as example)



5.1.1 Standby state

Plug the power source and switch on all the operating switches (1) of the power source, input *Switch Ligh* enters into standby state after soft-start delay of about 10 seconds (as shown in Fig. 3).

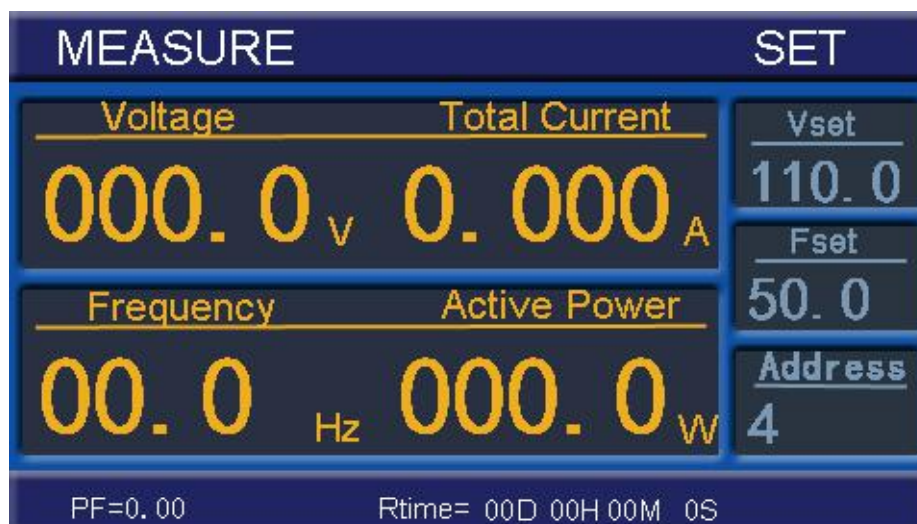


Fig.3 Power standby state

Note

Note: During the soft-start period of variable frequency power source, the key does not respond to any operation;

5. 1. 2 Setting state

5. 1. 2. 1 Press Setting key **Vset** to enter into setting state (as shown in Fig.4), set the voltage , upward & downward fluctuation parameters via pressing the Increase key and Decrease key. After the parameter setting is finished, pressing the **STOP** key can return to standby state again.

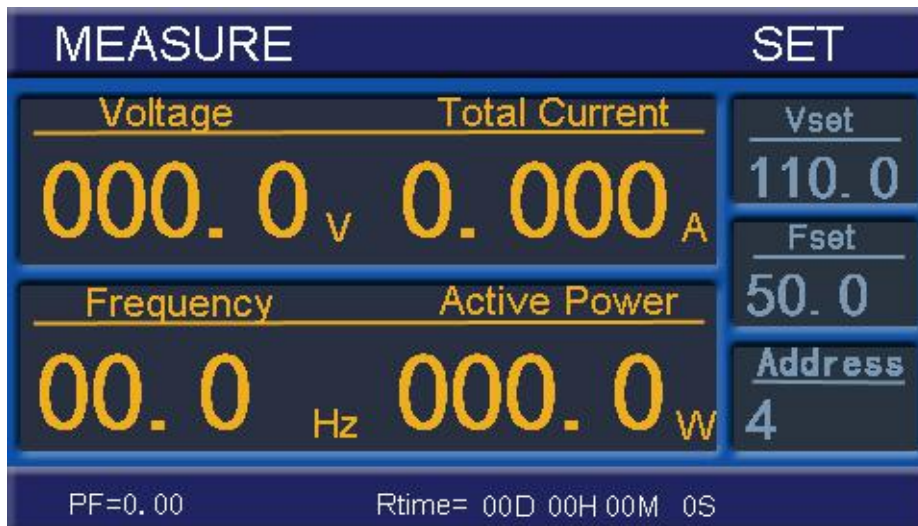


Fig.4 Power Setting state

5. 1. 2. 2 Press Setting key **Fset** to enter into setting state (as shown in Fig.5), set the frequency, upward & downward fluctuation parameters via pressing the Increase key and Decrease key. After the parameter setting is finished, pressing the **STOP** key can return to standby state again.

