爱科赛博
ACTIONPOWER

A Series of power grid simulator

Product User Manual V2.0

西安爱科赛博电气股份有限公司
XI'AN ACTIONPOWER ELECTRIC CO.,LTD.

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1 Preface

1.1 Preface

Dear customer, Thank you very much for choosing our power grid simulator. We sincerely hope that this product will meet your requirements and look forward to more precious opinions on the performance and function of this product. We will continue to improve and continuously improve product performance and service quality.

1.2 General information

Retention and use

This manual should be placed near the product for reference. It needs to be transferred when the device is moved or the user changes.

Copyright

Effectiveness

This manual applies to our product A-series of high-power grid simulator, including installation operations, electrical connection instruction, please read and understand this manual carefully before using the equipment, and pay attention to safety information and operating specifications.

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2 Introduction

2.1 Product introduction

AGS A series of power grid simulator is high-precision, high-dynamic, high-standard and the power supplies with comprehensive power grid characteristics. It can perform grid adaptability tests for equipment connected to the power grid and output stable voltages and frequencies. It can also provide a power supply environment with voltage changes, frequency changes, harmonics, inter-harmonics, unbalances, flickers and other power quality-related characteristics.

In addition to providing a power supply environment for electrical equipment, the power supply can also receive the energy returned from load and feed it back to the power grid for saving energy and improving the test environment.

2.2 System structure

The grid simulator principle diagram is shown in the figure2-1, the power grid simulator uses a two-way flow topology of energy. It is able to provide load energy and can absorb it as well.

The power grid simulator is divided into rectifier and inverter parts, the rectifier provides a stable DC bus voltage for the rear-stage inverter, the inverter adopts a three-phase independently controlled topology and outputs

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the DC voltage to a three-phase AC voltage through three single-phase inverts and three single-phase isolated transformer.

The RMS value, frequency and phase of the output three-phase voltage can be adjusted independently. By adjusting the RMS value, frequency and phase of the power output phase voltage, the normal and abnormal characteristics of the power grid are simulated.

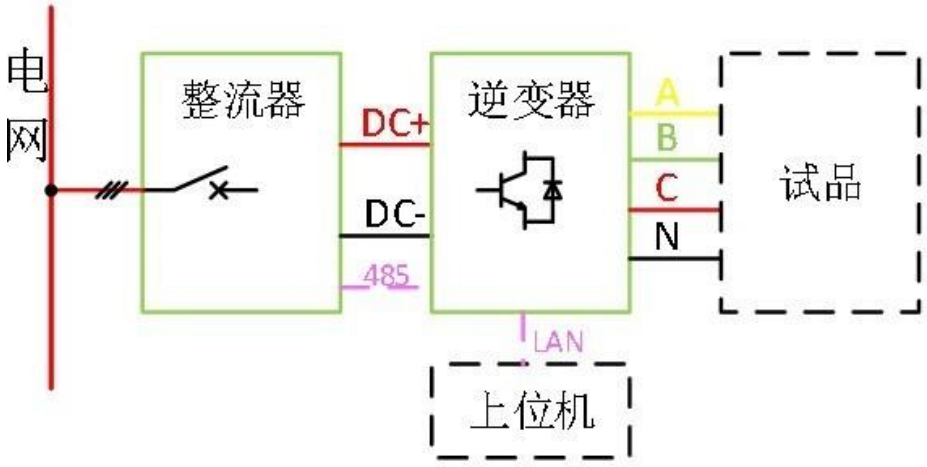

Figure 2-1 Schematic diagram

2.3 Product features

- High precision: voltage accuracy ± 0.1% F.S. and frequency accuracy 0.01% (customized)
- High dynamics: 10%-90% rising time is less than 1ms
- High standards: harmonics, inter-harmonics, fault ride through etc. are higher than the standard test requirements of South Africa, Germany and the United Kingdom
- Comprehensive simulation: full-range adjustment of three-phase voltage, three-phase phase and frequency, harmonics, inter-harmonics, unbalances,

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flickers, fault ride through to meet international standards, able to trigger by time and phase angle

- Able to simulate voltage harmonics, inter-harmonic, superimposition with 2-50 harmonic, harmonic phase angle can be set and able to superimposed 1Hz-3000Hz Inter-harmonic
- The same model can be used to install in parallel to improve the output capacity and expand capacity.
- Output synchronous signal to accurately catch the changes and the trigger mode is optional
- Able to do low voltage ride through, high voltage ride through and high/low voltage ride through. A, B, C three phases configurable and trigger phase angle can be set to meet international regulations like VDE-AR-N 4105, NRS 097-2-1, G83, EN50438
- Multiple communication interfaces: RS485/LAN/CAN

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3 Product function

3.1 Function description

A series grid simulator can be used not only as a power supply, but also as a load, and will be set according to the contract content before leaving the factory. The basic functions are described as follows:

Source mode

Function	Description
Basic functions	The main interface can make the power supply simulate normal and abnormal characteristics of public grid through the output voltage, frequency, phase and other parameters of the power supply. The three-phase output of the power supply is independently configurable, and the output voltage and frequency can set the slope of change. Electrical parameters can be adjusted in a real-time.
Harmonic injection	Output the distortion voltage waveform by setting parameters such as harmonic frequency and harmonic content.
Inter-harmonic injection	Output the distortion voltage waveform by setting parameters such as the number of harmonics and the content of harmonics between them.
Transient programming	The output voltage is programmable through parameters, including List, Pulse and Step
Flicker	Able to output flicker function
Three-phase unbalance	Able to output three-phase unbalance function

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Load mode

Function	Description
Basic functions	The main interface can set the output current, frequency, phase and other parameters of the load. The three-phase output of the power supply is independently adjustable, and the output current and frequency can set the slope of change. Electrical parameters can be adjusted online.
Harmonic injection	Output the distorted current waveform by setting parameters such as harmonic frequency and harmonic content.
Transient programming List	By setting parameters, the output current is programmable step by step.
User-defined waveform	Customization editing output waveform

Source & sink mode

Devices with source & sink mode can configure the required functions in the parameter configuration interface.

The above are 3 general functions introduction, users can find the functions in detail in section 4.3

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4 Software introduction

4.1 Initiation

For installation steps and initiation, please refer to the "Installation Manual"

4.2 Software notification

4.2.1 Data source

The data from operation, working status, and fault alarm information of grid simulator are actively uploaded by the controller.

The user can change the operating parameters of grid simulator through the setting interface.

4.2.2 Function description

The main functions of the host computer are as follows:

1、Real-time monitoring of the power grid simulator working status, operation data, and fault alarm status

2、Storage of the power grid simulator fault alarm status

3、The HMI is fully controlled by grid simulator

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4.2.3 Introduction of HMI

The main interface of the grid simulator host computer is shown in the figure 4-1.(The figure below is for example, and the interface of different models is slightly different). When initiated for the first time, it defaults to the steady-state parameter page. The whole page is divided into the following parts:

Number	Name	Description
1	Operation and status bar	For the basic start & stop & reset of the rectifier
2	Option bar	Function switching selection and basic settings
3	Status bar	To check the current status of each part of the power supply
4	Output operation bar	For switching on/off the power output and output rest, etc.
5	Given window	Setting and executing of given data commands
Middle	Desktop	Real-time monitoring of actual output parameters such as voltage, current, frequency, power, etc.

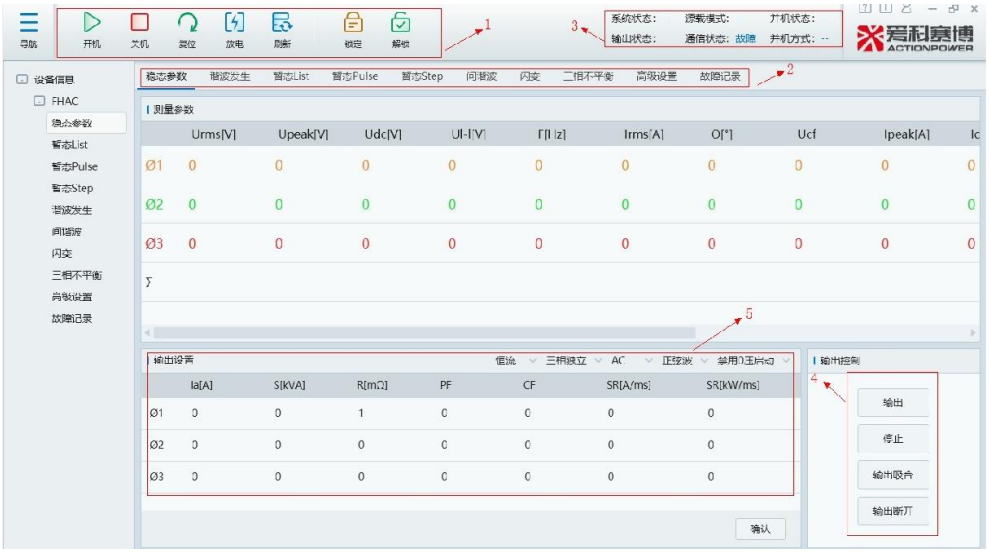

Figure 4-1 Grid simulator host computer HMI

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To confirm the current status right after the device is turned on, as shown in the figure 4-2

Items	Functions
System status	Five category to show the working status of the device: shutdown, standby, operation, reset and fault 1） Shutdown: it means that the equipment is trouble-free and does not work 2） Standby: indicates that the rectifier is on and the output switch is off 3） Operation: indicates that the output switch is on and the output is normal; 4） Reset: reset can be restored to standby. When the failure is investigated, the user can click the “power/reset” if they need to return to standby 5） Fault: The current equipment is faulty and has not been reset.
Communication status	“Normal” means that the communication connection is normal, and “fault” indicates that there is communication is disconnected and need to check the display Ethernet interface
Output state	Indicates the status of the output contactor.
Source load mode	Display the current functional mode of the device, which is divided into “Source”, “Sink”, “Source + sink”
Parallel mode	The equipment parallel mode is divided into two types: full parallel and series-parallel type.
Parallel status	Including handshake waiting, series parallel inconsistency, M Line N Columns information etc.

4.2.4 Parameter setting

The parameter setting before operation is mainly in the advanced settings interface, which needs to be carried out when the power is turned off, as shown

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in the following figure: including parallel settings, protection settings, and communication settings.

Name		Functions
Parallel setup	Parallel pass-through	Enabling and prohibiting
	Port1	State settings of the device column parallel installation, with stand-alone, host, slave modes
	Port2	State settings of the device line parallel installation, with stand-alone, host, slave modes
Protection		Set the protection edges and protection time for each voltage, current and power 1） Urms: Output voltage RMS protection 2） Uac: Output voltage AC component protection 3） Udc+, Udc-: Output voltage DC component protection 4） Irms: Output current RMS protection 5） P: Total output power protection 6） S: Output apparent power protection 7） Fmax, Fmin: Output frequency edge protection
Communication settings		Used for local/remote switching and the selection of communication port
Source & load settings	Load Mode Display only	Select the load type

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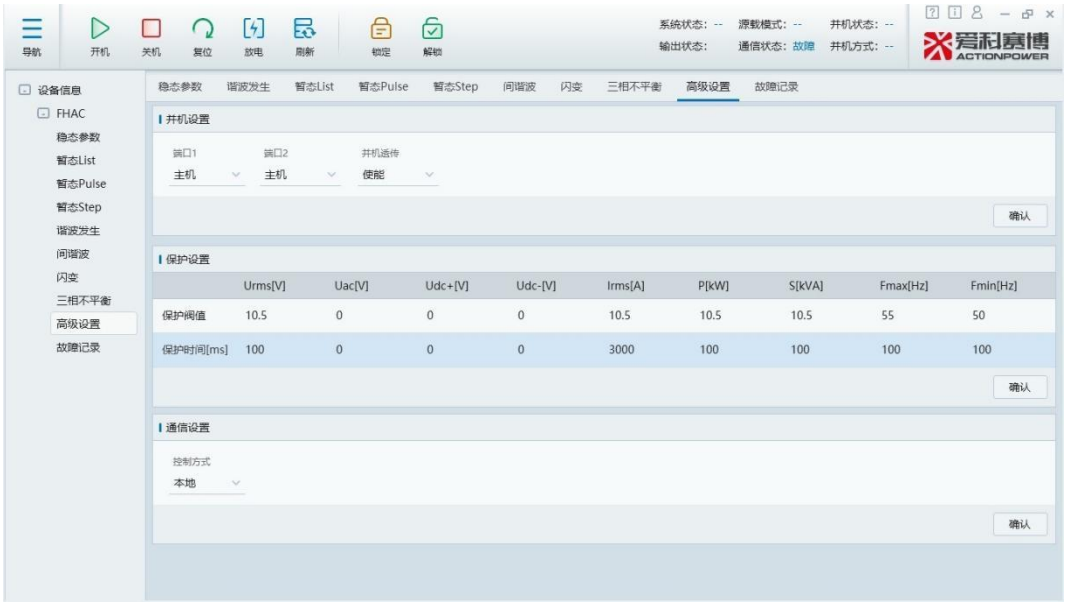

Figure 4-2 Grid simulator parameter setting

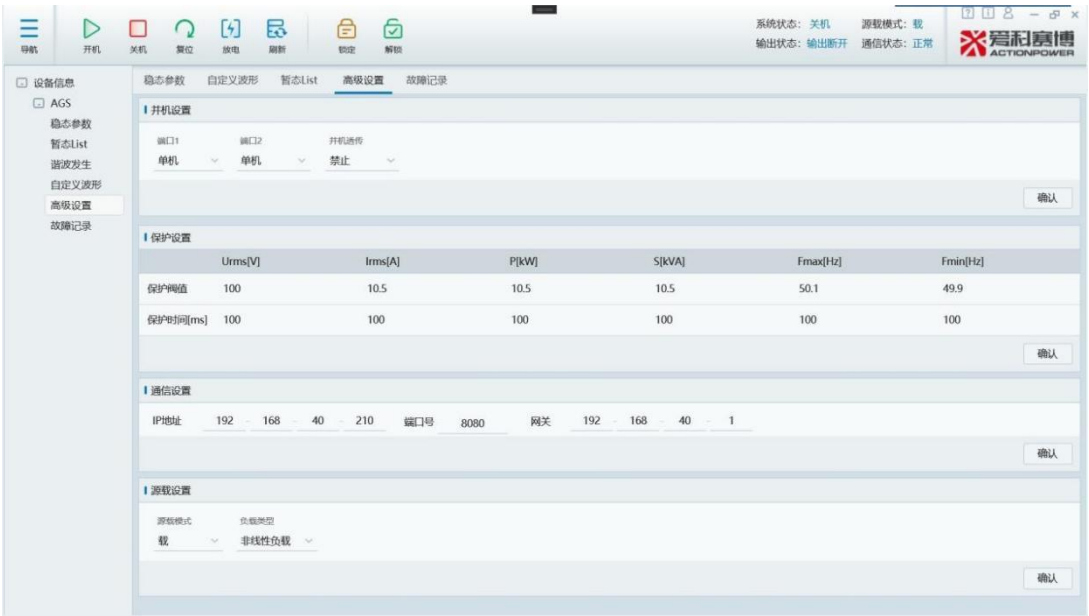

Figure 4-3 AC load parameter setting

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4.2.5 Menu function

The above system introduces the power supply usage settings. This section briefly introduces the use of common functions of the menu, modules functions see the picture below 4-4

1. Power on: used to start the rectifier and put the power supply in standby mode.

2. Shutdown: used to turn off the rectifier and put the power supply into the shutdown state.

3. Resetting: usually use after troubleshooting, and the software needs to check the status again.

4. Discharge: After the equipment shuts down, it needs to replace the cable manually, finding the faults, repairing the equipment and other situations. Considering safety issues, it needs to click “Discharge” button, the device discharges itself according to the power of the circuit.

