

# Instructions for using ACTIVE HARMONIC FILTER





## Precautions before use

- **Safety Precautions**

This manual deals with the installation and use of SVG / AHF module. Please make sure to read this manual before Installation.

- **Warning – current leakage**

Before connecting the input power, ground the SVG / AHF module reliably. The grounding of the module must comply with the electrical code.

- **User-maintainable device**

All internal maintenance and repair work on SVG / AHF module requires the use of professional tools and should be performed by personnel who have received relevant professional training. All devices that require professional tools to open the protective cover are user-unmaintainable devices. The equipment fully meets the safety requirements of the equipment in the operating area.

Components with hazardous voltages can only be accessed after the protective cover is opened, and non-maintenance personnel cannot reach it. If you follow the general rules and follow the procedures recommended in this manual, there will be no danger.

- **Dust Care**

Select whether to install the air filter according to the site environment. If the dust is large, install it. If you install an air filter, clean the air filter regularly to ensure smooth ventilation. The recommended cleaning frequency is 1 time per month

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# Chapter I: Module description

## 1.1 Module introduction

### 1.1.1 Module characteristics

- The module has a variety of compensation modes (harmonic, reactive, three-phase unbalance, capacitor switching control), which can be carried out at the same time.

- The proportion of harmonic, reactive and three-phase unbalanced compensation capacity can be set to comprehensively solve the problem of power quality at the low-voltage distribution side;

The module can filter 2 ~ 50 harmonics at the same time, and can also filter out 2 ~ 50 harmonics of a specific number according to the setting;

The module can dynamically and smoothly compensate inductive and capacitive reactive power, and the system power factor after compensation is  $\geq 0.99$ ;

After compensation within the rated capacity, the current unbalance of three-phase active load of the system is  $< 5\%$ ;

Fast response, high controllability, automatic current limiting function, no overload;

The module can automatically reactive power compensation, harmonic filter and three-phase unbalance compensation according to system harmonic current, reactive power and three-phase unbalanced load. will be no overcompensation problem;

Modular design, with rack type, wall mounted and other installation methods, which can operate multiple machines in parallel to meet the actual requirements.

It has multiple protection functions, such as overcurrent, overvoltage, overtemperature, phase sequence error, phase loss protection, etc.

RS485 and CAN standard communication interfaces can be configured to realize information exchange with other unit equipment, and wired / wireless communication module can also be configured to realize remote data monitoring

### 1.1.2 Module parameters

Grid voltage: AC 400V  $\pm 20\%$

Operating frequency: 50Hz  $\pm 5$ Hz

Module capacity: 50A, 75A, 100A, 150A

Multi module parallel connection: up to 10 machines can be connected in parallel

Response time:  $\leq 5$ ms

Single module efficiency:  $\geq 97\%$

Main circuit structure: 3P4W

Circuit topology: three-level structure

Display interface: external touch screen

Display status: data display

Operation: manual start, automatic start

Communication: RS485, MODBUS communication protocol

Ambient temperature: - 20 ~ 55 °C (rated power output)

Storage temperature: - 30 ~ 70 °C

Relative humidity: maximum 95%, no condensation

Altitude: below 1500 meters above sea level

Heat dissipation demand: good ventilation is required. The air outlet can be opened through the cabinet door, or a fan can be installed in the cabinet.

Working mode: harmonic compensation, reactive power compensation, three-phase load unbalance compensation, capacitor switching control.

The module can carry out the above compensation at the same time, and can set the proportion of harmonic, reactive power and three-phase unbalance compensation capacity.

Harmonic filtering: filter 2 ~ 50 harmonics at the same time, or select a specific harmonic in 2 ~ 50 harmonics number compensation.

Current limit: within the rated current limit.

Compensation effect: total distortion rate of harmonic current THDi  $\leq 5\%$ ; power factor  $\geq 0.99$ ; three phase unbalance  $\leq 5\%$ ;

*Note: The above parameters are reached when the compensation current reaches 50% of the rated capacity and above*



## 1.2 Outline and installation dimension

The capacity of the module is divided into 50A、75A、100A、150A. Each module can be combined in parallel. The overall dimensions of 50A and 75A are completely consistent, and the overall dimensions of 100A and 150A are completely consistent. The following is the overall dimension and installation hole of the module

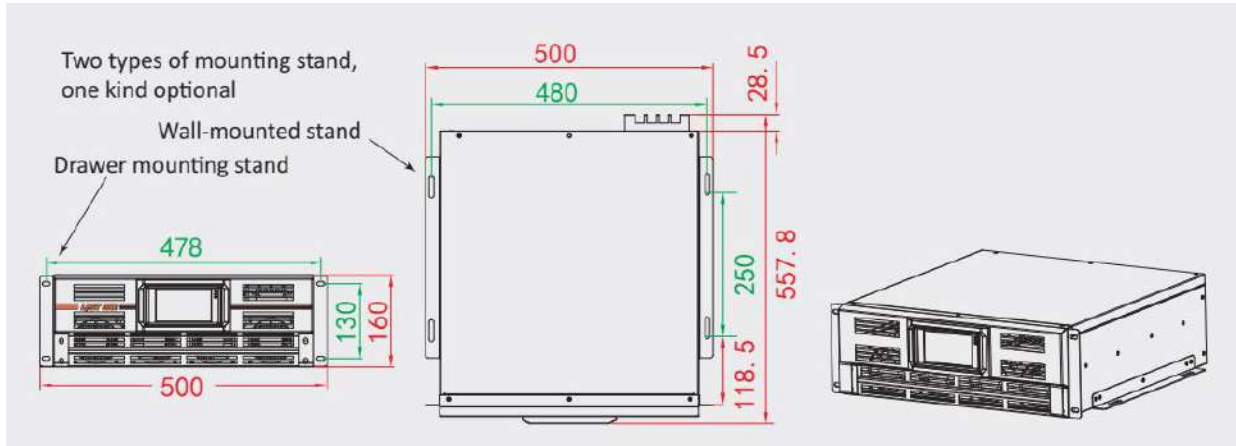


Figure 3.1 module overall dimensions and installation hole of 50A (35kvar), 75A (50kvar)

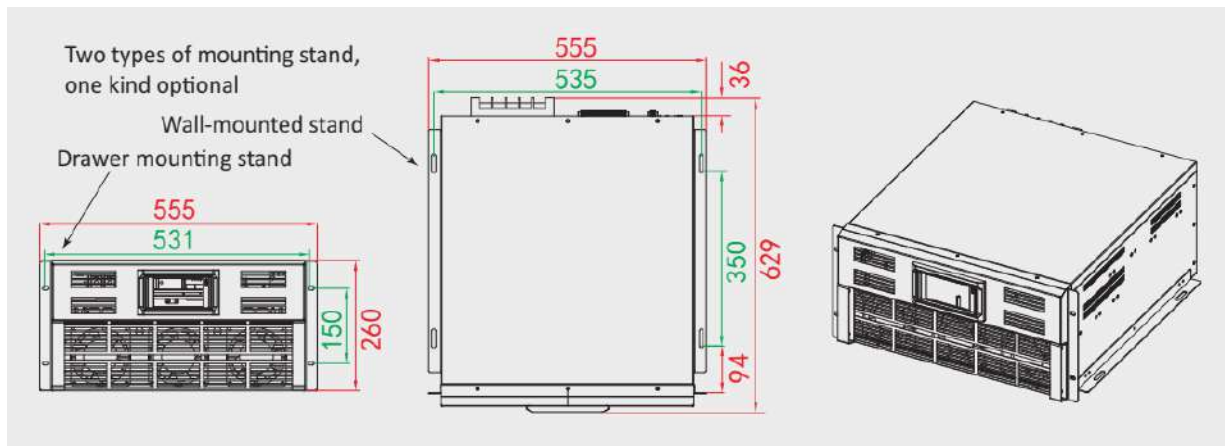


Figure 3.2 module overall dimensions and installation hole of 100A(70kvar), 150A (100kvar)

