

# User Manual of ZHDCS/T series thyristor rectifier power supply system

**Dear users**

We appreciate your choice, and we will do our best to provide all-around technical support and service to you.

Before using the product, please read this operation manual carefully. If you want to know more information or encounter issues beyond your ability to solve, please contact our power user service center for help without hesitation. Service Hotline:

**+86571-86699752**

## **Safety instructions**

There will be high voltage when this product is in operation, so please pay attention to the safety.

Please make wiring according to the wiring scheme provided by us, and please do not change the wiring scheme without authorization, otherwise the system may be damaged.

## **Version Notes**

**Version Number: V1.0**

**Released Date: 2021-12-7**

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# Special statement

## Personal safety

1. The product must be installed and debugged by the professional engineer of the manufacturer or its authorized agent. Otherwise, it may cause product failure or pose a threat to person.
2. Before installing and debugging the product, it is necessary to read the product manual and safety matters in detail. Otherwise, it may lead to product failure or pose a threat to person.
3. This product can't be used as a power source for any life support equipment.

## Equipment safety

1. If the product is stored or not used for a long time, it must be placed in a dry, clean and suitable temperature environment.
2. This product should be used in an appropriate working environment (see the environmental requirements section of this product manual for details).
3. It is forbidden to use this product in the following working environment:
  - Sites with High temperature, low temperature or humidity places beyond the technical specifications of this product
  - Sites with conductive dust, corrosive gases, salt spray or flammable gases
  - Vibrational and vulnerable sites
  - Sites near heat sources or with strong electromagnetic interference



## Exemption

The company is not responsible for defects or failures caused by the following reasons:

- Out of the scope of working environment specified by the product
- Unauthorized restructuring or maintenance, incorrect installation, improper operation
- Force majeure
- Other matters violating the regulations of this product manual.

## Important Notice

- All relevant parts of the manual must be read carefully prior to the installation.
- The charger must be commissioned by an engineer approved by the manufacturer (or its agent) before being put into service. Failure to observe this will invalidate any implied warranty.
- The charger is a product for commercial and industrial application only, and is not designed for life support equipment application.

	Used to emphasize important information in the manual
	Used to remind people of safety risks

## The Manual Contains Following Parts

Equipment	
48V/25A~1000A charger	For example:ZHDCS48150T/300
125V/25A~1000A charger	For example:ZHDCS125100T/400
Options	
IP Ratings	Dry contact board
DC insulation monitoring relay	Battery temperature sensor

## Safety Precautions

- Read thoroughly all the warnings and instructions in this manual and the charger before using the equipment.
- This product is Class C3 equipment. If this product is used for commercial and industrial application in the second environment, installation restrictions or additional measures may be required to prevent disturbances.
- The charger must be earthed well in accordance with local electrical codes.
- All equipment maintenance and servicing procedures involving internal access must be carried out only by authorized and qualified personnel.

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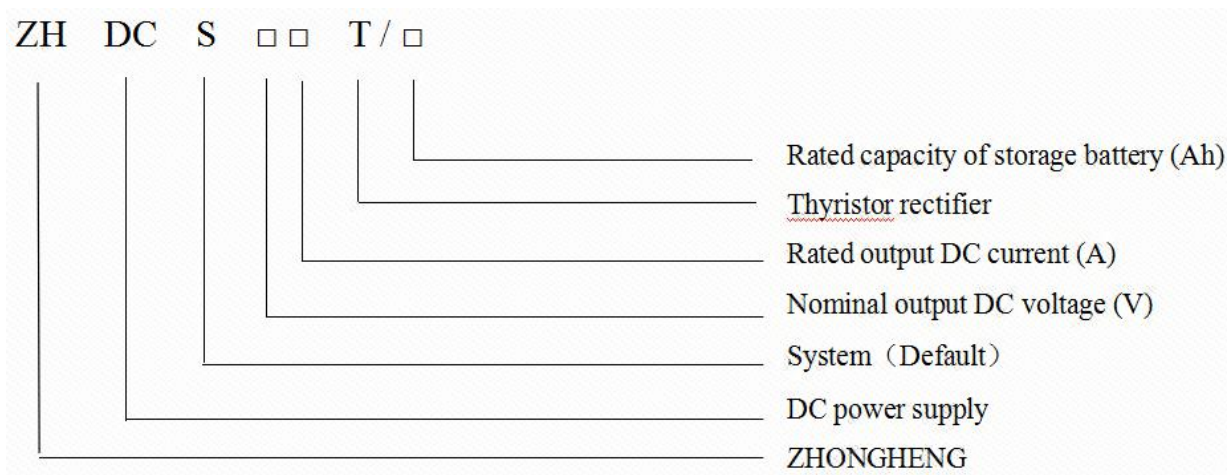
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## Chapter 1 Overview

### 1.1 Features

The charger adopts the AC-DC converter to charge the battery with smooth voltage. The charger adopts the AC-DC converter to charge the battery with smooth voltage. ZHDCS/T series thyristor rectifier power supply system is a power supply product designed for the high reliability of overseas power grid systems based on years of research and development and equipment operation experience. The power supply system using SCR as the rectifier device, the principle is that the AC input voltage is stepped down by a power frequency transformer, and then the SCR is used for rectification.



Sample: Product type ZHDCS48150T/300

Meaning: Thyristor rectifier power supply system which has nominal output DC voltage of 48V, rated output DC current of 150A and storage battery capacity of 300Ah.

### 1.2 Environmental Characteristics

Table 1-1 Environmental characteristics

Item	Unit	Rated Voltage and Current
		48Vdc/125Vdc/220Vdc
		25A~1000A
Operating temperature range	℃	0-55℃
Relative humidity range	%	≤95
Altitude	m	≤3000 When above 3000m, refer to standards for derating
Storage temperature	℃	−25~70℃

range		
Noise	dB	≤55dB

### 1.3 Basic parameters

Table 1-2 Basic parameters

Item	Unit	Rated Voltage and Current
		48Vdc/125Vdc/220Vdc
		25A~1000A
Height	mm	2260
Width	mm	800
Depth	mm	600/800/1000
Ventilation		Internal fan
MTBF	h	≥ 250000
Efficient	%	92%fully loaded
Transformer		Double winding isolate transformer
Note:		
The charger height/width/depth can be customized.		

### 1.4 Electrical Characteristics (AC)

Table 1-3 Electrical characteristics (charger Input)

Item	Unit	Rated Voltage and Current
		48Vdc/125Vdc/220Vdc
		25A~1000A
Rated Input voltage	Vac	220 :3-phase
Input voltage range	Vac	220:scope:-15%~ +15%
Rated frequency	Hz	60Hz;
Input frequency range	Hz	allowed change scope: ±5%
Input power factor	%	fully loaded 0.8

### 1.5 Electrical Characteristics (Charger output)

Table 1-5 Electrical characteristics (charger output)

Item	Unit	Rated Voltage and Current
		48Vdc/125Vdc/220Vdc
		25A~1000A

Charging voltage scope	V	198Vdc~286Vdc/ 99Vdc~190Vdc/ 40Vdc~58Vdc
Floating charge voltage	V/Cell	2.25
Equalize charge voltage	V/Cell	2.35
Charge current limit	A	(10%~110%)×rated value
Voltage stability	%	≤1%
Charge voltage ripple	%	≤1%
Battery temperature compensation	-3mV/°C	Configurable (default value-3mV/°C Single ) Configure the battery temperature sensor

## 1.6 Electrical Characteristics (DC output)

Table 1-6 Electrical characteristics (DC output)

Item	Unit	Rated Voltage and Current
		48Vdc/125Vdc/220Vdc
		25A~1000A
Voltage adjustable range	%	-20% ~ +20%
Output current specification	A	25A~1000A
Output current limit	%	(10%~110%)×rated value
Voltage regulation accuracy	%	≤±1%
Current regulation accuracy	%	≤±1%
Output Voltage Ripple	%	≤±1%

Note: Parallel redundant configuration with load sharing, With automatic load balancing function

## 1.7 Design Concept

Figure 1-1 shows the charger internal AC-DC working principle.