5. Refresh: It is used in cases where the interface data update is slow and is not often used.

6. Locking/Unlock: In order to prevent user-set parameters from being wrong operated during the use process, this series of devices has been added “Locking”. After clicking the button, the display parameters cannot be set, just for browsing. While clicking “Unlock" the button exits from locked state.

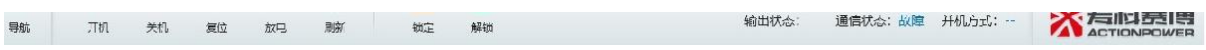

Figure 4-4

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4.3 Usage of host computer

4.3.1 Parameters in steady-state

Start the host computer software and you will see the basic operation interface. The basic operation steps are:

1. Start power supply: The parameters are confirmed to be correct, and the power supply can be started.

1) Start the rectifier: Click on the upper left corner "Start" The button power supply will run in the established timing sequence, when the upper right corner "System status" Shows "standby", the next step can be prepared. At this time, only the rectifier is running, and the power supply has no output.

2) Output: After the previous step is completed, click "Send out" button as showing in the figure 5-3, when the upper right corner "System status" Show "running", the power supply outputs normally.

3) Output on control: After the power supply completes the normal start- up process, the output voltage will stabilize at the set value, click "Output contact" button, the contactor at the power output will be contacted, and the power supply will begin to provide power to the device under test.

2. Measurement parameters: The monitoring interface displays data such as voltage, current, phase angle, power etc. from the power supply in real time.

3. Stop output: Click "Output disconnected" button, the contactor at the output side will be automatically cut off, and the power supply will stop providing power to the device under test.

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4. Power shutdown: Click on the upper left corner "Shut down”, the power supply will run in the established timing, when the upper right corner “System status” shows “Shut down” the power supply off.

The following separately introduce the difference of interface parameter settings for each mode.

4.3.1.1 Source mode

When the device is in the source mode, open the software and you can see the following interface. This interface performs the basic operation of the power grid simulator.

Figure 4-5

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Setup steps:

1. Output mode selection: three-phase independent or three-phase according to demand;
2. Select the output mode: AC (No DC component), AC+DC (AC current with DC components, DC part can be set).
3. Output waveform: built-in sine wave, square wave, triangle wave and other forms, and can also be stored by user-defined waveform.
4. Output data settings: Set the size, phase, frequency, etc. of the three-phase voltage.

4.3.1.2 sink mode

The load mode has two options: linear load and nonlinear load.

The linear load interface is shown in the following figures:

There are 4 working mode including constant current (CC), constant power (CP), constant resistance (CR), RLC

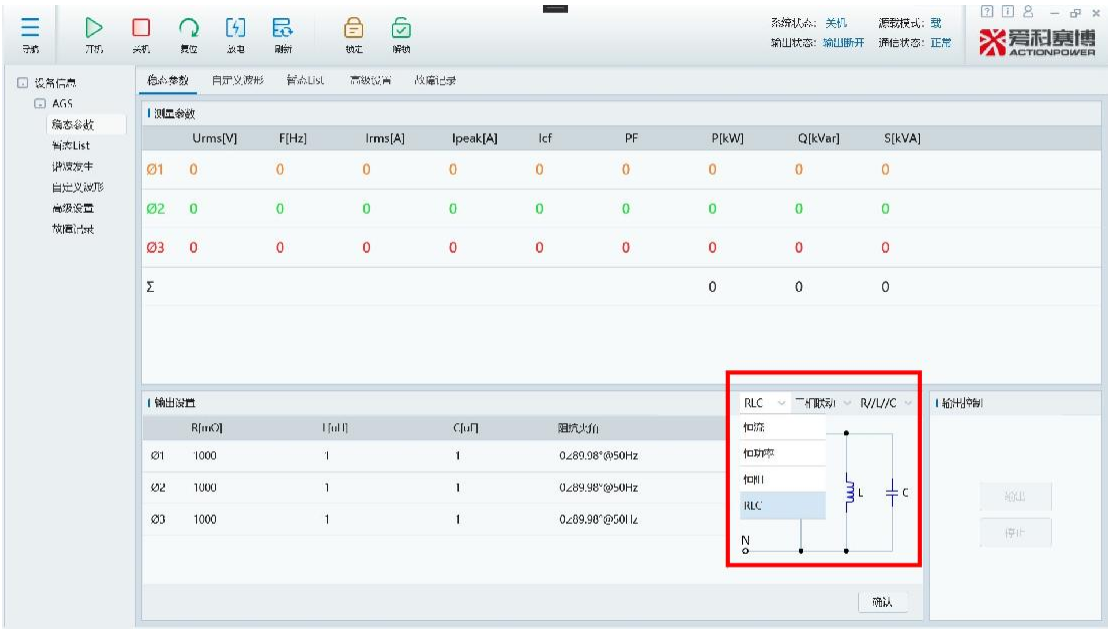

Figure 4-6

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1. CC mode

1. Output mode: choose three-phase independent or three-phase according to requirements.

2. Output waveform: built-in sine wave, square wave, triangle wave and other forms, and can also be stored by user-defined waveform.

3. Selection of 0V voltage start-up, usually it is disabled.

4. Output data settings: three-phase current setting, internal resistance, load type, SA (Output current rising speed) etc.

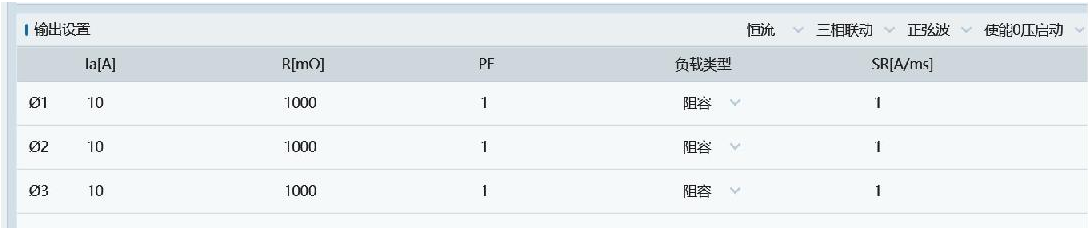

Figure 4-7

2. CP mode

The setting method is similar to the constant current mode. The output method is output according to the given power.

Figure 4-8

3. CR mode

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1. Output mode: three-phase independent or three-phase according to requirements

2. Internal resistance value settable

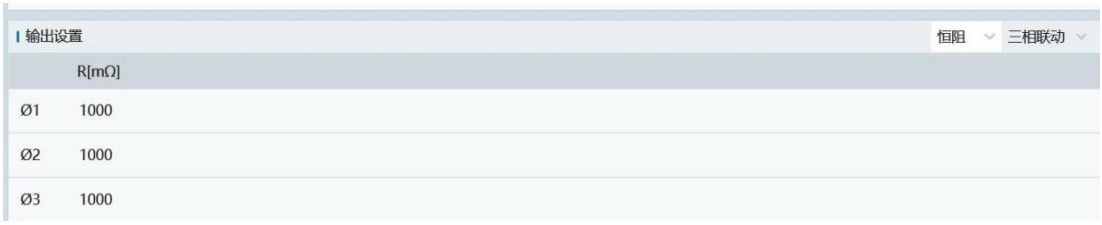

Figure 4-9

4. RLC Mode

1. Output mode: three-phase independent or three-phase according to requirements

2. Load connection method: R//L//C, (R//C)+L, (R+L)//C, (R+C)//L, R+L+C

3. Resistance value, capacitor and inductance value settable according to requirements.

Figure 4-10

The nonlinear load interface is shown as follows: Only CC mode and CR mode

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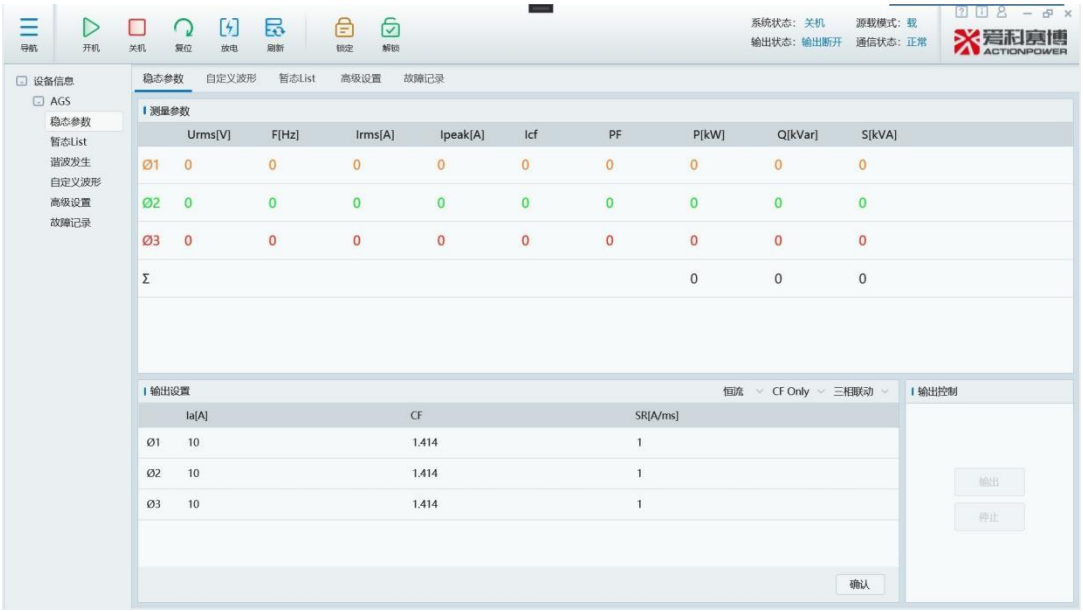

Figure 4-11

1. CC mode

1. Output mode: three-phase independent or three-phase according to requirements

2. CF/PF adjustment mode: CF only (crest factor adjustable) PF only (power factor adjustable) BOTH mode (both CF/PF can be set, priority adjustable)

3. Set the output parameters according to the requirements

输出设置　　恒流　CF Only　三相联动

	Ia[A]	CF	SR[A/ms]
Ø1	10	1.414	1
Ø2	10	1.414	1
Ø3	10	1.414	1

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Figure 4-12

2. CP mode

Similar to CC mode. The output power is controllable, and the output setting interface is as follows:

Figure 4-13

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4.3.2 Harmonic

The A series grid simulator has the function of outputting harmonics, and the operation interface is shown in the figure 4-13. It capable to output 2~50 times harmonics, each harmonic content can be controlled independently. Users can set up single harmonics and multiple harmonic combinations.

Source mode outputs voltage harmonics, and load mode outputs current harmonics.

Figure 4-14 Grid simulator harmonic injection control interface

Figure 4-15 AC load harmonic injection control interface

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1. **Parameter setting:**

The parameter table can set harmonic injection parameters, including harmonic times, content, phase, and single harmonic content limits 10%, and harmonic superposition content limits 8%.

2. Programming configuration

Items	Functions
Harmonic trigger	Single: Single trigger and manually Fundamental wave: Automatic
Trigger source	Local software: local without external trigger source External hardware: external trigger with trigger port
Phase number	Three-phase independence/Three-phase
Coupling mode	AC Coupling by default

3. Preview:

After setting the nominal parameters and harmonic parameters, the total harmonic content of the output voltage can be observed in real time, and the preview interface will automatically output a preview waveform consistent with the parameters.

4. Operation

1. Update: Once parameter setting completed, you need to click "Renew" for update;

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2. Loading/End: If the programming configuration selects the harmonic trigger output as fundamental, click "Loading" button while the power supply is running, it enters the function curve; click "End", the power exit curve enters nominal parameters.

3.Trigger: If the programming configuration selects the harmonic trigger output as "Single", you need to click "Trigger" manually. After a single trigger the power supply enters nominal parameter operation section automatically.

4.Other operations

Items	Functions
Importing	Users can import the parameter table (for specific Excel Table) directly imported into the host computer
Export	The set parameters can be exported directly to a specific Excel Tables
Clear data	Delete all set parameters
DST	27 different harmonic waveform built-in, one-click access and easy to use (Φ1，Φ2，Φ3 represents ABC Three phases)
Read	100 example saved, one-click call, the name can be modified
Storage	One-click edition with harmonic data as an example and make it easy to use again

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4.3.3 List Programming

Grid simulator source mode and AC load mode both support transient List function, as shown in the figure below.

