

# **AC Power Source PAS-F-33200N User Manual**

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## Safety instructions

### Danger

There are dangerous high voltages inside this machine. Do not open any covers of this machine (unless by authorized technicians), otherwise electrical shock to persons may happen.

All electricity to the machine must be disconnected and removed, in case that this machine needs to be moved or re-wired. After electricity is removed, please make sure that wait for at least 20 minutes before touching any live parts of this machine or electrical shock may still happen, since the electrical charges on the DC bus capacitors inside the machine need some time to be fully discharged.

For optimal safety protection to the users, this machine must have solid connections to the earth. Do not use this machine if it is not grounded.

In case of fire, use extinguisher with powder chemicals instead of liquid agents. Electrical shock may happen if liquid extinguishing products are used.

Any foreign objects and/or liquid are strictly prohibited from entering to the inside of this machine.

### Caution

Storage and operating environment have a certain degree of influence on the life and reliability of this product. Therefore, try to avoid placing and/or operating this machine in the following environments:

(i). Having extreme ambient temperature or humidity that exceeding the allowed limit stated in the specification (temperature: 0°C ~45°C, humidity: 0~90%).

(ii). Exposing to direct sunlight or being near to a heat source.

(iii). Places tend to be vibrated or hit by other objects.

(iv). Having heavy dust, heavy salt, corrosive chemicals or inflammable chemicals in the air.

Please keep the inlet and outlet of the air ventilation clear and clean. Obstruction on the inlet or outlet will have significant negative impacts on the quality and reliability of this machine.

If the machine will not be used for a long time, please store it in a dry and clean environment with temperature in the range of -40°C ~+70°C.

### Caution

This machine is composed of many delicate and precision devices. Please do not open any covers of this machine (unless by staffs authorized by our company). Warranty void in case of broken seal (quality seal)

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## Chapter 1 Introduction

AC source of PAS-F series (hereinafter referred to as “this machine” or “the machine”) is the newest generation of bi-directional AC source in our company. PAS-F employs the most advanced PWM rectification (active rectification) technology with four-quadrant operation capability. It is able to provide excellent sinusoidal voltage output and achieve very high output voltage and frequency stability. All necessary protection mechanisms are implemented in the electronic circuitry to quickly detect, execute proper actions immediately and activate necessary alarms. Those protections include overload, over-current, over-voltage and short circuit protection. Laminated bus-bar technology used on the DC bus combined with high efficient IGBT modules further increase the reliability and stability of the machine. This machine can be controlled by either the touch screen installed on it (the local control) or by the communication channels (eg. RS485) connected to an external computer (the remote control). Either way of control has a user friendly interface which makes the users in controlling and programming this machine much easier than before.

Main characteristics of PAS-F :

- Able to absorb energy from the output terminals then convert it and feed into the grid power, help the industry to conserve energy and reduce carbon emission.
- Employs the most advanced PWM rectification (active rectification) technology with four-quadrant operation capability;
- Very high input power factor , up to 0.99;
- Very low input current harmonics;
- Pure sinusoidal output voltage, THD < 2%;
- Interactive and user friendly human-machine interface;
- Versatile communication channels and protocols supported;
- Diversified in machine capacity, meet requirements from all kinds of customers.

## Chapter 2 Specification

### 2.1 Specification Table

Model no.		PAS-F-33200N
Output capacity (KVA)		200kVA
Circuit topology		Double IGBT
AC input	Phase type	3-phase, 3-wire
	Line Voltage	380V±15%
	Frequency range	47-63Hz
	Power factor	0.99
AC output	Phase type	3-phase, 4-wire
	Phase Voltage	0-300V
	Frequency range	40-70Hz
Output Features	Line regulation	<1%
	Load regulation	±1% (Linear load)
	Frequency stability	≤0.01%
	Waveform distortion (THD)	≤2% (Typical)
	Efficiency	≥92%
	Response time	≤2ms
	Crest factor	3:1
Display	Terminal	7'' touch screen
	Voltage	0.2V+0.1%FS, Resolution: 0.1V
	Current	0.2A+0.1%FS, Resolution: 0.1A
	Frequency	0.01Hz+0.1%FS, Resolution: 0.01Hz
	Real power	0.2kW+0.1%F, Resolution: 0.1kW
	Apparent power	0.2kVA+0.1%FS, Resolution: 0.1kVA
	Power factor	±0.01, Resolution: 0.01
Communications		LAN (SCPI)
Safety	Insulation resistance	10MΩ (test voltage ≥ DC500V)
	Dielectric Withstand Voltage	AC 1800V (test criteria: < 10mA for 1 minute)
Environ ment	Cooling mechanism	Fan (forced convection)
	Operating temperature	0°C~45°C
	Relative humidity	0~90% (non-condensing)
	Altitude	Below 1500m

## 2.2 Physical dimension

Dimension of PAS-F series products is in proportion to its capacity. Actual figures of this machine are:

**Note: The appearance and size of the actual machine to prevail**

Table 2-1 Dimension list

Capacity (kVA)	Physical dimension		
	Width W(mm)	Depth D(mm)	Height H(mm)
200 (host)	1600	850	2182
Input transformer	500	850	871
Output transformer	800	1050	871

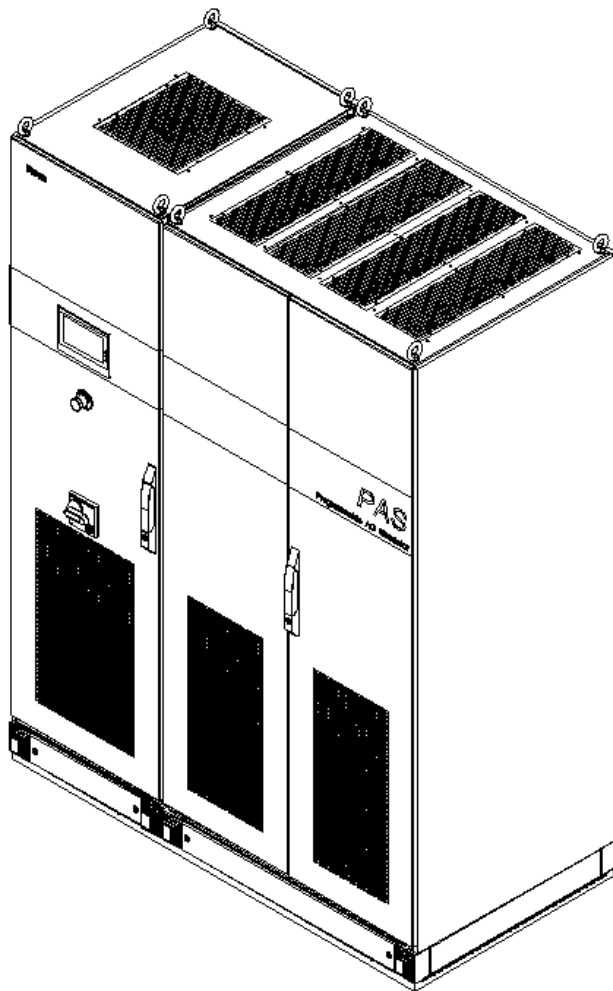


Fig. 2-1 Side view of the host machine

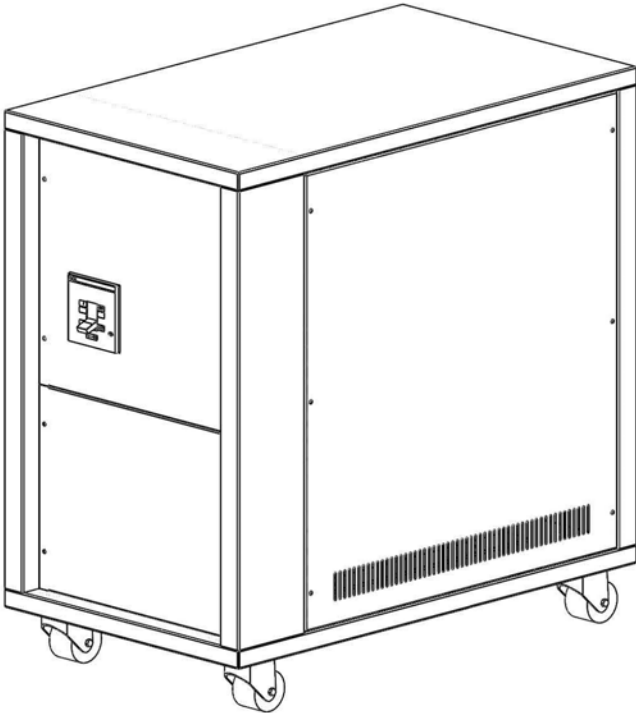


Fig. 2-2 Side view of input transformer

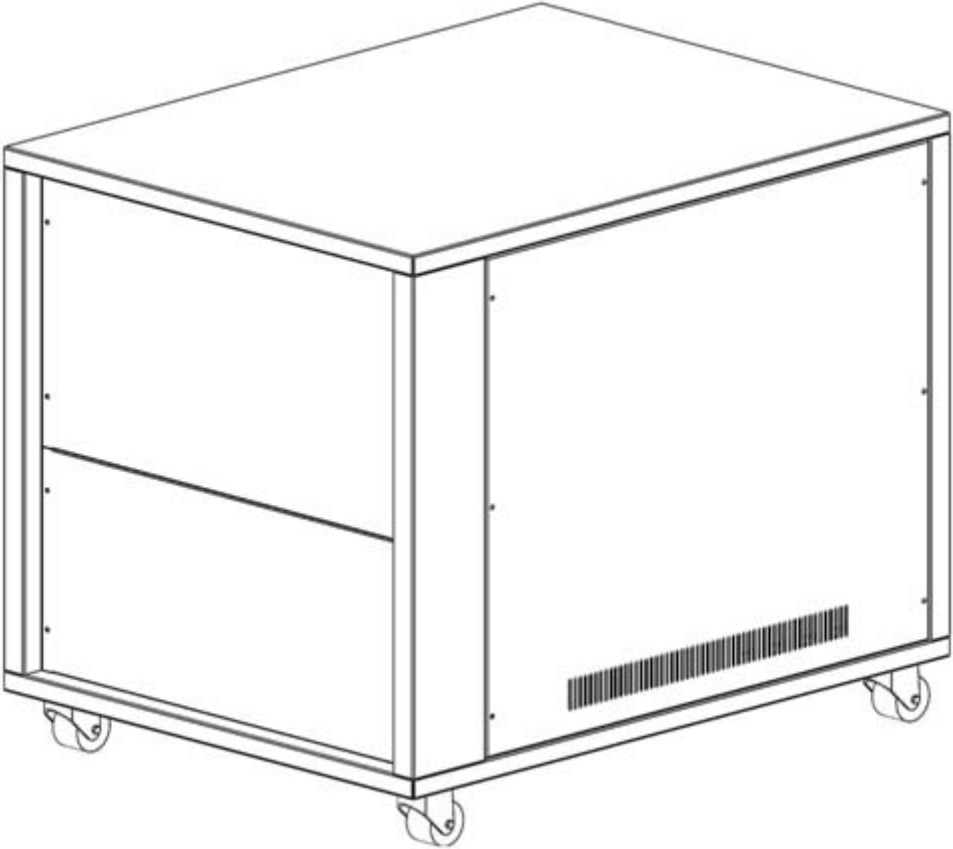


Fig. 2-3 Side view of output transformer



### 2.3 Illustration of outline

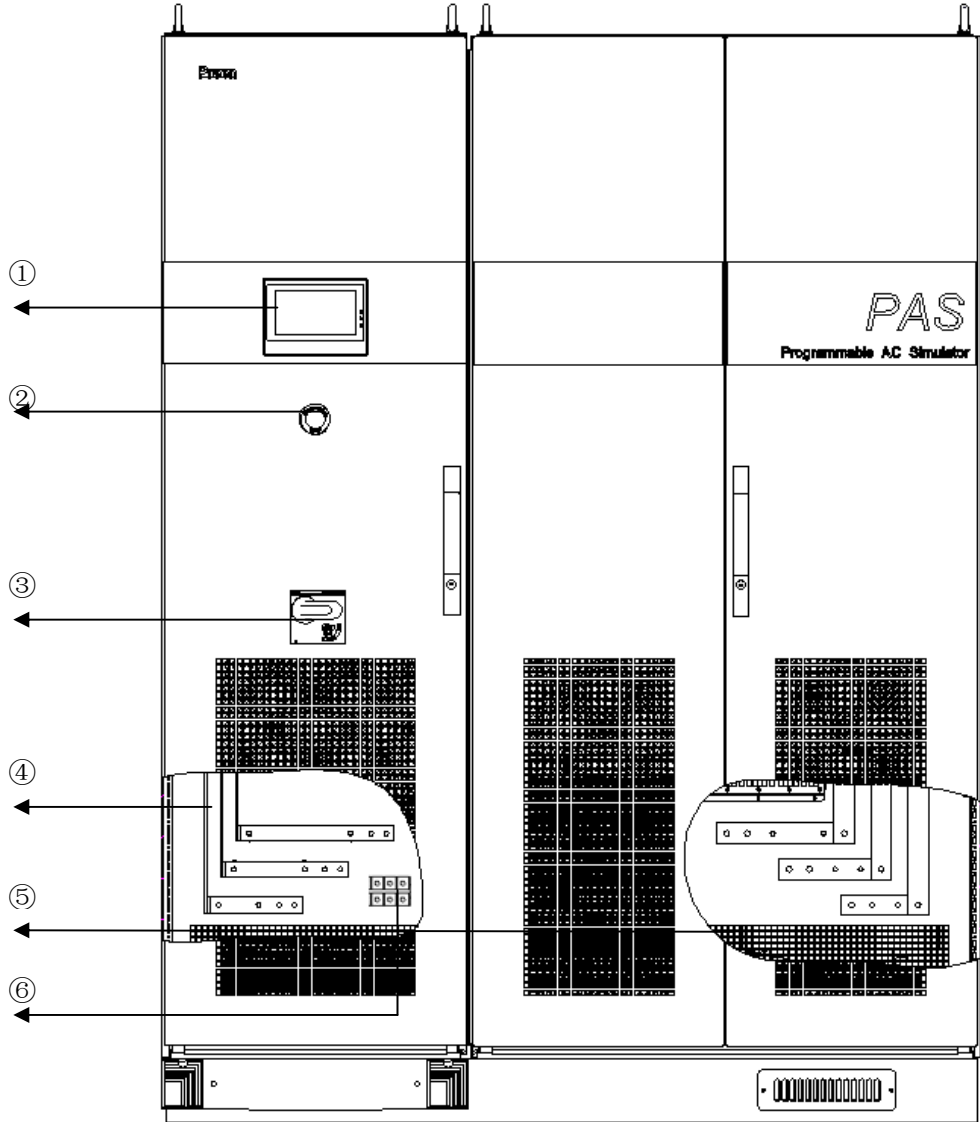


Fig. 2-4 Outline illustration of host machine

- ① Touch panel,
- ② Emergency stop,
- ③ Input switch,
- ④ Input terminal,
- ⑤ Output terminal,
- ⑥ TTL synchronized signal terminal

