Hertzkron

Natural Cooling
Advanced Static Var Generator

User Manual

Contents

Preface

Dear Valued Customer,

Thank you for choosing our Natural Cooling Advanced Static Var Generator!

For your safe and convenient use and reasonable maintenance, please read this user manual carefully before use and keep it properly for future reference.

Please follow the operation procedures and precautions in this manual.

If the device malfunctions, do not attempt to disassemble or repair it by yourself or entrust it to an unauthorized repair service. Please contact our Technical Service Department, providing your name, address, telephone number, device model, purchase date and fault description. We will serve you wholeheartedly.

Due to product upgrades and technological advancements, the Natural Cooling Advanced Static Var Generator may differ from this manual. We apologize for any errors, omissions or other improper parts.

Chapter I Safety Notes

1.1 About This Manual

1) This manual covers the installation and use of the Natural Cooling Advance Static Var Generator. Read it before installation.
2) Only qualified personnel are permitted to operate the device, including installation, operation, maintenance, repair, and dismantling. Unauthorized personnel are strictly prohibited.
3) Any modification, disassembly, disabling of components, or use of non-original parts may compromise safety and performance, and will void the warranty.
4) Ensure proper grounding before powering on. Poor grounding can cause abnormal operation and electric shock.
5) After power-off, wait 10 minutes before disassembling the cabinet. Use a dedicated instrument to test the DC bus voltage. Only dismantle components after confirming the DC capacitor residual voltage is fully discharged, otherwise electric shock may occur.
6) Poor ventilation can cause overheating and damage. Do not block vents and keep away from heat sources.
7) During transport and storage, protect the device from rain, immersion, high temperatures, salt spray corrosion, and dusty environments.

1.2 Safety Signs

To ensure user safety and proper product use, critical information is highlighted with symbols.

ATTENTION

Failure to follow the manual may cause loss or equipment failure and damage!

WARNING

Failure to follow the manual may cause equipment damage and minor personal injuries!!

DANGER

Failure to follow the manual may cause severe accidents, serious injury, or death!!!

These symbols indicate critical safety information. Non-compliance may result in economic loss, damage to the product, related equipment, or cabinets, and may cause injury or death. Our company bears no responsibility for injuries or damages resulting from failure to follow this manual.

1.3 Safety Matters

Before Installation	
 Danger	1) Do not install if the box is wet, components are missing, or parts are visibly damaged! 2) Do not install if the packing list does not match the actual items or the ordered device name!
 Pay Attention	1) This equipment is intended for commercial and industrial users only and shall not be used as a power source for any life support equipment. 2) When moving the module, be sure to hold the housing firmly. Dropping may cause injury or damage. 3) Lift and place the module with care during transportation, otherwise there is a risk of damaging the equipment! 4) Do not use damaged or incomplete modules! 5) The device has been tested for voltage withstand before leaving the factory, and no electrical withstand test can be carried out on any part of the device without confirmation by the company's technical personnel. Moreover, high voltage may cause damage to the insulation and internal components of the equipment.
During Installation	
 Danger	1) Non-electrical construction professionals are not allowed to install, maintain, check or replace parts. Otherwise, there is a risk of electric shock! 2) For renovation projects, when installing primary cables and secondary lines for current sampling, ensure that the access system is powered off and safe operation can be performed within the surrounding area. There is no danger of electric shock, which may lead to casualties!
 Pay Attention	1) When connecting the input cable, be sure to ground it reliably. The grounding of the equipment must comply with local electrical regulations. 2) When installing, please gently place the module and pay attention to not bump the module. If the damage is caused, it is not within the scope of the company's responsibility and warranty. 3) When the above two modules are placed in the same cabinet, please pay attention to the installation position to ensure the heat dissipation effect. It is recommended to add fans and other heat dissipation measures. 4) The installation position of the module should ensure ventilation. Do not cover the air inlet and outlet of the cooling fan built in the module. 5) The installation position of the module should ensure that the after-sales personnel can carry out safe debugging and maintenance. 6) Wall-mounted modules should be installed in locations where there is little movement of people, and safety signs should be made in obvious places. 7) Avoid installation in environments with conductive dust, volatile gas, corrosive substances, and excessive salt.
During Running	

 Danger	1) Do not open the cover after power on. Otherwise, there is a danger of electric shock and casualties! 2) Do not install or connect equipment with power on! 3) Do not touch any primary or secondary terminals of the module. Otherwise, there is a risk of electric shock and casualties! 4) This equipment must be adjusted by the manufacturer and its authorized agents, and other personnel should operate under the guidance of our after-sales engineers. Private operation is prohibited! Otherwise, it may cause damage to the equipment or even cause casualties!
 Pay Attention	1) Do not change the factory parameters of the equipment at will during operation. Otherwise, the equipment may be damaged! 2) During operation, avoid dropping anything into the equipment. Otherwise, it may cause damage to the equipment!
 Pay Attention	1) After the equipment is powered on, avoid frequent start/stop of the equipment or frequent switching of the superior switch of the equipment. 2) During debugging, if abnormal noise or fault information occurs, power off immediately and contact our technical personnel.
During Maintenance and Repair	
 Danger	1) Do not repair and maintain the equipment without professional training. Otherwise, it may cause personal injury or equipment damage! 2) Do not repair and maintain the equipment with electricity. Otherwise, there is a risk of electric shock! 3) Confirm that the input power supply of the equipment is cut off for at least 10 minutes before maintenance and repair. Otherwise, the residual charge on the capacitor will cause harm to human life! 4) Before performing maintenance on the equipment, ensure that the equipment is safely disconnected from all power sources. 5) After replacing the equipment, parameters must be set and checked. 6) Do not power up the equipment that has been reported to be faulty or damaged, otherwise it will increase the damage to the equipment.

Chapter II ASVG-NC Product Introduction

2.1 Product Principle

The ASVG-NC adopts a silent design, and connects the voltage source converter to the power grid in parallel through a filter. Its working principle is to detect the load current in real time, based on advanced reactive power, harmonics and three-phase active power detection and control algorithms, to generate the corresponding IGBT drive signal, and realize the comprehensive compensation of reactive current, harmonic current and three-phase unbalanced active power. At the same time, the device adopts IP66 outdoor protection grade design, the noise is less than 40dB, and it supports built-in grid-side sampling CT, which is easy to install and maintain and has a long service life.

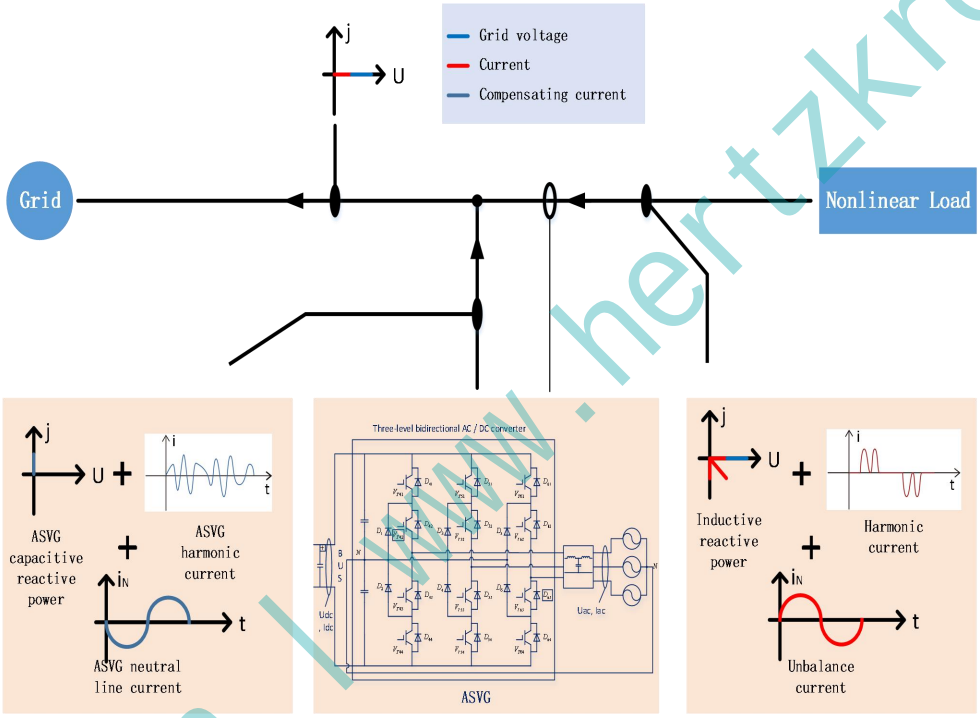


Figure 2.1. Schematic Diagram of ASVG-NC Principle

Figure 2.2: Physical image of the ASVG-NC module

2.2 ASVG-NC Model Definition

The model definition of the advance static var generator with natural cooling is shown in Figure 2.3, and the module specifications and dimensions are shown in Table 2.1. For detailed module dimension drawings of different capacity levels, please refer to the assembly drawings of each module.

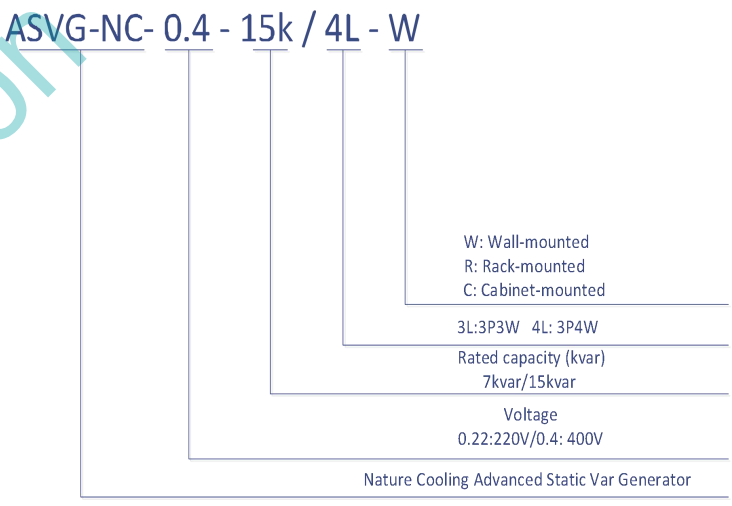


Figure 2.3. Model Description Diagram

Table 2.1. Module Dimensions

Module Model				
Models	**Compensation Capacity (kvar)**	**System Voltage (V)**	**Dimensions W*D*H (mm)**	**Net Weight (kg)**
ASVG-NC-0.22-7k/4L-W	7	220	885*490*220	44.5
ASVG-NC-0.4-15k/4L-W	15	400	885*490*220	44.5

Chapter III ASVG-NC Technical Parameters

Technical parameters for ASVG-NC modules are shown in Table 3.1.

Table 3.1. Technical Parameters

	220V Series	380V Series
Altitude	< 2000m (derated per GB/T 3859.2 above 2000m)	
Ambient Temperature	-10℃ ~ +50℃ (derated above 40℃)	
Relative Humidity	≤ 90%, no condensation on surface at monthly min. temperature of 25°C	
Pollution Level	Below Level III	
Operating Voltage	AC220V (±20%)	AC380V (±20%)
Operating Frequency	50Hz/60Hz（45Hz ~ 63Hz）	
Rated Compensation Capacity	7kvar,17kvar	15kvar,35kvar,50kvar
Grid Structure	3P3W, 3P4W	
Load Current Range	0 ~ 150A	
Numbers in Parallel	Unlimited	
Full Load Efficiency	≥97%	
Switching Frequency	16kHz	
Function Selection	Reactive Power, Harmonic, Reactive Power + Harmonic, Harmonic + Reactive Power, Harmonic + Unbalance , Reactive Power +Unbalance , Harmonic + Unbalance + Reactive Power , Reactive Power + Unbalance + Harmonic	
Reactive Power	≥ 99%	
Unbalance Compensation Capability	≤5%	
Current Harmonic Compensation Capability	≥95%	
Neutral Line Filtering Capability	The neutral line filtering capacity is 1.5 times the phase filtering capacity	
Total Response Time	Reactive Power <10ms, Harmonic <40ms	
Cooling Method	Natural Cooling	
Noise	≤40dB	
Communication	2*RS485 communication interface (Support WiFi)	
Protection Function	Overload, Software/Hardware Overcurrent, Over/Undervoltage, Unbalance, Power Supply Fault, Overtemperature, Frequency Anomaly, Short Circuit Protection	
Overload Capacity	Rated 1.2 times overload for 60 seconds	
Installation	Wall Mount	
Line Entry Method	Down Line	
Protection Level	IP66	

Chapter IV Transportation and Storage

4.1 Transportation

Products can be transported by car, train, airplane, or ship. Handle with care during transport. Protect from rain, direct sunlight, severe vibration, impact, and inversion.The transportation temperature should be within the range of -40~+70℃.

Symbol	Description
	Keep upright. Do not place horizontally, tilt, or invert.
	Handle carefully to avoid damage to the module caused by excessive collision and friction in the transportation environment
	Take precautions against moisture and avoid exposing the module to rain or dampness.

4.2 Storage

Store in a warehouse with ambient temperature between -40~+70℃, the maximum relative humidity of air ≤95% (equivalent to the air temperature of 20±5℃) and no corrosive gas.

4.3 Unboxing Inspection

When unboxing, please carefully check:

 Pay Attention	1) Check whether the capacity on the nameplate and the capacity and model on the module label are consistent with your order.
	2) Contents: Device, User Manual, Product Certificate, Factory Test Report, Waterproof Ethernet Connector. Some accessories are pre-installed.
	3) If the order includes a centralized HMI touchscreen, it is usually packed separately. Contents: 7-inch touchscreen, mounting accessories, communication cable, engineering drawings, module terminal insulation covers.
	4) Check for transport damage. Contact us immediately for any missing/damaged items.

