Fuguang Electronics

IDCE-860CTBATTERY DISCHARGER & CAPACITY TESTER USER MANUAL

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1. Introduction

1.1 Features

In all electric devices and running network systems, along with the growing intelligence and automation, uninterrupted power supply already becomes a fundamental and crucial component. And whatever in DC or AC power supply system, as the chief backup power source, battery groups play an extremely important role. When the external power source runs normally, the battery groups are on the floating charge status. Once the outage or other electric accidents happen, battery groups would be the only backup power suppliers of the actual load in the short time.

As we know, except for the regular service life cycle, the actual service time of battery groups also depends on materials, structures, craftwork and maintenance. Both defects of production and misuses in the running can cause the early failure of battery groups. To guarantee the power supply in an emergency, it is necessary to do a routine discharging to check the capacity and service time of battery groups. The discharge test can help maintainer to locate the lag cells promptly, prolong the service time by replacing them, and evaluate the expectation of batteries life cycle.

Based on over 10 years battery testing experiences and exclusive technologies, Fuguang Electronics Co. Ltd. has succeeded in developing systemized, high-intellectual and extremely high-accurate IDCE-860CT batteries discharger & capacity testers.

The advantageous features of IDCE-860CT main machine:

a) **Adopting wireless battery monitoring technology,** available for 1.2V/2V/6V/12V cells voltage monitoring
b) **Each wireless module can monitor 4 cells simultaneously,** compared with the traditional method that each module only can monitor 1 cell, the new wiring operation becomes easier because the quantity of new modules needed is only a quarter of old-fashioned modules.(only 6 wireless modules for 48V battery groups)
c) **Available for offline & online discharging test of multiple battery group,** IDCE-860CTE can simultaneously record the actual discharge currents of each battery groups in the test. (As accessories, extra current clamps are needed for multiple groups testing)
d) **The discharge current is continuously adjustable and automatically keeps stable,** during the online discharging, the current displayed in LCD = the discharge current of battery group = the current created by main machine + the current of the actual load. Because during the discharging the current of the actual load probably changes according to the decrease of the online voltage, IDCE-860CTE main machine can automatically adjust to keep the current stable

in the whole testing.

e) **Offering manual function for setting the cell number which voltages below the threshold value,** this design could help you to locate more lag cells in once constant discharging.

f) **Intelligent menu design,** the simplified menu minimizes the training for users.

g) **Applying the electric heating component made by aero-alloy for the power consumption section,** new generation material levels up the coefficient of safety and the transition rate between electricity and heat, meanwhile reduces the volume and weight.

h) **Automatic calculating function for the discharging current,** IDCE-860CT installs the discharge current formulae for all hour rates internally, so the setting interface can tell users the suitable discharge currents without manual calculation according to the marked capacities of battery groups and the testing hour rates.

i) **Real scan and display the voltage data of each battery during the discharging,** and display the histogram of all batteries to follow the battery voltage tracks in whole discharging process, using the different colors to highlight the lowest and the highest voltage can simplify the analysis of the variety of battery voltages.

j) **5.7 inch colorful touching LCD screen,** the big touching screen can fulfill the click operation on the screen easily and directly, and show all parameters and the voltage histogram in the discharging process.

k) **Intelligent judge program,** IDCE-860CT can identify the situations that the battery voltages reach the threshold value or the signal missing by manual mistake. Avoiding manual interruption in the discharging, this revolutionary program makes the test stable and smooth.

l) **The presetting function for discharge parameters,** IDCE-860CT provide 8 locations for setting up all discharge parameters in advance, this design can skip the setting procedures for the same discharging, simplified the operation and speed up the test.

m) **Allow connecting with PC during the discharging** for downloading the real time data, or use USB memory devices to download the integral data after the discharging process, PC analysis software assists users to analyze the data and create test report.

n) **8M internal memory,** IDCE-860CT main machine can record several sets of data independently, and the menu interface provides some management operations like reviewing, analyzing and deleting.

