

uXcel series charger user manual

Thank you for using the products of EverExceed.

Please strictly follow all safety instructions and instructions in the manual before using the machine. In the absence of complete reading. Please do not operate this machine until some safety instructions and instructions have made.

Please take good care of this product manual so that you can check it later.

Due to the continuous updating of the technical system, some contents of this manual may be changed, and The company reserves the right to improve the technology without prior notice.

Please keep this manual to the end operator and maintenance personnel.

Safety Precautions
Please do not install, operate, maintain or examine the equipment before reading the user manual, service materials carefully and using it correctly.
Danger!!
Incorrect operating may cause the hazardous situation which will result in death or serious injury
Notice!!
Incorrect operating may cause the hazardous situation which will result in minor or moderate injury, or direct economic loss, or hardware damage of equipment. Notice: the matter of “notice” may also result in serious consequences depending on different situation. Please follow the two precautions for they are important to the person concerned.

Safety Instructions

1). Avoid electric shock

Danger!!

- Please do not touch any part of the battery or the frame, electrolyte, cooling water of the battery by hand when the equipment charging up the battery. Operator shall wear insulative waterproof rubber shoes and gloves to operate the battery, or may result in electric shock injury accident.
- Please do not operate the equipment when opening the door of equipment, or may touch the high voltage terminal and result in electric shock accident.
- Keep the equipment off-position when connecting the battery, or may result in electric shock or injury.
- Please do not open the equipment when powering on or operating, or would get an electric shock.
- Please do not approach nearby ground when the equipment is on-position because in the process of charging, the output positive and negative side would in high pressure and the ground would have leakage current from the frame. The ground nearby would in high pressure.
- Please do not touch the DC output end in high pressure state, or may result in electric shock.
- When Wiring or examining, power shall be disconnected and 10 minutes later, detecting the residual voltage disappearing by multimeter, or may result in electric shock accident.
- Please do not maintain the equipment when the DC output end still connecting the battery even though the power is at a off-position state. Please maintain without connecting the battery, or may result in electric shock accident for the battery voltage attaches to the equipment through output cable and the equipment still in high pressure.
- The equipment shall use third-level or above grounding method.
- Please do not change the fuse when charging with electricity, or may result in electric shock.
- Please do not change the fuse when the equipment outputting and connecting the battery.
- Please do not operate the switch by wet hand to avoid electric shock.
- The operation including wiring and examination shall be conducted by professional technician.
- Please do not damage, stress, clamp or make the input and putout cable carry heavy objects, or may result in electric shock.
- The battery rack or frame shall use third-level or above grounding method.

2).Avoid fire

Caution!!
<ul style="list-style-type: none">➤ The equipment shall be installed in ventilated situation. Keep the around distance of the equipment 0.5 meters or more and the top and bottom vent shall not be blocked by objects. Do not install near the flammable and explosive objects, or may result in fire.➤ Please disconnect the power supply wiring and output battery wiring when the equipment breaking down. The keeping flowing high current may result in fire.➤ Please use the fuse of prescribed specification or with the same performance. Using the fuse of different model or different performance may result in fire.

3).Avoid Injury

Caution!!
<ul style="list-style-type: none">➤ The voltage of each terminal shall be the regulated voltage to avoid bursting and damaging➤ Always ensure that the output positive and negative poles of the equipment are connecting correctly with the positive and negative pole of the battery to avoid bursting and damaging the battery.➤ Do not touch the equipment when connecting or just disconnecting the power supply for the temperature of the equipment is high which results in scalding.➤ The input and output cable shall be connected according to the user manual. Orit may result in bursting and injuring accident.

Other Precautions

Please pay attention to the following precautions to avoid accident, injury and electric shock etc.

1).Transition and Installation

Notice!!		
<ul style="list-style-type: none"> ➤ Please use accurate lift appliance when transiting the product to avoid injuring. ➤ Please make sure the place could stand the weight of the equipment to avoid injuring resulted by the problem of weight. ➤ Please do not operate when the equipment injuring or lacking components. ➤ Please transit by the bottom other than by the lifting padeyes, or may result in injuring or falling off. ➤ Please check the left and right vent of the equipment not blocking by objects. ➤ Please keep the screw, the debris of cable or other conductive body or oil combustibile out off the equipment. ➤ Please use in the following conditions. 		
Conditions	Ambient temperature	-100C to 40°C no freezing
	Ambient temperature	90%RH no condensation of moisture
	Storage temperature	-20°C to 60°C
	Environment	Indoor(no corrosive gas, combustibile gas, oil pollution)
	Altitude	under 2km

2). Wiring

Notice!!	
<ul style="list-style-type: none"> ➤ Please correctly connect the positive and negative poles to the battery. In corrective connection may injury the battery. ➤ Please correctly connect the input and output cable according to the requirement of the following drawing. 	

3). Trial Run

Notice!!	
Please trial run according to the operation specification.	

4). Operation

Notice
<ul style="list-style-type: none">➤ Please operate according to the operation specification.➤ Please take relevant measures to radiate the equipment, or the equipment may be overheating and damaged because of the increasing ambient temperature.➤ Please check the nominal parameter values of the equipment when changing the trigger board or touch panel. The mismatched nominal parameter could result in abnormal charge and damage the battery.➤ Please trial run after maintaining the equipment.➤ The equipment unused for a long time shall keep away from dampness and keep in seal. It must be checked and trial run before being used.➤ Power supply network shall have sufficient capacity.

5).Maintenance, check and components change

Notice!!
<ul style="list-style-type: none">➤ The setting parameters shall be the same with the nominal parameters of the equipment when changing the touch panel.➤ The substituted components shall be the same prescribed specification or the same performance.➤ The equipment shall be checked by professional.

