

uXcel Series Rectifier / Charger



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1. Applications

uXcel series is a new kind of special charger for battery. This charger adopts the digital IC, the control trigger has good integration, powerful function and reliability. The charger has functions such as constant-current, constant-voltage etc, it is not only used as charger for battery, but also used as the power sources with constant-current and/or constant-voltage, as the power for formation and maintenance for battery. The charger can be operated automatically if it is used with a micro-PC.

2. Working conditions

- 2.1 The sea level of the working site shall not exceed 1000m.
- 2.2 The ambient temperature ranges from -10°C to +40°C.
- 2.3 The relative humidity is not higher than 85%.
- 2.4 There is no conductive dust, explosive gas, corrosive gas for metal, infective gas for insulation and steam around the site.
- 2.5 There is no violent vibration and slope larger than 5° on the site.
- 2.6 The ventilation on the site must be good.

3. Technical parameters

- 3.1 Input: three phase 208/380VAC, 50/60Hz, the allowable voltage tolerance for the line is $\pm 10\%$.
- 3.2 The rated DC output current: 16-2500A.
- 3.3 The rated DC output voltage: 24-400V.
- 3.4 The rated DC output voltage means the max. Charge voltage, if the input AC voltage of the line is lower than the nominal voltage, then the DC output voltage will be lower than rated voltage.
- 3.5 The running mode for the main circuit: three-phase full-bridge controlled rectifier.
- 3.6 Functions: constant voltage, constant current.
- 3.7 The accuracy for constant voltage: the accuracy for voltage is less than $\pm 0.5\%$ when the rated value ranges from 20% to 100%.
- 3.8 The accuracy for constant current: the accuracy for current is less than $\pm 0.5\%$ when the rated value ranges from 20% to 100%.
- 3.9 There are protection units for over-voltage and over-current.

4. Working Principle

The main circuit adopts the three-phase full-bridge controlled rectifier, the breaker and contactor are installed on the initial side of the transformer, and the fast acting fuse and voltage-absorbing unit are installed on the secondary side of the transformer. The control trigger sends out the signal to make six SCR conduct in turn and output DC voltage and current when the charger is working. The output voltage and current can be adjusted by controlling the conduction angle of the SCR. The fast acting fuse installed on the output terminal of the charger will cut off the DC circuit (main circuit) quickly to protect the batteries and SCR if there is short circuit in the DC output or batteries.

5. Installation and debugging

The installation for the charger will influence its normal operation, so there is some precautions.

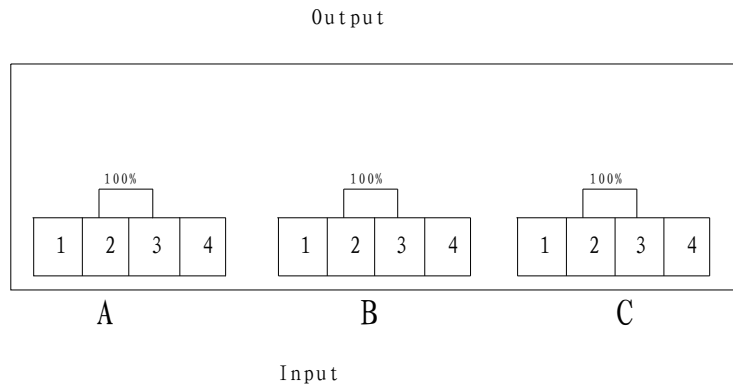
- 5.1 First inspect if there is any damage for the charger before installation, if there is any loose for the contact points.

