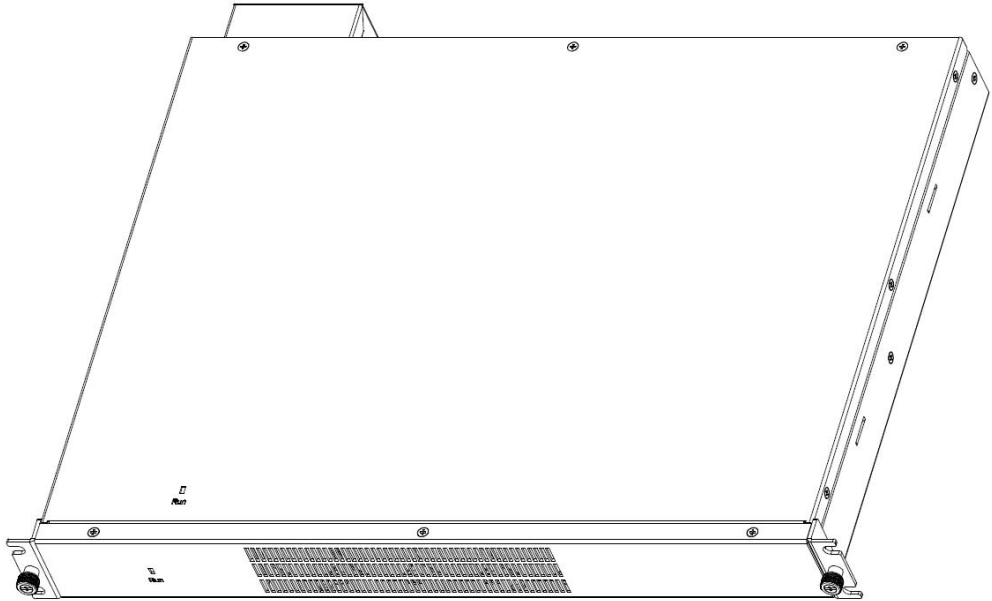


## Sinexcel Blade Active Harmonic Filter User's Manual



- *Before use, please read this user's manual carefully and keep it properly.*
- *This user's manual contains use description of the accessories.*

## **15A Active Harmonic Filter Module User's Manual**

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Shenzhen Sinexcel Electric Co., Ltd. ("Sinexcel") provides its customers with all-around technical support. Users can contact Sinexcel's local office or customer service center or directly contact Sinexcel Headquarters.

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## Chapter I Safety instructions

Welcome to use Sinexcel 15A Active Harmonic Filter Module. Before use, please read the safety instructions carefully and use the product correctly. The safety instructions record such important contents that can enable you to use the product safely and correctly and prevent you or others from personal injuries or property loss. Please keep the safety instructions properly after reading it so that all product users can review it at any time.




The following diagrams and symbols are used in this manual to classify and describe the contents which must be followed.

 <b>Danger</b>	It indicates that if this instruction is not followed or the operation is improper, it will be highly possible to result in death or serious injury.
 <b>Warning</b>	It indicates that if this instruction is not followed or the operation is improper, it will be possible to result in death or serious injury.
 <b>Attention</b>	It indicates that if this instruction is not followed or the operation is improper, it will be possible to result in personnel injury and article damage.







### Safety precautions

 <b>Danger</b>	Active Harmonic Filter cannot be exposed in rainwater or a wet place. It must be kept away from flammable liquid, flammable gas, corrosive substance or explosive.
 <b>Danger</b>	High voltage is dangerous, and large bulk capacitance exists. Disassembly can be carried out after discharging for over 5 minutes and full discharging.
 <b>Warning</b>	Any maintenance must be conducted by qualified technicians. Before maintenance, all power supplies must be cut off.
 <b>Attention</b>	Sufficient space must be reserved in front and at the back of Active Harmonic Filter so as to maintain good ventilation and facilitate maintenance.
 <b>Attention</b>	Active Harmonic Filter must be installed by trained and qualified personnel and operated in a controllable working environment.
 <b>Attention</b>	Please read this user's manual before power supply connection and keep this manual as a permanent reference.



## Wiring precautions

 Warning	To prevent the danger caused by leakage current, Active Harmonic Filter should be grounded well.
 Warning	As for wiring, compensation capacity and wiring current-carrying capability must be fully taken into consideration.
 Warning	Incoming line terminal must be connected with a protective device (such as a breaker), and the capacity of the protective device needs to match with the capacity of Active Harmonic Filter.

## Precautions for use

 Attention	The Active Harmonic Filter is used for compensating power harmonics. Its capacity must be selected according to harmonic content so as to prevent compensation effect from being affected by insufficient capacity.
 Attention	The Active Harmonic Filter must be used with a current transformer.
 Attention	To ensure that the Active Harmonic Filter has good reliability and overheating is avoided, air outlet should not be blocked.
 Attention	There should be no corrosive gas and conductive dust. The environment temperature goes between $-20^{\circ}\text{C} \sim 50^{\circ}\text{C}$ . If it is beyond this temperature range, the Active Harmonic Filter might not be operated normally.
 Attention	When the voltage distortion rate of power grid is higher than 15%, users need to propose special instructions so that Sinexcel provides different solutions.
 Attention	<b>It is necessary to check whether the N wire is connected correctly, otherwise the equipment will be damaged directly.</b>

## Storage precautions

	Use original packing materials to seal the Active Harmonic Filter so as to prevent any damage caused by mice invasion.
Attention	
	If no immediate installation is required, please put the Active Harmonic Filter in a dry and ventilated indoor environment. The storage temperature is maintained between -40°C~70°C, and the relative humidity goes between 5%~95%.
Attention	

## Product standards

This product shall comply with the following safety and electromagnetic compatibility standards:

1. IEEE519-1992: *Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems*
2. EMC: IEC61000-6-2: *Electromagnetic Compatibility (EMC) - Part 6-2: Generic Standards - Immunity for Industrial Environments*
3. EMC: IEC61000-6-4: *Electromagnetic Compatibility (EMC) - Part 6-4: Generic Standards - Emission Standard for Industrial Environments*
4. ESD: IEC61000-4-2: *Electromagnetic Compatibility-Testing and Measurement Techniques - Electrostatic Discharge Immunity Test*
5. RS: IEC61000-4-3: *Electromagnetic Compatibility-Testing and Measurement Techniques - Radiated Radio-frequency Electromagnetic Field Immunity Test*
6. EFT: IEC61000-4-4: *Electromagnetic Compatibility-Testing and Measurement Techniques - Electrical Fast Transient/Burst Immunity Test*
7. SURGE: IEC61000-4-5: *Electromagnetic Compatibility-Testing and Measurement Techniques - Surge Immunity Test*
8. DIP: IEC61000-4-11: *Electromagnetic Compatibility-Testing and Measurement Techniques - Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests*
9. CS: IEC61000-4-6: *Electromagnetic Compatibility-Testing and Measurement Techniques - Immunity to Conducted Disturbance, Induced by Radio-Frequency Fields*
10. IEC60068-2-6: *Environmental Testing - Part 2-6: Tests-Test Fc: Vibration (Sinusoidal)*
11. IEC60068-2-27: *Environmental Testing - Part 2-27: Tests-Test Ea: Guidance: Shock*
12. EN 50178:1998: *Electronic Equipment for Use in Power Installations*
13. EN 61000-6-2:2005: Part 6-2: Generic Standards-Immunity for Industrial Environments. *Electromagnetic Compatibility (EMC) - Part 6-4: Generic Standards - Emission Standard for Industrial Environments*
14. GB 7251.1, GB/T 7251.8: *Low-voltage Switchgear and Control Gear Assemblies--General Technology Requirement for Intelligent Assemblies*

15. GB 15576-2008: *The Specifications of Low-voltage Reactive Power Steady Compensation Equipments*

## Chapter II Overview

### 2.1 AHF 15A device

15A Active Harmonic Filter is mainly used for local control solution, treats harmonics by root, filters harmonics from the source and eliminate harmonic pollution. It is particularly applicable to small power harmonic source device. AHF15A device is highly cost-effective and can precisely control the tiny harmonic gaps and perfectly achieve a non-harmonic power grid environment.

### 2.2 Overall dimension

The dimension of 15A Active Harmonic Filter is 410mm (width) ×315mm (depth) ×45mm (height) (excluding handle on the front panel, protruded parts such as power terminal on the back panel), as shown in Fig. 2-1.

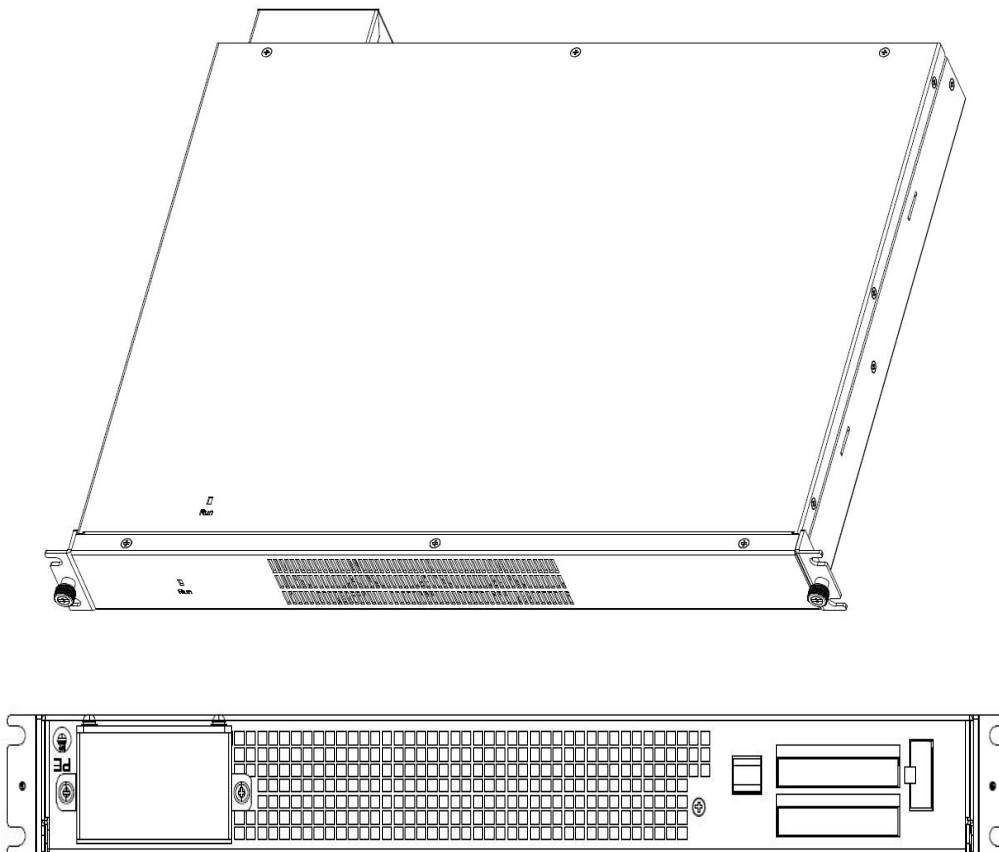


Fig. 2-1 Overall dimension

15A Active Harmonic Filter can be installed in rack-mounted type and wall-mounted type. In rack-mounted



type, the product can be installed and fixed with four screw holes. The hole size is shown in Fig. 2-2 (unit: mm).

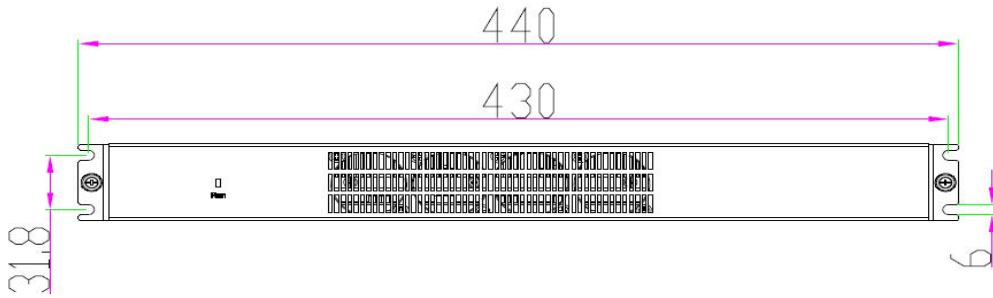


Fig. 2-2 Hole size diagram for AHF15A with rack-mounted type

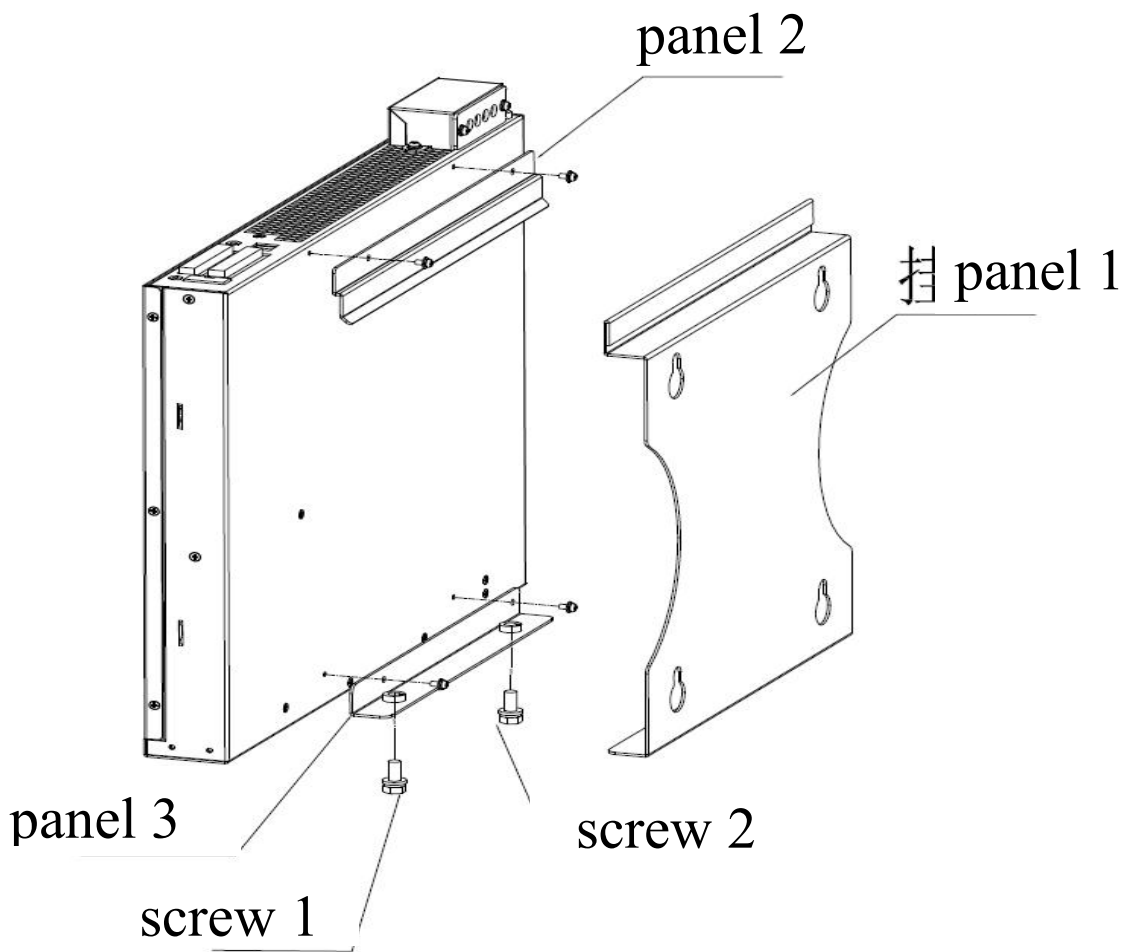
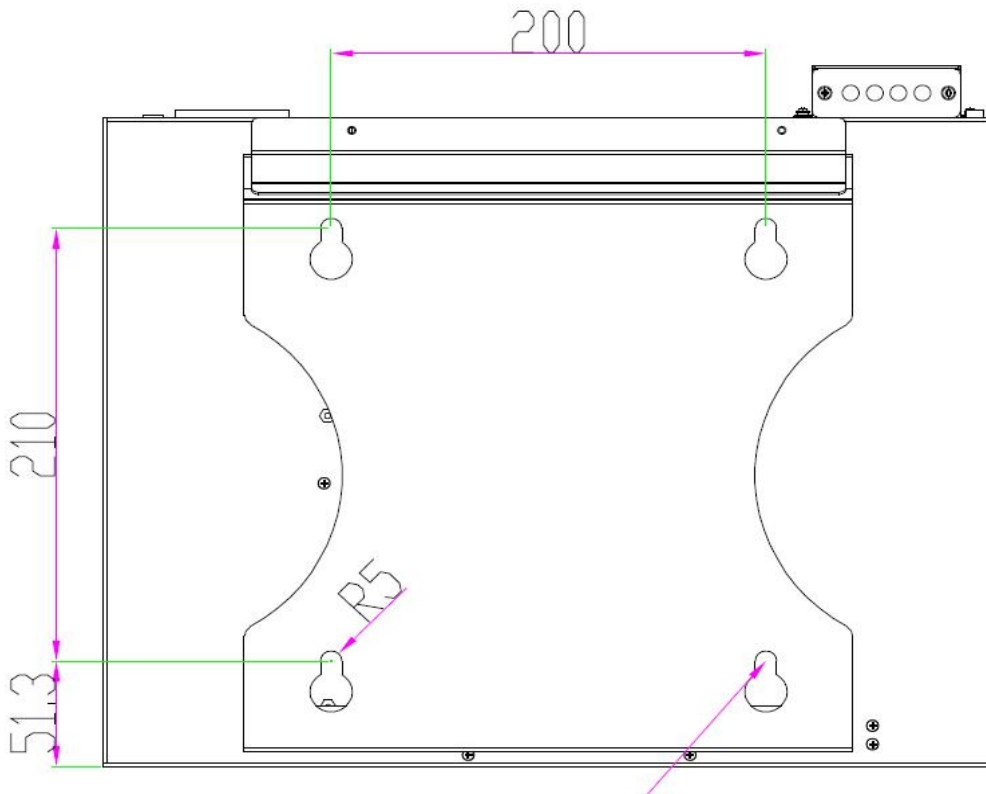


Fig. 2-3 Installation diagram for AHF15A with wall-mounted type

Installation of 15A Active Harmonic Filter with wall-mounted type is shown in Fig. 2-3. Firstly, install the hanging panel 1 on the wall. The installation hole size of the hanging panel 1 is shown in Fig. 2-4 (unit: mm). Then, use screws to fix the hanging panel 2 and the hanging panel 3 on AHF15. AHF15 is hung on the hanging panel 1. Finally, use screw 1 and screw 2 to fix AHF and the hanging panel 1.



Fasten by M8 bolt

Fig. 2-4 Hole size diagram for hanging panel 1 of AHF15A with wall-mounted type

## 2.3 Module model

The standard model of Sinexcel 15A Active Harmonic Filter is WIFI type. If any customers need 7-inch monitoring screen, please contact Sinexcel engineers.

## 2.4 Distribution port

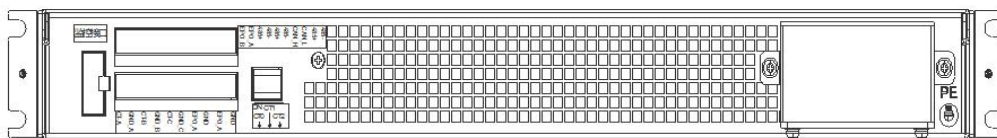


Fig. 2-5 Schematic diagram for AHF15A distribution port

As shown in Fig. 2-5, all wiring terminals of Sinexcel AHF 15A Active Harmonic Filter are located at the back of the module. Power wiring terminals include:

- (1) A: A-phase supply terminals;
- (2) B: B-phase supply terminals;

(3) C: C-phase supply terminals;

(4) N: two neutral wire terminals;

(5) PE: System ground terminal. System housing is made with metal. To prevent the accident against personal safety, the house must be connected with the ground via the terminal before the system is started.

(6) CT\_A (B, C): It is used to connect the secondary polarity of 3-phase CT (current transformer). The maximum allowable input current for each phase is 5A rms.

Refer to Appendix 2 for selection of power cables and port lines.

Signal interface is shown in Fig.2-6. Refer to Table 2-1 for description of CT and communication signal.

Dial switch is at the top left corner of the back of module and used to set the parallel operation number and differentiate different modules (such as module 1, module 2...module N) when multiple parallel operation devices are collectively monitored. The dial switch is in 3 digits in which the last digit in the right is a reserved digit. The relation between dial switch and machine number is expressed with binary system. Refer to Table 2-2 for specific dial code operation.

When the module has its WIFI operated independently or there is only one module in collective monitoring, the machine number needs to be set as 1 (namely 000) with a dial switch. Note: Do not modify the commissioned dial codes.

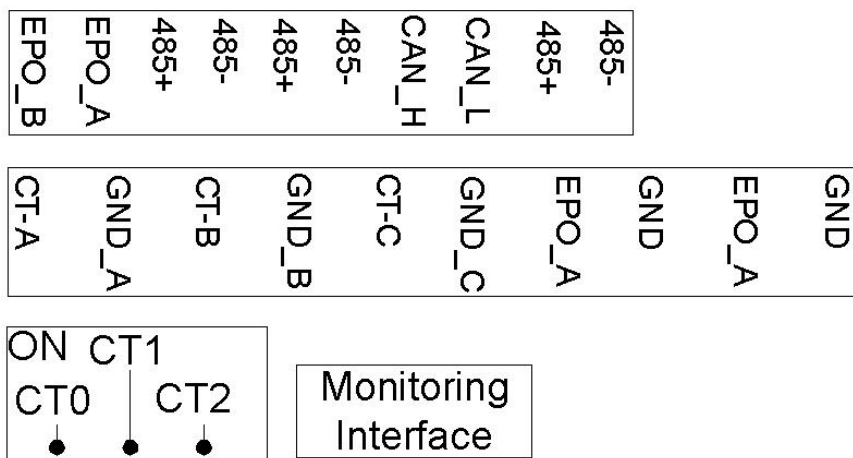


Fig.2-6 CT and signal interface

Table 2-1 Description of CT and communication signal

Mark		Description
CT	CT_A	Connect S1 terminal of A-phase CT
	GND_A	Connect S2 terminal of A-phase CT
CT	CT_B	Connect S1 terminal of B-phase CT
	GND_B	Connect S2 terminal of B-phase CT
CT	CT_C	Connect S1 terminal of C-phase CT
	GND_C	Connect S2 terminal of C-phase CT
EPO	EPO_A	Externally connect ON end of EPO button, polarity-free
	EPO_B	Externally connect ON end of EPO button, polarity-free
485	485+	RS-485 signal (A) for background monitoring
	485-	RS-485 signal (B) for background monitoring
CAN	H	Reservation function
	L	

Table 2-2 Description of dial switch and machine number

CT2	CT1	CT0	Machine No.
0	0	0	1
0	0	1	2
0	1	0	3
0	1	1	4
1	0	0	5
1	0	1	6
1	1	0	7
1	1	1	8

## Chapter III Installation and power distribution

### 3.1 Confirmation before installation

All installation, assembly and startup operations must be conducted by a qualified professional. If such operations are conducted by yourself, the qualified professional must be in site for supervision.

Refer to Appendix 1 Product parameters for the weight of Active Harmonic Filter.

Before wire installation or terminal connection, please ensure that the power supply of input terminal system of Active Harmonic Filter is off so as to avoid any accident.

Active Harmonic Filter must be grounded well so as to prevent any personal injury caused by leakage current.

Check the input terminal of Active Harmonic Filter (**It is necessary to check whether the N wire is connected correctly, otherwise the equipment will be damaged directly**) and the diameter of every wire which is externally connected with CT. Check the wire diameter. Check whether the phase sequence is correct. Refer to Appendix 2 for relevant input cable specifications.

Before installation of Active Harmonic Filter, please check the following:

(1) Visually inspect whether there is any transport damage inside and outside the Active Harmonic Filter. In case of any damage, please notify the forwarding agent immediately.

(2) Check product label and confirm the device correctness. The device is pasted with the label in which indicates model, capacity and main parameters of Active Harmonic Filter.

### 3.2 Environment requirements

Sinexcel 15A Active Harmonic Filter should be installed in a clean and ventilated indoor environment.

Sinexcel 15A Active Harmonic Filter is provided with intelligent air cooling by the internal fan. The cold air enters inside the Active Harmonic Filter via the front panel of Active Harmonic Filter, and the hot air discharges from air grids at the back of the Active Harmonic Filter. During use, the vent holes should not be blocked. To prevent the dust from blocking the air inlet, the air inlet needs to be cleaned regularly. It should be cleaned once every three months.

To ensure long-term and stable system operation of Active Harmonic Filter, the following environment requirements must be met:

(1) The environment temperature for the installation is higher than  $-20^{\circ}\text{C}$  but lower than  $50^{\circ}\text{C}$ . If it exceeds  $45^{\circ}\text{C}$ , automatic derating operation will be conducted for the device.

(2) The installation cannot be conducted in an environment with large dust, corrosive or explosive gases and conductive dust.

(3) The installation cannot be conducted in high-intensity magnetic field, nuclear radiation or high-power radio-frequency interference.

(4) The ambient humidity for the installation is less than 95%. There should be no water drops, vapor and condensed water in such an environment. Otherwise, it might result in permanent damage against Active Harmonic Filter and endangers personal safety.

(5) The installation altitude in installation site is less than 1,500 meters. If it exceeds 1,500 meters, the derating use must be conducted for the device.

(6) In the process of installation, violent vibration, severe impact and wide-angle inclination should be avoided. Otherwise, it might result in machine damage and failure.

(7) During installation, there should be a sufficient operation space for heat dissipation and operation. The distance of the back side of the whole device from the wall cannot be less than 200mm, and the distance of the front side of the device cannot be less than 800mm.

### 3.3 Power distribution for single module

Normal operation of Sinexcel 15A Active Harmonic Filter requires wiring and installation of 3-phase power cable, neutral cable (no connection for 3-phase and 3-wire system), PE wire and external CT cable.

At any moment, open circuit of CT secondary polarity is not allowed. To avoid open circuit of CT during installation, maintenance or disassembly, users are suggested to lead wiring terminal block during wiring. S1 and S2 are in short circuit at wiring terminal block until all wiring is completed. Then, S1 and S2 can be disconnected at wiring terminal block (CT short circuit in the module.). Wiring block diagram is shown in Fig.3-1 and Fig.3-2.

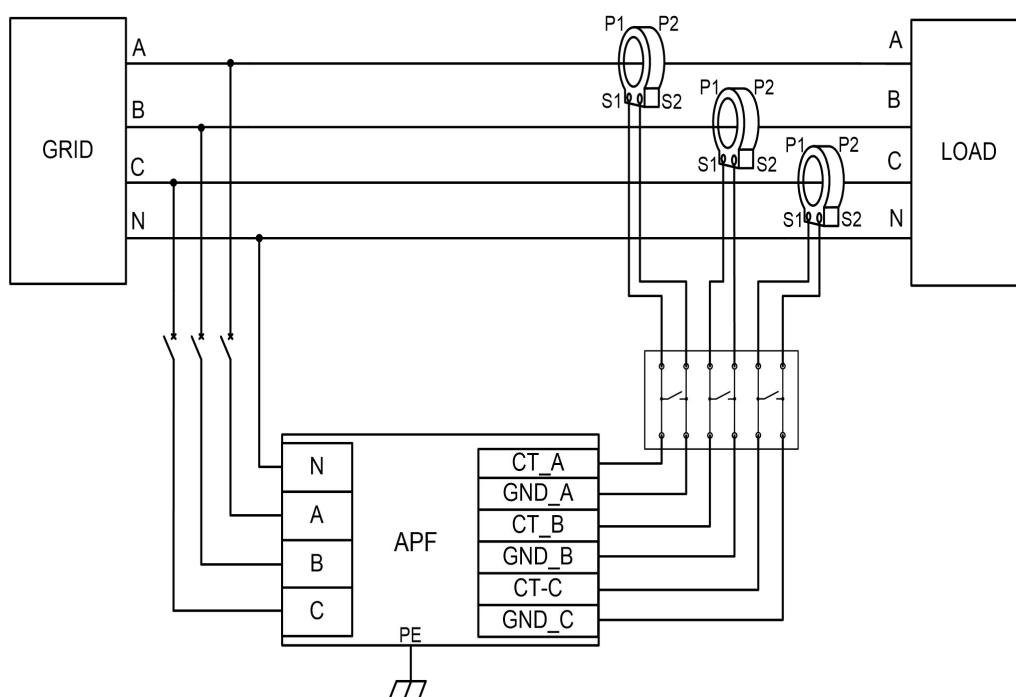


Fig.3-1 Wiring block diagram for single power module (3-phase and 4-wire system)

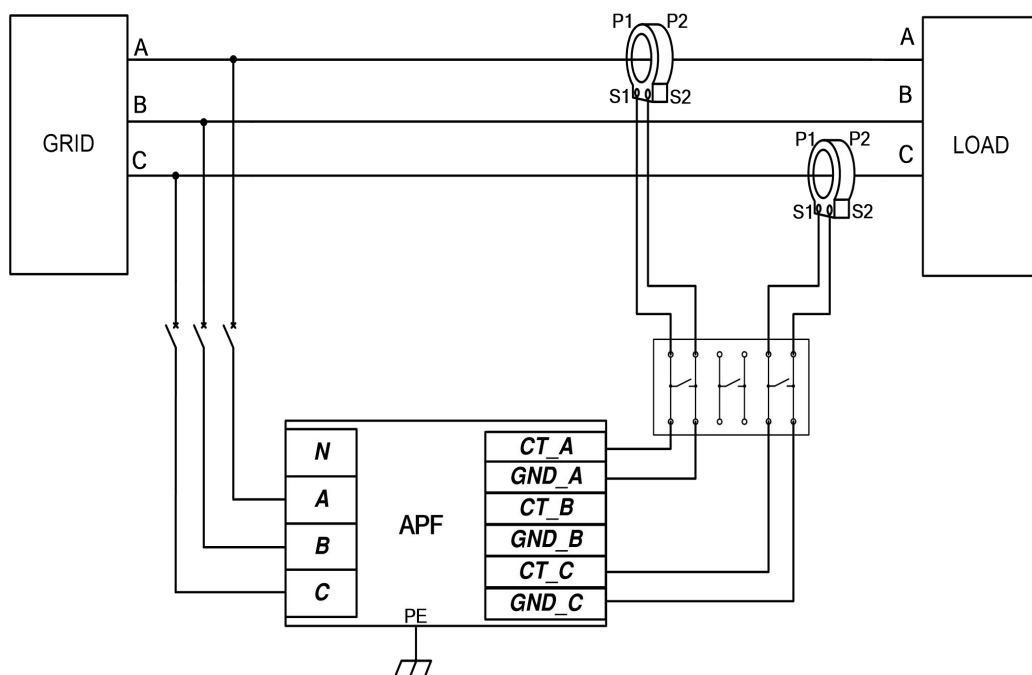


Fig.3-2 Wiring block diagram for single power module (3-phase and 3-wire system)

### 3.4 Power distribution for parallel operation

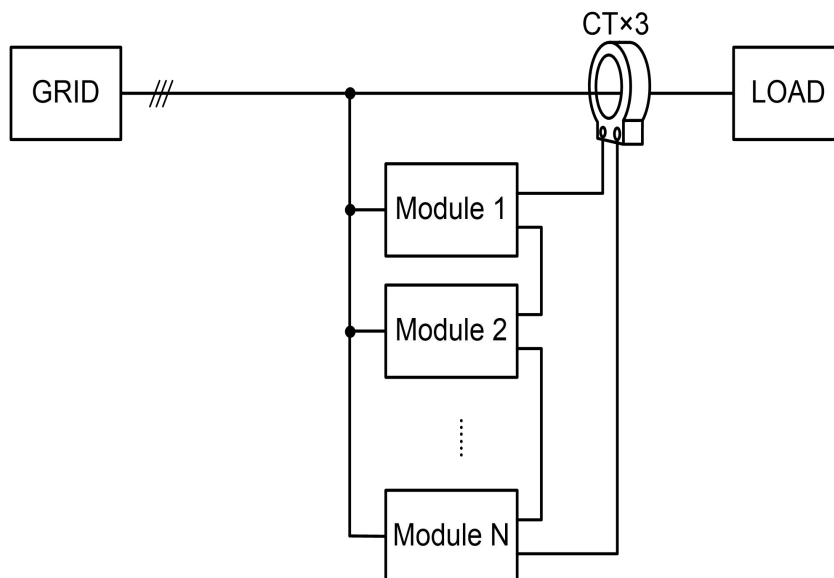


Fig.3-3 Typical topology for multi-module parallel operation

Fig.3-3 is typical topology for multi-module parallel operation. The connection of CT secondary polarity and module is series wiring.

Fig.3-4 is diagrams for series connection of CT secondary polarity during parallel operation. This kind of wiring mode is relatively simple.

The parallel operation cable should not be more than 15m. If the parallel operation cable with a length of over 30m is required, please contact Sinexcel product engineer in advance.

AHF15A Active Harmonic Filter also supports CT parallel connection. Please consult Sinexcel product engineer for specific operation mode.

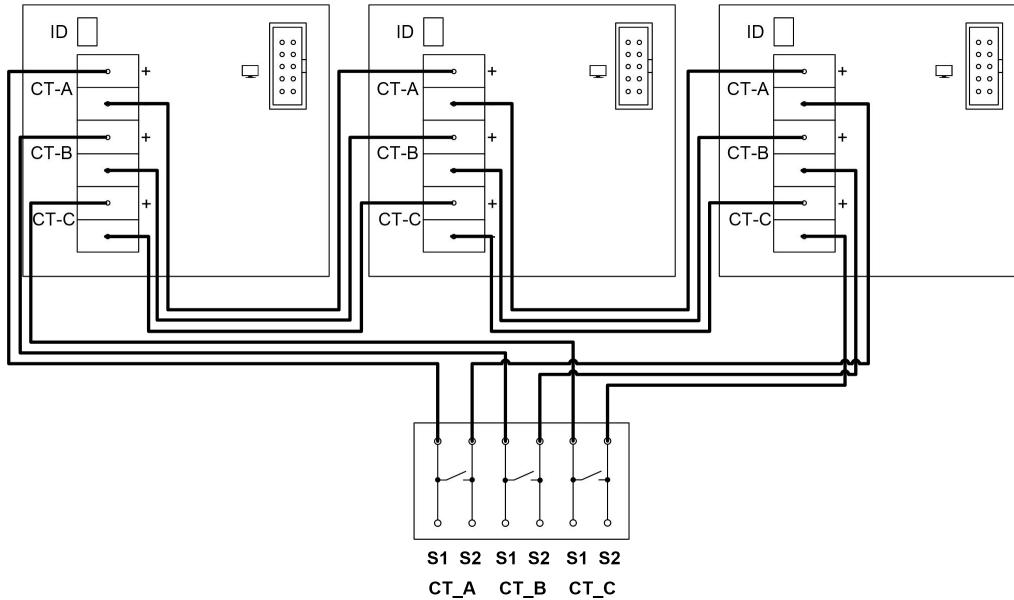




Fig.3-4 Diagram for series connection of CT secondary polarity

## 3.5 Current transformer (CT)

### 3.5.1 Connection type of CT

Current transformer (CT) plays a key role in the normal operation of Active Harmonic Filter.

Sinexcel 15A Active Harmonic Filter can adopt external CT transformation ratio between 50:5~10,000:5. Within this range, the setting of CT transformation ratio can be adopted according to the actual use.

 <b>Attention</b>	<p>Before startup, check whether the external CT transformation ratio set in monitoring system of Sinexcel 15A Active Harmonic Filter is consistent with real CT transformation ratio. If not, it will result in abnormal machine operation or reduction of compensation effect.</p>
 <b>Attention</b>	<p>When CT transformation ratio is selected, selection should be made according to 1.5 times of actual current. Only by configuring Sinexcel 15A Active Harmonic Filter can harmonic wave/ reactive compensation be conducted more precisely. For 15A Active Harmonic Filter, it is suggested to use CT at 50:5.</p>

CT can select open CT or closed CT. Open CT can be installed easily while closed CT must be installed when



in load outage.

In terms of precision, closed CT is class 0.2 above while open CT is class 0.5 above. If lower precision is selected, the compensation effect of Sinexcel 15A Active Harmonic Filter will reduce.

3 CTs must be used in 3-phase and 4-wire system and installed in phase A, B and C respectively.

At least 2 CTs are used in 3-phase and 3-wire system and installed in phase A and phase C respectively. The description below will be based on 3-phase and 4-wire system.

External CT of Sinexcel 15A Active Harmonic Filter is advisably installed in the load side. That is, it is installed between Active Harmonic Filter and load. If such installed is followed, a group of CTs (3 CTs) are respectively installed in phase A, B and C in the load side to meet the requirement (2 CTs for 3-phase and 3-wire system), as shown in Fig.3-5.

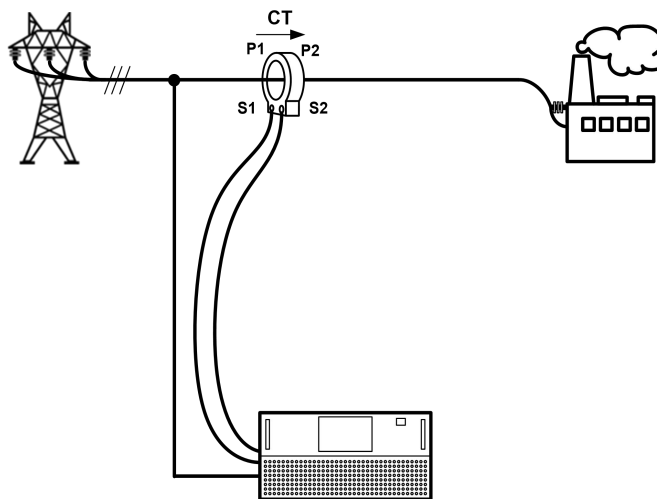


Fig.3-5 CT installed in load side

If CT is installed in the load side and large capacitance is in parallel connection between power grid and load, there will be two installation modes for selection, as shown in Fig.3-6 and Fig.3-7. In terms of connection mode in Fig.3-6, two groups of CTs (6 CTs) (4 CTs for 3-phase and 3-wire system) will be needed. The connection mode between the two groups of CTs is in parallel connection.

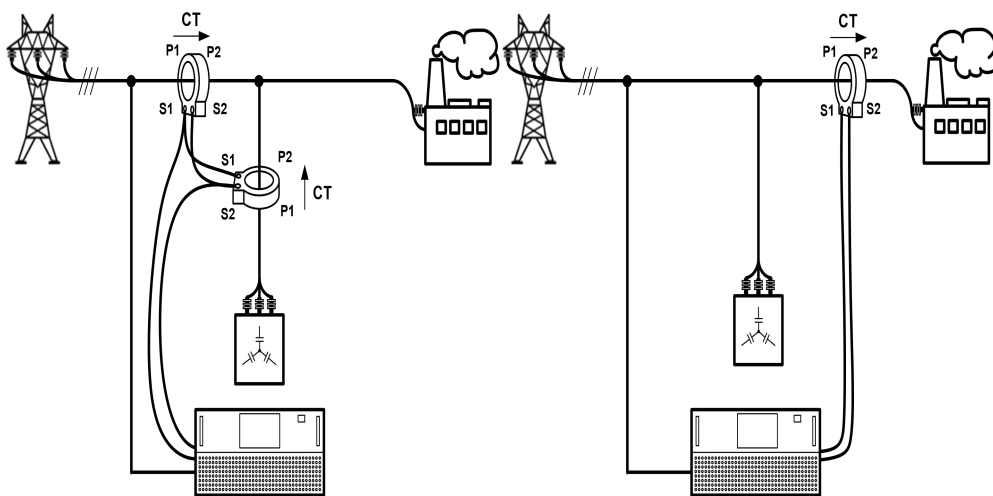


Fig.3-6 CT is installed in the load side

Fig.3-7 CT is installed in the load side

and has large capacitance (1).

and has large capacitance (2).

If CT is not easily connected in the load side at user end and can only be installed in the power side, the user needs to have a group of CTs (3 CTs) installed respectively in phase A, B and C in the power side (2 CTs for 3-phase and 3-wire system), as shown in Fig.3-8. The arrow direction in the figure is the positive direction of CT. The arrow direction should be consistent with that besides CT housing.

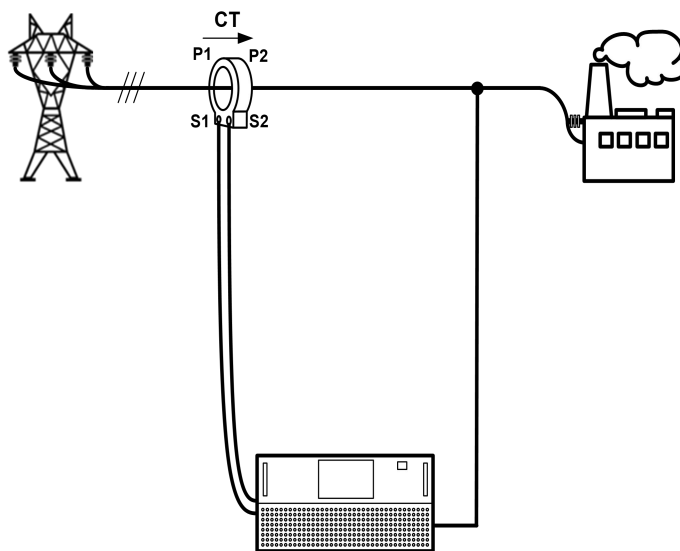


Fig.3-8 CT is installed in the power side.

If CT is installed in the load side (The installation of CT in power side is only limited to single module. When multiple modules are in parallel connection and CT is installed in the power side, please consult Sinexcel product engineer.) and there is large capacitance, there will be two installation modes for selection, as shown in Fig.3-9 and Fig.3-10. In terms of connection mode in Fig.3-10, two groups of CTs (6 CTs) (4 CTs for 3-phase and 3-wire system) will be needed.

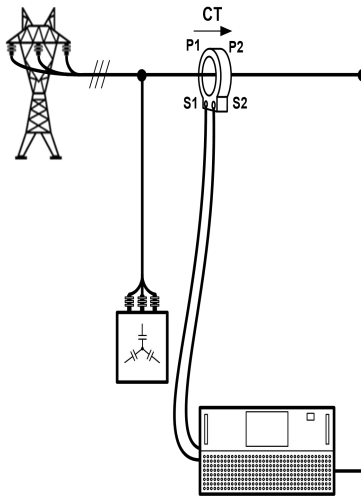


Fig.3-9 CT is installed in the power side

and has large capacitance (1)

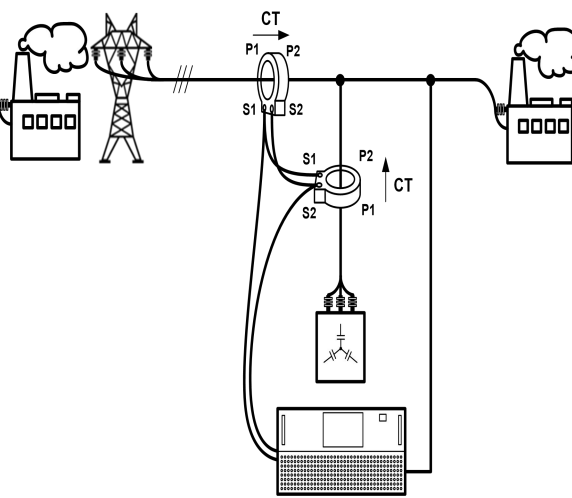


Fig.3-10 CT is installed in the power side

and has large capacitance (2).

### 3.5.2 CT cable

CT cable is an optional accessory and made with shielded twisted pair. Every set of cables have 6 cables in yellow + black, green + black and red + black. Two of them are twisted together to form CT cables.

The specifications of CT cable are determined by the cable length. Please refer to Appendix 2 for selection of cables and optional accessories.

<b>⚠</b>	The lengths of 6 cables in every group of cables (4 cables for 3-phase and 3-wire system) should be consistent so as to make the system operate more precisely.
<b>Attention</b>	
<b>⚠</b>	The cable for every phase should be twisted pair. It is the best to use shielded twisted pair so as to prevent any interference from other electric signals in space.
<b>Attention</b>	

### 3.5.3 Connection of CT secondary polarity

When external CT is installed, it is agreed that the yellow stranded wire is connected with phase A, the green stranded wire is connected with phase B, and the red stranded wire is connected with phase C.

The yellow wire is connected with S1 of CT in external phase A while the other end is connected with + end of CT-A marked on the module.

The black wire which is twisted with the yellow wire is connected with S2 of CT in external phase A while the other end is connected with - end of CT-A marked on the module.

The green wire is connected with S1 of CT in external phase B while the other end is connected with + end of CT-B marked on the module.

The black wire which is twisted with the green wire is connected with S2 of CT in external phase B while the other end is connected with - end of CT-B marked on the module.

The red wire is connected with S1 of CT in external phase C while the other end is connected with + end of CT-C marked on the module.

The black wire which is twisted with the black wire is connected with S2 of CT in external phase A while the other end is connected with - end of CT-C marked on the module.

## Chapter IV WIFI interface operation

### 4.1 Quick user manual

The standard model of Sinexcel 15A Active Harmonic Filter does not contain large monitoring module. WIFI is used for device commissioning and parameter review. As for ordinary use site, it can be used after connecting power cables and CT. The specific operation steps are as follows:

(1) Close disconnecting switch between power grid and Active Harmonic Filter to electrify the machine.

(2) Turn on WIFI of mobile phone, tablet and PC and add the hotspot. The hotspot name is “PQ+6 random letters” (e.g.: PQ42a076), as shown in Fig. 4-1. The initial password of the hotspot is 08080808.

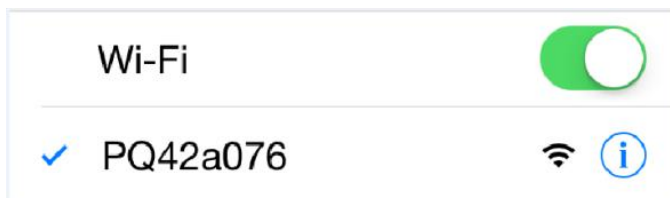


Fig. 4-1 WIFI hotspot of Sinexcel AHF

(3) Open the browser and enter “192.168.1.1” in “Address Search”, as shown in Fig.4-2. Click “Search” to enter the login interface.



Fig. 4-2 Enter IP address

(4) In the login interface, enter “admin” in “username” and enter “08080808” in “password”, as shown in Fig.4-3. Click “Login”.

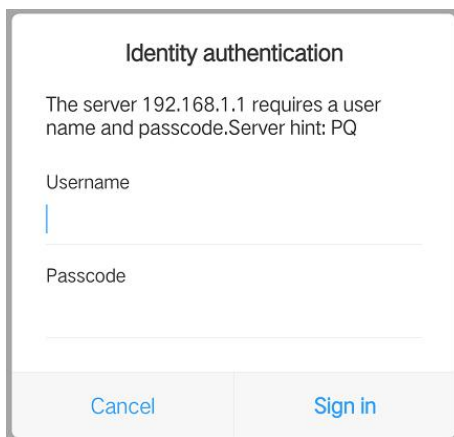


Fig. 4-3 Enter login name and password

(5) After WIFI connection, enter the operation interface to review power grid voltage, power grid current, load current, compensation current and other data, as shown in Fig. 4-4. Refer to Table 4-1 for detailed menu information.

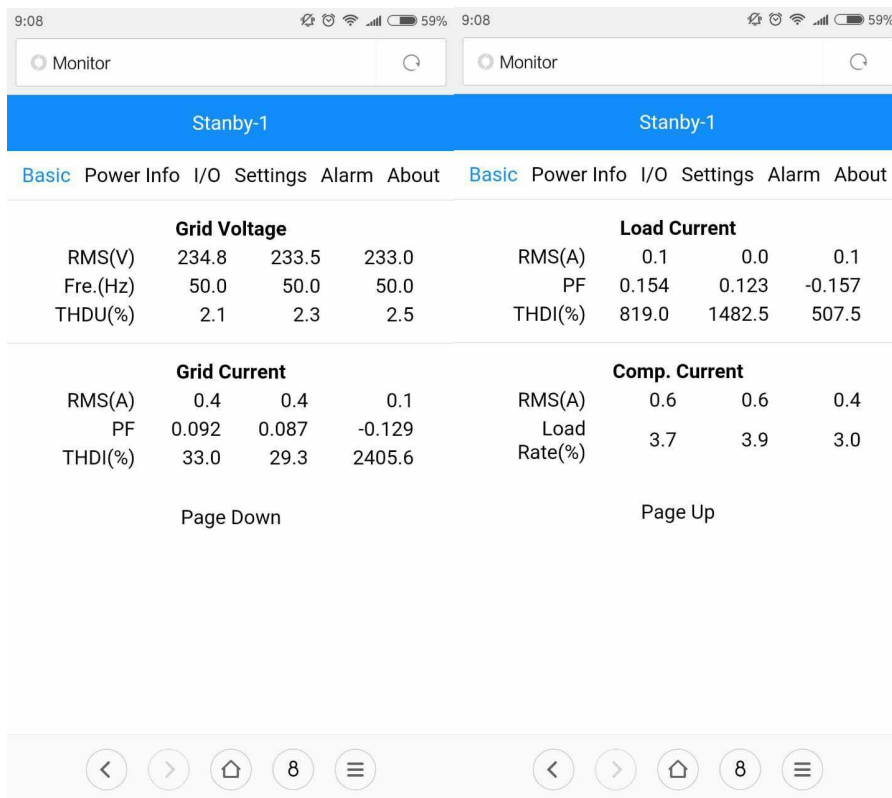


Fig. 4-4 Monitoring interface

In “Setting” menu, you can review “Compensation rate”, “Operation mode”, “Salve quantity” and “Total capacity” etc., as shown in Fig.4-5. In the last page, you can review “Description of some parameters setting”, as shown in Fig. 4-6. Different function combinations refer to different meanings and have different priorities. For example, Q+B+ H means that AHF compensates reactive power first, three-phase imbalance second and harmonics third. Auto-aging mode customers cannot select it and use it based on AHF delivery. As for operation mode, AHF has been set upon delivery. So, customers do not need to set it again.

Click “Start” in the setting menu and click “OK”. When the page will display “monitoring sending succeeded! return”, “Start” command can be sent successfully, as shown in Fig. 4-7.

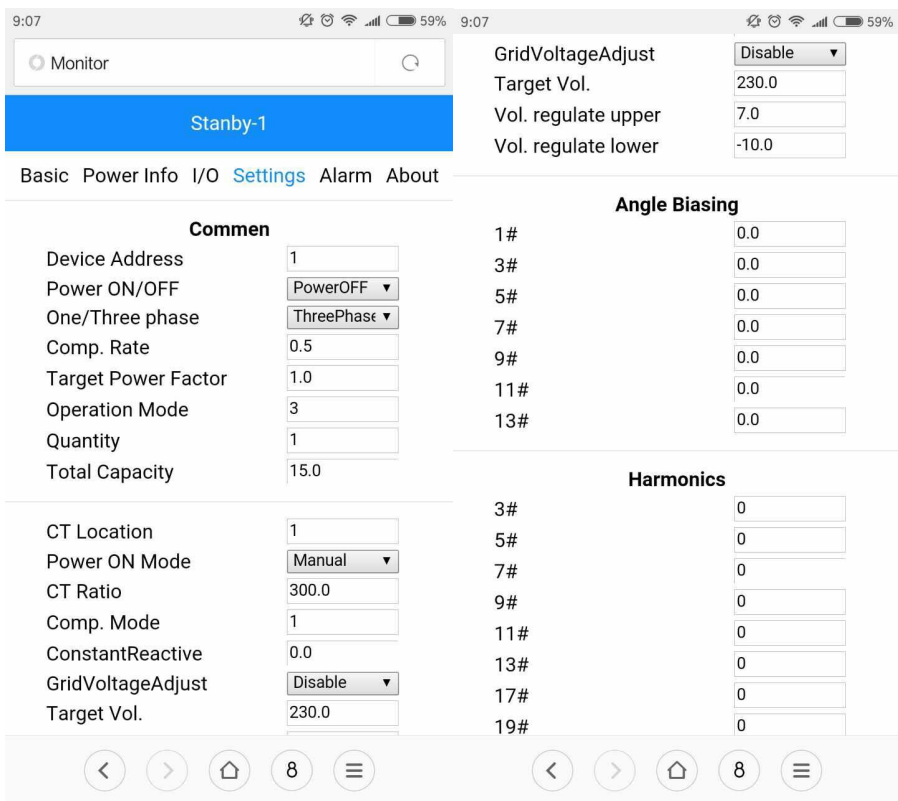


Fig.4-5 Setting interface

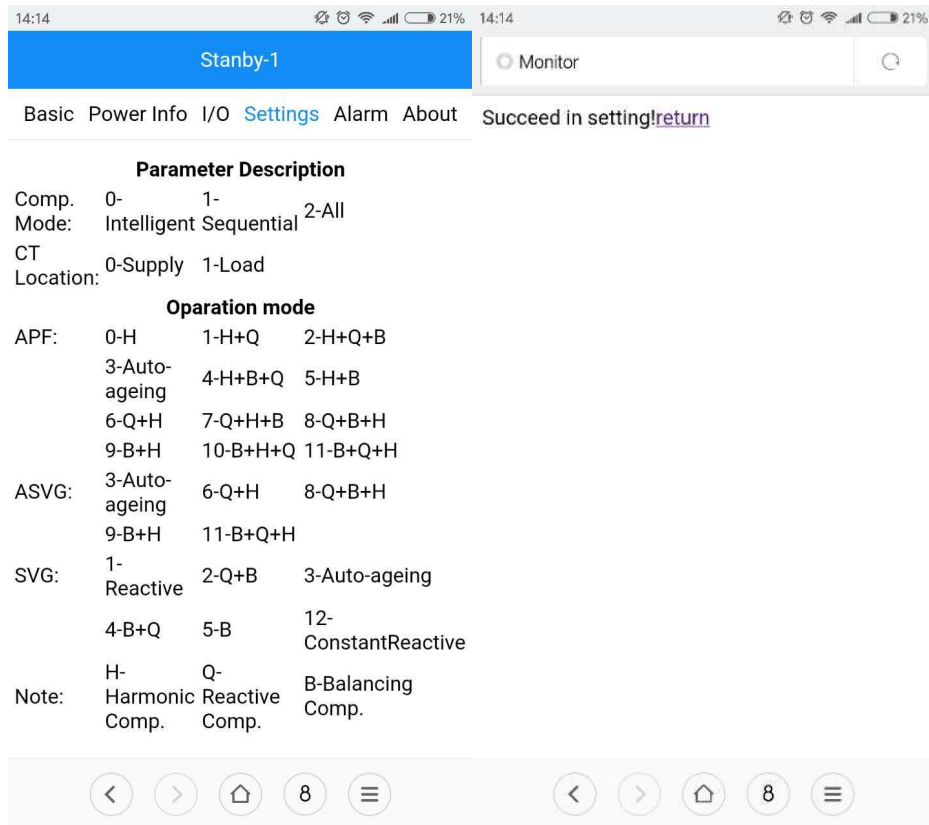


Fig. 4-6 Description of some parameter setting

Fig.4-7 Interface of monitoring sending success

Table 4-1 Menu description of AHF

Option	Item	Description and definition
Review data	3-phase power grid voltage	Review the effective value of phase voltage
	Compensation current	Review the compensating phase current of AHF
	Current in power grid side	Review the phase current of power grid
	Current in load side	Review the phase current of load
	Power factor in power grid side	Review power factor in power grid side
	Power factor in load side	Review power factor in load side
Review status	Warning information	Display the current fault information
	Operation state	Normal: AHF runs normally; stop: AHF is in a standby state; fault: AHF runs in fault.

Table 4-1 Menu description of AHF (continued table)

Option	Item	Description and definition
Setting	CT ratio	Set external CT Ratio, e.g. 150:5 etc.
	Total capacity	Set the actual capacity of the system
	CT location	CT is installed in power grid side or load side.
	Startup mode	Set manual startup or automatic startup
	Single/3-phase selection	3-phase for 15A machine
	Compensation rate	It is commissioned by the factory for further use. Customer does not need to set it.
	Target power factor	Set the expected power factor
	Operation mode	Harmonics, reactive power, imbalance, auto-aging
	Reactive power	15A does not have this function. It is set as 0.
	Regulation of power grid voltage	15A does not have this function. It is set as "forbidden".
Startup and shutdown	Send power on, power on, clear fault reset and return commands	



## 4.2 Electrification steps

After the machine is fixed, please confirm whether the electrical connection of AHF is completed. Electrification can be conducted after the electric connection of AHF has no error.

(1) Ensure that all input distribution switches of AHF are cut off. These switches should be pasted with warning labels so as prevent others from operating them.

(2) Ensure that 3-phase wiring terminals of AHF are connected correctly (**It is necessary to check whether the N wire is connected correctly, otherwise the equipment will be damaged directly**). CT wiring is matched with each phase, and each wiring point complies with the installation standard so as to prevent any danger caused by electric shock.

(3) Protective earth wire and other necessary grounding cable are connected to the grounding point PE of AHF so as to prevent any danger caused by housing electrification.

### 4.2.1 Startup steps

After AHF is electrified and inspected, the machine can be started after being commissioned by an engineer. The steps are as follows:

(1) Close disconnecting switch between electric supply and AHF.

(2) After normal electrification, the indicator light flickers in a standby state. User selects start sending command to start the system via WIFI or centralized monitoring setting interface. During AHF operation, the indicator light is always on.

### 4.2.2 Shutdown steps

There are two modes to shut down the device: One is to directly disconnect the isolating switches of AHF and power grid. This mode is a complete shutdown mode. After it is shut down, the system will be not electrified. System maintenance can be carried out. The other is to enter WIFI startup and shutdown interface. Click shutdown key to power off the machine. In this shutdown mode, only power component is closed in the system. As the system busbar and auxiliary power are still electrified, relevant control system is still in a standby state. In this shutdown mode, machine maintenance or housing opening will be not allowed.

## 4.3 Description of warning information

Table 4-2 Description of warning information of 15A AHF

Fault type	Description
Auxiliary power fault	Auxiliary power voltage is lower than the set value. Within valid 8us of auxiliary power supply, CPLD will directly lock IGBT trigger pulse.
Over-temperature of inverter	If the temperature of inverter substrate exceeds 100 °C, the inverter will stop running.
CT ratio setting fault	The current is more than 1.5 times of rated current of external CT, and phase sequences of CT are connected

	reversely.
Inverter overload fault	Output current is more than 150% rated current.
System faults	DC bus voltage is abnormal.
Read fault of machine capacity	The machine capacity is not equal to 15A.
EPO fault	Report EPO fault.
Input frequency abnormal	AC input frequency is not within 45Hz~63Hz.
Input voltage abnormal	The input voltage is not within 138V~265V.
Software version fault	DSP software does not match with CPLD software.
Controller parameter setting fault	<ol style="list-style-type: none"> <li>1) At CT position, the parallel capacity is more than unit capacity.</li> <li>2) The machine capacity is more than the parallel capacity.</li> <li>3) The machine capacity is not equal to 15A.</li> <li>4) The input voltage grade is not equal to 380V.</li> </ol>

## 4.4 Fault handling

Classification of mechanical faults:

(1) Faults caused by user's wrong use such as reverse connection of CT wires, wrong connection of phase sequences of power wires or parameter setting error: During startup for commissioning, this kind of faults can be found by observing the data. If the compensation effect is poor and there is no warning information, please contact service engineer of Sinexcel.

(2) LCD displaying alarm information: Please directly contact service engineer of Sinexcel.

(3) No response of electrified machine: Please directly contact service engineer of Sinexcel.

# Chapter V Preservation and Maintenance


## 5.1 Precautions

AHF15A Active Harmonic Filter is of modular design. Observe whether the data displayed on WIFI interface is correct in routine maintenance. If possible, customers can use infrared thermometer to observe whether the temperature point in the machine has any abnormal high temperature point. In case of any abnormality in routine maintenance, please power off the machine immediately and contact service engineer of Sinexcel.

AHF15A Active Harmonic Filter is a power product. To ensure the safety of maintenance personnel, any live part of the product cannot be touched during normal operation. During use, often check whether the product's grounding point (PE) is connected reliably.

In a severe environment such as high temperature, high humidity and conductive dust, please contact product engineer of Sinexcel to make the specific solutions.

## 5.2 Common fault diagnosis

	For your personal safety, you are prohibited to dismantle the device without the permission of Sinexcel. If the product label is torn or damaged, it will not be within the warranty scope.
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**Warning**

Refer to Table 5-1 for common machine faults and solutions. Some common faults and warning information can be solved on site. If such faults cannot be solved on site, please directly contact service engineer of Sinexcel.

The faults caused by user's wrong use such as reverse connection of CT wires, wrong connection of phase sequences of power wires or parameter setting error: During startup for commissioning, this kind of faults can be found by observing the data. If the compensation effect is poor and there is no warning information, please contact service engineer of Sinexcel.

Table 5-1 Common fault handling

Faults and warning	Possible causes	Solutions
Over-temperature	<ol style="list-style-type: none"> <li>1. Environment temperature is too high.</li> <li>2. Air duct is blocked.</li> <li>3. Fan has a fault.</li> </ol>	Check the causes one by one.
Input voltage abnormal	<ol style="list-style-type: none"> <li>1. Power wiring system is not set correctly (3-phase and 3-wire or 3-phase and 4-wire);</li> <li>2. There is input overvoltage or undervoltage. Converter is turned on or closed.</li> </ol>	Check whether the model wiring is in accordance with the wiring system, check whether the power cable is connected reliably and check whether the input phase voltage is within 132V~264V.
Input frequency abnormal	Input frequency exceeds the limit, which causes the converter to close or turn off.	Check whether AC input frequency is within 45-62.5Hz.
DC bus overvoltage	DC bus overvoltage causes the converter to close or turn off.	Please contact service engineer of Sinexcel.
Auxiliary power fault	Auxiliary power has a fault.	Please contact service engineer of Sinexcel.
No compensation current	<ol style="list-style-type: none"> <li>1. Active Harmonic Filter is not powered on.</li> <li>2. CT installation wiring is problematic.</li> <li>3. Compensation rate is set too small.</li> </ol>	Check whether the Active Harmonic Filter is powered on, check the setting of compensation rate, installation position and wiring mode, and check whether CT wires are connected reliably.
Controller parameter setting fault	The read controller parameters are not matched with the set controller parameters.	Please contact service engineer of Sinexcel.
Inverter overload fault	The compensation current of Active Harmonic Filter exceeds the rated current.	Check whether the capacity of Active Harmonic Filter is matched with the load.
CT ratio setting fault	External CT ratio setting has a fault.	Check whether the installation direction of CT and the phase sequence of cable are correct.

## Appendix 1 Product parameters

System parameters	
Voltage of power grid	400V (-40%~+20%)
Frequency of power grid	50Hz/60Hz (range: 45Hz~62.5Hz )
Parallel operation quantity	Unlimited
Structure of power grid	3-phase and 4-wire, 3-phase and 3-wire
Current transformer	50:5~10,000:5
Performance index	
Rated capacity	15A
Filter range	2~61 <sup>st</sup> harmonic wave
Filter capacity	Compensation rate of current harmonics in laboratory >95%
Rapid response time	<20μs
Total response time	<5ms
Target power factor	-1~1
Harmonic compensation	Support
Reactive compensation	Support
Unbalanced compensation	Support
Cooling mode	Intelligent air cooling 24CFM*4
Noise	<68dB
Communication monitoring capability	
Communication interface	RS485
Communication protocol	Modbus protocol, TCP/IP protocol
Protection function	Overvoltage protection, undervoltage protection, short circuit protection and overcompensation protection, etc.
Fault alarm	Yes. 500 alarm records at most.
Monitoring	WiFi (standard), collective monitoring (optional)
Physical properties	
Installation mode	Wall-mounted type, rack-mounted type installation
Net weight	4.98kg
Color	Silver
Environment requirements	
Altitude	≤1,500m. When it is used in altitude between 1,500~4,000m, it should be derated by 1% during use.
Running temperature	-10°C~50°C (If it is beyond 45°C, the automatic derating running is conducted for the device.)
Relative humidity	Maximally 95%, no condensation
Protection grade	IP20
Storage temperature	-40°C~70°C
Relevant standards	

Standards	See 1.5 Product standards
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## Appendix 2 List of cables and optional accessories

Rated current (A)	15
Cable of phase line (mm <sup>2</sup> )	4
Cable of neutral line	6
PE wire (mm <sup>2</sup> )	2
CT cable	15m below: RVVSP 2×2.5 mm <sup>2</sup> for shielded twisted connecting flexible cable; 15m-30m: RVVSP 2×4 mm <sup>2</sup> for shielded twisted connecting flexible cable; Above 30m: Please contact product engineer of Sinexcel.
CT ratio range	50/5~10,000/5
Remark:	In case of any requirement for cable temperature, the cable specification will be changed.