

**Herztkron**

**Low Noise**

**Advanced Static Var Generator**

**User Manual**

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## Preface

Dear Valued Customer,

Thank you for choosing the Low Noise Advanced Static Var Generator.

For safe and convenient use, and for proper maintenance, please read this user manual carefully before using the device and keep it handy for future reference.

Please adhere to the operating procedures and precautions that outlined in this manual.

Please neither attempt to disassemble or repair it by yourself, nor hand it over to unauthorized service departments. If the device encounters any issues. On the contrary please contact our technical service team and provide your name, address, phone number, device model, purchase date, and a description of the fault. We are dedicated to serving you.

Due to product upgrades and technological advancements, the Low Noise Advanced Static Var Generator may differ from the user manual. We apologize for any errors, omissions, or inconsistencies that arise.

# Chapter I Safety Precautions

## 1.1 About This Manual

- 1) This manual covers the installation and operation of the Low Noise Advanced Static Var Generator. Please read it carefully before installation.
- 2) Only qualified personnel are permitted to operate the equipment, which includes tasks such as installation, operation, maintenance, inspection, and dismantling. Operation by anyone other than the company's technical staff or qualified users is strictly prohibited.
- 3) Any modification, disassembly, disabling of components, or replacement of parts, may affect the safety performance of the equipment. Not using original parts may affect the working and safety performance of the equipment and will be considered as an automatic waiver of the quality guarantee.
- 4) Ensure that the equipment is properly grounded before power on. Poor grounding can cause abnormal operation and electric shock hazards.
- 5) Please wait for at least 10 minutes before disassembling the enclosure. Use a special instrument to test the DC bus voltage and ensure that the residual voltage in the DC capacitors is completely discharged before disassembling components, otherwise, there is a risk of electric shock.
- 6) Poor ventilation may cause the equipment to overheat and become damaged. Do not cover ventilation openings, and keep the equipment away from heat sources.
- 7) When transportation and storage, ensure that the equipment is not exposed to rain or water, not subjected to high temperatures, not corroded by salt fog, and not stored in a dusty environment.

## 1.2 Safety Labels

To ensure the personal and property safety of users while using this product, as well as to facilitate better product usage, this manual provides relevant information and highlights it with appropriate symbols.

The following are the symbols that may be used in this manual. Please read them carefully.



### ATTENTION

Failure to follow the requirements of this manual may result in damage or malfunction of the equipment!

---



### WARNING

Failure to follow the requirements of this manual may result in equipment damage and minor injury to personnel!

---



## DANGER

Failure to follow the manual may result in equipment damage and personal injury!

Whenever these symbols are used in this manual, they indicate important safety information. Failure to follow these precautions may result in economic losses, damage to this product, associated components, or enclosures, and may even lead to minor or serious injury or death. Additionally, our company assumes no responsibility for any injuries or equipment damage caused by your company or your company's clients not adhering to the contents of this manual.

### 1.3 Safety Precautions

| Before Installation |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <br>Danger          | <ol style="list-style-type: none"> <li>1) Do not install if you find water inside the box, missing components, or noticeable damage upon unpacking !</li> <li>2) Do not install if the packing list does not match the actual items or the ordered equipment!</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <br>Attention       | <ol style="list-style-type: none"> <li>1) This equipment is only for commercial and industrial users and must not be used as a power source for any life - support equipment.</li> <li>2) When carrying the module, be sure to hold the shell firmly. If it drops during transportation, there is a risk of injury and it may also cause damage to the equipment.</li> <li>3) When carrying, it should be lifted and placed gently; otherwise, there is a risk of damaging the equipment!</li> <li>4) Do not use a damaged or incomplete module, as there is a risk of injury!</li> <li>5) This device has been subjected to a withstand voltage test before leaving the factory. Without confirmation from the company's technical personnel, no voltage withstand test should be carried out on any part of the device. Moreover, high voltage may cause damage to the insulation and internal components of the equipment.</li> </ol> |
| During Installation |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <br>Danger          | <ol style="list-style-type: none"> <li>1) Installation, maintenance, inspection, or component replacement should not be performed by individuals who are not qualified electrical professionals. Failure to do so may pose a risk of electric shock!</li> <li>2) For modification projects, when installing primary cables or current sampling secondary lines, ensure that the system is de-energized and that the surrounding area is safe for work. Failure to ensure these conditions may result in electric shock hazards and could lead to serious injury or death!</li> </ol>                                                                                                                                                                                                                                                                                                                                                     |

|                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <br><br>Attention   | <ol style="list-style-type: none"> <li>1) When connecting the input cables, ensure that the equipment is properly grounded. The grounding must comply with local electrical regulations.</li> <li>2) Handle the module with care during installation and avoid dropping or bumping it. Damage resulting from improper handling is not covered under the company's responsibility or warranty.</li> <li>3) When placing two or more modules in the same cabinet, ensure they are positioned correctly to guarantee effective heat dissipation. It is recommended to add cooling systems such as fans.</li> <li>4) The installation location of the module should ensure adequate ventilation. Do not obstruct the module's built-in cooling fan's air intake and exhaust vents.</li> <li>5) The installation location of the module should allow for safe maintenance and adjustment by after-sales personnel.</li> <li>6) For wall-mounted modules, install them in areas with minimal foot traffic and ensure that safety hazard labels are clearly visible.</li> <li>7) Avoid installing the module in environments with conductive dust, volatile gases, corrosive substances, or excessive salt.</li> </ol> |
| <b>During Running</b>                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <br><br>Danger    | <ol style="list-style-type: none"> <li>1) Do not open the cover after powering on. Failure to adhere to this precaution may result in electric shock and potential injury or death.</li> <li>2) It is strictly forbidden to install or wire the equipment while it is energized!</li> <li>3) Do not touch any primary or secondary terminals of the module. Doing so may pose an electric shock hazard and could result in injury or death.</li> <li>4) This equipment must be commissioned by the manufacturer or its authorized agents. Any other operation should only be carried out under the guidance of our company's after-sales engineers. Unauthorized operation is prohibited and may cause equipment damage or even result in injury or death.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <br><br>Attention | <ol style="list-style-type: none"> <li>1) Do not change the factory settings of the device while it is operating, as this may cause damage to the equipment.</li> <li>2) Avoid letting any objects fall into the equipment during operation. This may cause damage to the equipment.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <br><br>Attention | <ol style="list-style-type: none"> <li>1) After powering on the equipment, avoid starting and stopping of the device frequently or toggling of the upstream switches frequently.</li> <li>2) Please promptly power off the device and contact our technical personnel if the equipment emits abnormal noises or displays fault information during commissioning.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>During maintenance</b>                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

|                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p>Danger</p> | <ol style="list-style-type: none"> <li>1) Do not perform maintenance or servicing on the equipment unless you have received professional training. Failure to do so may result in personal injury or equipment damage.</li> <li>2) Do not perform maintenance or servicing on the equipment while it is live. There is a risk of electric shock.</li> <li>3) Ensure that the equipment's input power is disconnected for at least 10 minutes before performing maintenance or repairs. Failure to do so may result in harm from residual charges in the capacitors.</li> <li>4) Before performing maintenance or servicing, ensure that the equipment is safely disconnected from all power sources.</li> <li>5) After replacing any parts of the equipment, parameters must be set and checked.</li> <li>6) Do not power on or operate equipment that has reported a fault or is damaged, as this may exacerbate the damage.</li> </ol> |
|-------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Chapter II ASVG-LN Overview

### 2.1 Product Theory

The Low Noise Advanced Static Var Generator Model (ASVG-LN) features a low-noise design in which a voltage-source converter is connected in parallel to the power grid via a filter. Its operating principle involves real-time detection of load currents; based on advanced detection and control algorithms for reactive power, harmonics, and three-phase active power, it generates corresponding IGBT drive signals to achieve comprehensive compensation for reactive currents, harmonic currents, and three-phase unbalanced active power. The device operates with a noise level of less than 45 dB and supports built-in grid-side sampling CTs, facilitating convenient installation and maintenance.

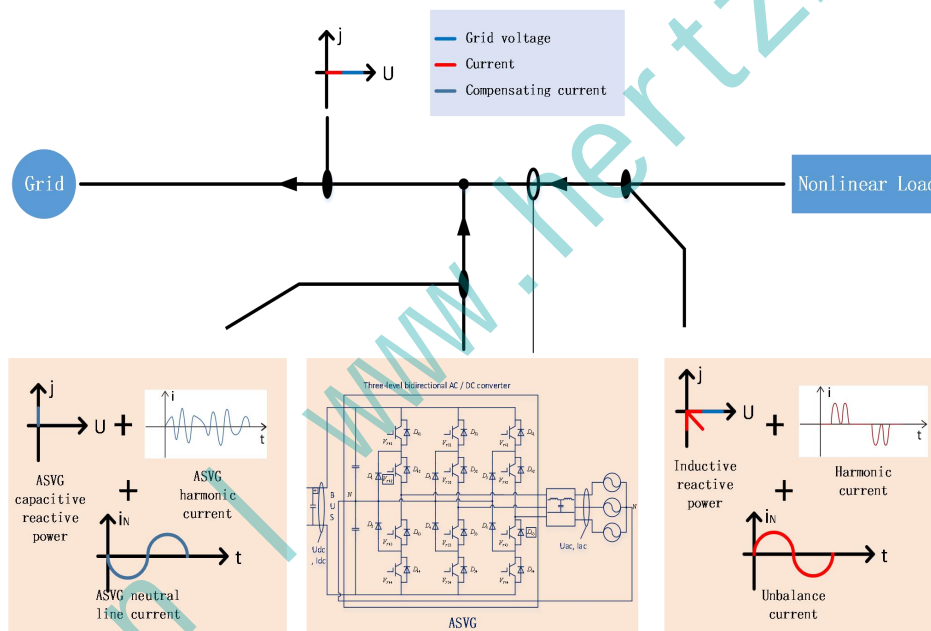


Figure 2.1: Schematic Diagram of ASVG-LN Principle



Figure 2.2: Physical Diagram of ASVG-LN Module

## 2.2 ASVG-LN Model Definition

The model definition of the ASVG-LN is shown in Figure 2.3. The module specifications and dimensions are listed in Table 2.1. Detailed dimensional drawings for modules of various capacity ratings can be found in the respective module general assembly drawings.

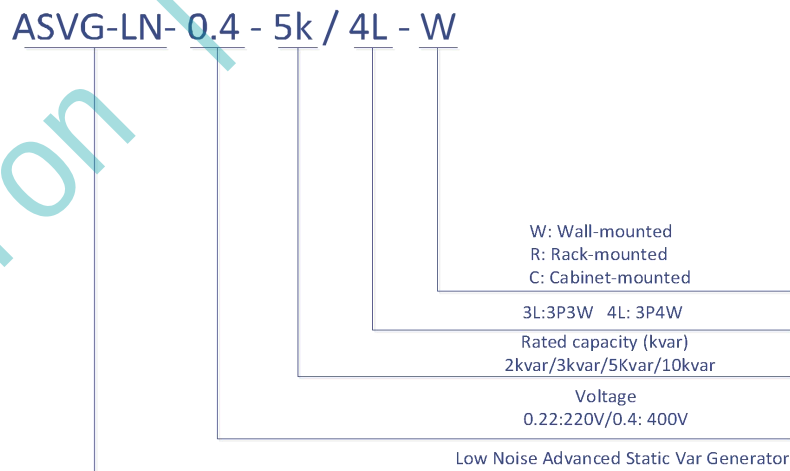


Figure 2.3: Model Description Diagram

Table 2.1: Module Specifications and Dimensions

| Module Model         |                              |                    |                       |                 |
|----------------------|------------------------------|--------------------|-----------------------|-----------------|
| Models               | Compensation Capacity (kvar) | System Voltage (V) | Dimensions W*D*H (mm) | Net Weight (kg) |
| ASVG-LN-0.22-2k/4L-W | 2                            | 220                | 350*540*90.5mm        | 15.4            |
| ASVG-LN-0.22-3k/4L-W | 3                            | 220                | 350*540*90.5mm        | 15.4            |
| ASVG-LN-0.22-5k/4L-W | 5                            | 220                | 350*540*90.5mm        | 15.4            |
| ASVG-LN-0.4-3k/4L-W  | 3                            | 400                | 350*540*90.5mm        | 15.4            |
| ASVG-LN-0.4-5k/4L-W  | 5                            | 400                | 350*540*90.5mm        | 15.4            |
| ASVG-LN-0.4-10k/4L-W | 10                           | 400                | 350*540*90.5mm        | 15.4            |

## Chapter III ASVG-LN Technical Parameters

The technical parameters of each series of modules are shown in Table 3.1.