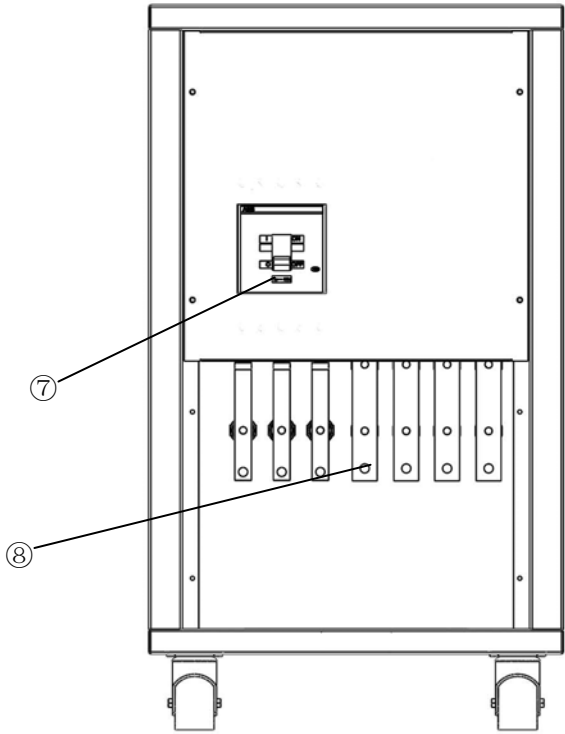


Fig. 2-5 Outline illustration of input transformer

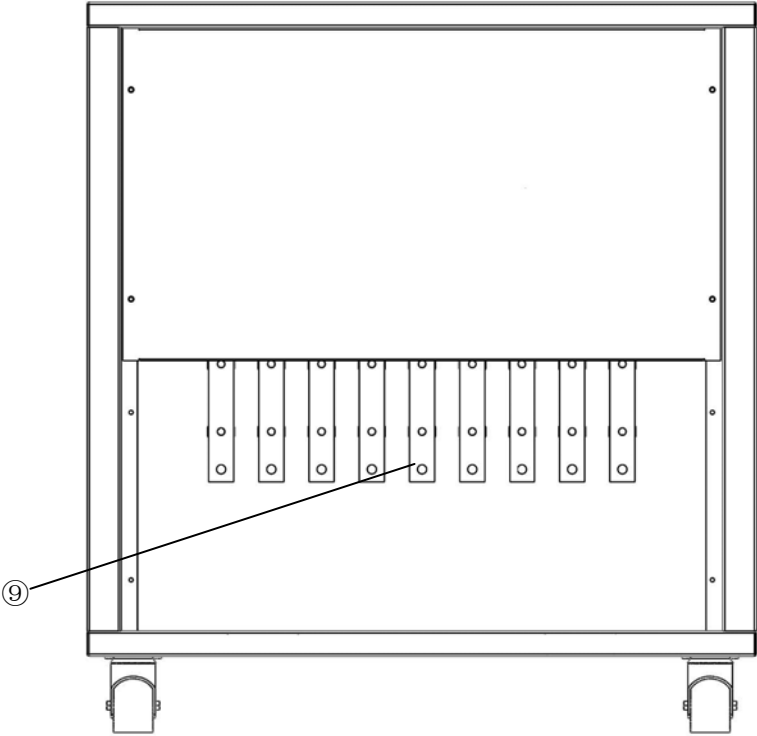


Fig. 2-6 Outline illustration of output transformer

- ⑦ Switch,
- ⑧ Terminal of input transformer,
- ⑨ Terminal of output transformer

## Chapter 3 Transportation and Installation

### 3.1 Transportation:

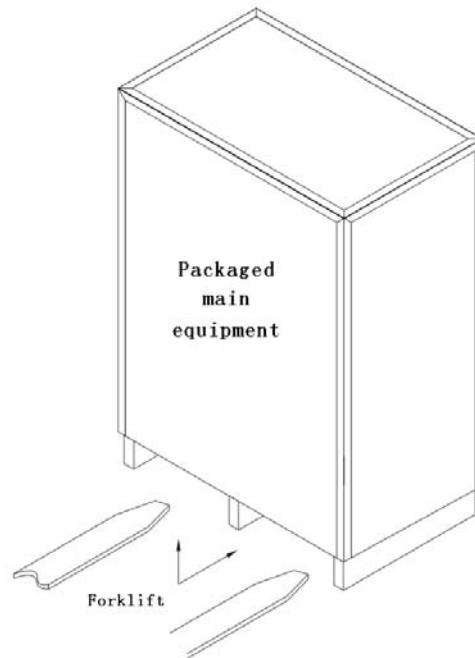


Fig. 3-1 Moving with forklift

There is space left in the bottom of the cabinet of PAS-F-33200N. The space can be used for moving the cabinet by a forklift. Once removing the cabinet, this machine is able to move with its own wheels independently.

Due to the heavy weight of this machine, please use forklift to move the cabinet slowly and with special care. Try to avoid any collisions with other objects, so to keep the machine intact.

Please keep this machine securely fastened in the truck during transportation to prevent it from collision or tumbling. Although the whole cabinet has anti-shock design, yet we still recommend taking extra anti-shock care in the vehicles, especially on a bumpy road.

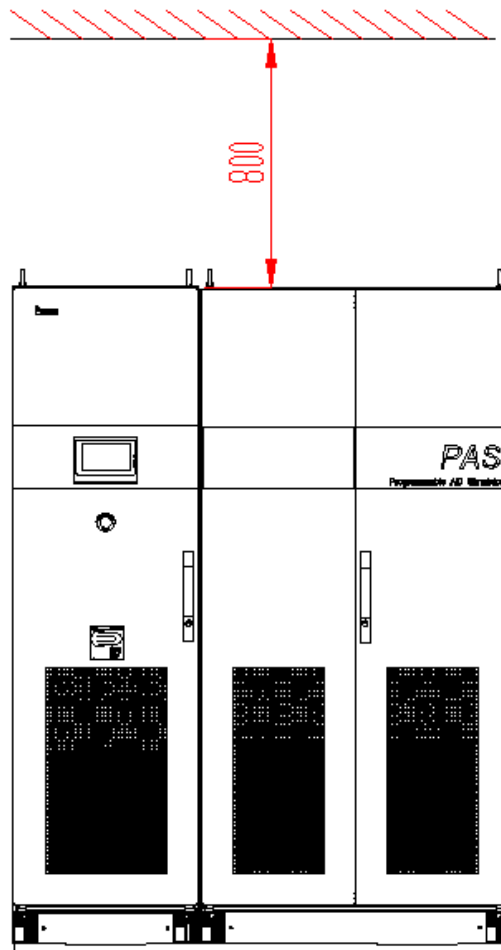
### 3.2 Inspection after unpacking

- Open the wooden cabinet, remove those cushion stuffs. Since the machine is pretty heavy, please pay special attentions to prevent the machine from tumbling or falling down, while moving it to its final destination;
- Examine the machine after unpacking it. Check to see if there is any physical damages, if yes, do not install it. Call customer service for help;
- Examine all the accessories, if there is anything missing, please call customer service for help.

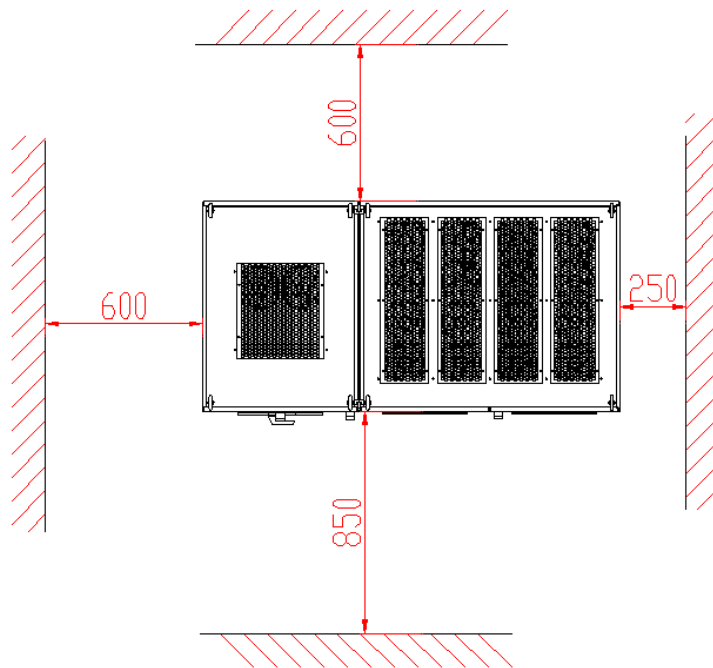
### 3.3 Requirements of the environment

Notes on environment for the machine operating:

- 1) Ingress protection of PAS-F-33200N is IP20, and for indoor use only. Location where the machine installed must have roomy space for air convection. Always keep the inlet and outlet (for air flow) clean and clear;
- 2) Make sure the location where the machine installed has strong enough intensity and good flatness. No shaking or tipping is allowed once installed;
- 3) All the entrance and exit of the wires (for energy in and out) are in the bottom of this machine. Recommend all the cables being directed to the duct or gutter on the floor ground, for easy layout and maintenance;
- 4) Sufficient space must be kept in surrounding area of the machine to ensure good air convection for heat dissipation (please see fig. 3-2);
- 5) Try to avoid any of the following substances in the place where the machine installed: heavy dust, heavy salt, corrosive chemicals or inflammable chemicals. Life and reliability of the machine may be significantly reduced due to the intrusion of them;
- 6) Do not install the machine in the place where temperature or humidity may exceed the allowed limit (see table in sec. 2.1). Keep the machine away from heat source, direct sunlight or inflammable vapor;
- 7) Follow strictly the instructions on wiring and adopt the proper wiring, which can ensure both the safety of users and the integrity of the machine.



(a) Required space on the top



(b) Required space in surrounding area

Fig. 3-2 Required space surrounding the machine

### 3.4 Connected terminal

All the cables connected to this machine are recommended to go through the reserved ducts or gutters on the floor ground. If not, the space between the feet of this machine and floor ground can be used for laying out those cables.

Main electricity cables connectors :

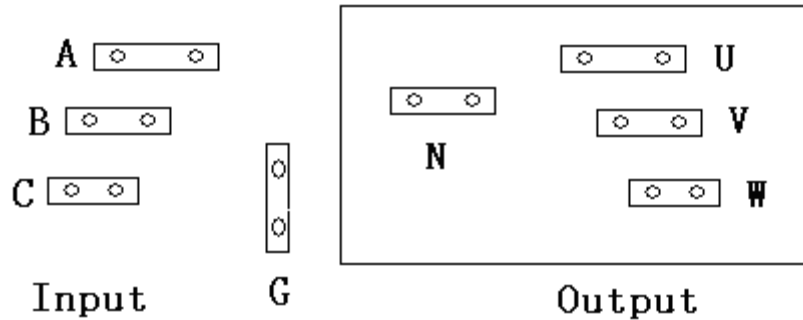


Fig. 3-3(a) illustration of host terminal

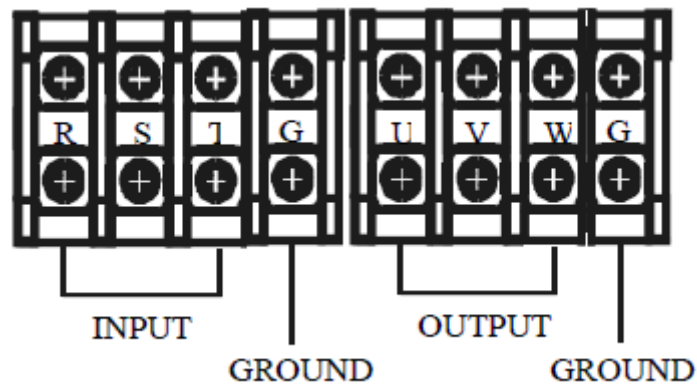


Fig. 3-3(b) illustration of input transformer

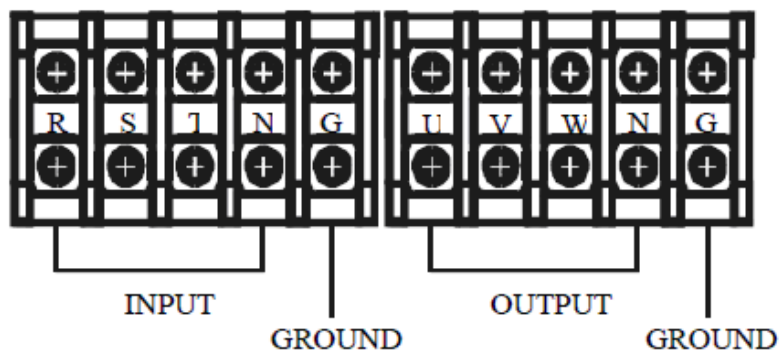


Fig. 3-3(c) illustration of output transformer

Before the machine is completely installed, make sure all the switches are in the OFF position. Connect all the cables of the input and output according to above figure.

### 3.5 Connected cables

- 1) Use the voltmeter to confirm whether there is no voltage output in the wiring;
- 2) Make sure all the switches are in the OFF position;
- 3) Adopt proper cables according. recommendations for those cables are listed in the following table (table 3-1);

Table 3-1 cables recommended

Model no.	AC IN		
	A, B or C phase		G
PAS-F-33200N	Max. current	cables	cables
	391A	95mm <sup>2</sup> *2	95mm <sup>2</sup> *1
	AC OUT		
	U, V or W phase		N
	Max. current	cables	cables
	222A	120mm <sup>2</sup>	120mm <sup>2</sup>

The reference cables recommended in the tables are multi-core flexible copper cables, and the user can select different cables according to the input and output current conditions by themselves. When the length of the input or output lines exceed 20 meters, it is recommended that the diameter of the cable should be doubled.

- 4) Connect the input and output cables respectively and correspondingly, please refer to Fig. 3-3 for the terminals arrangement.

## Chapter 4 Operation

### 4.1 First time start up

After finishing making all connections of the input and output cables, please double check the voltages on all the input terminals; the voltages must be within the limits specified in table 2.1, if not, do not turn on the machine. Recheck everything, fix the problems and redo the procedures.

*Note: If the load is connected already, make sure the output switch is turned off before the input switch turning on.*

### 4.2 Instructions on UI software

This machine can achieve its maximum functionality only when it is properly set up. There are detailed explanations for the UI operations on the setup in the following sections.