- 5.2 The charger must be installed in a room; the installation stands must horizontal and stable.
- 5.3 There is enough cooling space in the room.
- 5.4 The installation place shall avoid direct sunshine, high temperature, humidity and dust.
- 5.5 There is no corrosive and explosive gas around the installation place.
- 5.6 The correctness of the connection will directly influence the normal operation of the charger, the following shall be done before connection:
Read the operation manual and principle chart carefully; confirm the phase sequence of the AC power input and the polarity of the DC output ends. The input cables of the three-phase AC power shall connect to the input terminals of the breaker respectively according to the power phase sequence. The output DC cables connect with the batteries correctly according to the polarity; confirm there is no reverse polarity. The case of the charger shall ground well.
- 5.7 The power indicator will light after turning on the power circuit, the indication of diode on the trigger board shall be correct. If the PH on the trigger board lights, it means there is a wrong phase sequence or phase lose, then check or change the phase sequence of the input power.
- 5.8 Manual adjusting for the control board interior: connect the K3 (T) on the board, turn the potentiometer RP3/T on the board in counterclockwise to take suitable load then turn on the main circuit. Turn the RP3 in clockwise, the DC voltage of the main circuit will increase on an even step without vibration and the value is larger than the rated voltage, it means the phase sequence for synchronous rectifier and main circuit are all correct.
- 5.9 Manual open-loop adjusting for the control board exterior: if it is used as a constant-voltage power, the K2 (V) on the control board shall be connected; if it is used as a constant-current power, the K1 (C) on the control board shall be connected. Turn on the main circuit under rectification mode, the running control end is grounded, adjust the exterior potentiometer, the output DC voltage of the main circuit shall be increased from zero on an even step to a value larger than the rated voltage.
- 5.10 Switch on the breaker; the indicators for voltmeter and the ampere meter will light.

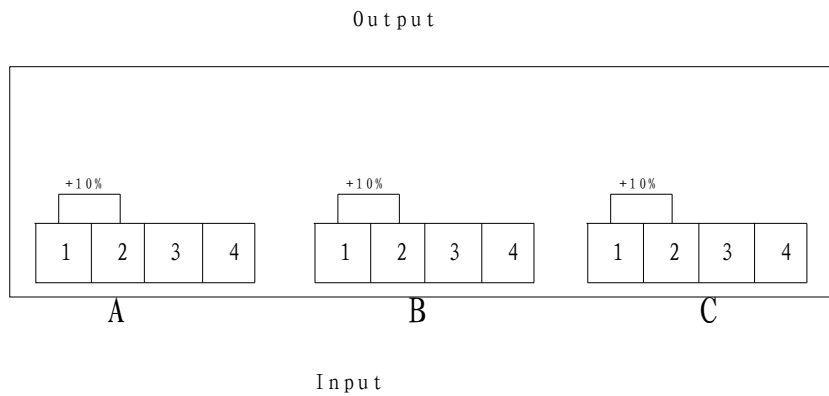
6. Operating instruction

Please read the instruction carefully before operating.

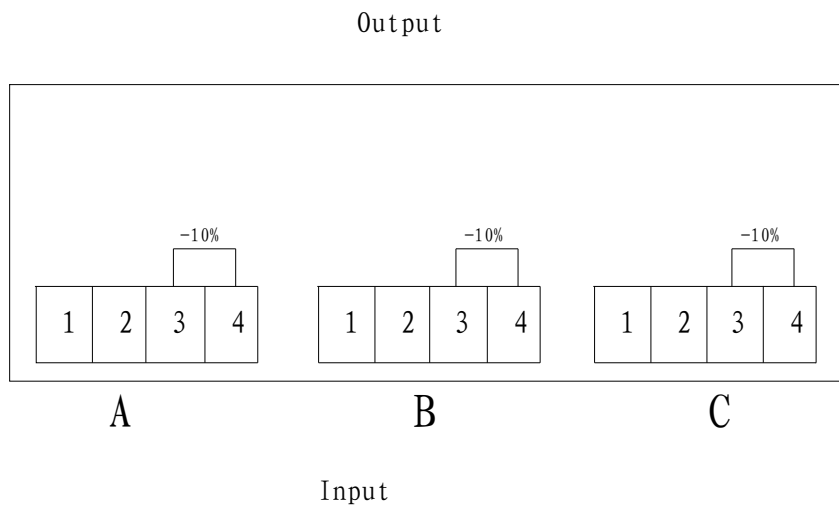
- 6.1 Inspect the correctness for the outside connection and the input voltage, there should be breaker in the AC power board.
- 6.2 operating process
- 6.2.1 after inspection for the input power then inspect the connection with the batteries. Turn the potentiometer on the panel in counterclockwise to the end before switch on the AC power.
- 6.2.2 Check the indication of the voltmeter to see if it is in a positive direction, positive is right. If the indication is in a negative direction, it means there is wrong connection to the batteries.
- 6.2.3 If it is necessary to charge manually, turn the switch to “manual” position, then press “start” after turning on the breaker, the green light will light during charge, adjust the potentiometer slowly to get the required output current. If it is necessary to charge automatically, turn the switch to “auto” position, set the micro PC and run it, the manual operation will be of no effect at this position. It is forbidden to stop the equipment with load.
- 6.2.4 If you want to stop the equipment manually, first to return the potentiometer to zero and till there is no output current, then press “stop” button. If you want to stop the equipment during automatic running, it is necessary to stop the equipment according to the process stipulated in “the operating manual for controller”. If the equipment is not in use, the breaker shall be turn off.
- 6.2.5 There are some adjusting jumpers on the initial side of the transformer which are all set before ex-work, so it is not necessary to adjust by the user. The connections are as follow:



But if the voltage of the power supply is 10% higher than the normal value, the short connection line can be move to the left for one jump, the connection draft is as follow:



If the voltage of the power supply is 10% lower than the normal value, the short connection line can be move to the right for one jump, the connection draft is as follow:



7. Controller Operating

7.1 Summary

Three-phase MC2000 series of controller have the characteristic of constant current, constant voltage, stable control and high precision etc., it can keep running at the abnormal conditions (for example: short circuit, open circuit), the controller can set nine steps of program, which applied battery charging and battery maintenance and so on.

7.2 Main technical parameter

1. The control range of the current: (1%--100%) rating
2. The precision of the current $\leq 1\%$
3. The control range of the voltage: -100%----+100%
4. The precision of the current $\leq 1\%$

7.3 Operating instructions

On the upper part of the face, there are Screen, indicator for charging, indicator for discharging and indicator for pausing from left to right. Two lines of buttons are on the lower part of the face. The buttons of the first line are numbers from 1 to 5, to left (\leftarrow), to up (\uparrow), <STOP>. The buttons of the second line are numbers from 6 to 9, number 0, to right (\rightarrow), to down (\downarrow), <ENTER>.

The sign will display on the screen after opening the controller.

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Holding for 2 seconds, range and version of the controller will be displayed.

For example, as DC output 300V/100A, the screen will display:

Range: 300V/100A

Version: 300.001

Holding for 2 seconds, the controller enter working state, the screen will display the First Page for setting:

**STEP1: CHA DCH
PAU REG RUN**

The cursor will flash on the first capital "C" of CHA.

STEP1 signs first step, CHA signs charging, DCH signs discharging, PAU signs pausing, REG signs registering. RUN signs running, press \leftarrow or \rightarrow to the place, then press <ENTER>, like this, make the program jump away parameter input to run according to the last setting. Press \leftarrow or \rightarrow , moving the cursor between CHA, DCH, PAU, REG and RUN to choose charging, discharging, pausing or running, then press <ENTER> to the screen for setting charging, discharging and pausing parameter. When move the cursor to RUN, then press <ENTER>, the controller will directly enter working.

Finish the first setting, it will display the second page for setting:

**STEP2: CHA DCH
PAU TOP**

When move the cursor to TOP, then press <Enter>, it will return to the first page (STEP1) for setting.

When the controller enter setting parameter, screen will display the page

If choose [CHA], the screen will display:

**U:000.0 I:000.0
H:00:00 C1 \leftarrow END**

If choose [PAU], the screen will display:

**PAU
H:00:00 P1 \leftarrow END**

If choose [REG], all programs set for last time can be read.

If choose [RUN], the controller will directly enter working state.

U-----Voltage 000.0 signs valid digits.

I-----Current 000.0 signs valid digits.

H-----time the first two numbers sign hour, the last two numbers sign minute

C signs the charging state.

D signs the discharging state.

P signs the pausing state.

1 signs the present setting is the parameter for the first step.

\leftarrow signs Return. When moving the cursor to " \leftarrow " and press <ENTER>, the setting will return to its first page [setting

voltage], then you can revise the parameters.