The advantageous features of IDCE-860CT analysis software:

a) Support data downloading and analyzing through real time communication or USB memory devices

b) The software interface includes: battery voltages curve and bar chart, battery resistances bar chart, group voltage curve, current curve, capacities histogram, data form and so on.

c) Powerful capacity estimating function, the software can predict the capacity of each battery in the tested group.
d) The software shows the data by various ways like bar charts, curve, and form. And users can magnify or minify any windows to read more details.
e) Automatically create EXCEL data report, it's so convenient to send or download the data.

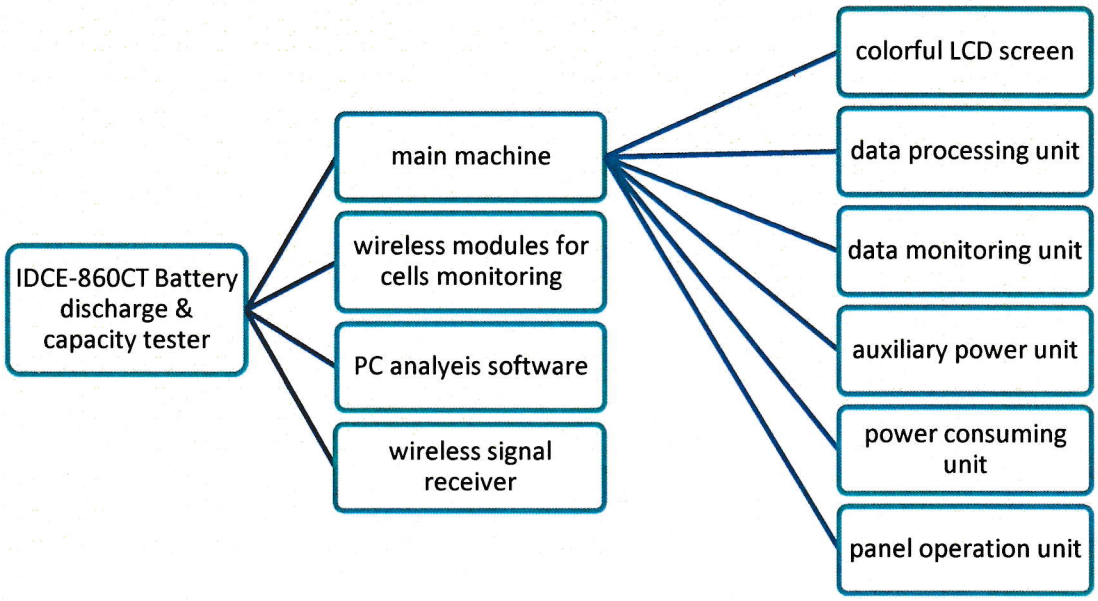
IDCE-860CT has diversified protective functions, which include the sounds alarm, lights warning, and clear interface prompts.

IDCE-860CT is small in volume, light in weight, simple to operate, highly accurate product line. For different applications, IDCE-860CT is available for the discharging test of 12V, 24V, 48V, 72V, 96V, 110V, 120V, 220V, 240V, 380V, 480V battery groups etc.

1.2 System Component Unit

The IDCE-860CT battery discharger & capacity tester consists by main machine, wireless modules for cells monitoring, wireless signal receiver and PC analysis software.

And the main machine is organized by colorful LCD screen, data processing unit, data monitoring unit, auxiliary power unit, power consuming unit and panel operation unit.



2. Main Technical Parameter

2.1 Environment & condition for use

2.1.1 Operating temperature

-5℃ ~ +50℃, full power, forced air cooling

2.1.2 Storage temperature

-40℃ ~ +70℃

2.1.3 Relative humidity

≤90% (40℃±2℃)

2.1.4 Altitude limit

0~2000m, -5℃~+50℃, full power

2000m～4000m, -5℃~+30℃, full power;

30℃~+50℃, decrease power for use.