## 1.3 Technical data

Table 1-1 technical data sheet

Rated current	50A	75A	100A	150A
Cooling mode	Air cooling			
Ambient temperature	-20 ~ 55°C			
Parallel operation	When multiple modules operate in parallel, refer to table 2-9 for the selection of CT and 2.3.5 for the connection method			
CT	50:5 ~ 20000:5			
power loss	Air cooling			
Air volume requirements	≥200m <sup>3</sup> /h	≥350m <sup>3</sup> /h	≥500m <sup>3</sup> /h	≥800m <sup>3</sup> /h
Grid frequency	50Hz± 5%			
Grid voltage	400V± 20%			
Wiring mode	3phases+N+PE			
Protection grade	IP20			

# Chapter II: Installation and electrical connection

## 2.1 Installation requirements

### 2.1.1 Electrical requirements

- 1) When the module is used for harmonic treatment and dynamic compensation of reactive power, please ensure that no compensation system for filtering harmonic is connected in the same distribution network, otherwise the module may conflict with these compensation systems.
- 2) The module is used for harmonic control and dynamic reactive power compensation of parallel public power grid. Other power supply modes in the power grid, such as distributed power supply (diesel generator), and other application modes (such as old chemical equipment test, etc.) may cause the module to fail to operate normally or be damaged. Please contact the company to confirm whether there are hidden dangers when the module is used under such working conditions.
- 3) If the harmonic distortion rate of on-site voltage is  $\geq 10\%$ , the module may not operate normally. It is necessary to contact the company to confirm the specific working conditions on site.

### 2.1.2 Installation space requirements

Table 2-1 installation space of module

Position	Installation space requirements
Front end (air inlet)	$\geq 100\text{mm}$ , or there is a vent at the air inlet of the corresponding module of the cabinet
Rear end (air outlet)	$\geq 200\text{mm}$ , or there is a vent at the air outlet of the corresponding module of the cabinet

Note: if the cabinet depth cannot meet the minimum installation space requirements, ventilation holes of the same size must be opened at the air inlet / outlet of the corresponding module on the front and rear cabinet doors of the cabinet, and filter cotton shall not be added at the ventilation holes!

## 2.2 Cabinet Ventilation Requirements

The module adopts power electronic components, which will generate large heat during operation. In order to ensure the normal and reliable operation of the equipment, the cabinet must have good ventilation and heat dissipation measures.

When the module panel is installed, the heat dissipation requirements of the cabinet are as follows:

1. The front and rear doors of the cabinet must be provided with air holes, and the requirements for air holes are as follows:
  - The opening on the front panel of the cabinet corresponding to the air inlet in front of the module, and the opening area shall not be less than the area of the air inlet in front of the module;
  - The opening on the rear panel of the cabinet corresponding to the air outlet at the back of the module, and the opening area shall not be less than the area of the air outlet at the back of the module;
  - The vent cannot be equipped with filter cotton to prevent dust and impurities from blocking the vent.
2. If the cabinet is equipped with ventilation and heat dissipation measures such as fans, the air volume requirements of a single module are as follows

Table 2-2 ventilation volume demand

Capacity	Air volume demand
50A	$\geq 200\text{m}^3/\text{h}$
75A	$\geq 350\text{m}^3/\text{h}$
100A	$\geq 500\text{m}^3/\text{h}$
150A	$\geq 800\text{m}^3/\text{h}$

## 2.3 The primary and secondary interfaces of the module

### Dangerous voltage

Short circuit and electric shock caused by ungrounded or liquid contact can lead to fatal danger

Make sure that the unit module is grounded

It is not allowed to install the module in the environment with liquid around

It is not allowed to expose the module to the environment with condensation

The cover / door can only be removed or opened when the module is completely powered off and sufficient capacitor discharge time (not less than 5 minutes) is maintained

### 2.3.1 The primary and secondary terminal positions of the

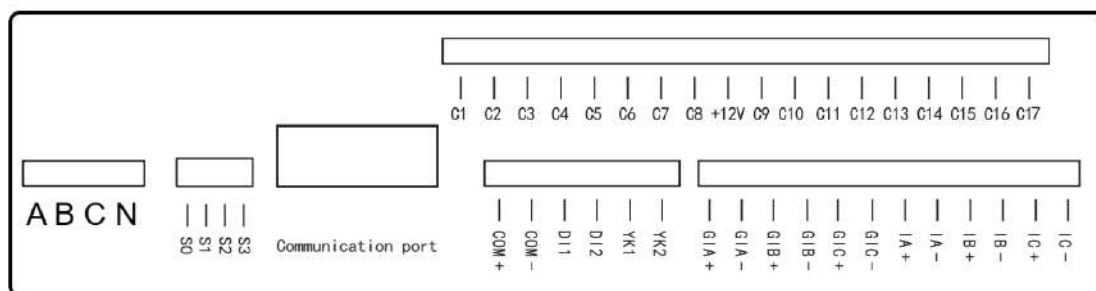


Figure 2-3 terminal position diagram of module 50A(35kvar), 75A(50kvar)

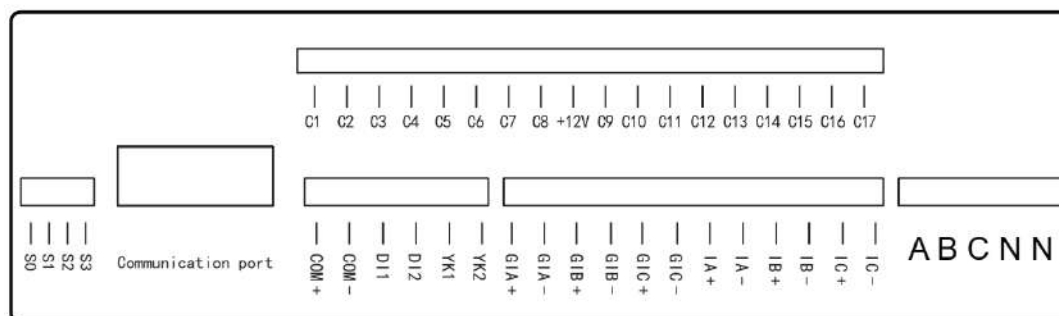


Figure 2-4 terminal position diagram of module 100A(70kvar), 150A(100kvar)

*Note: The terminal sequence and definition of all modules with different capacities are basically the same, and only the position and size of A / B / C / N main terminals of all modules are slightly different.*

### 2.3.2 Type selection of distribution cable of module

There are five power terminals between the module and the outside. See table 2-3 for cable selection table.

input A - phase A input terminal of power grid

input B - phase B input terminal of power grid

input C - phase C input terminal of power grid

input N - input end of power grid zero line

input N -input end of power grid zero line

Table 2-3 selection of module cable

Items	Parameter requirements			
CT ratio range	50:5 ~ 20000:5			
CT cable	CT rated load	Cross sectional area of conductor	One way wiring length	
			5VA	2.5mm <sup>2</sup>
	10VA	4.0mm <sup>2</sup>	10 ~ 20m	
		2.5mm <sup>2</sup>	≤20m	
	15VA	4.0mm <sup>2</sup>	20 ~ 40m	
		2.5mm <sup>2</sup>	≤30m	
Power cable (A/B/C/N/PE)	Capacity	A/B/C	N	PE
	50A	16mm <sup>2</sup>	2x16mm <sup>2</sup>	16mm <sup>2</sup>
	75A	25mm <sup>2</sup>	2x25mm <sup>2</sup>	16mm <sup>2</sup>
	100A	35mm <sup>2</sup>	2x25mm <sup>2</sup>	16mm <sup>2</sup>
	150A	50mm <sup>2</sup>	2x35mm <sup>2</sup>	25mm <sup>2</sup>
	If there are higher requirements for cable temperature, the cable specification needs to be increased			

**2.3.3 Module input fuse protection**

It is recommended to install fuse at the incoming line of the module for protection. See table 2-4 for fuse parameters.