END: to finish setting. When the cursor move to “END” and press <ENTER> key, the controller enter working state and run from the first step.

Using <ENTER> key may move the cursor to Voltage, Current, Time and Working state. Using number key “1—9” set the parameter for Voltage, Current and Time, then press <Enter>. Using <←> or <→> key may move the cursor between “C1←END”, “D1←END”, “P1←END” and “←END”.

When setting parameters, the controller will check, for example: if the set voltage and current is not beyond the range; the minute for the time is not more than 60. When the value goes beyond the range, the number will become 0 and the cursor stops moving.

The controller only can set parameters for 9 steps.

For example:

First step: Constant-current Charge

Current: 20A Time: 1 hour and 30 minutes

Second step: Constant-voltage Charge

Voltage: 150V Time: 3 hours

Third step: Constant-voltage and Limit-current Charge

Current: 15.5A Voltage: 100V Time: 3 hours

Fourth step: Pausing Time: 2 hours

Fifth step: Constant-voltage and Limit-current Charge

Current: 10A Voltage: 105.5V Time: not limited

Set Parameter

For the First Step (STEP1):

STEP1: Constant-current Charge Current: 10A Time: 1 hour and 30 minutes

After switching on, the controller enters parameter setting, the screen will display:

STEP1: CHA DCH
PAU REG RUN

Cursor will flash at “C” of the “CHA”

Press <ENTER> key, the controller enters the setting for Charging

U: 000.0 I: 000.0
H: 00:00 C1 ← END

Press <ENTER> key, set the parameter for Current

U: 300.0 I: 000.0
H: 00:00 C1 ← END

Warning: If there is no setting for charging voltage, the controller will set it to the maximum voltage (300V).

Using number key, input “02”:

U: 300.0 I: 020.0
H: 00:00 C1 ← END

Press <ENTER> key, move cursor to Time:

U: 300.0 I: 020.0
H: 00:00 C1 ← END

Using number key, input “0130”

U: 300.0 I:020.0

H:01:30 C1 ← END

Press<ENTER>, move cursor to “C1”

At the moment, check the parameter. If there are errors, using <→> or <←> key move cursor to “←”, then press<ENTER.>, move the cursor to the error and revise them. If there is no error, when the cursor is at “C1”, press <ENTER>, enter the second step page (STEP2):

**STEP2: CHA DCH
PAU TOP**

Warning: If begin setting with the first step(STEP1), using <→> or <←> key, move cursor to “TOP”:

**STEP2 :CHA DCH
PAU TOP**

Press<RETURN>, may return to the first page:

**STEP1: CHA DCH
PAU REG RUN**

If continue to set parameter, please refer to the first step.

After the second step, screen will display:

U:150.0 I:020.0

H:03:00 C2 ← END

After the third step, screen will display:

U:100.0 I:015.5

H:03:00 C3 ← END

Setting for the fourth Step {STEP4}

STEP4: PAUSING Time:2 hours

The screen will display:

**STEP4: CHA DCH
PAU TOP**

Using <→> or <←> key, move cursor to “ PAU”, press<ENTER>key, enter setting parameter for pausing page:

**PAU
H:00:00 P4 ← END**

Using number key, input “02”:

**PAU
H:02:00 P4 ← END**

Press<ENTER>key, move the bar to”P4”

H:02:00 P4 ← END

Press<RETURN>; enter setting parameter for the fifth step (STEP5):

STEP5: Constant-voltage and limit-current charging Current:10A Voltage:105.5V Time: not limited

Using number key and <ENTER>key, input the voltage and current parameter:

**U:105.5 I:010.0
H:00:00 C5 ← END**

Press<RETURN>key, enter the time setting:

**U:105.5 I:010.0
H:00:00 C5 ← END**

Press key, move the cursor to “END”

U:105.5 I:010.0

H:00:00 C5 ← END

Using<RETURN>key, end setting parameter and enter working state:

CHA[1] *.* V**
00:00H *.* A**

CHA sign the current working state is charging
[1] sign the program is in the first step
V sign the actual working voltage
H sign the running time of the current step
A sign the actual working current

After the controllers enter working state, the charging relay and discharging relay will be connected. After 2 seconds, the controller will be in adjusting state and display voltage, current and running time.

7.5 Refer to parameter setting

When the controller is working, using <→> or <←> key may refer to parameter setting.

For example:

When the controller end setting parameter for above five steps, then enter working state, the screen will display:

CHA[1] *.*V**
00:05H *.*A**

At this moment, using <↑> or <↓> key may refer to the page of program setting.

When in the above state, press <↓> key, the screen will display:

U: 00.0 I:020.0
H:01:30 CHA[1]

Press <↓> key again, display

U:300.0 I:012.0
H:03:00 CHA[2]

Press <↓> key again, display

U:100.0 I:015.5
H:03:00 CHA[3]

Press <↓> key again, display

U:000.0 I:000.0
H:02:00 PAU[4]

Press <↓> key again, display

U:105.5 I:010.0
H:00:00 CHA[5]

Press <↓> key again, return to actual control surface

CHA[1] *.*V**
00:05H *.*A**

Circulating like this.

If press <↑> key, will display the step from last to first.

Whatever using <↑> or <↓> key, all display the parameter including the actual surface. When the program is in referring surface, if not pressing, the controller will automatically return actual working state in 5 seconds.

7.6 PAUSING/STOPPING

Whatever in the actual display surface or in program referring surface, using<STOP>key may make running controller enter Pausing/Stopping page.

Press<STOP>key, the controller stop working, the charge relay or discharge relay will be disconnected after about 2 seconds.

BREAK: CON STOP

CON sign continue

At this moment, press<RETURN>, controller will enter working state instead of pausing state.

Using <←> or <→> key, move the cursor to <STOP>:

BREAK: CON STOP

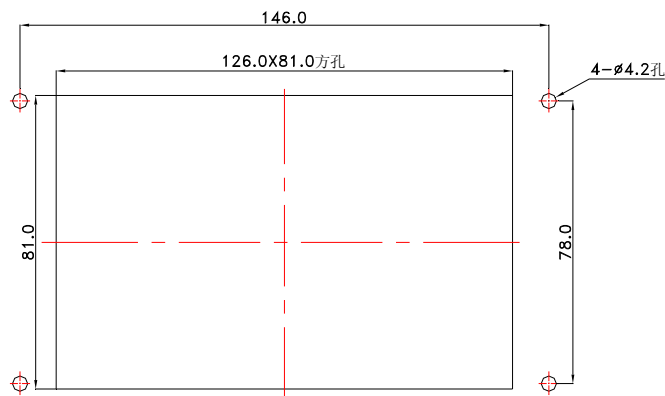
Press <RETURN>key, the controller will return the STEP1:

**STEP1: CHA DCH
PAU TOP**

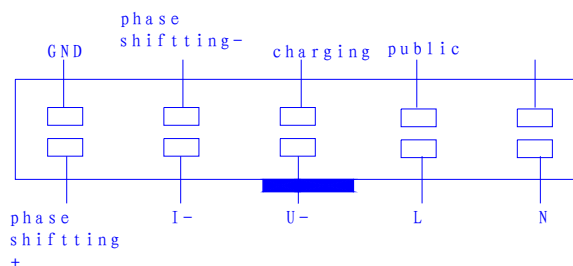
Finishing the work, the controller will return the STEP1.

The controller provides protective function for avoiding power off. If the power on, the controller will continue to run.

7.8 External size:



7.9 Wiring



The company reserves the right to change the specifications of its product without prior notice and such change would render the publication inaccurate.

8. Precautions

The control trigger is a kind of precision unit with the digital IC, it only can be checked and repaired by special engineer. If there is any damage, please contact with the manufacturer as soon as possible.

8.1 Please read the manual carefully before maintenance.

8.2 The type of the SCR must be confirmed before change to avoid the wrong type and damage of the equipment and batteries.

8.3 The set value for the current and voltage shall not exceed the max. capability of the equipments when it used for charging.

8.4 If the actual voltage output value is lower than 55% of the rated output, the DC current output shall be reduced responsively, or it will make the SCR too hot and damage the SCR.

8.5 The case for the charger must be grounded and conforms to the relative standards.

8.6 The inside of the case shall keep clean and without dust to get a good electric insulation

8.7 To check the connection and welding points to confirm the contacts are all good.

8.8 When you find there is no output current or alarm from the control panel, it shall be first to check and maintain the problem. The equipment cannot be used before the problems are solved.

9. Trouble shooting

Malfunction	Causes	Trouble-shooting
The current can not get the set value	1.the voltage of the power is too low; 2.the SCR was damaged; 3.the phase sequence is not right;	1.make the voltage to get to the rated value 2.to change the SCR mode; 3.to check the phase sequence (to see if the PH is light or not).
The current deviation is too large when used as constant-current power	1.the output DC voltage is too low; 2.the SCR was damaged; 3.the power deviation is too large, and the power supply is poor; 4.the contact for the circuit is not good	1.the quantity for the battery is less than normal; 2.to change the SCR mode; 3.to improve the quality of the power supply; 4.to check the circuit.
The output voltage got the rated value, but the current is still too low	1.the diameter of cable from charger to the main circuit is too small, and the length is too long; 2.the quantity of the battery is more than rated	1.to reduce the electrical resistance of the circuit; 2.to change the cable with larger diameter; 3.to reduce the quantity of the batteries
There is no indication for the ampere meter and voltmeter after turn on the AC power switch	1. The fuse for control is damaged 2. The contact for the power cable is not good	1. To change the fuse for the control 2. Check the circuit

There is no indication for the voltmeter after turn on the AC power switch (the charger connect with the batteries)	1. The fuse for output is damaged 2. The contact for feedback line of voltage is not good	1. To change the fuse for output 2. To check the feedback line of the voltage
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10. Specification

RANGE OF RATINGS	16	25	40	60	80	100	125	160	200	250	320	400	500	600	800	1000	1200	1500	2000	2500
Input type	Single-phase										Three-phase									
Output DC voltage (VDC)	24		48		110		200		24		48		110		220					
Available range of ratings (A)	25 - 250		25 - 250		25 - 250		25 - 250		25 - 2500		25 - 1200		16 - 1200		16 - 1000					

TECHNICAL CHARACTERISTICS	
INPUT	
Nominal AC voltage (VAC)	120/220/230/240
Input voltage tolerance (%)	+ 15 / -10
Input frequency (Hz)	50/60
Input frequency tolerance (%)	± 5
OUTPUT	
Nominal DC voltage (VDC)	24 / 48 / 110 / 120 / 220 / 240/ 400
Available ratings (A)	see above
Voltage stability	< 1% (in float mode, 0 to 100% load step, input within voltage tolerance)
Voltage ripple	< 1% RMS
Boost mode current limitation	0,1 C10 (Lead Acid battery) / 0,2 C5 (Nickel Cadmium battery)
GENERAL DATA	
Operating temperature(°C)	0 - 40 (in permanent operation conditions)
Storage temperature (°C)	-20 to +70
Relative humidity (%)	< 95
Operating altitude (m)	1000 (without derating)
Cooling	Natural ventilation on most of the range. (Fan-assisted for ratings above 1200 A)
External protection	IP44 (up to IP65 upon request)
Internal protection	IP44
Noise (dB)	< 60
Lock	Steel locked door with door handle
Frame colour	Grey RAL 7032 textured semi-gloss
Dimensions	Varying according to ratings and options
STANDARDS	
Compliance	IEC 950, 439, 146, 529, 726, 62040-1, -2, -3
CE directives	73 / 23 / EEC - LVD and 89 / 336 / EEC - EMC
US Standards	Manufacturing following UL, ANSI, NEMA, IEEE standards is available upon demand
OPTIONS	
Rectifier	6/12-SCR rectifier, harmonic filters, ripple filters, dropping diodes, meters, volt-free contacts, serial link
Battery	Battery protection , battery cabinet, Low-voltage disconnect, matching battery cabinet, Battery Management System
System	SCR full-bridge Intelligence charging managment , Fast acting fuse, Wide voltage and current range, Multiple protection
Mechanical	Metal case, other frame colour, anti-seismic design

*For other voltages, please contact us.

This product may differ from the product photograph on the front cover.