2.2 Structure & Weight

Adopting the stainless steel shell, IDCE-860CT has sturdy and stable structure. Meanwhile, the unique material of power consumption unit makes IDCE-860CT main machine portable.

The dimension (length*breadth*height):

IDCE-860CT: 670mm×230mm×370mm

Weight:

IDCE-860CT: 25 kg (main tester only)

2.3 Working Power Supply

IDCE-860CT: AC 220V single phase 45Hz~65Hz

2.4 Input Voltage from Battery Groups

IDCE-860CT: 10~480V

2.5 Discharge Current Range

Voltage range	current range
10-15V	0-60 A
15V-60V	0-120 A
86-150V	0-120 A
190-280V	0-60 A
280-480V	0-35 A

2.6 Parameter Display & Measure Accuracy

Parameter display: 5.7 inch LCD color screen

Displayed discharge current: resolution 0.1A

accuracy ≤±0.5%

Displayed battery groups voltage: resolution 0.1V

accuracy≤±0.5%

Displayed cells voltage: 1.2V/2V/6V cells resolution 0.001V
accuracy≤±0.05%
12V cells resolution 0.01V
accuracy≤±0.05%

2.7 Protection & Warning

The protection design of IDCE-860CT:

2.7.1 The protections of DC input overvoltage, polarity reversal in battery connecting, over current in discharging, and system overheat

2.7.2 When the discharging is abnormal, the warning light and buzzer would activate, meanwhile the LCD screen would show clear prompt.

2.8 Data Management & Communication

2.8.1 Discharge data management

a) The sampling and incidents data can be saved continuously and automatically, so the test record will not lost even when power off.
b) Support to manual inspection
c) Support to read & download the data by communication port
d) Display the residual space of internal memory
e) Smart deleting choice: delete all or delete the chosen record.

2.8.2 Setting Work Parameters

In "data management" interface, the user can set the discharge current, battery capacity, cells number, the stop threshold value of battery group voltage and cell voltage, discharge capacity, discharge time in the allowed range and IDCE-860CT provide 8 locations to save the presetting parameters for common usage.

2.8.3 Communication

a) Internal wireless signal receiver can help IDCE-860CT main machine to record the cell monitoring & sampling data.
b) By RS232 port in IDCE-860CT main machine, PC can connect with IDCE-860CT to display real time discharge data.
c) By USB port in IDCE-860CT main machine, user can download the data to PC by USB-disk.
d) By parataxis control port, IDCE-860CT main machine can co-work with another Fuguang discharger & capacity tester.

3. Basic Operational Principle

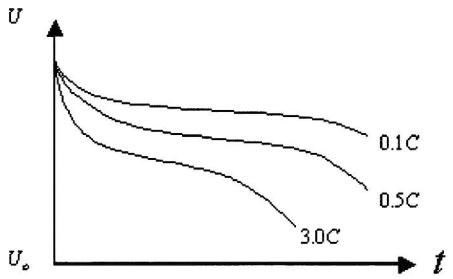
3.1 Battery Testing Principle

Because of the complexity of battery electric-chemical reaction and the diversity of materials, structure, craftwork, and installation environments, it causes that the battery groups from different manufacturers have much differences. Even the same type batteries from same manufacturers can't guarantee the same good

performance. Until now, there is no a uniform method can check the quality of batteries easily and efficiently. The processes of battery drown and failure is still complicated, so the testing and capacity estimation is still a difficult problem for battery application.

Nowadays, for the most popular lead-acid batteries—VRLA batteries, the common and effective test methods are testing the cell voltage routinely and deep cycle discharging annually. We believe:

a) The battery voltage in floating charge status and the batteries capacities has no correlation.
   As we know, even the batteries which have a low capacity still can show a normal voltage in floating charge status. So the maintainer can't estimate the capacity based on the batteries voltage without discharging.
b) Deep cycle (full capacity) discharge is still the most accurate method to test the performance of batteries.
   For the battery groups created by several cells in series, the actual capacity of battery groups relies on the ability of the worst cell. So the chief goal of battery groups discharging is to find the lag cell and replace it to increase the service time of the whole battery system.
   Usually, battery discharge test need to add constant current on the tested battery groups, and monitor the voltage dropping status of each cell until drops to the stop threshold value. Based on the actual energy discharged, the discharge tester can show the accurate capacity of the tested battery groups.
   The voltage dropping curve in the discharging process:



From the curve, we can know for different types, materials and craftwork, the voltage dropping data is the most uniform and accurate evident for estimating the battery capacity. And the curve also shows that using different hour rate to discharge the same batteries would get different results. For avoiding the harm of discharging, batteries discharge has to apply the suitable hour rate.

3.2 Constant Current Principle

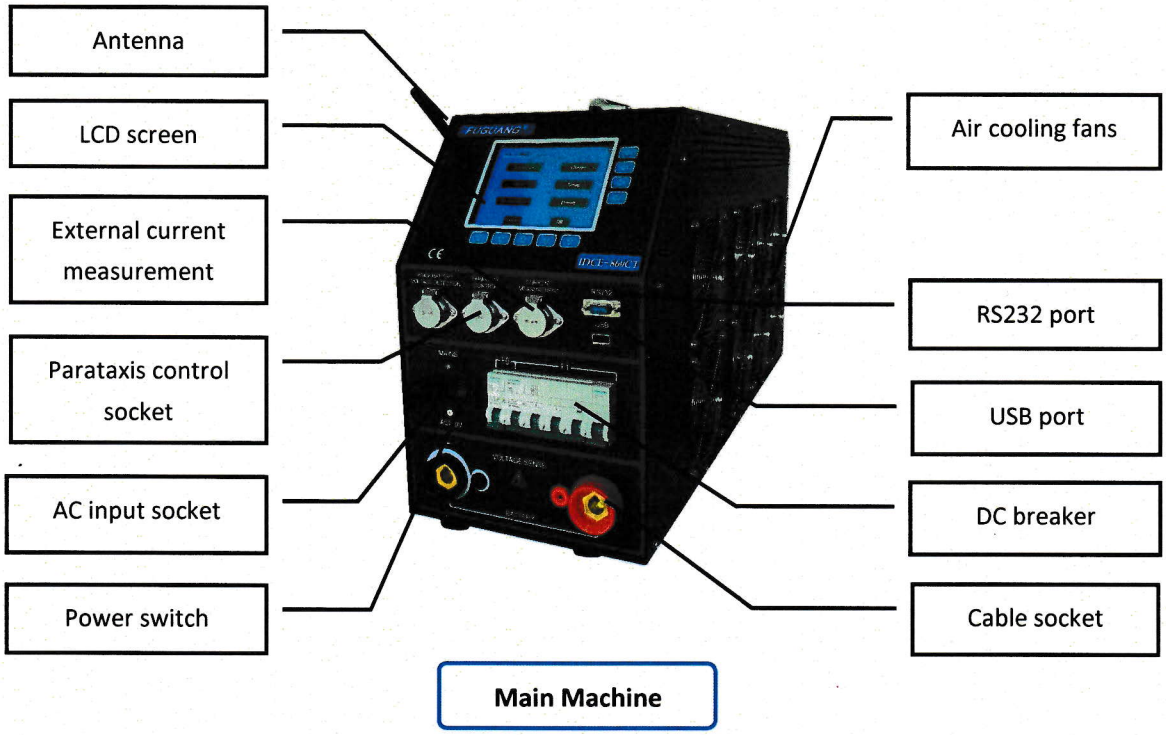
The internal circuit of IDCE-860CT adopts PWM (pulse width modulation) control technique. Under the control of central processing unit, the power circuit can discharge the battery groups in the setting current accurately.

4. Operating Instructions

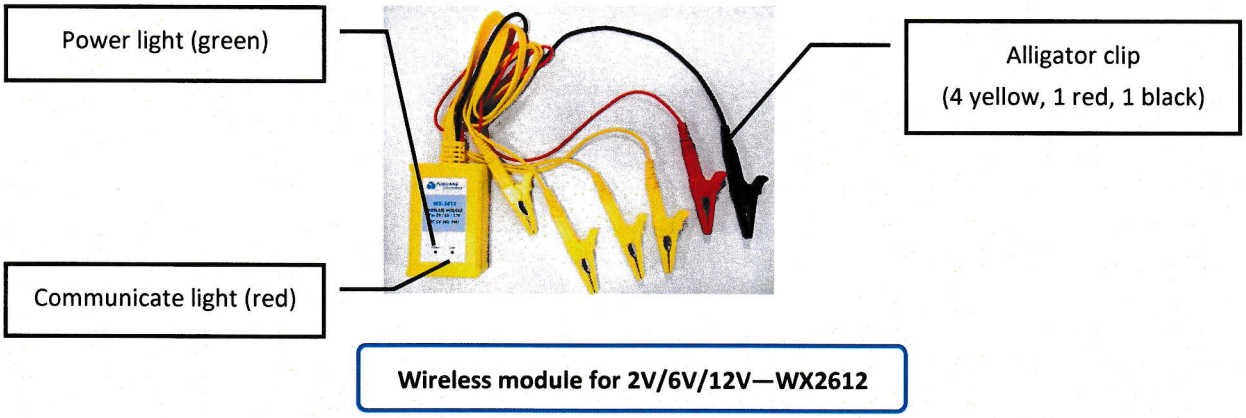
4.1 Environments Requirement

Should be NO CORROSIVE, NO EXPLOSIVE, NO ELECTRICAL BREAKDOWN AIR OR CONDUCTIVE DUST.