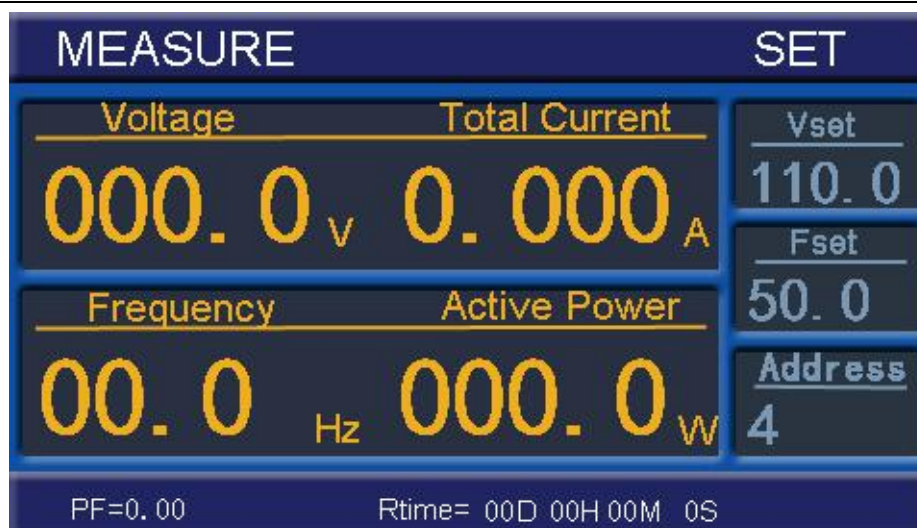


Fig.5 Power Setting state

5. 1. 2. 2 Press Setting key **Pro** to enter into setting state (as shown in Fig.6), set the Postal address , upward & downward fluctuation parameters via pressing the Increase key and Decrease key. After the parameter setting is finished, pressing the **STOP** key can return to standby state again.

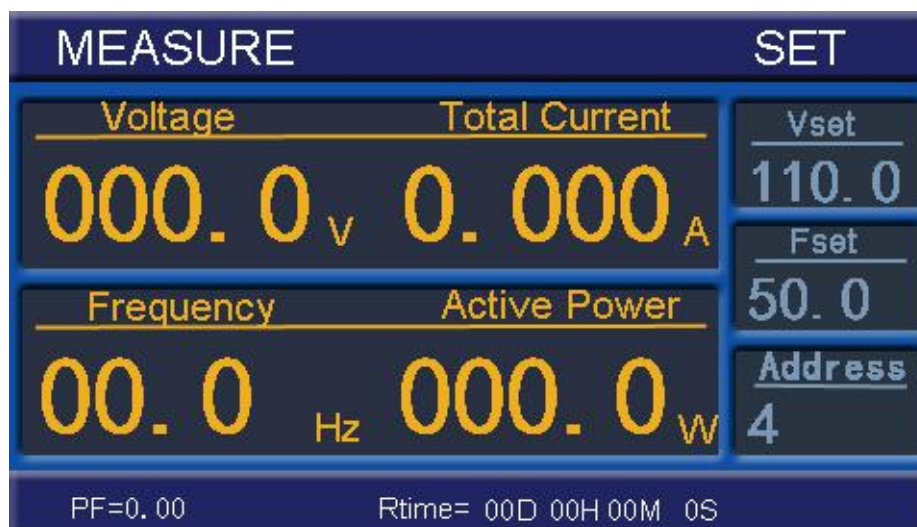


Fig.6 Power Setting state

5.1.3 Operation state

Under standby state, press **ON** key, the screen window displays such output parameters as output voltage, current and power; the variable frequency power source is displayed as shown in Fig.7.