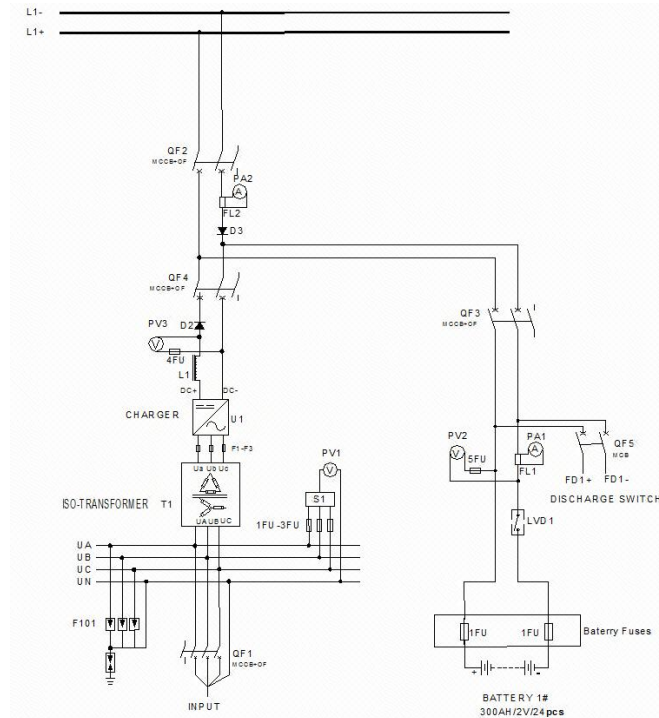


Figure 1-1 System schematic




## 1.8 Executive standard

Electric DC power supply system described in this operation manual complies with electric industry standards IEC 60146, EMC certification standard IEC61000.

## Chapter 2 Mechanical Installation

This chapter introduces the mechanical installation of the charger, including the precautions, environmental requirement, mechanical requirement and initial inspection before installation.

### 2.1 Notes

	The charger must be installed by authorized engineers in accordance with the information contained in this user manual or other user manual associated with the installation.
	Do not power on the charger before the arrival of the authorized engineers.
	Take special care when installing batteries. The battery terminal voltage will exceed 254Vdc, which is fatal to human being.



### 2.2 Environmental Requirement

#### 2.2.1 Charger Location Selection

The charger should be located in a cool, dry, clean-air indoor environment with adequate ventilation. Special attention: The ambient environment should be free of conductive powder, acid mist or other conductive media (strongly ionized substances). The environment specifications should comply with Table 1-2, and others should conform to national standard and regulations.

During the operation, the cooling air enters the charger through the ventilation grills and then exhausted through the ventilation grills at the back of the cabinet. Therefore, the charger must be installed on concrete or other nonflammable surfaces.

Refer to Table 1-3 for charger weight. During the installation, please make sure you have evaluated the bearing condition of the installation site.



	When the battery cabinet is installed near the charger, the maximum allowable ambient temperature is dependent on the battery rather than the charger.
	The installation site and passageway must be able to carry the weight of charger/ batteries and other accessories.

### 2.3 Mechanical Requirement

#### 2.3.1 Unpacking

Take special care when moving or unpacking the charger so as not to damage the equipment.

The charger cabinet can be moved by forklift. Ensure that the charger weight does not exceed the capacity of the lifting equipment. See Table 1-3 for its weight.

	The equipment is high and heavy, and the equipment should be avoided leant during the forklift handling. If necessary, put the equipment down and adjust its position to correct equipment balance and ensure safe transportation.
	charger is precise electronic equipment. It only supports vertical transportation and installation. Dumping should be strictly prohibited. Dumping or horizontal transportation, handling and installation may damage the devices in charger.

### **2.3.2 Operation space**

1. To facilitate the inspection on the charger, the clearance at front of the charger should be sufficient to enable free passage of personnel with the door fully open.
2. Maintain at the back of the cabinet a clearance at least 40cm to permit adequate circulation of air coming out of the charger.
3. Do not place any foreign materials on the charger.

### 2.3.3 Cable Access Mode

This charger and battery cabinet supports bottom cable access mode. See Chapter 3 for details.

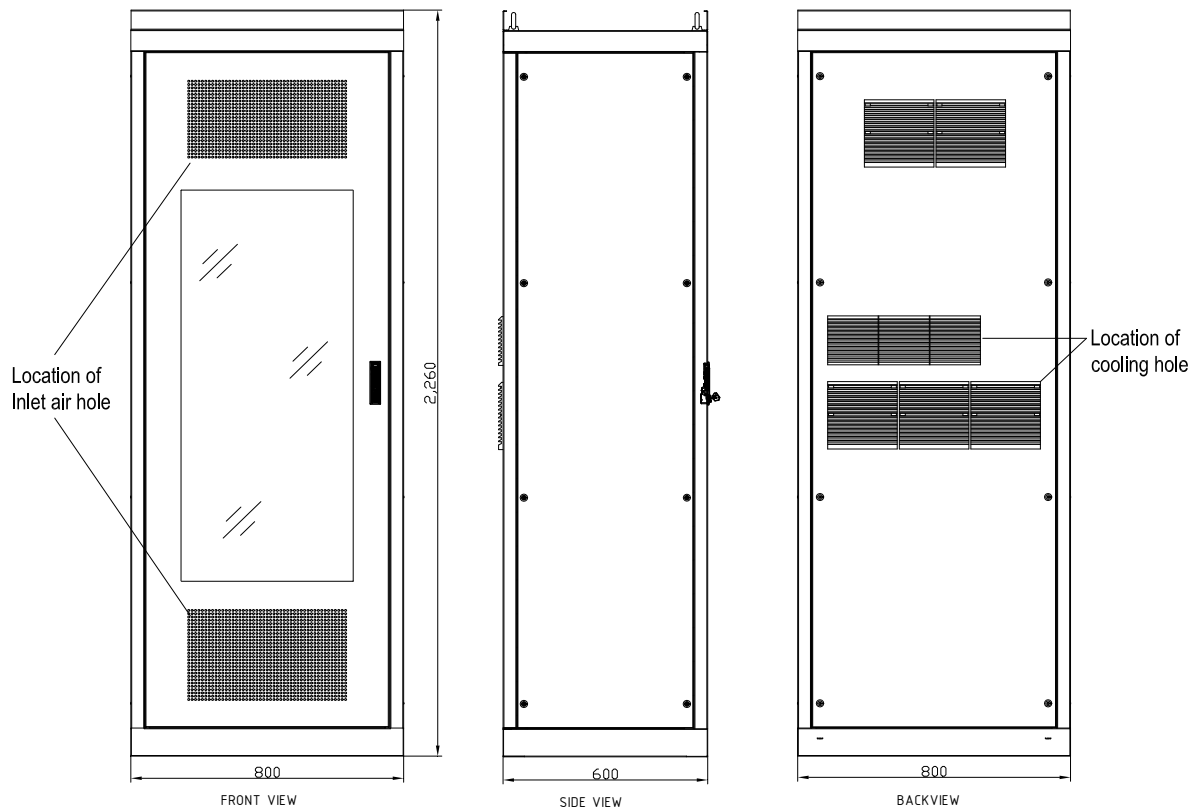
## 2.4 Initial Inspection

Before installing the charger, carry out the following inspections:

1. Ensure that the environment of the charger equipment room meets the environmental requirement specified in this manual.
2. Unpack the charger packaging, visually inspect whether the inside and outside of the charger have any transportation damage. If there is any damage, report to the carrier immediately.
3. Unpack the battery packaging, visually inspect whether there is a deformation, cracking or leakage. If there is any damage, report to the carrier immediately.