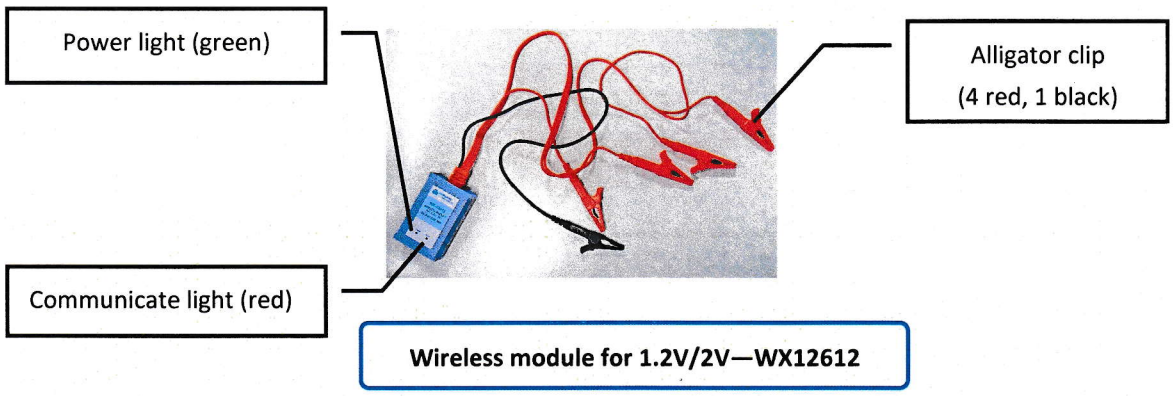
4.2 Panel Description



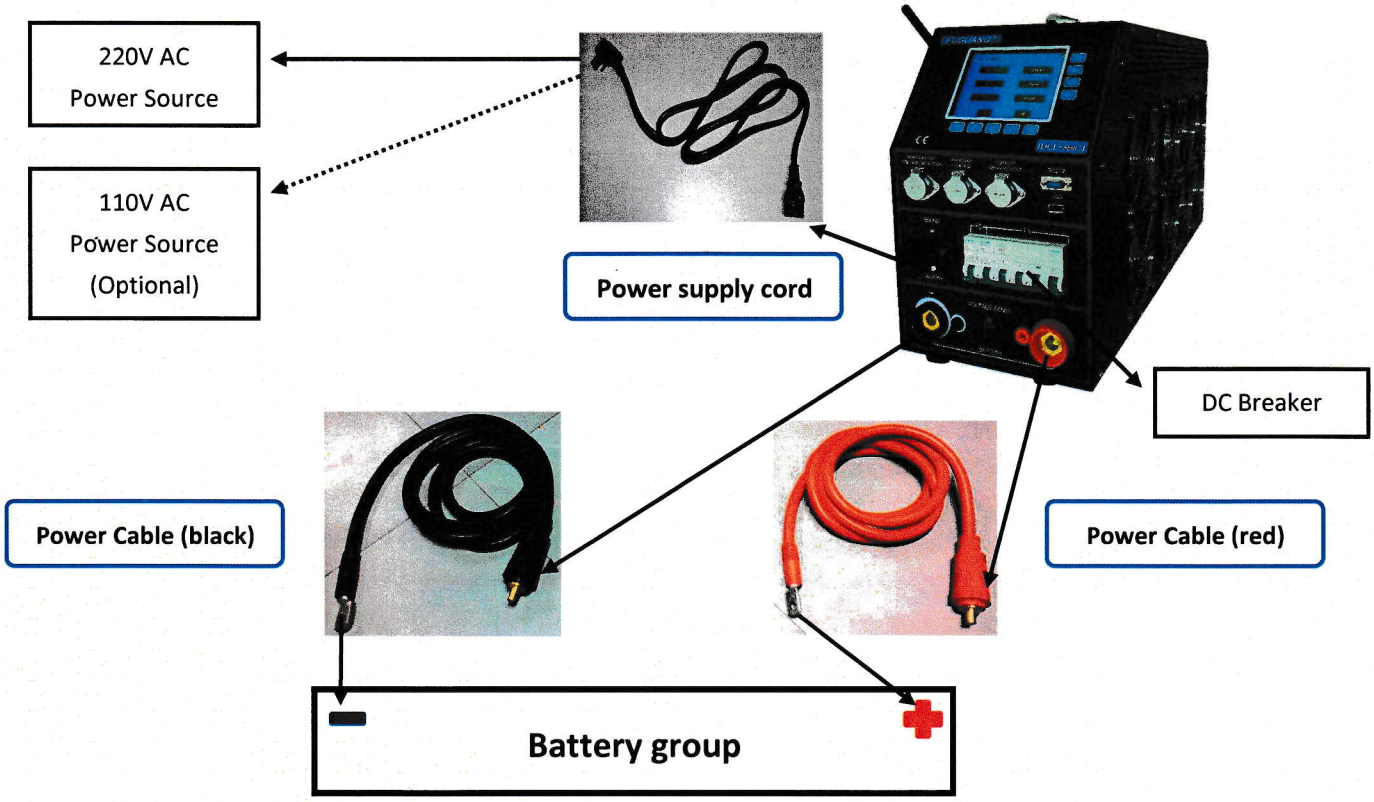
Main Machine



Wireless module for 2V/6V/12V—WX2612



4.3 Main Machine Connection



4.3.1 Use the power cable (1 red, 1 black) to connect the main machine with the tested battery group.

4.3.2 Use the power supply cord to connect main machine with the AC power source