4.4 Product Packaging Contents

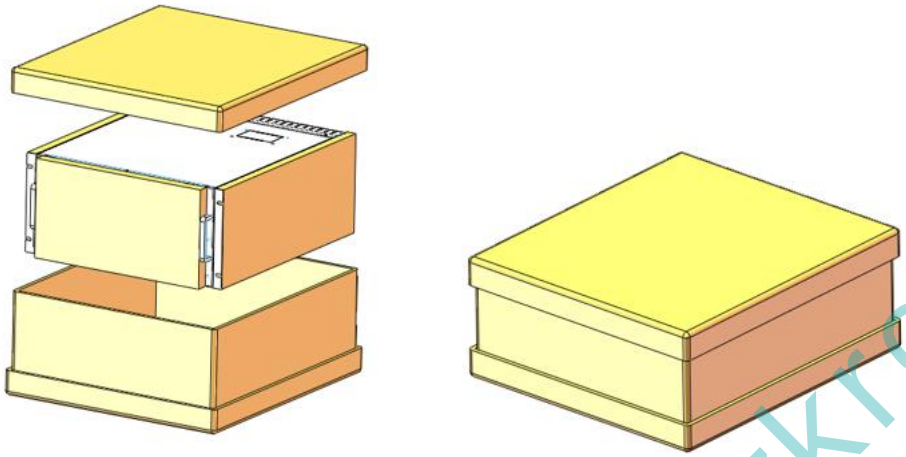


Figure 4.1. Module Packaging Diagram

4.5 Accessory Packaging Contents

1) Box contains: ASVG-NC device, User Manual, Product Certificate, Factory Test Report.
2) Host and accessories (some pre-installed).

Chapter V Installation and System Wiring Diagrams

5.1 Power distribution interface and secondary terminal interface

When wiring on-site, users only need to select appropriate cables for the fixed terminals of the equipment according to the power requirements. The wiring diagrams for each terminal are shown in Figure 5.1 and Table 5.1.

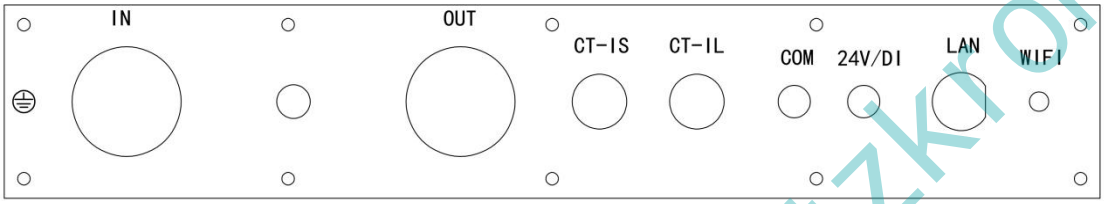


Figure 5.1. External Waterproof Terminals

Port Name	Port Label	Functions/Description
Primary Circuit Equipment Incoming Line (IN)	L3	C-phase incoming cable
	L2	B-phase incoming cable
	L1	A-phase incoming cable
	N	N-phase incoming cable
Primary Circuit Equipment Outgoing Line (OUT)）	L3	C-phase outgoing cable
	L2	B-phase outgoing cable
	L1	A-phase outgoing cable
	N	N-phase outgoing cable
CT-IS	IS_A+	Ia（Connect the S1 pole of phase A CT on the grid side or load side.）
	IS_A-	Ia（Connect the S2 pole of phase A CT on the grid side or load side.）
	IS_B+	Ib（Connect the S1 pole of phase B CT on the grid side or load side.）
	IS_B-	Ib（Connect the S2 pole of phase B CT on the grid side or load side.）

	IS_C+	Ic（Connect the S1 pole of phase C CT on the grid side or load side.）
	IS_C-	Ic（Connect the S2 pole of phase C CT on the grid side or load side.）
CT-IL	IL_A+	Ia（Connect the S1 pole of the A-phase CT in this cabinet; optional depending on the actual situation.）
	IL_A-	Ia（Connect the S2 pole of the A-phase CT in this cabinet; optional depending on the actual situation.）
	IL_B+	Ib（Connect the S1 pole of the B-phase CT in this cabinet; optional depending on the actual situation.）
	IL_B-	Ib（Connect the S2 pole of the B-phase CT in this cabinet; optional depending on the actual situation.）
	IL_C+	Ic（Connect the S1 pole of the C-phase CT in this cabinet; optional depending on the actual situation.）
	IL_C-	Ic（Connect the S2 pole of the C-phase CT in this cabinet; optional depending on the actual situation.）
COM	485A1	Communicating with the human-machine interface or communicating with the previous module
	485B1	Communicating with the human-machine interface or communicating with the previous module
	485A1	Communicate with the next module
	485B1	Communicate with the next module
	485A2	Debug Port
	485B2	Debug Port
24V/DI	24V	Power supply output is positive +24V (for powering the human-machine interface).
	DI	The power output is 0V (negative terminal) (powers the human-machine interface and indicator lights).
	DI_X1	Start signal (external dry contact button, powered via +24V common terminal)
	DI_X2	Emergency stop signal (external dry contact button, powered via +24V common terminal)
Network Port	LAN	Network cable interface
Wireless Antenna	WiFi	WiFi antenna interface

Grounding	PE	The system grounding terminal is essential because the system casing is made of metal. To prevent accidents that could endanger personal safety, the system must be connected to the ground via this terminal before powering on.
 Attention	Note: The maximum allowable secondary current of the CT is 5A.	

Table 5.1. Module Internet Terminal Description

5.2 Accessories Specifications

Table 5.2: Parts Specifications

Part Name	Installation Location	Function Description	Selection Recommendations
Molded Case Circuit Breaker (Required)	1) Power input terminal of the module. 2) Circuit breaker for rack-mounted modules is installed inside the cabinet. 3) The circuit breaker of the wall-mounted module is installed in the distribution box that is matched with the wall-mounted module.	1) Controls the on/off state of the module. 2) Simultaneously features overload, short circuit, and undervoltage protection functions to protect the circuit and module from damage.	1) Generally, one molded case circuit breaker is configured for one module, but multiple modules can also be configured with one large molded case circuit breaker. 2) The rated current of the molded case circuit breaker should be selected based on 1.25 to 1.5 times the rated current of the module. Number of poles: 3P/4P.
Surge Protector (Optional Installation)	1) The power input terminal of the module, the upper port of the molded case circuit breaker. 2) Installed inside the cabinet or distribution box.	Provides safety protection for cabinets and modules. When a surge voltage occurs in the electrical circuit, the surge protector can conduct and divert the current in a very short time, thereby preventing overvoltage from damaging other	1) Number of poles: 3P+N 2) Maximum discharge current: 40kA and above

		equipment in the electrical circuit.	
Miniature Circuit Breaker (Optional Installation)	1) Surge protector or fan input terminal. 2) Installed inside the cabinet or distribution box.	The main purpose of installing a circuit breaker in front of a surge protector or fan is to prevent fires or other accidents when a continuous short circuit occurs in the internal components of the surge protector.	1) Rated current 20A and above 2) Number of poles 4P
Centralized Monitoring Screen (Optional Installation)	1) For rack-mount installation, it can be installed on the cabinet door. 2) For wall-mount installation, it can be installed on the distribution box door.	Centralized monitoring makes it easy to view and set parameters.	Factory accessories
Emergency Stop Button (Optional Installation)	Installed on the cabinet door or the door of the distribution box.	When an abnormal situation occurs inside the cabinet or module (smoke, unusual noise, flame), the emergency stop switch can be pressed immediately to stop the module from working and effectively protect the module.	Button release type
Status Indicator Lights (Optional Installation)	1) Installed on the cabinet door. 2) Connected to the circuit of the alarm output point.	Display module status: running, stopped, normal, or faulty.	1) Any color 2) Twist diameter 22mm

Current Transformer (Optional Installation)	Installed on the main busbar of the power distribution system.	Detect the load current of the power distribution system.	1) Secondary current must be 5A, select from 100/5 to 10000/5 2) Accuracy 0.5 or higher 3) Rated load 2.5VA or higher

5.3 Primary Cable Diameter Selection Reference

The selection of ASVG incoming cables for different capacities and current ratings should comply with relevant electrical regulations and take into account environmental conditions. The table below can be used as a reference:

Table 5.3 Recommended values for cable cross-section

Primary Power Line			
Capacity	Three-phase main circuit incoming line	N line	PE line
15k	50mm²	50mm²×1	25mm²
Attention	1) ASVG is rated in kvar. The specifications in the table above are for reference only; please refer to national standards for accuracy. 2) Cables are typically BVR multi-strand copper core PVC insulated flexible wires. 3) If it is an aluminum cable, refer to the corresponding copper wire current carrying capacity specification.		

5.4 Reference for Primary Copper Busbar Selection

Table 5.4: Copper Busbar Selection Reference

Current capacity（A）	Copper busbar specifications(mm*mm)
＜150	15*3

5.5 CT and Current Secondary Cable Selection Reference

The main purpose of using current transformers is to collect load current in ASVG-NC and calculate data such as harmonic current, reactive current, negative sequence current, and zero sequence current. The NC has a built-in transformer; if you need to add an additional transformer, please refer to the table below:

Table 5.5 CT Cable Selection Reference

Parameter	Requirements	Remarks
Primary Rated Current	——	The primary rated current of the instrument transformer is ≥ 1.5 times the actual operating current.

Secondary Rated Current	5A	——
Rated Voltage	≥0.66kV	——
Rated Capacity	≥2VA	——
Accuracy Class	Class 0.5 or 0.2	——
Dimensions	——	Select based on installation environment
Cable Diameter	There are 3 sets (6 cables) of current transformer secondary side (rated current 5A). The wire diameter is 2.5mm².	

5.6 Other Cable Selection Reference

Table 5.6 Other Cable Selection Reference

Name	Specification
Surge Protector Primary Cable	6mm² BVR multi-strand copper core flexible wire
Fan Circuit Cable	1.5mm² BVR multi-strand copper core flexible wire
Emergency Stop Switch Circuit Cable	
Indicator Light Circuit Cable	
Grounding Cable	Yellow-green BVR multi-strand copper core flexible wire; Recommendations for selecting protective earth (PE) wire: When the AC phase wire diameter S < 16mm², select the same diameter as the phase wire; when the phase wire diameter 16 ≤ S ≤ 35mm², select a 16mm² protective earth wire; when the phase wire diameter S > 35mm², select half the phase wire diameter as the protective earth wire diameter.
Touchscreen Communication Cable	Power Cable: 1.0 mm² BVR stranded copper-core flexible cable (to be connected by the complete-set manufacturer); Communication Cable: Standard connecting cables are provided by our company along with the equipment.
Module Parallel Communication Cable	For communication cabling, it is recommended to use RVVP 2×0.75 mm² shielded twisted-pair cable.

5.7 Installation and Wiring

5.7.1 Installation Environment

Table 5.7 Installation Environment

Installation environment requirements	
 Attention	1) Ambient Temperature: Ambient temperature significantly affects the lifespan of the ASVG. The operating temperature of the ASVG must not exceed the allowable range (-10℃ to 50℃). 2) The ASVG should be installed on a flame-retardant surface, with sufficient space around it for heat dissipation. 3) Install in a location free from vibration, with vibration levels not exceeding 0.6G. Pay special attention to keeping it away from stamping equipment such as punch presses. 4) Avoid installation in locations containing corrosive, flammable, or explosive gases. 5) The installation environment must not be exposed to strong magnetic fields, nuclear radiation, or high-power radio frequency interference. 6) Wall-mounted modules should be installed in areas with minimal foot traffic and must be clearly marked with safety warning signs.

5.7.2 Installation Space

Table 5.8 Installation Space Requirements

Installation space requirements	
 Attention	1) For wall-mounted installation, leave at least 150mm of space on both sides of the module. 2) The distance between the wall-mounted installation location and the ground should be more than 1.5 meters, and a visible warning sign indicating the danger of electric shock should be affixed.

Wall-mounted Installation Space Requirements

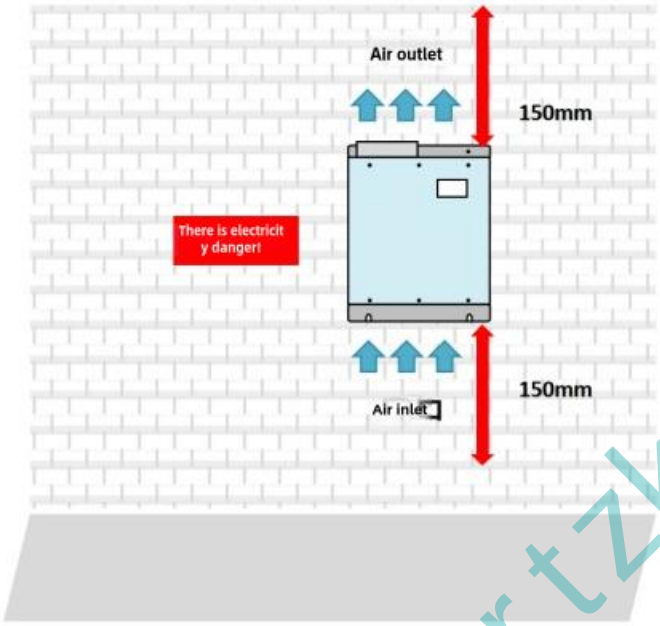


Figure 5.2 Wall-mounted Module Installation Space Diagram

5.8 Module Installation Instructions

Wall-mounted installation:

The wall-mounted module can be wall-mounted and operates independently. The mounting hole layout is shown in Figure 5.3.

Installation method: Secure to the wall using M8*15 Phillips head screws via the eight mounting holes on the bracket.