#### 4.2.1 nitializing

Starting the UI, first screen display as Fig. 4-1:

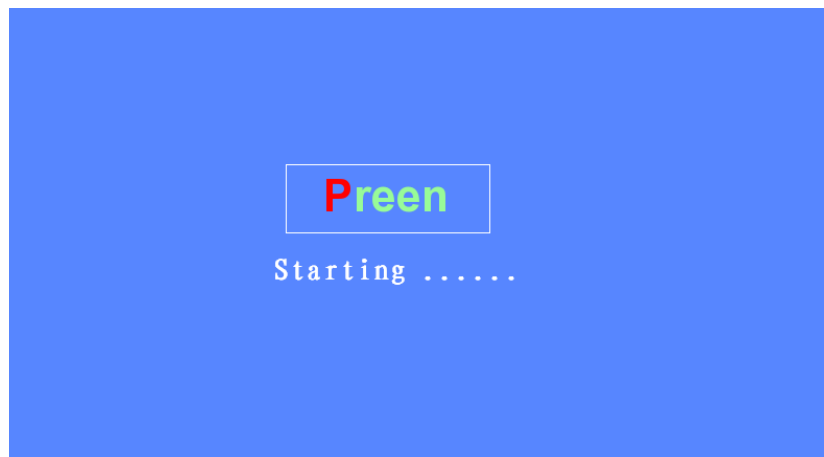


Fig. 4-1 UI initializing

Continue the initialization as Fig. 4-2:

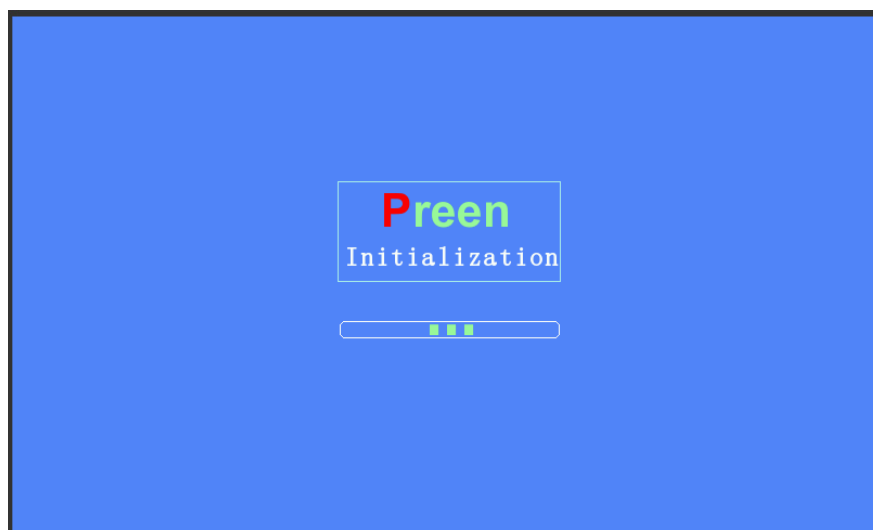


Fig. 4-2 Continue initializing



### 4.2.2 User mode

Enter the starting menu in the user mode, screen display as Fig. 4-3:



Fig. 4-3 Starting menu in the user mode

- **【APP】** Enter the menu of setup/programming of the operations;
- **【SYSTEM】** Enter the system setup menu;
- **【EVENT】** Enter the menu of events log.

### 4.3 Applications selection

There are total 5 operation modes in the menu of the “Applications”. They are “General”, “Step”, “Gradual”, “LVRT” and “Measure”.

**Note:** Following figures for illustration of the UI are general figures only. Actual information in those figures should be referred to its real display on the touch screen for that specific model of machine.

#### 4.3.1 General mode

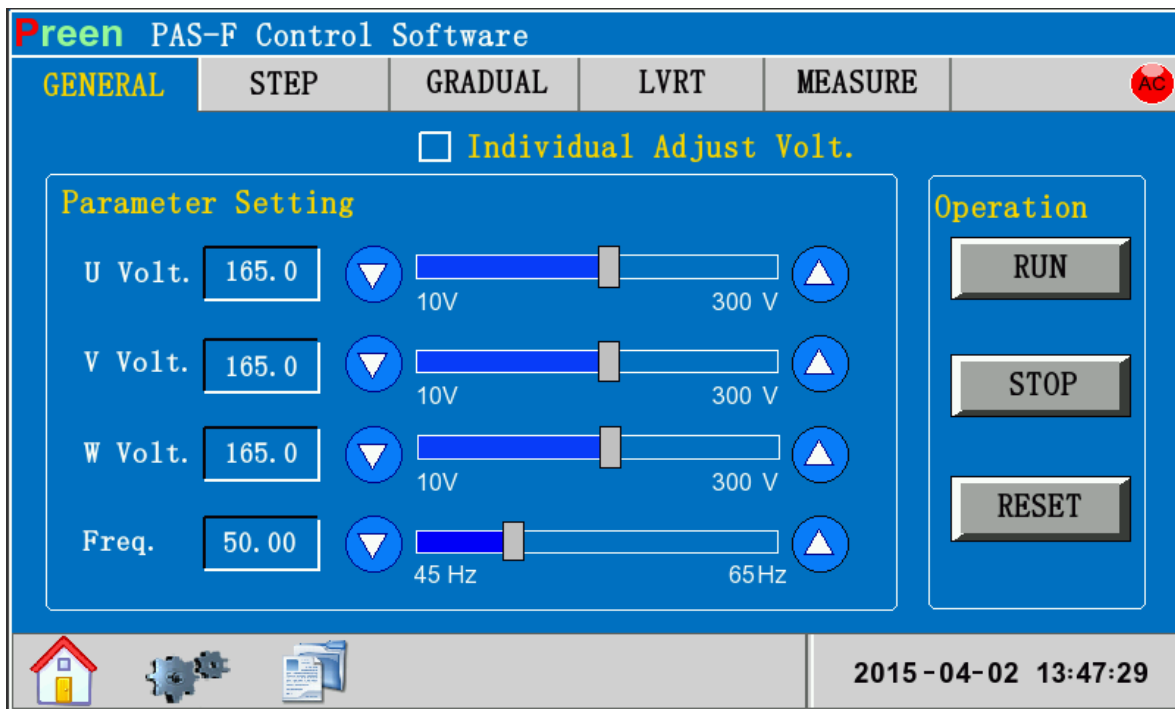


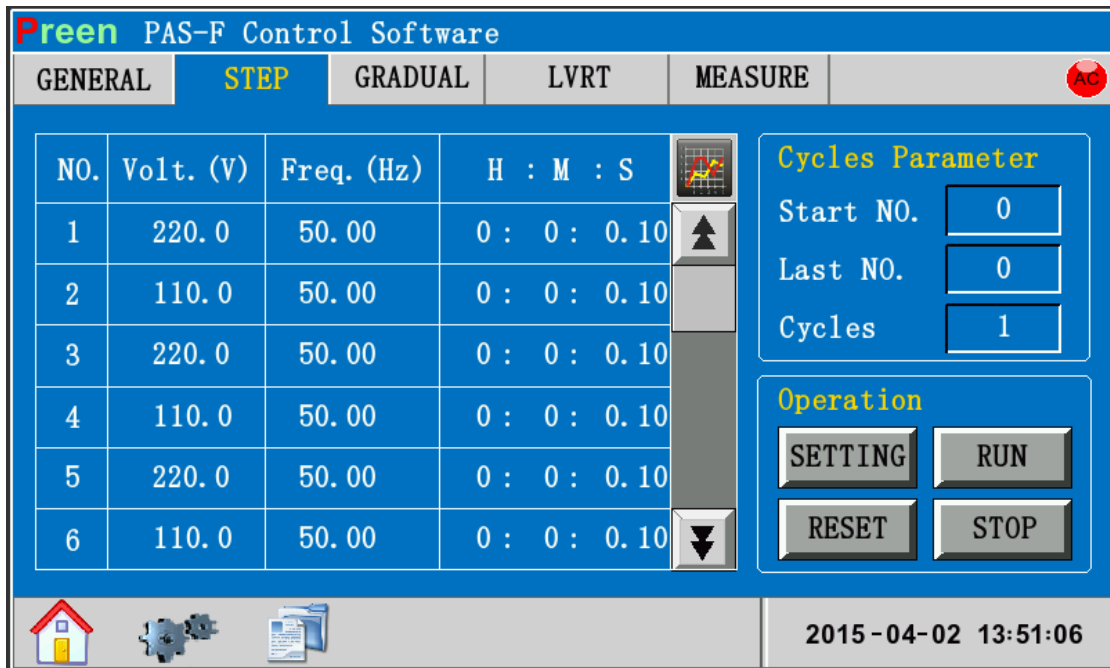
Fig. 4-4 Menu of the general operations mode

- **【Individual Adjust Volt】** When this option is chosen, each phase can be set up independently;
  - **【U Volt.】 / 【V Volt.】 / 【W Volt.】** Set up the phase voltage for each phase, there are following three ways that can be used:
    - a) Enter the value of voltage in this field . Click on this field, then you will see a tiny popup keyboard, key in the value you want with the keyboard;
    - b) In this field  , touch the pointer in the slider then slide it to the position (value) you want;
    - c) Click on  &  to change the value, resolution is 0.1
- Note:** If the option **【Individual Adjust Volt.】** is not picked, setting up a value on a specific single phase, the value on the same field for the other two phases will be changed to the same value as the one you just entered simultaneously.
- **【Freq.】** the same as voltage setup;
  - **【RUN】** Once clicked, the machine will start to work with the voltage and frequency

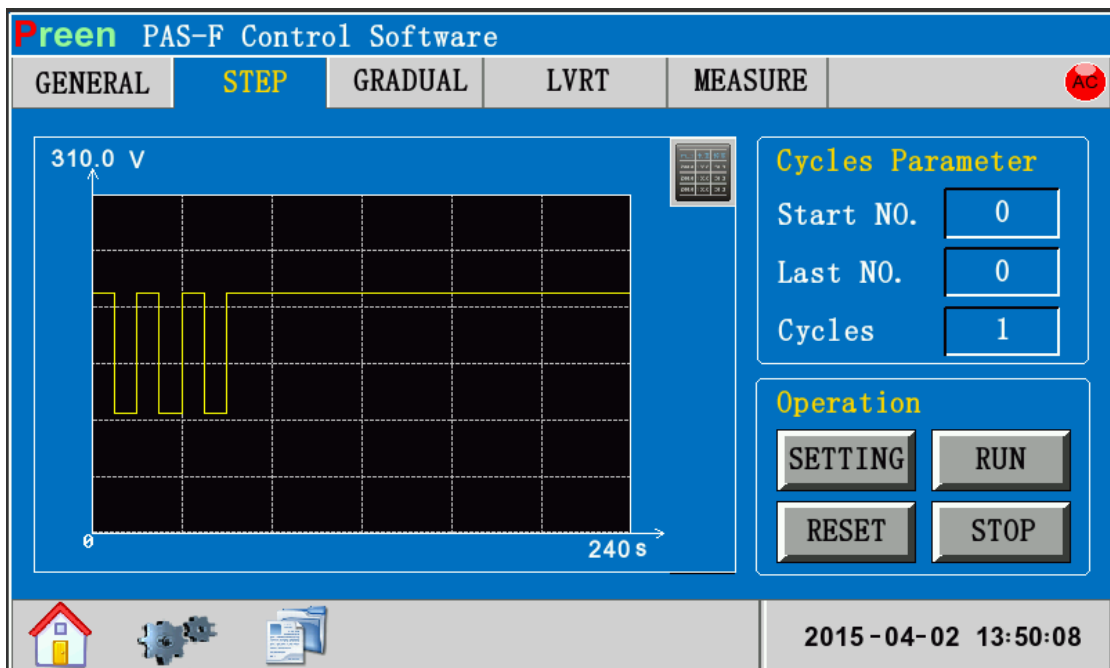
according to above setup;

- **【STOP】** Once clicked, the machine will stop the output;
- **【RESET】** Once clicked, the machine will release itself from the “alarm”state;
- **【AC】** This is the indicator of the output state. Red light indicates that the machine is in idle state (output stopped), while green light indicates the machine is in normal working state (output activated).

#### 4.3.2 Step mode





(a) Menu of step mode



(b) Preview display in step mode

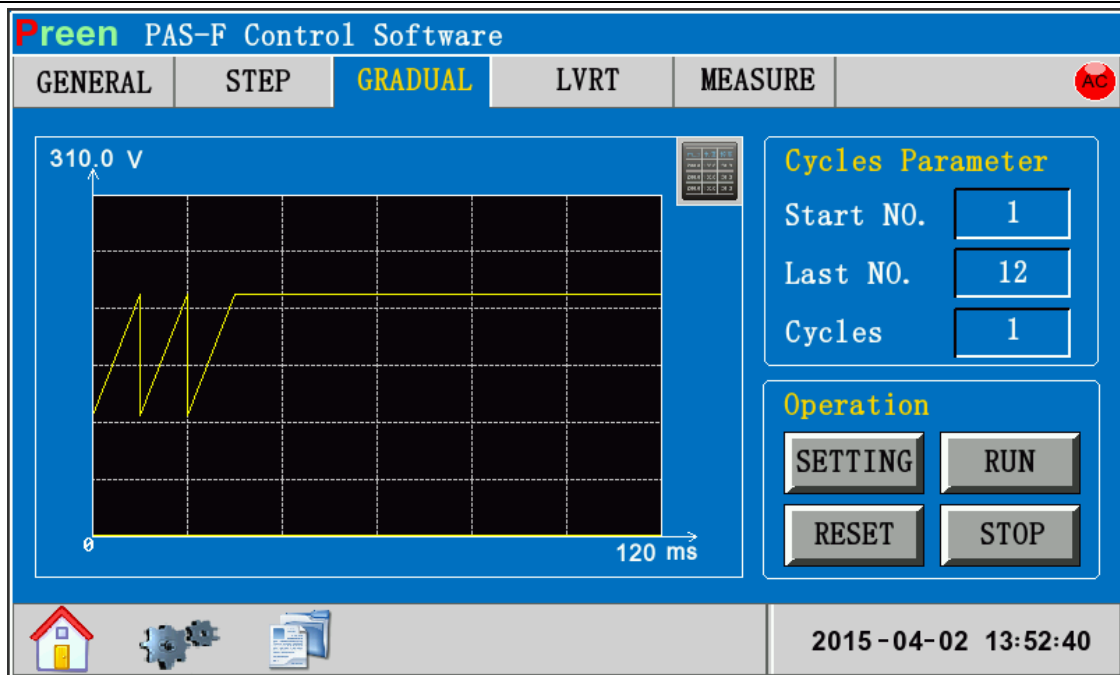
Fig. 4-5 Step mode

- **【SETTING】**: Save all the parameters in the touch panel into the control unit. User have to execute this action before running the whole step procedures.
- **【Cycles Parameter】**: The machine will start the output from the first procedure set in “Start No.” to the last procedure set in “End No.”, and execute the whole procedures continuously for the cycles of the parameter set in this field.
- **【RUN】** Once clicked, the machine will start to work with the voltage and frequency according to above setup;
- **【STOP】** Once clicked, the machine will stop the output immediately;
- **【RESET】** Once clicked, the machine will release itself from the “alarm” state;
-  & : Switch the displays between the setup menu and the preview menu.

### 4.3.3 Gradual mode





(a) Menu of gradual mode



(b) Preview display in gradual node

Fig. 4-6 Gradual mode

- **【SETTING】**: Save all the parameters in the touch screen into the control unit. User has to execute this action before running the whole step procedures.
- **【Cycles Parameter】**: The machine will start the output from the first procedure set in “Start No.” to the last procedure set in “End No.”, and execute the whole procedures continuously for the cycles of the parameter set in this field.
- **【RUN】** Once clicked, the machine will start to work with the voltage and frequency according to above setup;
- **【STOP】** Once clicked, the machine will stop the output immediately;
- **【RESET】** Once clicked, the machine will release itself from the “alarm” state; ;
-  & : Switch the displays between the setup menu and the preview menu.

### 4.3.4 Low voltage ride through test (LVRT)

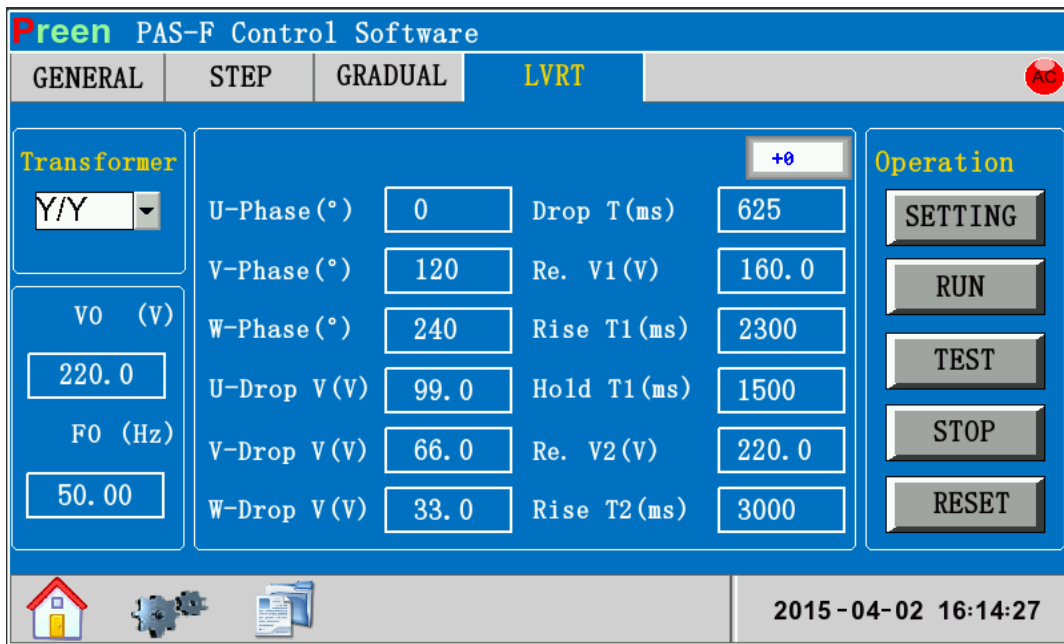




Fig. 4-7 LVRT setup menu

- **【Transformer】**: Set the wiring method of the transformer;
- **【VO】**: Set the rated voltage of the inverter output;
- **【FO】**: Set the rated frequency of the inverter output;
- **【U/V/W -Phase】**: Set the phase angle of the 3-phase voltage during LVRT process;
- **【U/V/W -Drop】**: Set the drop-off voltage that LVRT regulations require, set the voltage of 3 phases independently.
- **【Drop T】**: Set the time interval required during the drop-off voltage;
- **【Re. V1】**: Set the first stage of the recovery voltage;
- **【Rise T1】**: Set the time interval required from the drop-off voltage to the first stage of the recovery voltage;
- **【Hold T1】**: Set the holding time for the first stage of the recovery voltage;
- **【Re. V2】**: Set the second stage of the recovery voltage;
- **【Rise T2】**: Set the time interval required from recovery voltage 1 to recovery voltage 2;
- **【+0】**: When wiring method of the transformer is Y/D, D/Y or D/D, the vector sum calculated from the drop-off voltage of the 3 phases shall be very near to zero. “0 ( $\pm 3$ ) ”;
- **【SETTING】**: Save all the parameters in the touch screen into the control unit. The user has to execute this action before running the whole LVRT procedures.
- **【RUN】**: Output the rated voltage;
- **【TEST】** Once clicked, the machine will initiate the whole LVRT procedure;
- **【STOP】** Once clicked, the machine will stop the output immediately;
- **【RESET】** Once clicked, the machine will release itself from the “alarm” state;
-  & : Switch the displays between the setup menu and the preview menu.

### 4.3.5 Measure

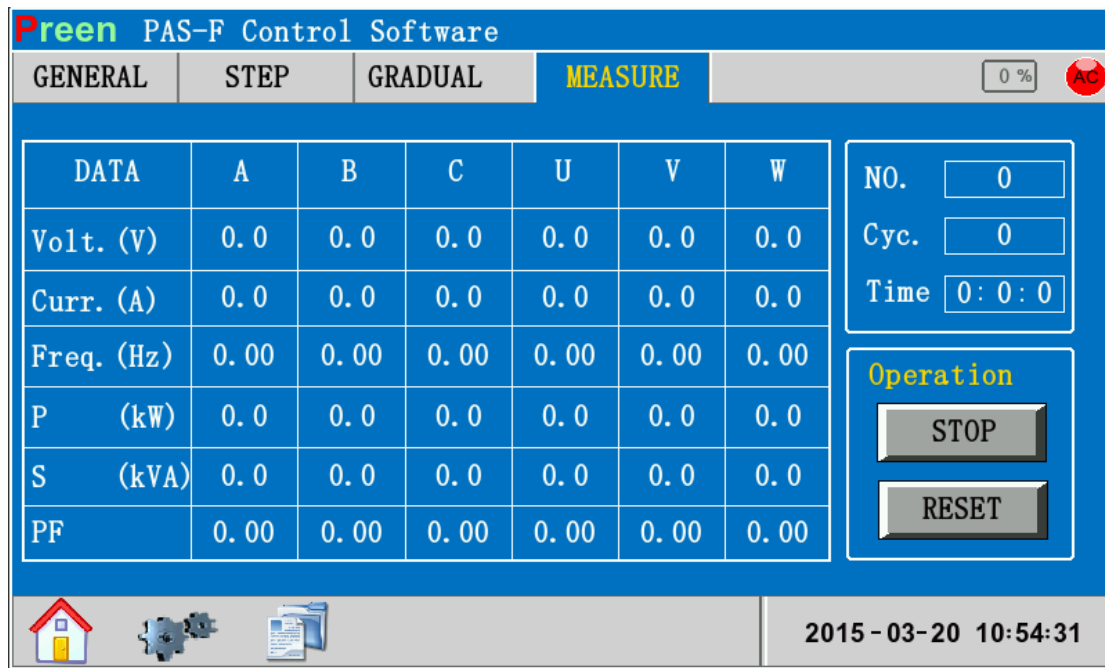


Fig. 4-8 Display of measure

- **【STOP】** Once clicked, the machine will stop the output immediately;
- **【RESET】** Once clicked, the machine will release itself from the “alarm” state; ;

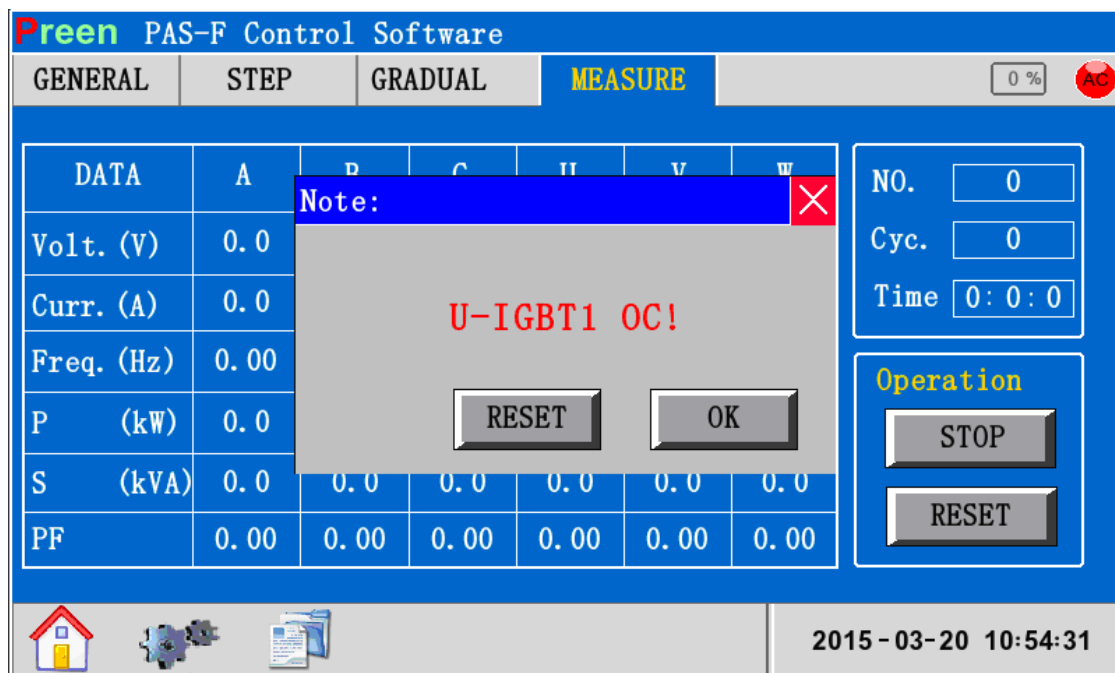


图 4-9 Fault menu

- **【RESET】** Once clicked, the machine will release itself from the “alarm” state;
- **【OK】**: Click it, the fault menu will cancel.

### 4.3.6 System set

Menu of system setting is as below picture:

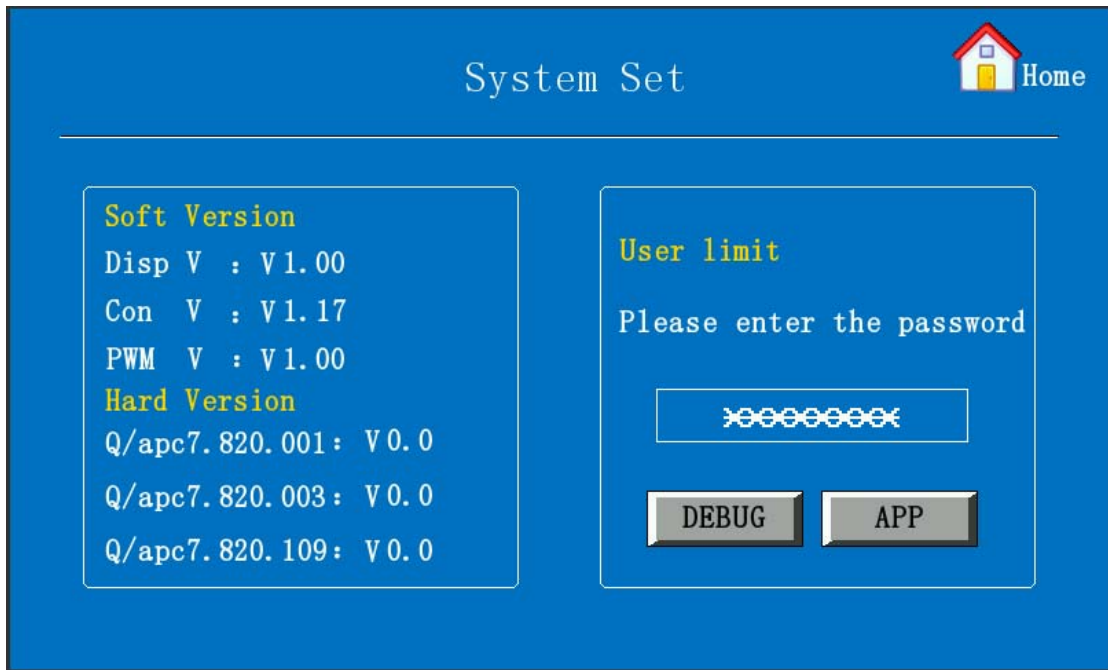


Fig. 4-10 Menu of system setting

- **【DEBUG】**: Click and enter the menu of debugging. There are lots of parameters for system debugging. Normal users can only read but not modify those settings. Call customer service if there are really necessity that need to modify those parameters;
- **【APP】**: Click and enter the menu of this mode, users can set time/date and the language used in this UI software.

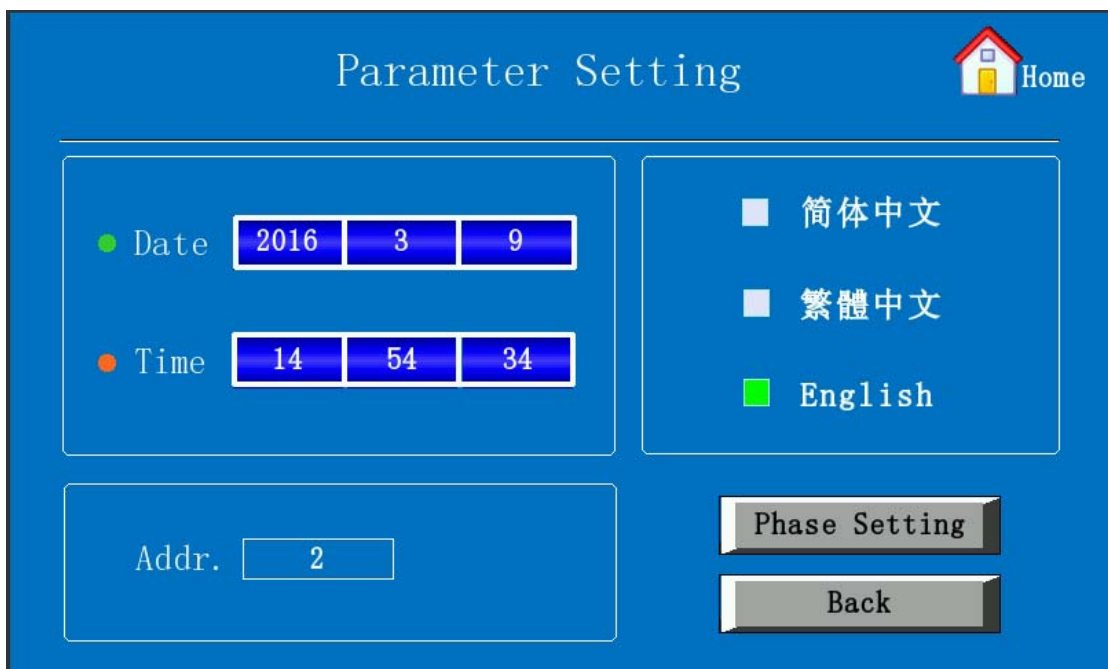


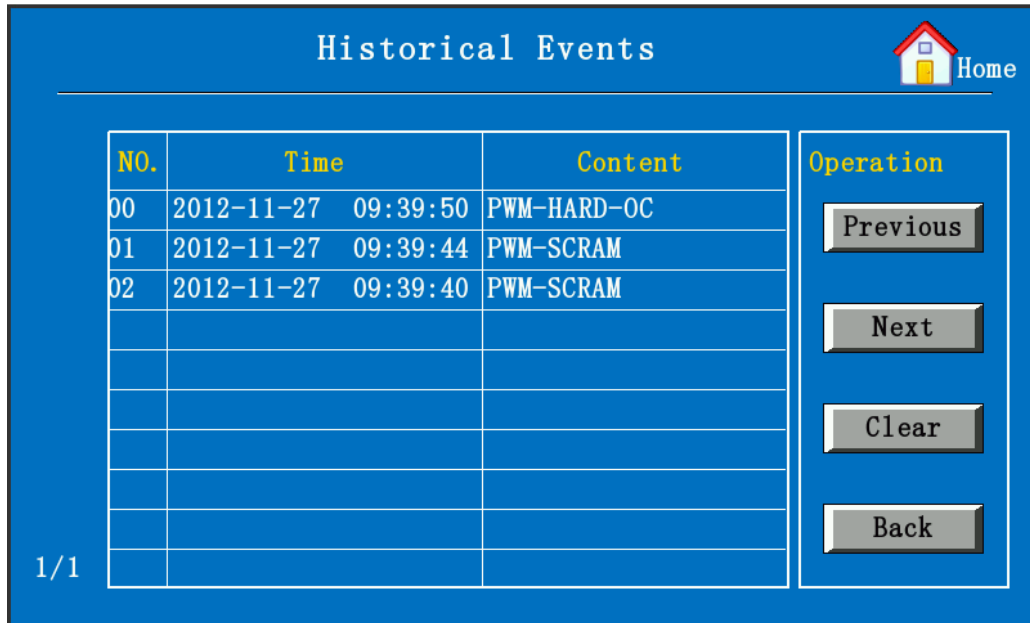
Fig. 4-11 Parameter setting



- **【Time Setting】**: Click it, Users can set time.
- **【Language Setting】**: Click it, Users can choose the simplified Chinese, traditional Chinese and English three languages.
- **【COMM Setting】**: Click it, Users can set communication mode

#### 4.3.7 Historical events

Events log display as below:



NO.	Time	Content	Operation
00	2012-11-27 09:39:50	PWM-HARD-OC	Previous Next Clear Back
01	2012-11-27 09:39:44	PWM-SCRAM	
02	2012-11-27 09:39:40	PWM-SCRAM	

1/1

Fig. 4-12 Events log display

- **【Previous】 / 【Next】**: Review all the events on every page;
- **【Clear】**: Clear all the events in this log;
- **【Back】**: Return to the main menu.

## Chapter 5 Remote Control

### 5.1 Communication interface

RS-485 and RS-232 are standard communication interfaces for this series of machine. RS-232 supports SCPI command and RS-485 supports MODBUS RTU command. The RS-232 and RS-485 belong to the same interface with different pins and need to be configured in factory. LAN, USB, GPIB options apply different converters and connect to the RS-232/485 port.

#### 5.1.1 Interface of RS-232/485

Open the front cover, RS-232/RS-485 interface is located in the back of touch screen shown as below figure:



a) Back of the touch screen computer

	RS-485 interface is female connector, and has nine pins		
	Pin	Signal	PC
	1	Rx-(B)	RS 485 B
	5	GND	Signal Gnd
	6	Rx+(A)	RS 485 A

b) Pin definition of this RS-485 interface

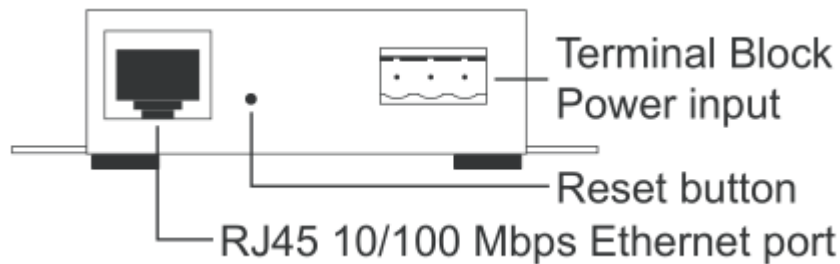
	RS-232 interface is female connector, and has nine pins		
	Pin	Signal	PC
	2	RXD	TXD
	3	TXD	RXD
	5	GND	Signal Gnd

c) Pin definition of this RS-232 interface

Fig. 5-1 Pictures of RS-232/485 connection

### 5.1.2 Interface of LAN Port (Optional)

Open the front cover, LAN interface is located in the back of front door shown as below figure:



#### Factory Default IP Address:

An NPort 5200 Ethernet to Serial Port converter is configured with the following default private IP address:

Default IP address: 192.168.127.254

(IP addresses of the form 192.168.xxx.xxx are referred to as private IP addresses, since it is not possible to access a device configured with a private IP address directly from a public network. We will recommend to set your PC as 192.168.127.1 to communicate with the converter via a local network.)

Please follow the NPort 5200 Series user manual and software to set up the Virtual COM port on your PC.

### 5.1.3 Indication of remote control on touch screen

While the communication interface of this machine is successfully linked with other computing equipment, there will be an indication text (“under remote control ...”) shown on the screen, as below figure:

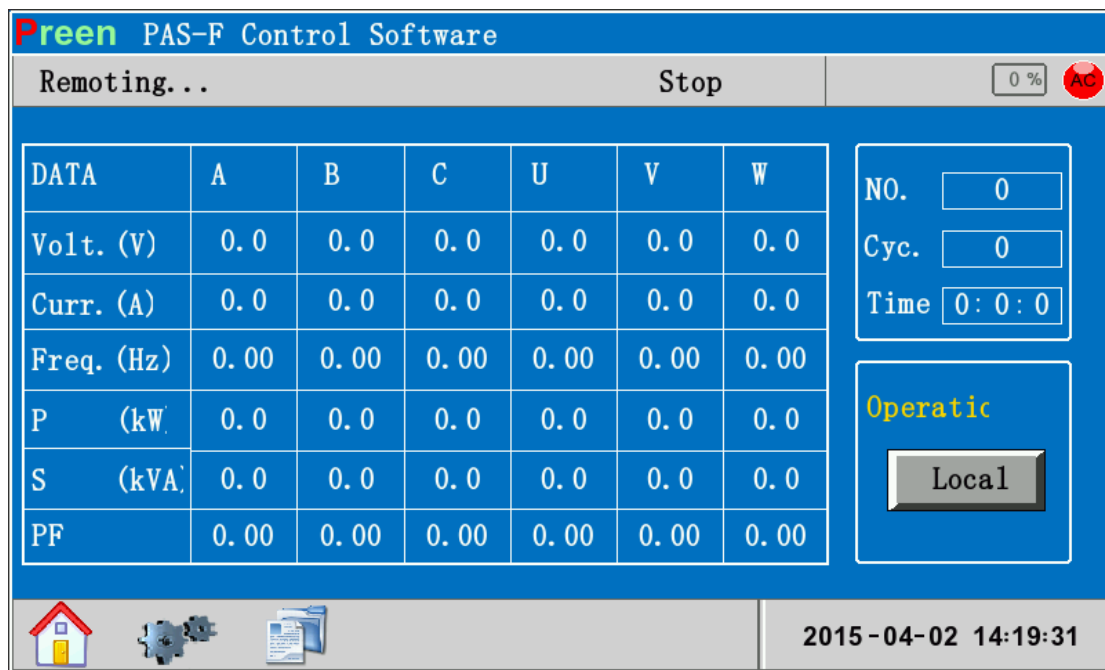


Fig. 5-2 “Under remote control”... shown on screen

## 5.2 Operations of remote control on PC

### 5.2.1 Software installation

Open the software CD package, install the software by executing the setup.exe in the CD, as shown in the below picture.

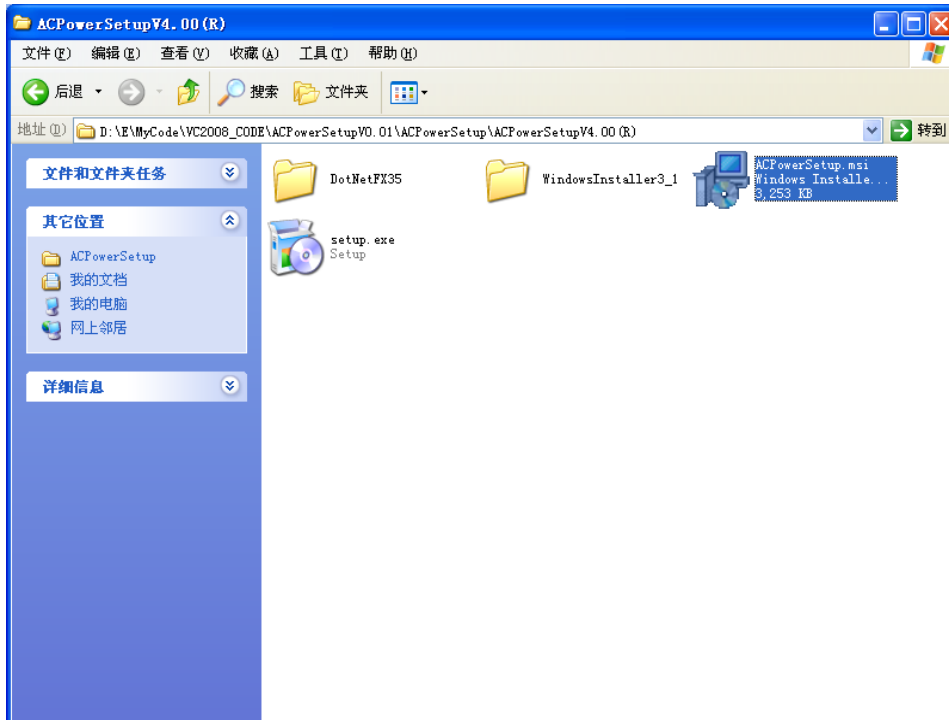


Fig. 5-3 Software installation kit on the CD

Operating system supported: Windows XP、WIN7、WIN8.

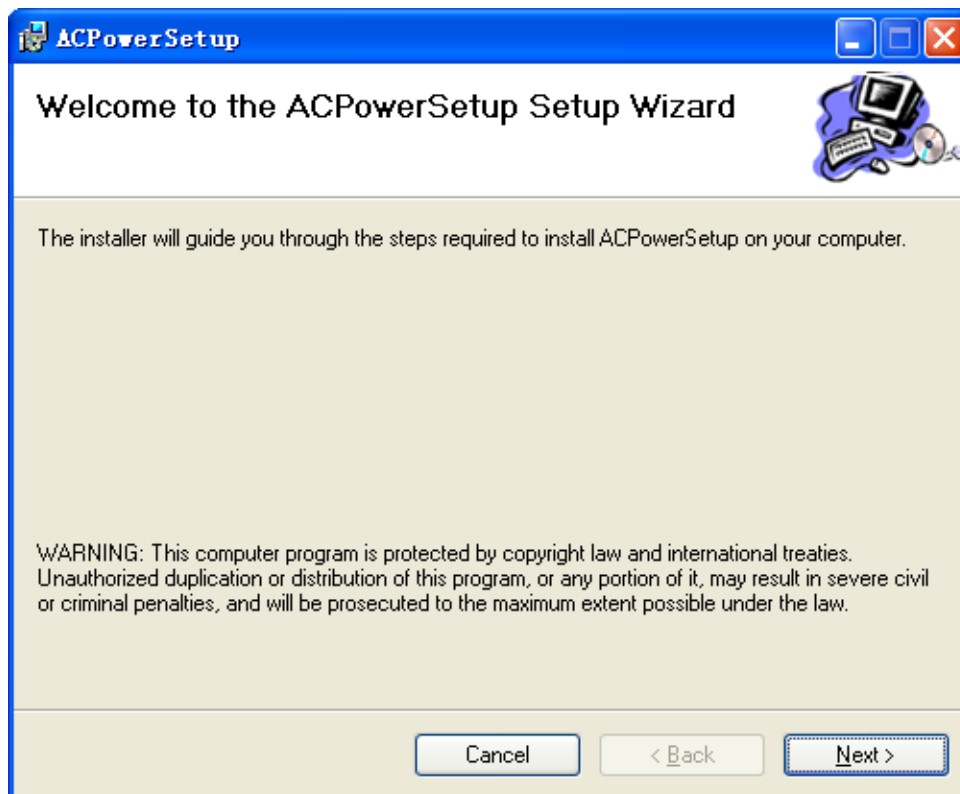


Fig. 5-4 Procedures of the installation: 1st step.

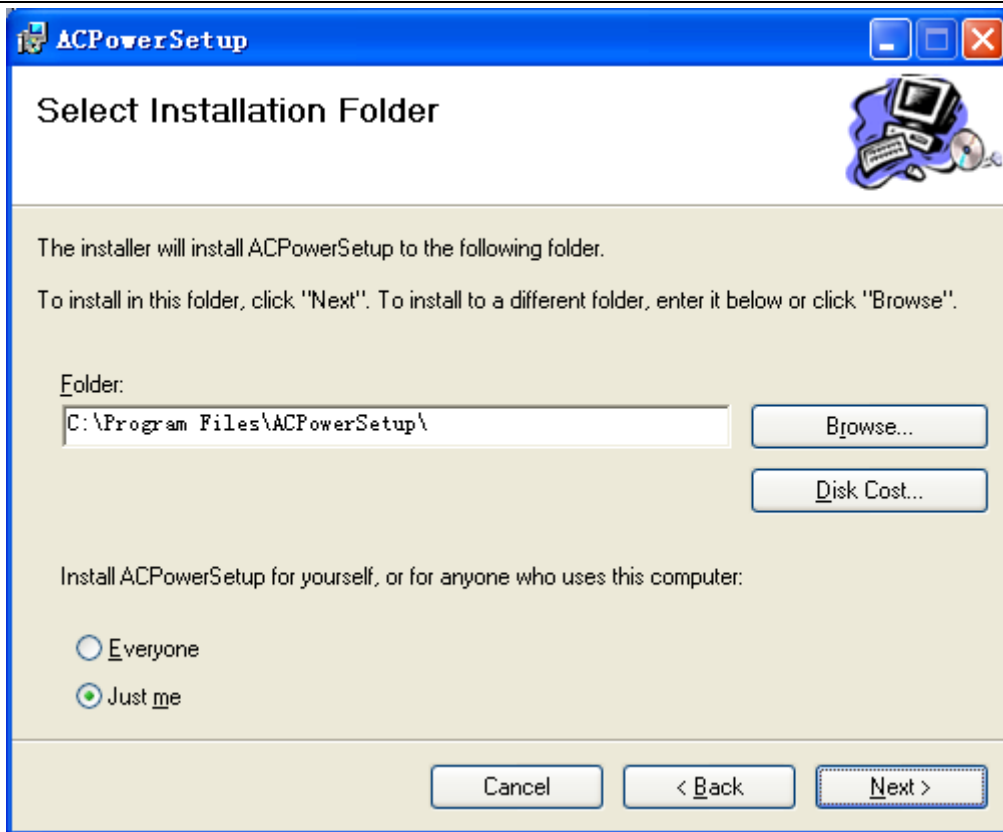


Fig. 5-5 Procedures of the installation: 2nd step.

Choose the installation folder, recommend installing on D:\ disk (do not install on system disk).

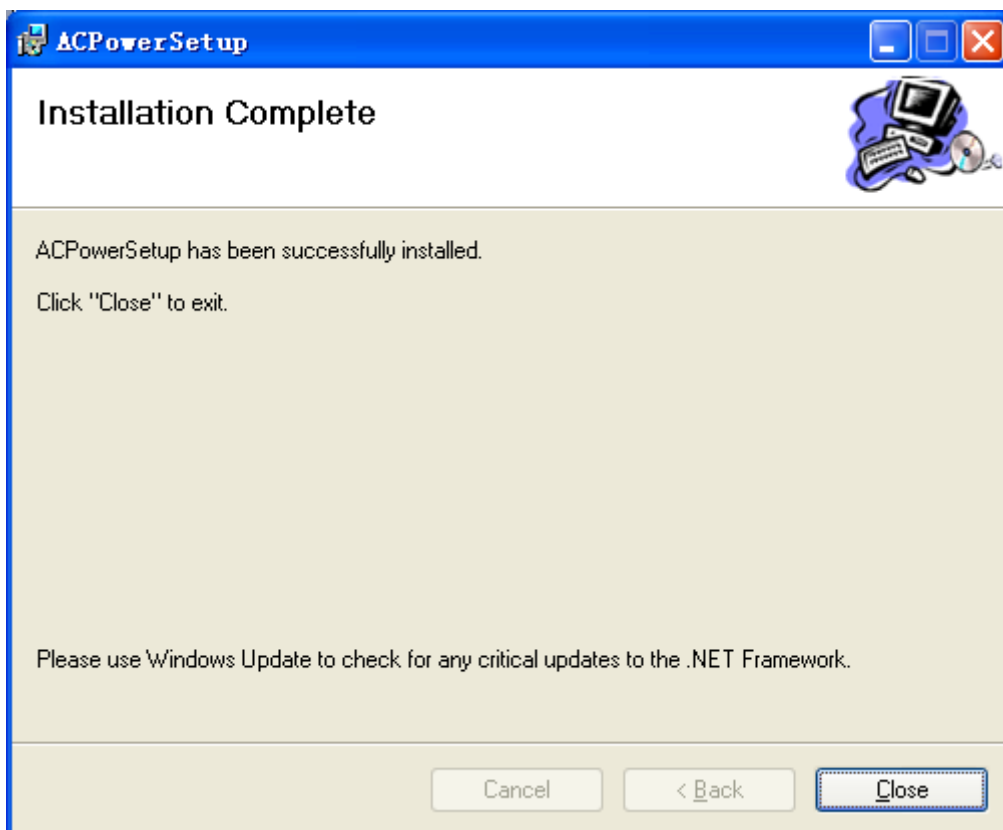


Fig. 5-6 Procedures of the installation: 3rd step.



Fig. 5-7 Shortcut on the PC desktop after successful installation

### 5.2.2 Operations on PC

Double click the shortcut (as shown in fig. 5-7) on the desktop, then enter the communication setting UI (as shown in fig. 5-8). Before communication interface are successfully linked, the operation button **【Read Dev. Info.】** is grayed (and can not operate).

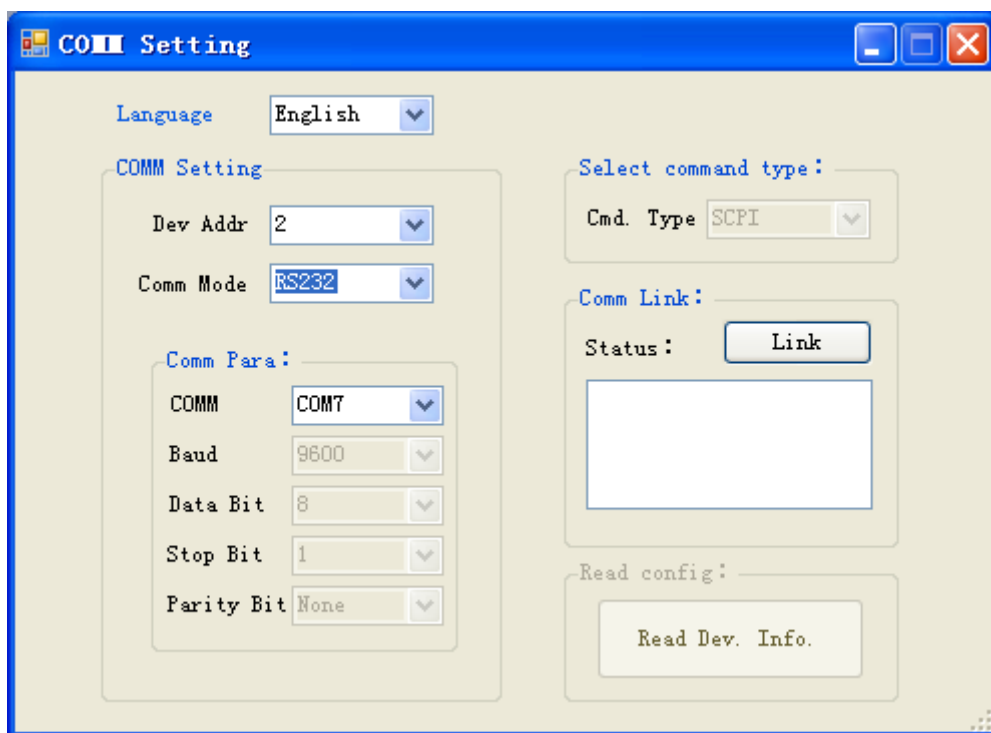
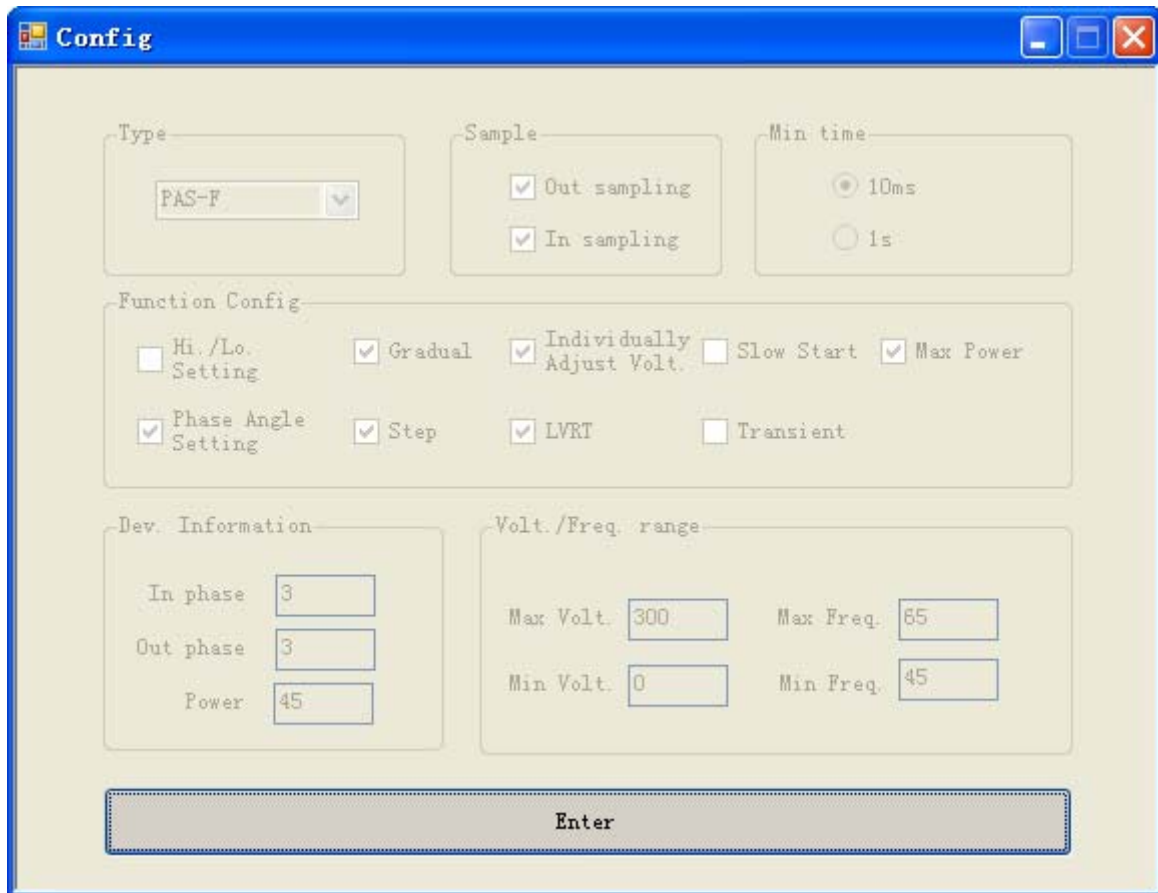


图 5-8 Communication UI

- Dev Addr: Address of this machine while in communication, for this series (PAS-F) of machines, default value is 2;
- Comm Mode: Select the communication interface (or protocol), default is RS485;
- COMM : Serial number of the com port to be selected;
- **【Link】**: Click on this button after setting up all the required parameters for that specific communication mode, physical link is created. Status of this action will be shown on the blank area below this button.
- Other communication parameter is fixed: 9600bps , databit : 8 , stopbit : 1 , check : None ;

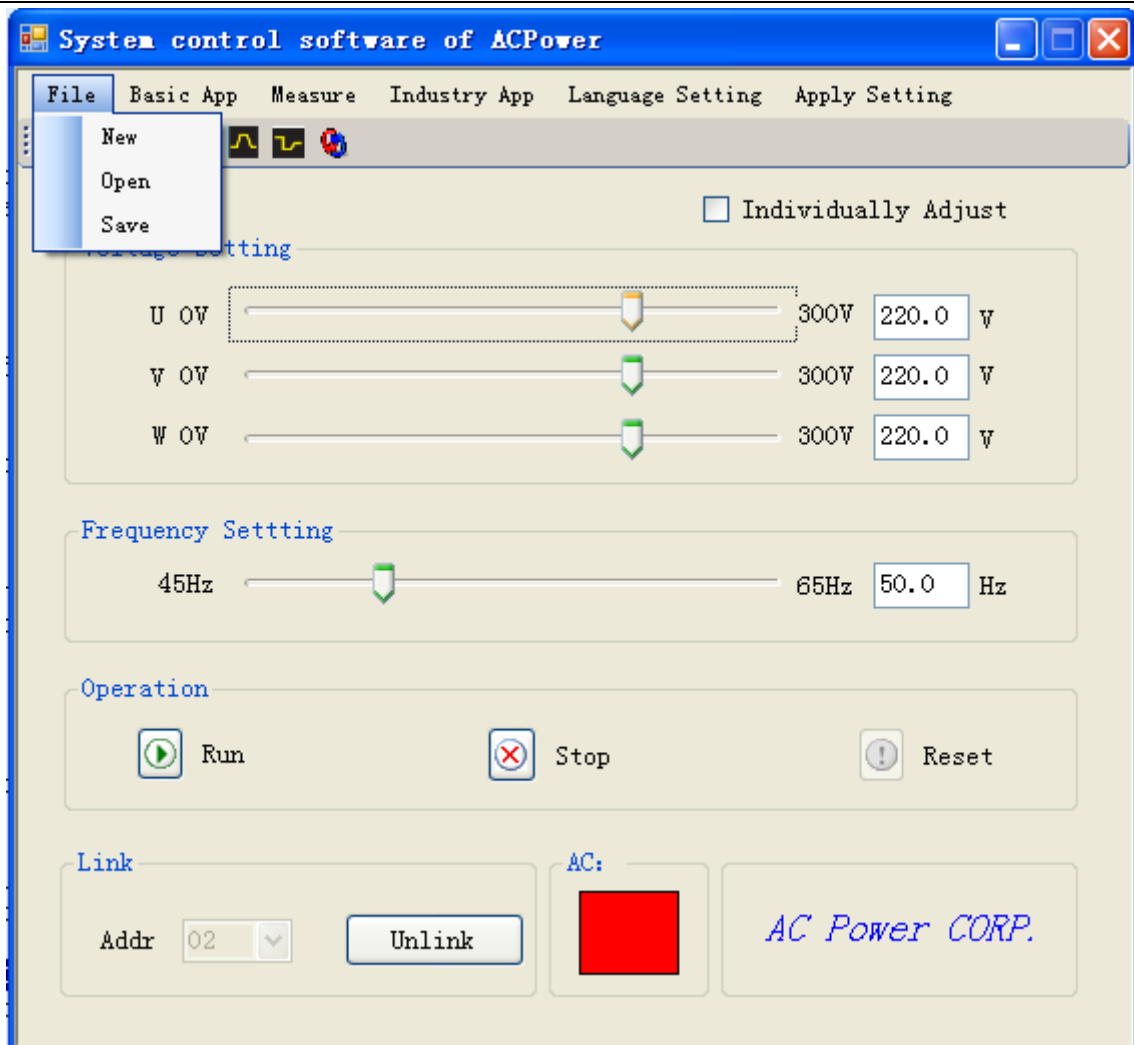
After a successful connection, button **【Read Dev. Info.】** lift ashing, click **【Read Dev. Info.】** (communication right) enter such as 5-9 shown in the device information display interface:



5-9 System Config UI

Users can view the system configuration information read from the power supply equipment is consistent with the parameters of the actual product, if it does not meet, please contact customer service staff to resolve.

After system configuration parameters confirm, click **【Enter】** button to enter the main interface of the software function, as shown in figure 5-10:



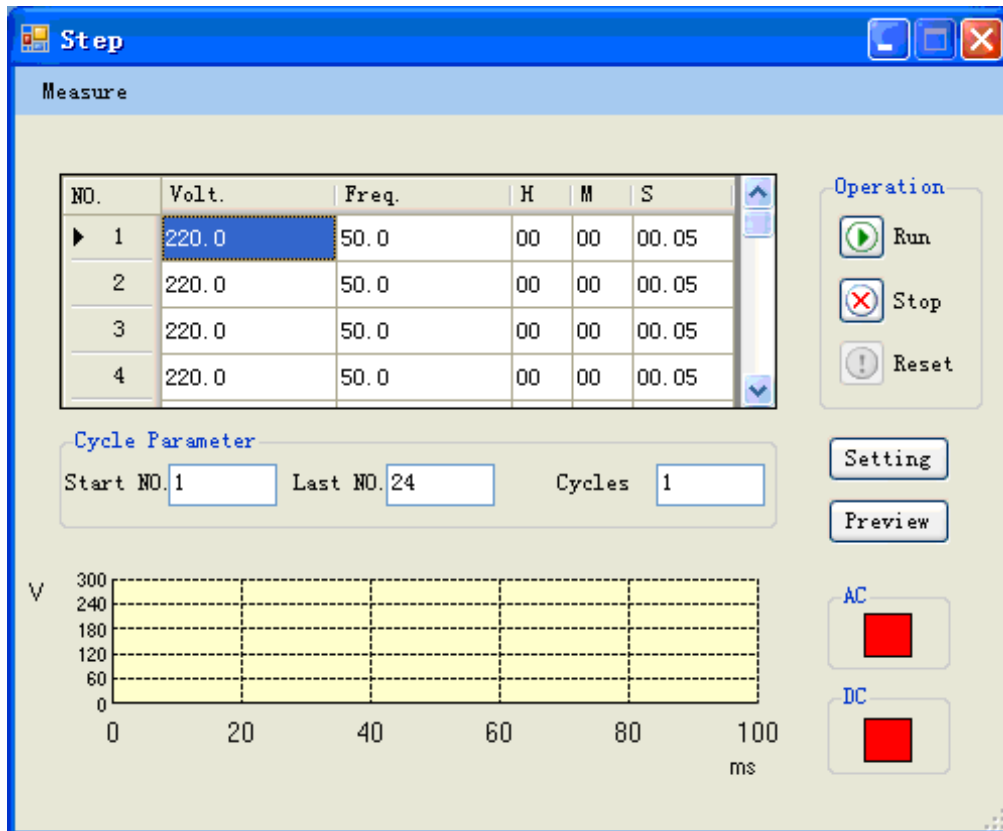
5-10 Main software UI

In the above menu:

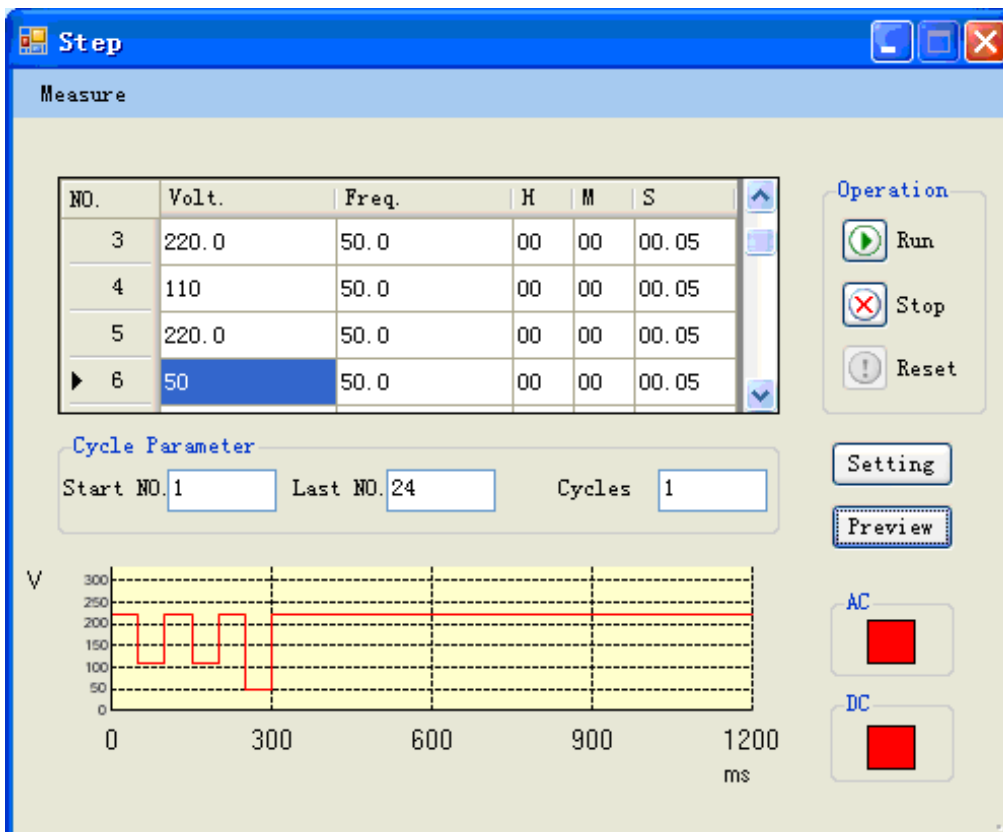
- **【New】**: Create a new file for system data storage;
- **【Open】**: Open an existing system data file;
- **【Save】**: Store all the data that users have created into the current system data file;



- (1) In the menu of “Basic App”, click on **【Step】**, and get into all the options and actions in “Step” mode, as fig. 5-11




(a) Menu of “step change” – Parameters settings



(b) Menu of “step” – Results preview

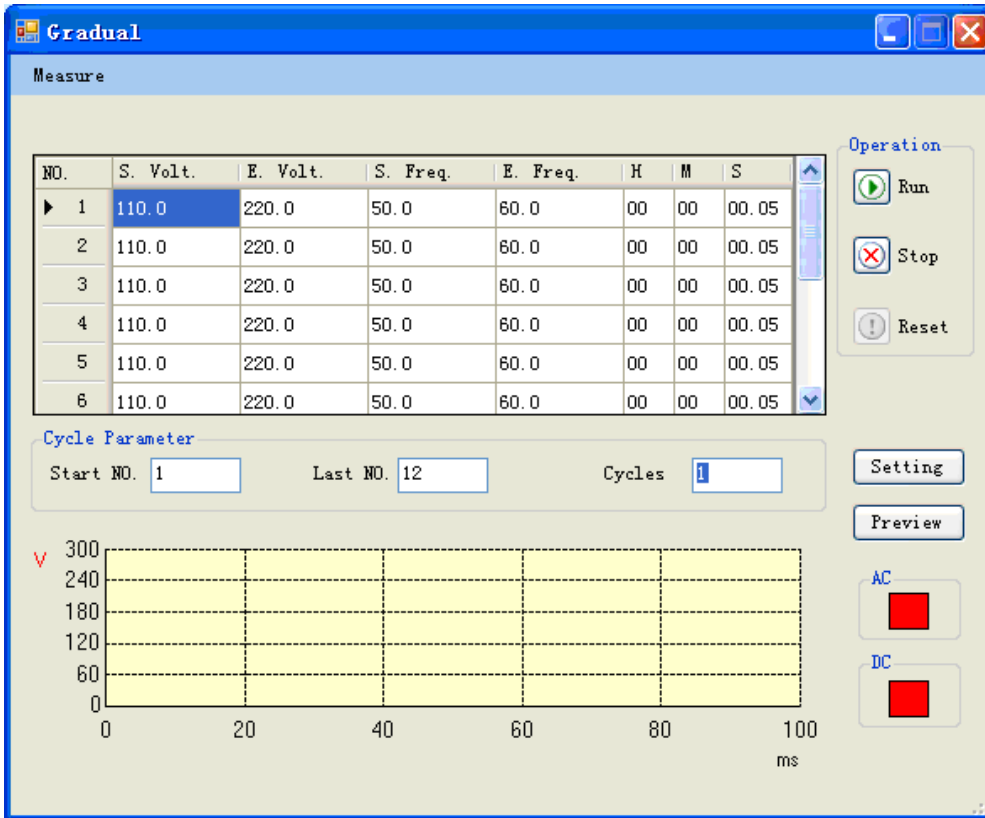
Fig. 5-11 Menu of “step” mode in remote control

- 
- U/V/W settings on 3 phases: If the machine has the function of “Individually Adjust”, then you can set up the parameters for each phase and one phase by one phase, otherwise these buttons are “grayed”.
  - **【Cycle Parameter】**: The machine will start the output from the first procedure set in “Start No.” to the last procedure set in “End No.”, and execute the whole procedures continuously for the number of iteration of the parameter set in this field. The maximum number of procedures that can be stored is 24. The maximum number of iteration is 255.
  - Click on **【Preview】** can preview the procedures (once executed) in time domain;
  - **【Setting】**: Save all the parameters in the touch screen into the control unit . User has to execute this action before running the whole “step” procedures;
  - All the data the users enter in this menu will be saved, once any of the action buttons of **【Preview】** , **【Setting】** or **【Run】** is clicked.
  - **【】** indicator : Red light indicates that the machine is in idle state (output stopped), while green light indicates the machine is in normal working state (output activated).

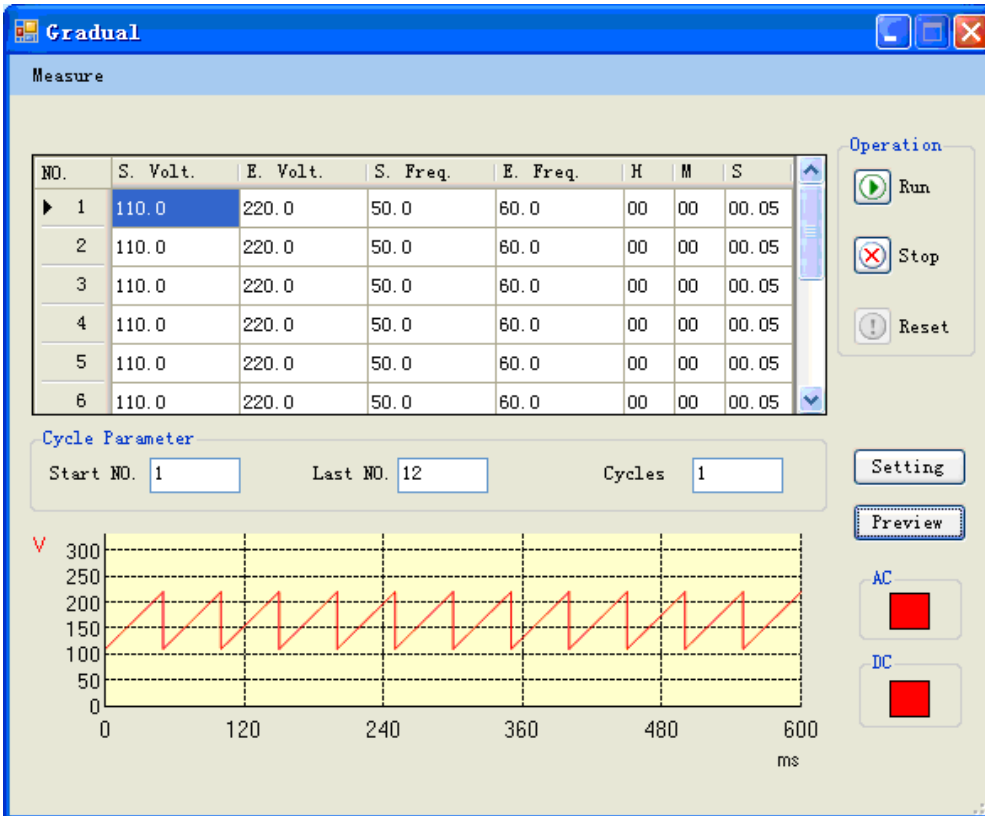
***Note: If none of the above 3 action buttons has been clicked, all the data the user has entered in this session will be lost once this menu is exited.***

- **【Run】** Once clicked, the machine will start the output immediately as above procedures setup;
- **【Stop】** Once clicked, the machine will stop the output immediately;
- **【Reset】** Once clicked, the machine will release itself from the “alarm” state

(2) In the menu of “Basic App”, click on **【Gradual】** will bring you to the menu of “Gradual” mode, as shown in Fig. 5-12:




(a) Menu of “Gradual” – Parameters settings



(b) Menu of “Gradual” – Results preview

Fig. 5-12 Menu of “Gradual” mode under remote control

- U/V/W settings on 3 phases: : If the machine has the function of “Individually Adjust.”, then you can set up the parameters for each phase and one phase by one phase, otherwise these buttons are “grayed”.
- **【Cycle parameter】**: The machine will start the output from the first procedure set in “Start No.” to the last procedure set in “End No.”, and execute the whole procedures continuously for the number of iteration of the parameter set in this field. The maximum number of procedures that can be stored is 12. The maximum number of iteration is 255.
- Click on **【Preview】** can preview the procedures (once executed) in time domain;
- **【Setting】**: Save all the parameters in the touch screen into the control unit inside the machine, the user have to execute this action before running the whole “Gradual” procedures;
- All the data the users enter in this menu will be saved, once any of the action buttons of **【Preview】** , **【Setting】** or **【Run】** is clicked.
- **【】** indicator : Red light indicates that the machine is in idle state (output stopped), while green light indicates the machine is in normal working state (output activated).

***Note : If none of the above 3 action buttons has been clicked, all the data the user has entered in this session will be lost once this menu is exited.***

- **【Run】** Once this button is clicked, the machine will start the output immediately as above procedures setup;
- **【Stop】** Once clicked, the machine will stop the output immediately;
- **【Reset】** Once clicked, the machine will release itself from the “alarm” state

- (3) In the menu of “Industry Apply”, click on【LVRT】will bring you to the menu of “LVRT” mode, as shown in Fig. 5-13:

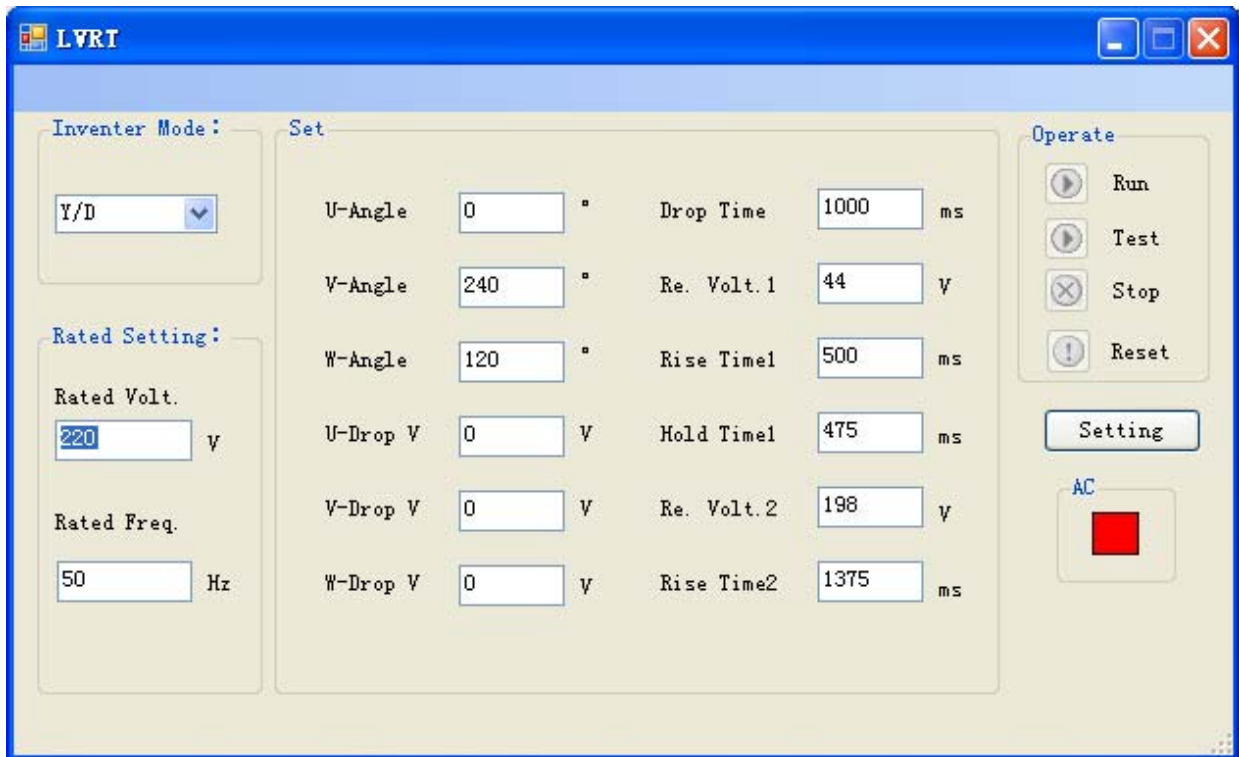


Fig. 5-13 Menu of “LVRT” mode under remote control

- **【Rated Volt.】**: Set the rated voltage of the inverter output;
- **【Rated Freq.】**: Set the rated frequency of the inverter output;
- **【U/V/W -Angle】**: Set the phase angle of the 3-phase voltage during LVRT process;
- **【U/V/W -Drop V】**: Set the drop-off voltage that LVRT regulations require, set the voltage of 3 phases independently.
- **【Drop Time】**: Set the time interval required during the drop-off voltage;
- **【Re. Volt.1】**: Set the first stage of the recovery voltage;
- **【Rise Time 1】**: Set the time interval required from the drop-off voltage to the first stage of the recovery voltage;
- **【Hold Time1】**: Set the holding time for the first stage of the recovery voltage;
- **【Re. Volt.2】**: Set the second stage of the recovery voltage;
- **【Rise Time 2】**: Set the time interval required from recovery voltage 1 to recovery voltage 2;
- **【Run】**: Output the rated voltage;
- **【Test】** Once clicked, the machine will initiate the whole LVRT procedure;
- **【Stop】** Once clicked, the machine will stop the output immediately;
- **【Reset】** Once clicked, the machine will release itself from the “alarm” state;
- **【Setting】**: Save all the parameters in the touch screen into the control unit inside the machine. User has to execute this action before running the whole LVRT procedures.

(4) In the interface of “Main software UI”, click on 【Measure】 menu enter the interface of “Measure”, as shown in Fig. 5-14:

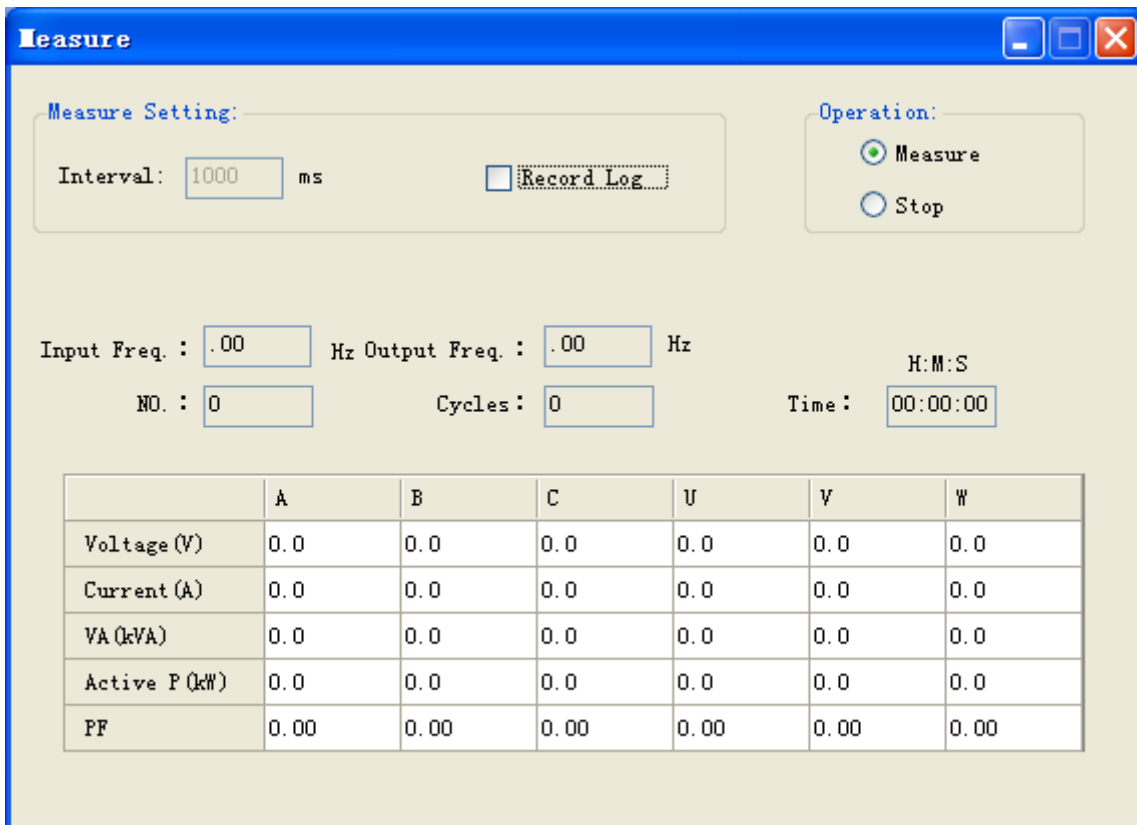


Fig. 5-14 Menu of “Measure” under remote control

- “Interval” : The time interval fixed the default value:1000ms.
- “Record Log”: Save all the data measured in this mode into a log file.The file path:C://ACPower.
- “Measure” collection and “Stop” collection can be clicked and executed any time.
- Input measure data:A/B/C phase data is measure on anytime.
- Output measure data:U/V/W phase data is measure when the device running.

**Note: these items can be selected only under the collection is ongoing.**

- (5) Click on the sub-menu of **【Language Setting】**, there are 3 kinds of languages can be chosen. Click on the language you want, and all the user-interface in this software will be changed to that language, as shown in fig. 5-15:

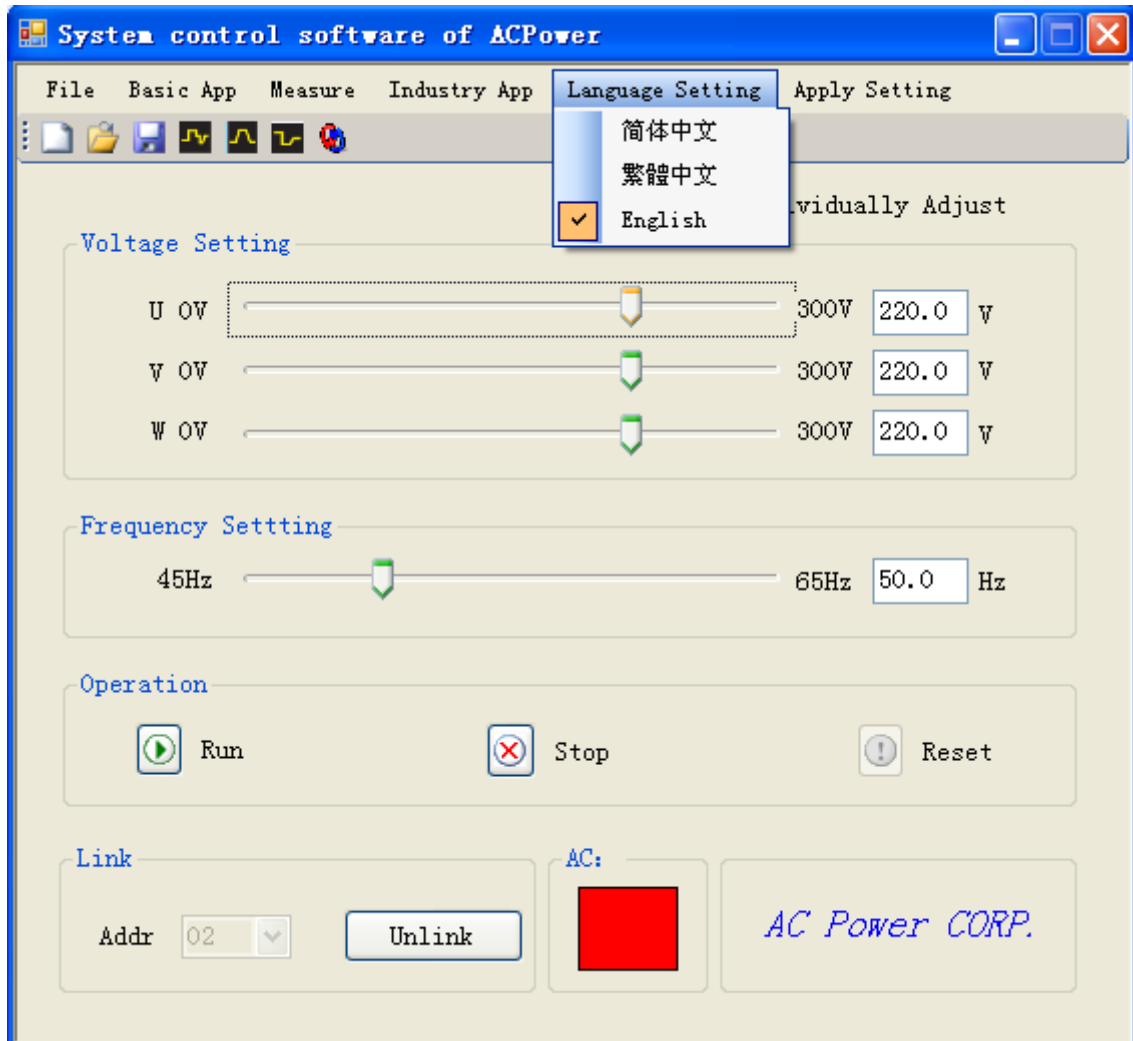


Fig. 5-15 Language selection under remote control

Click the button **【Unlink】** convert to local mode, and return to the communication setting UI (as shown in fig. 5-8).

## Chapter 6 Theory of the functions of machine

### 6.1 Block diagram

Functional blocks (from input to output) of PAS-F series AC source are shown in fig. 6-1:

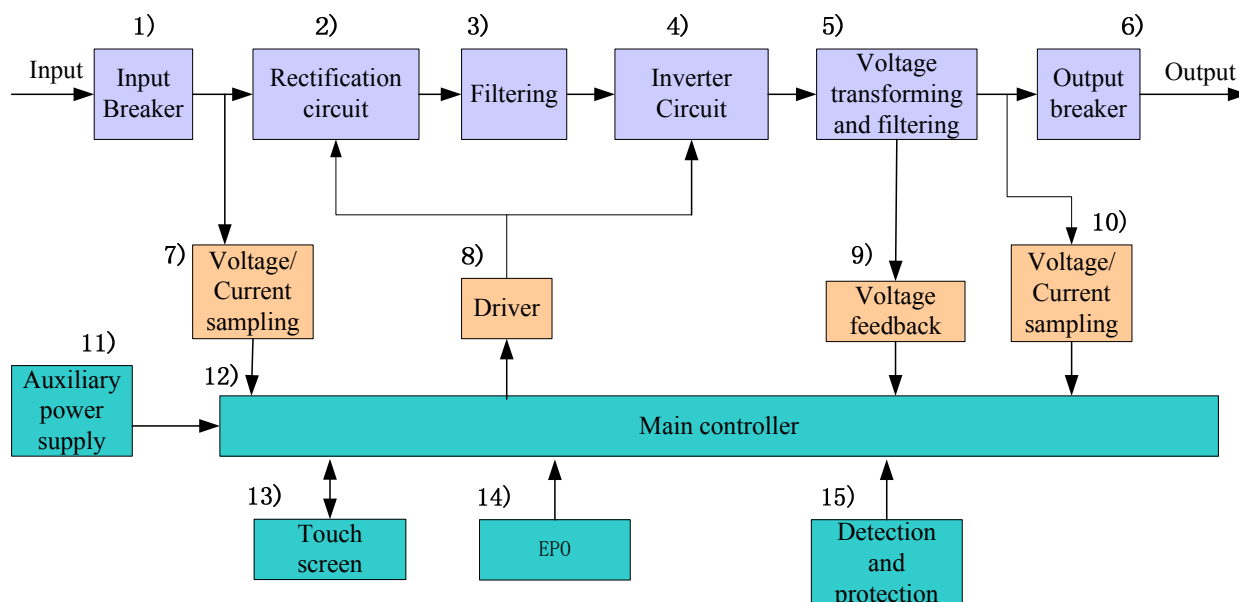


Fig. 6-1 Functional block diagram

### 6.2 Illustration of the block diagram

- 1) Input breaker: Manual control the input of the power grid;
- 2) Rectification circuit: Convert the AC input to DC energy;
- 3) Filtering: Low pass filtering on the waveform after rectification;
- 4) Inverter circuit: Convert DC back to AC;
- 5) Voltage transforming and filtering: Boost the output voltage form the inverter, then filter the waveform by LC filter and output it as a pure sinusoidal voltage waveform;
- 6) Output breaker: Enable or disable the output;
- 7) Voltage/Current sampling: Input Voltage/Current sampling;
- 8) Driver: Drivers for the IGBT modules in PWM rectification and Inverter circuit;
- 9) Voltage feedback: Control and regulation of the output voltage;
- 10) Voltage/Current sampling: Output Voltage/Current sampling;
- 11) Auxiliary Power supply: Power source for all the PCB circuit;
- 12) Main controller: All the controlling circuit.
- 13) Touch Screen: Touch panel display and control;



14) EPO: Emergency stop mechanism;

15) Detection and protection: Detecting all the signals and executing all the protection mechanism.

### 6.3 Structure of the main control

The main controller board is composed of three major blocks: “Detection and protection”, “Central control”, “Display and communications”, as shown in fig.6-2 :

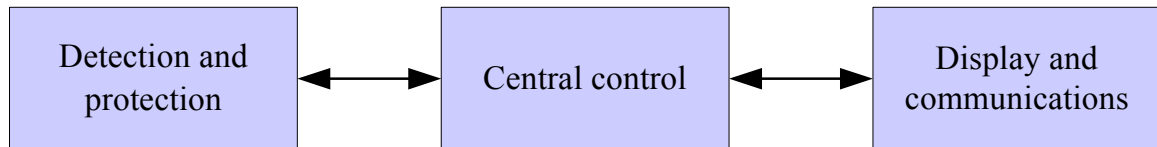


Fig. 6-2 Functions blocks in Main controller

## Chapter 7 Maintenance

Extreme temperature, high humidity, heavy dust, chemicals pollution and physical vibration all could impose negative impacts on the life and reliability of this machine. Nevertheless, the nature aging of all the electrical and mechanical components would further cause it more vulnerable to all kinds of faults. Therefore, routine and periodic maintenance are necessary and key to the reliability of this machine in the long run.



*Only authorized and trained technical professionals are allowed to carry out the maintenance on this machine.*

### 7.1 Routine maintenance

First of all, the daily operating environment must comply with the requirements stated in this user manual. Routine inspection on the environment and the machine should be checked on a regular base. All the environment data, the operating status and the parameters set in the machine should be recorded as well. It is best to have a detailed and accurate “machine usage log file” for all time reference and maintenance.

Abnormal phenomenon on the machine can be detected by the routine inspection and maintenance, and once observed; we should identify the root cause and remove the problem immediately. Call our customer service if you are not able to identify the cause or not able to remove the problem. The early we can remove the problems, the longer the life of the machine is. Checking items in the routine maintenance are listed in table 7-1.

Table 7-1 List of checking items on routine maintenance

Object to check	Inspection details			Criteria
	Checking items	When to check	Methods to check	
Environment	(1). Temperature and humidity (2). Dust, moisture and water leakage (drop on the machine). (3). Abnormal Chemical vapor	Anytime	(1). Thermometer, Hygrometer (2). Visual inspection (3). Visual inspection and smell	(1). Ambient temperature must < 40°, or maximum load need to be de-rated. Humidity should be comply with the spec requirements. (2). Little dust, no condensing, no water drop on the machine. (3). No abnormal smell, no abnormal color in the air.

This machine	(1)Shock, vibration (2)Heat dissipation (3)Acoustic noise	Anytime	(1)Visual inspection, sense of moving. (2)Thermometer (3)Sense of hearing	(1)No shock, no vibration. (2)Fan operating: check to see if speed and air flow volume OK or not. Measure the temperature on the surface of the enclosure; they should not have more than 30° temperature rise. (3) No abnormal acoustic noise.。
Input / Output status	(1)Input voltage (2)Output voltage (3)Output current (4) Temperature inside the machine	Anytime	(1)Voltmeter (2)Voltmeter (3)Ammeter (4)Thermometer	(1)within the spec limit (2)within the spec limit (3)within the spec limit (4)Temperature rise < 40°

## 7.2 Periodic maintenance

Depending on the usage of this machine and the environment where it works, a periodic maintenance can be carried out once every 3~6 months.

Maintenance task:

Screen filter for the air inlet should be detached and washed clean.

***Note: Open the front door of the enclosure to detach and re-install the screen filter, there is a cover in front of the screen filter, it needs to be removed before the filter can be accessed.***