## 2.5 Installation Drawings

See Figures below for the installation dimensions.



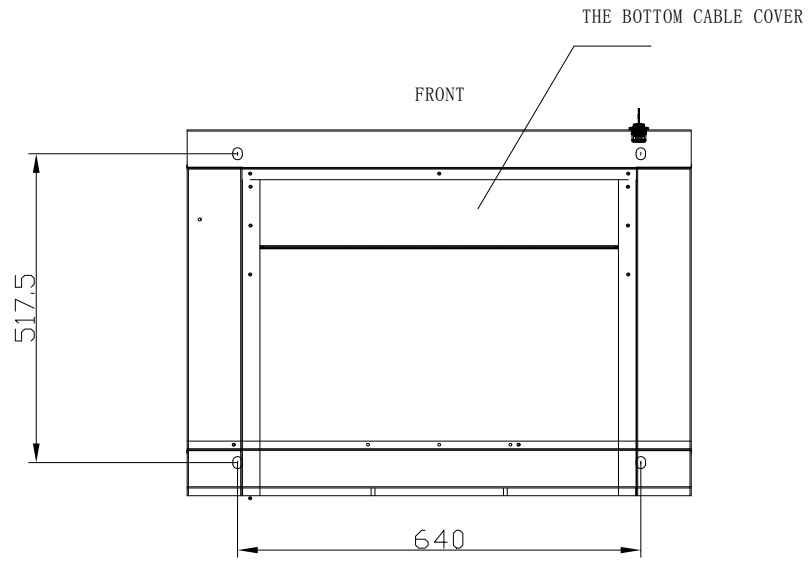


Figure 2-1 Side/front/rear/bottom view (unit: mm)

## Chapter 3 Electrical Installation

This chapter mainly introduces the electrical installation of the charger, including the power cable and signal cable connecting procedures and methods.



**All the signal cables, whether shielded or not, shall be kept away from the power cables.**

### 3.1 Wiring Of Power Cables

1. Refer to 2.3.3 *Cable Access Mode* for cabling mode.
2. The power cable must be selected according to the instructions in this chapter and local regulations, and take environmental conditions into consideration, then refer to Table 3B in IEC 60950-1.



**Before the cables connection, to avoid electric shock, please note that the front distribution switch can't be closed. All the switches must have warning labels.**

#### 3.1.1 Selection Of Cable Size

1. The cable sizes of the charger input cable, battery cable and load cable are related to the charger power rating, input/output voltage level. Refer to Table 3-1 for selection and note that the cable size should meet the requirement of maximum current.
2. The cable size of the protective earth cable shall be selected according to the AC power failure level, cable length and protection type. Please follow the actual situations and local regulations.

#### 3.1.2 Protective Earth

The PE terminals are shown in Figure 3-1 , The PE lines should be connected to the PE terminals.



**Incorrect ground connection can cause electric shock and fire hazards.**



**To avoid electric shock, the equipment must be well earthed.**

#### 3.1.3 Protective Device

To ensure the safety, it is necessary to install external circuit breaker for the input and battery of the charger.

##### AC

Generally, a suitable protective device is installed on the distribution line between the charger AC terminal and the AC power, so that the charger can be safely isolated from the AC power during installation and maintenance.

##### Battery

Generally, a suitable protective device is installed on the distribution line between the charger and the battery so that the charger can be safely isolated from the battery during installation and maintenance.

#### 3.1.4 Power Cable Connection Steps

After the mechanical installation of the charger, refer to Figure 3-1 for the power cable connection steps:

1. Make sure that all the input switches are fully disconnected, and that charger internal switches are fully disconnected. Make a warning symbol at these switches to protect against unwanted operation.
2. Open the charger front door, remove the bottom protective cover, and you can see the terminal blocks.
3. Connect GND cables to GND terminals.
4. Connect the AC input cables to the terminals (UR,UY,UB,UN).

11X			211X		
1# AC INCOMING LINE			2# AC INCOMING LINE		
QF1-1	1	UR	QF1-1	1	UR
QF1-3	2	UY	QF1-3	2	UY
QF1-5	3	UB	QF1-5	3	UB
TSPD-N	4	UN	TSPD-N	4	UN
	5			5	
	6			6	

Figure 3-1 Power cable connecting terminals of charger AC input



**The connection of ground must comply with the relevant local and national regulations..**

5. Connect the DC load cables between the terminals (KM+,KM-) and the load.

14X				214X			
Busbar Output Line				Busbar Output Line			
QF2-2	1	KM1+	RED	QF2-2	1	KM2+	RED
QF2-6	2	KM1-	BLACK	QF2-6	2	KM2-	BLACK

Figure 3-2 Power cable connecting terminals of DC output



**If the charger does not have power supply requirement temporarily, please take care of the safety insulation of the output cables end to avoid electric shock.**

6. Connect the battery cables between the charger (Battery+/Battery-) terminals and the battery.

15X				215X			
1# Battery Input				2# Battery Input			
QF3-2	1	1# Battery+	RED	QF3-2	1	2# Battery+	RED
	2				2		
QF3-6	3	1# Battery-	BLACK	QF3-6	3	2# Battery-	BLACK

Figure 3-3 Power cable connecting terminals of Battery



**Don't closed the external battery switch before end of installation.**

7. Ensure that all the cables are connected firmly, then install the bottom protective cover,.

## 3.2 Wiring Of Communication

Charger dry contact ( 12X/13X/212X/213X )

Charger dry contact ( 12X/13X/212X/213X ) position is showed in Figure 3-4:

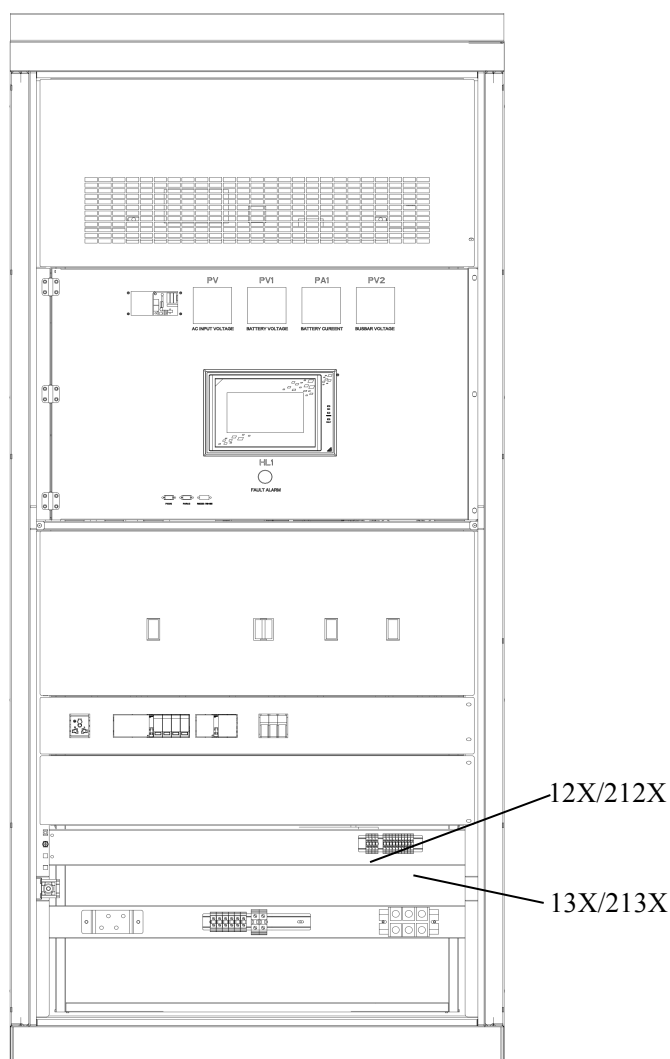


Figure 3-2 Dry contact terminals position

The dry contact signal cables must be routed separately from the power cables. They should be the double-insulation stranded wire with cable size of 0.5mm<sup>2</sup>~1.5mm<sup>2</sup>, and the maximum wiring distance is 25m~50m.