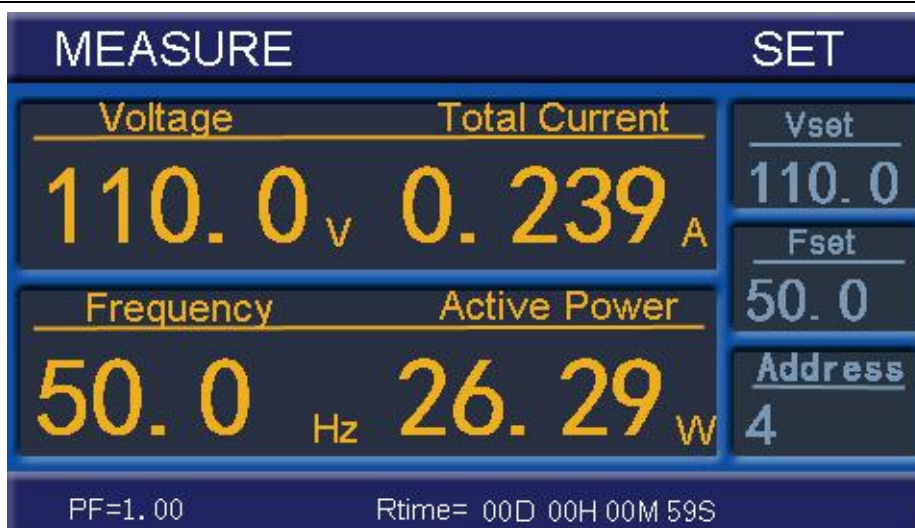


Fig.7 Power starting state



Although the input and output of variable frequency power source is isolated, dangerous voltage still exists at the output end after being started, please remind the operators of the danger!

Stop the operation: Under operation state of the power source, press **Stop** key to stop the power source output and return to standby state.

5. 1. 4 Fault state

When the variable frequency power source fails to work properly, audio & video alarming signals will be generated, the power source enters into fault state and fault code will be displayed and the power source is displayed as shown in Fig.8. Under this condition, press the **Stop** key to eliminate the alarm to return to the standby state.

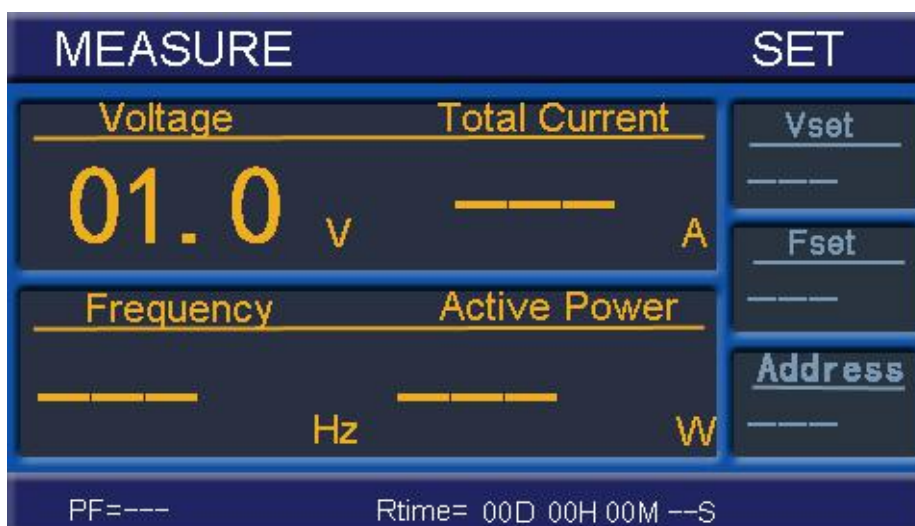


Fig.8 Power supply alarm state

5. 2 Key operation instruction

- Stop** key: a) Stop output under start state;
b) Eliminate alarming signal under alarm state;
c) Exit setting under setting state and record the set parameters.

RUN key: Start the power source under standby state.

Vset Key: the first press **Vset** key processing voltage parameter setting, adjust scope 1.0-300.0V;
The second press **Vset** key return to standby;

Fset key: the first press **Fset** key processing frequency parameter setting, adjust scope 45-400Hz;
The second press **Fset** key return to standby;

PROkey: the first press **PRO** key make communication address parameter setting, adjust scopel-127;
The second press **PRO** key return to standby;

▲ Key: a) On-line increase of power source output voltage under start state of the power source;
b) Vset&Fset statues increase the corresponding setting value parameter.

▼Key: a) On-line decrease of power source output voltage under start state of the power source;
b) Vset&Fset statues reduce the corresponding setting value parameter.