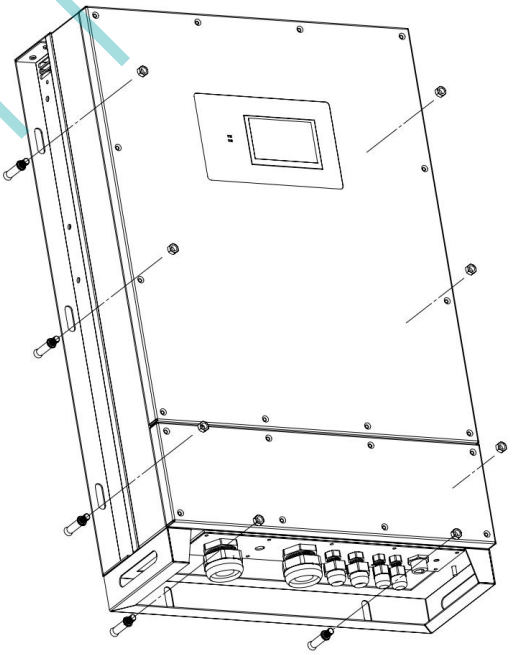


Figure 5.3 Wall-mounted ASVG-NC Mounting Hole Diagram

5.9 Wiring

5.9.1 CT Installation Direction Description

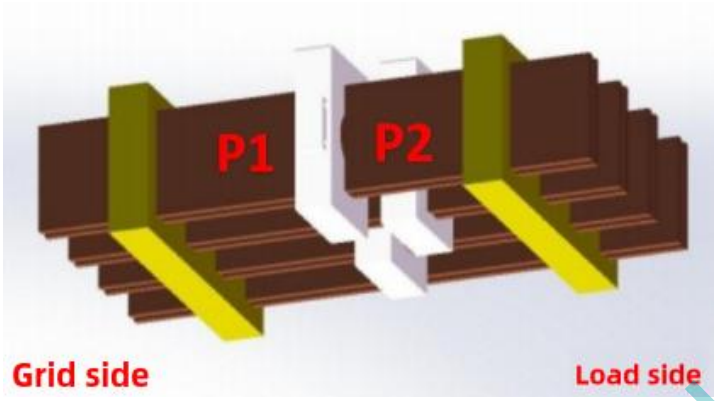


Figure 5.4 CT Installation Diagram

Pay Attention	If the current flows from P1 to P2, S1 is + and S2 is - .

5.9.2 Wiring diagram of a single-module built-in CT operating system

Wiring diagram of a single-module built-in CT operating system

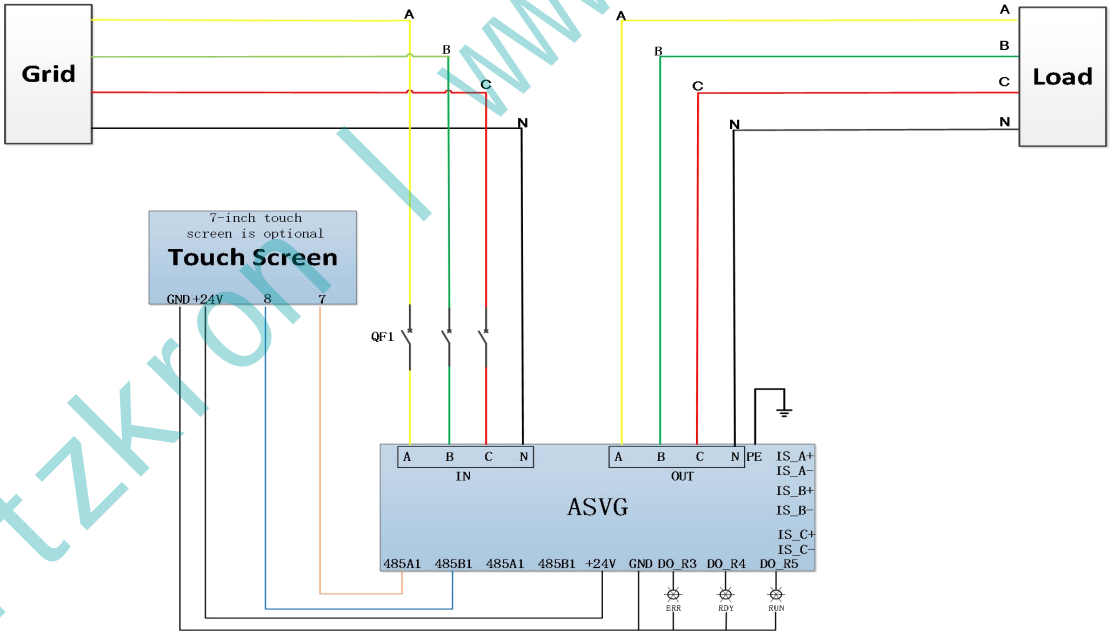


Figure 5.5: Wiring diagram of a single-module built-in CT system during operation

5.9.3 Wiring diagram of multi-module external CT system during operation

Connecting multiple ASVG modules in parallel can increase the compensation current. In this case,

multiple devices share a single current transformer. The current signal collected by the external current transformer is transmitted to all ASVG devices connected in parallel. At the same time, a sampling transformer CT2 is added inside the cabinet to collect the current of the entire cabinet. The CT is installed on the power supply side in the field, as shown in Figure 5.6

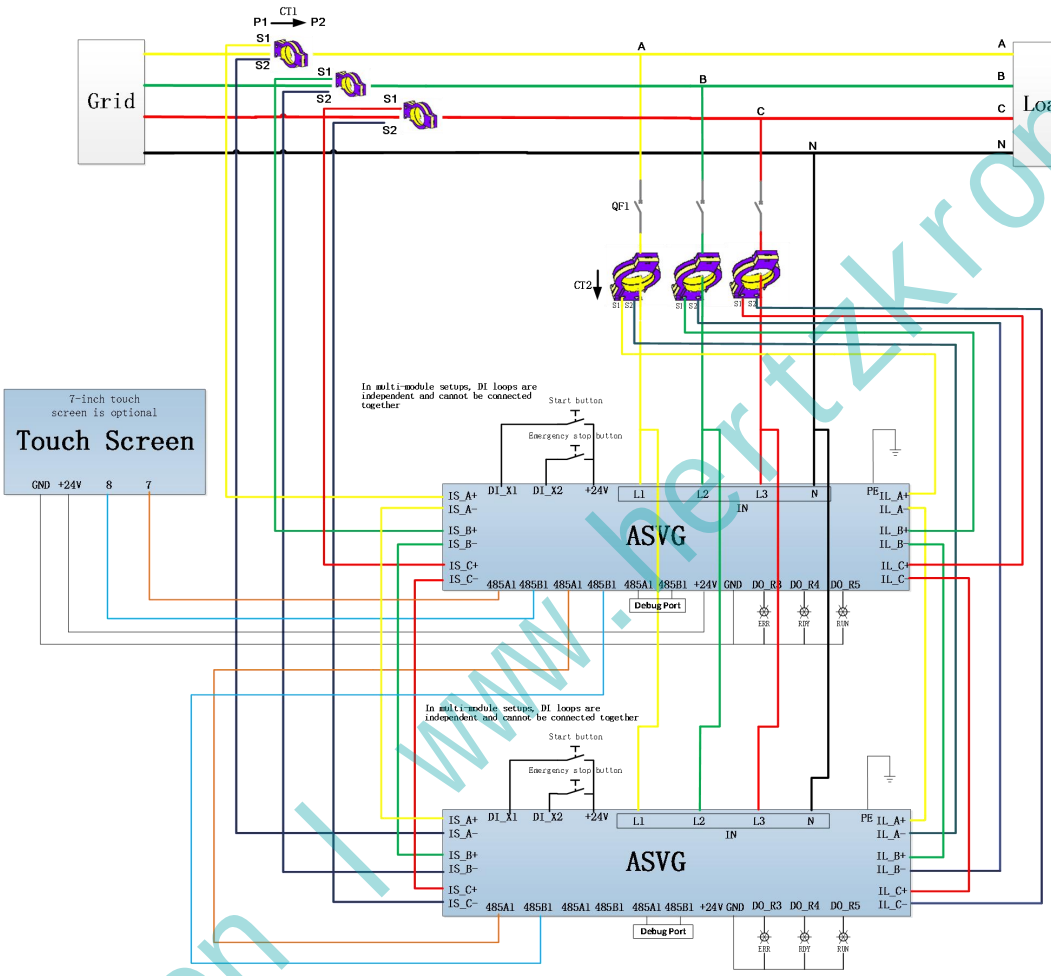


Figure 5.6: System wiring diagram for multi-module single cabinet operation

Chapter VI Operation Interface Description

(4.3-inch Touch Screen)

6.1 Default Startup Interface

The HMI main interface is shown in Figure 6.1. It displays system information, including grid and load currents/voltages. Start, Stop, and Reset functions are accessible here. Left side buttons: "Main Page", "Data", "Settings", "Record".

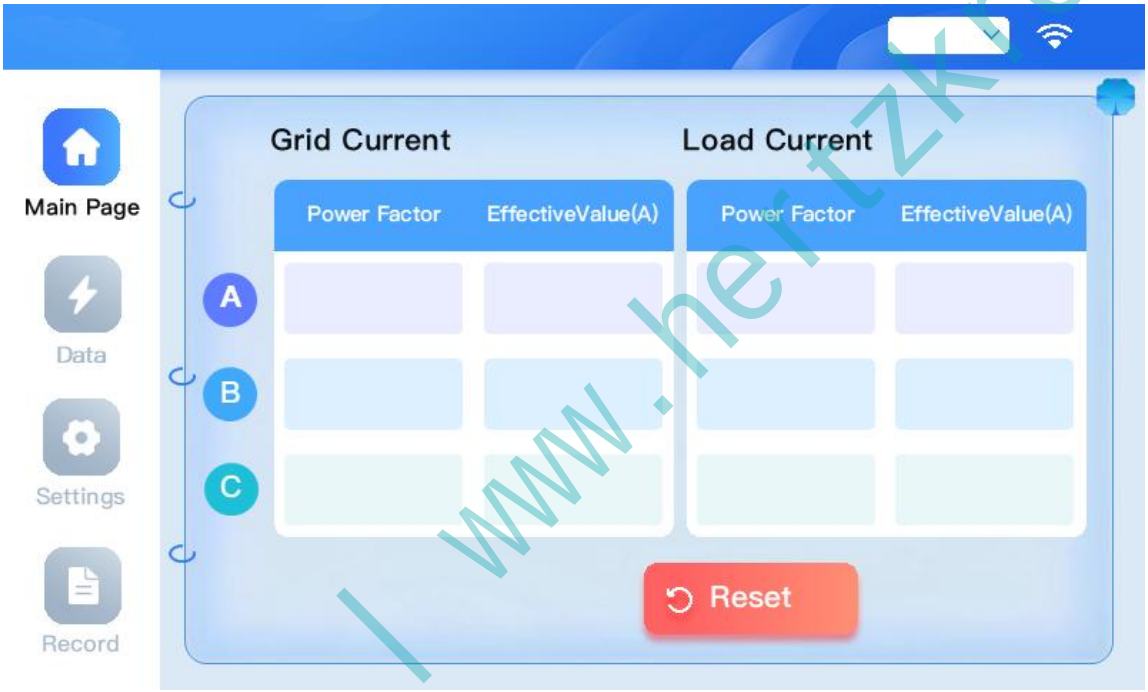


Figure 6.1. HMI Home Page

6.2 Operation Permission Account

The login screen (Figure 6.2) appears when clicking "Settings" or selecting a parameter.

Password: 123

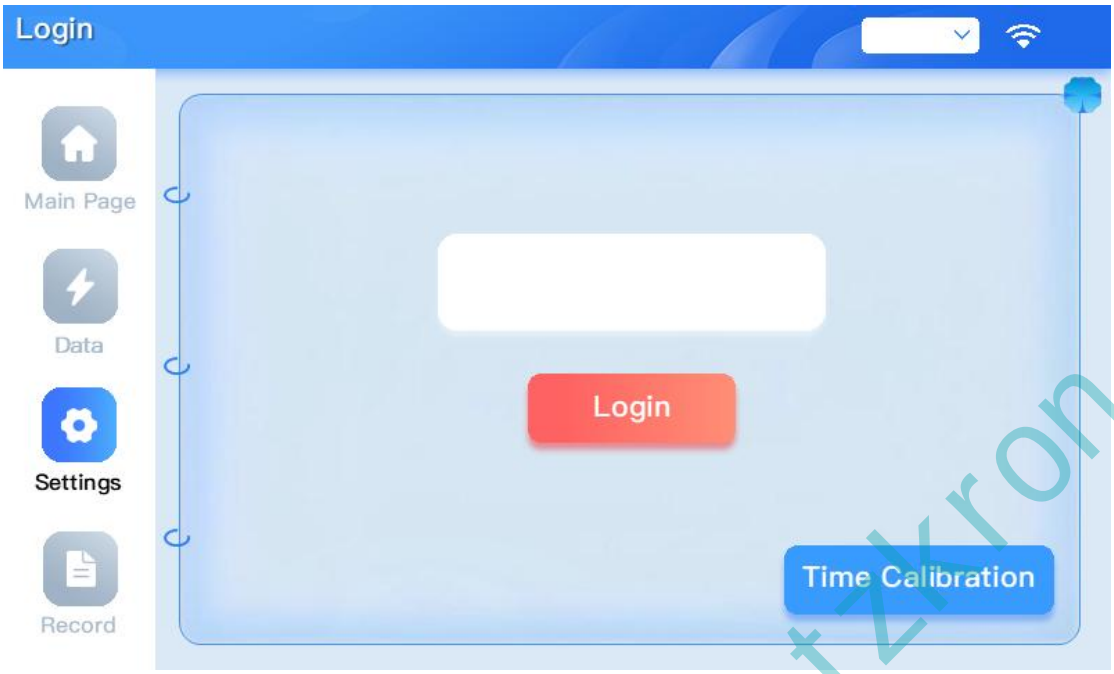


Figure 6.2. Permission Login Interface

6.3 Operation Permission

Under this permission, users can query parameters (browse only, no input), run data/history query, start, stop, and reset.