Table 2-4 recommended parameters of fuse

Module rated capacity	50A	75A	100A	150A
Fuse rated current	80A	100A	125A	160A
Fuse type	fuse	fuse	fuse	fuse

**2.3.4 Module secondary terminal description**

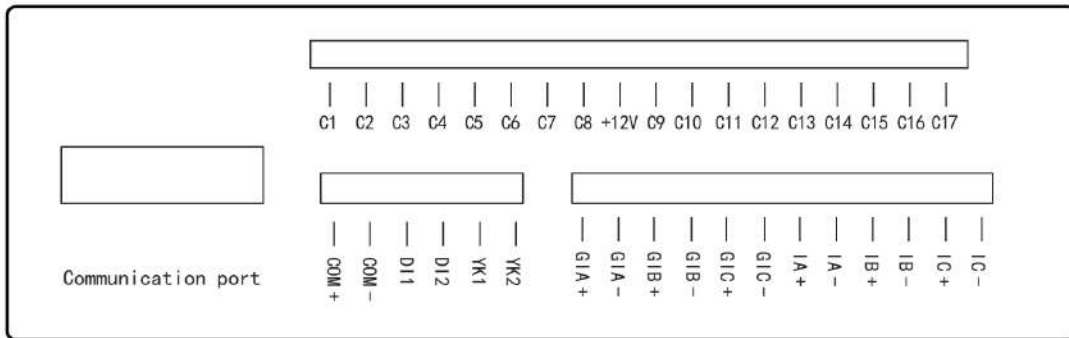


Figure 2-5 definition of module secondary line terminal



Table 2-5 Description of secondary wiring port 1

No.	Identification	Description	Remarks
1	485B1	1 RS485 port B	Step 1 RS485(standby, can be connected to RS485 port of intelligent capacitor or other equipment)
2	485A1	1 RS485 port A	
3	DI1	Module start signal (remote signaling input)	DI1 & COM- connect NO jog button
4	COM-	-24V power supply	-24V common port
5	DI2	Module stop signal (remote signaling input)	DI2 & COM- connect NC jog button or short circuit
6	485A2	2 RS485 port A	Step 2 RS485(module parallel, LCD, HMI board)
7	485B2	2 RS485 port B	

Table 2-6 Description of secondary wiring port 2

No.	Identification	Description	Remarks
8	COM+	DC24V+	24V DC power output, power 25W, can be used as power supply for external LCD or other controllers
9	COM-	DC24V-	
10	DI1	module start signal (remote signaling input)	DI1 & COM- connect NO jog button
11	DI2	module stop signal (remote signaling input)	DI2 & COM- connect NC jog button or short circuit
12	YK1	module operation indication (relay output)	YK1 & COM- connect to DC 24V indicator light, light when operation
13	YK2	module fault indication (relay output)	YK2 & COM- connect to DC 24V indicator light, light when fault

Table 2-7 Description of secondary wiring port 3

No.	Identification	Description	Remarks
14	GIA+	Cabinet CT A phase S1 terminal	Measuring CT input signal (internal CT current input signal). When a single module is used, this signal does not need to be connected. When multiple modules are used in parallel or equipped with capacitors, the measuring CT must be installed. The internal CT measures the total output current of the cabinet (the compensation current of all modules and capacitors)
15	GIA-	Cabinet CT A phase S2 terminal	
16	GIB+	Cabinet CT B phase S1 terminal	
17	GIB-	Cabinet CT B phase S2 terminal	
18	GIC+	Cabinet CT C phase S1 terminal	
19	GIC-	Cabinet CT C phase S2 terminal	
20	IA+	Grid/load CT A phase S1 terminal	Sampling CT input signal(external CT current input signal), the CT can be installed on the load side or grid side, and it is recommend to be installed on the load side.
21	IA-	Grid/load CT A phase S2 terminal	
22	IB+	Grid/load CT B phase S1 terminal	
23	IB-	Grid/load CT B phase S2 terminal	
24	IC+	Grid/load CT C phase S1 terminal	
25	IC-	Grid/load CT C phase S2 terminal	

Table 2-8 Description of port 4 (optional) of secondary wiring

No.	Identification	Description	Remarks
1	C1	Capacitor switching control signal	This port is optional and used to control capacitorswitching There are 17 channels of 12V capacitor switching control signals. When wiring, connect from small to large, first to split compensation, and then to three phase compensation. Among them, three control signals are required for the split compensation capacitor to control A, B and C phases respectively, and one control signal is required for the three phase compensation capacitor
2	C2	Capacitor switching control signal	
3	C3	Capacitor switching control signal	
4	C4	Capacitor switching control signal	
5	C5	Capacitor switching control signal	
6	C6	Capacitor switching control signal	
7	C7	Capacitor switching control signal	
8	C8	Capacitor switching control signal	
9	+12V	Capacitor switching control power supply	
10	C9	Capacitor switching control signal	
11	C10	Capacitor switching control signal	
12	C11	Capacitor switching control signal	
13	C12	Capacitor switching control signal	
14	C13	Capacitor switching control signal	
15	C14	Capacitor switching control signal	
16	C15	Capacitor switching control signal	
17	C16	Capacitor switching control signal	
18	C17	Capacitor switching control power supply	

2.3.5 Module secondary terminal wiring diagram

2.3.5.1 Start / stop button wiring diagram

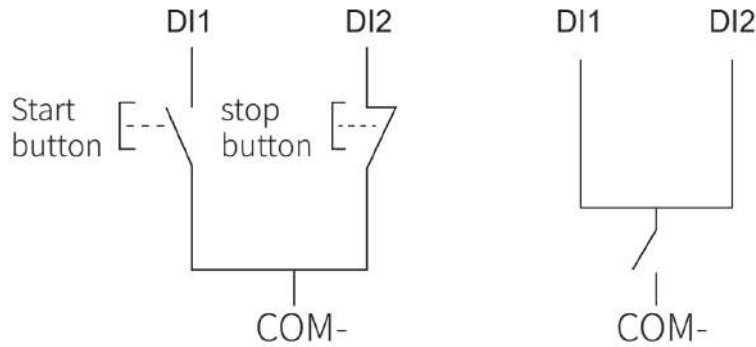


Figure 2-6 Start / stop control by button mode

When the module is started by button, there are the above two wiring modes

1. Use the jog button, and DI1 is connected with the NO button, which is the start button. DI2 is connected to the NC button, which is the stop button, as shown in the left figure above.
2. Use the change-over switch to start when closing and stop when disconnecting, as shown in the above right figure.

*Note: if the start / stop button is not connected outside the module, DI1 is not connected, and DI2 and COM- need to be short circuited.*

### 2.3.5.2 Operation status indicator

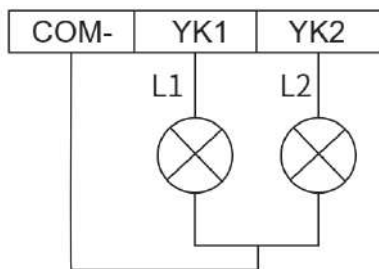


Figure 2-7 fault and operation indicator

When the external operation status indicator is required, YK1 and YK2 output DC 24V signal through the relay. L1 indicate operation and L2 indicate fault.

### 2.3.5.3 RS485 interface

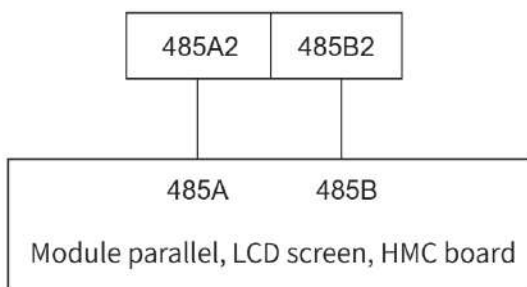


Figure 2-8 RS485 communication wiring diagram

When multiple modules are connected in parallel, RS485 communication is used. When the number of modules in parallel exceeds 8 or the transmission distance exceeds 300m, a 120 Ω resistor needs to be connected in parallel at both ends of the communication line.