The relays for the output contact is 250V/8A.

For dry contact details, please check the drawings .

Table 3-1 Dry output contact (12X/212X) definition

Terminal	PIN	Status	DEFINITION
12X	1,2	NO	AC&Charger Fault
212X	3,4	NO	Battery Fault

Table 3-2 Dry output contact (13X/213X) definition

Terminal	PIN	DEFINITION
13X 213X	1	485A 1#PANEL TO SCADA
	2	485B 1#PANEL TO SCADA
	3	COMMON ALARM (COM)
	4	COMMON ALARM (NO)
	5	SPARE
	6	SPARE
	7	SPARE



	8	SPARE
	9	SPARE
	10	SPARE

## Communication port

The communication ports include RS232/RS485/RS485/ TCP/IP realizes Modbus protocol

### RS232/RS485 :

The charger provides RS232/RS485 port for the authorized personnel to commission and service. You can change the communication baud-rate through “Settings”→“Comm Settings”→“RS232 Baud” or “RS485 Baud”. The communication port's pin definition is shown in Table 3-5.

Table 3-3 Pin definition for RS232/RS485

Terminal	PIN	DEFINITION
RS232/RS485	PIN1	NULL
	PIN2	RS232-RXD
	PIN3	RS232-TXD
	PIN4	RS232-DTR
	PIN5	RS232-GND
	PIN6	NULL
	PIN7	RS232-RTS
	PIN8	RS485+
	PIN9	RS485-

## Chapter 4 Display Panel

### 4.1 Introduction

The display panel is located on the charger front door, Figure 4-1 show the monitoring display panel.

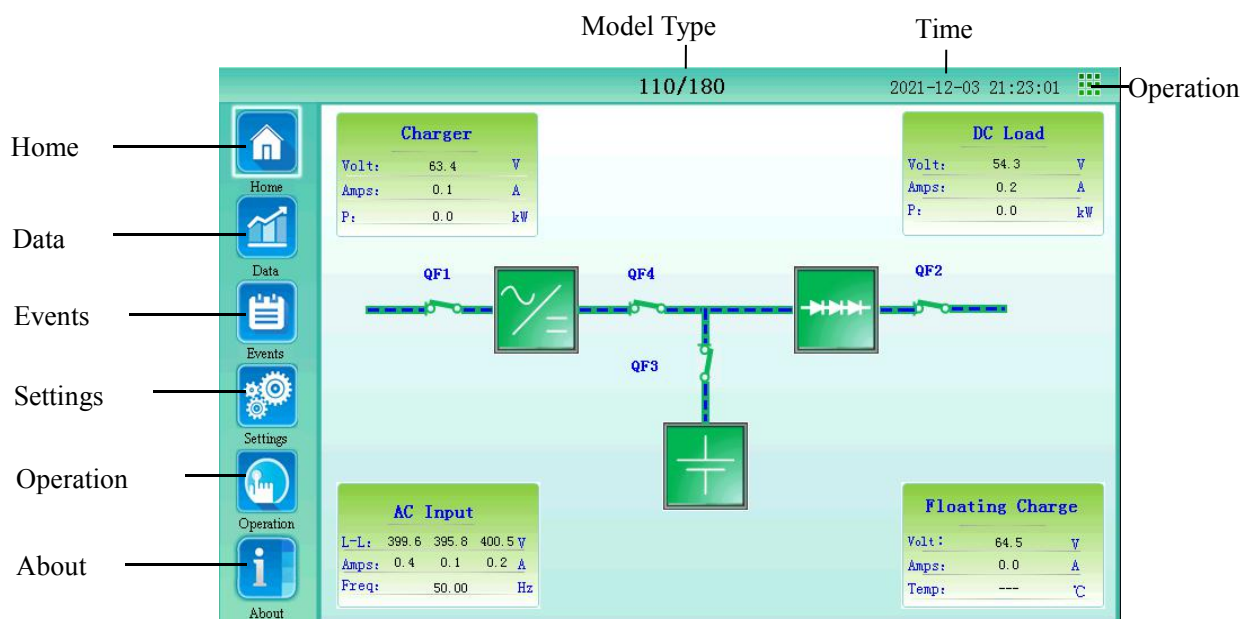


Figure 4-1 Monitoring display panel

#### 4.1.1 Indicators

There are totally three indicators. See Table 4-1 for details.

Table 4-1 Description of indicator status

Name	Status	Meaning
Normal	Green	charger working normal
Warning	Yellow	charger has warning alarms
Fault	Red	charger has critical alarms

#### 4.1.2 Audible Alarm (Buzzer)

The charger activity is accompanied by the three kinds of sound listed in Table 4-2.

Table 4-2 Description of audible alarm

Alarm sound	Description
Single beep	Touch the LCD
Discontinuous beep	charger has warning alarms
Continuous beep	charger has critical alarms

### 4.1.3 Touch Screen

Through the Touch screen, the user can view charger input, DC output and battery parameters, and get current status and alarm information, then conduct corresponding function setting and control operation.

### 4.1.4 Display Information

#### 1. Home page window

The HOME window gives the basic information of the charger.

ON the left side there are six buttons for different functions. See Table 4-3 for details.

Table 4-3 Description of buttons and keys

Button	Function
Home	Click to back to homepage
Data	Click to show the input ,output and battery data
Events	Click to show the alarms and records.
Settings	Click to show the setting options.
Operation	Click to operate the equipment.
About	Click to show the equipment information

AC Input, Charger, Battery and DC load parameter are also shown at four corners in the home page screen. User can press the frame for more details.

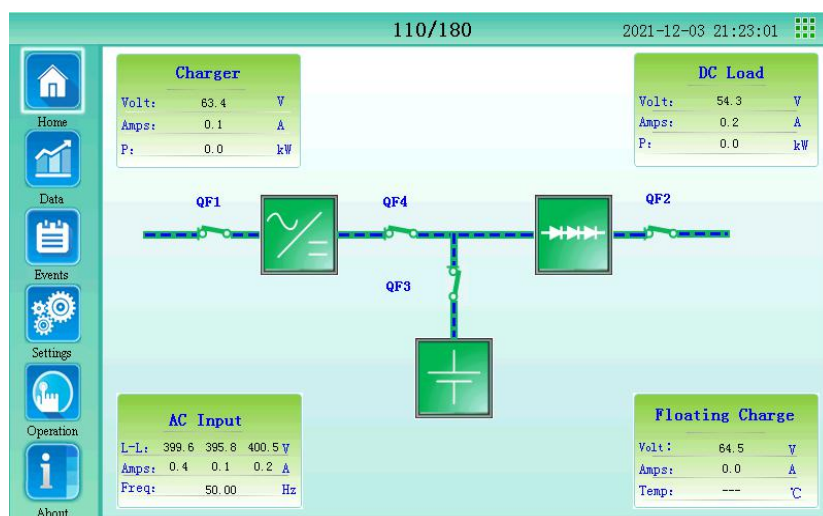


Figure 4-2 Home page

#### 2. Data window

User can press Data and enter corresponding charger data window. In the Data screen user can press "Input", "Output", "Battery" to show corresponding parameters.