6.4 Parameter Settings

Click "Settings" on the main screen to enter the Parameter Settings interface (Figure 6.3). Parameters are categorized: "System Params", "Sampling Params", "High Volt Params", "Harmonic Ctrl", "Single Params", "Time Calib". Click the relevant category to set parameters.

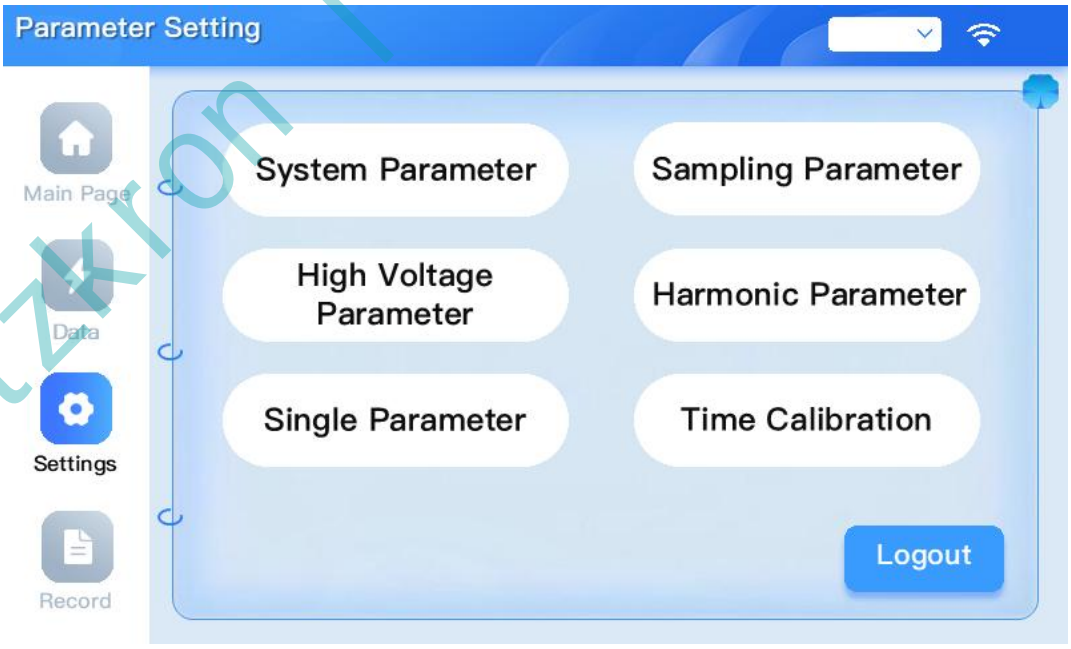


Figure 6.3. Parameter Settings Interface

6.5 Parameter Settings-System Parameters

The System Parameters interface is shown in Figure 6.4.This article details these interface parameters.

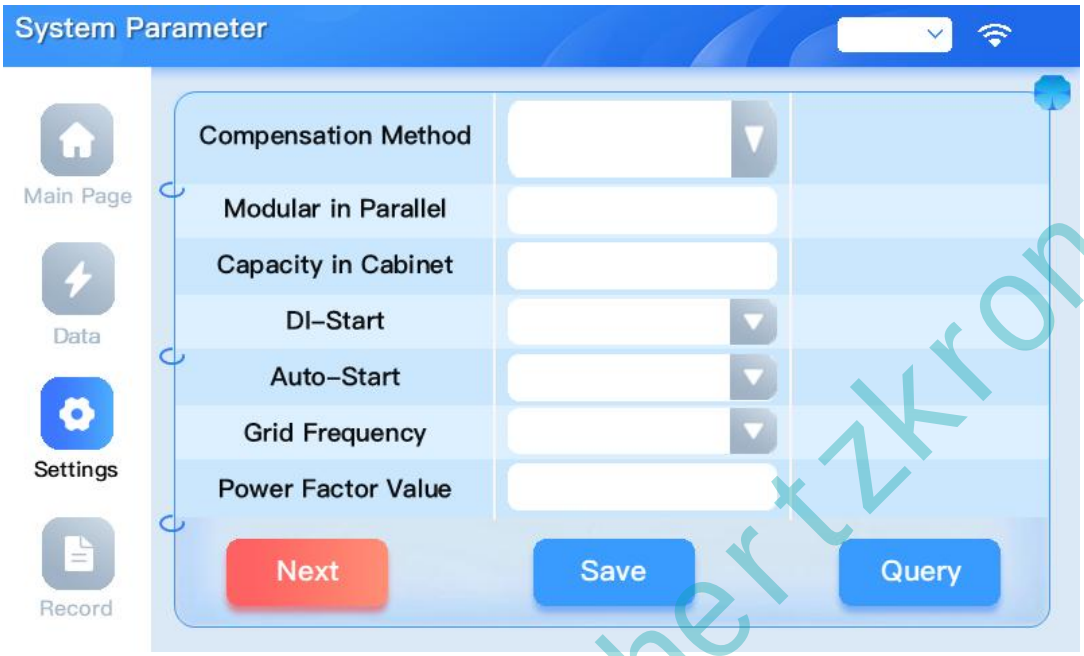


Figure 6.4. System Parameter Settings

1) Number of Parallel Modules: The total number of ASVG modules to be connected in parallel. If two modules are connected in parallel, set the value to 2.

2) Cabinet Capacity: The sum of the capacities of the parallel modules in this cabinet (unit: kvar). If the cabinet has two modules with capacities of 15 kvar and 15 kvar respectively, set the value to 30.

3) Compensation Method Selection: Reactive Power , Harmonic , Reactive Power + Harmonic , Harmonic + Reactive Power , Harmonic + Three-phase Unbalance, Reactive Power + Three-phase Unbalance, Harmonic + Three-phase Unbalance + Reactive Power , Reactive Power + Three-phase Unbalance + Harmonic , self-aging. Different priorities can be selected. Self-aging mode should be used with caution by the customer.

4) DI Start/Stop Enable: If the customer requires the module to be started via an external switch, select "Enable" for this option; otherwise, select "Disable".

5) Auto-start Enable: Selecting "Disable" requires manual clicking of the start button after power-on; setting it to "Enable" enables automatic startup after power-on when the set conditions are met.

6) Power Factor Setpoint: The actual setpoint for the field power factor, which can be set from 0 to 1.

7) After setting all parameters, click the "Save" button to confirm and complete the settings. You can click the "Query" button to confirm whether the settings were successful.

6.6 Parameter Settings-Sampling Parameters

Sampling Parameter interface is shown in Figure 6.5.This article details these interface parameters.

Figure 6.5 Input Side Sampling Parameter Interface

1) Input Current Sampling Location Selection: If the field CT is connected to the incoming line side, select "Grid Side"; if the field CT is connected to the load side, select "Load Side".

2) Input Current Sampling Direction Selection: If the field CT's direction is from the load side to the grid side, select "Inflow into Grid"; otherwise, select "Outflow into Grid".

3) Input Current CT Ratio: If the field CT ratio is 2000:5, set it to "400". Equipment Current Sampling Enable: This sampling is only used for cabinet-wide current sampling. If the number of modules in the cabinet is greater than one, it is recommended that the module be connected to the cabinet's sampling CT. If connected, select "Enable"; otherwise, select "Disable".

4) Equipment Current Sampling Location Selection: This sampling is only used for cabinet-wide current sampling; select "Cabinet".

5) Equipment Current Sampling Direction Selection: If the direction of the cabinet-wide sampling CT is from the module side to the busbar side, select "Inflow into Grid"; otherwise, select "Outflow into Grid".

6) Equipment Current CT Ratio: If the cabinet-wide sampling CT ratio is 2000:5, set it to "400".

Note: The built-in CT ratio is 150/5. The factory default settings are: ratio 30, sampling location: power grid side, direction: outflow from the power grid.

6.7 Setting Harmonic Filtering Parameters

The harmonic filtering interface is shown in Figure 6.6. If the module is required to compensate for harmonics on-site, you can enter this interface to select the order and compensation rate of the harmonics to be compensated. Select the compensation rate for the corresponding harmonic order. For example, if the third harmonic needs compensation, enter "1.00" in the corresponding field

shown in the figure below. Finally, click "Save". You can confirm the setting was successful by clicking "Query". This device allows you to filter up to 8 selected harmonics.

Figure 6.6 Harmonic Filter Parameter Interface

6.8 Parameter Settings-High Voltage Parameters

The high-voltage parameter setting interface is shown in Figure 6.7, and the interface parameters are explained in detail (this function is only used when reactive power compensation is required).

Figure 6.7. High Voltage Parameter Interface

1) Winding type: normal, YY0, DY11, YD1 can be selected.
2) Transformation ratio: If the field transformation ratio is 10kV:0.4kV, set "25".

6.9 Operation Instructions

Operation modes: Auto or Manual (DI). Configure based on needs.

6.10 Auto Mode

Auto-start Enabled: Selecting "Disabled" requires manually clicking the Start button for the ASVG device to boot. Setting it to "Enabled" will allow the ASVG to boot automatically after power-on and meeting the device's auto-start settings.

6.11 Manual (DI)

DI Startup and Stop Enablement: If the customer requires the ASVG device to be started via an external switch, select "Enable" for this item; otherwise, select "Disable".

Note: Parameter changes require technical expertise. Modify with caution.

6.12 Debugging Parameters

The debugging parameters are provided by the manufacturer's debugging interface and are not publicly available.

6.13 Startup and DIP Switch Settings

When two or more modules are connected in parallel, a DIP switch needs to be set. The module with address 1 corresponds to module one in the touch screen, the module with address 2 corresponds to module two in the touch screen, and so on.

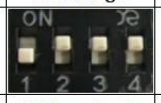
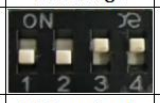
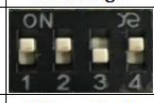
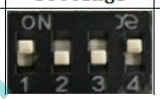
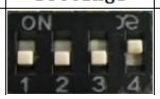
machine number	DIP switch settings	machine number	DIP switch settings	machine number	DIP switch settings	machine number	DIP switch settings
1		2		3		4	
machine number	DIP switch settings	machine number	DIP switch settings	machine number	DIP switch settings	machine number	DIP switch settings
5		6		7		8	

Figure 6.8 Schematic Diagram of Dial Switch

After the equipment is powered on, in the "Module Switching Configuration" interface, put in the module that needs to establish a communication connection with the touch screen, and set the operating parameters after the communication connection is successfully established. When the parameters are set correctly and there is no fault, the touch screen start permission indicator lights up, the "Start" button shows valid, and the "Stop" button shows invalid. In the module monitoring interface, select the module to be started, click the "Start" button, start the device, and the DC bus voltage will increase. When multiple modules are connected in parallel, the startup process of other modules is similar.

The instructions for using the touch screen to stop when two or more modules are connected in parallel are as follows: When the "Start" button shows invalid and the "Stop" button shows valid. Click the "Stop" button to stop.

 **Note**	Parameter changes require technical expertise. Modify with caution.

Chapter VII HMI Description (7-inch Touchscreen)