Table 3.1: Technical parameters of each series module

|                                          | 220V Series                                                                                                                                                                                                                 | 380V Series                                                          |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| <b>Altitude</b>                          | < 2000m (derated per GB/T 3859.2 above 2000m)                                                                                                                                                                               |                                                                      |
| <b>Ambient Temperature</b>               | -10°C ~ +50°C (derated above 40°C)                                                                                                                                                                                          |                                                                      |
| <b>Relative Humidity</b>                 | ≤ 90%, no condensation on surface at monthly min. temperature of 25°C                                                                                                                                                       |                                                                      |
| <b>Pollution Level</b>                   | Below Level III                                                                                                                                                                                                             |                                                                      |
| <b>Operating Voltage</b>                 | AC220V (±20%)                                                                                                                                                                                                               | AC380V (±20%)                                                        |
| <b>Operating Frequency</b>               | 50Hz/60Hz (45Hz ~ 63Hz)                                                                                                                                                                                                     |                                                                      |
| <b>Rated Compensation Capacity</b>       | 2kvar, 3kvar, 5kvar                                                                                                                                                                                                         | 3kvar, 5kvar, 10kvar                                                 |
| <b>Grid Structure</b>                    | 3P3W, 3P4W                                                                                                                                                                                                                  | 3P4W                                                                 |
| <b>Load Current Range</b>                | 0 ~ 100A                                                                                                                                                                                                                    |                                                                      |
| <b>Numbers in Parallel</b>               | 2kvar (parallel connection not supported), 3kvar, 5kvar (unlimited)                                                                                                                                                         | 3kvar (parallel connection not supported), 5kvar, 10kvar (unlimited) |
| <b>Full Load Efficiency</b>              | ≥ 97%                                                                                                                                                                                                                       |                                                                      |
| <b>Switching Frequency</b>               | 30kHz (2kvar)<br>16kHz (3kvar, 5kvar)                                                                                                                                                                                       | 30kHz (3kvar)<br>16kHz (5kvar, 10kvar)                               |
| <b>Function Selection</b>                | Reactive Power, Harmonic, Reactive Power + Harmonic Compensation, Harmonic + Reactive Power, Harmonic + Unbalance, Reactive Power + Unbalance, Harmonic + Unbalance + Reactive Power, Reactive Power + Unbalance + Harmonic |                                                                      |
| <b>Reactive Power</b>                    | ≥ 99%                                                                                                                                                                                                                       |                                                                      |
| <b>Unbalance</b>                         | ≤ 5%                                                                                                                                                                                                                        |                                                                      |
| <b>Current Harmonic Compensation</b>     | ≥ 95%                                                                                                                                                                                                                       |                                                                      |
| <b>Neutral Line Filtering Capability</b> | The neutral line filtering capacity is 1.5 times the phase filtering capacity                                                                                                                                               |                                                                      |
| <b>Total Response Time</b>               | Reactive Power < 10ms, Harmonic < 40ms                                                                                                                                                                                      |                                                                      |
| <b>Cooling Method</b>                    | Forced Air Cooling                                                                                                                                                                                                          |                                                                      |
| <b>Noise</b>                             | 2kvar ≤ 38dB, 3kvar ≤ 40dB<br>5kvar ≤ 45dB                                                                                                                                                                                  | 3kvar ≤ 38dB, 5kvar ≤ 40dB<br>10kvar ≤ 45dB                          |
| <b>Communication</b>                     | 2*RS485 Communication Interface (Support WiFi)                                                                                                                                                                              |                                                                      |
| <b>Protection Function</b>               | Overload, Software/Hardware Overcurrent, Over/Undervoltage, Unbalance, Power Supply Failure, Overtemperature, Frequency Anomaly, Short Circuit Protection                                                                   |                                                                      |
| <b>Overload Capacity</b>                 | Rated 1.2 times overload for 60 seconds                                                                                                                                                                                     |                                                                      |
| <b>Installation</b>                      | Rack-Mounted, Wall-Mounted                                                                                                                                                                                                  |                                                                      |

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|                           |                                                     |
|---------------------------|-----------------------------------------------------|
| <b>Dimensions (W*D*H)</b> | 390*525*90.2mm                                      |
| <b>Line Entry Method</b>  | Rear Inlet (Rack-Mounted), Top Inlet (Wall-Mounted) |
| <b>Protection Level</b>   | IP20 (IP54 is customizable)                         |

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## Chapter IV Transportation and Storage

### 4.1 Transportation

The product can be transported by automobile, train, airplane, and ship. It must be handled carefully during transportation. Exposure to rain, intense sunlight, severe vibration, collision, and inversion is strictly prohibited. The transportation temperature should be within the range of  $-40^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$ .

| Sign                                                                              | Description                                                                                                             |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
|  | The module must be kept with the front side facing up. It is prohibited to lay the module horizontally, tilt or invert. |
|  | Handle with care to avoid damage to the module caused by excessive collision or friction during transportation.         |
|  | Take precautions against moisture to avoid the module being exposed to rain or becoming damp.                           |

### 4.2 Storage

The product must not be exposed to direct sunlight or rain. It should be stored in a well-ventilated area where the surrounding temperature is between  $-40^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$ , with a maximum relative humidity of 95% (equivalent to an air temperature of  $20\pm 5^{\circ}\text{C}$ ) and free from corrosive gases.

### 4.3 Unboxing and Inspection

Upon unboxing, please carefully check:

|                                                                                                  |                                                                                                                                                                                                                                                                                                                                     |
|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <br>Attention | 1) Verify that the capacity and model on the cabinet nameplate, module labels that align with your order.                                                                                                                                                                                                                           |
|                                                                                                  | 2) The package contains the ASVG-LN device, user manual, product certificate of conformity, and factory test report.                                                                                                                                                                                                                |
|                                                                                                  | 3) If your order includes a centralized monitoring touchscreen, it is typically packaged separately. The package includes a 7-inch touchscreen, touchscreen installation accessories, communication cables for the touchscreen connection module, equipment engineering drawings, and insulation covers for module terminal blocks. |
|                                                                                                  | 4) Check for any damage during transportation. If you find any omissions or damage, please contact us promptly for resolution.                                                                                                                                                                                                      |

#### 4.4 Product Packaging Contents

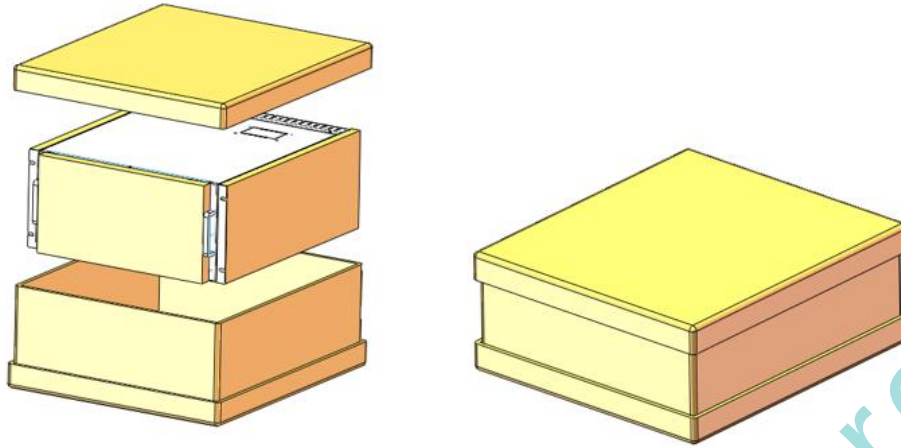


Figure 4.1: Module Packaging Illustration

#### 4.5 Accessory Packaging Contents

- 1) The cabinet contains ASVG-LN equipment, a touch screen, user manuals, product certificates, and factory inspection reports.
- 2) Main unit and accessories (some accessories are pre-installed on the main unit at the time of factory shipment)

# Chapter V Installation and System Wiring Diagram

## 5.1 Power Distribution Interface And Secondary Terminal Interface

When wiring at the user's site, it is only necessary to select appropriate cables according to the power requirements for the fixed terminals of the equipment. The wiring of each terminal is shown in Figure 5.1 and Table 5.1.

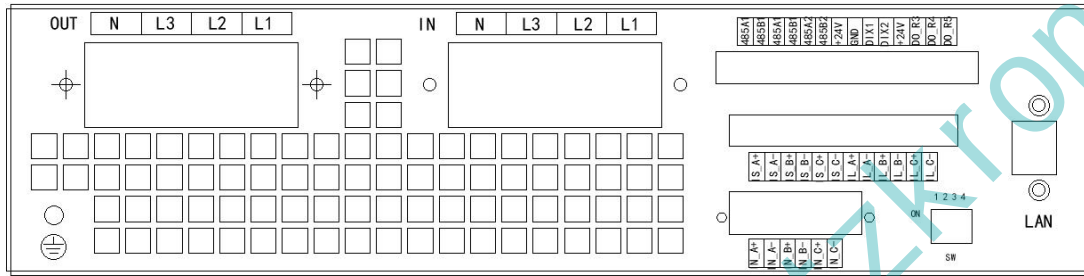


Figure 5.1: External wiring terminals

Table 5.1: Module terminal diagram description

| Port Name                                             | Port Label | Function/Description                                                  |
|-------------------------------------------------------|------------|-----------------------------------------------------------------------|
| Primary Circuit<br>Equipment<br>Incoming Line<br>(IN) | L3         | Phase C Incoming Cable                                                |
|                                                       | L2         | Phase B Incoming Cable                                                |
|                                                       | L1         | Phase A Incoming Cable                                                |
|                                                       | N          | Phase N Incoming Cable                                                |
| Primary Circuit<br>Equipment Outlet<br>(OUT)          | L3         | Phase C Outgoing Cable                                                |
|                                                       | L2         | Phase B Outgoing Cable                                                |
|                                                       | L1         | Phase A Outgoing Cable                                                |
|                                                       | N          | Phase N 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.) |

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|                  |       |                                                                                                                                                                                                                 |
|------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CT-IL            | IL_A+ | Ia (Connect to the S1 terminal of the A-phase CT within this cabinet; this connection is optional, depending on actual requirements.)                                                                           |
|                  | IL_A- | Ia (Connect to the S2 terminal of the A-phase CT within this cabinet; selection is optional, depending on actual requirements.)                                                                                 |
|                  | IL_B+ | Ib (Connect to the S1 terminal of the B-phase CT within this cabinet; this connection is optional, depending on actual requirements.)                                                                           |
|                  | IL_B- | Ib (Connect to the S2 terminal of the B-phase CT within this cabinet; this connection is optional, depending on actual requirements.)                                                                           |
|                  | IL_C+ | Ic (Connect to the S1 terminal of the C-phase CT within this cabinet; this connection is optional, depending on actual requirements.)                                                                           |
|                  | IL_C- | Ic (Connect to the S2 terminal of the C-phase CT within this cabinet; this connection is optional, depending on actual requirements.)                                                                           |
| COM              | 485A1 | Communicate with the Human-Machine Interface (HMI) or with the preceding module.                                                                                                                                |
|                  | 485B1 | Communicate with the Human-Machine Interface (HMI) or with the preceding module.                                                                                                                                |
|                  | 485A1 | Establish Communication Link with the Next Module                                                                                                                                                               |
|                  | 485B1 | Establish Communication Link with the Next Module                                                                                                                                                               |
|                  | 485A2 | Debug Port                                                                                                                                                                                                      |
|                  | 485B2 | Debug Port                                                                                                                                                                                                      |
| 24V/DI           | 24V   | Power Supply Output: +24V (Powers the HMI)                                                                                                                                                                      |
|                  | DI    | Power Supply Output Negative (0V) — Powers the HMI and Indicator Lights                                                                                                                                         |
|                  | DI_X1 | Start Signal (External dry-contact button, powered via the +24V common terminal)                                                                                                                                |
|                  | DI_X2 | Emergency Stop Signal (External Dry Contact Button, powered via the +24V Common Terminal)                                                                                                                       |
| Network Port     | LAN   | Ethernet Port                                                                                                                                                                                                   |
| Wireless Antenna | Wi-Fi | Wi-Fi Antenna Port                                                                                                                                                                                              |
| Grounding        | PE    | System Grounding Terminal: As the system enclosure is constructed of metal, this terminal *must* be connected to earth ground prior to powering on the system to prevent accidents that could endanger personal |

|                                                                                                |                                                               |         |
|------------------------------------------------------------------------------------------------|---------------------------------------------------------------|---------|
|                                                                                                |                                                               | safety. |
| <br>Attention | Note:<br>The maximum allowable secondary current of CT is 5A. |         |

