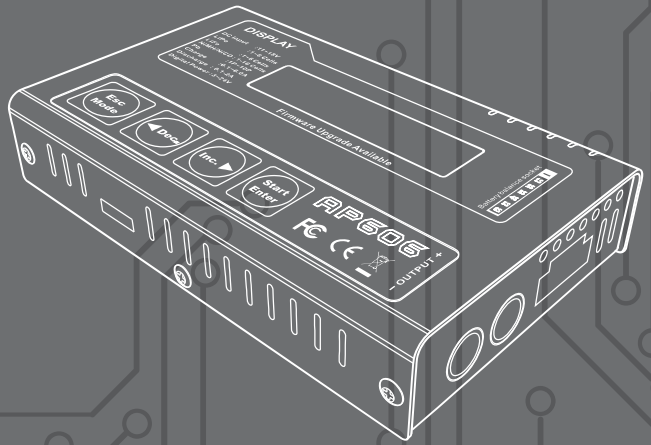
AP606

Operating manual

AP606



AP606 Operating Manual

Content

1. Special Features

1.1 AP employs an advanced charging calculation and design which allow multilayer error to be compatible.It can create a safe charging condition and maximum reduce the danger caused by negligence or setting error of user.

1.2 Accept all types of R/C batteries:LiPo、Lilo、LiFe、NiMH、NiCd、Pb.

1.3 AP employs an individual-cell-voltage balancer to maintain your pack in balance while charging/discharging.During the process,it can monitor and balance each cell of the pack individually（Tolerance：±0.01V）.

1.4 Perform 1-5 cycles of charge>discharge or discharge>charge continually for NiMH / NiCd refreshing and You can set the cycle patameter in one menu now.

1.5. You can set the battery capacity in the menu,and the charger will start charging at the current rate of 1C.

1.6. Discharge cut-off voltage can be adjust from 3.0V to 4.0V.

1.7. Digital power： you can set the input power to a output power of 3.0V-24.0V.

1.8. Outside temperature monitor function and USB communication function can be used at the same time.

1.9. Screen backlight saver： after a few minutes of your operation,the backlight will become dark automatically.you can set this time yourself（0-10minutes）.

1.10. You can enquire the unit cell voltage and total voltage by press the INC&DEC for more than 3 seconds.

1.11. precharge function to restore the battery.

example： when the battery voltage lower than the lowest safety voltage,you can set the restore time,then the charger will charge the battery through a very.

1.12. firmware upgrade available.

2. Performance Parameter

2.1	Input voltage range	DC 11.0～18.0V
2.2	Charge current range	0.1～6.0A
2.3	Discharge current range	0.1～2.0A
2.4	Charge power limited	max.50W/80W
2.5	Discharge power limited	max.6W
2.6	Balance current	max.250mA
2.7	Balance tolerance	±0.01V
2.8	NiCd/NiMH battery cell count	1～16cells
2.9	Lithium battery types	Li-Po, Li-Ion,Li-Fe
2.10	Lithium battery cell count	1-6cells
2.11	Pb battery voltage	1P~10P(2.45V~24.5V)
2.12	Weight：	210g
2.13	Dimensions：	130 x 81 x 25 mm

3. Key Features

"MODE/ESC": mode selection/stop/back button Press this key to the mainmenu and to stop during the process.
"◄DEC/INC►": reduce and increase button, you can browse other concerning informations by this button during the charge/discharge process. When you are setting parameters, press ◄DEC key for reduce and INC► key for increase.
"ENTER/START":select/enter button,to start work by press it more than 2 seconds.

4. Warning and Safety Notes

WARNING: Read the ENTIRE instruction manual to become familiar with the features of the product before operating. Failure to operate the product correctly can result in damage to the product, personal property and cause serious injury.

WARNING: Failure to exercise caution while using this product and comply with the following warnings could result in product malfunction, electrical issues, excessive heat, FIRE, and ultimately injury and property damage.