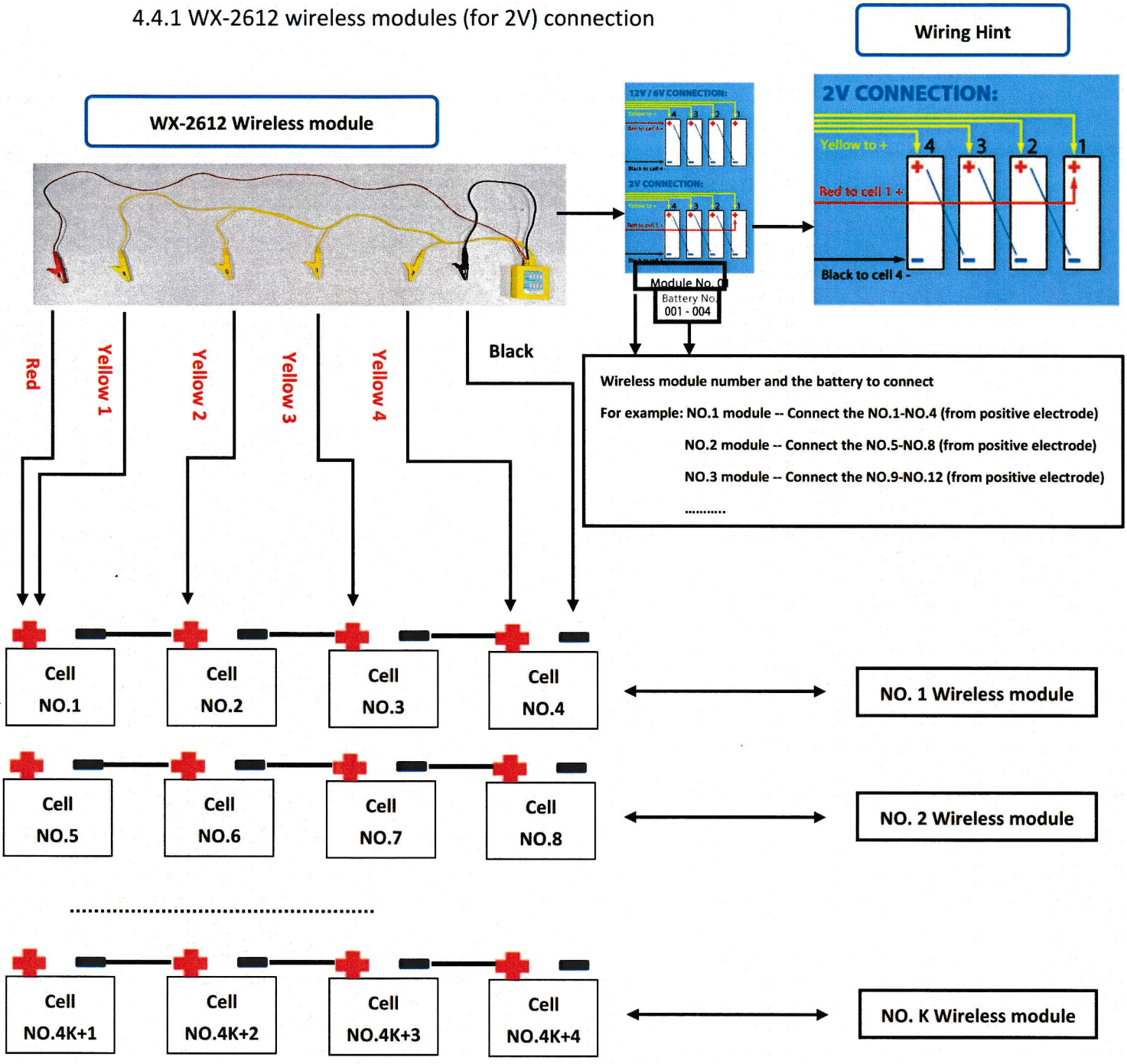
a) IDCE-860CT support 220V AC 50Hz/60Hz external AC power source

b) If the power source is 110V AC 50Hz/60Hz, please use an 110V AC to 220V AC transformer to start the tester. Because external AC power source only provides the power for LCD and control circuit, the normal rated power of the transformer not need to be high.