Content

Safety Instructions.....	2
Other Precautions	4
1. Overview.....	7
2. Technical Parameters	7
2.1. Product model and implication	7
2.2. Working condition	7
2.3. Performance parameters	8
3. Systematic principle	9
3.1. System operating principle.....	9
3.2. Circuit schematic diagram	9
4. Installation.....	10
4.1. Safety precautions.....	10
4.2. Installation instructions	10
5. Operating instructions.....	10
5.1. Panel display and description.....	10
5.2. Touch panel operating.....	12
5.3. Start-up debugging	20
6. Trouble shooting	21
7. Maintenance	22
7.1. Routine inspection and regular inspection	22
8. Warranty service	23
Attachment: control panel diagram and description.....	23

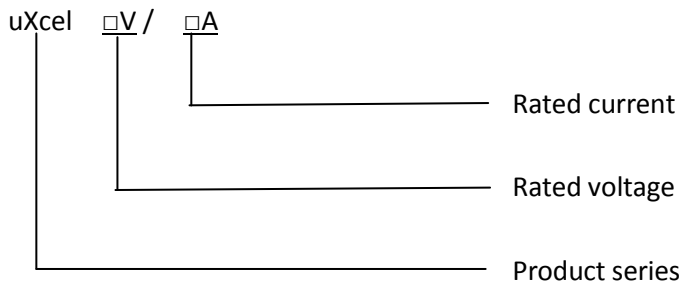
1. Overview

This manual makes comprehensive introduction of uXcel charger series, presenting the working principle, systematic structure, usage and maintenance of the chargers in detail. Hope it would be convenient for the user.

The product applies to the charging of all kinds of lead-acid batteries, alkaline batteries and the power supply of DC load. The charger has reasonable and compact configuration. Under the digital IC, the operation of the charger is convenient and reliable with the charging mode of constant voltage, constant current and cycling. When operating, the operation panel works out the procedure in advance. After working out, it starts charging. The whole charging process is auto-complete. The important component, transformer, adopts high-durable enameled wire, which could reach H-level insulation grade. The power component adopts aluminum profile and high-power SCR component of cake shape. The product has superior performance and stable operation. In addition, it has long-distance centralized controllable function, which could arrange real time monitoring management for system by computer and mobile phone.

2. Technical Parameters

2.1. Product model and implication



The rated DC Output current: 20A, 40A, 50A, 80A, 100A, 160A, 200A, 250A, 315A, 400A etc.

The rated Output voltage: 24V, 48V, 110V, 200V, 220V, 300V, 400V, 500V, 600V etc.

Note: the particular specification could customize.

2.2. Working condition

Input power: three phase AC400V 50Hz the allowable voltage fluctuation range of power grid is $\pm 10\%$.

Equipment power: **16.5KW**

The rated DC Output voltage: **330V**

The rated DC Output current: **50A**

(Note: The rated DC Output voltage means the max charge voltage. If the input AC voltage of the line is lower than the nominal voltage. The DC output current means the max charge current.)

Charging functions: constant current, constant voltage, current limiting, voltage limiting and cycling.

The accuracy for constant current: the accuracy for constant current is less than $\pm 1\%$ when the rated value ranges from 20% to 100%

The accuracy for constant voltage: the accuracy for constant voltage is less than $\pm 1\%$ when the rated value ranges from 20% to 100%.

The running mode for the main circuit: Three- phase full-bridge controlled rectifier.

Communication interface and protocol: RS232 interface (support standard MODBUS-RTU protocol)

Ambient temperature: range from 0°C to 40°C

Ambient humidity: not higher than 90%

Altitude: less than 2KM.

2.3. Performance parameters

Control mode:

The charge-discharge process of all kinds of batteries could be set and the parameters are automatically controlled, which could reserve the charge formula.

Running mode:

Constant current charging, constant voltage and limiting current charging, constant current and limiting voltage discharging, cycling, etc.

Protection:

Reserving data when there is over-current, over-voltage, current-cutting and power off. It could automatically recover when power on and provide phase break protection.

Phase transformation:

Setting time, voltage, current etc.

Record:

Recording the charging data, voltage-current curve, wrong information and operation record.

Rectifying mode:

Three- phase full-bridge controlled rectifier

Cooling mode:

Self cooling or air cooling

The accuracy for stable current and voltage: the accuracy for stable current and voltage is less than $\pm 0.5\%$

The accuracy for time: <30S/24h

Operating mode instructions:

Constant current charging: setting charging current. Transition has two modes: time and voltage

Constant voltage and limiting current charging: setting controlled current value and controlled voltage value. Transition has two modes: time and current

Cycling: setting the charging steps from one to five. Inside could loop and nest.

Note: please find the specific setting modes in the chapter of touch panel operating instruction.

3. Systematic principle

3.1. System operating principle

The main circuit adopts triangle-like or star-like transformer and three-phase full-bridge controlled rectifier to make charging circuit. When the charger working, the trigger board controls the conducting angle of silicon controlled rectifier and changes the voltage level and current magnitude. The fast acting fuse is installed on the output terminal, which could cut off the DC circuit quickly to protect the battery and SCR components if there is short circuit in DC output or battery.

The specific controlling process is: when controlling the charger, the human-computer interface would send the procedure which establishes in advance to touch panel. Then touch panel begins to control according to the procedure and rectifier controller would output the charging mode, current and voltage required. Measuring the present current and voltage uninterruptedly when the touch panel is working and comparing with the current and voltage required by the procedure. Adjusting the output if necessary. The virtual current and voltage should in line with the requirement of the procedure. If the operating data reaches the value rated by the procedure when it changes and finishes, touch panel would stop the operation to switch the mode according to the requirement of the procedure. The next stage of operation or ending would begin.