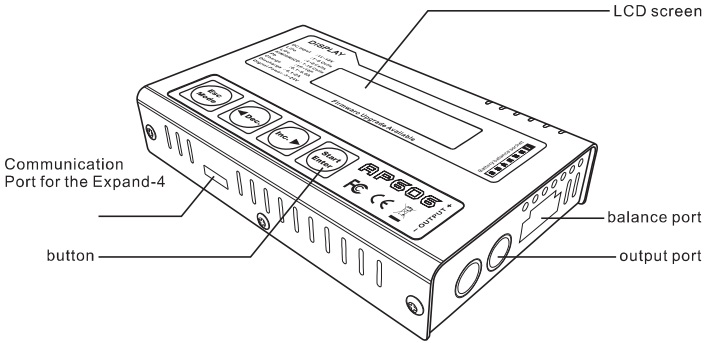
- Never leave the power supply, charger and battery unattended during use.
- Never attempt to charge dead, damaged or wet battery packs.
- Never attempt to charge a battery pack containing different types of batteries.
- Never allow minors to charge battery packs.
- Never charge batteries in extremely hot or cold places or place in direct sunlight.
- Never charge a battery if the cable has been pinched or shorted.
- Never connect more than one battery pack to this charger at a time.
- Never connect the charger if the power cable has been pinched or shorted.

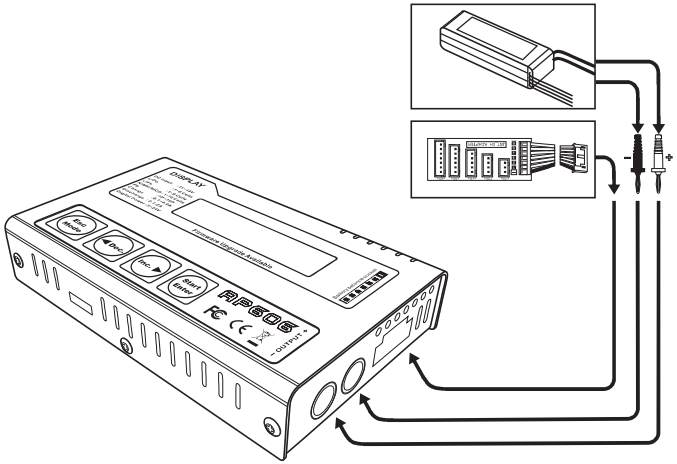
- Never connect the charger to an automobile 12V battery while the vehicle is running.
- Never attempt to dismantle the charger or use a damaged charger.
- Never reverse the positive and negative terminals.
- Never connect the input jack (DC input) to AC power.
- Always use only rechargeable batteries designed for use with this type of charger.
- Always inspect the battery before charging.
- Always keep the battery away from any material that could be affected by heat.
- Always monitor the charging area and have a fire extinguisher available at all times.
- Always end the charging process if the battery becomes hot to the touch or starts to change form (swell) during the charge process.
- Always connect the charge cable to the charger first, then connect the battery to avoid short circuit between the charge leads. Reverse the sequence when disconnecting.
- Always connect the positive red leads (+) and negative black leads (-) correctly.
- Always disconnect the battery after charging, and let the charger cool between charges.

WARNING: Never leave charger unattended, exceed maximum charge rate, charge with non-approved batteries or charge batteries in the wrong mode. Failure to comply may result in excessive heat, fire and serious injury.

CAUTION: Always ensure the battery you are charging meets the specifications of this charger and that the charger settings are correct. Not doing so can result in excessive heat and other related product malfunctions, which can lead to user injury or property damage.