RS485 cable generally adopts shielded twisted pair. One end of the shielding layer is connected to the cabinet ground and the other end is suspended.

RS485 wiring of multiple modules must be connected in series hand in hand, and star connection or bifurcation is not allowed. The wiring is shown in Figure 2-9:

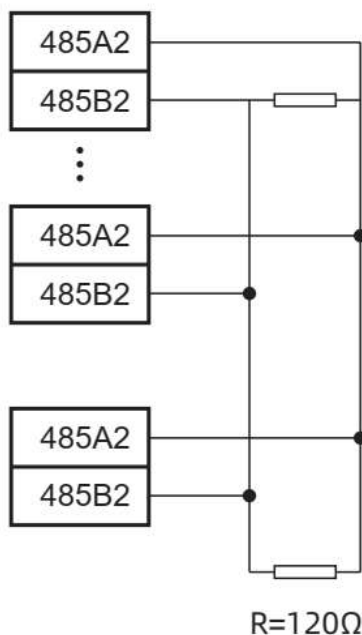


Figure 2-9 RS485 communication wiring diagram when multiple modules are connected in parallel

### 3.3.5.4 CT wiring

- Dangerous voltage

If CT is not connected correctly, it may lead to open circuit of CT, damage CT or personal danger. When wiring the CT, the secondary side of CT must be short-circuited first to ensure that CT is in a short-circuit state until all the CT connection terminals are connected.

When disconnecting the module, it is necessary to short-circuit the secondary side of the CT first.

- Please follow the rules below:

CT P1 is close to the grid side and P2 is close to the load side;

S1 of CT is connected to the module current input terminal (+), and S2 is connected to the module current output terminal (-)

The input signal of CT must be equipped with current test terminal to facilitate module commissioning

When less than 4 units are connected in parallel, CT is preferentially installed on the load side, and can also be installed on the grid side. When more than 4 units are connected in parallel, CT must be installed on the load side.

CT must be special use, and the secondary side of CT shall not be connected in series with other equipment.

Table 2-9 CT specifications

Content	Parameter value
Rated output current	5 A
Rated output power	≥5.0VA (1 ~ 4 units operate in parallel) ≥10.0VA (5~8 units operate in parallel)
Accuracy class	≥0.5 (or higher)
Rated input current	The rated current at the primary side of CT is generally selected according to 2 times of the rated capacity of transformer (kVA).

#### a, CT wiring for single module

The sampling CT (external CT) can be installed on both the load side and the grid side, the load side priority.

Be confirm the installation direction (P1 is close to the grid side and P2 is close to the load side) and phase sequence of CT to ensure the module work normally

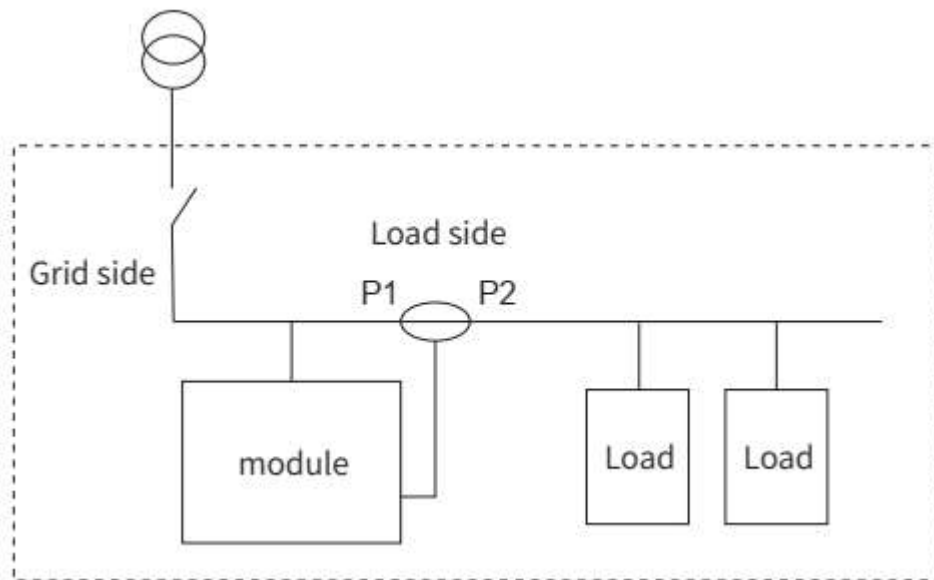


Figure 2-10 position of CT on the load side when a single module is running (priority)