On the human-computer interface, operator could monitor the details about the current, voltage and the time mode when the charger is working and control the system by sending the stage commands of operating, stopping and switching to touch panel.

3.2. Circuit schematic diagram

The charging machine consists of the main circuit and the control circuit. The main circuit diagram is shown in Figure.3-1.

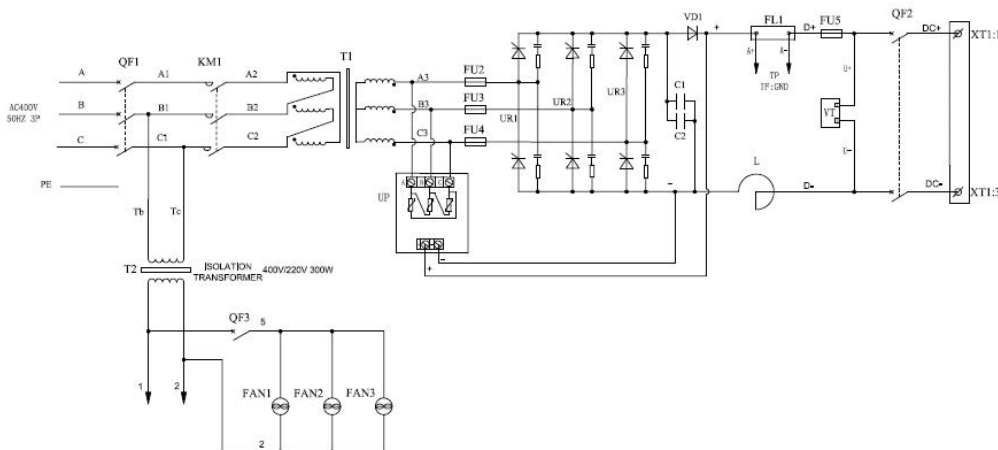


Figure 3-1

4. Installation

4.1. Safety precautions

Please keep the vertical direction when installing and carrying, or may result in the damage of the equipment.

Please make sure the installing place could stand the weight of the equipment.

Please install in the place that not liable to shake violently.

Avoid installing in the environment with acid fog, or may result in strong corrosion of components, wire and cabinet.

Avoid installing in the high temperature and high humidity environment and direct sunlight.

Good ventilation condition and installing air-conditioning if possible.

Making sure that the inlet cable and power grid capacity could make the equipment work at full capacity regularly.

4.2 Installation instructions

When taking out the controller cabinet from the packing box, please open the front and back door to check the nameplate whether the charger specification in line with the order form and the cabinet has no apparent damage. Removing the fixed screw and holder to check whether each component and wire loose or short out or not.

The equipment shall be installed vertically. The max. incline angle shall be less than 50. Making sure that the place for the equipment is enough. Cooling air could move from the bottom and outgo from the top.

The equipment must be installed in ventilated situation. Keep the around distance of the equipment more than 0.5 meters. The ambient temperature could make big difference to the service life of the equipment. When installing, the ambient temperature shall not over the rated range. Please avoid the high temperature, high humidity and the place with direct sunlight.

Please choose the suitable input and output wire according to the electric atlas provided by the equipment.

Making sure that the power grid has sufficient input power according to the power parameters provided by the equipment.

5. Operating instructions

5.1 Panel display and description.

The control cabinet panel of the charger is schematic, as showed in the figure 5-3.

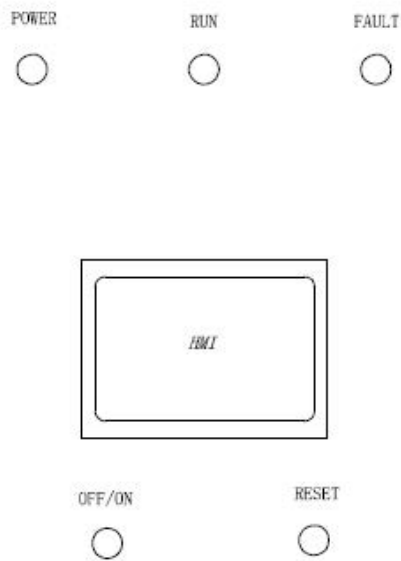


Figure 5-1

The panel includes the operation and display parts of the charging machine control cabinet. The details are as follows:

- Power light ——When the external power supply is energized, the input circuit breaker and auxiliary circuit breaker are closed. The indicator light is on, indicating that the power supply is ready.
- Running light ——The status indicator of the charger is controlled by the charging machine, and the indicator light is always on when the charging machine is in normal operation. When the charging machine stops or fails, the indicator will go out.
- Failure indicator light of charger——The charging machine state indicates that the charging machine is normally extinguished under normal condition, indicating the light is on when the charger fails.
- Change-over switch ——The switch ON the charger, when the switch is ON, the main circuit of the charging machine is closed, and the charging machine controls the electricity ON the circuit.
- Reset button——The reset button of the charger is used to reset the charging machine. When the charger fails, press the button to reset the fault.
- Control Interface——Responsible for charging process control, man-machine interaction and data recording.

5.2 Touch panel operating

uXcel charger series monitors and controls with 7 inches high-performance screen. The inside processor of touch panel adopts Cortex-A8 which has quick reaction and high sensitivity.

The main work of touch panel monitor

(a) Touch panel monitors the operating charging power supply and its present value of working parameters. Then real-time displaying (mainly includes the present voltage value, current value, ampere hour, working stage, working mode, charging curve, operated time value in present stage and the present working condition) and real-time giving an alarm when it out of order (displaying by screen and judging whether the equipment misfunctions or not)

(b) Real-time operating and controlling the equipment. The operations to charging power mainly are operating, pausing, recovering, stopping, leapfrogging(GOTO stage) and temperature compensating etc.