5. Exterior

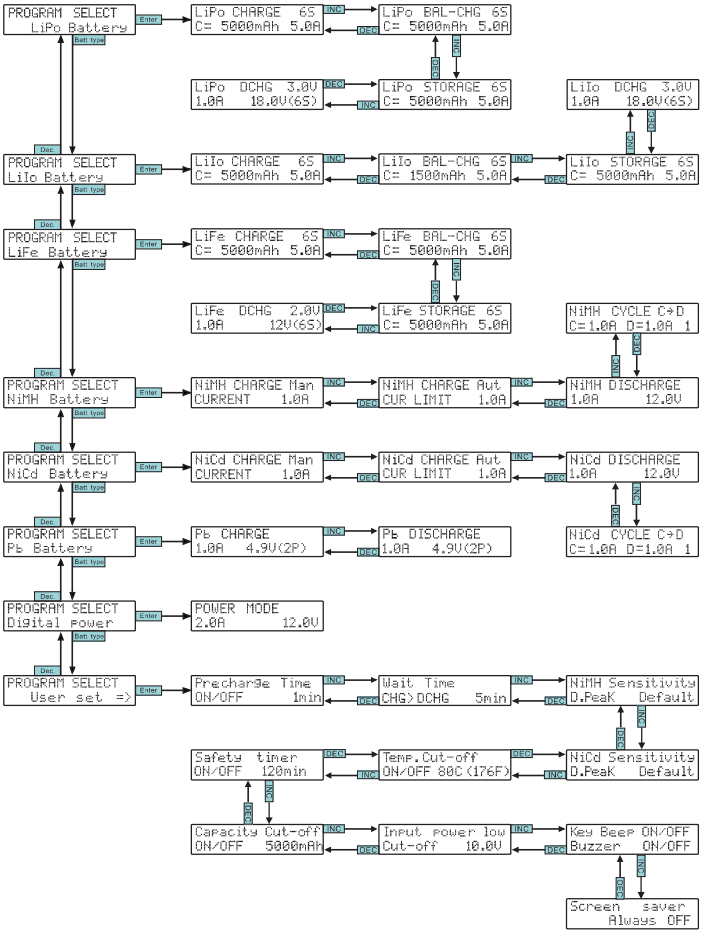




CAUTION: Always power on the charger before connecting a battery to the charger, or damage to the charger and the battery can result.

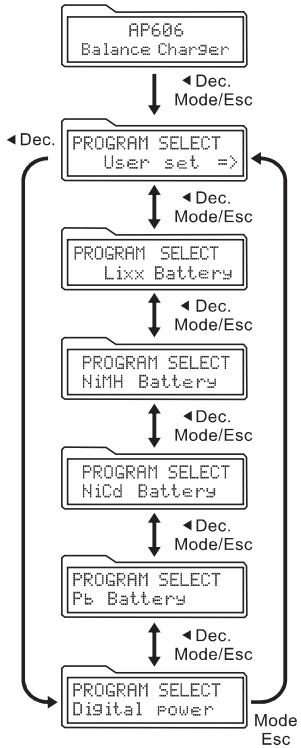
1. Connect power supply to power source.
2. Power on the power supply.
3. Connect charger to power supply.
4. Make program selections in the charger for battery charging.
5. Connect charger adapters to charger.
6. Connect battery to charger adapters (connect main charging connectors before connecting cell-balancing connectors, where used).
7. Start battery charging.

6. Programming Guide



7. Operating Instructions

7.1 main menu



This shows you the type of charger for 2 seconds, press Enter Start into the main menu after self-check OK

User set program,press Mode Esc key adown and Dec. ◄ key upward for circulatory choose. press Enter Start key into submenu.

Lithium battery program.

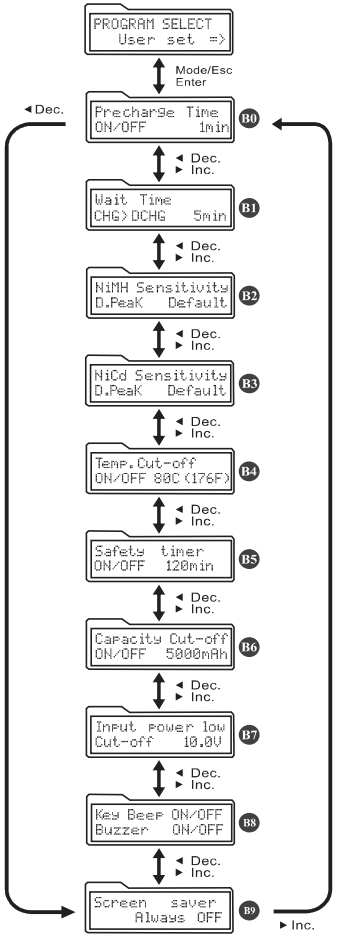
NiMH battery program.