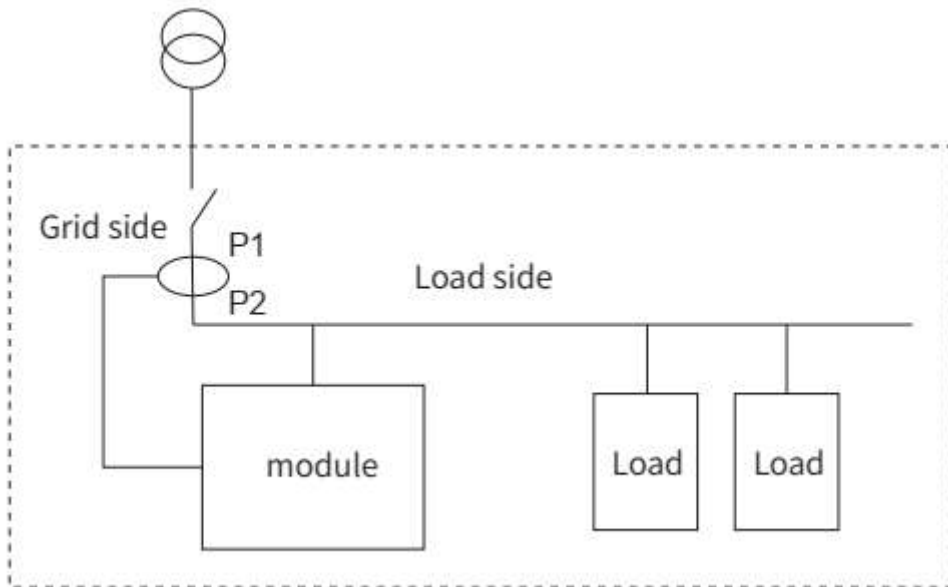


Figure 2-11 The position of CT on the grid side when a single module is running

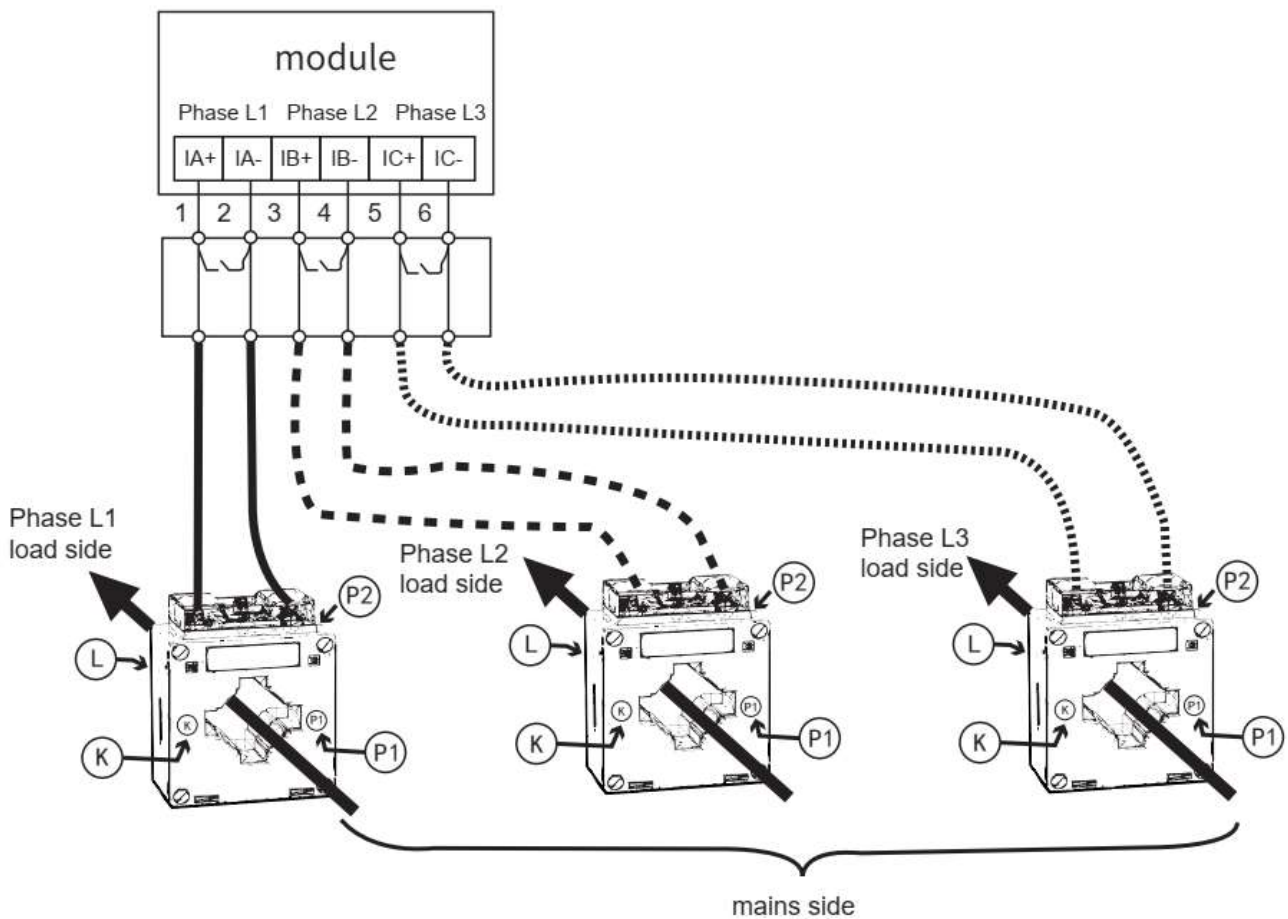


Figure 2-12 CT wiring for single module

CT installation and wiring instructions:

P1 of CT is close to the grid side, P2 of CT is close to the load side (P1 incoming line, P2 outgoingline);

S1 of CT is connected to the current input terminal (+) of the module, and S2 of CT is connected to the current output terminal (-) of the module;

The input signal of the CT is installed with the current experimental terminal on the cabinet

**b. CT wiring for multiple modules**

Parallel operation of multiple modules can increase the compensation current value. When connected in parallel, multiple modules share a set of sampling CT, and the current signals of the sampling CT are connected to all parallel modules, as shown in the figure below.

When less than 4 units are connected in parallel, CT is preferentially installed on the load side, and can also be installed on the grid side. When more than 4 units are connected in parallel, CT must be installed on the load side. If it is installed on the grid side, the compensation effect of the module may be poor, and even the stable operation of the module may be affected. When multiple modules are connected in parallel, a measuring CT must be installed in the cabinet to measure the total compensation current of all modules.

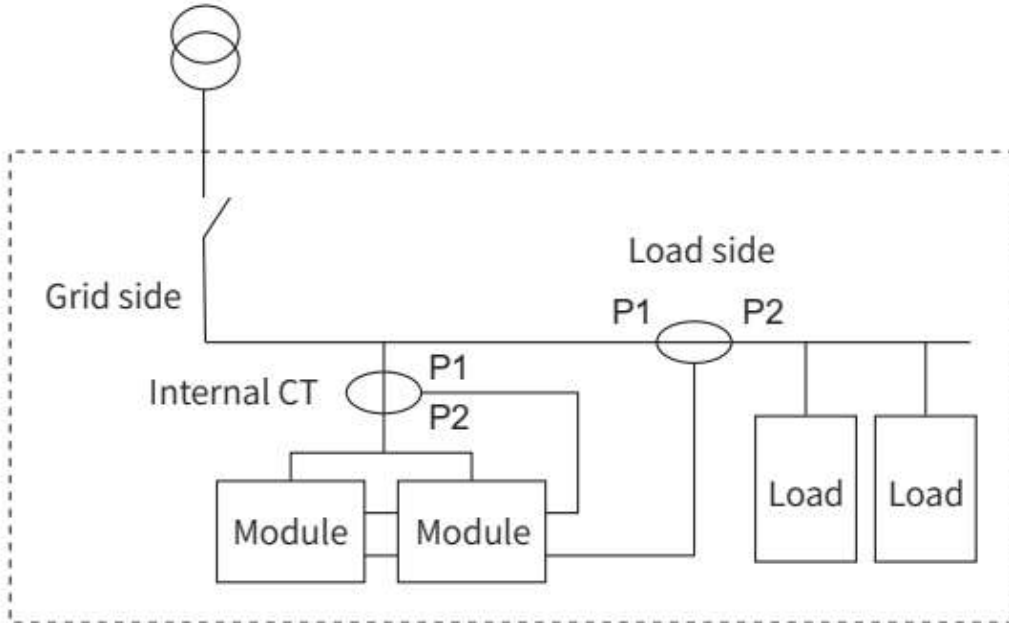


Figure 2-13 The position of CT on the load side when modules are running in parallel

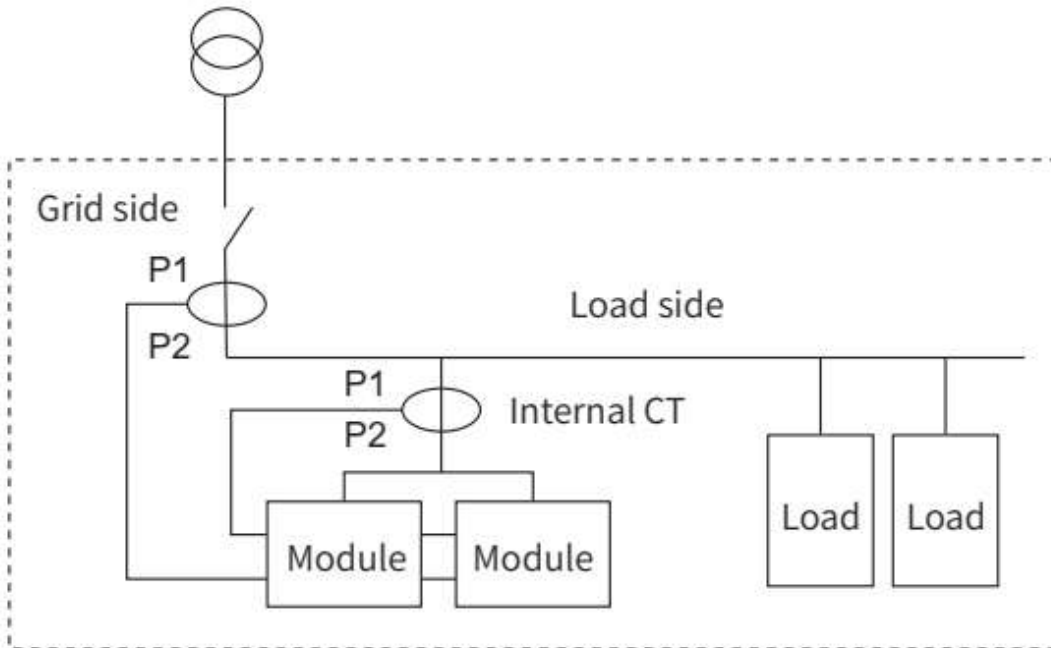


Figure 2-14 The position of CT on the grid side when modules are running in parallel



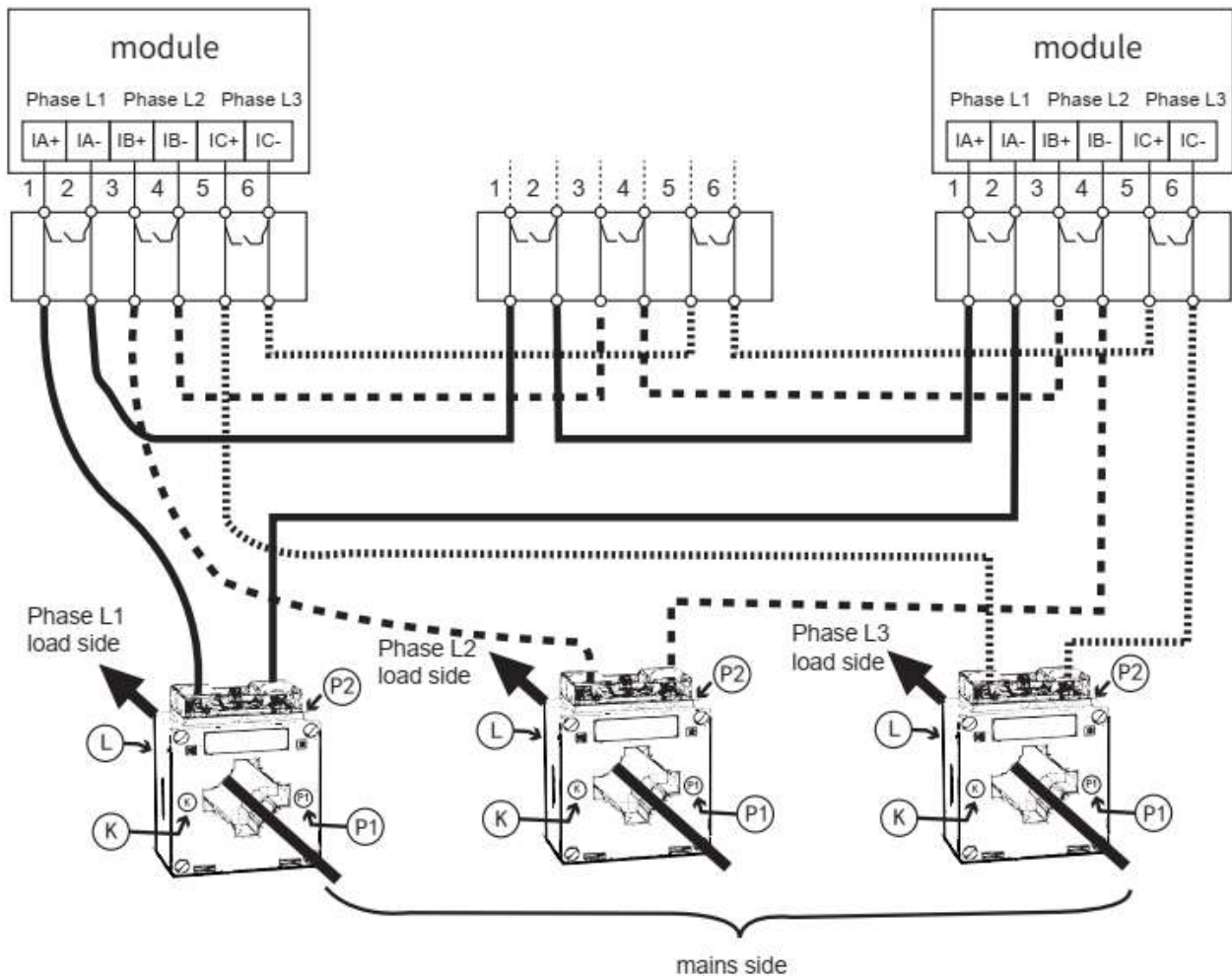


Figure 2-15 CT wiring when multiple modules are running in parallel

When the modules are connected in parallel, the external sampling CT signal is serially connected to each module in sequence, and the wiring is shown in Figure 2-15.

According to Table 2-9 CT Specification, max. 5 units can be connected to one CT. When quantity of modules in parallel is more than 5 units, please select one CT with stronger load output capability or increase quantity of CT.

CT installation and wiring instructions:

P1 of external CT is close to the grid side, P2 of external CT is close to the load side (P1 incoming line, P2 outgoing line);

P1 of internal CT is close to the grid side, P2 of internal CT is close to the module side (P1 incoming line, P2 outgoing line);

The secondary current of CT flows in series through all the modules in parallel

S1 of CT is connected to the current input terminal (+) of the module, and S2 of CT is connected to the current output terminal (-) of the module;

The input signal of the CT is installed with the current experimental terminal on the cabinet. CT parameter setting description:

The ratio setting is set according to the transformer ratio and the number of parallel modules. The ratio is set as CT ratio / number of modules,

For example: the external ratio is 2000/5, the internal ratio is 800/5,

4 modules in parallel,

The external CT ratio of each module is set to 500/5, The internal CT ratio is set to 200/5 .

**c. Single module + capacitor hybrid compensation cabinet**

In the hybrid compensation, in addition to the harmonic or reactive power compensation, the module also needs to control the switching of capacitors. The internal CT measures the total compensation current of all modules and capacitors, and the external CT measures the load side current (preferred scheme). If the external CT measures the grid side current, it must be ensured that there is no current of other reactive power compensation modules in the current sampled by the grid side CT

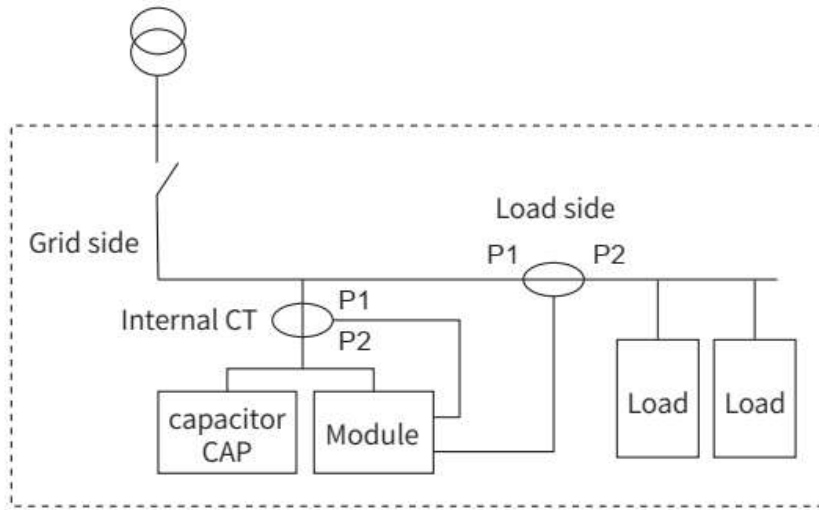


Figure 2-16 external CT installed on the load side (preferred scheme)

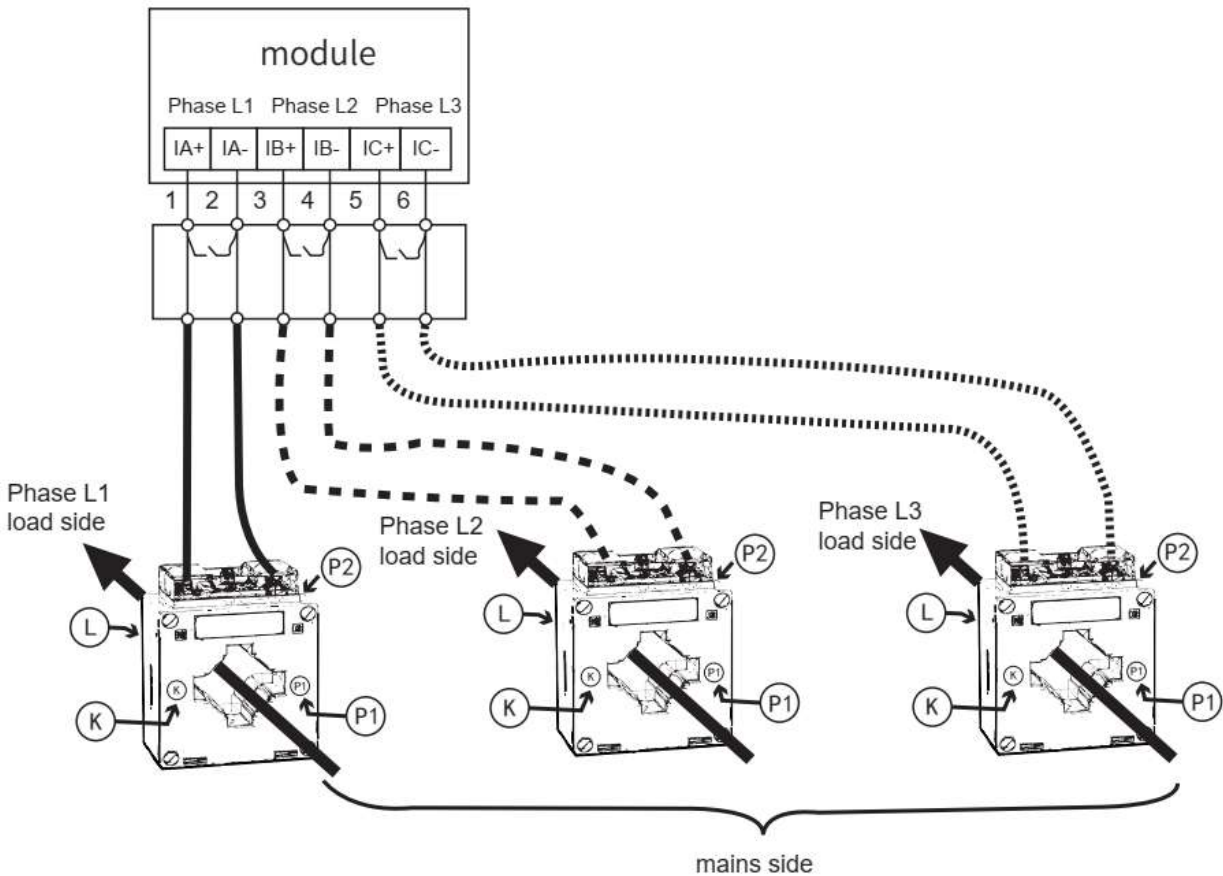
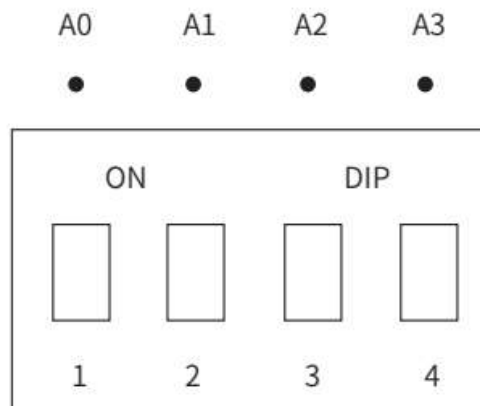


Figure 2-17 CT wiring diagram for hybrid compensation

### 2.3.6 DIP switch description

The DIP switch is used to adjust the 485 communication address of the module, and its appearance is shown in the figure below



Dial up (close to the ON side) of the DIP switch means 1, and dial down means 0. The corresponding 485 communication address of the DIP switch is shown in the table below

Dial position, dial up is 1, dial down is 0				Module address
A0	A1	A2	A3	
0	0	0	0	0 (software setting address)
1	0	0	0	1
0	1	0	0	2
1	1	0	0	3
0	0	1	0	4
1	0	1	0	5
0	1	1	0	6
1	1	1	0	7
0	0	0	1	8
1	0	0	1	9
0	1	0	1	10
1	1	0	1	11
0	0	1	1	12
1	0	1	1	13
0	1	1	1	14
1	1	1	1	15

### 2.3 External touch screen of the module

The module has an optional external touch screen, usually the touch screen is connected to the No.2 RS485 port of the module (terminal identification: 485A2, 485B2).

# Chapter III: Module commissioning instructions

## 3.1 Switching module

### 3.1.1 Start-up mode

There are three boot modes of the module, namely [Automatic start], [Button start] and [Communication start], which can be set through external touch screen.

[Automatic start]: the module starts automatically after power on. If the module is shut down due to failure or abnormal communication during normal operation, the module can start automatically after the failure disappears. In the automatic boot mode, the module can be turned off through the stop button or touch screen operation.

[Button start]: Control the module to start up through the “start button” on the cabinet. [Communication start]: Control the module to start up through the “start button” on the touch screen.

*Note: only one of the three boot modes can be selected, and multiple selection is not allowed. Multiple selection is allowed for shutdown mode.*

### 3.1.2 Boot steps

The module is set to [Automatic start] mode, if the module has no fault after power on, the module will start automatically;

The module is set to [Button start], which can be started through the external button or change-over switch; The module is set to [Communication boot], which can be started through the touch screen.

### 3.1.3 Shutdown mode

There are three shutdown modes:

Module direct power-off (emergency shutdown mode): directly disconnect the circuit breaker or disconnect between the module and the power grid. In this mode, the module is not charged, and the relevant maintenance work of the module can be carried out. (Note: emergency shutdown mode, normal operation is prohibited! Due to the existence of internal electrolytic capacitor, it is strictly prohibited to open the module shell within 5 minutes after power failure).

Touch screen shutdown: use the “On / Off button” of the touch screen for shutdown operation. Button shutdown: manually shutdown through the button on the cabinet.

Touch screen shutdown and button shutdown only shut down the operation of IGBT power modules in the system. However, since the bus and auxiliary power supply of the module are still charged, the relevant control systems are in standby state.

## 3.2 Module display interface

The module itself does not have a display screen. For single module use, it can be equipped with a 4.3-inch touch screen (see the appendix for operation instructions). For multi modules use, can be equipped with a 7-inch touch screen, which can display the system data in real-time, set the relevant parameters of the module operation, record and save the fault information and related data occurred during the operation of the module, etc.

## 3.2 Commissioning steps

### 3.3.1 Inspection items

- The module casing is grounded;
- Whether the incoming line of power A/B/C/N is correct and whether the voltage is normal;
- Whether the CT installation is correct, whether the direction is correct, and whether the wiring is correct;
- Whether the control signal line is correct;
- Whether the communication wiring is correct;
- Whether the design of the ventilation holes of the cabinet is reasonable;
- Whether there are left tools on site.

### 3.3.2 Module startup

First, power on the module, and check whether the module voltage is normal through the display screen.

Set the relevant parameters and observe whether the current, power and power factor are correct. If there is a fault at this time, deal with it accordingly. If there is no fault and all the displayed measurement data are correct, start the module. After the module runs normally, observe the compensation effect of the module.

### 3.3.3 Observe the compensation effect

The compensation effect of the module can be observed in real time through the touch screen, and the system harmonic current, reactive current, three-phase active power, etc. can be measured by the power quality analyzer to verify the compensation effect of the module

# Chapter IV: Maintenance

## 4.1 Daily maintenance

1. The module is a modular design, and routine maintenance only needs to observe whether the data displayed on the touch screen is correct and whether there is an alarm signal.
2. Qualified customers can use an infrared thermometer to observe whether there are abnormal high temperature points inside the module through the air inlet and air outlet. If there is any abnormality, please turn off the power immediately and contact our customer service engineer.
3. Always check whether the grounding point of the product is reliable.
4. Always check whether the ventilation of the module is normal and whether the air duct of the cabinet is smooth.