110V、**120V**、**220V**key: Under the standby state or setting state of the power source, rapidly switch to 110V、120V、220V。

50Hz、**60Hz**、**400Hz**key: Under the standby state or setting state of the power source, rapidly switch to 50Hz, 60Hz and 400Hz。

HIGH、**LOW** key: high gear、low gear press key, not work in start up sate,

must be operated in standby mode.

Description : **HIG gear** corresponding voltage adjustment scope 150.1-300.0V;

LOWgear corresponding voltage adjustment scope1.0-150.0V。

Shuttle knob: This knob has a switch function (key switch). In the set state or RUN state, this knob can adjust the corresponding numerical parameters (clockwise increase, counterclockwise decrease), press the button once to change the adjustment step. The stride is 1V/0.1V respectively. For example: if in V set state, the setting voltage is 220.0V at this time, rotate clockwise, set the voltage to 221V, press the knob switch, rotate clockwise, set The voltage becomes 221.1V and then press the knob switch. Turn it counterclockwise to set the voltage to 220.1. In other states, the adjustment method is the same.

6 Fault analysis and elimination

| Symptoms | Analysis of cause | Remedy |
|--|--|--|
| After being plugged, the display window is not lighted | 1.Power source is not properly plugged 2Fuse burnout | 1、 Inspect whether the power source is well-connected; 2、 Shut off the power supply, and change fuse. |
| Display confusion | Large impact load operates in the power grid, such as welding machine and controlled rectifier equipment; or caused by thunder and lightening; | Shut off the power source and re-start again. |
| Alarming, displaying 000X | Find the cause of fault according the fault code: 0001-Short-circuit protection; 0002-Over-heat protection; 0003-Over-current protection. | Re-start after eliminating corresponding fault circuit; in case of over-heat protection, let the standby state last for 5 minutes before continuing to work. |

7. Maintenance

7.1 Daily maintenance

- Clean the power source machine case and panel on a regular basis to prevent dust from gathering at the power source input & output port.
- Don't place heavy sundries or vessels containing liquid on the power source.
- Please prevent the power source from direct exposure to rain water or sunlight.
- Please keep the operational site of the power source away from flammable liquids, corrosive liquids and conductive fiber dust.

7.2 Maintenance during operation

- It is forbidden to shut off the power source switch under the operating condition of the product (please press the stop key at first and then shut off power source switch).
- Ensure that the model of changed fuse is same with that of the fuse of this machine
- When voltage and current display windows display "---", being accompanied by audio & video alarming signals, the power source enter into self-protection state; press "Stop" key to eliminate the alarming sound and return to standby state. At this time, please inspect the causes of alarming and eliminate the faults before re-starting the machine. In case that the fault can not be eliminated, please shut off the machine and consult professionals or contact the manufacturer.

7.3 Maintenance for long-term shut-down

In case that the power source is placed in humid environment for a long time, place the power source at dry and well-ventilated place to remove the moisture inside before plugging and operation.

8. Transportation, storage

- a) Avoid inversion storage and transportation;
- b) The storage place shall be free from flammable, explosive, toxic and other chemicals and other corrosive gases, free from strong mechanical vibration and shock as well as strong electromagnetic field or direct sunlight exposure.
- c) Storage condition
 - Temperature: -10°C ~ 40°C
 - Relative humidity: 10% ~ 90%

9. Product warranty and repair

9.1 Warranty period

a) This product completely achieves various technical data nominated in manual. Our company provides one-year after-sales quality warranty as from the date of sales (unless otherwise prescribed by the contract).

b) In case that the product requires quality warranty service or repair, the product must be returned to the manufacturing company or the repair unit appointed by the company.

9.2 Warranty restrictions

The foregoing warranty does not apply to the damages caused by the following conditions:

- a) The product that is incorrectly or improperly repaired by the customer;
- b) Unauthorized modification or misuse;
- c) Operate the product outside the designated environment or install and repair the product at an improper locale.
- d) The damage caused by the circuit self-installed by the customer;
- e) The product model or machine body serial number is altered, deleted or illegible;
- f) The damages are caused by accidents, including but not restricted to lightning, water penetration and fire disaster, etc.

9.3 Contact us

If you have any questions about the product, please get in touch with us, we will be happy to help answer your questions.

Attention

The manual is subject to change based on the improvement of the products without prior notice.