NiCd battery program.

Pb battery program.

Tunable digital power mode,you can set the input power to a output power of 3.0V-24.0V

7.2 Initial parameter set up



Tips: please set up correctly in the "user set" menu before into the job for the first time you use it

Press Mode Esc key to the first screen on the left, then press Enter Start key to enter the into parameter setting menu.

You can switched at the same level menu by Dec. / Inc. ◄ ► key. please refer the detailed flow chart on the left

When you are willing to alter the parameter value in the program,press Enter Start key to make it blink,then change the value with Dec. / Inc. ◄ ► key. the value will be stored by press Enter Start key once.

The charge accept three types of Lithium batteries : LiPo/LiIo/ LiFe ; you have to check the battery carefully and set it up correctly, or itwill cause a explode! (Please refer the table A)

This charger can recognise the cell count of Lithium battery automatically. for the battery voltage lower than the lowest safety voltage, charger will not start the charge process. But this charge has a precharge function to restore the battery.you can set the restore time (normally 2 minutes) in the B0 menu.then precharge program will start-up. The more capacity of the battery is,the more time it will need

Attention:

In the normal charge mode,you need to turn off the precharge process.

DO NOT use this function unless you know the battery status very well.

If the battery voltage increase very few,please stop the precharge process immediately.or it will cause a danger!!!

When NiMH or NiCd battery is on the cyclic process of charge/discharge, It may become warm .The program insert a time delay to occur after each charge and discharge process to allow the battery adequate time to cool down before being subjected to the next process. (see the screen B1) the value ranges from 1 to 60 minutes.If you are not sure,you can set it over 10 minutes.

B2 B3 shows the trigger voltage for automatic charge termination of NiMH and NiCd battery (△V), the effective value ranges from 5 to 20mV per cell. If △V is set higer, there is a danger of overchargeing the battery; if it is set lower, there is a possibility of premature termination. please refer technical specification of the battery.(NiCd: 12mV,NiMH:7mV)

Tips：If the voltage of charging battery is lower than 2.5V, △V may can not be perceived, this will cause a danger of discharge.You can connect a temperature sensor or use the charger current above 1C to avoid it.

The 3-pin port on the left side of the unit is a temp. sensor port, you can set the max. safety temperature,(see the screen B4)then monitor the battery temp. via the temp. sensor.

When you start a charge process, the integral safety timer automatically starts running at the same time.this is programmed to prevent overcharge the battery if it proves to be faulty,or if the termination circuit cannot detect the battery full. B5 shows you this program can be on or off,and you can set the maximum safety time, the value ranges from 10 to 720min. As the same principle,there is a maximum-capacity-limited function. See B6, the value ranges from 100 to 25000mAh.

When you use the car battery to supply power for charger, screen B7 shows you this program monitors the voltage of input DC battery. If the voltage drops below the value you set the operation forcibly terminated to protect the input battery.

At the screen B8 you can set the audible sounds to be on or off by this program.

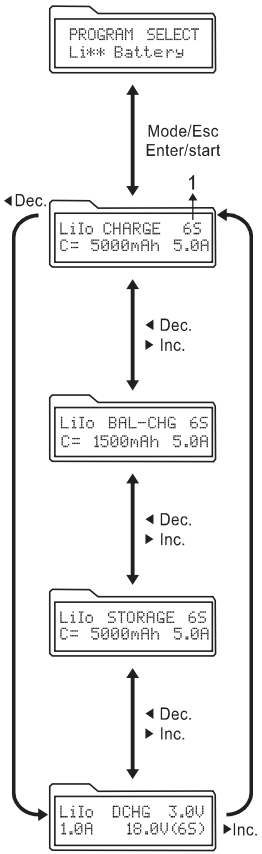
At the screen B9 you can adjust the time of backlight you want to show. The backlight of LCD will darkle when the charger in the screen saver mode.