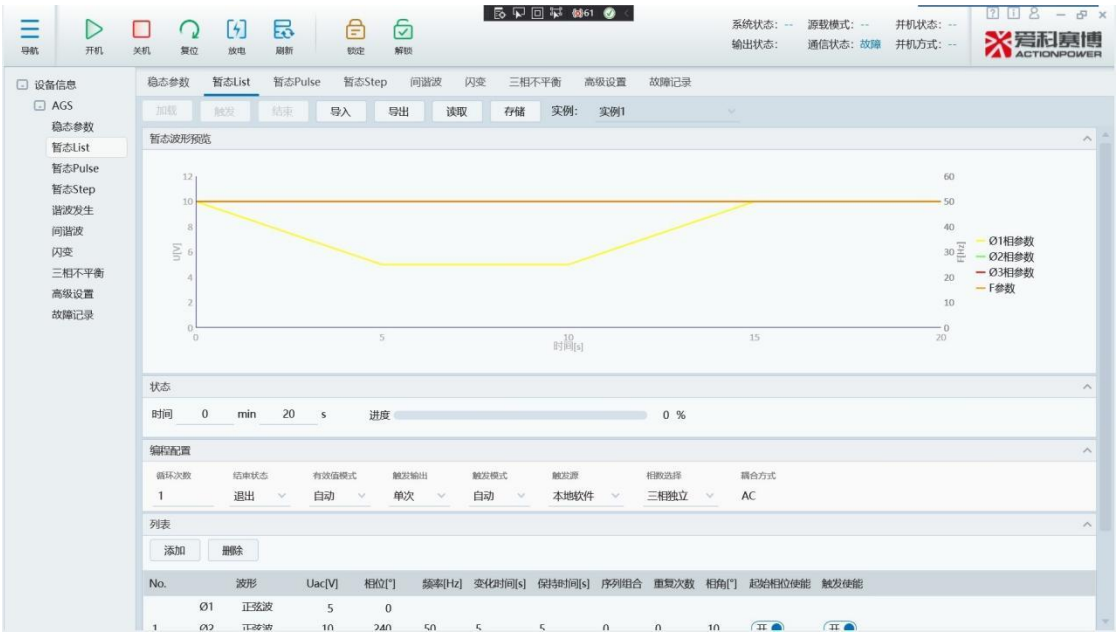

Figure 4-16 Grid simulator transient List Interface

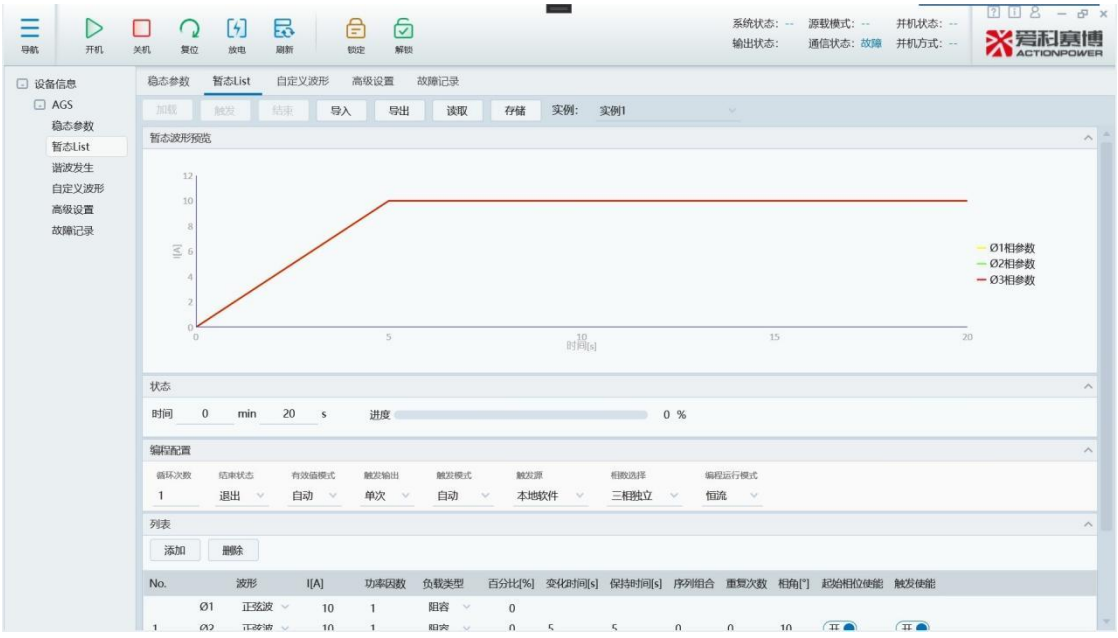

Figure 4-17 AC load transient List Interface

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1. **Programming configuration**

Name	Function
Cycle	The number of cycles of the whole programming steps, maximum1000, 0 Represents an infinite loop
End status	"Exit" : After the power supply completes the output according to the configuration, it automatically exits and runs with steady- state parameters. "Hold" : After the power supply completes the output according to the configuration, it is automatically kept on the setting parameters of the last step. In this mode, the control system does not detect the cycle number value and automatically keeps running on the parameters of the last step of the manual setting after only one cycle is completed.
RMS mode	Choose to enable or disable according to the requirement whether the programming is valid for the effective value or not.
Trigger output	Single step: Programming data output only 1 step while receive the trigger signal single cycle: Programming data output 1 time while receive trigger signal Single: All programming data is output according to the set number of cycle steps while receiving the trigger signal The differences in detail are shown in the figure 4-18.
Trigger mode	Automatic: The configured data automatically triggered while receives a signal; Single step: the configured data manually clicks to trigger only one step
Trigger source	Local software or external hardware
Phase number selection	Three-phase independent or three-phase, according to the requirements
Programming mode	Only working with AC load mode, according to CC or CP mode

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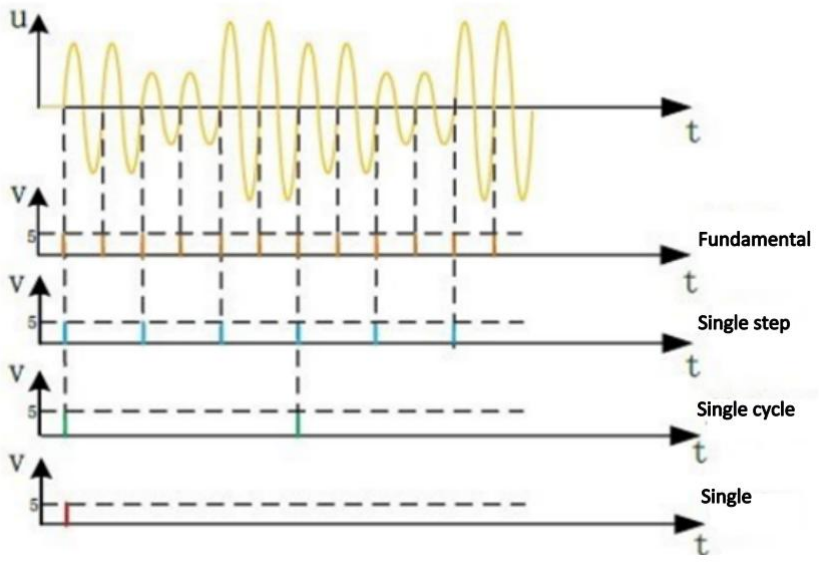

Figure 4-18

2. Parameter setting (waveform edition)

Step 1: Set basic parameters of each step according to the requirements. The grid simulator is able to set waveform, voltage, phase, frequency etc. AC load needs to select load type and power factor etc.

Step 2: “change time” The process time of change from the previous step to current step

Step 3: “holding time” Duration of programming parameters

Step 4: “ repeat number ” Number of repeated runs of one-step programming data

Step 5: “Sequence combination" After setting the parameters, it indicates the programming sequence that the programming can call back from the end of this step, for example, set 2 in the sequence 5 sequence combination,

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indicating that after the third step is completed, return to the first 3 Step by step continues to run in progress.

Step 6: “Phase angle” “Initial phase enabling” set them as enable and set the value of phase angle, indicating the angle at the beginning of the programming step. If the disable it, the programming can be triggered at any phase angle.

Step 7: Select in the previous step where you need to add a programming order, click “Add” The button can increase the number of sequences. Select the programming sequence you want to delete, click “delete” can reduce the number of the sequence.

Step 8: Preview: The parameter can be observed in real time in the waveform preview interface, and the programming time is also updated in real time.

3. Start programming operations

1. Trigger: After all parameter settings are completed, click on the upper left corner of the interface “Trigger” button, the parameters are sent to the control system.

2. Loading/End: During the normal operation, click “Loading” button, the power supply enters the transient programming mode; click “End”, the power exit current curve and enters the nominal standard.

3.

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4. Other operations

Items	Functions
Importing	Users can import the existing parameter table (for specific Excel Table) directly into the host computer software.
Export	The parameters can be exported directly to a specific Excel Tables.
Read	Pre-deposition100An example, convenient one-click “Read” Call, the instance name can be modified
Storage	One-click the edited harmonic data “Stockpile” become an example and make it easy to call with one click

List Programming examples

Example 1: Output of the following waveform

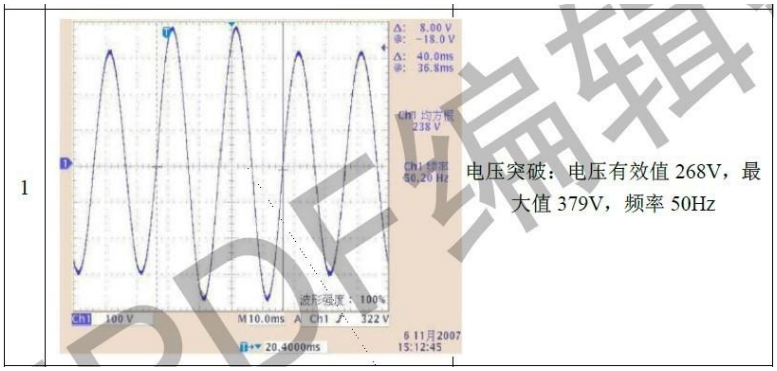

Figure 4-19

Set parameters as following:

序列

No.		波形	Uac[V]	Udc[V]	相位[°]	百分比[%]	频率[Hz]	变化时间[s]	保持时间[s]	序列组合	重复次数	相角[°]
	Ø1	正弦波	220	0	0	50						
1	Ø2	正弦波	220	0	240	50	50	0	0.04	0	0	开 0
	Ø3	正弦波	220	0	120	50						
	Ø1	正弦波	268	0	0	50						
2	Ø2	正弦波	268	0	240	50	50	0	0.04	0	0	关 0
	Ø3	正弦波	268	0	120	50						

Figure 4-20

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Output

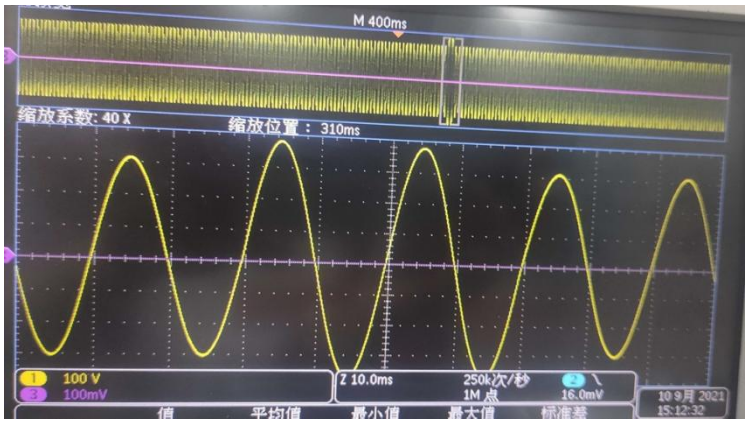
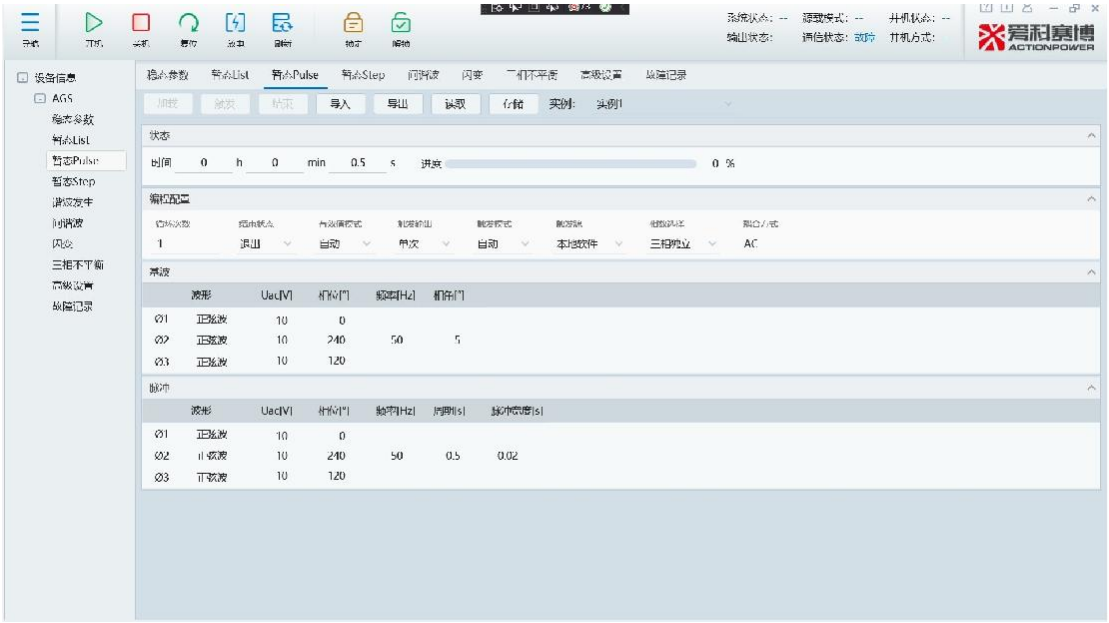


Figure 4-21

4.3.4 Pulse Programming

Transient pulse programming only works in the grid simulator mode, pulse waveforms can be added to the base wave, as shown below,



Picture 4-22

Parameter editing instructions and usage steps refer to section 4.3.3, here are some examples of programming:

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Pulse Programming examples

Required output:

1. Before charging, the oscillation voltage occurs in the following phases: 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315°. Charge the vehicle and check the charging status.

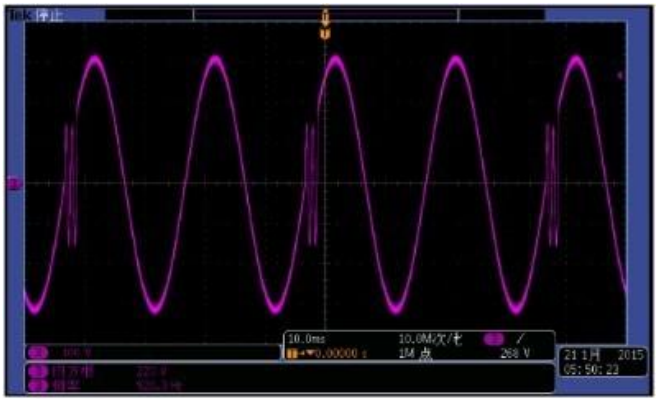

Figure 4-23

Set parameters to the phase angle 0° as an example, changing the trigger phase angle in the graph can change the angle at which the pulse occurs.

Pi 4-24

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Output

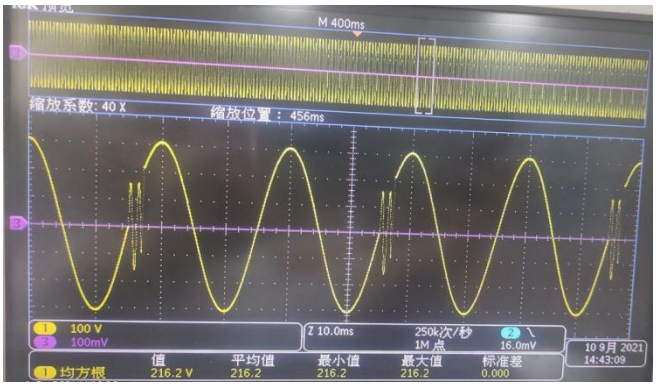

Figure 4-25

4.3.5 Step Programming

Pulse programming only works under the grid simulator mode, it can be increased in a fixed increase or smaller output voltage, output frequency, etc., as shown below.