7.1 Touchscreen Installation

7.1.1 Touchscreen Mounting Dimensions

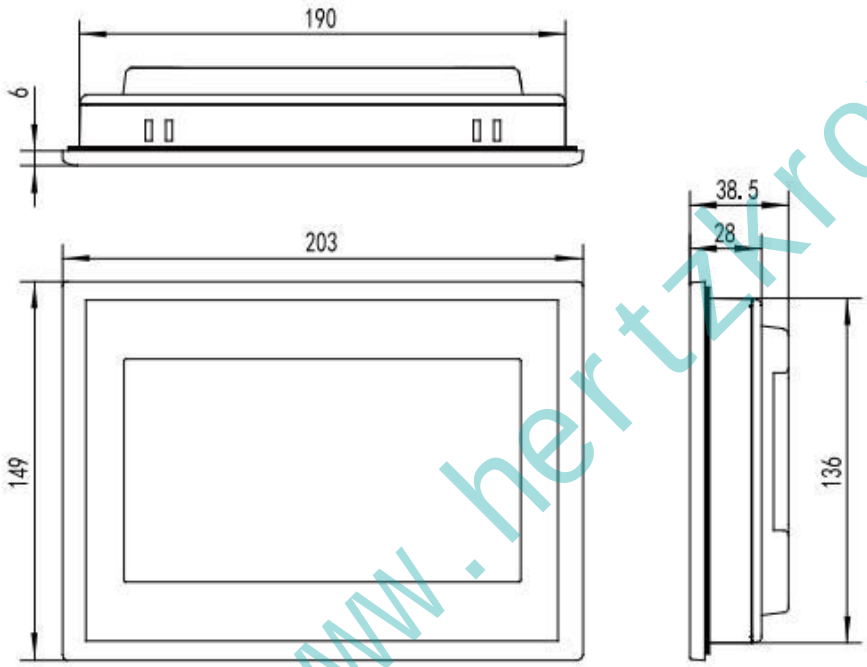


Figure 7.1: Overall Dimensions

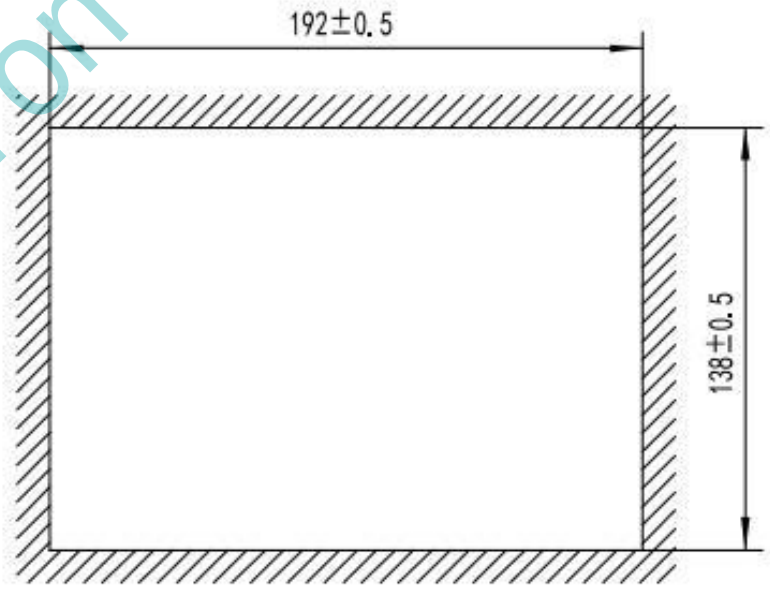


Figure 7.2: Cutout Dimensions

7.1.2 Touchscreen Installation Method

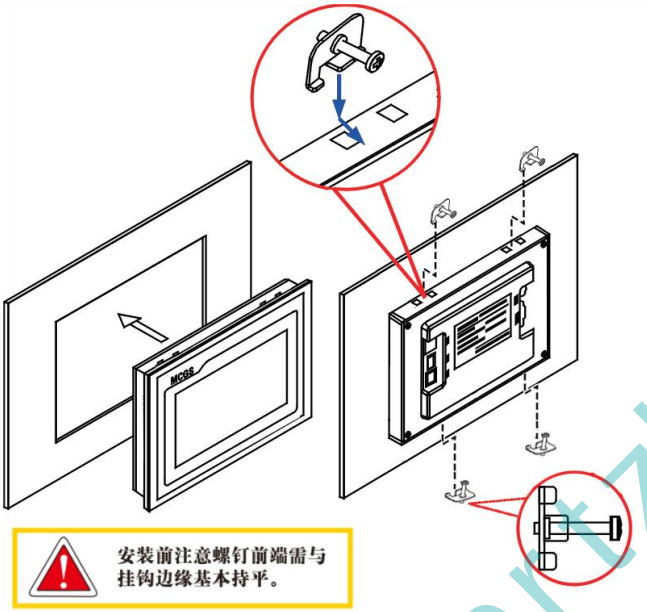


Figure 7.3: Touchscreen Installation Method

7.1.3 Touchscreen Interface Pin Definitions

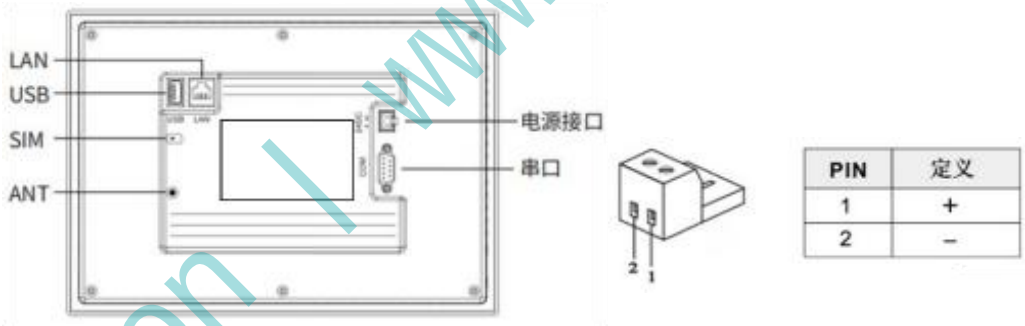


Figure 7.4: Touchscreen Interface Pin Definitions

Table 7.1: Touchscreen Serial Port DB9 Pin Definitions

Touchscreen Serial Port DB9 Pinout			
	COM1 Connects to Modules 1～4	PIN7	RS485+
		PIN8	RS485-
	COM2 Connects to Modules5～8	PIN4	RS485+
		PIN9	RS485-

Table 7.2: Communication Harness and Module Wiring Reference Table

Communication Wire Harness	ASVG Module Terminals	Directions
COM1:485A	485A1(Module 1)	Modules 1 through 4 are connected to Link 1.
COM1:485B	485B1(Module 1)	
COM2:485A	485A1(Module 5)	Modules 5 through 8 are connected to Link 2.
COM2:485B	485B1(Module 5)	

7.2 Default Startup Screen

Upon powering up, the touchscreen defaults to the "Home" interface. From this interface, users can monitor real-time system operational data, such as Grid Voltage, Grid Current, Device Current, Active Power, Reactive Power, and Apparent Power. Specifically, the "Device Current" refers to the compensation current of the entire ASVG cabinet, while the remaining data points represent grid-side parameters.

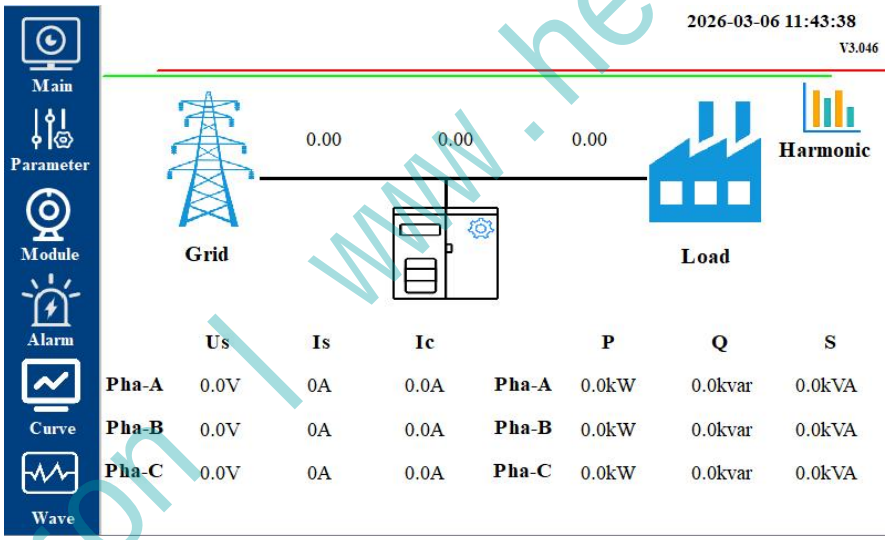


Figure 7.5: Default Startup Interface

The homepage not only displays real-time runtime data but also allows you to navigate to specific sub-interfaces by clicking icon buttons, as shown in the figure below:

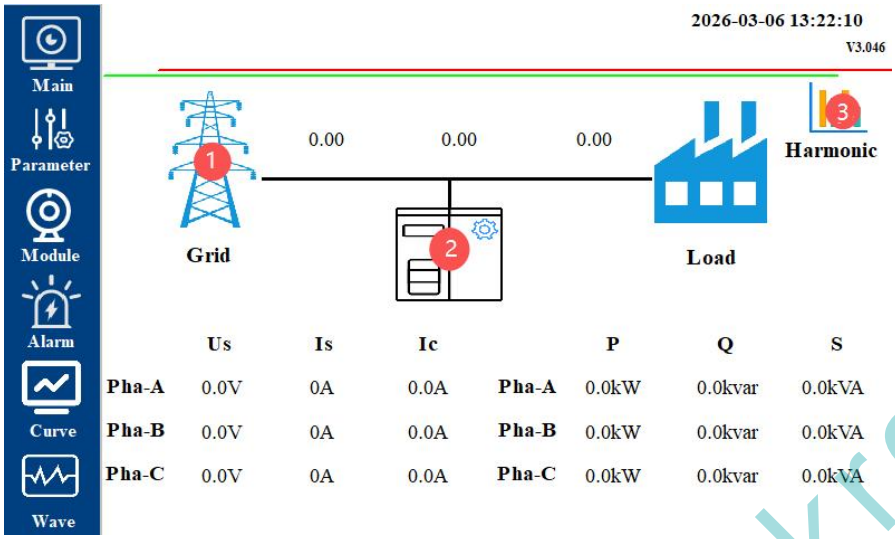


Figure 7.6: Startup Default Interface Navigation Button (Home Button)

① Clicking the "  " icon button on the homepage allows you to navigate to the detailed system operational data monitoring interface; clicking the "Home" button in the top-left corner allows you to return to the previous screen.

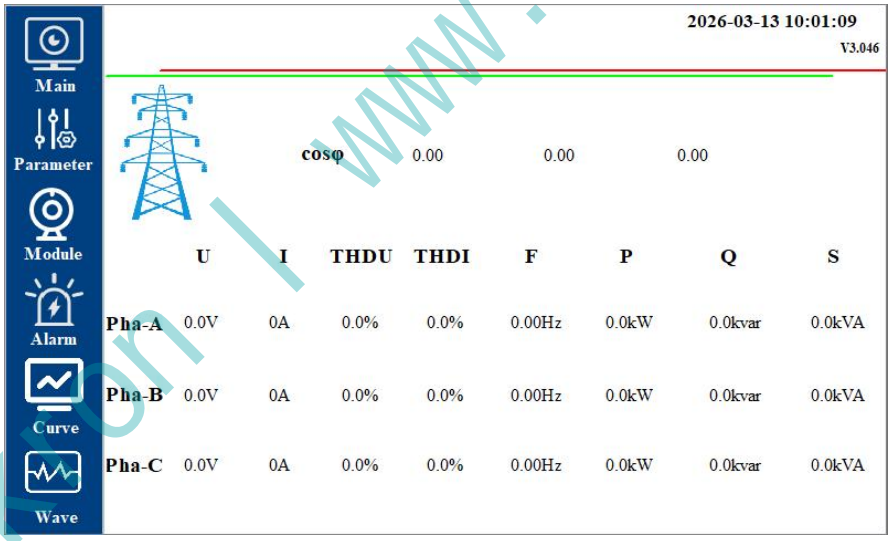


Figure 7.7: System Operation Data Monitoring Interface

② By tapping the "  " icon button on the Home screen, you can navigate to the "Module Switching Settings and Confirmation" interface. You can return to the previous screen by tapping the "Home" button in the top-left corner or the "Back" button in the bottom-right corner.

Through this interface, users can control the communication connection status between each module and the touchscreen. The touchscreen features a "memory" function; therefore, if the device experiences an abnormal power outage and is subsequently powered back on, manual re-engagement is not required.

1) ID: Module serial numbers are fixed and start from 1. Each touchscreen can connect to a maximum of 8 modules;

2) ID Setting: Enter the actual communication address of the module (controlled by a DIP switch for the actual communication address of the module);

3) Module Exit: The touchscreen exits communication with this module;

4) Module In: The touchscreen engages communication with this module.

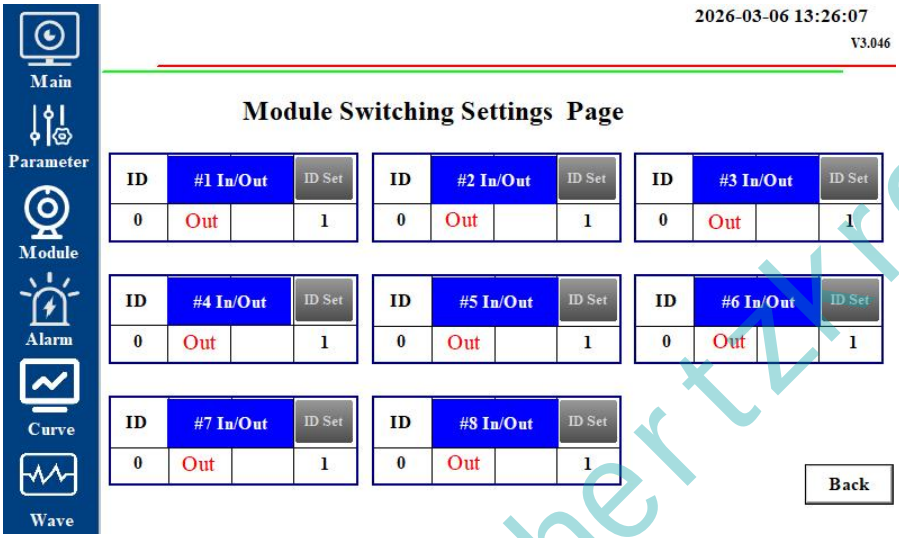


Figure 7.8: Module Switching Settings and Confirmation Interface

③ By clicking the "  " icon button located in the top-right corner of the homepage, you can navigate to the "Harmonic Bar Chart" interface. Users can select the specific harmonics they wish to view by utilizing the Module ID and the selection box on the right. Clicking the "Home" button in the top-left corner allows you to return to the previous screen.

1) This interface displays the harmonic content of the grid voltage, grid current, load current, and device current (module current). The buttons located at the top allow for switching between the harmonic display interfaces for Phases A, B, and C.

2) Display options are available for user selection in the upper-right corner of the interface. When "Device Current" is selected as the displayed content, the Module ID becomes active, allowing users to view the "Device Current" for different modules by specifying the ID number; for all other selected options, the Module ID is not applicable.

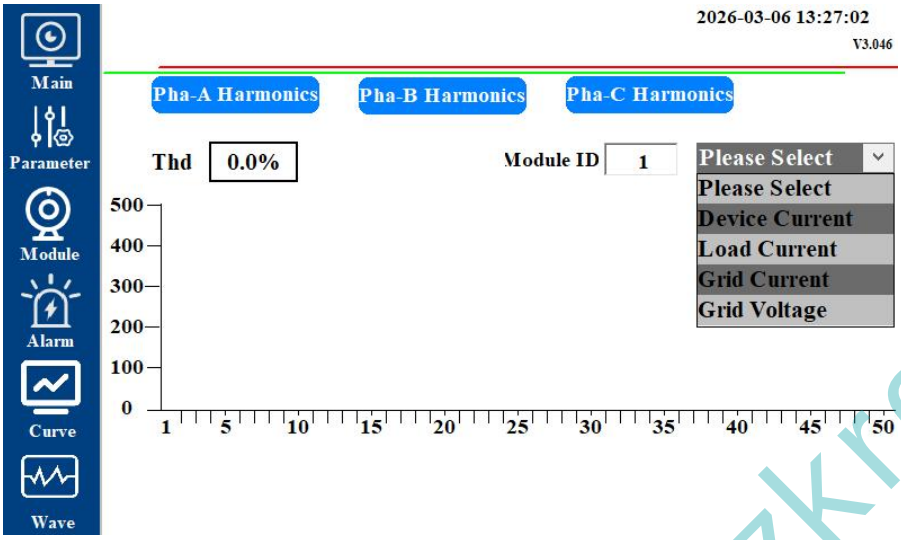


Figure 7.9: Harmonic Bar Chart

7.3 Module Monitoring Interface

The module monitoring interface displays various information regarding the module, including parameters such as the current, voltage, IGBT temperature, and frequency of the individual module. Located in the bottom-right corner of the touchscreen is a status indicator displaying the communication link between the module and the touchscreen; a green indicator signifies that the module is online, while a red indicator signifies that it is offline (this status display is active only when the "Module Switching" function is engaged; it is inactive when the module is switched out).

Users can view operational data for different modules by utilizing the "Module 1" through "Module 8" toggle buttons located at the top of the interface. Additionally, users may employ the "Reset" button to reset a module (in the event of an equipment fault, an engineer must first inspect and troubleshoot the issue; once external troubleshooting has been completed, the module can be reset by pressing the "Reset" button).

Note: When a module fault occurs, the interface displays only the Reset button; when the module is running, it displays only the Stop button; and when the module is in standby mode, it displays only the Start and Reset buttons (however, if an external phase sequence anomaly is detected, the Start button will not be displayed, and an alarm will be triggered).

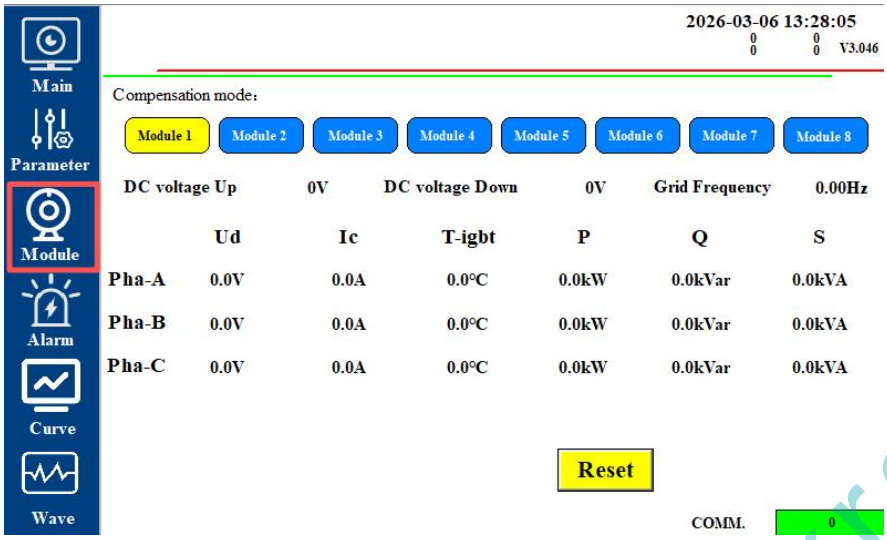


Figure 7.10: Module Monitoring Interface

7.4 Alarm Inquiry

The Alarm Query interface comprises "Real-time Alarms" and "Historical Alarms." The Real-time Alarms section displays the device's most recent alarm records, while the Historical Alarms interface allows users to query alarm information by specifying a specific time period.

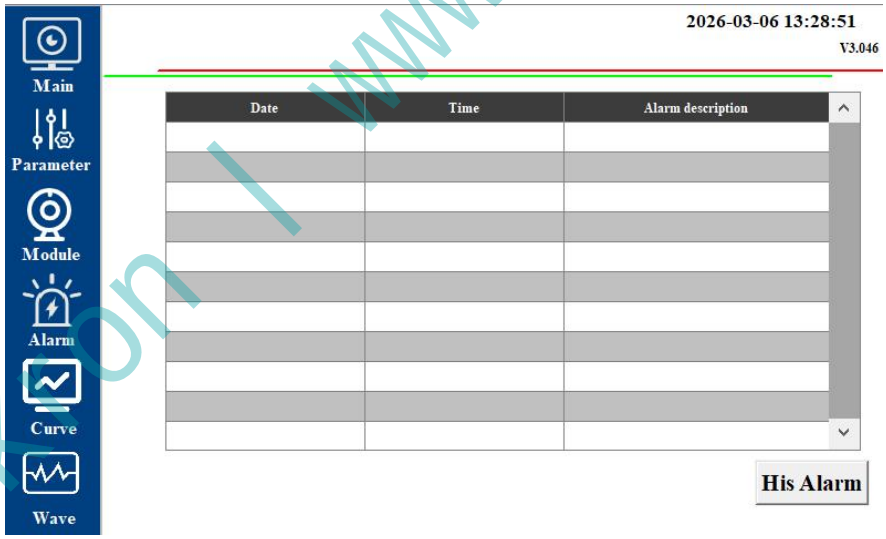


Figure 7.11: Real-time Alarm Information Query

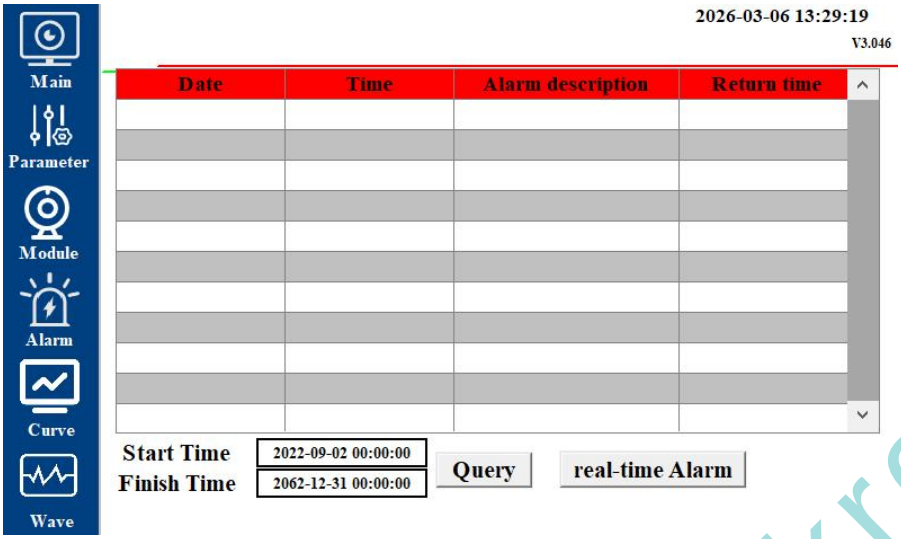


Figure 7.12: Historical Alarm Information Query

7.5 Historical Trends

The "Data Curves" interface allows you to query historical data, including historical records for grid voltage, grid current, and IGBT temperature.

The curve display interface presents data spanning the 24-hour period immediately preceding the moment the interface is accessed. To determine the absolute time for a specific point, tap on the curve displayed on the screen; an information window will then appear as shown below:

	Content	Coordinate range	Current value	Unit
	Absolute clock	1Day	19:21	
	Line1	0.0~500.0		V
	Line2	0.0~500.0		V
	Line3	0.0~500.0		V

Figure 7.13: Curve Data Information Display

Pressing the "double-arrow" movement button below shifts the timeline by 12 hours, while the "single-arrow" button shifts it by 6 hours.

The query time range can be configured using Button . By selecting the "Specified Time" option, you can retrieve data curves for a designated time interval; the other options need not be utilized.

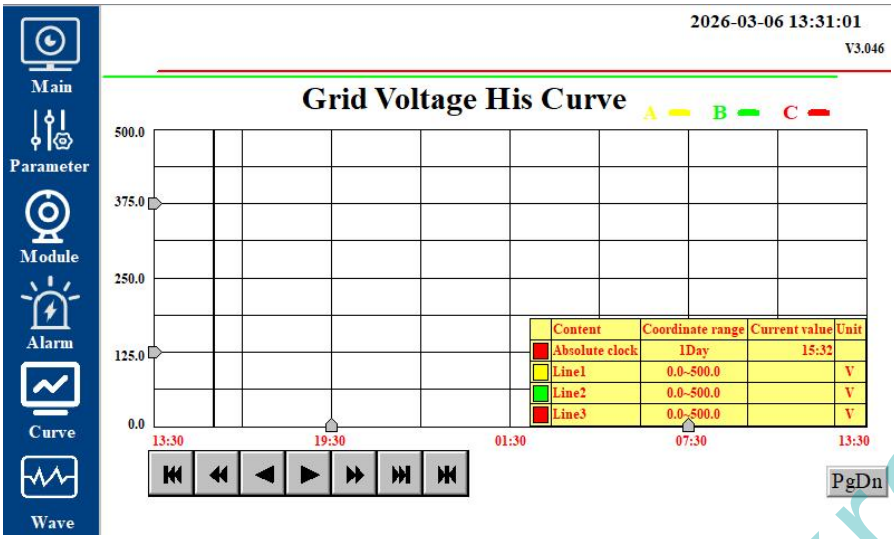


Figure 7.14: Grid Voltage History Curve Interface

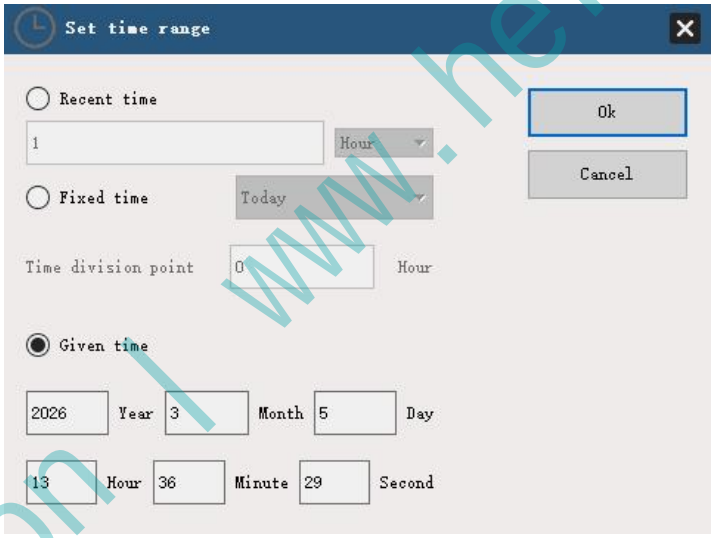


Figure 7.15: Historical Curve Query

7.6 Waveform Display

The waveforms include the grid voltage curve and the device current curve; the horizontal axis, ranging from 0 to 30, represents 30 waveform recording data points.

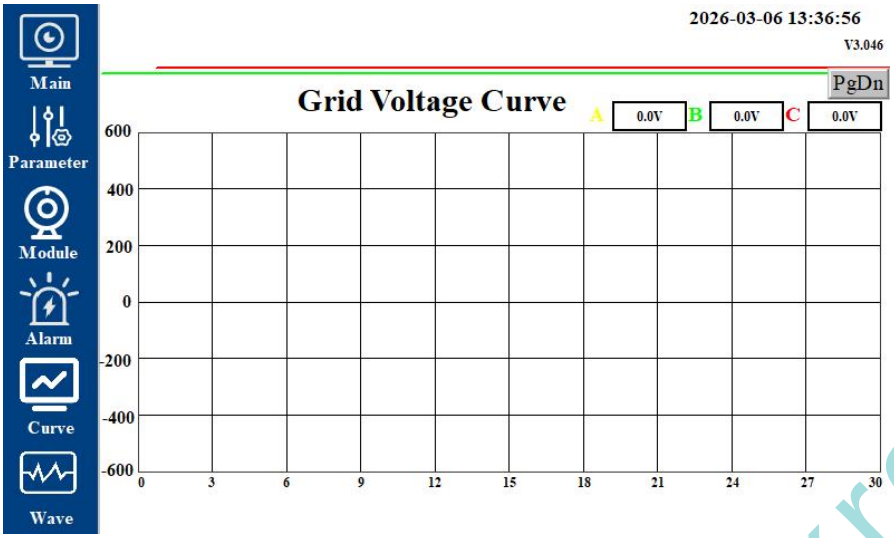


Figure 7.16: Waveform Curve

7.7 Operational Permissions

The permission login interface is shown in the figure below: this interface appears when you click the "Parameter Settings" button or select a parameter number. Select "User2," enter the password "123," and click the "Login" button.

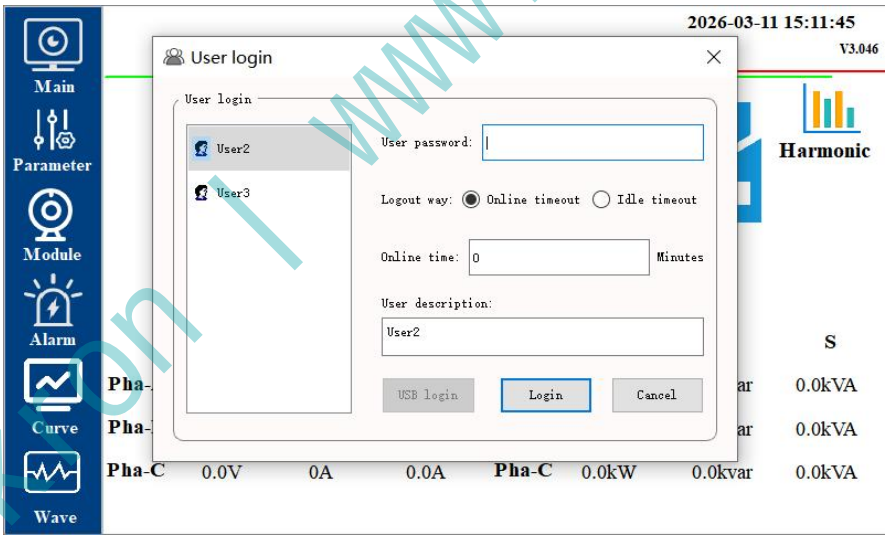


Figure 7.17: Permissions Login Interface

1）Operational Permissions

Under this permission level, users can perform parameter queries, runtime data queries, and historical record queries, as well as operations such as startup, shutdown, and reset.

2）Set Permissions

Under this permission level, users can not only perform all operations authorized by their operational privileges but also configure relevant runtime parameters.

7.8 Parameter Settings

Select the "Parameter Settings" button on the touchscreen's main interface to access the Parameter Settings screen. All parameters are categorized into distinct groups—including "System Parameters," "Sampling Parameters," "Harmonic Parameters," and "Debugging Parameters" — which can be configured to suit actual operating conditions. To configure a specific parameter, simply tap the corresponding entry to enter its dedicated settings interface.

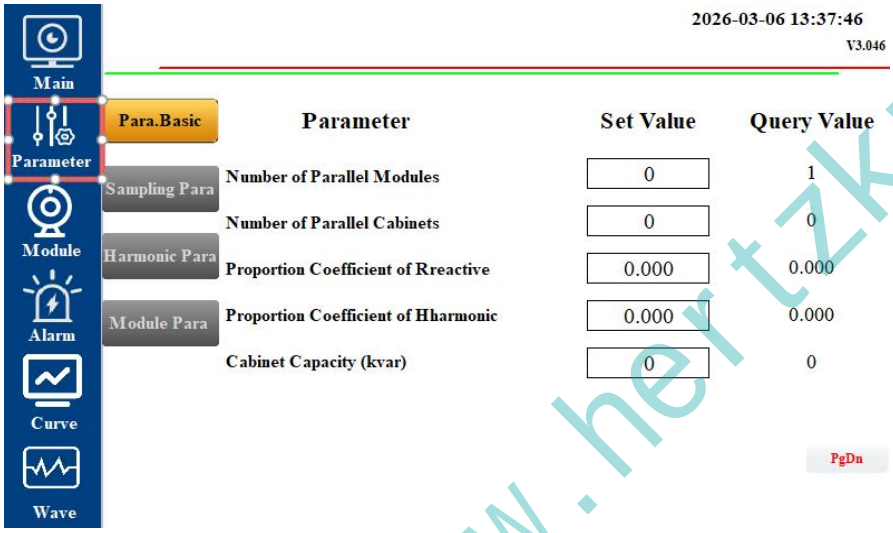


Figure 7.18: Parameter Settings Interface

7.9 System Parameters

Detailed Explanation of the System Parameter Settings Interface:

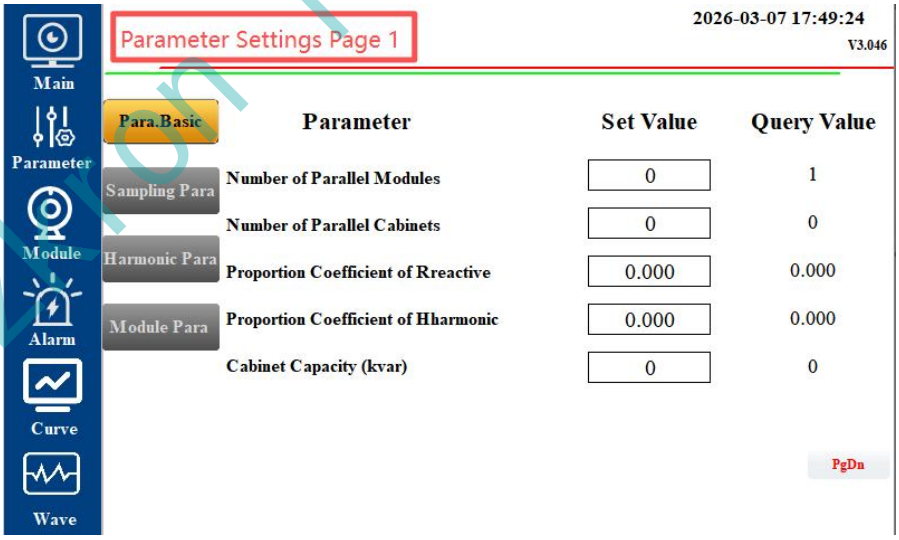


Figure 7.19: Parameter Setting Interface (Page 1)

1) Number of Parallel Modules: The total number of ASVG modules in the cabinet. For example, if there are three modules in the cabinet, set the value to 3.

2) Number of Parallel Cabinets: If three cabinets are connected in parallel, set it to "3".

3) Reactive Power Capacity Ratio of This Cabinet: The ratio of the reactive power capacity of this cabinet to the total reactive power capacity of all cabinets. If the capacities of the three cabinets are 15kvar, 35kvar, and 15kvar, then this parameter for the second cabinet is 35/65, set to 0.538.

4) Harmonic Capacity Ratio of This Cabinet: The ratio of the harmonic capacity of this cabinet to the total harmonic capacity of all cabinets. The setting method is the same as for the reactive power capacity ratio.

5) Cabinet Capacity (kvar): For example, if there are two 15kvar modules and one 35kvar module, set the value to 65.

6) After setting the parameters on this interface, you need to click on the following functions below the parameters: "Number of Parallel Modules", "Number of Parallel Cabinets", "Reactive Power Capacity Ratio Coefficient of This Cabinet", "Harmonic Capacity Ratio Coefficient of This Cabinet", and "Cabinet Capacity (kvar)". A confirmation dialog box will pop up. If the settings are correct, click "OK"; otherwise, click "Cancel" to reset. You can check whether the settings are successful by clicking "Query Value".

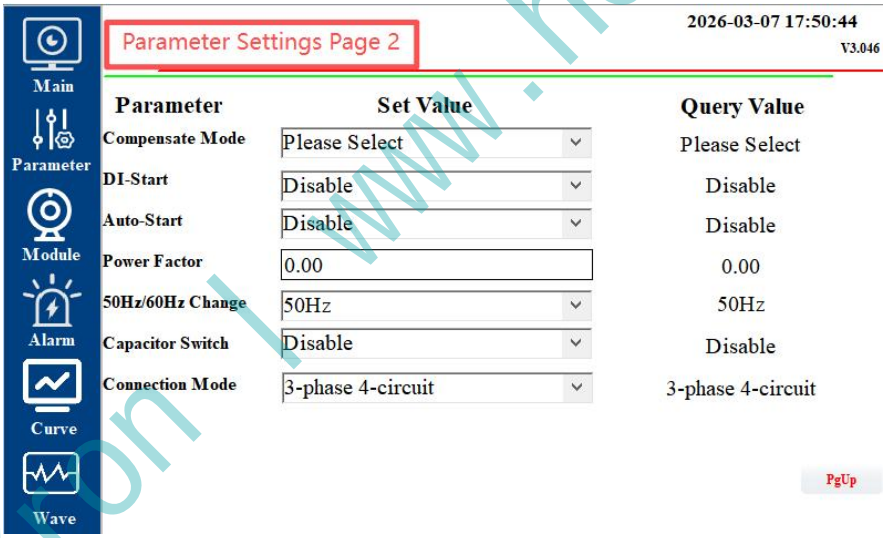


Figure 7.20: System Parameter Settings Interface (Page 2)

1） Compensation Mode Selection: Reactive Power, Reactive Power + Three-Phase Unbalance, Self-Aging. Different priority levels can be selected. Note: The Self-Aging mode should be used with caution by customers.

2） DI Start/Stop Enable: If the customer requires the module to be started via an external switch, select "Enable"; otherwise, select "Disable."

3) Auto-start Enable: If set to "Disabled," the module must be manually started by pressing the Start button after power-up; if set to "Enabled," the module will automatically start once the preset conditions are met following power-up.

4) Power Factor Setpoint: The actual target power factor value for the site; can be set within the range

of 0 to 1.

5) 50Hz/60Hz Switching: Select "50Hz" or "60Hz" based on the power grid frequency.

6) Capacitor Switching Enable: No configuration is required; the default setting is "Disabled."

7) Wiring Mode: Select "Three-phase Three-wire" or "Three-phase four-wire" according to the wiring requirements of the equipment.

8) Once parameter configuration is complete on this interface, you must click on the specific function fields located below the parameters—namely: "Compensation Mode Selection," "DI Start/Stop Enable," "Auto-start Enable," "Power Factor Setpoint," "50Hz/60Hz," "Capacitor Switching Enable," and "Wiring Mode." A confirmation dialog box will appear; if the settings are correct, click "OK"; otherwise, click "Cancel" to reconfigure. You can verify whether the settings were successfully applied by checking the "Query Value."

7.10 Sampling Parameters

Detailed Explanation of the Sampling Parameter Settings Interface:

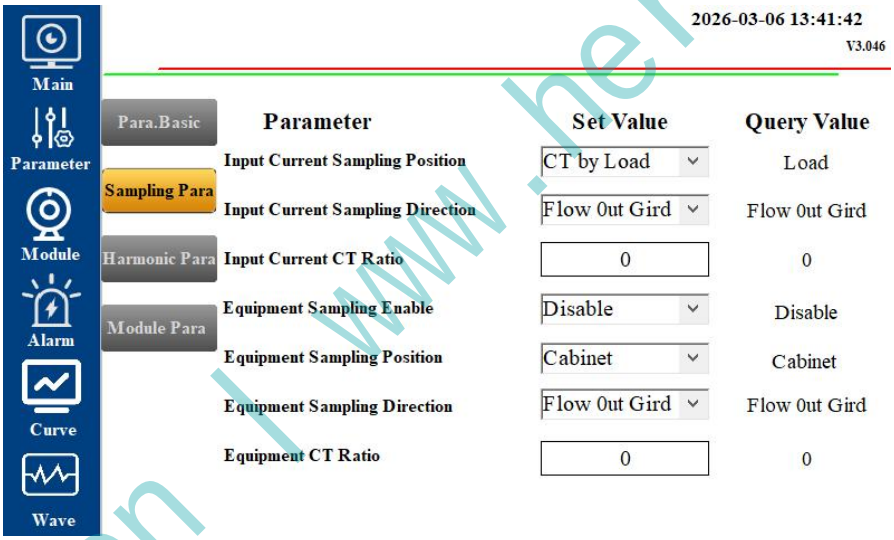


Figure 7.21: Sampling Parameter Settings Interface

1) Input Current Sampling Position Selection: If the field CT is connected on the incoming line side, select "Grid Side"; if the field CT is connected on the load side, select "Load Side."

2) Input Current Sampling Direction Selection: If the direction of the field CT points from the load side toward the grid side, select "Flowing into Grid"; otherwise, select "Flowing out of Grid."

3) Input Current CT Ratio: If the field CT ratio is 2000:5, set the value to "400."

4) Device Current Sampling Enable: This sampling function is used exclusively for whole-cabinet current sampling. If the cabinet contains more than one module, it is recommended that the modules be connected to the cabinet's dedicated sampling CT; if connected, select "Enable"; otherwise, select "Disable."

5) Device Current Sampling Position Selection: This sampling function is used exclusively for whole-cabinet current sampling; select "Cabinet."

6) Device Current Sampling Direction Selection: If the direction of the whole-cabinet sampling CT

points from the module side toward the busbar side, select "Flowing into Grid"; otherwise, select "Flowing out of Grid."

7) Device Current CT Ratio: If the whole-cabinet sampling CT ratio is 2000:5, set the value to "400."

8) Once the parameter settings on this interface are complete, you must click on the specific parameter fields located below — namely: "Input Current Sampling Position Selection," "Input Current Sampling Direction Selection," "Input Current CT Ratio," "Device Current Sampling Enable," "Device Current Sampling Position Selection," "Device Current Sampling Direction Selection," and "Device Current CT Ratio." A confirmation dialog box will appear; if the settings are correct, click "OK"; otherwise, click "Cancel" to reconfigure. You may use the "Query Value" function to verify whether the settings have been successfully applied.

7.11 Harmonic Parameters

The interface for the harmonic controller settings is shown in the figure below. If site requirements mandate that the module perform harmonic compensation, you may access this interface to select the specific harmonic orders to be compensated, as well as their respective compensation rates. To compensate for a particular harmonic, simply select the desired compensation rate corresponding to that specific harmonic order. For instance, if the site requires compensation for the 3rd harmonic, enter "1.00" in the field corresponding to the 3rd harmonic within the interface shown below. Finally, click "Modify"; you may then click "Query" to verify whether the settings have been successfully applied.

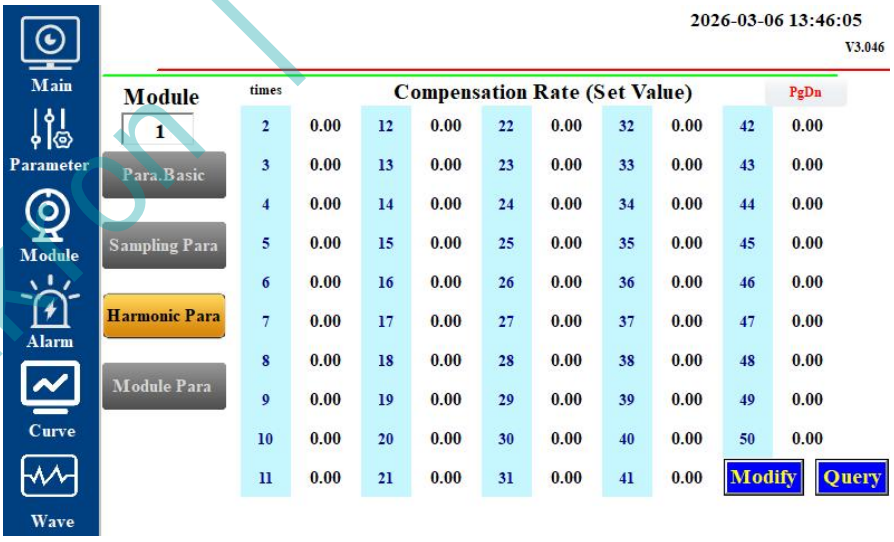


Figure 7.22: Harmonic Compensation Order Selection Settings Interface

7.12 Debugging Parameters

The debugging parameters pertain to the manufacturer's debugging interface and are not accessible to

the public.