Please refer the information below(chart A)，and select the correct parameter for each battery, or it will cause a serious result!

chart A

types / iterm	Li-Po	Li-Io	Li-Fe	NiMH	NiCD	Pb
Standard voltage (V/cell)	3.70	3.60	3.30	1.20	1.20	2.00
Max. Charge voltage cut off level (V/cell)	4.20	4.10	3.60	1.60	1.60	2.45
Allowable fast current	≤1C	≤1C	≤4C	≤2C	≤2C	≤0.4C
Min.Discharge voltage cut off level (V/cell)	>3.00	>3.00	>2.00	>1.00	>0.85	>1.75

7.3 Lithium batteries (Lilo/LiPo/LiFe) program



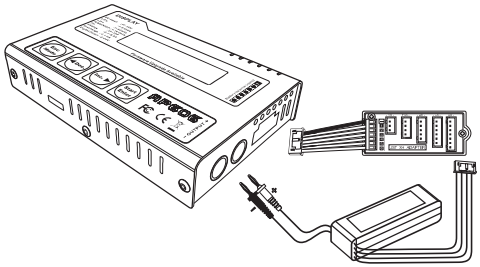
Press Mode Esc key to the screen on the left, then press Enter Start key to enter into the parameter setting menu. You can switched at the same level menu by Dec./Inc. key. Please refer the detailed flow chart on the left. When you are willing to alter the parameter value in the program, press Enter Start key to make it blink, then change the value with Dec./Inc. key. the value will be stored by pressing Enter Start key once. then press Enter Start key for more than 2 seconds to start the process.

This mode is for individual battery or some special battery pack without balance port or cell count.1 shows you the cell count number,C shows you the capactity of the battery pack. Notice:charger will set the charge current according a rate of 1C automatically when you set the capacity of the battery pack, If you charge a high-rate battery pack,you can set the value of the "Current" a little higher

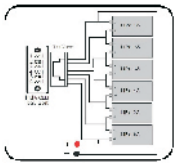
"Balance charging" this is for 2-6 cells of Lithium battery with balance port, the battery pack being charged should have the individual cell connect, and connect it to the individual port at the right side of charger with a suitable connection cable that fits with your battery pack. (see picture B)In this mode, the charging process will be different from ordinary charging mode. the internal processor of the charger will monitor and control the voltage of each cell of the battery pack. This can improve the discharging performance of the battery! EV charger use the optimised calculation tocontrol the tolerance in the range of ±0.01V!

"Storage mode " this is for charging or discharging Lithium battery not to be used for the time being. In order to reduce the wastage, you can select this mode to remain the power to 40% to store. The final voltage are different from the type of the battery, Lilo:3.75V、LiPo:3.85V、LiFe:3.3V. This is an intellective program, If the voltage of battery at its initial stage is over the voltage level to storage, the program will start to discharge,and if it is lower, the program will start to charge automatically. In order to ensure each battery meets the demand, the individual plug of the battery pack should be connected to the individual port of charger.

"Discharge mode" theoretically, Lithium battery do not need to discharge, especially deep-discharge. To avoid the overcharge of the individual battery, you should connect the balance plug of the battery to the charger, you can set the discharge cut-off voltage to 3.0V-4.0V

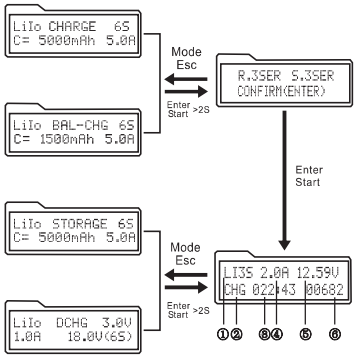


connection diagram in the balance charging /storage/discharge mode



Individual cell connection diagram

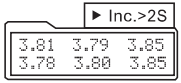
7.3.1 Start to charge/discharge: after set up the mode menu correctly, press Enter Start key for more than 2 seconds to start the process。



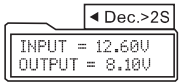
This screen shows the number of cells you set up and the processor detects."R" shows the number of cells found by charger and "S" is the number of cells selected by you at the previous menu. If both number are identical you can start charging by press Enter Start button.if not, press Mode Esc button to go back to previous menu, then carefully check the number of cells of the battery pack to charge again. If you selected the AUTO mode or discharge mode, you can pass over this screen directly.