## 4.2 Precautions

1. This module is a strong current product. In order to ensure the safety of maintenance personnel, it is not allowed to touch any live part of the product during normal operation.
2. Due to the air duct isolation of the module, the dust filter is not required in the general application environment. However, for the environment with harsh daily environment, such as high temperature, high humidity and more conductive dust, when making the scheme, contact our product engineer to confirm the specific scheme.

## 4.3 Fault judgment

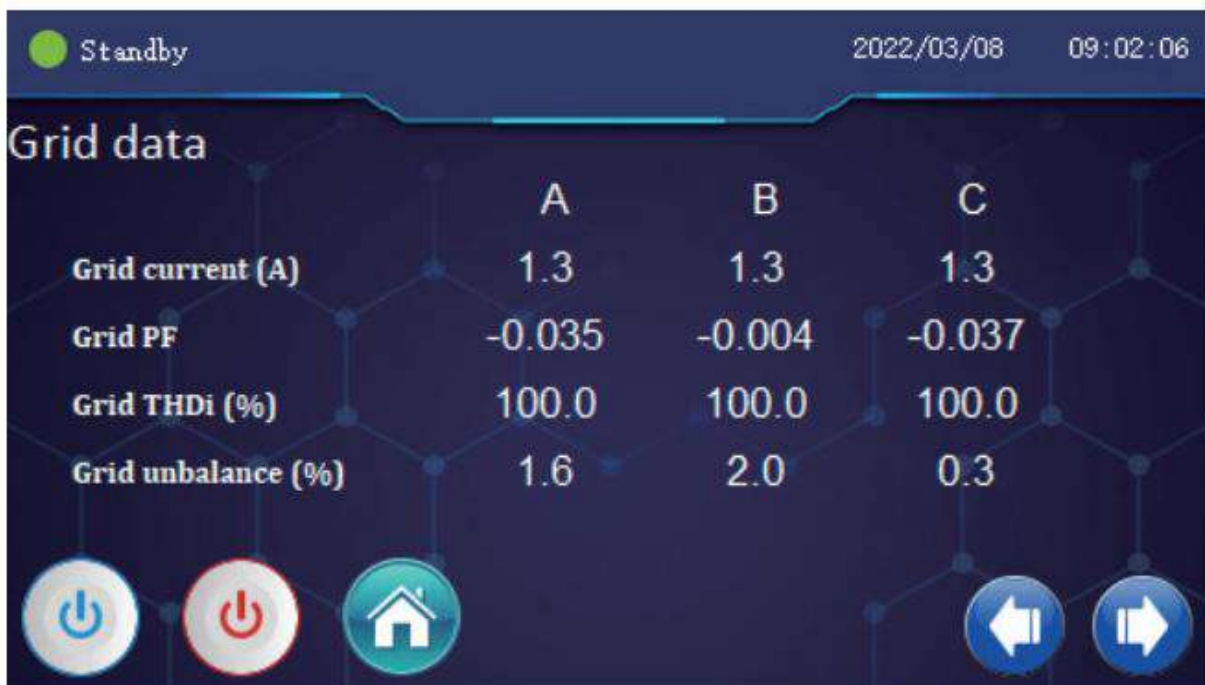
1. Common errors: such as the reverse connection of the CT line, the reverse connection of the power line phase sequence, or the wrong parameter setting, etc. Such failures are easy to find by observing the data during startup and debugging. If there is a poor compensation effect but no alarm information, please contact our product engineer.
2. The touch screen displays alarm information, please contact our product engineer directly.
3. There is no response when the module is powered on, please contact our product engineer directly.

*Note: for your personal safety, no matter what kind of fault it is, it is not allowed to disassemble the machine without our permission, and the products with damaged labels are not within the scope of warranty.*

# Appendix

## Appendix 1: Operation instructions for optional touch screen of module

The module is equipped with a 4.3-inch touch screen, which can switch pages and set parameters through buttons. The HMI can display the grid three-phase voltage, load harmonic, reactive current, module output current, etc. in real time, set the startup mode, CT ratio, harmonic compensation, etc., record the faults during the operation of the module, and save the key system parameters of the faults





### 1. Real-time data display

After the touch screen is powered on, enter the real-time data display interface, and you can see the grid data, load data, module data, etc., including voltage, current, power factor, active power, reactive power, harmonic information, etc. you can view the grid data, load data, module data, etc. in turn through the page turning button



Figure 1 Real-time data interface

## 2. Touch screen main interface



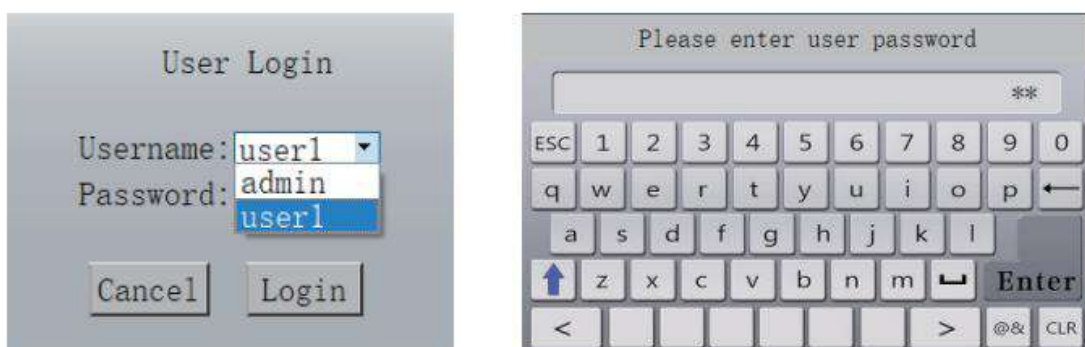
Figure 2 Touch screen main interface

Touch screen icon description, press different icons to enter the corresponding interface



## 3. Parameter setting

Click the "Parameter setting button", the password is **20**, enter the parameter setting interface. And then enter the corresponding interface to change the parameters



Take the startup mode setting as an example, Figure 3 startup mode setting interface, other settings are similar

The parameter settings are described as follows

Module parameter setting			
No.	Parameter item	Parameter setting	Remarks
1	Startup mode	Communication start <input type="checkbox"/> Button start <input type="checkbox"/> Auto start <input type="checkbox"/> Load rate self starting <input type="checkbox"/>	
2	Local address setting	1	default
3	Compensation mode	Full compensation <input type="checkbox"/> Compensation by harmonic order <input type="checkbox"/>	
4	Harmonic current compensation capacity	A	
5	Harmonic order	2 ~ 50	
6	Reactive power compensation function	On <input type="checkbox"/> Off <input type="checkbox"/>	
7	Reactive current compensation capacity	A	
8	Unbalance compensation function	On <input type="checkbox"/> Off <input type="checkbox"/>	
9	Unbalance compensation capacity	A	
10	Local mode	Single module <input type="checkbox"/> Multi - module <input type="checkbox"/> Single module+capacitor <input type="checkbox"/>	
11	External CT location	Load side <input type="checkbox"/> Grid side <input type="checkbox"/>	
12	External CT ratio	/5	
13	Internal CT location	Single module <input type="checkbox"/> Multi-module/Mixed cabinet <input type="checkbox"/>	
14	Internal CT ratio	/5	
15	Phase sequence adaptation	On <input type="checkbox"/> Off <input type="checkbox"/>	
16	Save	After the parameter setting is completed, enter the parameter saving interface and select to save the parameter	

#### 4. Fault record

Select fault record in the main interface and enter the fault record interface. You can see VBUS voltage, instantaneous value of module current, IGBT temperature and other data

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