## 5.2 Accessory Description

Table 5.2: Accessories Description

| Accessory Name                         | Installation Location                                                                                                                                                                                                                                               | Function Description                                                                                                                                                                                                                                             | Selection Recommendations                                                                                                                                                                                                                                                                                                                         |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Molded Case Circuit Breaker (Required) | 1) Power input terminal of the module.<br>2) The circuit breaker for the rack-mounted module is installed inside the cabinet.<br>3) The circuit breaker for the wall-mounted module is installed inside the distribution box supplied with the wall-mounted module. | 1) Controls the switching (on/off) of the module.<br>2) Features simultaneous overload, short-circuit, and undervoltage protection functions, safeguarding both the circuitry and the module from damage.                                                        | 1) Typically, each module is equipped with a dedicated molded-case circuit breaker (MCCB); alternatively, a single, larger MCCB may be configured to serve multiple modules.<br>2) It is recommended that the rated current of the MCCB be selected at 1.25 to 1.5 times the rated current of the module. The number of poles should be 3P or 4P. |
| Surge Protector<br>(Must be installed) | 1) The power input terminal of the module (the upper terminals of the molded-case circuit breaker).<br>2) Installed inside a cabinet or distribution box.                                                                                                           | It provides safety protection for cabinets and modules. When a surge voltage occurs within an electrical circuit, the surge protector activates to divert the current within an extremely short timeframe, thereby preventing overvoltage from causing damage to | 1) Poles: 3P+N<br>2) Maximum Discharge Current: 40 kA or higher                                                                                                                                                                                                                                                                                   |

|                                                          |                                                                                                                                                                        |                                                                                                                                                                                                                                                        |                                                           |
|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|
|                                                          |                                                                                                                                                                        | other equipment within the circuit.                                                                                                                                                                                                                    |                                                           |
| Miniature Circuit Breaker<br>(Optional Installation)     | 1) Surge protector or fan input terminal.<br>2) Installed inside the cabinet or distribution box.                                                                      | The primary function of installing a circuit breaker upstream of a surge protector or fan is to prevent fire hazards—such as combustion—in the event that the internal components of the surge protector experience a sustained short-circuit fault.   | 1) Rated current: 20A or higher<br>2) Number of poles: 4P |
| Centralized Monitoring Screen<br>(Optional Installation) | 1) For cabinet-mounted installations, it can be installed on the cabinet door.<br>2) For wall-mounted installations, it can be installed on the distribution box door. | Centralized monitoring facilitates convenient viewing and configuration of parameters.                                                                                                                                                                 | Factory-Supplied Accessories                              |
| Emergency Stop Button<br>(Optional Installation)         | Installed on the cabinet door or the door of the distribution box.                                                                                                     | In the event of an abnormal situation within the cabinet or module (such as smoke, unusual noises, or visible sparks), the emergency stop switch can be pressed immediately to halt the module's operation, thereby effectively protecting the module. | Button-Release Type                                       |

|                                                   |                                                                                  |                                                                                                                                                                   |                                                                                                                                                            |
|---------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fan<br>(Must be installed)                        | Installed on the cabinet door at the rear of the cabinet body.                   | 1) When the number of modules is $\leq 2$ , it is recommended to install 2 fans.<br>2) When the number of modules is $> 2$ , It is recommended to install 4 fans. | 1) AC 220V, 50Hz<br>2) 87W or higher<br>3) Airflow: 850 CFM<br>4) Rotation Direction: Counter-clockwise                                                    |
| Status Indicator Light<br>(Optional Installation) | 1) Mounted on the cabinet door.<br>2) Connected within the alarm output circuit. | Displays the module's running, stopped, normal, and fault statuses.                                                                                               | 1) Any color<br>2) Knob diameter: 22 mm                                                                                                                    |
| Relay<br>(Optional Installation)                  | Installed inside the cabinet.                                                    | Control the indicator lights and the fan.                                                                                                                         | Multi-module DI/DO loops cannot be connected in parallel.                                                                                                  |
| Current Transformer<br>(Optional Installation)    | Installed on the main busbar of the power distribution system.                   | Detect the load current of the power distribution system.                                                                                                         | 1) The secondary current must be 5A; select from the range of 100/5 to 10000/5.<br>2) Accuracy class: 0.5 or higher.<br>3) Rated burden: 2.5 VA or higher. |

### 5.3 Reference for Primary Cable Sizing

The selection of incoming cables for ASVG systems—across various capacity and current ratings—should adhere to relevant electrical regulations and take environmental conditions into account. The table below may serve as a reference:

Table 5.3: Recommended Cable Cross-Sectional Areas

| Primary Power Line |                                      |                          |                 |
|--------------------|--------------------------------------|--------------------------|-----------------|
| Capacity           | Three-Phase Main Circuit Input Lines | N line                   | PE Line         |
| $\leq 10\text{k}$  | $35\text{mm}^2$                      | $35\text{mm}^2 \times 1$ | $16\text{mm}^2$ |

|                                                                                                |                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <br>Attention | 1) ASVG is rated in kvar. The specifications in the table above are for reference only; please refer to national standards for accuracy.<br>2) Cables are typically BVR multi-strand copper core PVC insulated flexible wires.<br>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

Current transformers are primarily utilized by the ASVG-LN unit to acquire load current data, enabling the calculation of various parameters such as harmonic currents, reactive currents, negative-sequence currents, and zero-sequence currents. The LN unit features built-in current transformers; should additional units be required, please refer to the table below for guidance.

Table 5.5: CT cable selection reference table

| Parameter               | Index requirements                                                                                                                                                               | Remark                                                                                                         |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| Primary Rated Current   | —                                                                                                                                                                                | 1.5 times the actual maximum working current in the system $\leq$ the primary rated current of the transformer |
| Secondary Rated Current | 5A                                                                                                                                                                               | —                                                                                                              |
| Rated Voltage           | $\geq 0.66\text{kV}$                                                                                                                                                             | —                                                                                                              |
| Rated Capacity          | $\geq 2\text{VA}$                                                                                                                                                                | —                                                                                                              |
| Accuracy Level          | Level 0.5 or Level 0.2                                                                                                                                                           | —                                                                                                              |
| Size                    | —                                                                                                                                                                                | The specific size needs to be selected according to the on-site installation environment                       |
| Wire Diameter           | There are a total of 3 sets (6 cables) for the secondary side of the instrument transformers (rated current: 5 A). A cable cross-section of $2.5\text{ mm}^2$ has been selected. |                                                                                                                |

## 5.6 Other Cable Selection Reference

Table 5.6: Reference table for other cable selections

| Name                          | Specifications                                              |
|-------------------------------|-------------------------------------------------------------|
| Surge Protector Primary Cable | 6mm <sup>2</sup> BVR multi-strand copper core flexible wire |

|                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fan Circuit Cable                      | 1.5mm <sup>2</sup> BVR multi-strand copper core flexible wire                                                                                                                                                                                                                                                                                                                                                                                                      |
| Emergency Stop Switch<br>Circuit Cable |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Indicator Light Circuit<br>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 $S < 16\text{mm}^2$ , select the same diameter as the phase wire; when the phase wire diameter $16 \leq S \leq 35\text{mm}^2$ , select a 16mm <sup>2</sup> protective earth wire; when the phase wire diameter $S > 35\text{mm}^2$ , select half the phase wire diameter as the protective earth wire diameter. |
| Touch Screen<br>Communication Cable    | Power cord: 1.0mm <sup>2</sup> BVR multi-strand copper core flexible wire (provided by the equipment manufacturer); Communication cable: Standard connector cable provided by our company with the equipment.                                                                                                                                                                                                                                                      |
| Module Parallel<br>Communication Cable | For communication cables, it is recommended to use RVVP2*0.75mm <sup>2</sup> shielded twisted pair cable.                                                                                                                                                                                                                                                                                                                                                          |

## 5.7 Installation and Wiring

### 5.7.1 Installation Environment

Table 5.7: Installation environment

| Installation environment requirements                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <br><b>Attention</b> | <p>1) Ambient temperature : The ambient temperature has a great impact on the life of ASVG-LN. The operating temperature of ASVG-LN is not allowed to exceed the allowable temperature range (-10°C~50°C). If the temperature is lower than -10°C, appropriate heating equipment must be added. If the temperature is higher than 45°C, it is necessary to add cooling equipment such as air conditioning.</p> <p>2) The ASVG must be mounted on the surface of a flame-retardant material, and sufficient clearance for heat dissipation must be maintained around the installation area. As the unit generates a significant amount of heat during operation, it is recommended that the perforations in the cabinet door panel be spaced 2–3 mm apart to ensure unimpeded airflow into and out of the module (refer to Figure 5.3).</p> <p>3) Please install it in a place where it is not easy to vibrate. The vibration should not be greater than 0.6G. Special attention should be paid to keeping away from stamping equipment such as punch presses.</p> <p>4) Avoid installation in places that are exposed to direct sunlight, humidity, or water droplets.</p> |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>5) Avoid installing in places where there are corrosive, flammable, or explosive gases in the air.</p> <p>6) Avoid installation in areas with oil contamination or dust.</p> <p>7) The installation environment must not be exposed to strong magnetic fields, nuclear radiation, or high-power radio frequency interference.</p> <p>8) When the rack-mount module is installed in a cabinet, the cabinet must meet relevant standards and regulations.</p> <p>9) Wall-mounted modules must be installed in places where there are very few people moving around, and must be affixed with obvious safety signs.</p> <p>10) The wall-mounted installation location must be on a dry wall.</p> <p>11) The module is equipped with intelligent air cooling via an internal fan. The ventilation holes must not be blocked during use. To prevent dust from blocking the air inlet, the air inlet should be cleaned regularly, and it is recommended to clean it every three months.</p> |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### 5.7.2 Installation Space

Table 5.6: Installation space requirements

| Installation space requirements                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <br>Attention | <p>1) It is strictly prohibited to block the air outlets of the module.</p> <p>2) For cabinet-type installation, a space of at least 600mm must be reserved for air inlet and outlet as well as rear maintenance at the front and rear outlets of the cabinet. Additionally, ensure that the rear door of the cabinet can be opened and closed properly.</p> <p>3) For wall-mounted installation, a space of at least 150mm must be reserved for air inlet and outlet at the upper and lower outlets of the module.</p> <p>4) For wall-mounted installation, the distance between the installation position and the ground must be more than 1.5 meters, and a warning sign for electric shock hazard should be affixed in a prominent place.</p> |

## Requirements for Rack-Mounted Installation Space

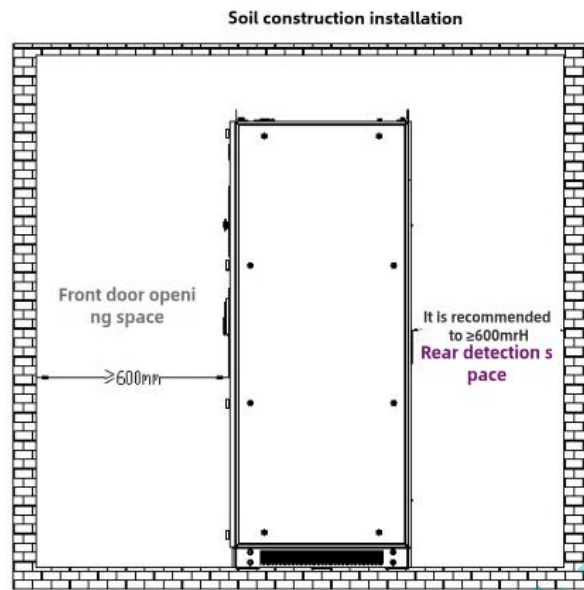


Figure 5.2: Schematic diagram of space requirements for vertical cabinet installation

## Requirements for Wall-Mounted Installation Space

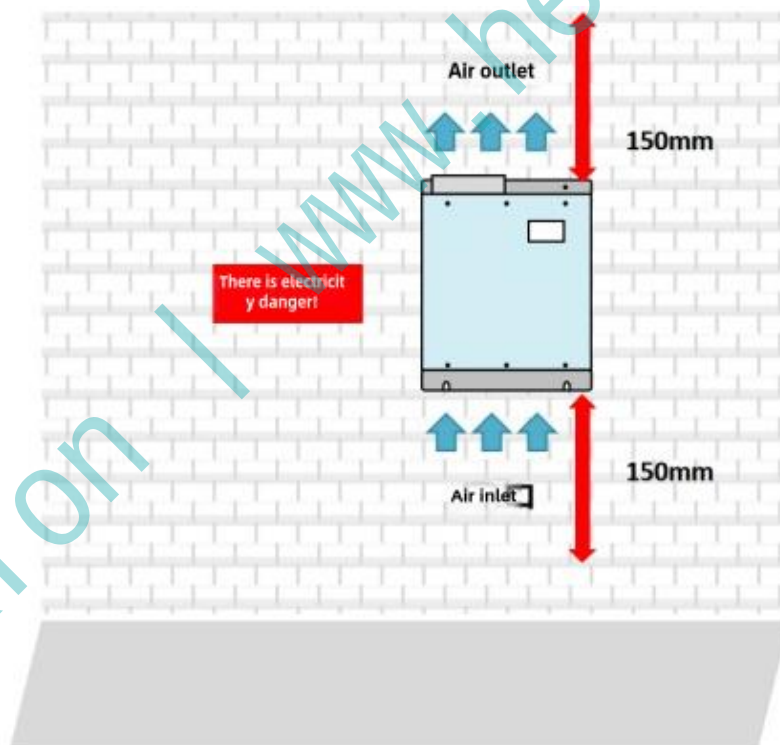


Figure 5.3: Schematic Diagram of Space Requirements for Wall-Mounted Module Installation

## 5.8 Installation Instructions

### Wall-Mounted Installation:

The wall-mounted module can be mounted on the wall for independent operation. The schematic diagram of the mounting holes is shown in Figure 5.4.

Installation:

It is fixed to the wall or cabinet through the 4 mounting holes on the bracket using cross recess combination screws of M8\*15.

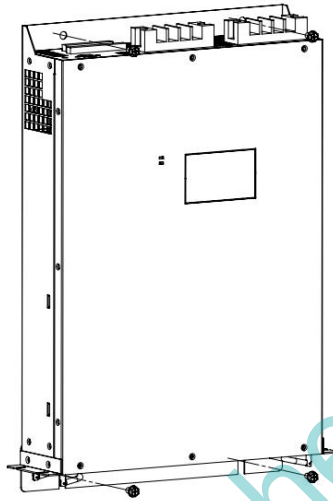


Figure 5.4: Mounting Hole Diagram for Wall-Mounted ASVG-LN

### Rack-Mounted Installation:

When fixing the module in the rack, the positions of the mounting holes are shown in Figure 5.5.

Installation:

Secure the four mounting holes of the bracket to the cabinet using cross recess combination screws M6\*15.