This screen shows the present situation during charge process. to stop charging press Mode Esc key once; As you can see in the sketch on left,①:for the cells count,②:for the operating mode,CHG=charging at auto mode、BAL=balance charging mode 、FAS=fast charging、STO=storage mode、DSC=discharge mode;③:elapsed time,④:charge/discharge current,⑤:charge/discharge voltage of battery,⑥:capacity of charge/discharge

7.3.2 According to press Dec. / Inc. key you can inquire the individual voltage of each batteries and final voltage etc. continually as follow (this need to connect the balance plug):



You can enquire the unit voltage and total voltage before charge or discharge process.
Press ▶ Inc. key for more than 2 seconds, then it will show you the unit voltage as left.



Press ◀ Dec. key for more than 2 seconds, then it will show you the input voltage and output voltage as left.

Attetion: You should enter into the Lithium battery charge/discharge mode first.

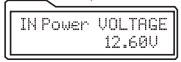
You can check the individual voltages of each cell in the battery pack while using the individual connection cable to the battery.

The final voltage will be reached at the end of process

You can inquire the safety capacity

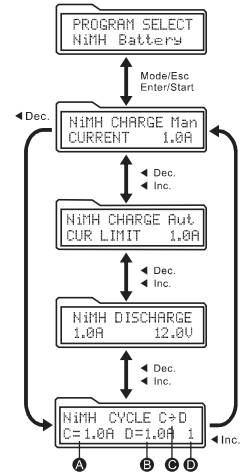
You can inquire the safety time

It shows you the external temperature when the temperature sersor is connected you can inqrire.
You can enquire the inner/external temperature when temperature sensor is connected



This shows the present voltage of input power

7.4 NiMH/NiCd battery program



Ⓐ Charge current in the cycle mode
Ⓑ Discharge current in the cycle mode
Ⓒ Sequence fo cycle
Ⓓ Number of cycle times

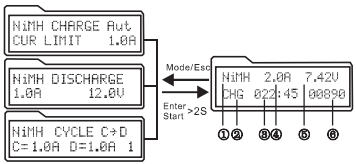
Press Mode/Esc key to the screen on the left, then press Enter/Start key to Enter/Start into the submenu. You can switched at the same level menu to select the mode by Dec./Inc. Key. please refer the etailed flow chart on the left. When you are willing to alter the parameter value in the program, press Enter/Start key to make it blink, then change the value with Dec./Inc. key. the value will be stored by pressing Enter/Start key once. then press Enter/Start key for more than 2 seconds to start the process. Since the menu of NiMH are the same as NiCd, there is an example of NiMH only.

"CHARGE" mode the default mode is "AUT". In "AUT"mode, you need to set the upper limit of charge current to avoid from higher feeding current that may damage the battery. Because some batteries of low impedance and small capacity can lead to the higher charge current by the processor at automatic charge mode. But in "Man" mode, it will charge the battery with the charge current you set at the display. Each mode can be switched by pressing start/enter key, when the current field is blinking, press Dec./Inc. Key for more than 1 second.

"DISCHARGE" mode the discharge current ranges from 0.1A to 5.0A and the final voltage ranges from 0.1 to 25.0V, the operating method is similar as Lithium battery. The final voltage of NiMH battery is 1.0V/cell, and the NiCd is 0.85V/cell, please refer the recommend by the battery of manufacturer.

"CYCLE" mode EV can perform 1-5 cycles of DCHG >CHG or CHG>DCHG continually. You can select it for the new NI** battery or the long-term placement NI** battery . please set up carefully, or it will damage the battery! To set the parameter please follow the previous charge/discharge menu

7.4.1 After check all the mode, to start the process press Enter/Start key for more than 2 seconds



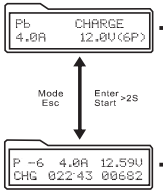
The screen displays the present state of process. To stop it press Mode/Esc key; Description: ①: the type of battery, ②: operating mode: CHG=charge、DSC=discharge、DCHG>CHGorCHG>DCHG=the cycle mode; ③: elapsed time, ④: charge/discharge current of the battery, ⑤: voltage of the battery pack, ⑥: capacity of charge/discharge

You can inquire the temperature and △V continua lly by press Dec./Inc. key

7.5 Pb battery program

This is programmed for charging Pb battery with nominal voltage from 2 to 20V, Pb battery can not be charged rapidly. they can only deliver relatively lower current compare to their capacity. the optimal charge current will be 1/10 of the capacity. please always follow the instruction supplied by the manufacturer of battery.