7.13 Module Startup and DIP Switch Settings

When two or more modules are connected in parallel, the DIP switches must be configured. The communication lines for the four modules with addresses 1 through 4 should be connected to the HMI's COM1 port (terminals 7A/8B), while the communication lines for the four modules with addresses 5 through 8 should be connected to the HMI's COM2 port (terminals 4A/9B). The module with address 1 corresponds to "Module 1" on the HMI, the module with address 2 corresponds to "Module 2," and so on.

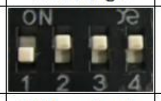
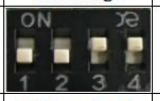
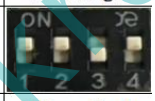
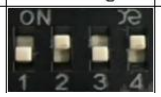
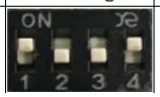
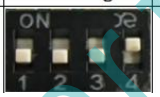
machine number	DIP switch settings	machine number	DIP switch settings	machine number	DIP switch settings	machine number	DIP switch settings
1		2		3		4	
machine number	DIP switch settings	machine number	DIP switch settings	machine number	DIP switch settings	machine number	DIP switch settings
5		6		7		8	

Figure 7.23: DIP Switch Schematic

After powering on the equipment, enable the specific modules required to establish a communication link with the touchscreen via the "Module Switching Configuration" interface. Once the communication link has been successfully established, proceed to configure the operating parameters. Provided that the parameters are set correctly and no faults are detected, the "Start Enable" indicator on the touchscreen will illuminate; the "Start" button will become active, while the "Stop" button will remain inactive. On the Module Monitoring interface, select the specific module you wish to start, then click the "Start" button to initiate the equipment startup sequence; the DC bus voltage will subsequently rise. When multiple modules are operating in parallel, the startup procedure for the remaining modules is similar.

The procedure for shutting down the system via the touchscreen—specifically when two or more modules are operating in parallel—is as follows: When the "Start" button appears inactive and the "Stop" button appears active, simply click the "Stop" button to shut down the equipment.

7.14 Touchscreen WiFi Network Settings

1) Immediately after powering on the screen, continuously press any location on the screen until the System Configuration Interface appears (as shown in Fig. 7.24); this indicates that you have successfully entered the System Configuration Interface.

Figure 7.24: System Configuration Interface

2) If you have already entered the main interface, please locate and click "Parameters" in the title bar on the right side. After entering the password (Password: 123), locate and click "Debug Parameters" within the interface's title bar. In the displayed Debug Parameters interface, find the "Restart" button (as shown in Figure 7.25); please click "Restart" and repeat the previous operation of continuously pressing and holding the screen.

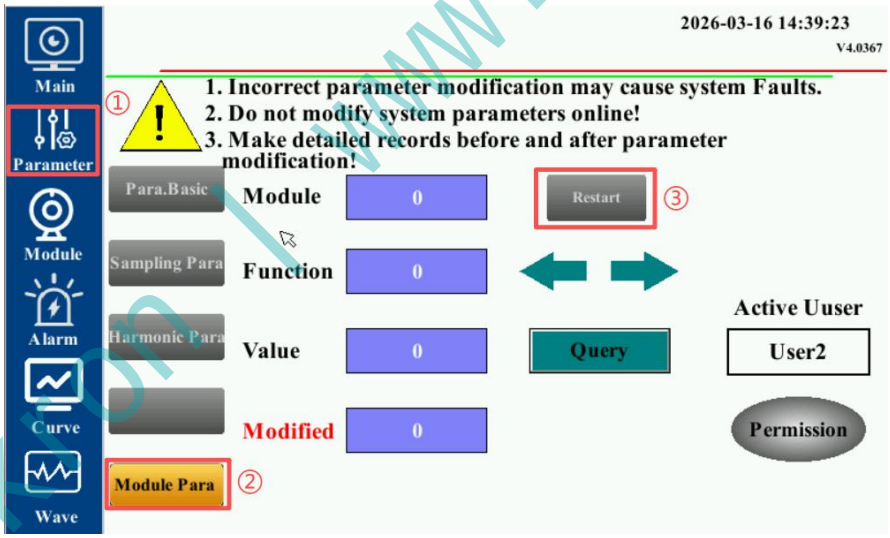


Figure 7.25: Touchscreen Restart Interface

3) Once you have successfully accessed the system configuration interface, please click "System Parameter Configuration." Upon clicking, the "TPC System Settings" interface will appear (as shown in Figure 7.26).

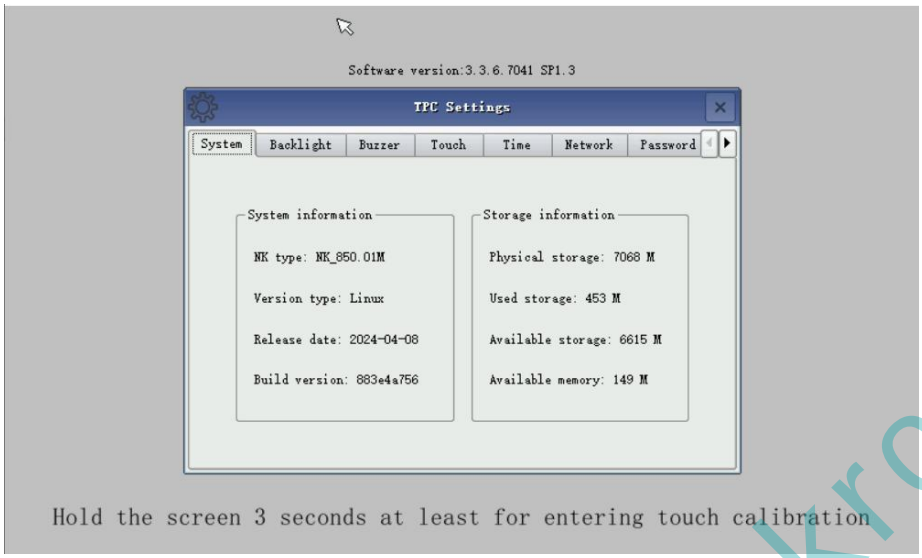


Figure 7.26: TPC System Settings Interface

4) Click the "Network" option in the title bar of the "TPC System Settings" interface to display the Network Settings screen. On this screen, click the drop-down menu next to "Network Adapter," and then select "WiFi" from the options that appear. If the selection field updates to display "WiFi," the selection was successful; then, click the "Configure" button located below (as shown in Figure 7.27).

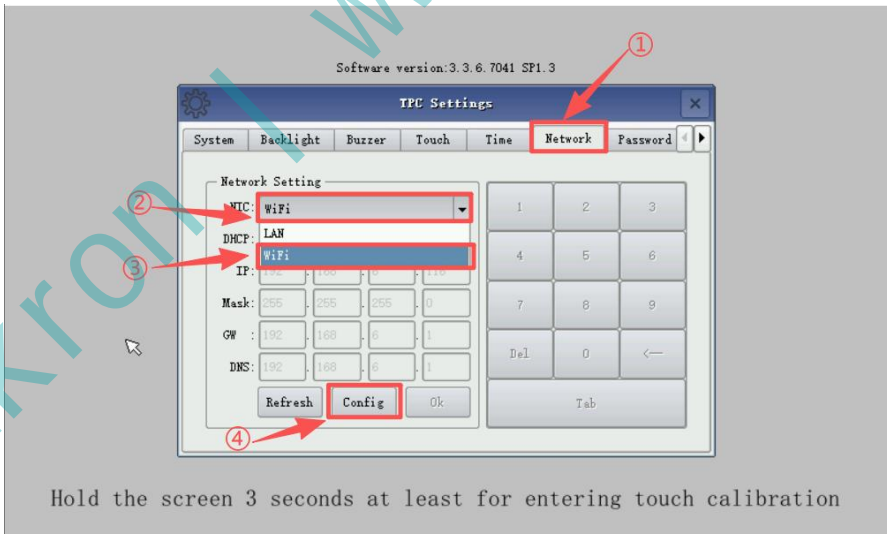


Figure 7.27: WiFi Configuration Interface 1

5) Clicking "Configuration" will take you to the Wi-Fi configuration interface. First, select "Enable"; then, click "SSID" to choose the Wi-Fi network you wish to connect to. Next, enter the password, and finally, click "Connect." After waiting a few seconds, the status indicator will display "Connected," signifying that the network configuration was successful (as shown in Figure 7.28). Click the "Close" button in the top-right corner to exit back to the System

Configuration interface (as shown in Figure 7.29), then click "Runtime Environment" to enter the main interface.

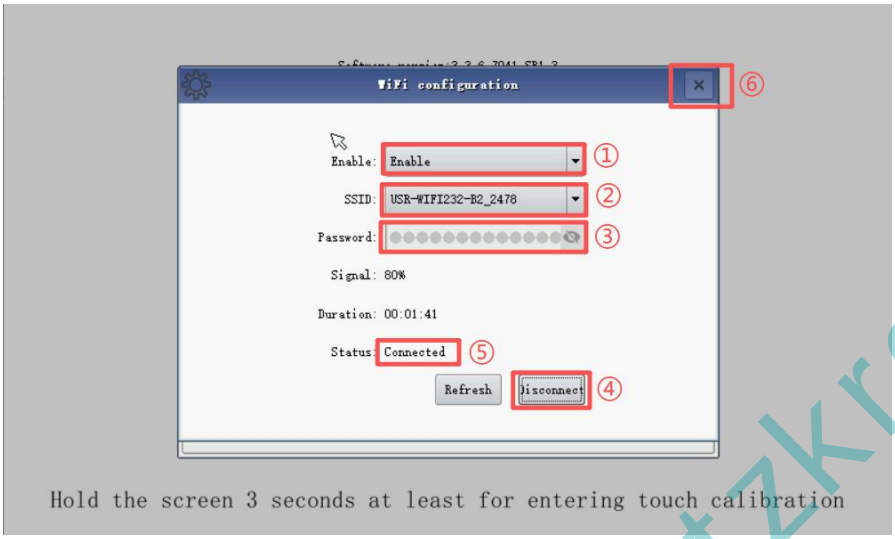


Figure 7.28: WiFi Configuration Interface 2

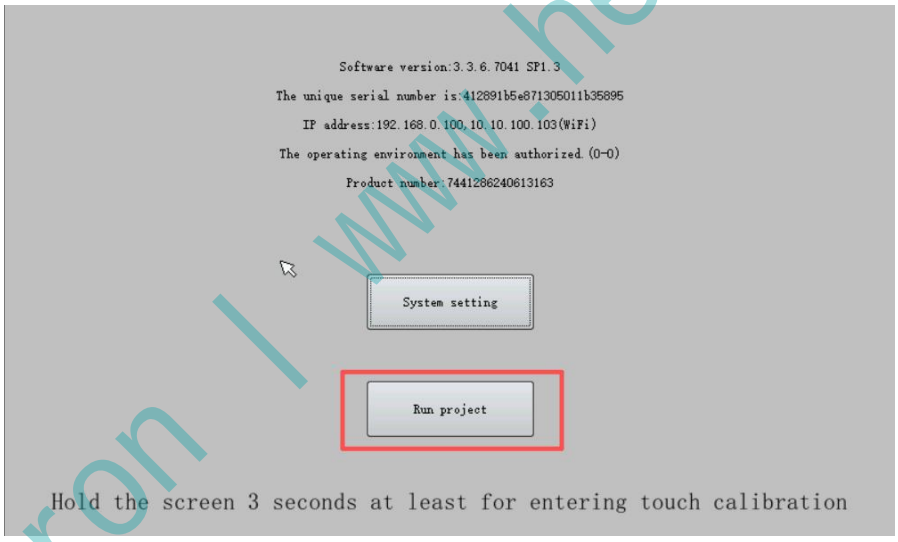


Figure 7.29: Entering the Main Interface

Attention	Parameter modifications must be determined by professional technical personnel; please proceed with caution.

Chapter VIII ASVG Common Troubleshooting

Refer to Table 8.1 for common faults and solutions. Some common faults and alarm messages can be troubleshooted by the user. If the issue cannot be resolved, please contact the product engineer directly.

Faults caused by user errors, such as reversed CT connections, incorrect power line phase sequence, or parameter setting errors, can often be identified during startup and debugging by monitoring the data. If compensation performance is poor but no alarm information is displayed, please contact the product engineer.

Table 8.1: Common Faults and Solutions

Fault and Alarm	Possible Reason	Solution
Communication Fault	Communication issue between monitoring and ASVG module.	Check if the communication cables are securely connected.
Overtemperature Fault	1) High ambient temperature 2) Blocked air ducts 3) Fan failure	Check each possible reason one by one
Phase Lock Failure After Startup	Incorrect phase sequence of power lines	Verify the sequence of power lines A, B and C
AC Software Overvoltage Fault	At least one phase of the three-phase voltage is overvoltage	Ensure that the three-phase voltage is within the operating range of the device
AC Software Undervoltage Fault	At least one phase of the three-phase voltage is undervoltage	Ensure that the three-phase voltage is within the operating range of the device
Input Frequency Abnormal	Input frequency exceeds the limit, causing ASVG shutdown	Check if the input voltage frequency is within the device's rated range
DC Bus Over Voltage Fault	High DC bus voltage causing ASVG module shutdown	Contact the engineer
Over Current Fault	Device output current exceeds the protection value, causing ASVG module shutdown	1) Check if the network voltage distortion rate is too high; 2) Check for significant voltage surges or drops in the network; 3) If the network voltage is normal, contact the engineer.

Chapter IX Contact Us

The company offers comprehensive after-sales service, and is dedicated to providing timely and high-quality follow-up services to new and old customers. For any questions or needs, visit the Help section or contact our Technical Service Department directly. Our engineers provide 24/7 online support.