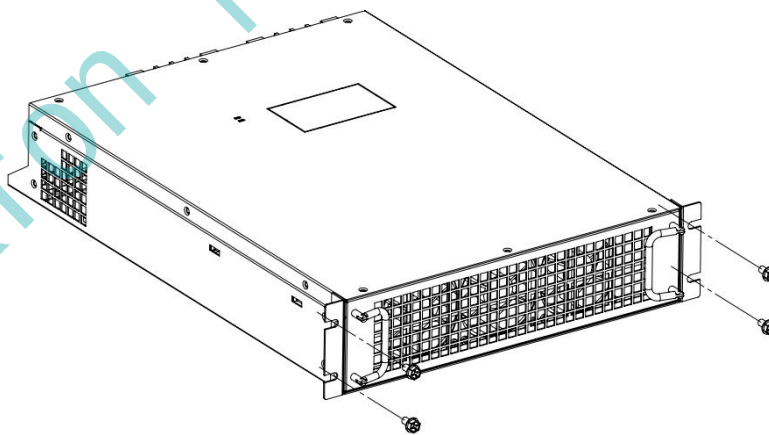


Figure 5.5: Mounting Hole Diagram for Rack-Mounted ASVG-LN

5.9 Wiring

5.9.1 CT Installation Direction Instructions

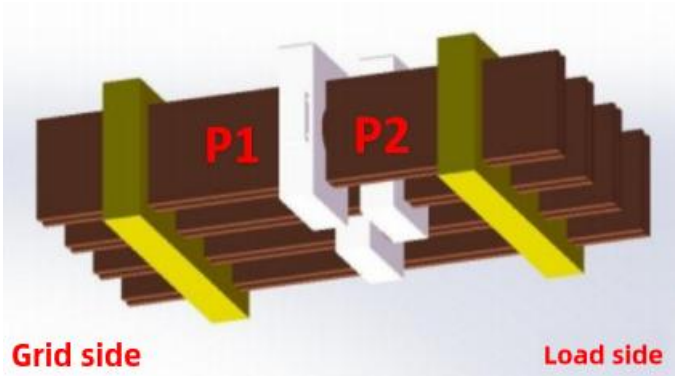


Figure 5.6: CT installation diagram

|                                                                                   |                                                                                                     |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
|  | If the current direction of the CT is from P1 to P2, then S1 is positive (+) and S2 is negative (-) |
| Attention                                                                         |                                                                                                     |

5.9.2 System Wiring Diagram for Single Module Operation in a Single Cabinet

When a single module is used with a built-in CT, the wiring is as shown in Figure 5.7.

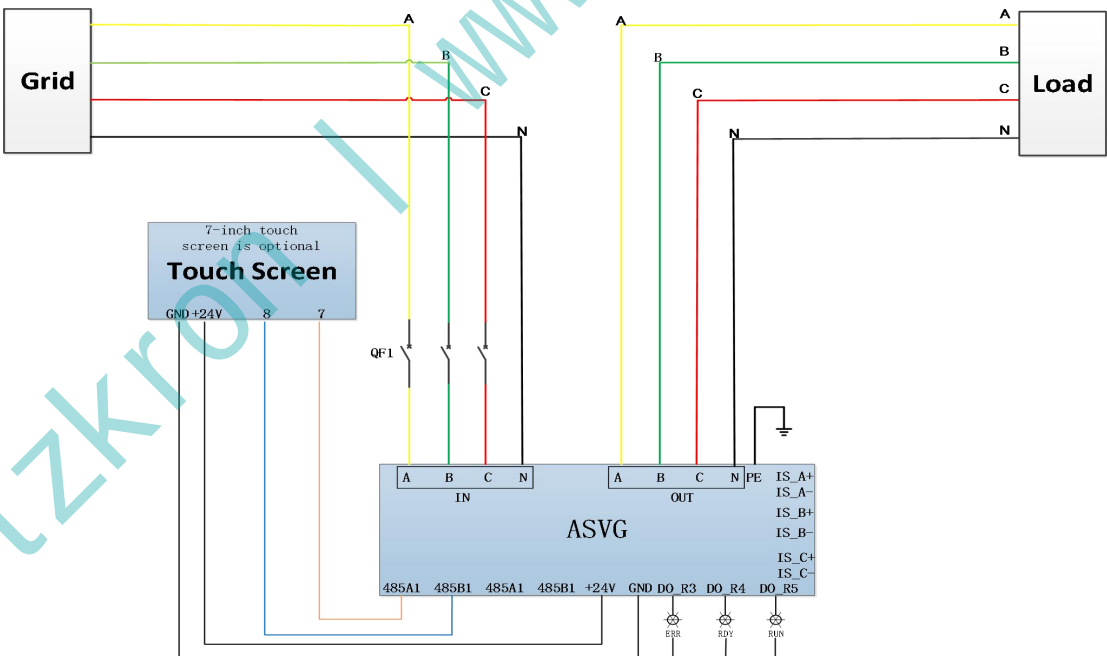


Figure 5.7: Wiring Diagram for the Single-Module Built-in CT Runtime System

### 5.9.3 Wiring Diagram for Multi-Module External CT Runtime System

Connecting multiple ASVG modules in parallel allows for increased compensation current. In this configuration, the multiple devices share a single set of external Current Transformers (CTs); the current signals acquired by these external CTs are transmitted to all the parallel-connected ASVG devices. Simultaneously, a secondary set of sampling transformers (CT2) is installed within the cabinet to monitor the total current of the entire assembly. The external CTs are installed on the power supply side, as illustrated in Figure 5.8.

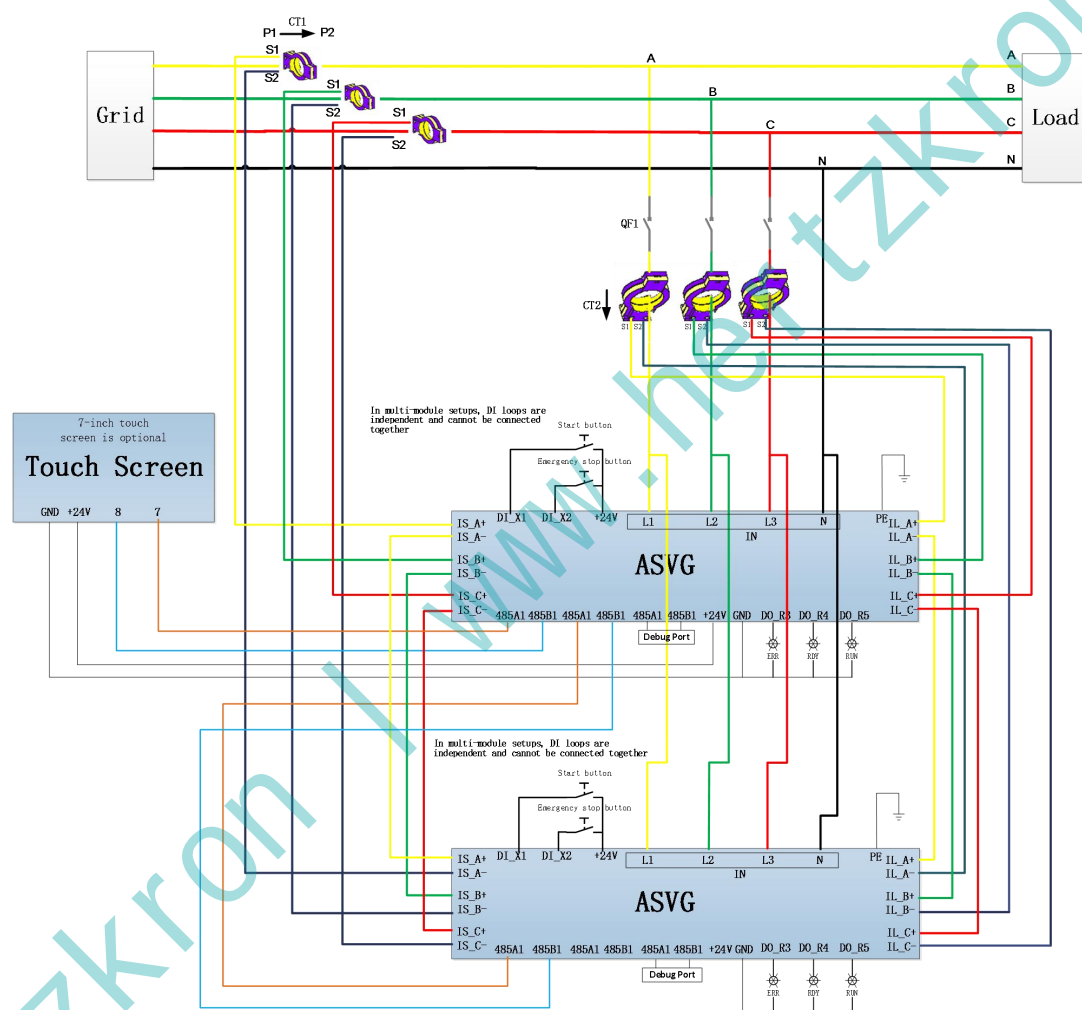


Figure 5.8: System Wiring Diagram for Multi-Module Operation in a Single Cabinet

## Chapter VI Description of the Operation Interface (4.3-inch Touch Screen)

### 6.1 Default Startup Interface

The main interface of the touch screen is shown in Figure 6.1. It displays various system information, including all kinds of grid current and load information. The device can be started, stopped, or reset via the main interface of the touch screen. On the left side of the main interface are "Data", "Settings", and "Records".

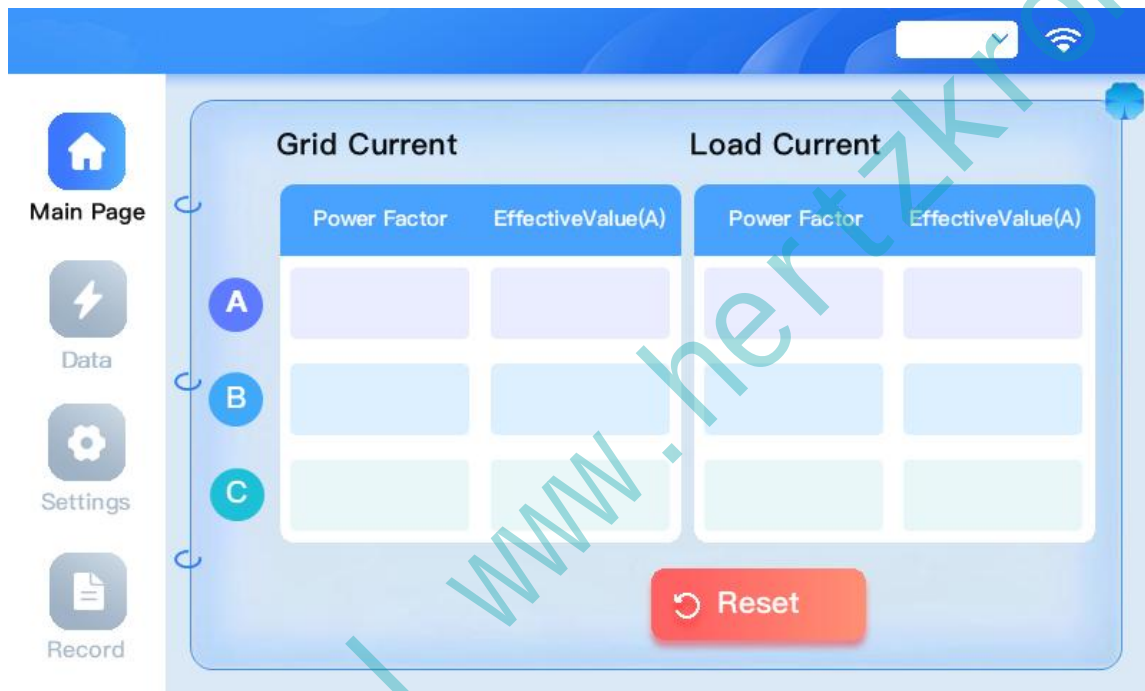


Figure 6.1: HMI Home Page

### 6.2 Operation Permission Accounts

The permission login page, as shown in Figure 6.2, will pop up when you click the Settings button or select a parameter number. The password is 123.

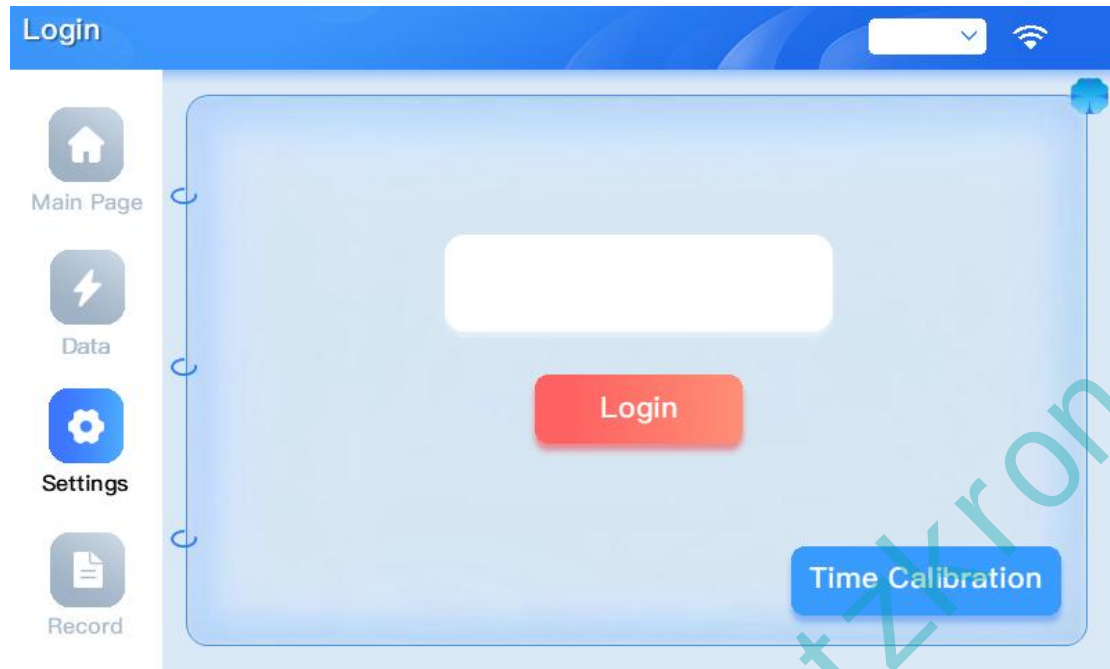


Figure 6.2: Permission Login Interface

### 6.3 Operation Permissions

Users can perform operations such as querying configuration parameters, retrieving real-time operational data, accessing historical records, starting, stopping, and resetting.

### 6.4 Setting Permissions

Select the "Settings" button on the main touchscreen interface to enter the parameter settings interface, as shown in Figure 6.3. All parameters are divided into different categories, including "System Parameters," "Sampling Parameters," "High Voltage Parameters," "Harmonic Parameters," "Individual Parameters," and "Time Calibration." To set a specific parameter, click the corresponding operation bar to enter the parameter settings interface.

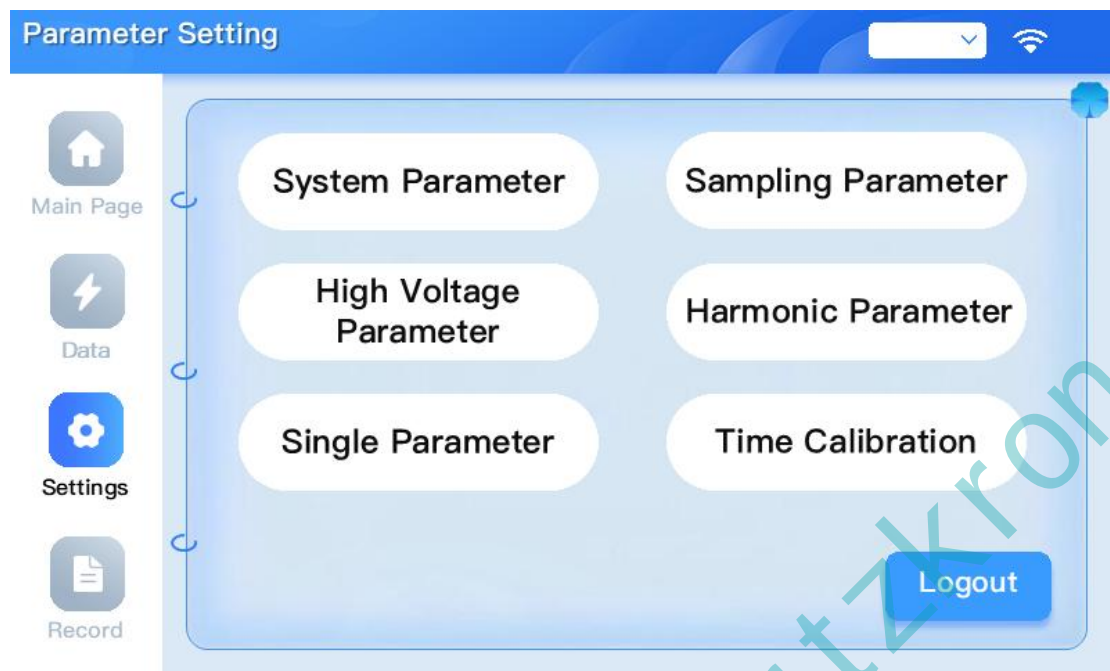


Figure 6.3: Parameter Setting Interface

### 6.5 Parameter Settings - System Parameters

The system parameter settings interface is shown in Figure 6.4. This article describes the parameters of this interface in detail.



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 this cabinet has two modules with capacities of 5kvar and 10kvar respectively, set the value to 15.
- 3) Compensation Method Selection: Reactive Power Compensation, Harmonics , Reactive Power + Harmonics, Harmonics + Reactive Power, Harmonics + Three-phase Unbalance , Reactive Power + Three-phase Unbalance, Harmonics + Three-phase Unbalance + Reactive Power , Reactive Power + Three-phase Unbalance + Harmonics, 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

The sampling parameter setting interface is shown in Figure 6.5, and the interface parameters are explained in detail.

| Parameter                        | Value        |
|----------------------------------|--------------|
| Sampling Input Current Location  | [Dropdown]   |
| Sampling Input Current Direction | [Dropdown]   |
| Input CT Ratio                   | [Text Input] |
| Sampling Load Current            | [Dropdown]   |
| Sampling Load Current Location   | [Dropdown]   |
| Sampling Load Current Direction  | [Dropdown]   |
| Load CT Ratio                    | [Text Input] |

Buttons: Save, Query

Figure 6.5: Sampling parameter setting 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".

## 6.7 Setting Harmonic Filter 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 image below. Finally, click "Save," and you can confirm the settings were successful by clicking "Query." This device allows you to filter up to eight selected harmonics.

The screenshot displays the 'Harmonic Setting' interface. It features a sidebar on the left with icons for 'Main Page', 'Data', 'Settings' (highlighted), and 'Record'. The main area contains a grid of input fields for harmonic orders 2 through 50. A red box highlights the first row of fields (orders 2-8), and a red arrow points to the field for order 3. At the bottom of the grid, there are two buttons: 'Save' and 'Query'.

Figure 6.6: Harmonic filter parameter setting 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).

| Winding Type           | Transformation Ratio |
|------------------------|----------------------|
| Winding Type 1         |                      |
| Transformation Ratio 1 |                      |
| Winding Type 2         |                      |
| Transformation Ratio 2 |                      |

Save Query

Figure 6.7: High-voltage parameter setting interface

- 1) Winding type: Normal, YY0, DY11, YD1 are selectable.
- 2) Transformer ratio: If the field transformation ratio is 10kV:0.4kV, set it to "25".

## 6.9 Operating Instructions

The equipment can be operated in two modes: automatic operation and DI operation, which can be set according to actual needs.

### 6.10 Automatic

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 modifications should be determined by professional technicians; please modify them 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.

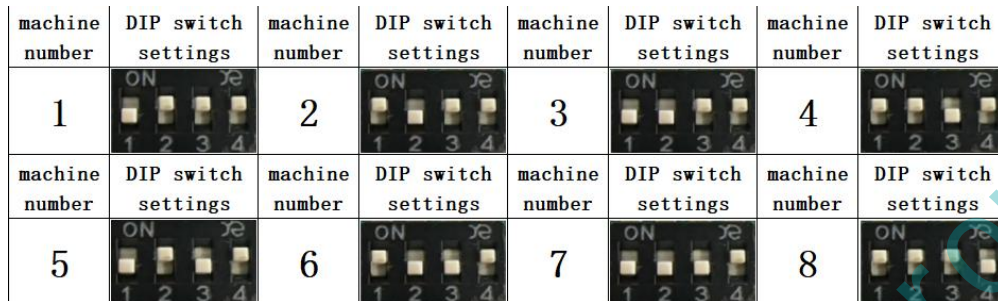


Figure 6.8 Schematic diagram of DIP switch

After powering on the equipment, in the "Module Switching Configuration" interface, select the modules that need to establish a communication connection with the touchscreen. Once the communication connection is successfully established, set the operating parameters. When the parameters are set correctly and there are no faults, the touchscreen's start-up enable indicator light will illuminate, the "Start" button will be active, and the "Stop" button will be inactive. In the module monitoring interface, select the module to be started and click the "Start" button to start the equipment; the DC bus voltage will increase. When multiple modules are connected in parallel, the startup process for other modules is similar.

Instructions for stopping the system using the touchscreen: When the "Start" button is disabled and the "Stop" button is enabled, click the "Stop" button to stop the system.

|                  |                                                                                                                   |
|------------------|-------------------------------------------------------------------------------------------------------------------|
|                  | <p>Parameter modifications should be determined by professional technicians; please modify them with caution.</p> |
| <p>Attention</p> |                                                                                                                   |

## Chapter VII HMI Description (7-inch Touchscreen)

### 7.1 Touchscreen Installation

#### 7.1.1 Touchscreen Mounting Dimensions

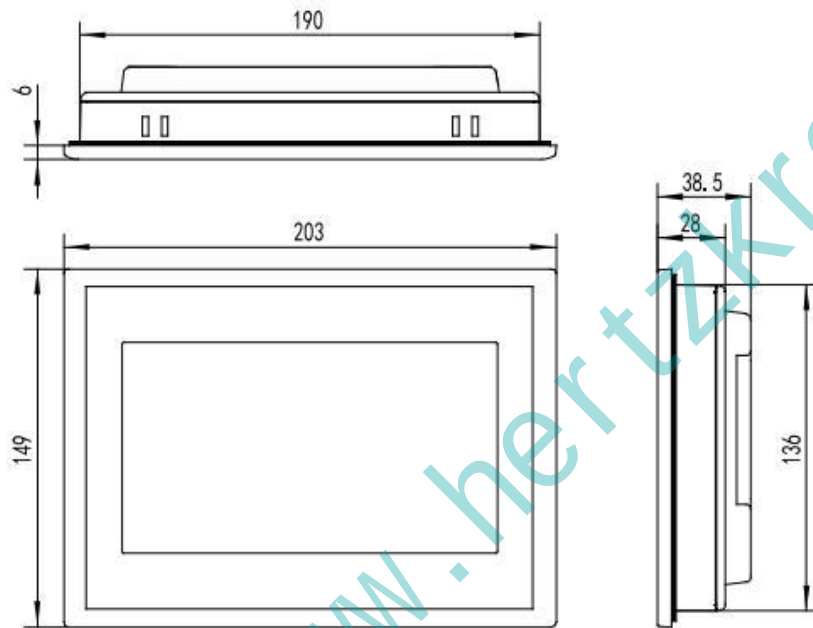


Figure 7.1: Overall Dimensions

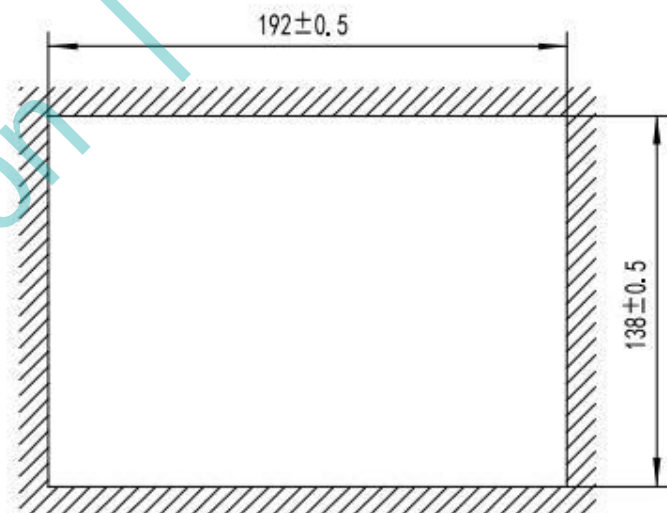


Figure 7.2: Cutout Dimensions

7.1.2 Touchscreen Installation Method

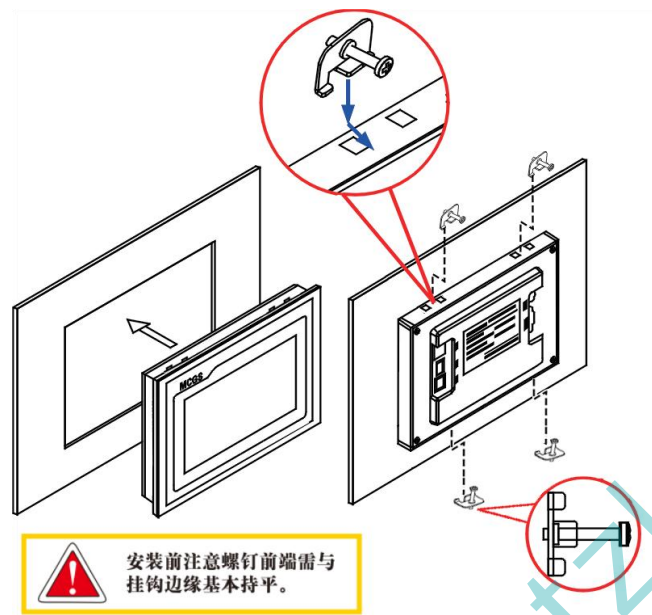


Figure 7.3: Touchscreen Installation Method

7.1.3 Touchscreen Interface Pin Definitions

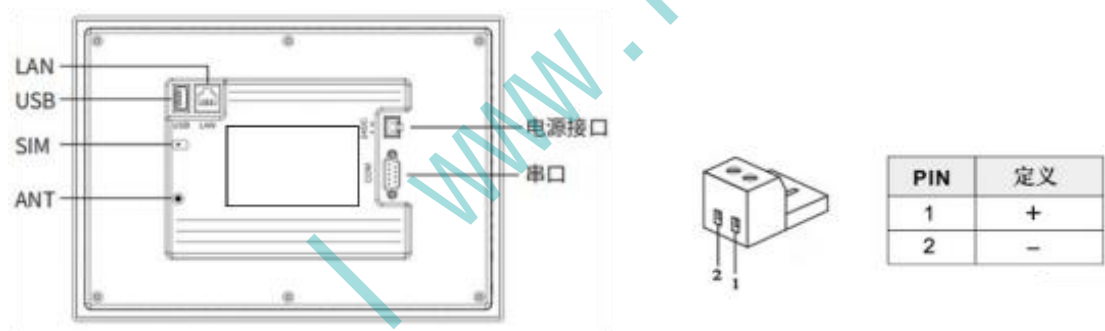


Figure 7.4: Touchscreen Interface Pin Definitions

Table 7.1: Touchscreen Serial Port DB9 Pin Definitions

| Touchscreen Serial Port DB9 Pinout                                                  |                                 |      |        |
|-------------------------------------------------------------------------------------|---------------------------------|------|--------|
|  | COM1<br>Connects to Modules 1~4 | PIN7 | RS485+ |
|                                                                                     |                                 | PIN8 | RS485- |
|                                                                                     | COM2<br>Connects to Modules 5~8 | PIN4 | RS485+ |
|                                                                                     |                                 | PIN9 | RS485- |

Table 7.2: Communication Harness and Module Communication Wiring Comparison 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

After the touchscreen is powered on, it defaults to the "Home" interface, through which you can view real-time system operating data, such as: grid voltage, grid current, equipment current, active power, reactive power, and apparent power. Among them, equipment current refers to the ASVG cabinet compensation current, and the other data are grid data.