(c) Including the monitoring function, touch panel also could compile procedure.

Below is the specific operating and displaying screen

1). Start-up screen

When the charger is turned on, enter a friendly welcome screen. as showed in the figure 5-2.



Figure 5-2

2). Charging state screen

From the charging state screen, operator could start or stop the charger and see the parameters of the present charging step, charging voltage, charging current, charging time and charging capacity etc. as showed in the figure 5-3

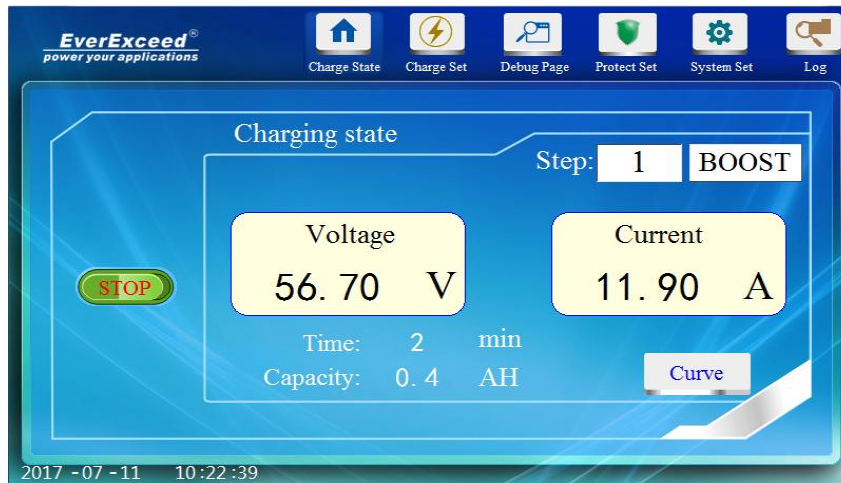


Figure 5-3

3). Charging curve screen

Operator could click the bottom right button of “curve” to enter into the charging curve screen. From the charging curve, checking the situation of the charging voltage and current that changed by time. It could save st most charging curve of 7 days. As showed in the figure 5-4.

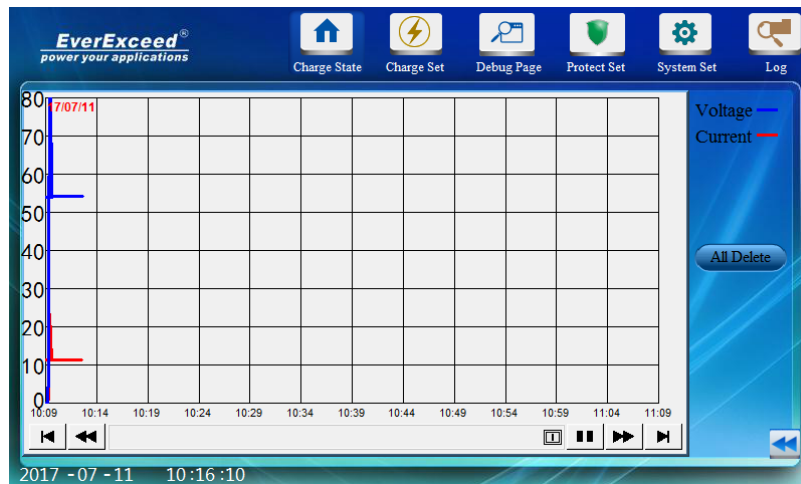


Figure 5-4

4). Charging setting screen

Operator could click the top button of “charge set” to enter into the charging setting screen. In this screen, flexibly setting charging step is allowed according to the battery characteristics. as showed in the figure 5-5.

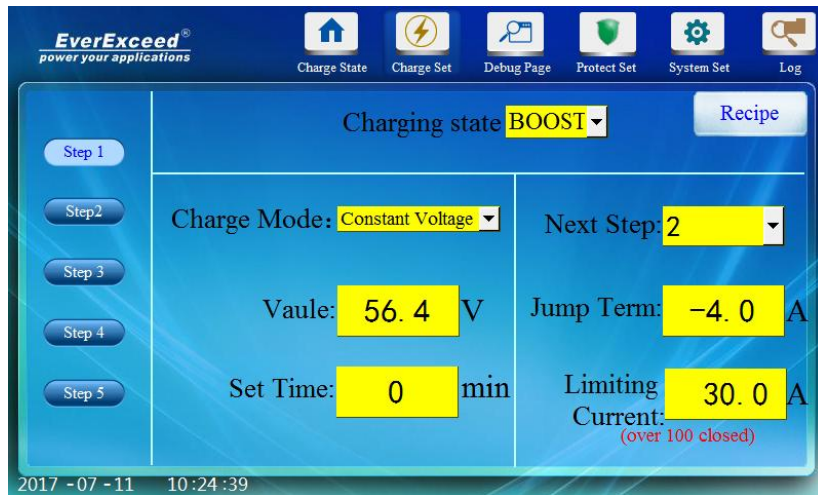


Figure 5-5

The available setting contents are:

Charging state (boost/float): in this case, operator could set the present step as “boost” or “float”. After setting, it would display in the charging state screen and charger panel.

Charge mode (constant voltage/constant current): constant voltage mode or constant current mode could be chosen.

Value: Setting the voltage value of constant voltage mode and the current value of constant current mode.

Set Time: Setting the charging time for the present step.

Next step: When the "Set Time" or the “Jump Term” meets the condition, then goes on the "next step" and sets any step from 0 to 5. If sets among 1 to 5, it means the step is what the value for after meeting the leaping condition. If sets as 0, it means stopping charging when meets the condition.

Jump Term: Setting the jump term condition. When charging voltage or current reaches this adjustment, it would leap and leap to the step of setting “next step”. Minus means leaping if it is less than the value. No symbol means leaping if it is more than the value.

Limiting current (voltage): if it is a constant voltage charging mode, the term would display as limiting current, showing the max. current shall not over the rated value. If it is a constant current charging mode, the term would display as limiting voltage, showing the max. voltage shall not over the rated value.

The steps of setting charging: charging setting screen could set five charging steps. Each step could set charging state, charging mode, values, time, next step, jump term, limiting current (voltage) etc. The five steps could realize the cyclic charging process.

For example, a 48V200AH battery bank firstly needs constant current charging with 40A. when the voltage reaches 56.4V, constant voltage equalized charging with 56.4V. if the current is less than 4A, float charging with 54V. if the current is more than 16A, it would leap to the second step.

In this moment, setting three charging steps on the charger:

Step 1: Setting charging state as "boost" and the charging mode as constant current with 40A. Time could be set as 0min (0 means the jump condition would not affect by time). Setting next step as 2 and the jump term as 56.4V. The limiting voltage could be set as 100V.



Figure 5-6

Step 2: Setting charging state as "boost" and the charging mode as constant voltage with 56.4V. Time could be set as 0min (0 means the leaping condition would not affect by time). Setting next step as 3 and the jump term as -4A. The limiting current could be set as 40A.

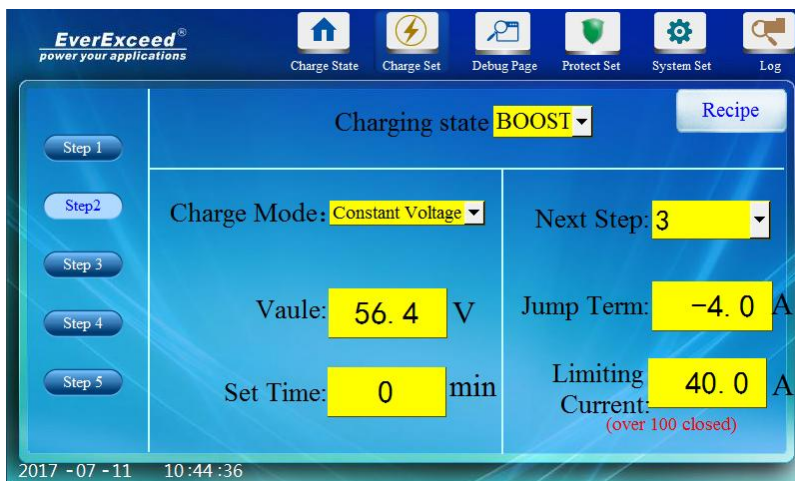


Figure 5-7

Step 3: Setting charging state as "float" and the charging mode as constant voltage with 54V . Time could be set as 0min (0 means the leaping condition would not affect by time). Setting next step as 2 and the jump term as 16A. The limiting current could be set as 40A.



Figure 5-8

5). Recipe screen

Recipe screen is designed for different batteries with different charging modes. It has five recipes. All charging steps could be saved in recipe for convenient using. Clicking the "save parameter" button could save charging step. Clicking "parameter download" button could download the charging step to changing setting screen. For example, the charging setting of the 48V200AH battery bank mentioned above has three steps. For convenience, it could save the whole charging steps to the prescription which no need to inputting the charging steps again. As showed in the figure 5-9.

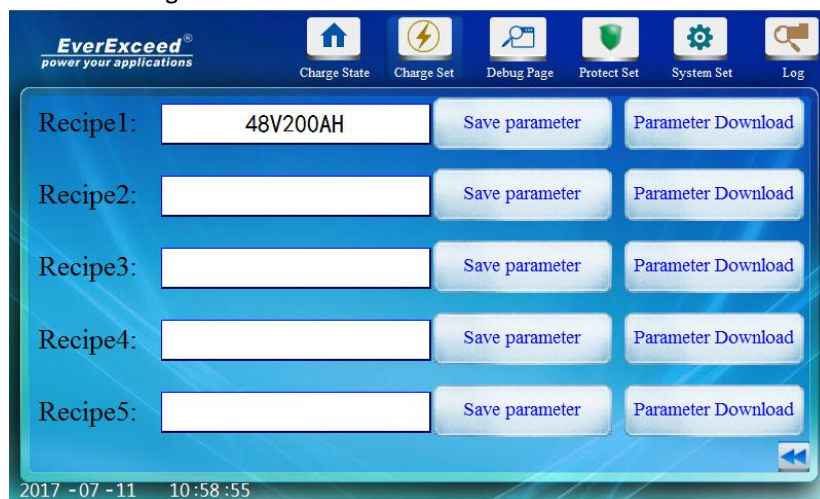


Figure 5-9

6). Debug page

Debug page is a screen used for debugging the charger before it leaves the factory and it is not accessible to the user. as showed in the figure 5-10.

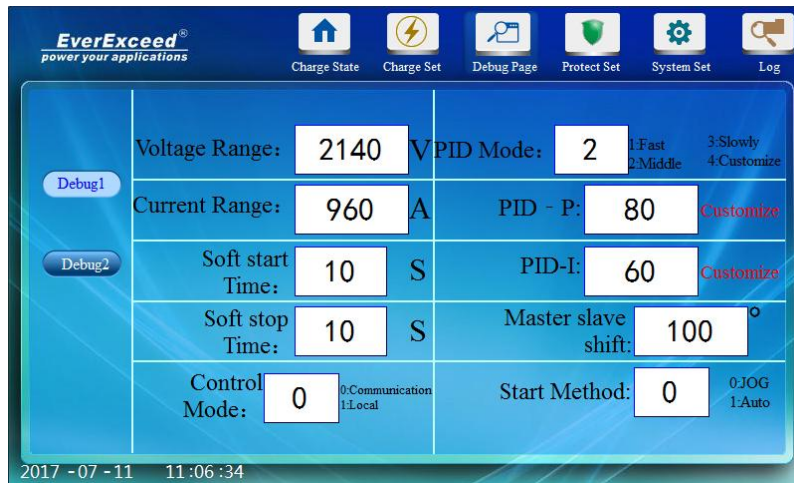


Figure 5-10

7). Protect Set

Protect Set page need a password to enter in and the screen could set the parameters of over & under voltage protection, overload protection, phase-break protection and three-phase imbalance. as showed in the figure 5-11.



Figure 5-11

8). System set

① Language setting----setting the date, time brightness and language. as showed in the figure 5-12.



Figure 5-12

② Password modification----modifying the debugging password, protection password and system password. as showed in the figure 5-13.



Figure 5-13

③ network setting---- setting the parameters of IP address and remote control for the charger.(please find the specific entering ways of remote control in remote control chapter). As showed in the figure 5-14.



Figure 5-14

④ Factory reset

Saving the present parameters as factory reset value: saving all the values of charging setting screen, debugging screen and protection screen as factory reset value.

Parameter factory reset: resetting the charger and the factory reset value shall be the present value saved.

Charger panel factory reset: when the charger panel out of order or system halted, its function is to restore the charger panel. as showed in the figure 5-15.

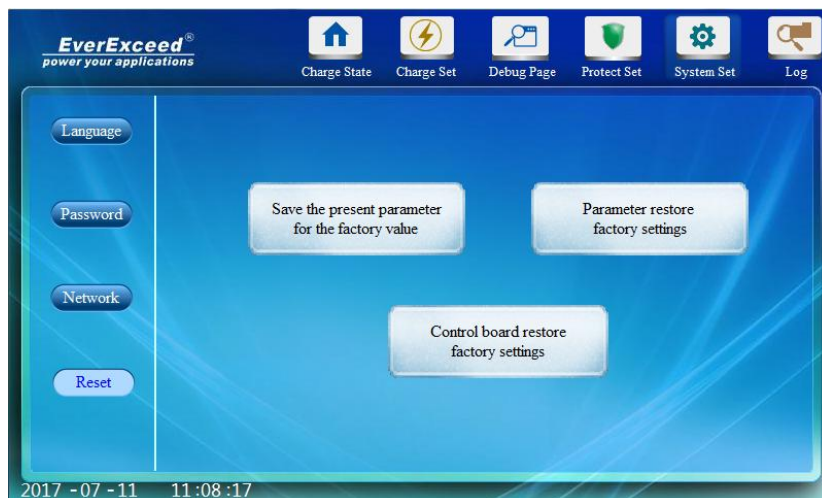


Figure 5-15

9). History log

On this screen, operator could check the history malfunction record and the history charging record. as showed in the figure 5-16 and 5-17.

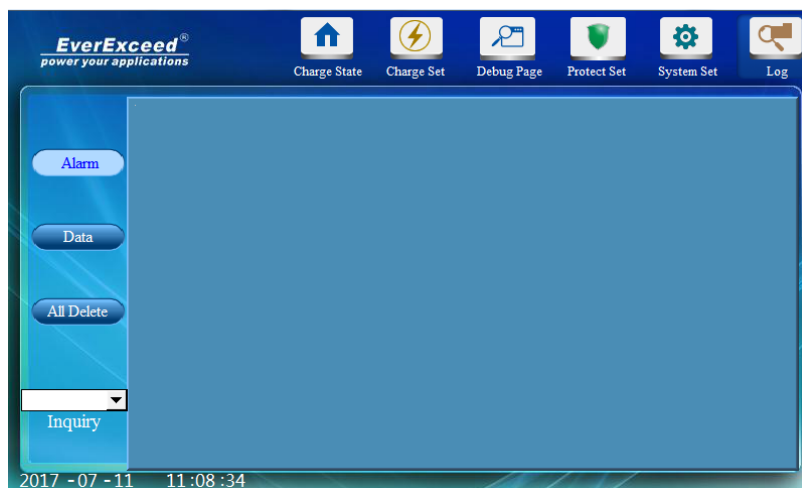


Figure 5-16

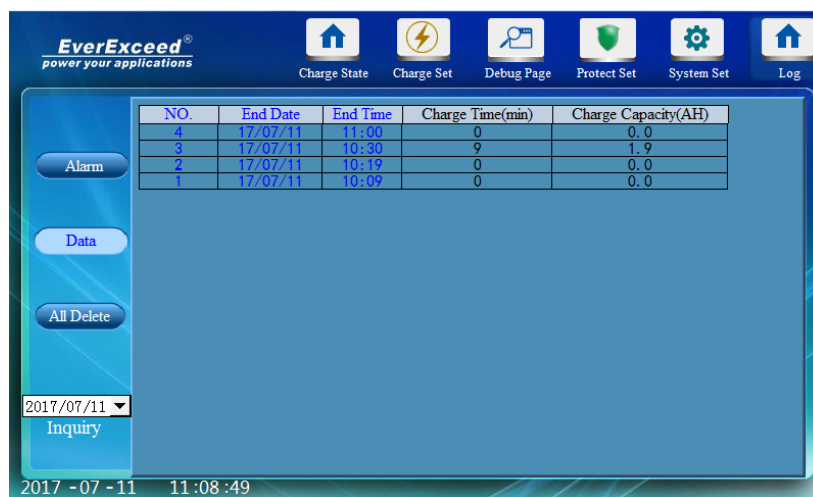


Figure 5-17

5.3 Start-up debugging

- (1) checking whether the input voltage is the rated input voltage
- (2) connecting the resistance wire load (bulb) to output switch
- (3) closing the input switch, auxiliary switch (two switches) and output switch in proper order.
- (4) rotating the rotary switch ON/OFF on the door to "ON" and the touch panel would bright.
- (5) Entering the setting screen, setting the charging voltage of the first step as 10%、50%、100% rated voltage in turn and it begins charging. Checking whether the virtual voltage is in line with the setting voltage or not. If it matches, then go to the next step.
- (6) Closing the output switch, ON/OFF rotary switch, auxiliary switch (two switches) and input switch in order. Switching off the resistance wire load and connecting the battery to the output terminal of charger.
- (7) After making sure the battery connects correctly, closing the input switch, auxiliary switch (two switches), output switch, rotary switch (rotating to "ON") in order. Establishing the

charging procedure of battery and turning on [start-up & pause] to send the operating command.

(8) Checking the operating displaying data 20 minutes and making sure the positive and negative of battery polarity have no fault. When it is constant current charging, the voltage shall rise slowly. If the above found abnormal, please stop operating immediately and check the connection among the equipment and external output wire and the battery polarity. When operating, operator shall pay attention to the current, voltage and time which shall in line with the requirement of the procedure.

6. Trouble shooting

When the equipment is out of order, please check the following items. If the problems still continue, please contact the manufacturer.

Malfunction	Causes	Trouble-shooting
Cutout, overcurrent, undercurrent and overvoltage when operating the equipment	Control circuit: 1. Contactor is loose contacting or is damaged resulting in open circuit 2. Fuse blowing 3. Air switch is damaged resulting in phase-deficient 4. Wiring loses resulting in cutout	1. Checking the contactor and wiring 2. Checking the fuse 3. Checking the air switch 4. Checking the inside wiring situation and fastening 5. Changing the malfunction components
	Control panel part: 1. Flat wire is loose contacting 2. Touch panel malfunctions	1. Re-inserting and re-extracting the flat wire several times or changing the flat wire 2. Changing the touch panel
	Outer part 1. Output circuit disconnection 2. Overvoltage of the battery	1. Checking the wiring 2. Reduce the series battery number
Closing the circuit air switch and tripping automatically	1. Using low speed fuse resulting in damaging the SCR of main control panel 2. Air switch is damaged	1. Using the fuse recommended by manufacturer and changing the SCR 2. Changing the air switch
Current cannot be adjusted(to the rated value)	1. Voltage of the power is too low 2. SCR mode is damaged	1. Making sure the voltage reaches the rated value 2. Changing the SCR mode
Current fluctuates obviously when the current is stable	1. Output DC voltage is too low 2. SCR mode is damaged 3. Current sensor is damaged 4. Circuit is loose contacting	1. Charging battery number not enough 2. Changing SCR mode 3. Changing current sensor 4. Checking and repairing the circuit

Abnormal start-up and no any signs when connecting the power	1. Control fuse is damaged 2. Power wire is loose contacting	1. Changing the control fuse 2. Checking the circuit
Voltmeter displays 0 when connecting power (charger is connecting the battery)	1. Output fuse is damaged 2. Voltage feedback line is loose contacting	1. changing the output fuse 2. checking the voltage feedback line
Fuse blowing	1. Output short out unexpectedly 2. Wiring with electrification 3. Power grid is in outage 4. Voltage of power grid is too low	1. Pay attention to avoid 2. Pay attention to avoid 3. Stop operating before power off 4. Improving the power grid
Cooling fan malfunctions	Cooling fan in cabinet gathers much dust and the fan has loud noise when operating	1. Cleaning the dust 2. Changing the fan

7. Maintenance

7.1 Routine inspection and regular inspection

Charger is a stationary machine mainly formed by semiconductor. In order to avoid the influences of using condition, such as acid mist, temperature, humidity, dust, dirt and vibration and other factors of aging and lifetime of the components, operator must has the routine inspection and regular inspection.

	Content	Remark
Routine inspection item	Whether charging normally or not	Regulating the current to charge and discharge
	Whether the installing place suitable or not	Visual inspection
	Whether cooling fan is normal or not	
	Whether the indicator light is normal or not	
	Whether the voltage and current display normal or not	Measuring
	Whether the equipment is misoperated or not	Visual inspection
	Whether there is abnormal sound	
	Whether there are overheating and changing color	
	Always keep cleaning the ventilated place and avoiding the dust	
	stacking, routine inspecting and changing cooling fan	
Conductor and insulating material		
Checking the high speed fuse		
Regular	Whether wiring is damaged, changing color and	Visual inspection

inspection	overheating normally	
	Whether the wiring terminal falls off or changes color	
	Whether the insulting part of electric wire has the phenomenon of aging and falling off.	
	Whether the dust in cabinet is too much	
	Whether the current displays incorrectly	Standard current
	Whether the voltage displays incorrectly	inspecting
	The changing time for cooling fan component: 1~2 years	One-year changing and inspecting

High-speed fuse: after inspecting according to the actual use, operator must use the fuse with the same type or recommended by manufacturer.

Note: cutting off the input power and DC output circuit before and maintenance and inspection to avoid electric shock.

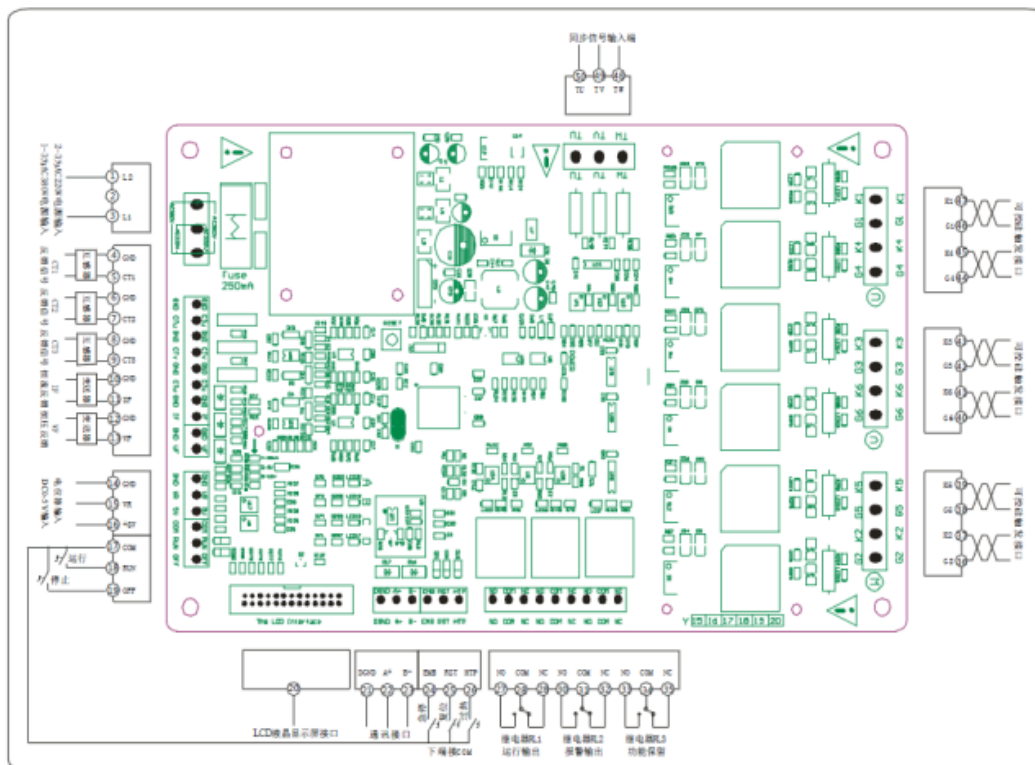
8. Warranty service

The charging machine ontology takes place as follows, the company will provide warranty service:

1. Warranty scope refers only to the charging machine body.
2. During the product warranty period, the manufacturer shall be responsible for the repair and repair after the normal use of the product. After the warranty period, reasonable maintenance fee will be charged.
3. Even within the warranty period, if the following circumstances occur, a certain maintenance fee shall be charged:
 - 1) machine damage caused by user manual operation;
 - 2) damage caused by fire, flood, abnormal power supply and human factors;
 - 3) use charger for the damage caused by the abnormal function;
4. The service fee shall be calculated according to the actual cost, if there is a contract or agreement, which shall be dealt with in accordance with the principle of contract or agreement.

Attachment: control panel diagram and description.

Control panel diagram and component location map (see attached drawing)



- 1,2,3: Working power input terminal of control panel. 1~3 are 380Vac power input. 2~3 are 220Vac power input. It could only connect one of the power voltage. 380Vac power input is advised.
- 4,5: CT1 current transformer connecting terminal. It is corresponding to U-phase current display and has overcurrent protection and the recognition function of open-phase protection. Don not connect if do not use.
- 6,7: CT2 current transformer connecting terminal. It is corresponding to V-phase current display and has overcurrent protection and the recognition function of open-phase protection. Don not connect if do not use.
- 8,9: CT3 current transformer connecting terminal. It is corresponding to W-phase current display and has overcurrent protection and the recognition function of open-phase protection. Don not connect if do not use.
- 10,11: Constant current signal feedback terminal. The factory defaults is DC0-5V, GND(-)、IF (+) , please specify in advance if needs other signals.
- 12,13: Constant voltage signal feedback terminal. The factory defaults is DC0-5V, GND (-) 、VF (+) . Please specify in advance if needs other signals.
- 14,15,16: Input terminal of potentiometer adjustment. The potentiometer is 10K 2W. the input terminal could input other automatic controlling signals (0-5V、0-10V、4-20mA) to take control through the terminal of GND (-) and VR (+) . It is also called input terminal of

fixed signal.

- 17,18,19: Common terminal COM, star-up and stop terminal. When the start-up is “self-locking”, connecting 17 and 18 could start working. It stops working when disconnects and the star-up and stop key of hand operator are noneffective. When the start-up is “inching”, connecting 17and 18 could start working. Connecting 17and 19 could stop working. The star-up and stop key of c are effective.
- 20: Interface of LCD. That is hand operator (optional item. Not a standard configuration when leaves the factory) .
- 21,22,23: RS485 communication connection terminal. (optional item. Not a standard configuration when leaves the factory) .
- 24: Scramming key input terminal. Another terminal is corresponding to 17 COM connection. Connecting 17and 24 could scam the equipment.
- 25: Resetting key input terminal. Another terminal is corresponding to 17 COM connection. When in malfunction, connecting 17and 25could reset the system.
- 26: SCR overheating input terminal. Another terminal is corresponding to 17 COM connection. Adopting normally open temperature controlled switch. When overheating, it would shut down automatically.
- 27,28,29: Operating relay output terminal. 27 is normally open terminal. 28 is Common terminal. 29 is normally close terminal.
- 30,31,32: Mal functional relay output terminal. 30 is normally open terminal.31 is Common terminal.32 is normally close terminal.
- 33,34,35: Function preservation.
- 36,37,38,39: W-phase SCR controlled triggering terminal.
- 40,41,42,43: V -phase SCR controlled triggering terminal.
- 44,45,46,47: U -phase SCR controlled triggering terminal.
- 48,49,50: Synchronizing signal input terminal of main circuit power. 48 is corresponding to W phase.49 is corresponding to V phase. 50 is corresponding to U phase. (adding synchronous transformer is advised when in serious.