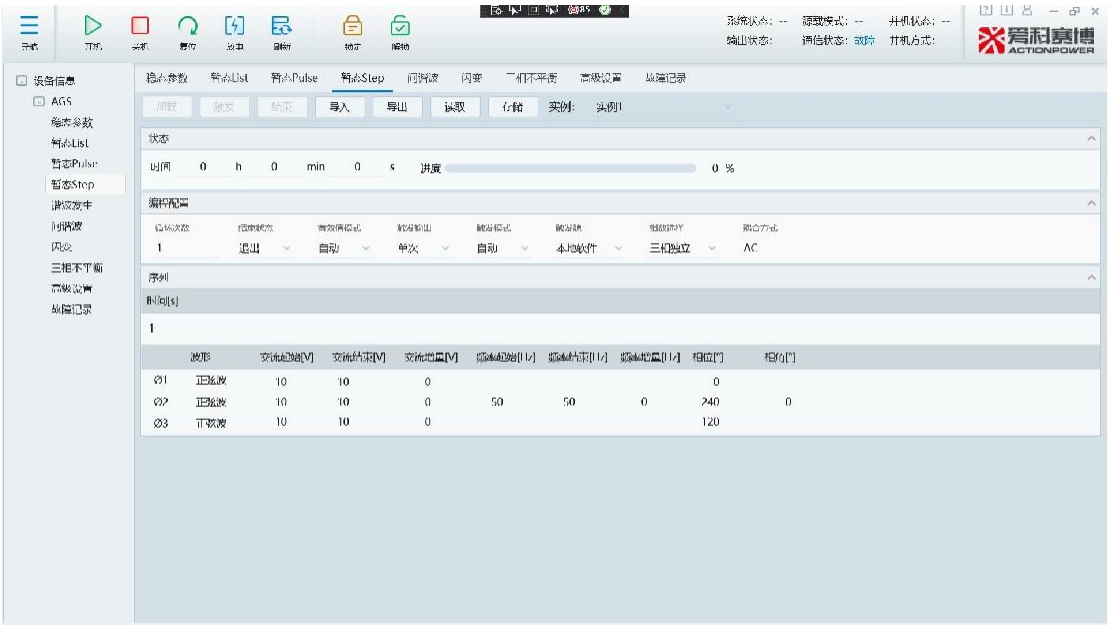

Figure 4-26

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Parameter editing instructions and steps refer to section 4.3.3, here are some examples of programming:

Step Programming examples

Follow these steps to set up the transient step test:

1. Set the AC start from 100V and end with 250V, Increments 50V
2. Set time 0.08s, and number of loops with 3
3. Start the power supply on the main interface
4. Click load and trigger on the interface

Output

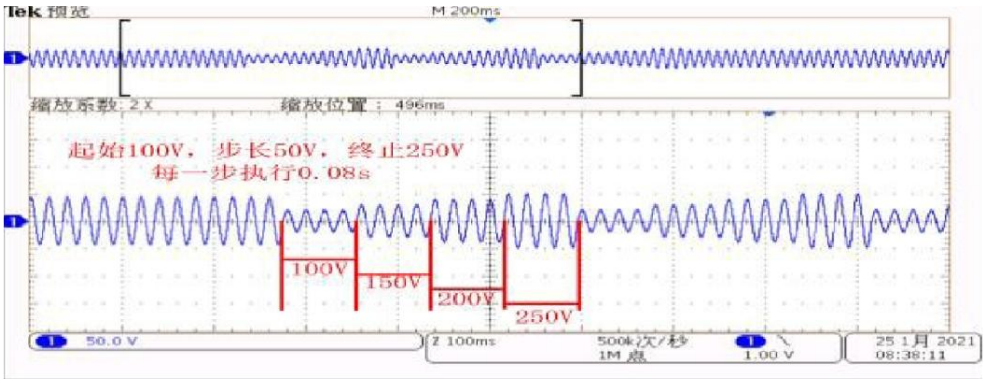

Figure 4-27

4.3.6 Inter-harmonic

The inter-harmonic injection function of grid simulator supports output 1Hz~2500 Hz. The operation interface of inter-harmonic injection is shown in the figure below. The operation methods of inter-harmonic injection is generally same as harmonic injection.

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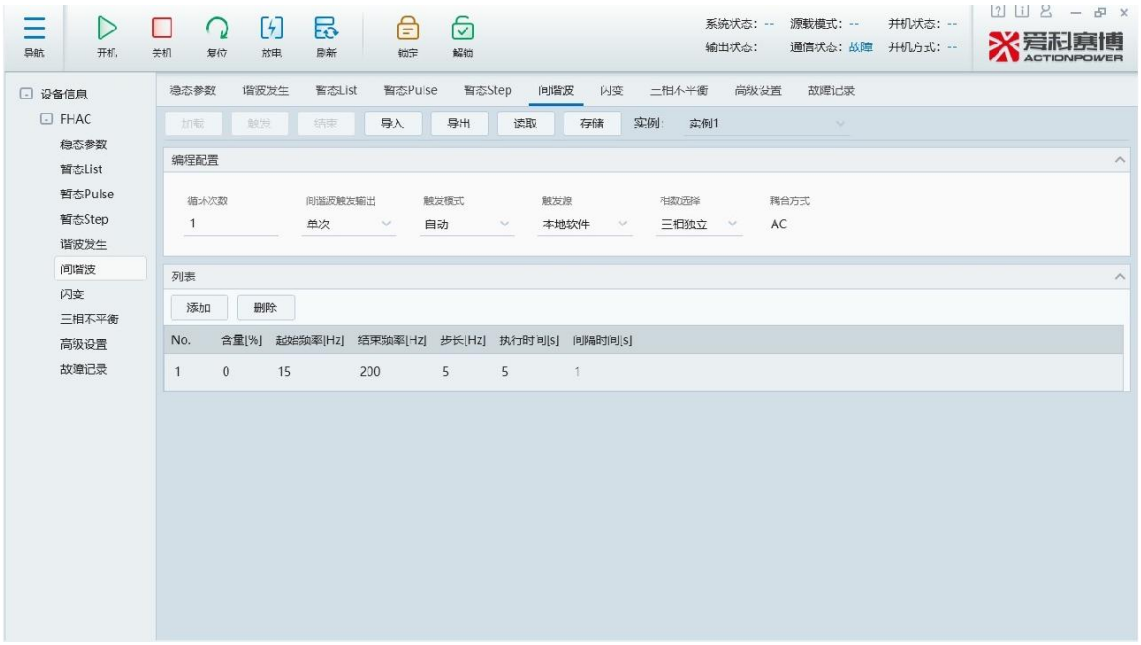

Figure 4-28 Inter-harmonic injection control interface

1. Programming settings

1. In the inter-harmonic injection interface, you can choose the inter-harmonic parameters to be output by the power supply, the inter-harmonic content, the inter-harmonic starting and ending frequency, inter-harmonic step length, execution time, interval time, etc.

2. Select in the previous step where you need to add a programming order, click "Add" The button can increase the number of sequences. Select the programming sequence you want to delete, click "delete" can reduce the number of the sequence.

3. Number of cycles: Maximum cycle 1000 times.

2. Operation:

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1. Trigger: After all parameter settings are completed, click on the upper left corner of the interface “Trigger” button, the parameters are sent to the control system.

2. Loading/End: If the programming configuration selects the harmonic trigger output as fundamental, click “Loading” button while the power supply is running, it enters the function curve; click “End”, the power exit curve enters nominal parameters.

3. Import and export: The parameters can be exported directly to a specific excel form and the user can import existing parameter table (for specific excel table) directly into the host computer.

Set up the inter-harmonic test according to the following instruction below:

- Inter-harmonic content 20%, frequency start from600Hz and end with 800Hz, step length 200Hz,
- Execution 0.02s, interval 0.02s
- The inter-harmonic interface and scope waveform are shown as following: (The scope only shows A Phase waveform)

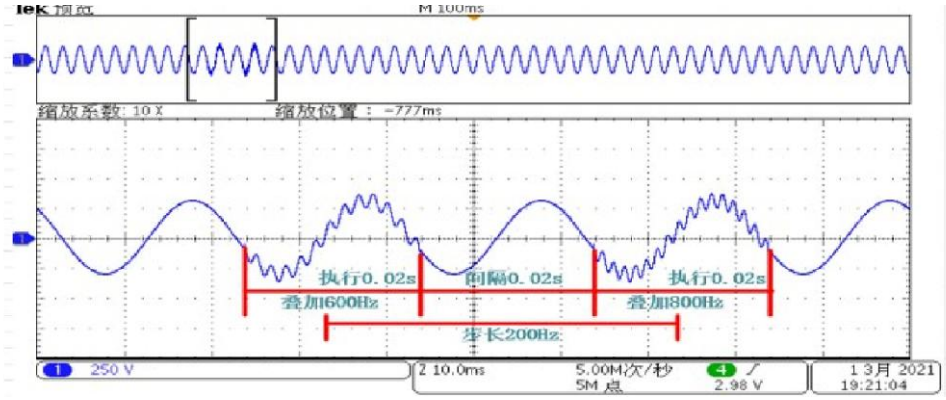

Figure 4-29

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4.3.7 Flicker

The flicker interface of the grid simulator is shown below. Users can set different nominal parameters and flicker levels (Range of options 1~10), the interface supports waveform preview function, steps as following:

1. Set the flash level: The waveform preview interface is updated in real time according to the settings.

2. Set RMS mode and the number of loops

3. Trigger

4.Loading/End

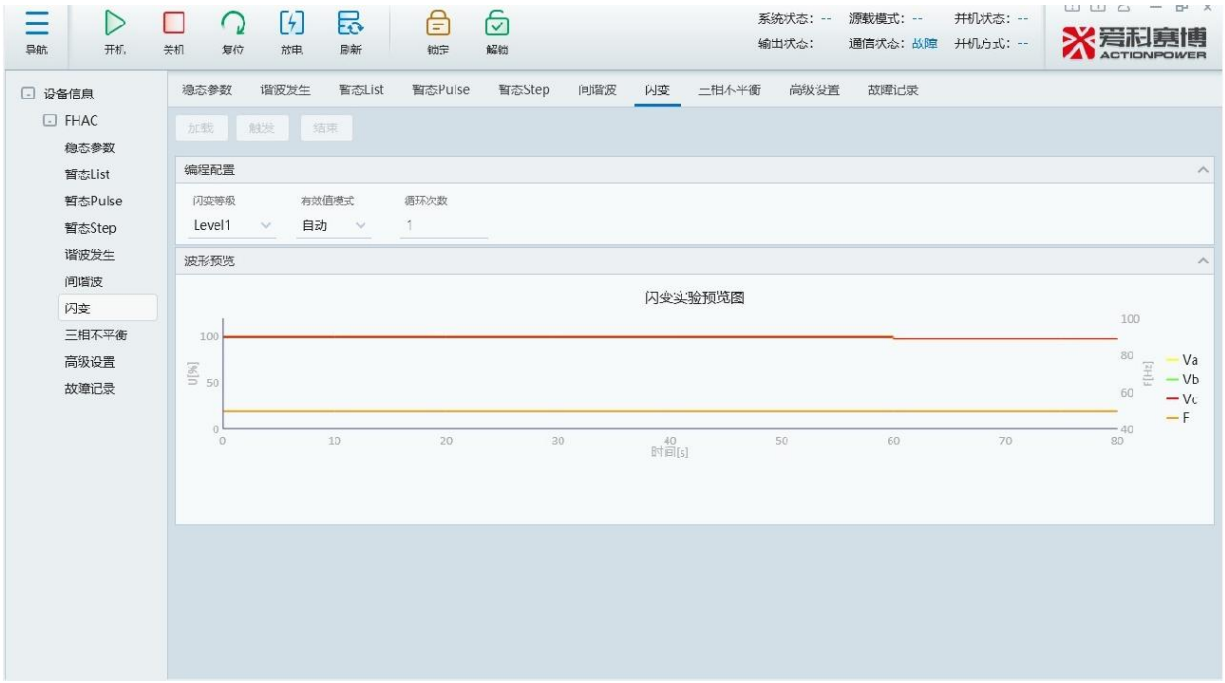

Figure 4-30

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4.3.8 Three-phase unbalance

The three-phase unbalanced control interface of the grid simulator is shown below.

Built-in three standards Class1/2/3 according to IEC61000-427, each Class corresponds to different programming data, the data is standard and fixed, and cannot be edited. “Unbalance factor”, “Duration time” and “phase angle” etc. can be edited.

In addition to the above criteria, the three-phase unbalance can be customized. ClassX is an unbalanced custom test, which is also based on IEC61000-427 regulation, but parameters can be edited as user-defined, with the unbalance factor switch open, the unbalance factors in the list are editable. However, the other three-phase voltage parameters are not editable.

After shut it down the unbalance factor then cannot be edited, and other parameters are set freely. After the setting is completed and loaded, then execute the trigger.

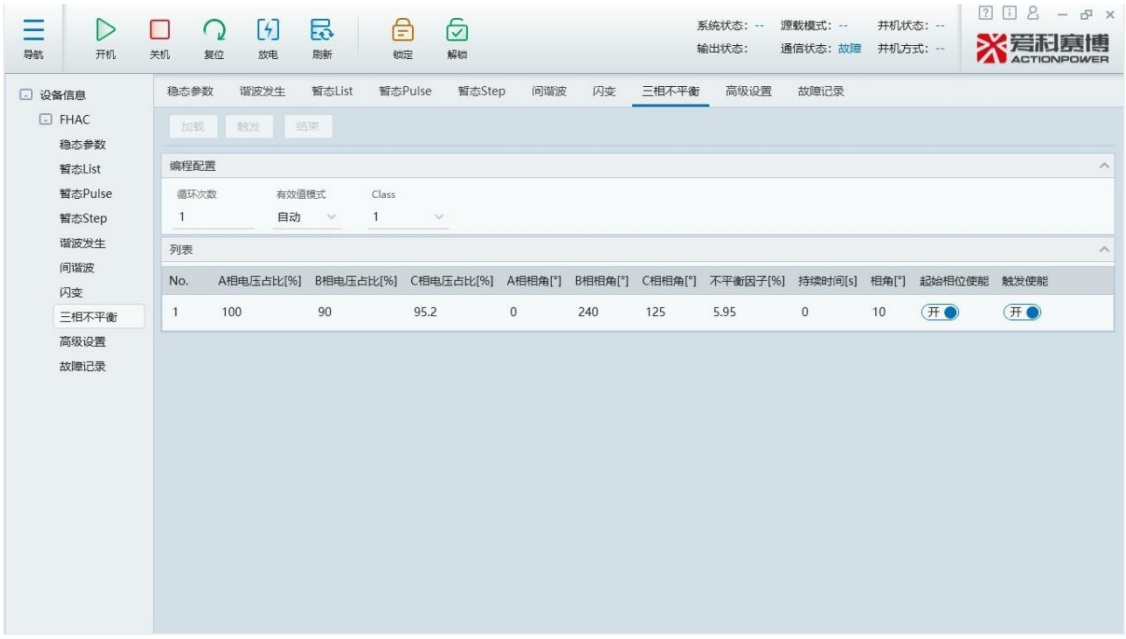

Figure 4-31

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4.3.9 User-defined waveform

User-defined waveform mode is available in AC load mode, indicating that the output waveform can be customized. As shown in the figure below, it has editing interface and waveform selection interface.

The programming steps are as follows:

1. Choose one custom waveform number
2. Select the waveform type in the configuration options, such as built-in sine wave, triangle wave, etc.
3. Click edit Waveform to edit or import edited waveform data
4. Download the waveform and store the edited waveform into the selected number
5. Waveform selection interface: For loaded waveform A, B or C (ABC does not represent the three-phase)
6. In List Interface selection waveform A, B or C and able to output a custom waveform.

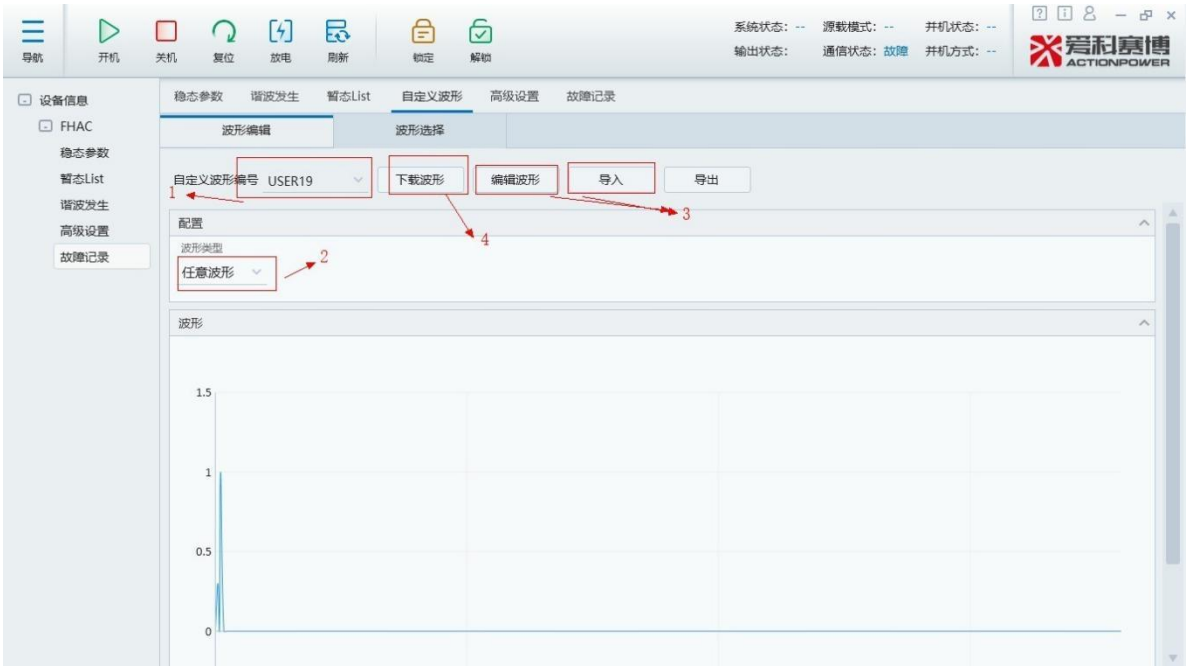

Figure 4-32 Waveform editing interface

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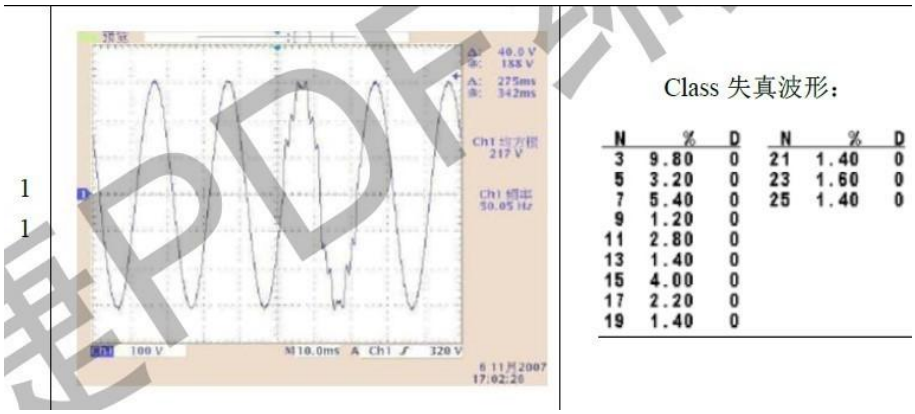
Figure 4-33 Waveform selection interface

Custom waveform programming examples



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Required output

Programming threads

Export the harmonic data first, and save the exported data into waveform A in the custom waveform interface, then output waveform A in List Programming page.

1. Set the waveform according to the harmonic content and select the export waveform

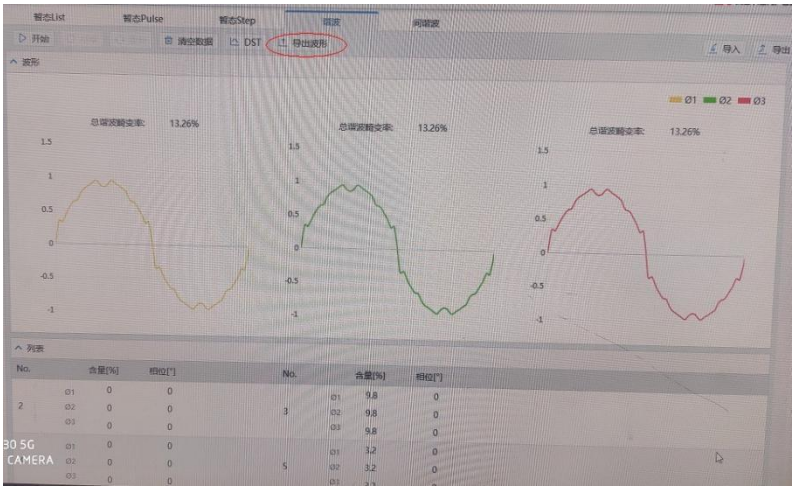

Figure 4-35

2. Back to the waveform editing interface, select any wave, select a waveform example, and import the waveform data saved in the first step

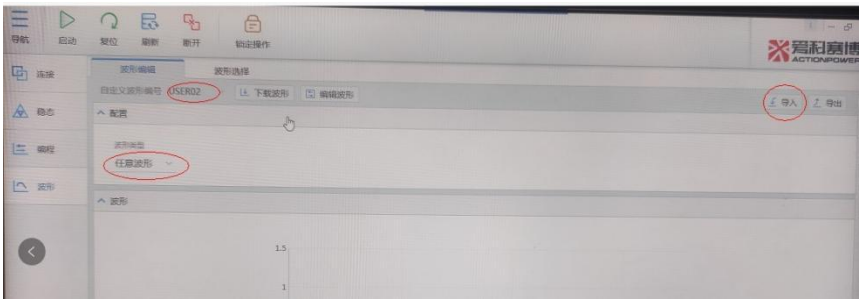

Figure 4-36

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3. Click Waveform to select, waveform A Set the example of selecting the second imported waveform

Figure 4-37

4. Select waveform A in list programming page

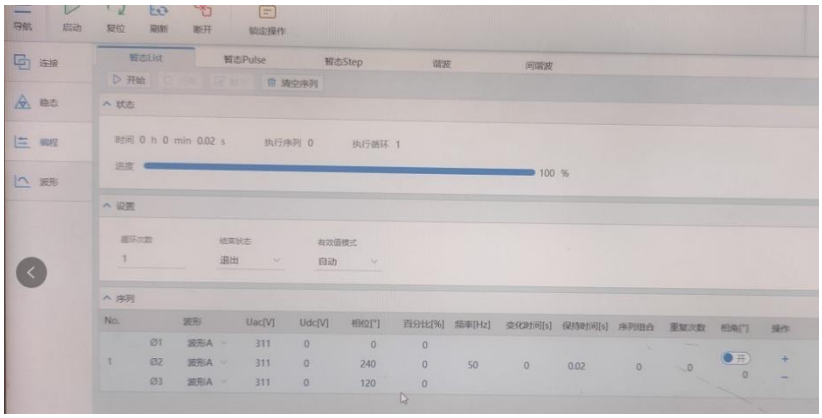

Figure 4-38

Output

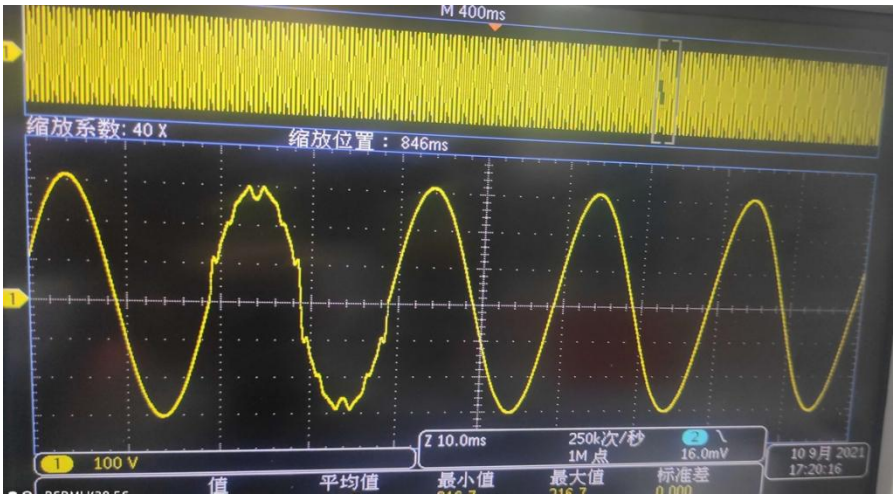

Figure 4-39

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5 LCD instruction

Functions and applications

The AGS display interface is divided into 7 Parts, as shown in the figure 5-1.

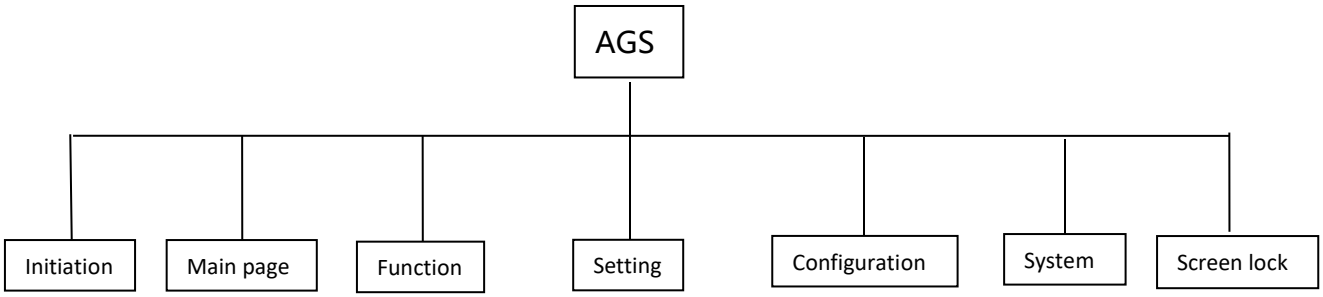

Figure 5-1

5.1Launch interface

After powered on the device, start the interface and then jump to the main interface. The startup interface is shown in the figure1.1_1.

Picture1.1_1 Launch interface

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5.2Main interface

The main interface is shown in figure1.2_1, it is divided into the 5 regions: status display area, output display area, menu operation area, output settings area, output control area, different areas can achieve different functions, and users can quickly obtain the information they need in these interfaces.

Picture1.2_1 Main interface area division map

5.2.1Status display area

The status display area at the top of the screen indicates AGS working status and mode, as shown in the figure1.2.1_1, see the details in table 1.2.1_1 Status function table.

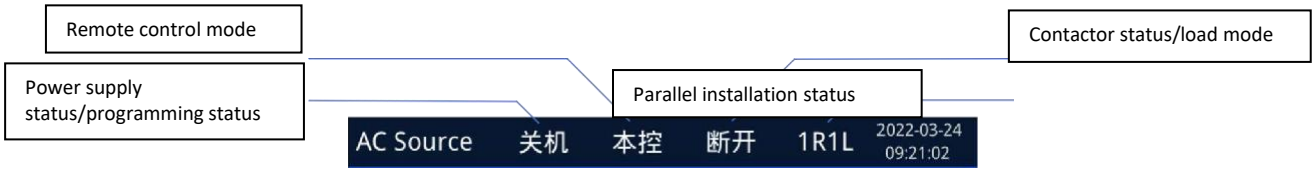

Figure 1.2.1_1 Status display area map

Table 1.2.1_1 Status function table

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Status area	Content	Definition and application
Power mode	AC Source	Source Mode.
	AC Load	Load Mode.
Power supply status/programming status	Shut down	Shutdown status, white “shut down” sign not flashing
	Stand by	Standby mode, white “standby” sign not flashing
	Run	Running mode, white “Run” sign not flashing
	Fault	Fault status, red “Fault” sign flashing. Click to view the fault record (the fault record is not saved when the power goes down), See the picture1.2.1_2 Faulty pop-up window interface.
	Reset	Reset mode, white “Reset” sign not flashing
	Program status	Programming status, the current programming status showing with scrolling status
Remote control mode	LCD	LCD control mode, white LCD sign not flashing
	LAN	Remote LAN mode, white “LAN” sign not flashing
	RS485	Remote RS485 mode, white “RS485” sign not flashing
	CAN	Remote CAN mode, white “CAN” sign not flashing
Contactor status/load mode	On	Source Mode, contactor on. White “On” sign not flashing
	Off	Source Mode, contactor off. White “Off” sign not flashing
	Load type	Load Mode. White “load type” sign not flashing
Parallel installation status	xRxL	Line x Column x, white "xRxL" sign not flashing, as shown in the figure 1.2.1_3 parallel pop-up interface. Note: After modifying the model parameters with the host computer, you need to click the “parallel” button to update the model parameters. Under 1R1L, the display information as follows, Parallel combination: xSxP (P Parallel number, S Series number) Total power(kW)：Xxx.x(Rated power*Series number*Parallel

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		number) Total voltage(V)：Xxx.x(Rated voltage*Series number) Total current(A)：Xxx.x(Rated current*Parallel number) Number of rows in this column: X (Current number of rows in this column) While 1RnL (N>1), the display information are as follows: Parallel combination xSxP Number of rows in this column:X While nRnL (N>1), the display information are as follows Parallel combination:xSxP
	Handshake	Yellow “handshake” flashing
	SP-ERR	Yellow “SP-ERR” flashing
Time status	2021-06-11 13:29:14	Current time displays

Figure 1.2.1_2 Faulty pop-up interface

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Figure 1.2.1_3 Parallel pop-up interface

5.2.2 Output display area

Output display including three parts, the main interface 1 (Source) output display area, main interface 1 (Load) output display area, main interface 2 output display area, and the display content is shown in the table1.2.1_11.2.2_1.

Table 1.2.2_1 Output display area table

Output display area		Display content
Main interface1 (Source)	Urms(V)	Voltage RMS value
	Ull(V)	Phase voltage
	Irms(A)	Current RMS value
	Θ(°)	Phase
	F(Hz)	Frequency
	PF	Power factor
Main interface1 (Load)	Urms(V)	Voltage RMS value
	Ull(V)	Phase voltage
	Ipeak(A)	Peak current
	Icf	Peak current factor
	PF	Frequency
	P(KW)	Power factor

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Main interface2	P(KW)	Active power
	Q(kVar)	Reactive power
	S(kVar)	Reactive power
	ΣP(kW)	Total active power
	ΣQ(kVar)	Total reactive power
	ΣS(kVar)	Total apparent power

Figure 1.2.2_1 Main interface1 (Source)

Figure 1.2.2_2

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Main interface1 (Load)

Figure 1.2.2_3 Main interface2

5.2.3Menu operation area

The menu operation area is shown in the figure1.2.3_1 As shown, click sign under any interface you will enter the main interface and click sign under any interface you will enter the first-level menu interface, see the picture1.2.3_2.

Picture1.2.3_1 Menu operation area diagram

Picture1.2.3_2 first-level menu interface

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In remote mode, "Function" under first stage menu, "setup" grey out, the button is disabled;

In running mode, "Config" under first stage menu grey out, the button is disabled.

5.2.4Output setting area

Output parameters can be set in this area.

Different power modes have different setting parameters and settings pages.

See the table 1.2.4_1 for more details.

When setting parameters ≤ 2 class, the setting parameters display and settings are completed on the main page;

While 2 Class < setting parameters ≤ 4 class, only part of setting parameters are displayed on the home page, the rest of parameter settings will be finished on the main settings page2;

While 4 Class < setting parameters ≤ 6 class, only part of setting parameters are displayed on the home page, the rest of parameter settings will be finished on the main settings page1;

Note: linear load RLC After the mode parameters are set, you need to click the OK button to send all the data on this page (if there is data modification, Setting button enabled, and setting button will be disabled after the data is sent), and this data will be sent immediately after the other mode parameters are set.

Surface1.2.4_1 Output setting area content table

Power mode	**Setting parameters**		**Setting parameters in home page**	**Settings page**
Source mode	Uset(V)	Voltage-given	Voltage-given &	Main settings

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	SR(V/ms)	Voltage slope rate	phase-given	page2
	Θset(°)	Phase-given		
	Fset(Hz)	Frequency-given		
Linear load CC mode(0-voltage launch is disabled)	Iset(A)	Current-given	Current-given & PF given	Main settings page2
	SR(A/ms)	Current slope rate		
	PFset	PF-given		
	Load type	Load type		
Linear load CC mode(0-voltage launch is enabled)	Iset(A)	Current-given	Current-given & PF given	Main settings page1
	SR(A/ms)	Current slope rate		
	PFset	PF-given		
	Load type	Load type		
	Rset(mΩ)	Resistance-given		
Linear load CP mode(0-voltage launch is disabled)	Sset(kVA)	Power-given	Power-given & PF given	Main settings page2
	SR(kW/ms)	Power slope		
	PFset	PF-given		
	Load type	Load type		
Linear load CP mode(0-voltage launch is enabled)	Sset(kVA)	Power-given	Power-given & PF given	Main settings page1
	SR(kW/ms)	Power slope		
	PFset	PF-given		
	Load type	Load type		
	Rset(mΩ)	Resistance-given		
Linear load CR mode	Rset(mΩ)	Resistance-given	Resistance-given	Home page

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Linear load RLC Mode (3 types of setting parameters , but to display RLC Connection method and impedance angle, so you will need to finish on the main settings page1)	Rset(mΩ)	Resistance-given	RLC connections & Impedance Angle	Main settings page1
	Cset(uF)	Capacitors given		
	Lset(uH)	Inductance given		
Nonlinear load constant current CF Model	Iset(A)	Current-given	Current-given & CF given	Main settings page2
	SR(A/ms)	Current slope rate		
	CFset	CF-given		
Nonlinear load constant current PF Model	Iset(A)	Current-given	Current-given & PF given	Main settings page2
	SR(A/ms)	Current slope rate		
	PFset	PF-given		
	Load type	Load type		
Nonlinear load constant power CF Model	Sset(kVA)	Power slope	Power-given & CF given	Main settings page2
	SR(kW/ms)	Power slope		
	CFset	CF-given		
Nonlinear	Sset(kVA)	Power slope	Power-given	Main

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load constant power PF Model	SR(A/ms)	Power slope	& PF given	settings page2
	CFset	CF-given		
	Load type	Load type		

Picture1.2.4_1 Main setting interface2 (Source mode)

Picture1.2.4_2 Main setting interface1 (Linear load CP mode-0-voltage launch enables)

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Picture1.2.4_3 Main setting interface1 (Linear load RLC Mode

5.2.5Output control area

The output control of the power supply can be completed in this area. The output control button is shown in the figure1.2.5_1 , the output button description is shown in the figure1.1.5_2 , the button function is detailed in the table1.2.5_1

Picture1.2.5_1 Output control button diagram

Picture1.2.5_2 Output control button instruction

Chart1.2.4_1 Output control area button function table

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Button Type	Function (Being disabled in remote control mode)
Power-on button	The power supply is shown in blue when it is off, and green in standby mode, blinking display means from off state to standby status (frequency 100ms);
Output/Discharge button	The discharge button is blue when the power supply is off, and click to enter the discharge state, the lights turns to green; The output button is blue when the power supply is in standby mode, and click to enter the discharge state, the lights turns to green; This button is disabled in case of failure.
Contactor button	Blue display when disconnected, green display when connected; Contactor defaults on when at loading mode; This button enables at non-off and non-failure state in source mode, click to switch the contactor state;
Reset button	The non-failure status is displayed in blue, and the fault status is green; The button enables only at fault state, click to reset.

5.3Function

AGS configured with powerful programming functions, which greatly facilitates users to simulate the functional characteristics of various working conditions and equipment. The function function is shown in the figure1.3_1

Function

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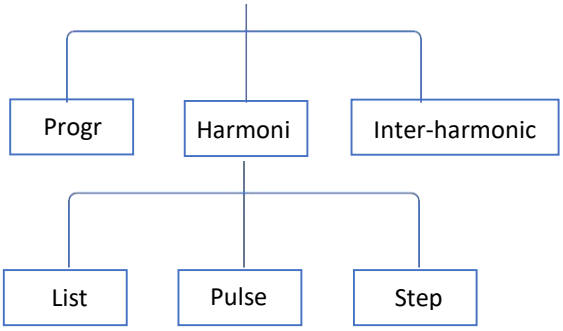

Picture1.3_1 Function function tree diagram

Click on the first- level menu “Function” and enter the secondary menu-Functions, see the figure for details 1.3_2.

Picture1.3_2 Secondary menu-Function diagram

When at load mode, the secondary menu function “Inter-harmonic” grey out, the button is disabled.

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5.3.1Programming

Click on the secondary menu-Function “ Progr ” Enter the third menu Programming, see the figure for details1.3.1_1. There are "List", "Pulse", "Step".

Picture1.3.1_2 Third menu-Programming diagram

When at loading mode, the third menu "Pulse" and "Step" grey out, the button is disabled.

5.3.1.1List Program

List Programming has source mode and load mode, each mode corresponding to three interfaces, configuration, data and storage.

List(Source) configuration interface is detailed in the figure1.3.1.1_1 .

List(Source) data interface is detailed in the figure1.31.1_2, button function in table1.3.1.1_3 . List(Source) storage interface is detailed in the figure1.3.1.1_3 , button function table1.3.1.1_4

List(Load) configuration interface is detailed in the figure1.3.1.1_4.

List(Load) data interface is detailed in the figure1.3.1.1_5, parameter function in table1.3.1.1_6 and button function table1.3.1.1_3.

List(Load) storage interface is detailed in the figure1.3.1.1_6 and button function in table1.3.1.1_4

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Picture1.3.1.1_1 List (Source) Configuration interface

Picture1.3.1.1_2 List(Source) Data interface

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Surface1.3.1.1_3 List Data interface button menu

Button	Function (white display when enabling, grey out when disable)
Loading	"Loading" button enabling while the device is running, click to load programming data; "Loading" button disabled while the device off, "End" button enables after loading, click to end programming.
Trigger	After loading, the button is enabled, click to trigger programming; the button is disabled if the loading unfinished.
Add	The button enables when total sequence is less than100, click to add sequence, while the button disabled when total sequence is greater than or equal to 100.
Delete	The button enables when total sequence is greater than1, click to delete; while the button disabled when total sequence is equal to 1.
Previous page	The button enables when current sequence is greater than1, click to switch to the previous page; while the button disabled when current sequence is equal to 1.
Next page	The button enables when the current sequence is smaller than the total sequence, click to switch to the next page; while the button disabled when current sequence is equal to the total sequence.

Picture1.3.1.1_3 List(Source) Storage interface

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Surface1.3.1.1_4 Storage Interface Button Function Table

Button	Function (white display when enabling, grey out when disable)
Read.	This button is always enabled, if the case X saved data on the current mode, click on it from the case X, and it will read and update the current programming data; if the case X did not save the data on the current mode, a pop-up window will prompt for failed reading.(X Scope from 1-100)
Put in	This button is always enabled to store the current programming data to the case X after clicking it. (X Scope from 1-100)

Picture1.3.1.1_4 List(Load) Configuration interface

Picture1.3.1.1_5 List(Load)Data interface

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Surface1.3.1.1_6 ProgramList(Year)Data interface parameter function table

rameters	Functions
I[A]/S[kVA]/P[kW]	Xx When the operating mode is CP and PF in priority, I[A] column in data page change to S[kVA] column; When the operating mode is CP and PQ in priority, I[A] column in data page change to P[kW] column, Arrange; The power factor column in data page turns to Q[kVar] column.
Power factor./Q[kVar]	Xx When the operating mode is CP and PQ is prioritized, the power factor column in data page turns to Q[kVar] column.
Percentage	Xx The current waveform is a sine wave, 5% Clipping, 10% Clipping, 20% clipping, waveform A, waveform B, waveform C The percentage cannot be set; The percentage can be set while the current waveform is square wave, trigonal wave and X% clipping.
Power factor	
Frequency[Hz]	Output frequency; “Frequency” grey out, the button disable, only display function.

Picture1.3.1.1_6 List(Load) Storage interface

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5.3.1.2Pulse Program

Pulse programming has three interfaces that correspond to the source mode, configuration, data, and storage.

Pulse configuration interface is detailed in the figure1.3.1.2_1.

Pulse (Fundamental wave) data interface is detailed in the figure1.3.1.2_2, Pulse programming (Pulse) data page is detailed in the figure1.3.1.2_3, and button function is in table 1.3.1.2_3.

Pulse storage page is detailed in the picture1.3.1.2_3, button function is in table1.3.1.1_4.

Picture1.3.1.2_1 Pulse Configuration interface

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Picture1.3.1.2_2 Pulse (Fundamental wave) data interface

Picture1.3.1.2_2 Pulse programming (pulse) data interface

Picture 1.3.1.2_3 Pulse Storage interface

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Surface1.3.1.2_3 Pulse Data interface button menu

Button	Function (white display when enabling, gray display when disable)
Loading	“Loading” button enabling while the device is running, click to load programming data; “Loading” button disabled while the device off, “End” button enables after loading, click to end programming.
Trigger	After loading, the button is enabled, click to trigger programming; the button is disabled if the loading unfinished.
Previous page	Pulse interface button enables, click to enter the fundamental wave interface, the fundamental wave interface button is disabled.
Next page	The fundamental wave interface button enables, click to enter the pulse interface; the pulse interface button is disabled.

5.3.1.3Step Program

Step Programming has three interfaces that correspond to the source mode, configuration, data, and storage.

Step configuration interface is detailed in the figure1.3.1.3_1 。

Step data interface is detailed in the figure1.3.1.3_2, button function is in table1.3.1.3_3.

Picture1.3.1.3_1 Step Configuration interface

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Step storage interface is detailed in the figure1.3.1.3_3, button function is in table 1.3.1.1_4.

Picture1.3.1.3_2 Step Data interface

Surface1.3.1.3_3 Step Data interface button menu

Button	Function (white display when enabling, grey out when disable)
Loading.	“Loading” button enabling while the device is running, click to load programming data; “Loading” button disabled while the device off, “End” button enables after loading, click to end programming.
Trigger	After loading, the button is enabled, click to trigger programming; the button is disabled if the loading unfinished.
Previous page	AC+DC Mode button enables, click to switch pages; AC Mode button disabled.
Next page	AC+DC Mode button enables, click to switch pages; AC Mode button disabled.

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Picture1.3.1.3_3 Step Storage interface

5.3.2Harmonic wave

The source mode and load mode of harmonic programming correspond to three interfaces: configuration, data and storage.

The harmonic programming configuration interface is shown in the figure1.3. 2_1.

The data interface of harmonic programming is shown in the figure1.3.2_2, button function is in table1.3.2_3.

The storage interface of harmonic programming is shown in the figure1.3.2_3, button function is in table1.3.1.1_4.

Picture1.3.2_1 Harmonic programming configuration interface

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Picture1.3.2_2 Function harmonic programming data interface

Surface1.3.2_3 Function harmonic programming data interface button function sheet

Button	Function (white display when enabling, grey out when disable)
Loading	"Loading" button enabling while the device is running, click to load programming data; "Loading" button disabled while the device off, "End" button enables after loading, click to end programming.
Trigger	After loading, the button is enabled, click to trigger programming; the button is disabled if the loading unfinished.
Renew	After the programming triggers, the button is enabled, click to update the programming data, the button is disabled during non-trigger process.
Clear	This button is always enabled, and the harmonic data clear after clicking
Previous page	The button enables when current page is larger than 1, click to switch to the previous page; The button disabled when current page is equal to 1.
Next page	The button is enabled when the current page is less than the total number of pages, click to switch to the next page; when the current page is equal to the total number of pages, the button is disabled.

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Picture1.3.2_3 Harmonic programming storage interface

5.3.3Inter-harmonic

Inter-harmonic programming only has three interfaces in source mode, corresponding to configuration, data, and storage.

The configuration interface of inter-harmonic programming is shown in the figure1.3. 3_1.

The data interface of inter-harmonic programming is shown in the figure1.3.3_2, button function is in table1.3.3_3.

The inter-function harmonic programming storage interface is shown in the figure1.3.3_3, button function is in table1.3.1.1_4.

Picture1.3.3_1 Inter-harmonic configuration interface

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Picture1.3.3_2 Inter-function harmonic data interface

Surface1.3.3_3 Inter-function harmonic programming data interface button function table

Function	Function (white display when enabling, grey out when disable)
Loading	"Loading" button enabling while the device is running, click to load programming data; "Loading" button disabled while the device off, "End" button enables after loading, click to end programming.
Trigger	After loading, the button is enabled, click to trigger programming; the button is disabled if the loading unfinished.
Add	The button enables when total sequence is less than100, click to add sequence, while the button disabled when total sequence is greater than or equal to 100.
Delete	The button enables when total sequence is greater than1, click to delete; while the button disabled when total sequence is equal to 1.
Previous page	The button enables when current sequence is greater than1, click to switch to the previous page; while the button disabled when current sequence is equal to 1.
Next page	The button enables when the current sequence is smaller than the total sequence, click to switch to the next page; while the button disabled when current sequence is equal to the total sequence.

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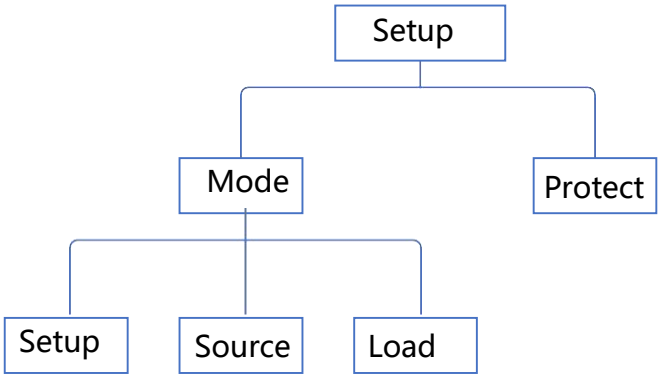
Picture1.3.3_3 Inter-harmonic programming storage interface

5.4Setup

The setting function is shown in the figure1.4.1, users can set AGS Working mode, parameter setting for each mode, power protection function.



Picture1.4.1 Tree diagram of setup

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Click on the first-level menu “Setup” and enter the secondary menu settings, see the picture for details1.4_2.

Picture1.4_2 Secondary menu of setup

In running mode, secondary menu setup “mode” grey out, the button is disabled.

5.4.1Mode

There are three interfaces under the mode menu: Settings, Source and Load. When the mode is selected as the source mode, it cannot enter the load interface, and when the mode selects load mode, it cannot enter the source interface.

5.4.1.1Setup

The mode setting interface is shown in the figure.1.4.1.1_1, parameter function table 1.4.1.1_1.

Picture1.4.1.1_1 Mode setting interface

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Surface1.4.1.1_1 Mode setting interface parameter function table

Parameters	Functions
Mode	Xx When mode selection is “Source”，" Load” interface grey out and the button is disabled; when the mode is selected “Load”，" Source” interface grey out and the button is disabled.

5.4.1.2Source

The mode source interface is detailed in the figure1.4.1.2_1, parameter function table 1.4.1.2_1

Picture1.4.1.2_1 Mode source interface

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Surface1.4.1.2_1 Mode Source Interface Parameters Function Table

Parameter	Function
Phase number	
Coupling mode	Xx When the coupled mode is AC, "AC+DC" grey out, button disabled.
Waveform	Xx When the coupled mode is AC, the waveform default as sine wave and cannot be set

5.4.1.3Load

The mode loading interface is detailed in the figure1.4.1.3_1, parameter function table1.4.1.3_1.

Picture1.4.1.3_1 Mode loading interface

Surface1.4.1.3_1 Mode loading interface parameter function table

Parameter	Function
0-voltage start	Xx Linear load CR mode/ Linear load RLC Mode/ Nonlinear load CC/ CP mode, “Enable” ” Disable” grey out, the button is disabled.
Adjustment mode	Xx Linear load CC/ CP/ Linear load CR/ Linear load RLC mode. When mode, "CF", "PF" grey out, button disabled.

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Waveform	Xx Linear load CR/ Linear load RLC mode/ Nonlinear load CC/ CP, the waveform type grey out, button disabled.
Load connection	Xx Linear load CC/ CP/ Linear load CR/ Nonlinear load CC/ CP, the load connection mode grey out, button disabled.

5.4.2Protect

The setting protection interface is detailed in the figure1.4.2 _1.

Picture1.4.2_1 Setup the protection interface

5.5Configuration

Configuration functions are shown in the figure1.5.1. User can configure AGS Communication mode, parallel function, expansion function.

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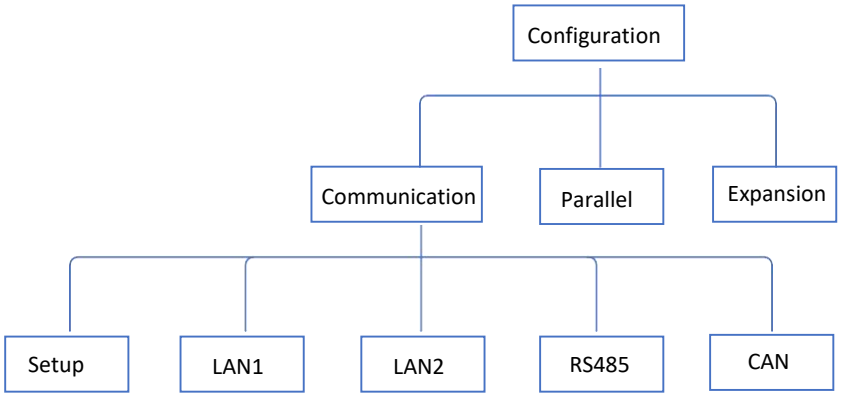

Picture1.5.1 Tree diagram of configuration

Click on the first level menu “Config” and enter the secondary menu configuration, see the figure for details 1.5_2.

Picture1.5_2 Secondary menu-Configuration diagram

In remote control mode, the secondary menu configuration “parallel” and "Expand” grey out, button disabled.

5.5.1 Communication

Under the communication menu, there are settings, LAN1, LAN2, RS485, CAN, totally five interfaces.

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5.5.1.1 Setup

The communication settings interface is detailed in the figure1.5.1.1_1

Picture1.5.1.1_1 Communication settings interface

5.5.1.2 LAN

LAN1 communication interface is detailed in the picture1.5.1.2_1, LAN2 interface is detailed in the picture1.5.1.2_2.

Picture1.5.1.2_1 LAN1 Interface

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Picture1.5.1.2_2 News dispatchLAN2 Interface

Note: After setting parameters on the LAN1 and LAN2 interfaces, click the OK button to deliver all data on this page (The button is enabled after data is modified and the button is disabled after the modified data delivered)

5.5.1.3 RS485

RS485 interface is detailed in the picture1.5.1.3_1.

Picture1.5.1.3_1 RS485 Interface

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5.5.1.4 CAN

CAN interface is detailed in the picture1.5.1.4_1

Picture1.5.1.4_1 CAN Interface

5.5.2 Parallel installation

The parallel interface is detailed in the figure1.5.2_1, parameter function table1.5.2_1

Picture1.5.2_1 Configure the parallel interface

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Surface1.5.2_1 Configure the parallel interface parameter menu

Parameter	Function
Port1	Xx When port 2 is master or slave, Port 1 “slave” button grey out, button disabled.
Port2	Xx When port 1 is master or slave, Port 2 “slave” button grey out, button disabled.
Parallel pass through	Xx When port 1 and port 2 are not single machine, the “performance” in parallel pass through grey out, button disabled.

5.5.3Expansion

The extended interface is detailed in the figure1.5.3_1 , parameter function table1.5.3_1

Picture1.5.3_1 Expansion configuration interface

Surface1.5.2_1 Configure the extended interface parameter function table

Parameter	Function
PDU	
Remote compensation	Xx PDU When prohibited, the “enable” button in remote compensation grey out.

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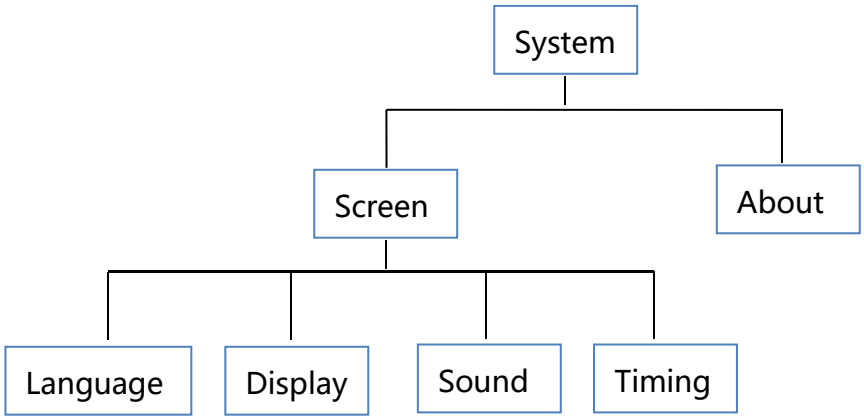
5.6 System

System functions are as shown in the figure1.6.1, User can configure the display screen information and version number query.



Picture1.6.1 System tree diagram

Click on the first level menu “System” Enter the secondary menu and see the picture for details1.6_2.

Picture1.6_2 Secondary menu system diagram

5.6.1 Screen

There are Language, Display, Sound and Timing, totally four interface under screen menu.

5.6.1.1Language

The screen language interface is detailed in the picture1.6.1.1_1

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Picture1.6.1.1_1 Screen language interface

Surface1.6.1.1_1 Screen Language Interface Parameters Function Table

Parameter	Function
Language	Display language, currently only Chinese is supported

5.6.1.2 Display

The screen display interface is detailed in the picture1.6.1.2_1, parameter function table1.6.1.2_1.

Picture1.6.1.2_1 Screen display interface

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Surface1.6.1.2_1 Screen Language Interface Parameters Function Table

Parameter	Function
Brightness	The brightness of the display, move the slider to adjust the brightness of the display
Screen saver	Set how long you don't touch the display, and it will enter the screen lock interface. For example, setting 30s , in 30s If you don't touch the screen, you will enter the screen lock interface

5.6.1.3 Sound

The sound interface is detailed in the picture1.6.1.3_1, parameter function table1.6.1.3_1.

Picture1.6.1.3_1 Screen sound interface

Surface1.6.1.3_1 Screen sound interface parameter function table

Parameter	Function
Alarm sound	The display beeps alarm in case of failure
Touch sound	Display beep prompt every touch
Boot tone	The display beeps when it is turned on

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5.6.1.4Time

The screen time interface is detailed in the picture1.6.1.4_1, parameter function table1.6.1.4_1.

Picture1.6.1.4_1 Screen Time interface

Surface1.6.1.3_1 Screen Time Interface Parameters Function Table

Parameter	Function
Date	Set the display date
Time	Set the display time

5.6.2About

The system details interface as shown in the figure1.6.2_1, parameter function table1.6.2_1.

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Picture1.6.2_1 System detail interface

Surface1.6.2_1 Screen Time System About Device Interface Parameters Function Table

Parameter	Function
Software version	HIM-Display program HIC-Display control program MON- Central control M4 Program CTR- Central control M7 Program FPG-FPGA Program

5.7 Screen lock interface

If you do not operate the display during the screen lock time, you will jump to the screen lock interface. After clicking anywhere on the screen lock interface, you will jump out of the screen lock interface.

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Picture1.7. _1 Screen lock interface

Screen lock interface “Actionpower” Logo will display evry 10s separately on the 4 corner and middle of screen.

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6 Maintenance

Due to the influence of environment temperature, humidity, dust and vibration, the inside of grid simulator will be aged, resulting in potential of failure. Therefore, it is necessary to carry out daily and regular maintenance of the grid simulator to ensure its normal operation and service life.

The content of the routine maintenances and the recommended maintenance period are shown in the following table:

Maintenance items		**Period**
Items	**Methods**	
Storage software data	1. Read the data of the data collector 2. Save running data, parameters, and logs to a disk or file 3. Check the parameter Settings 4. Software updates	1 month(depending on the size of system)
Operating conditions and environmental testing	1. Check whether AGS damaged or deformed. 2. Check whether AGS has abnormal sound 3. Check the variables while the system is running. 4. Check whether the main components are normal. 5. Check the AGS shell if over-heated, thermal monitor is suggested. 6. Check whether the wind tube is normal. 7. Check the AGS environment humidity and dust, if the operation room inlet filter normal.	6 months

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	8. Cautions! Outlet ventilation must be checked, the module will be faulty due in the over-heating scenario.	
System cleaning	1. Check the circuit board and components for more wet dust accumulation, dirt, moisture and external water seepage, and so on. 2. Check the heat sink temperature and dust. If necessary, shall be used for compressed air and open fan, to clean module. 3. Clean or replace the air filter. 4. Insect protection for clean air inlet and outlet.	6 months(depending on the quality of environment)
Power circuit connection check	1. Check whether the power cable connection is loose and tighten it according to the specified torque. 2. Check whether there is any damage on the power cable, control cable, especially with the metal surface contact if there is a cut trace of the skin. 3. Check whether the insulation wrapping tape of the wiring terminal of the power cable is off.	6 months after first configuration, 6-12 months then.
Terminal and wiring connection check	1. Check whether the screw of the control terminal is loose and tighten it with a screwdriver. 2. Check the status of main circuit terminal have poor contact, screw position if there is overheating. 3. Visually check device terminal connections and cable distribution.	12 months
Cooling fan function test	1. Check the functions and running noise of all fans, and check whether the	12 months

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	blades are cracked. If you have any abnormal, please change in time.	
Protection functional test	1. Routine inspection of all metal components for corrosion. 2. Contactor yearly check (auxiliary switch and micro switch) : current breaker electrical leakage, circuit breaker, surge protector, power switch, all the risks and isolating switch, according to lubricating or replacing contactor, to ensure that the machine is in good working status. 3. Overheating function test: Check the overheating safety circuit.	6 – 12 months
Security function detection	1. Check warning labels and replace them if necessary. 2. Check the emergency stop button and the LCD stop function. 3. Shutdown simulation, signal communication check as well.	6months

Note:

1. During maintenance work, metal devices such as screws and gaskets cannot be left in the panel, otherwise the equipment may be damaged and cause unsafe accidents.

2. Before hardware maintenance of the power supply, turn off the front-stage distribution power to ensure that the contact parts is not charged; cut off all auxiliary circuits and wait at least 15 minutes for the circuit capacitor discharge; open the cabinet door and measure the voltage of the input terminal and intermediate circuit terminal to ensure that there is no dangerous voltage before the corresponding operation.

3. Only qualified electrical engineers can perform the work described in this chapter.

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7. Troubleshoot

Fault unit and types		Fault analysis	Solutions
	The LED indicator of "Power" off	AGS power supply is not provided electricity.	Check to ensure that the power supply and connection are normal. Turn off AC and DC voltage and hold for 5 minutes, reconnect the DC and AC voltage. If the light is still not on, please contact us.
	The LED indicator of "Run" off	AGS power supply is not under the normal running conditions.	Check that the AC and DC cables are correct. Use a multimeter to measure Input voltage to ensure that the voltage not less than starting voltage of the AGS, ensure that the parameters meet the operating requirements. If there is no problem with the above check, and the indicator is still not on, please contact us.
	The LED indicator of "Fault" on	AGS is faulty, and there is potentially other issues.	Check the detailed fault information on the touch screen and take appropriate troubleshooting measures. If the light still on, please contact us.
LCD screen	Input over-voltage	Voltage of grid side too high.	Check voltage of grid side, line to line voltage should less than 418V, if the grid side voltage normal and issue continues, please contact us.
	Input under-voltage	Voltage of grid side too low.	Check voltage of grid side, line to line voltage should greater than 332V, if the grid side voltage normal and issue continues,

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n			please contact us.
i s s u e s	Inductance at grid side over-heat	The inductance connecting to grid side in cabinet 1# is over temperature.	Check the fan on the top of rectifier cabinet 1#, if the fan normal and issue continues, please contact us.
	Bridge inductance over-heat	The rectifier module inductance connecting to cabinet 1# & 2# is over temperature.	Check the fan on the top of rectifier cabinet 1# & 2#, if the fan normal and issue continues, please contact us.
	A phase transformer over-heat	The temperature of the A-phase inverter transformer is too high.	Check the fan on top of A-phase inverter cabinet, if the fan normal and issue continues, please contact us.
	B phase transformer over-heat	The temperature of the B-phase inverter transformer is too high	Check the fan on top of B-phase inverter cabinet, if the fan normal and issue continues, please contact us.
	C phase transformer over-heat	The temperature of the C-phase inverter transformer is too high	Check the fan on top of C-phase inverter cabinet, if the fan normal and issue continues, please contact us.
	Others	Others	Please contact us.
	Communication issues	The display program on LCD is not according to DSP	Check if there is a problem with the communication cable connection, if the problem is not solved, please contact us.
Noise’ s too loud during machine running		AGS and transformer running abnormal, and the cooling fan is faulty.	Check whether the power is within the normal range, measure the output current and voltage wave shape, abnormal waveform often produces a lot of noise. Check and replace the cooling fan if necessary.
Communication issue with host		Communication is not following up.	Please look up at supplement 2

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PC		

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Contact us

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Attachment 1

1.3 Preparation for parallel installation

1）Parallel current sensor sampling line is 2.5mm2 cable, the cable length is configured according to the actual situation;

2）12 of Parallel optical fiber cable, the cable length is configured according to the situation.

3）Parallel connection drawings——See the attached page

Parallel operation

Cable connection

Parallel current transducer sampling line and parallel optical fiber connection, as shown in the attached picture, complete the connection according to the picture.

Note: The direction of parallel current sampling transducer threading, by P1 Point to P2, which is the direction of the load current; the current transduce sampling line S1 and S2 should strictly follow the diagram for connection.

Display settings

Select from the debugging parameters of the four power supplies “Parallel setup”, one of them is set as the host and the other three are set to the slave.

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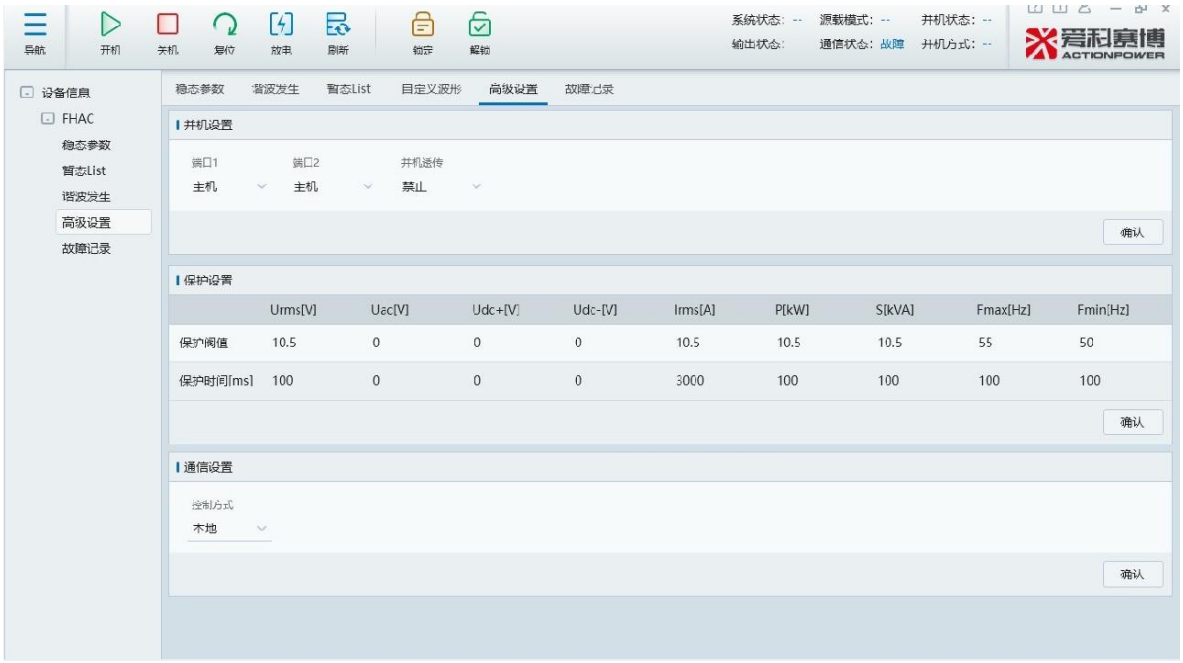

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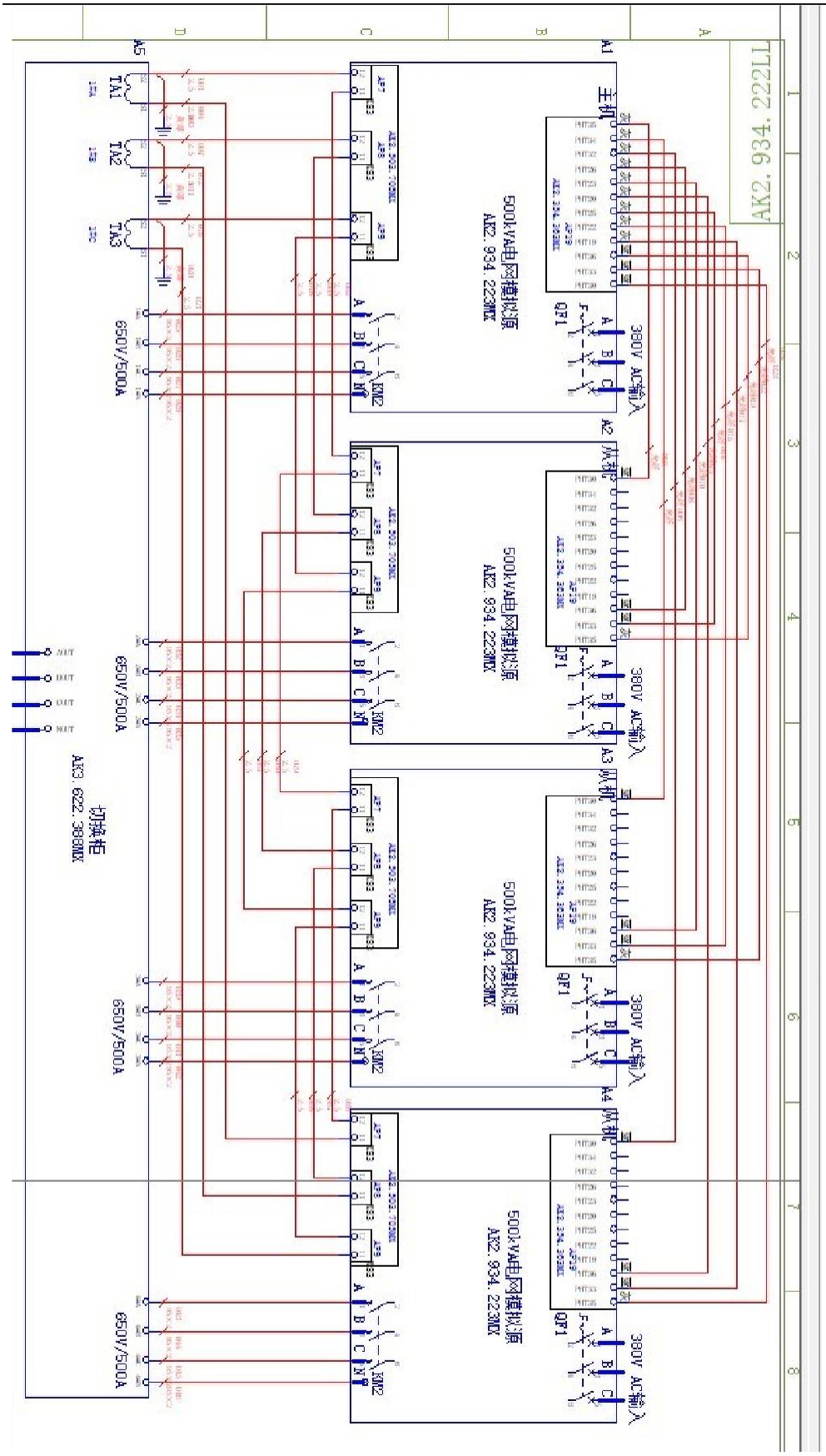

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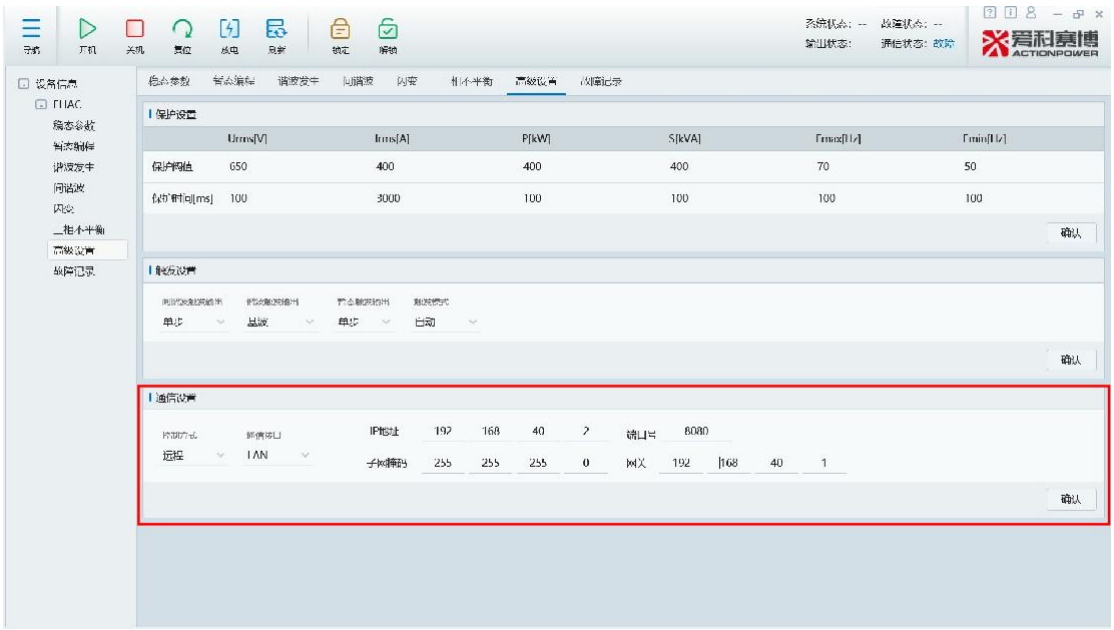
Attachment 2
Ethernet remote connection instructions

Step 1: Set up remote control on the display, set up IP Address, as shown in the red box below:



Note: Set IP, it needs to be in the same network segment as the computer where the user's host computer is located.

Step 2: Turn on the host computer and find Config.xml file in Debug file folder,open the file, the changes is as shown below, write the IP address and port number.

Change 1to 0 on the letters “Whether touch screen mode or not”. After saving, open the host computer.

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Config.xml - 记事本

文件(F) 编辑(E) 格式(O) 查看(V) 帮助(H)

```
<?xml version="1.0" encoding="utf-8" ?>
<Config>
 <!--APP版本-->
  <AppVersion>AK05.571_V1.0_B00_D11</AppVersion>
  <FHAC>1</FHAC>
  <FHDC>0</FHDC>
  <!--是否显示恢复出场设置按钮-->
  <SHowFactoryReset>0</SHowFactoryReset>
  <!--是否显示直流调试模式-->
  <SHowDebugPage>1</SHowDebugPage>
  <!  延时连接时间  >
  <DelayTime>5000</DelayTime>
  <!--交流整流器回读时间-->
  <AcDelayTime>1300</AcDelayTime>
  <!--是否为触摸屏模式-->
  <TouchMode>0</TouchMode>
 <!--是否显示交流调试模式-->
  <SHowAcDebugPage>0</SHowAcDebugPage>
  <!--是否显示窗体任务栏-->
  <ShowWindowBottom>0</ShowWindowBottom>
  <!--FHDC 单双通道模式0单通道1双通道-->
  <FHDCCHSelect>0</FHDCCHSelect>
  <!--FHAC -连接参数-->
  <FHACIPAddress>192.168.40.210</FHACIPAddress>
  <FHACIPPort>8080</FHACIPPort>
   <FHDCIPAddress1>192.168.40.210</FHDCIPAddress1>
  <FHDCIPPort1>8080</FHDCIPPort1>
   <FHDCIPAddress2>192.168.40.211</FHDCIPAddress2>
  <FHDCIPPort2>8080</FHDCIPPort2>
</Config>
```


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