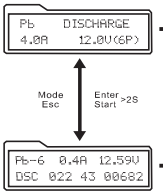
7.5.1 charging Pb battery



As you can see on left, you can set up the charge current on the left. the nominal of the second line and voltage of the battery on the right of the second line. the charge current ranges from 0.1-10.0A and the voltage should be matched with the battery being charged. start the charge process by pressing Enter/Start key for more than 2 seconds.

The screen displays the state of charging process. to stop charging forcibly, press Mode/Esc key once.

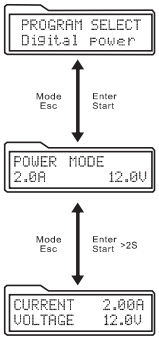
7.5.2 discharging Pb battery



Set discharge current on the left and final voltage on the right, the discharge current ranges from 0.1-5.0A and the voltage should be matched with the battery being discharged. start the discharge process by pressing Enter/Start key for more than 2 seconds.

The screen displays the current state of discharge.

7.6 Digital power program



In this mode, charger can provide a output power of DC3.0V-24V for the other electronic equipment

8. Warning and Error Messages

REVERSE POLARITY	The output is connected to a battery with incorrect polarity
CONNECTION BREAK	This will be displayed in case of detecting an interruption of the connection between battery and output or voluntarily disconnecting the charge lead during the operation of charge or discharge on output
SHORT ERROR	There was a short-circuit at output.please check the charging leads.
INPUT VOL ERR	The voltage of input power drops below the limit.
VOL SELECT ERR	The voltage of Lithium battery pack was selected incorrectly.Verify the voltage of battery pack carefully
BREAK DOWN	There happens the malfunction at the charger circuit by any reason.
BATTERY CHECK LOW VOLTAGE	The processor detects the voltage is lower than you set at Lithium program.please check the cell count of the battery pack.
BATTERY CHECK HIGH VOLTAGE	The processor detects the voltage is higher than you set at Lithium program.please check the cell count of the battery pack.
BATTERY VOLTAGE CELL LOW VOL	The voltage of one of the cell in the Lithium battery pack is too low.please check the voltage of the cell one by one.
BATTERY VOLTAGE CELL HIGH VOL	The voltage of one of the cell in the Lithium battery pack is too high.please check the voltage of the cell one by one.
BATTERY VOL ERR CELL CONNECT	There are bad connection at the individual connector. please check the connector and cables carefully
TEMP OVER ERR	The internal temperature of the unit goes too high. cool down the unit.
CONTROL FAILURE	The processor can not continue to control the feeding current by any reason.The unit needs to be repaired.

9. After-Sale Service and Guarantee

Thank you for purchasing the this balance charger， We will do our best to provide you with a comprehensive after-sale service and protect your rights and interests .

We warrant this product for a period of one year from the date of purchase, if it has a quality problem itself, all guarantee will be free; In case customers can not provide an effective certificate of purchase, we will refer the date of machine's internal. If it is over one year since the purchase date, an appropriate cost will be charged, users need to bear the transportation cost back and forth. User disassembly, alteration, or damage caused by improper use,they should bear the maintenance and transport costs.

COMPLIANCE INFORMATION FOR THE EUROPEAN UNION

Declaration of Conformity

CE

Product(s): Battery balance charger
Item Number(s): AP606

The object of declaration described above is in conformity with the requirements of the specifications listed below, following the provisions of the European EMC Directive 2004/108/EC

EN 55014-1:2006
EN55014-2:1997+A1:2001
EN61000-3-2:2006
EN61000-3-3:2008

Instructions for disposal of WEEE by users in the European Union

This product must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of their waste equipment by handing it over to a designated collections point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment.