

**Enjoypowers SinE Series**  
**Active Harmonic Filter**  
**User Manual**

**Document version** V2.4- (20240103)

**Release date** 2024-01-25

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# 1 Important Safety Instructions

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## 1.1 Safety Precautions

The Active Harmonic Filter (AHF) is designed for industrial applications. It shall be connected with a power grid system and in parallel with harmonic sources (i.e. nonlinear loads) as a means to control harmonics.

The AHF shall not be exposed to rain or wet conditions, and shall be away from any flammable fluid, gas, or explosives.

Adequate space shall be left in the front and at the back of the AHF for well ventilation and convenient maintenance.

To minimize fire and electric shock hazards, installation must be conducted by the qualified personnel in a controllable working environment.

To minimize electric shock hazards, all maintenance work must be carried out by the qualified technician and be sure to cut off all power supply before maintenance.

High voltage hazards! It takes over 15 minutes for the DC capacitor to discharge. Please make sure the device has discharged completely before carrying out any operation.

To minimize electric shock hazards, please read this Manual carefully before switching the power on and keep this Manual properly for permanent reference.

When the AHF is used in IT applications, please install an insulation resistance detection device so that the alarm will go off when protection earth fault is detected.

## 1.2 Wiring Warnings

To prevent a possible risk of current leakage, the AHF shall be earthed properly.

About wiring, the compensation capacity and the current-carrying capacities of cables shall be considered.

The incoming lines of the AHF shall be connected with appropriate protective devices. It is recommended to provide every module with an over-current protective device with a third-party certification. Besides, take the installation positions of auxiliary equipment into consideration and choose the protective devices with adequate breaking capacity.

The capacity of the protective devices shall fit that of the AHF.

To prevent scaling caused by high temperature, after the power is cut off, the operating switch shall be allowed to cool down before being operated again.

The 3P4W AHF is applicable to the power grid system with neutral grounding.

### 1.3 Usage warning

Since the AHF is used for harmonic compensation of the power grid, the capacity selection of the AHF shall be subject to the harmonic content to avoid poor compensation due to insufficient capacity.

Since the AHF is used for harmonic control, it shall be connected to harmonic current from an external source for CT testing (CT: Current transformer).

To guarantee sound reliability and avoid overheating, do not block, or cover the air inlet and outlet.

The working temperature range of the AHF is -10°C - 55°C, beyond which the AHF will not work.

### 1.4 Storage Precautions





Please use the original packing material to protect the APF to avoid damage by rodents.

If the customer will not install the AHF immediately after receiving the equipment, please be sure to store the APF in a dry and ventilated indoor place, which shall be maintained between -40°C and 70°C with relative humidity no higher than 95%.

### 1.5 Symbols

Please use the original packing material to protect the APF to avoid damage by rodents.

Table 1-1 Symbols meaning

Symbol	Meaning
	Be aware of hazards, which may result in minor injuries.
	Be aware of hazards that may result in moderate injury.
	Be aware of hazards that may result in serious injury.
	CAUTION: ELECTRICAL HAZARD.

# 2 Introduction

---

## 2.1 Product introduction

The SinE series active harmonic filters (AHF) utilize advanced three-level topology circuits and are primarily designed for harmonic elimination, power factor correction, and correction of three-phase load imbalances. The SinE series AHF modules have a wide capacity range, ranging from 30A to 200A, and allow for the parallel connection of up to 20 modules, catering to diverse user requirements for filter current capacity.

Key features of this device include:

- Efficient compensation of specified harmonics from the 2nd to the 50th order
- Applicability for power factor correction and correction of three-phase load imbalances
- Fast dynamic response, stable parameters, and excellent harmonic compensation effectiveness
- High efficiency with low heat loss
- Modular design offering various options for different compensation capacity.
- Comprehensive system protection features
- Support for timed power on/off and energy-saving ECO operation modes.

## 2.2 Principle of operation

SinE Series AHF is connected in parallel with non-linear loads and uses one set of current transformers (CT) to detect the load current. It calculates each order harmonic current by FFT algorithms in its DSP microchips, and then generates a compensating current with the same amplitude but opposite phase angles to the detected harmonic current, which cancels out the original load harmonics.

SinE series AHF not only eliminates harmonic current from the load side, but it also mitigates harmonic voltage caused by harmonic currents. The AHF system can also improve power factor (PF) and correct load imbalances in the power system.

Note: CT is a critical part of the AHF system, and it can be purchased by users themselves, following Enjopowers' suggestions on CT specification.

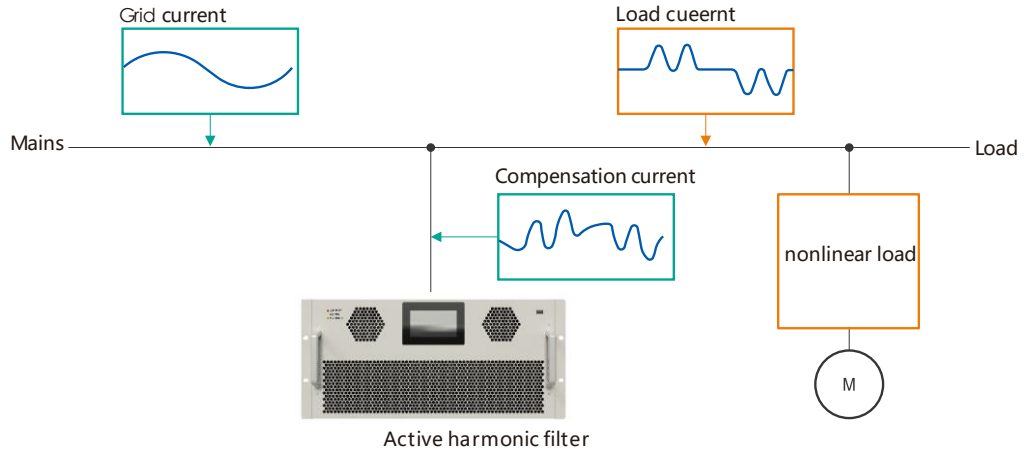


Figure 2-1 Work principle of Enjoypowers' AHF

The active harmonic filter operates on a 3-level neutral point clamped (NPC) topology. As shown in the figure below, the traditional 2-level topology circuit structure consists of 6 IGBTs (2 IGBT power devices on each phase pin and current path), and in the 3-level topology, there are 12 IGBTs (in each phase 4 IGBT power devices on pins and current paths).

The 3-level topology circuit can generate three voltage levels at the output, including DC bus positive voltage, zero voltage and DC bus negative voltage. Two-level topology circuits can only output positive and negative voltages. At the same time, the three-level topology circuit also ensures higher quality and better harmonic output voltage, thereby reducing output filter requirements and associated costs.

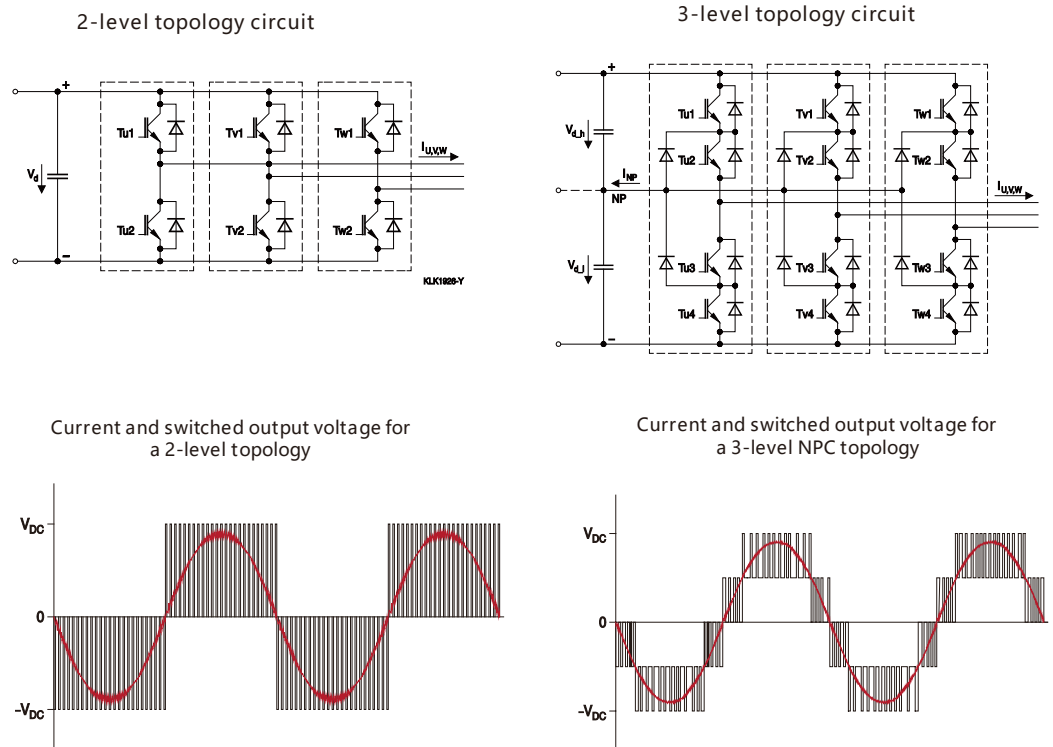


Figure 2-2 The difference between 3 levels and 2 levels



## 2.3 Product category

SinE series AHF includes rack-mounted and wall-mounted installations, both supporting 3P3W and 3P4W wiring methods. Table 2-1 lists the model, capacity, installation method and HMI information.

SinE series AHF includes rack-mounted and wall-mounted installations, both supporting 3P3W and 3P4W wiring methods. Table 2-1 lists the model, capacity, installation method and HMI information.

Table 2-1 Enjoypowers AHF product category

Model	Describe	Mounted Version	Optional HMI
SinE-APF-30A	30A/400Vac	Wall	4.3-inch
SinE-APF-45A	45A/400Vac	Rack	1.8-inch
SinE-APF-50A	50A/400Vac	Wall/Rack	4.3-inch
SinE-APF-75A	75A/400Vac	Wall/Rack	4.3-inch
SinE-APF-100A	100A/400Vac	Wall/Rack	4.3-inch
SinE-APF-150A	150A/400Vac	Wall/Rack	4.3-inch
SinE-AHF-100A-6FW	100A/690Vac	Wall/Rack	4.3-inch

## 2.4 Functions & Features

**Versatile Functionality:** The AHF excels in achieving simultaneous control of harmonics, reactive power, and three-phase imbalance.

**Effective Harmonic Control:** Achieves highly effective filtering, addressing up to 97% of system harmonics.

**Precise Reactive Power Compensation:** The device offers rapid (ms-grade response), precise (power factor within -0.99 to 0.99 range), and bi-directional (capacitive and inductive compensation) control of reactive power.

**Outstanding Three-Phase Unbalance Compensation:** Corrects both active and reactive unbalance, with the ability to eliminate neutral current (applicable to three-phase four-wire series only).

**Wide Input Voltage and Frequency Range:** Suitable for applications involving diesel generators and challenging power supply conditions.

Table 2-2 AHF module's input voltage range

Module Type	Upper Limit	Lower Limit
200V Module	240	180

400V Module	480	308
690V Module	850	552

**Efficient Power Usage:** Low power loss (less than 3% of rated device power) and actual efficiency exceeding 97%.

**Stable Operation:** Acts as an infinite impedance to the power grid system, producing accurate and flawless output waveforms without affecting other equipment.

**Simple and Flexible Integration:** Modular design allows easy embedding into other cabinets for seamless operation with PDU.

**Scalable Capacity:** For a single system cabinet, capacity depends on the quantity of installed modules; in parallel, capacity is unlimited due to unrestricted connections for parallel system cabinets.

**Versatility in Operating Conditions:** The device operates in high temperatures up to 50°C, withstands salt spray corrosive conditions, endures grade-9 seismic intensity, and is compatible with diesel engine generating systems.

**User-Friendly Interface (English, customizable support):** Features such as event logs, automatic fault alarms, alarm history, and parameter setting functions.

**Comprehensive Functions:** Includes automatic self-checking start, settable soft start time, emergency stop (E.P.O.), and more.

## 2.5 Mini Wall-mounted AHF module

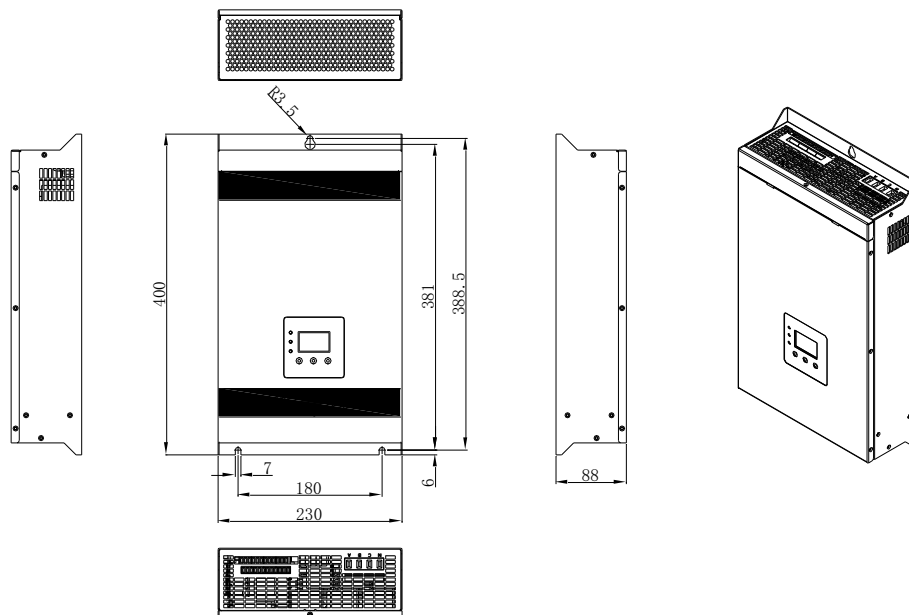


Figure 2-3 MINI wall mounted AHF Module Dimensions

Table 2-3 SinE Series AHF Rack mounted Module Dimensions and weight

Model	Dimensions (W×D×H, mm)	Weight (kg)
SinE-APF-30A	400*230*88	7.5

## 2.6 Rack-mounted AHF module

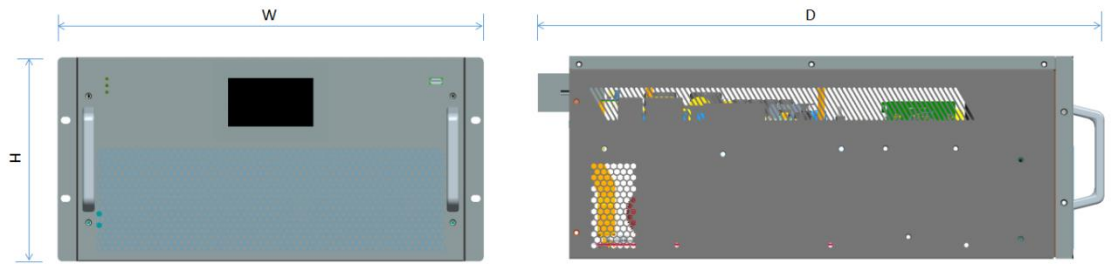


Figure 2-4 SinE Series AHF Rack mounted Module Dimensions

Table 2-4 SinE Series AHF Rack mounted Module Dimensions and weight

Model	Dimensions (W×D×H, mm)	Weight (kg)
SinE-APF-50A	359*538*200	22
SinE-APF-75A	399*626*200	27
SinE-APF-100A	484*646*232	38
SinE-APF-150A	554*656*250	47
SinE-AHF-100A-6	569*697*250	50

## 2.7 Wall-mounted AHF module

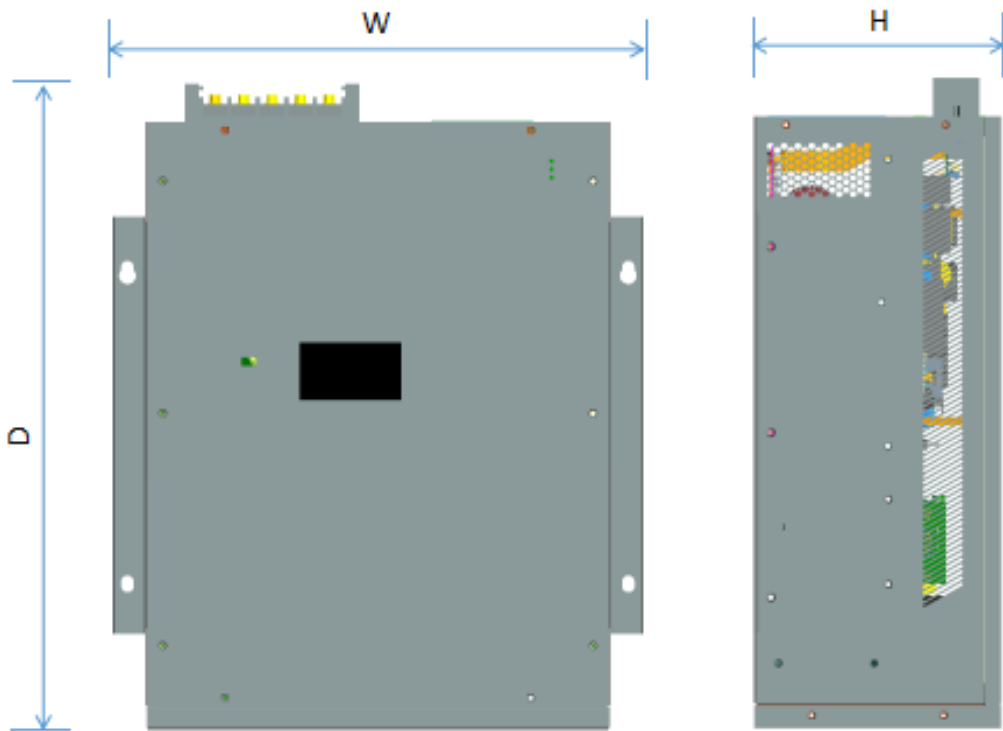


Figure 2-5 SinE Series AHF wall mounted Module Dimensions & Weight

Table 2-5 AHF module specifications

Model	Dimensions (W×D×H, mm)	Weight (kg)
SinE-APF-50A	378 * 525 * 200	22
SinE-APF-75A	418 * 556 * 200	27
SinE-APF-100A	503 * 611 * 232	38
SinE-APF-150A	573 * 621 * 250	47
SinE-AHF-100A-6	588 * 662 * 250	50

## 2.8 MINI wall mounted AHF appearance

Wiring and communication terminals for wall-mounted AHF modules  $\leq 30A$



Figure 2-6 MINI-AHF module's terminals

Table 2-6 Introduction to mechanism of MINI-AHF signal terminal

AS1	AS2	CT terminals
BS1	BS2	
CS1	CS2	
24V +	GND	DC24V output
TA1	TC1	DO×2
TA2	TC2	
DI1 +	DI1-	DI×2
DI2 +	DI2-	
2A +	2B-	RS485, connect to HMI
3A +	3B-	RS485, connect to HMI
H	L	CAN

## 2.9 Rack/Wall mounted AHF appearance

Taking the rack mounted AHF module as an example to introduce the appearance of the AHF.

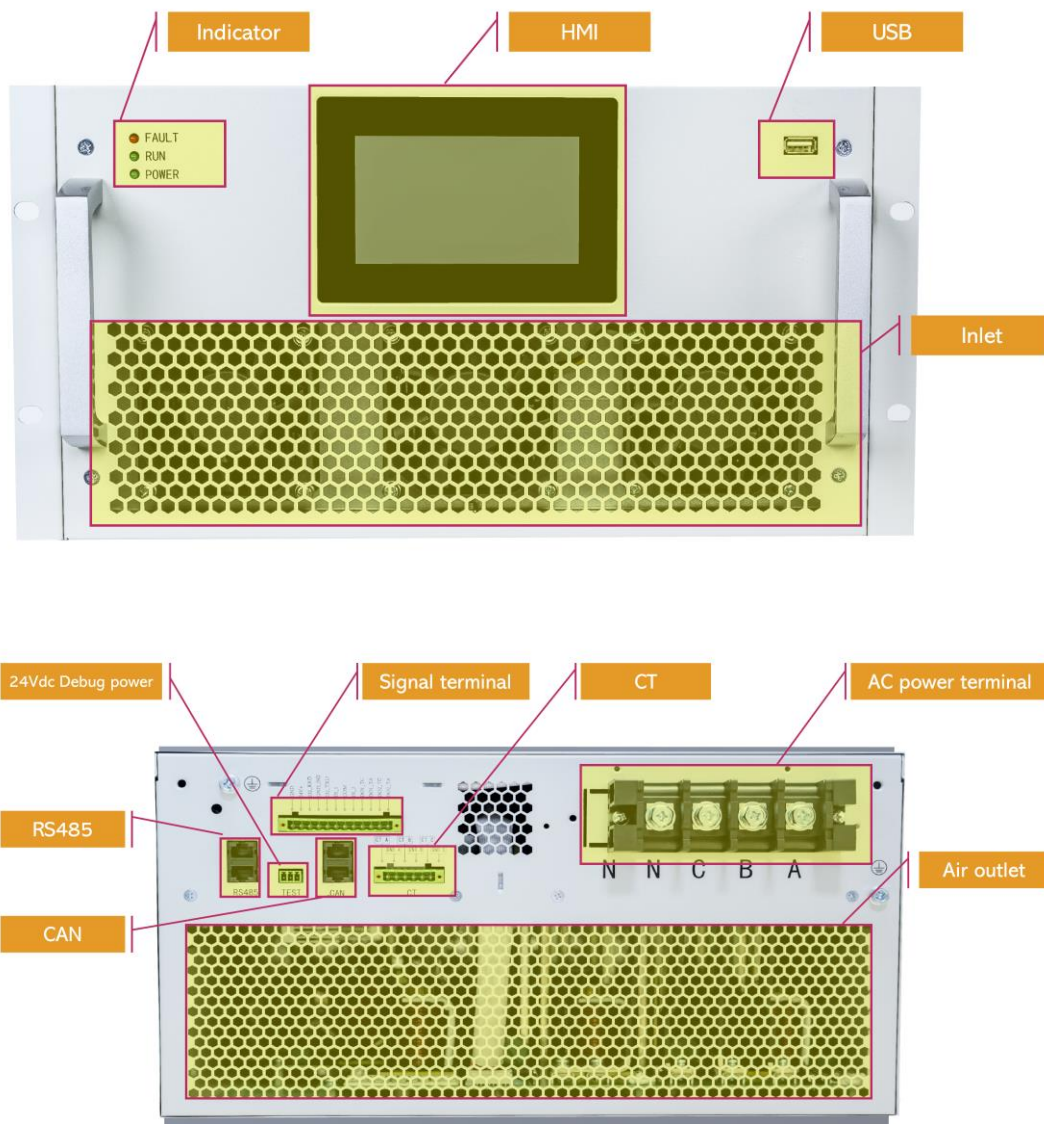


Figure 2-7 AHF module’s appearance

Table 2-7 Introduction to mechanism of AHF appearance

Item	Description
Indicator	Module state indicator
HMI	4.3-inch HMI, optional
USB	Insert a U-disk to upgrade the HMI program
Air inlet	airflow air inlet
24Vdc debug power	24Vdc debugging power input port. Note: use it under the guidance of Enjoypowers.
RS485	communicates with HMI, or SCADA, or parallel work with other module.

CAN	Can be used for module parallel communication
Signal Terminal	Signal terminal
CT	CT terminal
AC power terminal	AC power terminal
Air outlet	airflow air outlet

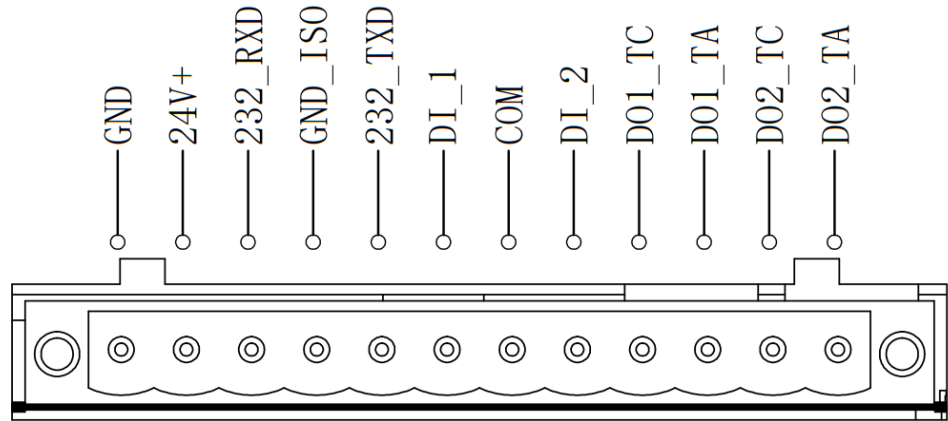


Figure 2-8 SinE Series AHF signal terminal

Table 2-8 SinE Series AHF signal terminal

Signal terminal symbol	Meaning
GND	24V/1A dc output
24V+	
232_RXD	RS232, 9600
GND_ISO	
232_TXD	
DI_1	DI ×2
COM	
DI_2	
DO1_TA	DO×1
DO1_TC	

DO2_TA	DO×1
DO2_TC	



# 3 Installation and Wiring

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AHF module is applicable to many applications and can meet the installation requirements of industrial sites, power distribution rooms and IT data centers. According to different work conditions and environment requirements, the rack mounted module can be installed in a customized cabinet or standard cabinet, and flexible configuration and on-site capacity expansion can be realized based on the current and subsequent capacity requirements.

## 3.1 Pre-installation Confirmation

Since the installation environment varies for different users, please be sure to read this Manual carefully before installation. All installation, assembly and start-up work must be carried out by the qualified professional personnel. If the work is to be carried out by the customer, it shall be under the supervision of the qualified professional personnel. When a forklift or similar lifting equipment is used to handle the device, make sure the lifting capacity is sufficient.

## 3.2 Installation Environment

The AHF device is suitable for indoor installation only. Avoid outdoor installation. Ensure compliance with the IP20 protection rating during installation. For higher protection requirements, please consult the distributor.

Avoid installing the AHF device near dust sources or areas with heavy environmental pollution, as conductive dust may damage the device. Ensure the installation location is free of conductive dust.

Confirm that the transport route and placement location are secure and spacious enough for the AHF system cabinet and forklift.

Due to potential operational noise, consider the impact on noise levels when selecting the installation position for the APF.

Maintain cleanliness in the installation area. Ensure wiring routes are sealed to prevent potential damage from rodents.

Allow ample space for future maintenance in the installation area. For ventilation purposes, avoid placing the AHF against the wall. Leave a 1500mm space in front of the device for front operation, maintenance, and wiring.

Due to potential heat generation during APF operation, ensure the cooling system in the installation environment is sufficient for heat dissipation, preventing the ambient temperature from exceeding the device's normal working temperature.

The device is equipped with cooling fans and features front air inlet and rear air outlet design. Leave at least a 500mm space both in front and behind for ventilation.

Meet the minimum vent flow requirements for every module and system cabinet to ensure normal device cooling. Ensure the air is properly cooled and treated to be free of conductive particles, heavy dust, or hazardous gas before entering the device through the air inlet.

The AHF's working temperature range is  $-10^{\circ}\text{C}$  to  $50^{\circ}\text{C}$ ; beyond this range, the AHF will not operate.

Avoid using the device at altitudes above 1000m. If unavoidable, consider derating or consult the distributor.

The Rack mounted module is recommended for use in a customized system cabinet with a minimum IP20 protection rating. Maintain a distance of at least 10mm between conductive metal cabinet parts and the live terminals of the module.

When using the Rack mounted module separately, provide insulation caps for the live terminals at the back of the module. Consult your supplier for insulation caps.

When the altitude is lower than 1500m, AHF can operate at full load; When the altitude is within the range of 1500m-4000m, the power is reduced by 1% for every 100 meters above 1500 meters.

### 3.3 AHF module wiring

Before connecting cables or electronic components, be sure to cut off the input power to the AHF module to avoid accidents.

The AHF module must be well grounded to avoid damage caused by leakage.

Please ensure that the wire diameter and phase sequence of the power line of the AHF module are correct. For the wire diameter of the power line, please refer to Table 3-1.

Table 3-1 Recommended wire diameter and switching capacity

Voltage(V)	Capacity	Power wire (mm <sup>2</sup> )			Switch(A)	
	AHF(A)	A/B/C	(L1/L2/L3)	N		PE
400	7.5		4	4	2.5	16
	15		6	6	4	32
	30		10	10	6	60
	50		16	25	16	80
	75		25	35	16	125
	100		35	35	16	160
	150		50	50	25	250
200		70	70	25	400	

690	100	35	35	16	160
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## 3.4 CT installation & wiring

### 3.4.1 CT Selection Precautions

The appropriate rated ratio of primary to secondary current shall be determined. The primary current is recommended to be  $1.2\sim 1.5 \cdot I_n$  (the actual rated current of the testing point).

The rated voltage is 0.5KV or 0.66KV.

The secondary current is 5A.

The nominal secondary capacity (rated load) of the CT shall meet the requirement of secondary impedance ( $\geq 5VA$  when the secondary current is 5A).

For the wire diameter and maximum one-way wiring length from CT to AHF, refer to Table 3.2.

Table 3-2 Recommended CT wire diameter and length

CT rated power	wire diameter	maximum one-way wiring length
5VA	2.5 mm <sup>2</sup>	$\leq 10m$
	4.0 mm <sup>2</sup>	10m~20m
10VA	2.5 mm <sup>2</sup>	$\leq 20m$
	4.0 mm <sup>2</sup>	20~40m
15VA	2.5 mm <sup>2</sup>	$\leq 30m$
	4.0 mm <sup>2</sup>	30~60m

### 3.4.2 Basic CT installation & wiring

The CT for current detection shall be located on the side of the harmonic source to feed the detection signal to the APF, as shown in Figure 3-1.

A set of three CTs must be provided for current detection of the harmonic source.

The CTs must be oriented accurately.

The phase sequences of the detection signal of the CTs must not be exchanged.

The secondary output S1 of CT1 for A-phase detection must be connected to the terminal board CT\_A, and the S2 outgoing line must be connected to the terminal board GND\_A.

The secondary output S1 of CT2 for B-phase detection must be connected to the terminal board CT\_B, and the S2 outgoing line must be connected to the terminal board GND\_B.

The secondary output S1 of CT3 for C-phase detection must be connected to the terminal board CT\_C, and the S2 outgoing line must be connected to the terminal board GND\_C.

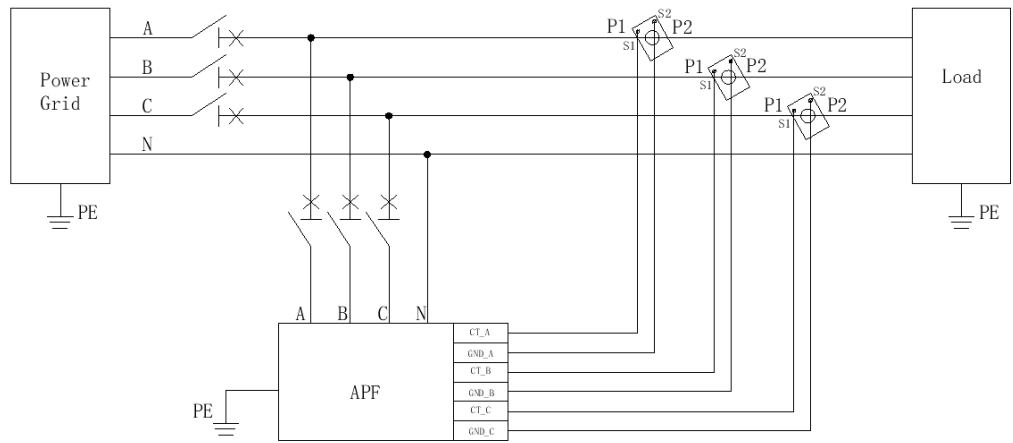


Figure 3-1 The position of CT wiring is on the load side

### 3.4.3 CT installation and wiring for multiple AHF modules

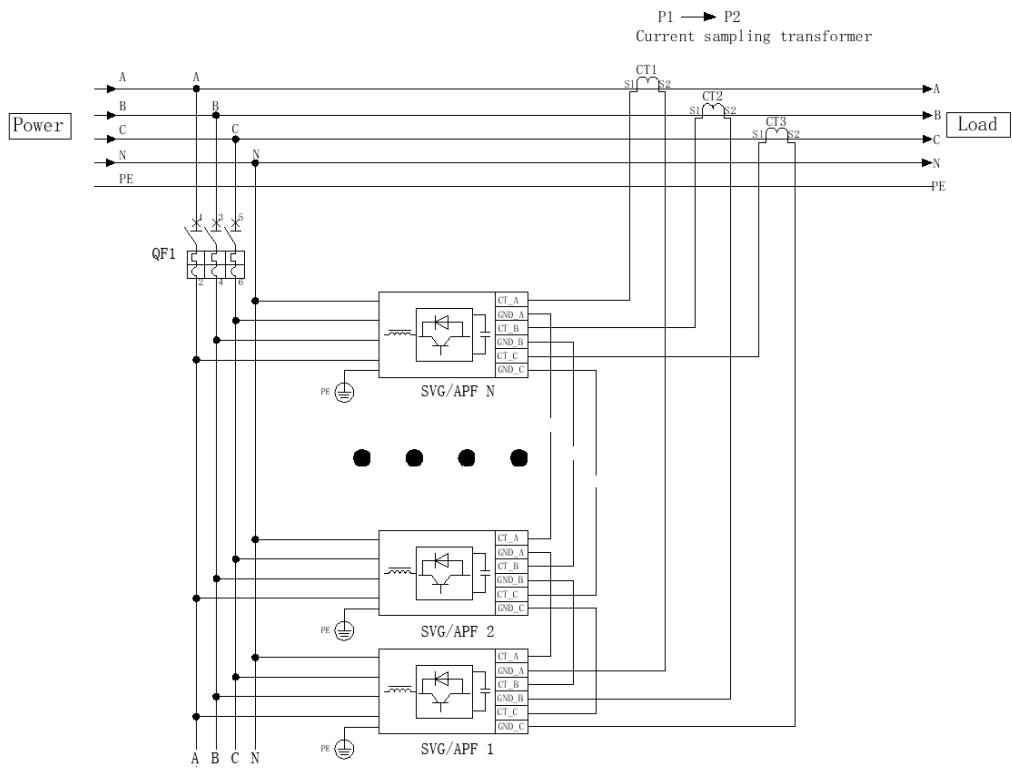


Figure 3-2 multiple modules are running in parallel; the CT wiring position is on the load side.

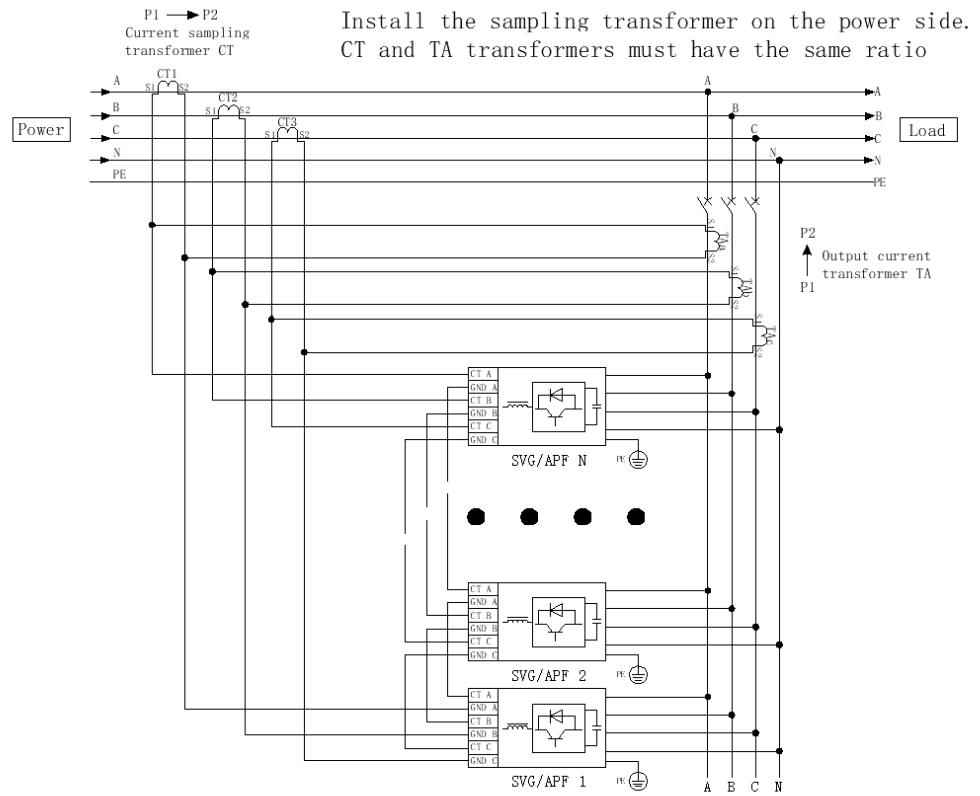
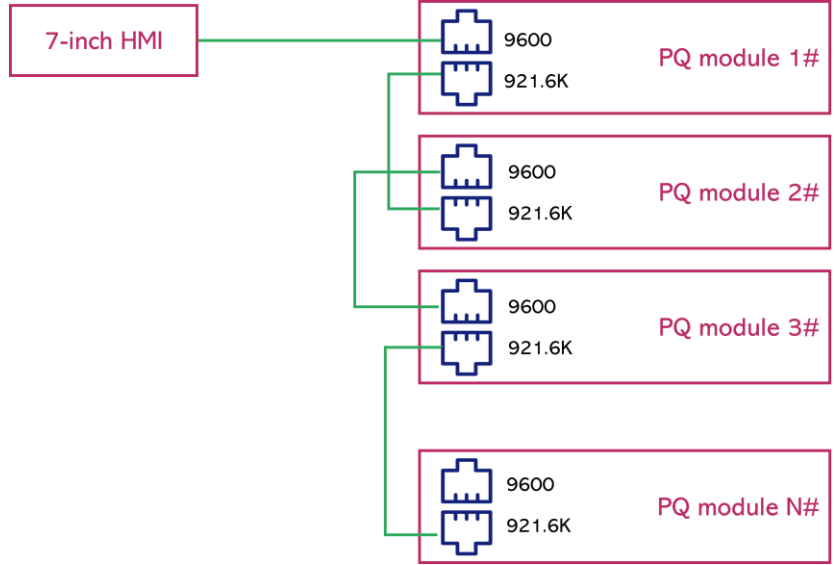


Figure 3-3 multiple modules are running in parallel, the CT wiring position is on the grid side

### 3.5 Parallel cable connection

When paralleling multiple AHF modules, please ensure that the upper RS485 is connected to the upper one, and the lower RS485 is connected to the lower one, just like holding hands.

Figure 3-4 multiple modules are running in parallel, the communication cable



# 4 Operation procedure

---

## 4.1 Checks before Start-up



**There is a risk of electric shock, explosion, or arc burns.**

Please use appropriate personal protective equipment (PPE) and follow electrical safety practices!

Installation and maintenance work on the equipment should only be carried out by professional electricians, and non-professionals are strictly prohibited from operating the equipment!

It is strictly forbidden to exceed the rated maximum limits of the equipment!

Ensure correct wiring of the power terminals!

There is a significant leakage current during equipment operation; before connecting the power, ground the equipment according to the provided grounding connection points!

Before energizing, carefully check if any tools are left on the equipment!

CT terminals must have securely tightened anti-loosening screws, and open circuits in CT are strictly prohibited!

CT terminals must be connected as indicated, and misconnections are strictly prohibited!

**Failure to comply with the above instructions may result in death or serious electric shock injuries!**

Before starting the AHF, please perform the following checks to ensure the proper functioning of the equipment:

- Cabinet or Wall Mounting: Ensure that the AHF is securely installed either in the cabinet or on the wall to ensure stability and safety.

- **AC Power Line Wiring Accuracy:** Use a multimeter to check the wiring of the AC power lines, ensuring accurate connections and avoiding short circuits or other wiring issues.
- **CT Wiring Accuracy:** Check the wiring of the CT to ensure correct and error-free connections. Simultaneously, inspect the CT's installation position and phase sequence to ensure accurate current measurement.
- **PE Ground Check:** Ensure the proper grounding of the PE for the AHF; this is a crucial step to ensure the safe operation of the equipment.
- **Environmental Conditions Check:** Examine the operating environment of the AHF to ensure compliance with the specifications outlined in section 3.2. Pay particular attention to environmental parameters such as working temperature and humidity to ensure they fall within the specified ranges.

By conducting these checks, the start-up stability of the AHF equipment can be enhanced, the risk of malfunctions reduced, and optimal performance achieved during normal operation. If there are any questions or further checks needed, consult with relevant professionals.

## 4.2 Start-up Procedures

Switch the main circuit breaker of the AHF to the ON position.

The internal auxiliary power supply of the AHF will initiate, and the fans will start running. Check if the POWER LED indicator on the front panel of the AHF is illuminated. The HMI will enter the startup screen, establish communication with the AHF, retrieve messages, and verify the absence of any faults.

Set the parameters and operating mode of the AHF on the HMI. For detailed HMI settings, refer to Chapter Five: LCM Display and Settings.

Initiate the operation of the AHF through the HMI and wait for 30 seconds for the AHF to start. The RUN indicator will illuminate when the AHF has successfully started and is operating normally. Confirm that the transport route and placement location are secure and spacious enough for the AHF system cabinet and forklift.

## 4.3 Start-up modes

The AHF module offers two startup modes: Automatic Mode and Manual Mode.

- **Automatic Mode:** In this mode, the AHF will initiate automatically upon power-up.
- **Manual Mode:** In this mode, the AHF requires manual initiation through the HMI after powering up.

The default startup mode for the AHF module is Manual Mode. Users can choose the preferred startup mode by selecting the appropriate option in the "**Start-up Mode**" section on the HMI, according to their specific requirements.

## 4.4 Shutdown Procedure

When it is necessary to power off the AHF module (or a multi-AHF module parallel system), the shutdown procedure can be performed. The shutdown steps are as follows:



Turn off the harmonic output of the AHF by pressing the "STOP" button on the control interface; the AHF will shut down.

Power off. Disconnect the circuit breaker switch between the mains power and the AHF module, ensuring the system is completely powered off.



**Risk of electric shock, explosion, or arc burn**

After power-off, wait for 15 minutes to allow the capacitors inside the AHF module to discharge!

Always use appropriate sensing devices with rated voltage to confirm whether the AHF module is completely de-energized!

**Failure to follow the above instructions may result in death or serious electrical injury!**

# 5 HMI display and settings

HMI is mainly used to view the operating data and parameters of AHF and can set the operating mode and setting parameters of AHF according to needs.

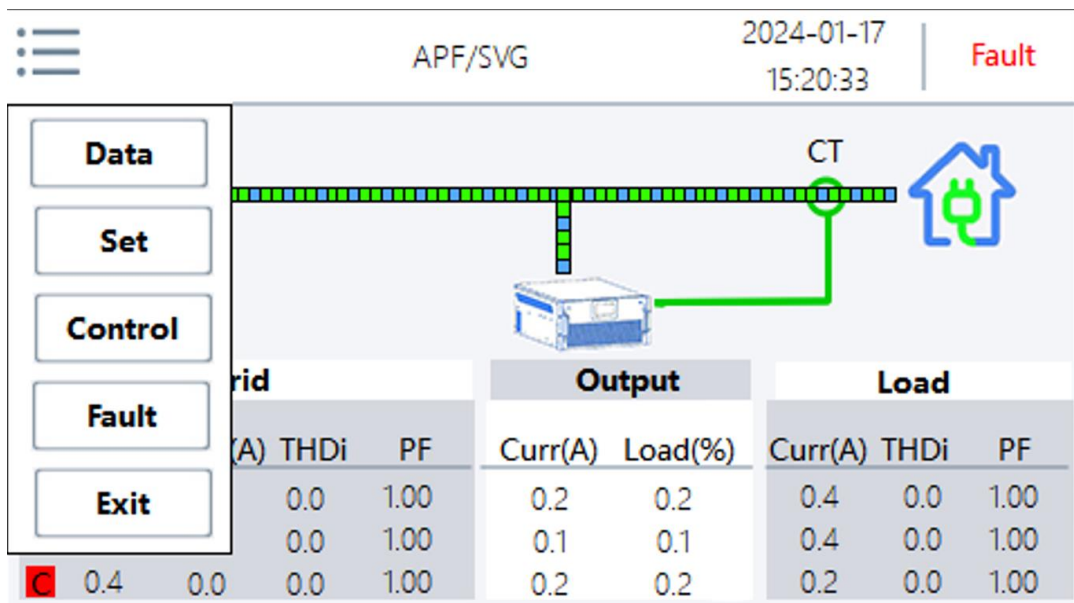


Figure 5-1 The home of HMI

The HOME page of the HMI presents the operational data and function keys for the AHF, featuring:

**Operational Data:** Includes status parameters for AHF, the power grid, and the load.

**AHF Operation Schematic:** View the illustration to determine whether the CT is installed on the load side or the grid side.

"☰" Button: access additional data, settings, controls, and fault information.

**Time:** Indicates the current time of the HMI.

**Operation Status:** Displays the operational status: run, standby, and fault status of the AHF.

## 5.2 HMI Display Hierarchy

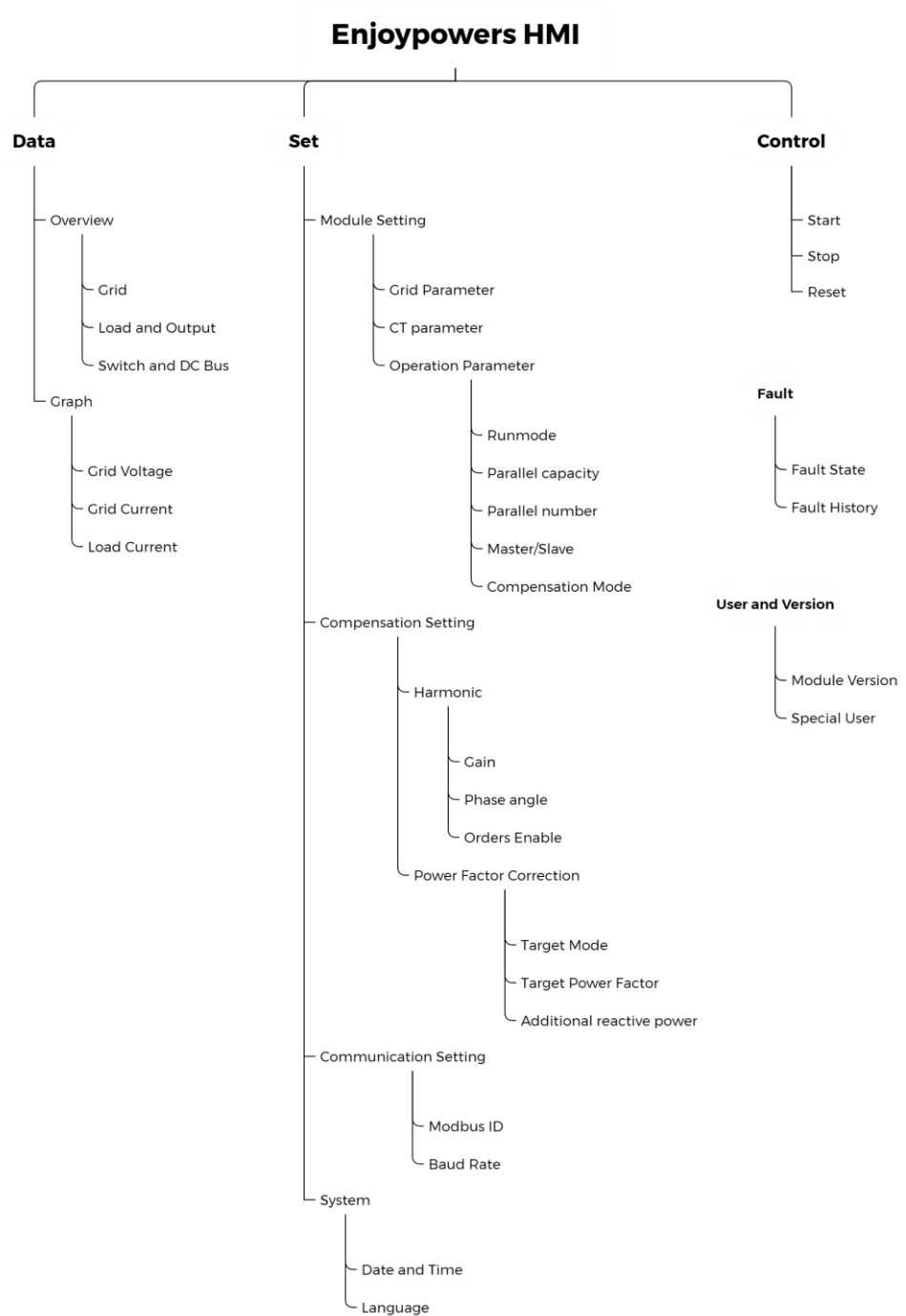


Figure 5-2 The hierarchy of HMI

## 5.3 HMI Data interface

The HMI data interface provides a display of the grid side, load side, and operational data of the AHF module. By selecting the "Spectrum" menu, this interface presents a bar chart illustrating the harmonic content of any phase on both the grid side and the load side.

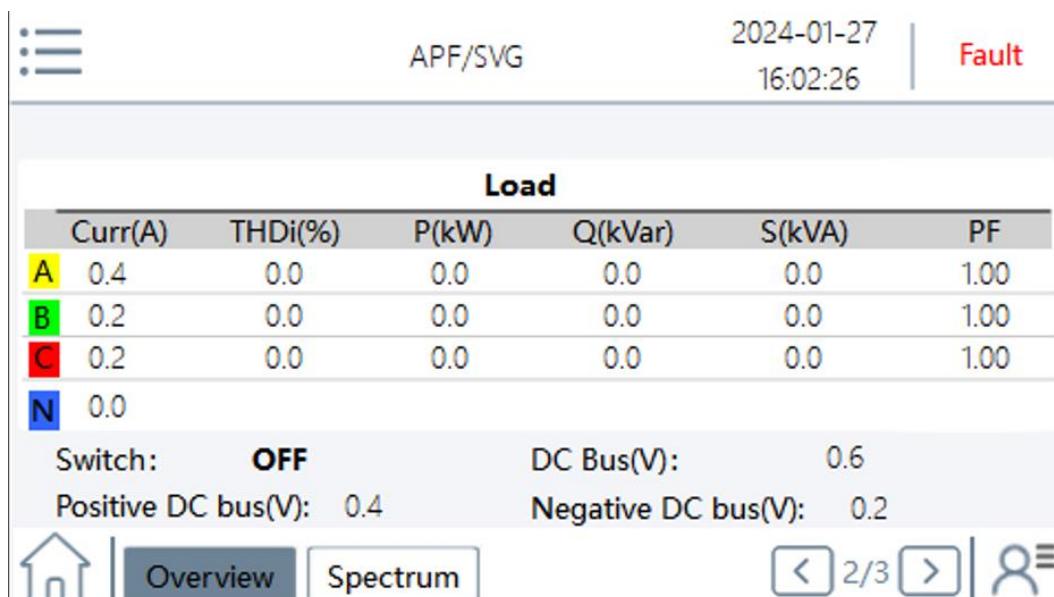


Figure 5-3 multiple modules are running in parallel, the CT wiring position is on the grid side

## 5.4 HMI setting interface

Enjoppowers' AHF primarily focuses on filtering harmonic currents from the grid while also providing compensation for grid reactive power and imbalance. In the configuration interface, users can set the corresponding operating mode and adjust device operation parameters based on the on-site grid conditions.

The HMI includes four submenu interfaces: "Module Settings," "Compensation Settings," "Communication Settings," and "System Settings."

### 5.4.1 Module setting interface

Module Configuration allows for the adjustment of grid parameters, CT parameters, and operational parameters. Within operational parameters, users can set the startup mode, parallel capacity, number of parallel modules, master/slave configuration, and compensation mode.

- **Grid Parameter Settings:**

Phase System: 3P3W or 3P4W

Voltage: Default voltage is 400V

Frequency: 50Hz or 60Hz

- **CT Parameter Settings:**

CT Ratio: Set within the range of 50-5000, with a secondary side current of 5A

CT Location: Options include "Load Side" and "Grid Side," selected based on the actual installation position of the external CT.

CT Direction: P1->P2 or P2->P1

- **Operational Parameters:**

Startup Mode: Choose between automatic and manual modes.

In "Automatic Mode," the AHF will automatically begin filtering output upon system power-up.

In "Manual Mode," manual initiation through the HMI is required.

Default is "Manual Mode."

- **Operating Modes:**

The dropdown menu below the input box contains up to 9 operating modes, including harmonic compensation, power factor correction, and three-phase imbalance correction, as well as various combinations of these modes. Users can choose the corresponding operating mode based on the actual grid or load conditions on-site.

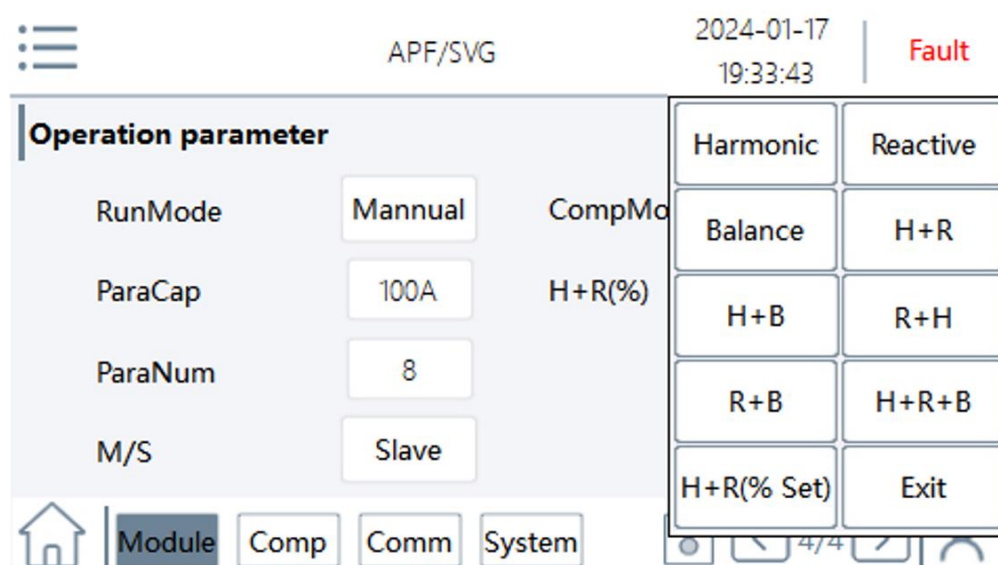


Figure 5-4 Compensation mode setting page

**Harmonic Compensation Mode:**

A mode solely dedicated to compensating harmonics, where the AHF will only filter out harmonics from the grid.

**Various Hybrid Operating Modes:**

By selecting relevant modes, the AHF will compensate sequentially based on the output capacity status of the device. For example, choosing the "Harmonic + Reactive + Unbalance" operating mode will initiate harmonic compensation first. Subsequently, based on the remaining output capacity of the device, it will compensate for grid reactive power and imbalance in sequence.

- **Capacity Settings:**

Parallel Capacity: The total capacity of the parallel system. This input box should be filled with the corresponding total current capacity value of the parallel module, measured in Amperes (A).

Number of Parallel Modules: Setting the total number of parallel AHF modules. The range is from 1 to 8.

M/S: Setting the master/slave configuration.

### 5.4.2 Compensation setting interface

This interface displays real-time data for THDi of grid and load.

**Harmonic compensation:**

Compensation gain for harmonics from the 2nd to the 50th order.

Phase angle offset for harmonics from the 2nd to the 50th order.

Enable compensation for harmonics from the 2nd to the 50th order.

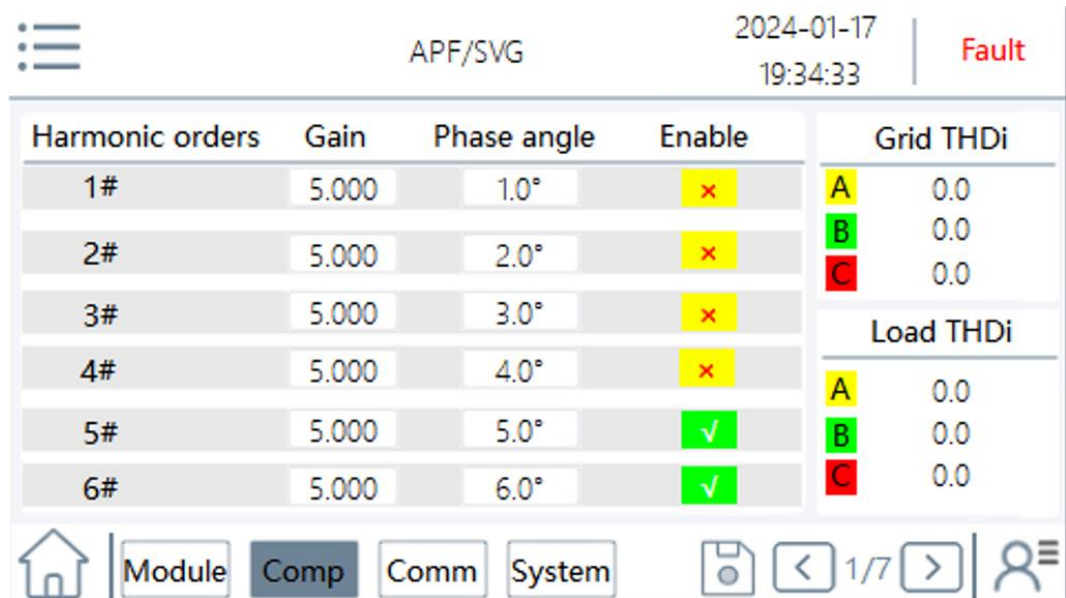


Figure 5-5 Harmonic filter parameter setting page

**Reactive power compensation:**

Two correction target modes can be set: PF mode and kVar mode.

PF Mode: Provides power factor correction based on the target PF.

kVar Mode: In addition to power factor correction based on the target PF, it allows the user to set an additional kVar value.

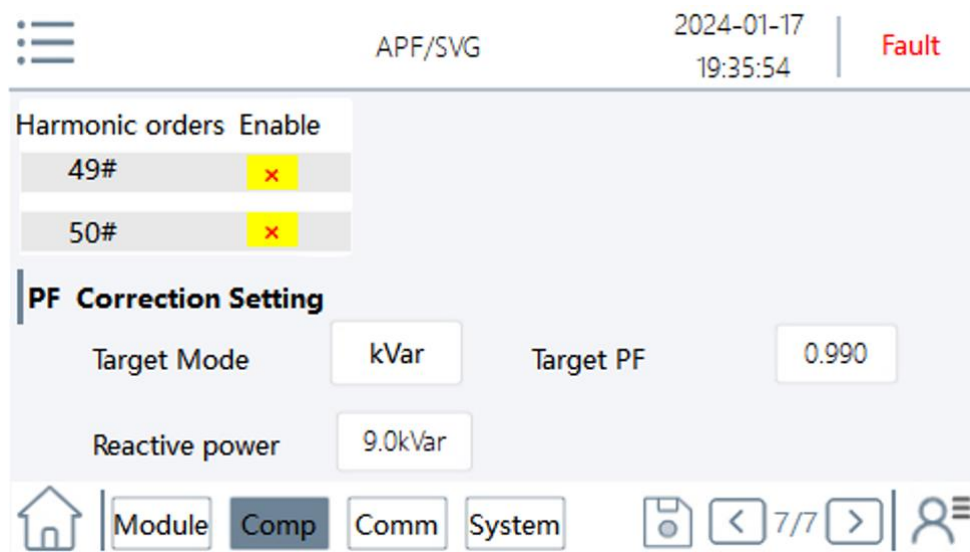


Figure 5-6 Power factor correction parameter setting page

## 5.5 HMI control interface

On the control interface, three buttons are provided:

**Start:** After the device is installed and checked, pressing this button will start the AHF module, and it will run after 30 seconds.

**Stop:** Stop the operation of the AHF module.

**Reset:** Press this button to reset the device after a fault has occurred and been resolved.



Figure 5-7 Control page

## 5.6 HMI Fault interface

On this interface, you can view the fault status information of the AHF module, as well as check the history of alarm messages.

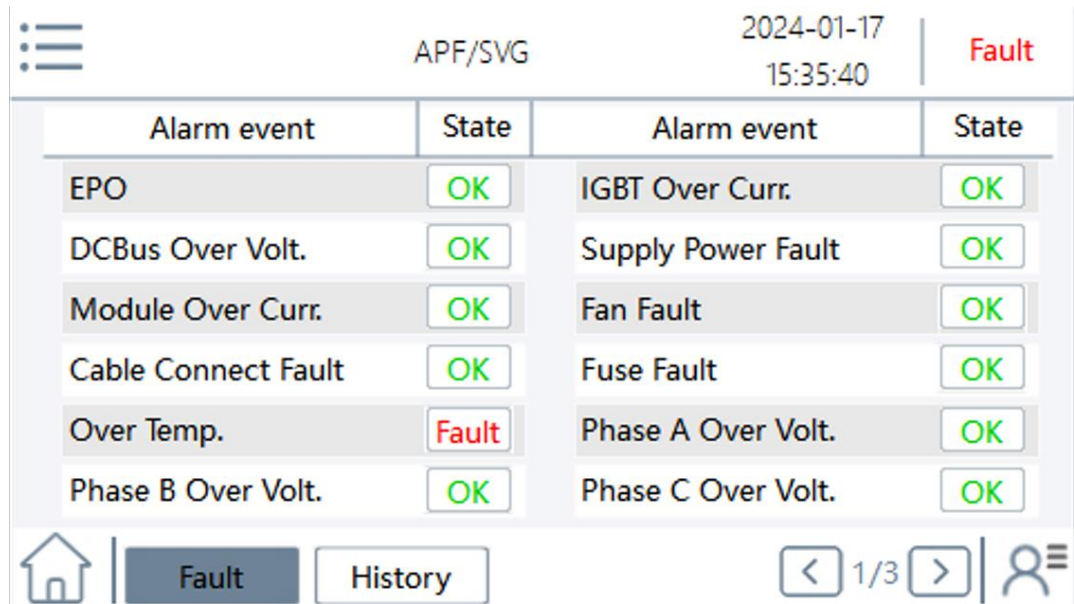


Figure 5-8 Fault page

## 5.7 Version and special users

This interface provides various software version information for the module.

Special users can log in to the AHF module to set more parameters. This operation must be completed under the guidance of Enjyopowers.



Figure 5-9 Version and special users



# 6 Maintenance

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Cleaning of the AHF: please contact service personnel for regular cleaning of the AHF (every 6 months. However, it is recommended that the customer clean up the dust on the baffles of air inlet and outlet every 3 months).

Regular inspection of the AHF: please contact service personnel for maintenance of the AHF (every 6 months).

# 7 Troubleshooting

If any fault message is found, please refer to the table below for the corresponding solution.

Table 7-1 AHF module specifications

<b>Fault message</b>	<b>Solution</b>
EPO fault	Check the EPO signal. After the EPO signal is released, RESET can clear the alarm.
IGBT hardware over streams	Restart AHF after RESET
Bus hardware over voltages	Check the bus voltage data in the HMI. The normal value is 650V.
Module hardware over streams	Check whether the CT installation is accurate.
Auxiliary power failure	Please contact Enjyopowers
Fan failure	Check that the fan is operating properly. If the fan is not running, replace the fan.
Board connection failure	Restart AHF after RESET
Damaged fuse	Restart AHF after RESET
The power module is over heated	Check the ambient temperature and the module's air inlet.
Over voltage	Check the voltage of Grid
Grid over frequency	Check the frequency of Grid

Grid under frequency	Check the frequency of Grid
The grid phase sequence is reversed	Check the phase sequence of the Grid
A phase pass	Reduce the grid input current value,
B phase overflow	Reduce the grid input current value,
C phase overflow	Reduce the grid input current value,
over voltage of the pre-charged bus	Click RESET to shut down, cut off the power and adjust the bus to take power
Pre-charge bus under voltage	Click RESET to shut down, cut off the power and adjust the bus to take power
Do not control the under voltage of the rectifier bus	Click RESET to shut down, power off and restart
Run the bus over voltage	Check whether the bus voltage is normal
Run the bus under voltage	Check whether the bus voltage is normal
The positive and negative bus bars are not balanced	Check if the N line is connected
Error in communication protocol	Check whether the connection between AHF and HMI is normal
EEPROM failure	Restart AHF after RESET
Auxiliary DSP fault	Restart AHF after RESET
Synchronous phase locking between DSPs	Restart AHF after RESET
System resonance	Restart AHF after RESET
AHF does not communicate with HMI	Check the communication line between AHF and HMI, and the baud rate of AHF

# 8 Warranty

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AHF module is applicable to many applications and can meet the installation requirements of industrial sites, power distribution rooms and IT data centers. According to different work conditions and environment requirements, the rack mounted module can be installed in a customized cabinet or standard cabinet, and flexible configuration and on-site capacity expansion can be realized based on the current and subsequent capacity requirements.

Enjoypowers warrants this product, if used in accordance with all applicable instructions, to be free from original defects in material and workmanship within the warranty period. If the product has any failure problem within the warranty period, Enjoypowers will repair or replace the product at its sole discretion according to the failure situation.

This warranty does not apply to normal wear or to damage resulting from improper installation, operation, usage, maintenance, or irresistible force (i.e. war, fire, natural disaster, etc.), and this warranty also expressly excludes all incidental and consequential damages.

Maintenance service for a fee is provided for any damage out of the warranty period. If any maintenance is required, please directly contact the supplier or Enjoypowers.

## **WARNING!**

The individual user should take care to determine prior to use whether the environment and the load characteristic are suitable, adequate, or safe for the installation and the usage of this product. The User Manual must be carefully followed. Enjoypowers makes no representation or warranty as to the suitability or fitness of this product for any specific application.