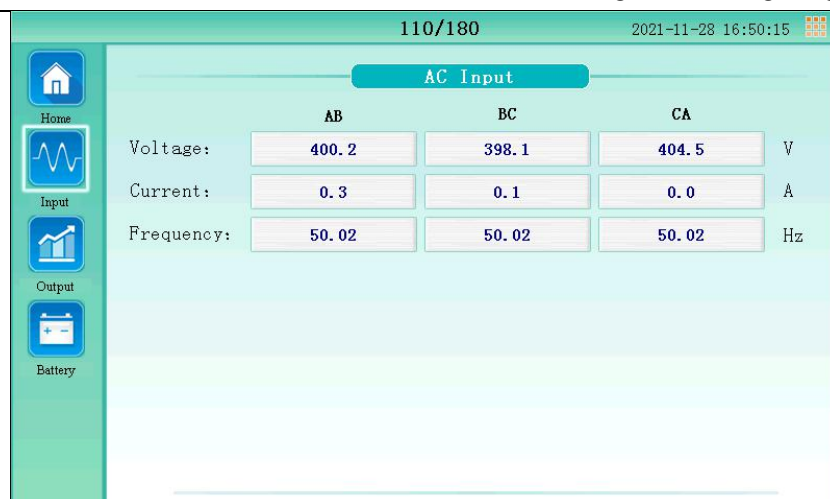


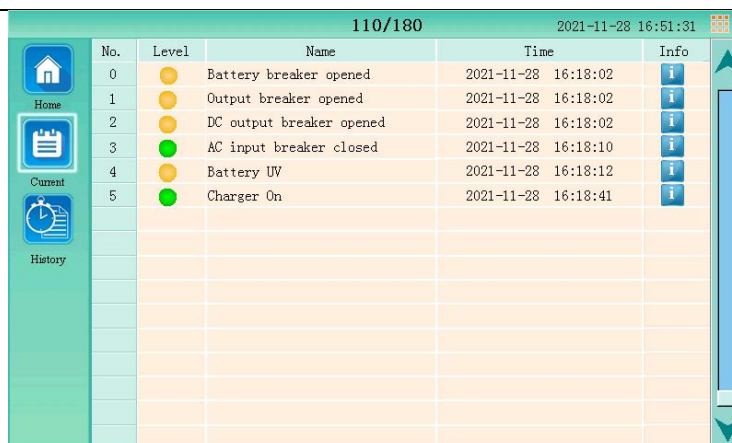
Figure 4-3 Data window

Table 4-4 Data window description

No.	Menu name	Menu item		Meaning
1	Input	AC Input	L-L voltage (V)	Rectifier line voltage of 3-phase
			current (A)	AC input Current
			Frequency (Hz)	Input frequency
2	Output	DC Load	voltage(V)	DC voltage
			current (A)	DC current
			Power(kW)	DC output power
		Charger	voltage(V)	Charge voltage
			current (A)	Charge current
			Charger power(kW)	Charge power
3	Battery		Working status	Battery not connected, battery is boost charging, battery is float charging. etc.
			Voltage (V)	Battery voltage
			Current (A)	Battery current
			Temperature(°C)	Battery environment temperature

### 3. Events window

The Events page includes current alarms and history records.



No.	Level	Name	Time	Info
0	●	Battery breaker opened	2021-11-28 16:18:02	i
1	●	Output breaker opened	2021-11-28 16:18:02	i
2	●	DC output breaker opened	2021-11-28 16:18:02	i
3	●	AC input breaker closed	2021-11-28 16:18:10	i
4	●	Battery UV	2021-11-28 16:18:12	i
5	●	Charger On	2021-11-28 16:18:41	i

Figure 4-4 Events page

#### 4. Settings window

In the Settings page, General settings can be set by user. Function setting need to be authorized and protected by passwords.

##### General:

##### Common settings:

In this settings page, the language and date can be set through the menu.

Backlight can be select as "Timed Light" and "Keep Light":

■ Timed Light: In the absence of serious faults, LCD will be extinguished.

■ Keep Light: The screen will be in constant light.

Once the settings are completed, click OK and the settings will take effect.



110/180

2021-11-28 16:51:57

Common Settings

Date:

2021 Y 11 M 28 D

Time:

16 H 51 M 54 S

BackLight:

Timed Light

Language:

English

OK

Cancel

Figure 4-5 Common setting

##### COM settings:

In this page, you can set up the relevant content of communication:

■ Communication address: The communication address of charger equipment can be set from 0 to 255.

■ Baud rate: baud rate can be selected as 2400, 4800, 9600 or 19200.

■ Protocol Selection: CHINA TELECOM, MODBUS and MEGATEC can be selected.



Figure 4-6 COM setting

### Function Settings:

The parameters of the charger can be set in this page, include:

- System settings
- Bus voltage settings
- Battery settings
- FC settings
- EC settings
- Commission settings
- Temp. settings
- Battery manual test
- Battery auto test
- Calibration

**Note:**Function settings are protected by password, only authorized persons can operate. Any wrong settings will damaged the charger or the battery.

**Note:** Monitor can control MCCB automatic switching.

- System settings: "Rectifier soft time" and "Rectifier walk-in delay time" can be set, and the setting range can be described on the data setting interface.



Figure 4-7 System settings

- **BUS Volt settings:** The values of "Output bus down limit volt" and "Output bus Upper limit volt" can be set. Enter the data setting interface to describe the setting range.

If the DC output voltage exceeds the setting voltage range, the charger will alarm.



Figure 4-8 BUS Volt settings

- **Battery settings:**
  - Batt Type:
  - Batt Capacity:
  - Batt group:
  - Line Impedance:
  - Charge limit current:
  - Cell per group:
  - Batt UV pre-warn:
  - Batt UV:
  - Batt OV pre-warn:
  - Batt OV:
  - Batt up limit current:

**Notes:** The battery settings should be checked before the battery is connect to charger. The settings must be same the battery. Otherwise the battery will be damaged.

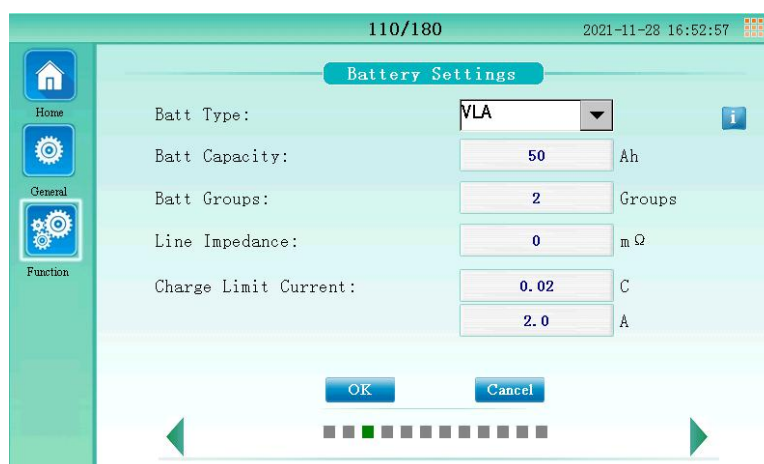


Figure 4-9 Battery settings (1)



Figure 4-10 Battery settings (2)

- FC settings: Parameters of "floating voltage" and "floating to equalize current" can be set. The setting range can be described on the data setting interface.

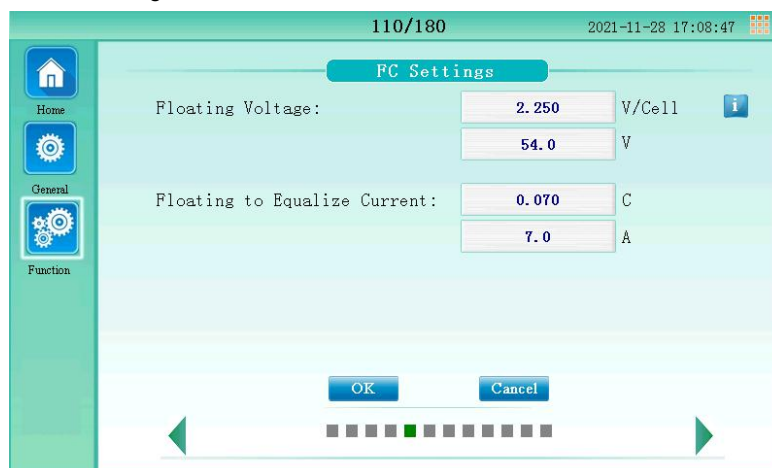


Figure 4-11 FC settings

- EC Settings: Parameters including "Equalize enable", "Auto equalize protect time" and "Force equalize protect time", "Equalize Voltage", "Equalize to floating current" can be set. Enter the data setting interface to describe the setting range.

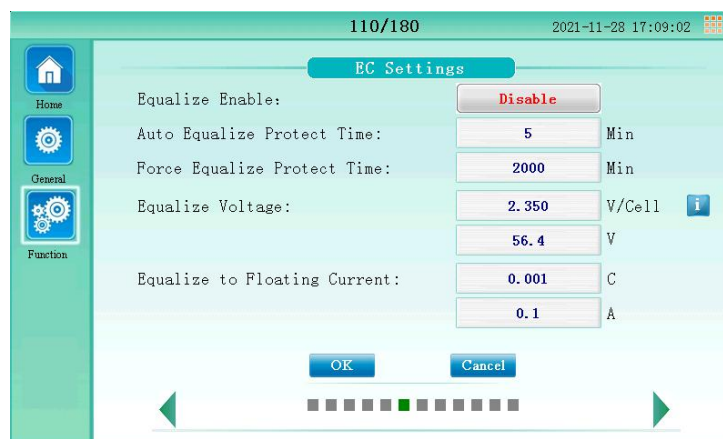


Figure 4-12 EC settings (1)



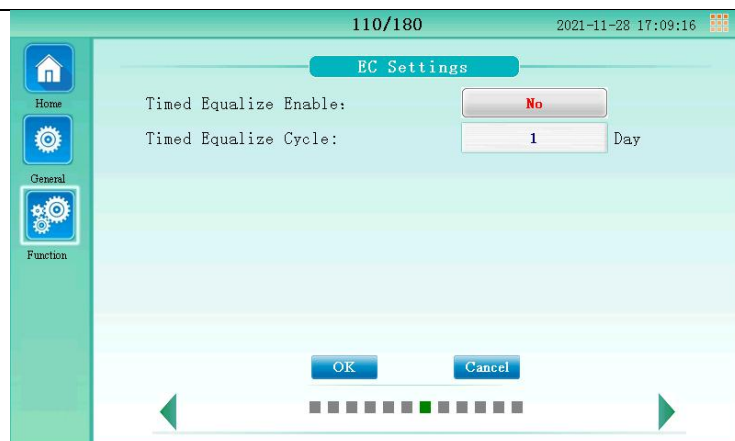


Figure 4-13 EC settings (2)

- Commission settings: Parameters of "Batt commissioning voltage" and "Commissioning charge time" can be set. The setting range can be described in the data setting interface.



Figure 4-14 Commission settings

**Notes: The commission settings should refer to the battery manufacturer instructions . Any wrong settings will damaged the battery.**

- Temp settings: Parameters including "Temp sensor enable", "Temp compensation enable", "Temp compensation factor", "Temp center" , "Temp upper" and "Temp lower" can be set. Enter the data setting interface and the setting range can be described.



Figure 4-15 Temp settings

- Battery manual test: Parameters including "Manual-test end voltage", "Manual-test protect time" and "Auto/manual test current" can be set. Enter the data setting interface and the setting range can be described.

**Notes: The battery test only could be carried out when the DC load current greater than the current values (Equal to setting value + 10% charger rated current).**

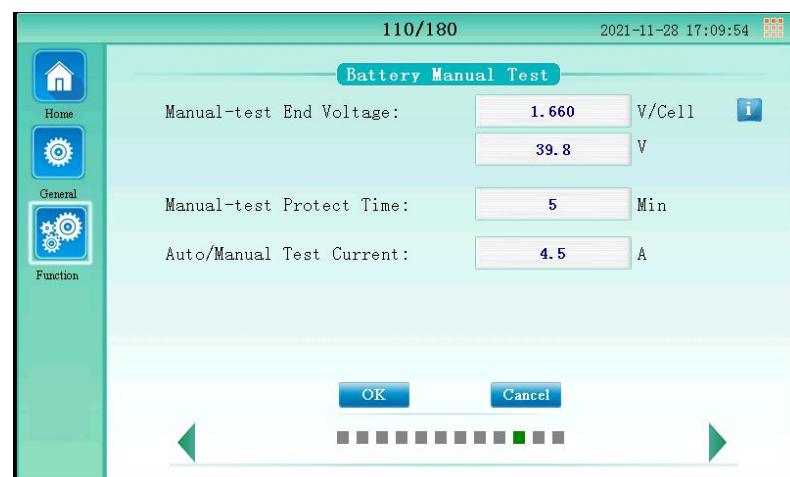


Figure 4-16 Battery manual test

- Battery auto test: Parameters including "Auto-test end voltage", "Auto-test protect time", "Auto-test cycle", "Auto-test enable" and "Auto-test start time" can be set. Enter the data setting interface and the setting range can be described.

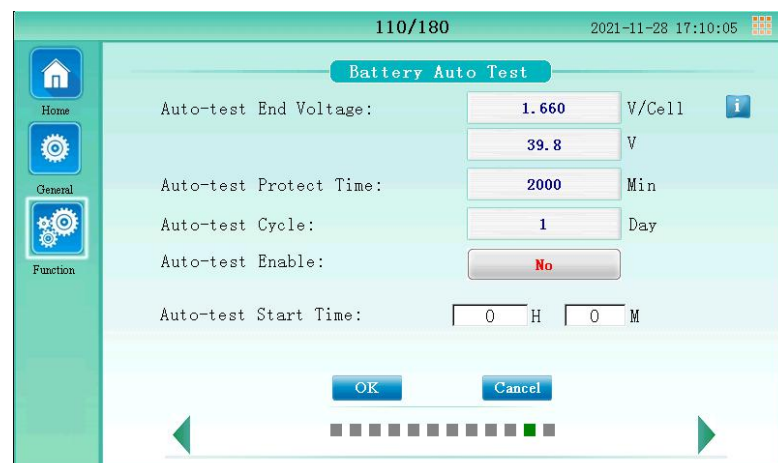


Figure 4-17 Battery auto test

- Calibration: In this page, The voltage and current could be calibrated.

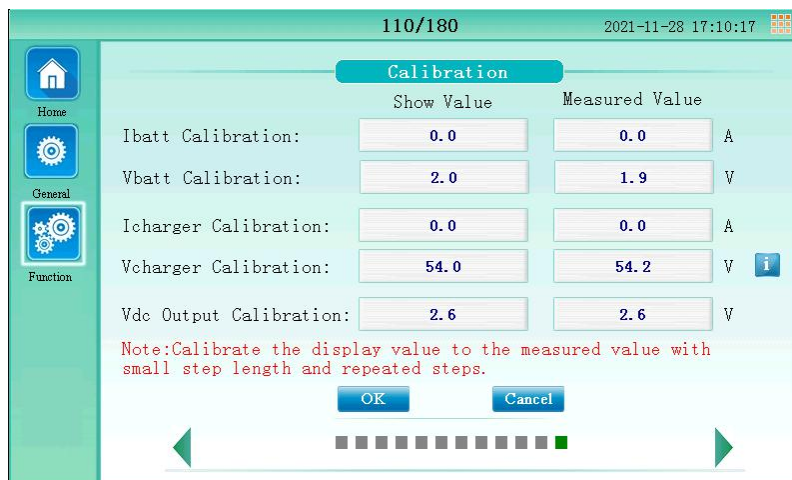


Figure 4-18 Battery auto test

#### Note:

1. The settings should be set one by one. If set more than one at a time, it may not succeed. Reset it again.
2. All settings shouldn't be changed during the charger is running.

## 5. Operation window

### Manual Operation:

The Operation page include four buttons. See *Figure 4-19 Manual Operation* and *Table 4-5 Description of buttons and keys* for details.



Figure 4-19 Manual Operation

Table 4-5 Description of operation buttons and keys

Button	Function
POWER ON	Press to start the charger
POWER OFF	Press to shut down the charger
SILENCE ON/OFF	Press to silence on/off the alarm
FAULT CLEAR	Press to clear the alarms

### Command:

The Operation page include four buttons. See *Figure 4-20 Manual Operation* and *Table 4-5 Description of buttons and keys* for details.

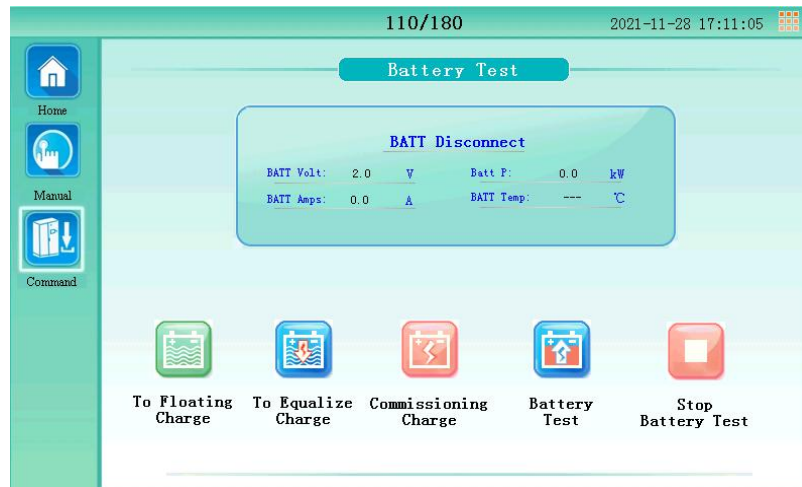


Figure 4-20 Battery Test

Table 4-6 Description of Battery Test

Button	Function
To floating charge	Press to transfer to floating charge
To equalize charge	Press to transfer to equalize charge
Commissioning charge	Press to start Commissioning charge
Battery test	Press to start battery test
Stop battery test	Press to stop battery test

**Notes:** Before start commissioning charge, the load breaker QF2 should be opened.

## 6. About window

The About page shows the information of the equipment. See *Figure 4-21 About Page Screen* for details.

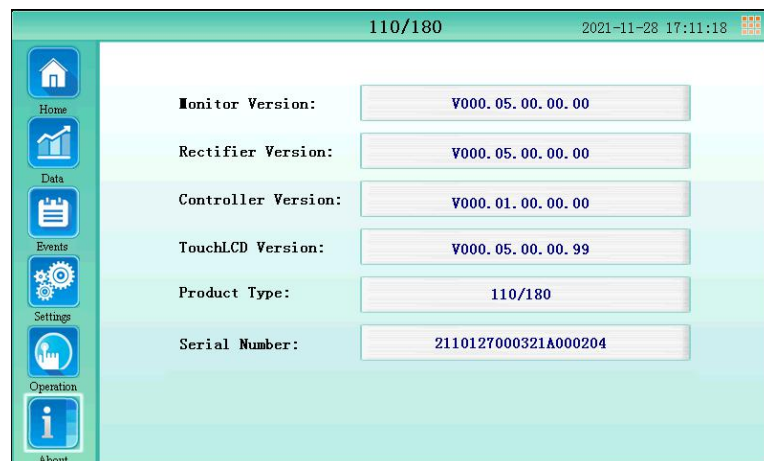


Figure 4-21 About Page

## Screen-saver

After the charger power-on and start-up, or during the charger operation, if there is not any alarm occurs within 10min, and no click operation, then the system will automatically go into the screen-saver mode and the screen backlight will be off. Then if there is any alarm occurs or touch the screen, it will back to the original screen and the screen backlight will be on.

## 4.2 charger Alarm List

Table 4-7 provides the alarm message for display.

Table 4-7 charger alarm list

Alarm	Explanation
HMI starting	HMI starting
Fan abnormal	At least one fan has a fault
Commissioning charge	Commissioning charge, be careful that the voltage is set in safe range
Battery undertemp.	The battery temperature is too low. Please checkup the battery room temperature
Unit overload	Unit is overload, and when the condition is not met, the alarm will automatically clear
Reverse diode overtemp.	Reverse diode over temperature
Battery over current	Battery is overcurrent
Mains volt. low	The mains voltage is outside specification of rectifier low voltage
Mains volt. abnormal	The mains voltage is outside specifications and results in rectifier shutdown
Mains freq. abnormal	The mains frequency is outside specifications and results in rectifier shutdown
Mains phase reversed	The AC input phase rotation is reversed
REC soft start fail	After the rectifier start, the DC bus voltage should reach the required value
Battery disconnecting	The system check that there is no battery connection, please confirm the battery CB/KM and cables connection are normal
Battery reversed	Check the battery cables connection
Rectifier overtemp.	The rectifier is over-temperature, and the alarm will shut down the rectifier, please check the system operation environment and ventilation
REC drive circuit fault	The rectifier drive line connection is failed. The alarm will shut down the rectifier
Mains phase lost	The mains input phase lost, please check the power connection
Bus capacitor OV	The alarm will shut down the rectifier.
DC bus overvoltage	The alarm will shut down the rectifier
Mains curr. unbalanced	The difference between input current and input current average is over-limit. Alarm but no action required
Charge KM fail	The charge KM is abnormal
Rectifier comm. fail	The communication between rectifier DSP and monitoring MCU is abnormal
Controller comm. fail	The communication between control DSP and monitoring MCU is abnormal
Battery overtemp.	The battery temperature is too high, please check the battery working status
Float charge	Battery is on float charge mode
Auto equalize charge	Battery is on equalize charge mode
System manual on	Manually start the system

Alarm	Explanation
System manual off	Manually shut down the system
Alarm silence	Press the SILENCE ON/OFF button
Alarm reset	Press the FAULT CLEAR button
Generator online	The input dry contact IO signal is active, that is the generator is connected
Refreshing charge	The battery has forced refreshing charge
MCU comm. Fail	Hmi communication fail, please check the communication line between TLCD and monitor board

## Chapter 5 Operating Instructions

This chapter introduces the operating precautions and method of the charger in detail.

### 5.1 Introduction

#### 5.1.1 Precautions



The user can execute relative operation only after the authorized engineer carries out the first power-on and test. The AC input and output terminals of the charger have hazardous voltage at any time. No operator-serviceable parts are located behind covers that require a tool for their removal. Only qualified service personnel are authorized to remove such covers.

#### 5.1.2 Power Switch

Use the key to open the front door, you can see the power switches in the charger, see Figure 5-1, including:

QF1: AC input breaker, which connects charger to the AC power.

QF2: DC output breaker, which connects the charger DC output to the load. .

QF3: Battery breaker, which connects the charger to the battery.

QF4: Charger output breaker, which connects the charger.

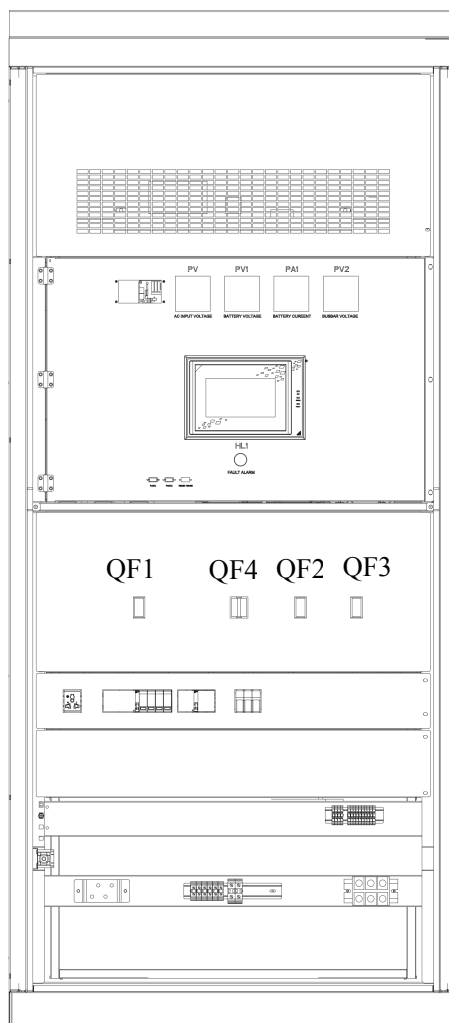


Figure 5-1 Power breaker

## 5.2 Start-up Procedures In Normal Mode

Provided that the charger has been completely installed and tested by the authorized engineer, and that all external power switches and batteries are connected. Then you can start the charger.



**During the operation, the charger output terminal and the connected load will have hazardous voltage, please mark a warning label: Only authorized personnel shall start the charger.**

1. Check the AC input cable of the charger is correctly connected to terminals UR, UY, UB and UN. Check the DC output positive pole is connected to KM+ , and the DC output negative pole is connected to KM-. Check the battery positive pole is connected to the Battery+ , and the battery negative pole is connected to the Battery-. Check the AC input three-phase voltage amplitude and frequency meet the requirements. See Table 1-4 for the range.
2. Close AC input switch QF1, QF2 DC breaker and QF3 battery breaker keep open. Check whether there are abnormal alarms on the "Record" page. If abnormal alarm is observed, please contact equipment manufacturer. If no abnormal alarm exits, proceed to the next step.
3. Click to the home screen, the charger will auto start when the input voltage is normal.

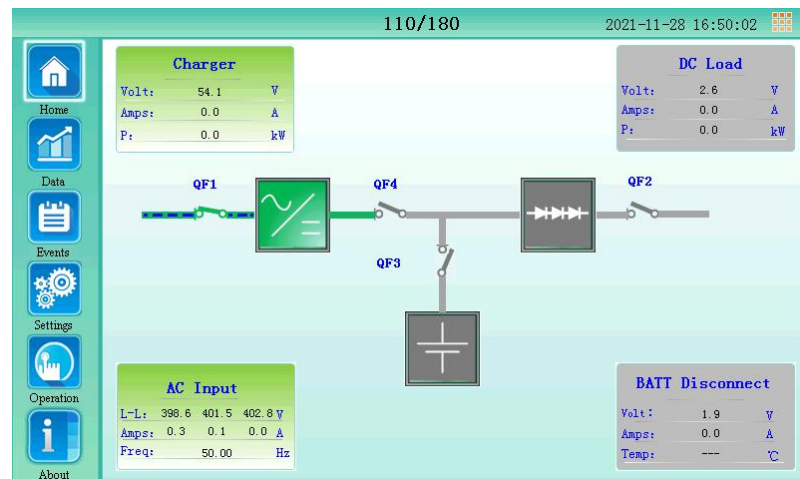


Figure 5-2 Start charger

4. Check the battery voltage, Close the DC load breaker QF2 and battery breaker QF3. Check the record page, there should exit no alarm information except the status information, and observe whether the charging data is correct.

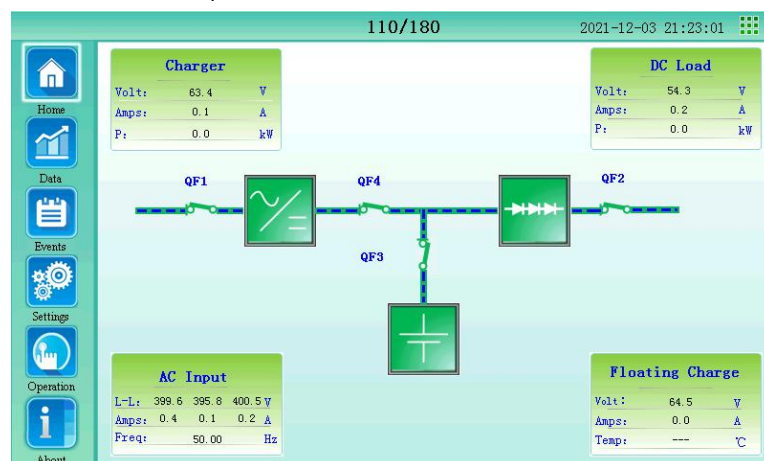


Figure 5-3 Charger normal status

5. Now the charger start-up is complete.

**Notes: Before changing the charger settings , the charger should be powered off.**



## 5.3 Procedures For charger Shutdown

This step will completely shut down the charger, and the charger will no longer charge the battery. Please confirm the risk before operation.



**The following operation will cut off the load power supply.**

1. Click the "POWER OFF" button on the touch screen of the charger to stop charging the battery.
2. Disconnect the ac input breaker QF1, the charger breaker QF4, the battery breaker QF3, the load breaker QF2 of the charger, and the device is completely powered down.
3. Disconnect the external mains power distribution switch and make a warning so that the charger is in complete isolation.

## Chapter 6 Communication

This chapter introduces the communication of charger .

Charger support Modbus protocol.

### 6.1 Modbus Communication

Charger can provide communication with Modbus protocol. The Modbus protocol can be set from LCD shown in Figure 6-1.



Figure 6-1 Communication settings

## Chapter 7 Service And Maintenance

Regular service and maintenance are required during the long term operation of the charger system. This chapter provides recommendation for the regular check and service of the key components and replacement. Proper service and maintenance of the charger system can extend the USP life and reduce the risk of the system malfunction.



**Routine inspection of charger systems shall be executed by people who have received relevant training, and the inspection and replacement of components should be operated by authorized professionals.**

### 7.1 Key Components Maintenance

During the charger operation, some charger components' lives are shorter than the charger life due to wear and tear in working. To ensure the safe power supply of the charger system, regular check and replacement of these components are required. When system works in different conditions (environment, load, and so on), you may ask professionals to assess the components and provide advice whether to replace the components.

#### 7.1.1 Electrolytic Capacitors

The life of the electrolytic capacitors depends on the DC bus voltage and ambient temperature of the charger. To ensure safe and stable charger operation, it is recommended to check the operation status of the electrolytic capacitors on an annual basis. The electrolytic capacitors must be replaced before their life expires.

#### 7.1.2 Magnetic Components

The key factors affecting the life of the magnetic components are the inter-winding isolation system and the temperature increase in operation. The charger adopts H-level isolation system and can withstand the working temperature up to 180°C.

#### 7.1.3 Fans

The fan of the charger can effectively reduce the internal temperature of the cabinet and prolong the actual service life of the key component. During the inspection, if there is any fan fault or abnormal occurs, please replace the fan in time. The recommended check period of the fan is 6-month.