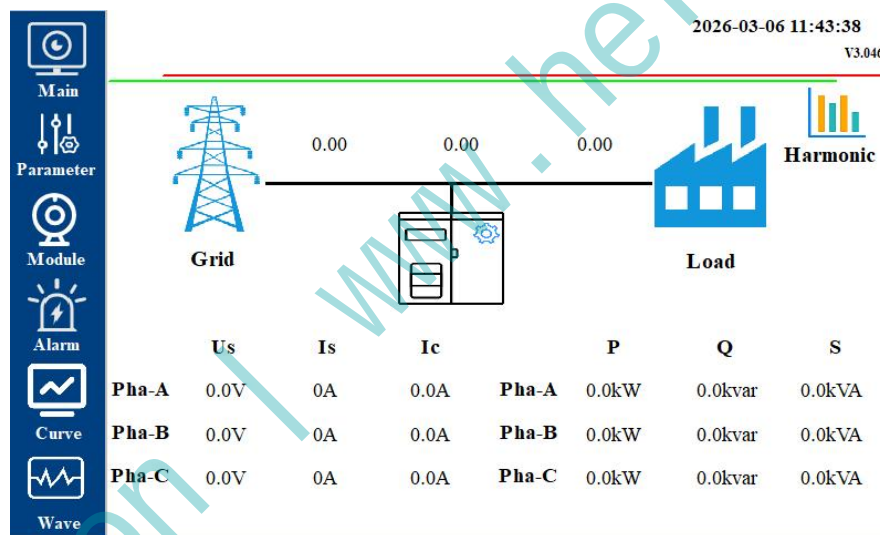


Figure 7.5: Default Startup Interface

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:

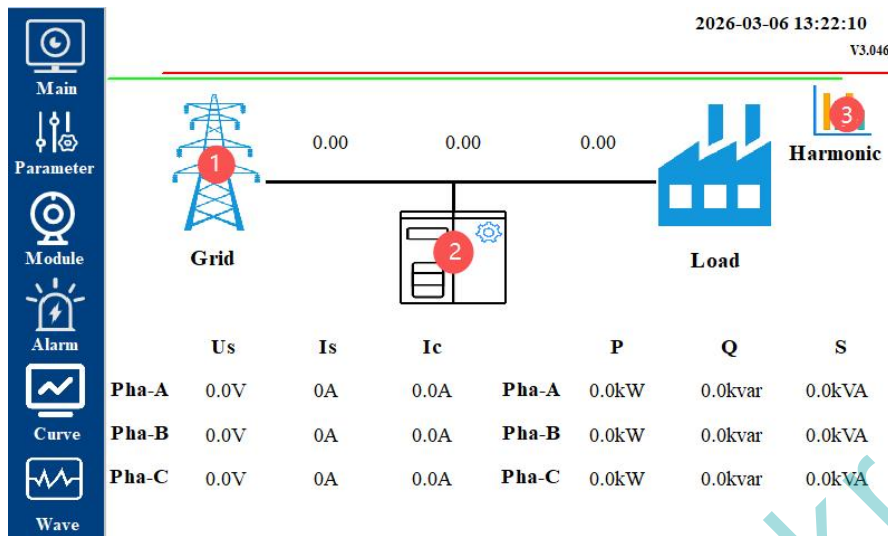


Figure 7.6: Startup Default Interface Navigation Button (Home Button)

- 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.

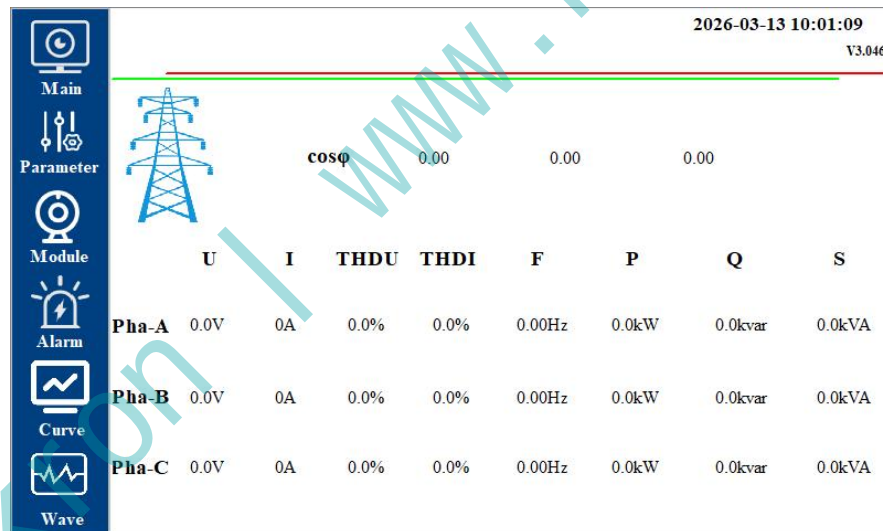


Figure 7.7: System Operation Data Monitoring Interface

- 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, starting from 1; each touchscreen supports the connection of up to 8 modules.
- 2) Module Exit: The touchscreen terminates communication with this module.
- 3) Module Entry Point: The communication between the touchscreen input and this module.

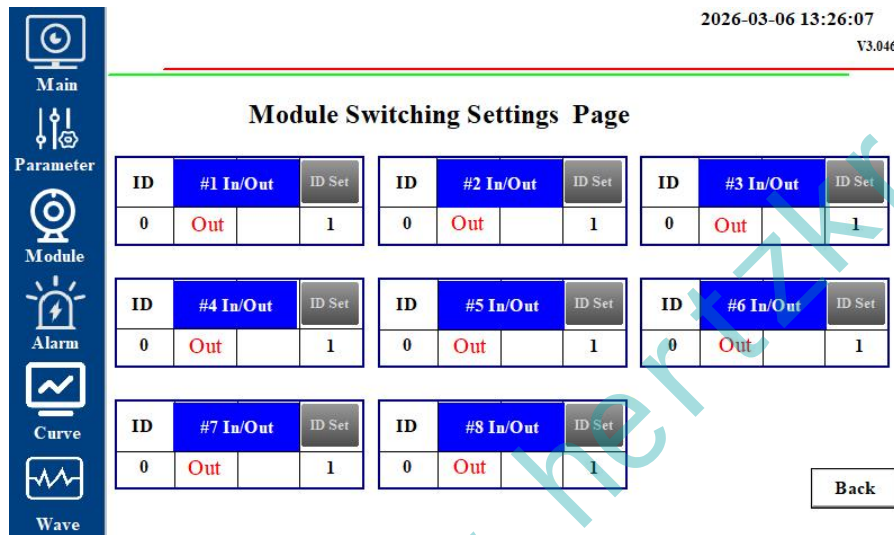


Figure 7.8: Module Switching Settings and Confirmation Interface

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.

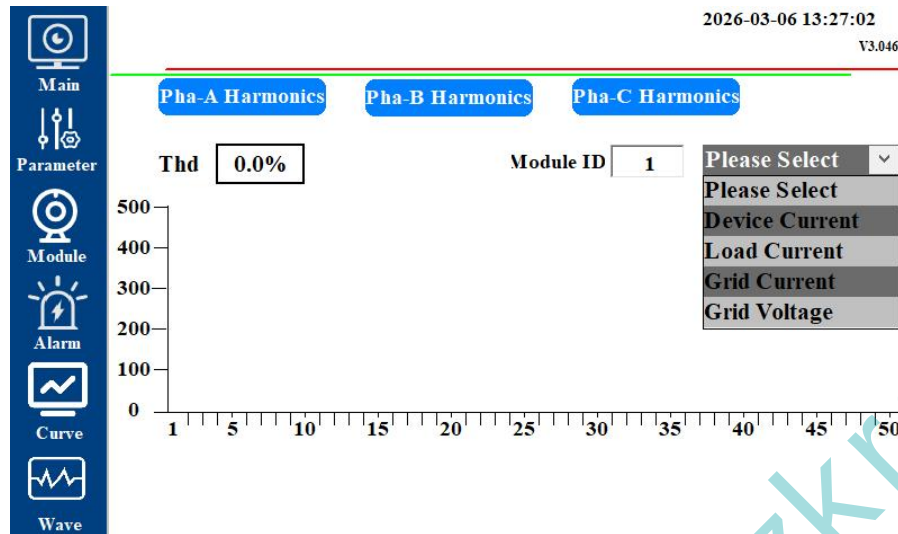


Figure 7.9: Harmonic Bar Chart

### 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).

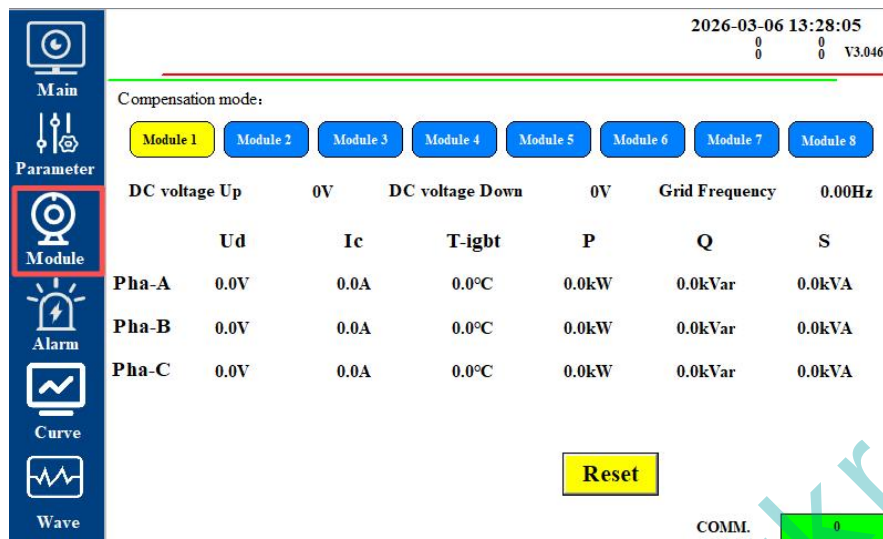


Figure 7.10: Module Monitoring Interface

## 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.

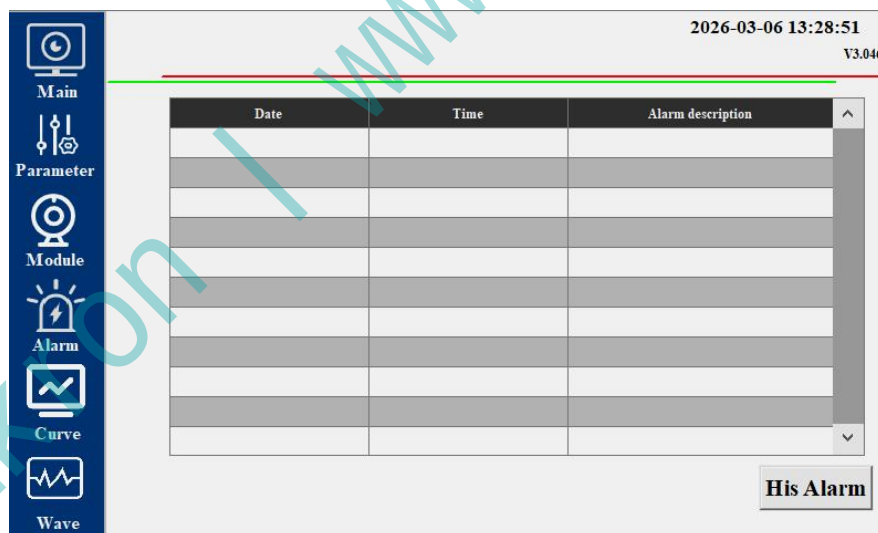


Figure 7.11: Real-time Alarm Information Query

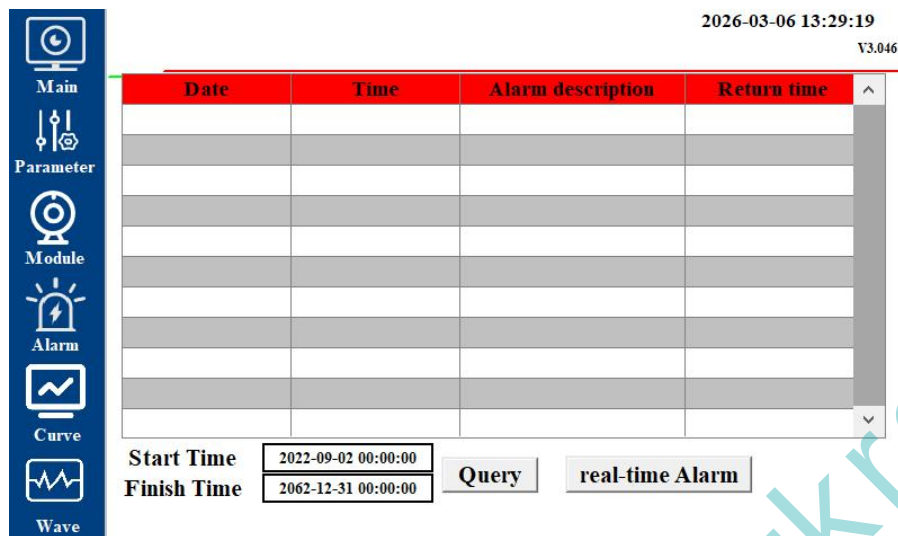


Figure 7.12: Historical Alarm Information Query

## 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.

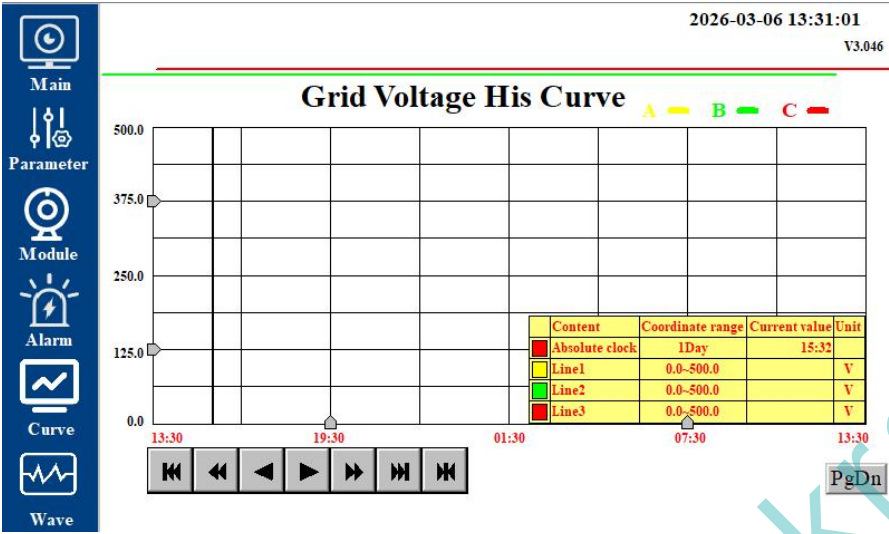


Figure 7.14: Grid Voltage History Curve Interface

The "Set time range" dialog box allows users to select a time range for the historical curve query. It includes options for "Recent time", "Fixed time", and "Given time". The "Given time" option is selected, showing the date 2026-03-06 and time 13:36:29. The "Time division point" is set to 0 Hour. The "Ok" and "Cancel" buttons are at the bottom right.

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.

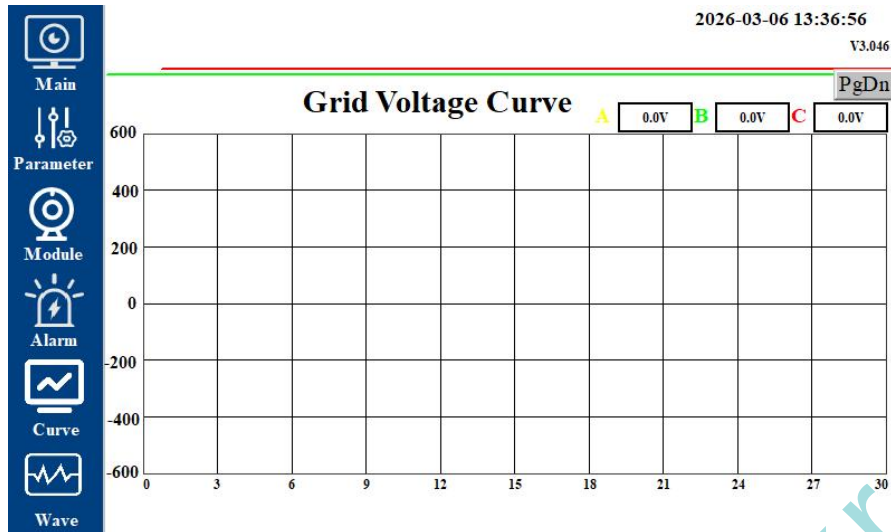


Figure 7.16: Waveform Curve

## 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.

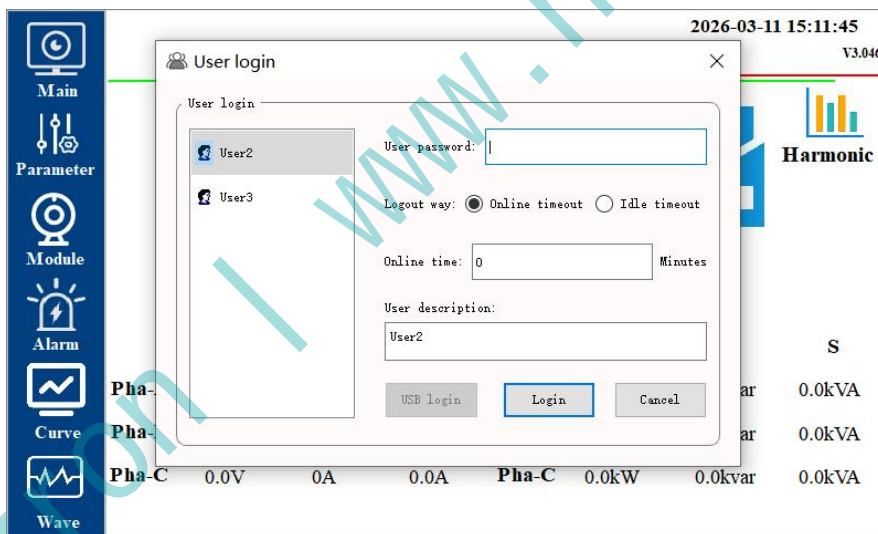


Figure 7.17: Permissions Login Interface

### 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.

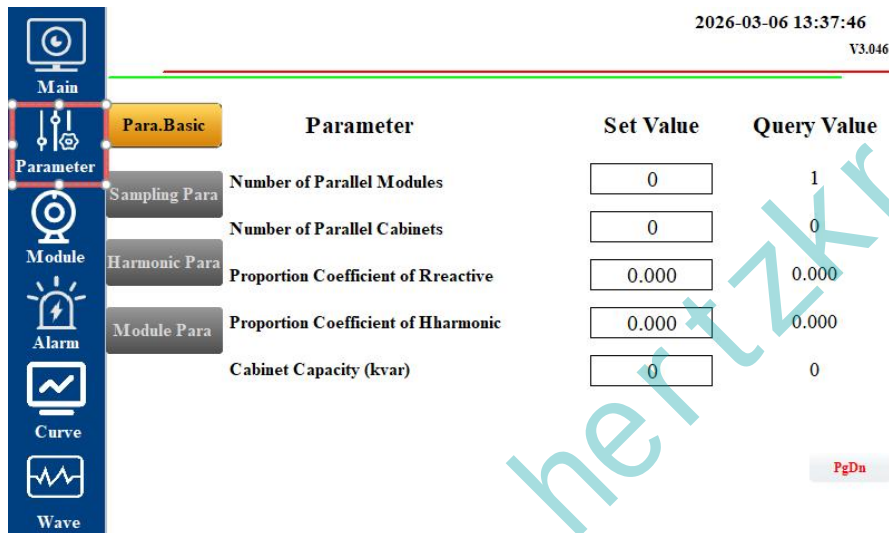


Figure 7.18: Parameter Settings Interface

## 7.9 System Parameters

Detailed Explanation of the System Parameter Settings Interface:

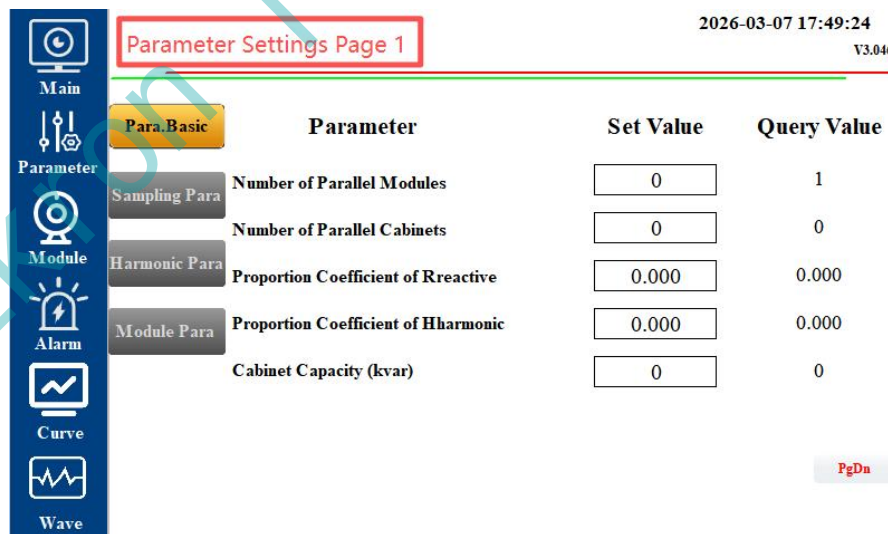


Figure 7.19: System Parameter Settings Interface (Page 1)

- 1) Number of parallel modules: The total number of ASVG modules in the cabinet. If there are three modules in the cabinet, the value is set to 3.
- 2) Number of cabinets in parallel: 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 of 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 that of the reactive power capacity ratio.
- 5) Cabinet capacity in kvar: For example, if there are 2 15kvar modules and 1 35kvar module, the value should be set 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".

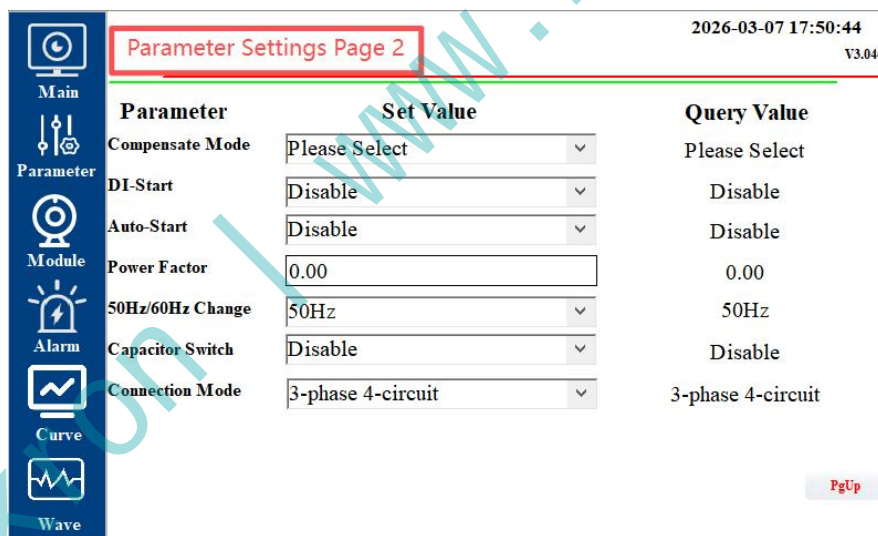


Figure 7.20: System Parameter Settings Interface (Page 2)

- 1) Compensation 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 customers.
- 2) 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".

3) Enable auto-start: If "Disable" is selected, the module must be manually started by clicking the start button after power-on; if set to "Enable", the module will start automatically after power-on when the set conditions are met.

4) Power factor setpoint: The actual setpoint of the power factor on site, which can be set from 0 to 1.

5) 50Hz/60Hz switching: Select "50Hz" or "60Hz" according to the power grid frequency.

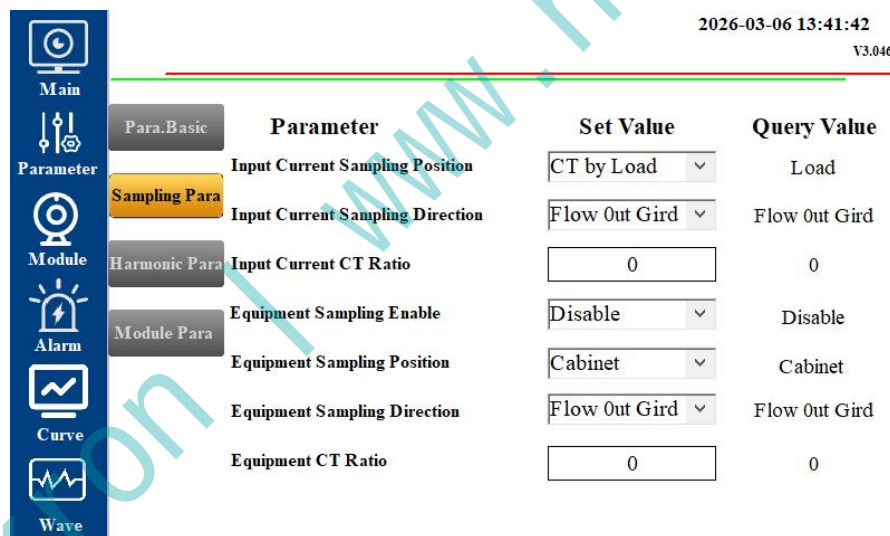
6) Capacitor switching enable: No setting required, the default is disabled.

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

8) After setting the parameters on this interface, you need to click on the following functions below the parameters: "Compensation Method Selection", "DI Start/Stop Enable", "Auto-Start Enable", "Power Factor Setpoint", "50Hz/60Hz", "Capacitor Switching Enable", and "Wiring Method". 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".

## 7.10 Sampling Parameters

Detailed Explanation of the Sampling Parameter Settings Interface:



| Parameter                        | Set Value     | Query Value   |
|----------------------------------|---------------|---------------|
| Input Current Sampling Position  | CT by Load    | Load          |
| Input Current Sampling Direction | Flow Out Gird | Flow Out Gird |
| Input Current CT Ratio           | 0             | 0             |
| Equipment Sampling Enable        | Disable       | Disable       |
| Equipment Sampling Position      | Cabinet       | Cabinet       |
| Equipment Sampling Direction     | Flow Out Gird | Flow Out Gird |
| Equipment CT Ratio               | 0             | 0             |

Figure 7.21: Sampling Parameter Settings 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's ratio is 2000:5, set it to "400".

4) 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".

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

6) 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".

7) Equipment Current CT Ratio: If the total cabinet sampling CT ratio is 2000:5, then set it to "400".

8) After setting the parameters on this interface, click on the following functions below the parameters: "Input Current Sampling Location Selection", "Input Current Sampling Direction Selection", "Input Current CT Ratio", "Equipment Current Sampling Enable", "Equipment Current Sampling Location Selection", "Equipment Current Sampling Direction Selection", and "Equipment Current CT Ratio". A confirmation dialog box will pop up. If the settings are correct, click "OK"; otherwise, click "Cancel" to reset. You can confirm whether the settings were successful by checking the "Query Value".

## 7.11 Harmonic Parameters

The harmonic controller settings interface is shown in the figure below. 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. To compensate for a particular harmonic, simply select the compensation rate for the corresponding order. If the site requires compensation for the 3rd harmonic, enter "1.00" in the corresponding position for the 3rd harmonic in the interface shown below. Finally, click "Modify" and you can confirm whether the setting was successful through "Query".

2026-03-06 13:46:05  
V3.046

| Module        | times | Compensation Rate (Set Value) |    |      |    |      |    |      |    |      |        | PgDn  |
|---------------|-------|-------------------------------|----|------|----|------|----|------|----|------|--------|-------|
| 1             | 2     | 0.00                          | 12 | 0.00 | 22 | 0.00 | 32 | 0.00 | 42 | 0.00 |        |       |
| Para.Basic    | 3     | 0.00                          | 13 | 0.00 | 23 | 0.00 | 33 | 0.00 | 43 | 0.00 |        |       |
|               | 4     | 0.00                          | 14 | 0.00 | 24 | 0.00 | 34 | 0.00 | 44 | 0.00 |        |       |
| Sampling Para | 5     | 0.00                          | 15 | 0.00 | 25 | 0.00 | 35 | 0.00 | 45 | 0.00 |        |       |
|               | 6     | 0.00                          | 16 | 0.00 | 26 | 0.00 | 36 | 0.00 | 46 | 0.00 |        |       |
| Harmonic Para | 7     | 0.00                          | 17 | 0.00 | 27 | 0.00 | 37 | 0.00 | 47 | 0.00 |        |       |
|               | 8     | 0.00                          | 18 | 0.00 | 28 | 0.00 | 38 | 0.00 | 48 | 0.00 |        |       |
| Module Para   | 9     | 0.00                          | 19 | 0.00 | 29 | 0.00 | 39 | 0.00 | 49 | 0.00 |        |       |
|               | 10    | 0.00                          | 20 | 0.00 | 30 | 0.00 | 40 | 0.00 | 50 | 0.00 |        |       |
|               | 11    | 0.00                          | 21 | 0.00 | 31 | 0.00 | 41 | 0.00 |    |      | Modify | Query |

Figure 7.22: Harmonic Compensation Order Selection Settings Interface

## 7.12 Debugging Parameters

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

## 7.13 Module Startup and DIP Switch Settings

When two or more modules are connected in parallel, a DIP switch needs to be set. The communication lines of the four modules with addresses 1 to 4 are connected to the COM1 port (terminal 7A/8B) of the touch screen, and the communication lines of the four modules with addresses 5 to 8 are connected to the COM2 port (terminal 4A/9B) of the touch screen. 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.

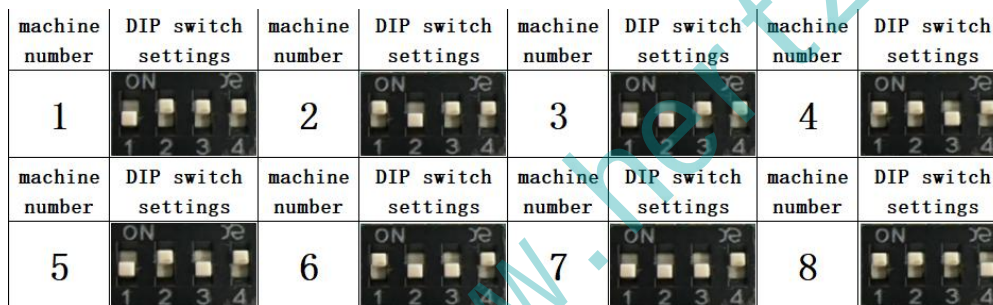


Figure 7.23: Schematic diagram of DIP switch

After powering on the equipment, in the "Module Switching Configuration" interface, select the modules that need to establish a communication connection with the touchscreen. Once the communication connection is successfully established, set the operating parameters. When the parameters are set correctly and there are no faults, the touchscreen's start-up enable indicator light will illuminate, the "Start" button will be active, and the "Stop" button will be inactive. In the module monitoring interface, select the module to be started and click the "Start" button to start the equipment; the DC bus voltage will increase. When multiple modules are connected in parallel, the start-up process for other modules is similar.

When two or more modules are connected in parallel, the following instructions apply to stopping the equipment using the touchscreen: When the "Start" button is inactive and the "Stop" button is active, click the "Stop" button to stop the equipment.

## 7.14 Touchscreen WiFi Network Settings

1) After the screen is powered on, press and hold any position on the screen until the system configuration interface appears (as shown in Figure 7.24), then 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.

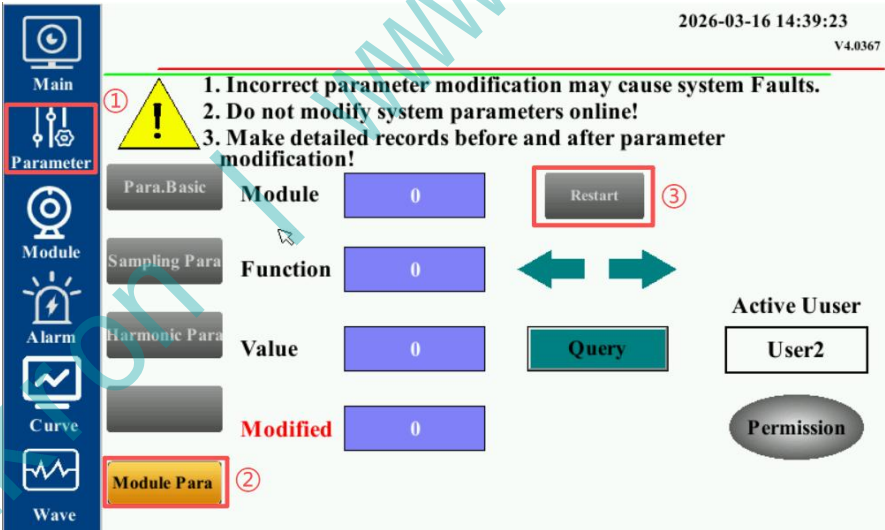


Figure 7.25: Touchscreen Restart Interface

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).

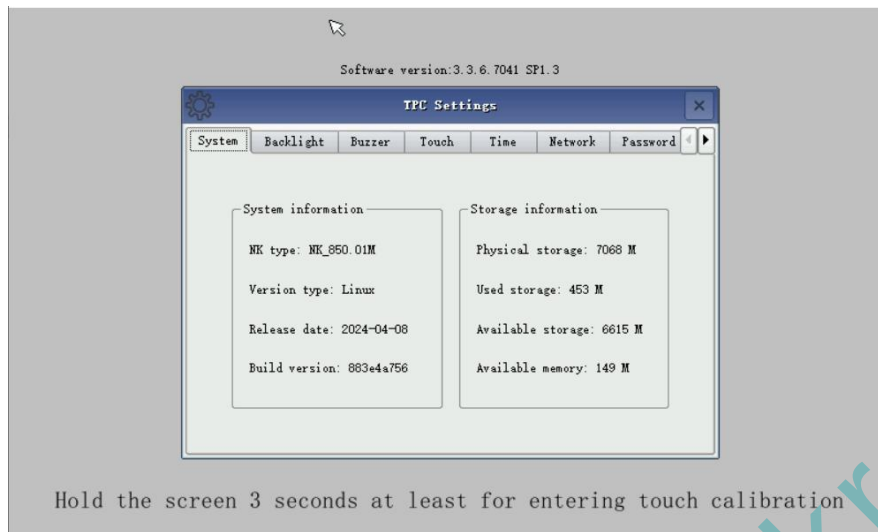


Figure 7.26: TPC System Settings Interface

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).

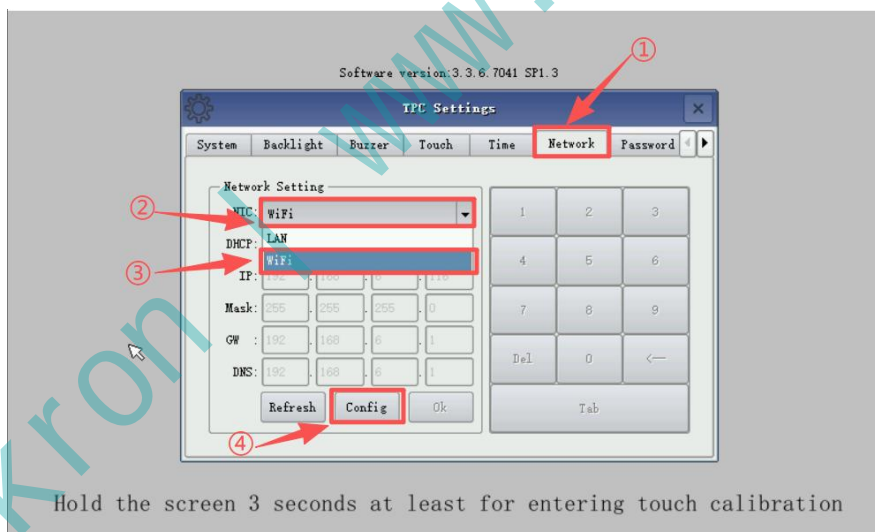


Figure 7.27: WiFi Configuration Interface

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.

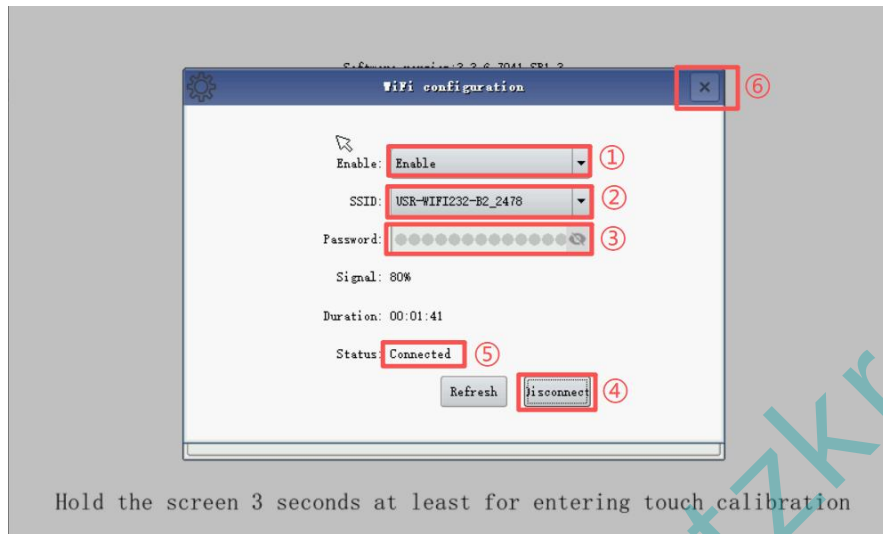


Figure 7.28: Wi-Fi configuration interface 2



Figure 7.29: Entering the main interface



Parameter modifications should be determined by professional technicians; please modify them with caution.

Attention

## Chapter VIII ASVG-LN Common Troubleshooting

Refer to Table 7.1 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 7.1: Common Fault Handling

| Fault and Alarm                           | Possible Reason                                                                                      | Solution                                                                                                                                                                 |
|-------------------------------------------|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Communication Fault                       | Communication issue between monitoring and ASVG-LN module.                                           | Check if the communication cables are securely connected.                                                                                                                |
| Over temperature Fault                    | High ambient temperature; blocked air ducts; fan failure                                             | Check each possible reason one by one                                                                                                                                    |
| Start-up without successful phase-locking | 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 grid voltage is undervoltage                                   | Check whether the three-phase voltage is within the operating voltage range of the device                                                                                |
| Input Frequency Abnormal                  | Input frequency exceeds the limit, causing ASVG-LN 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-LN module shutdown                                                  | Contact the engineer                                                                                                                                                     |
| UP\UN\VP\VN\WP\WN Fault                   | Drive fault causing ASVG-LN module shutdown                                                          | Contact the engineer                                                                                                                                                     |
| Over Current Fault                        | The ASVG-LN module shuts down because the device output current is greater than the protection value | Check whether the grid voltage distortion rate is too large;<br>The grid voltage has large temporary rise and fall;<br>The grid voltage is normal. Contact the engineer. |

## Chapter IX Contact Us

Our company boasts a comprehensive after-sales service system and network, and is dedicated to providing timely and high-quality follow-up services for both new and existing customers. If users have any questions or needs, they can access the help interface to contact our technical service department in a timely manner, and our technical engineers will be at your service 24 hours a day.

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