4.4 Wireless Modules Connection

Before connecting, please install the antenna in main tester

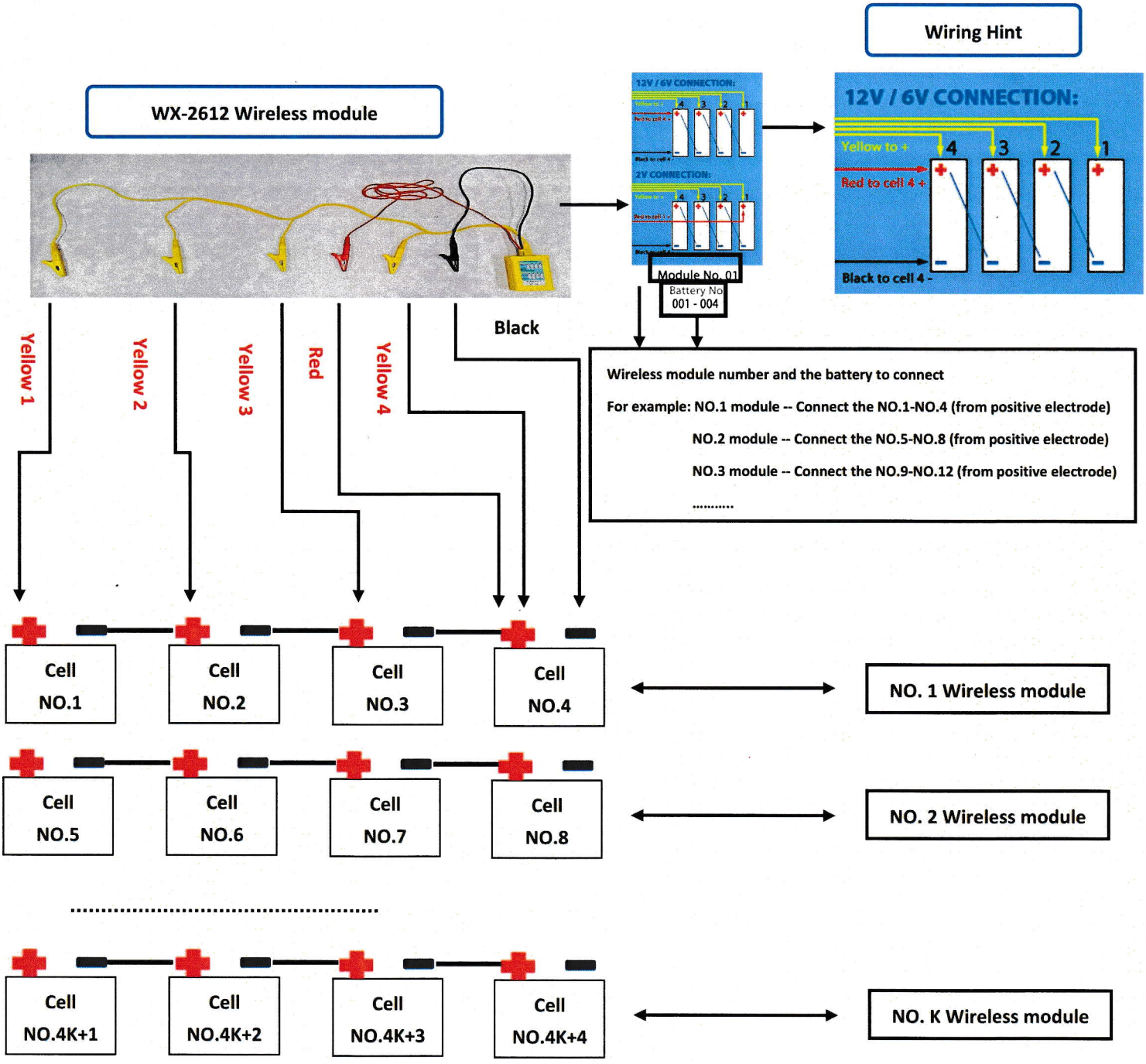
4.4.1 WX-2612 wireless modules (for 2V) connection



4.4.1.1 Read the module number from the label in the modules, fined the right batteries to connect with. Do not connect the modules to 4 batteries no adjacent like NO.1, 3, 8, 9; it will damage the module immediately!

4.4.1.2 Use the alligator clips (1 red, 1 black, 4 yellow) to connect modules with the batteries, please follow the right wiring rule "Yellow 1 to Yellow 4, from long to short", and the wiring hint also print on the label of modules.

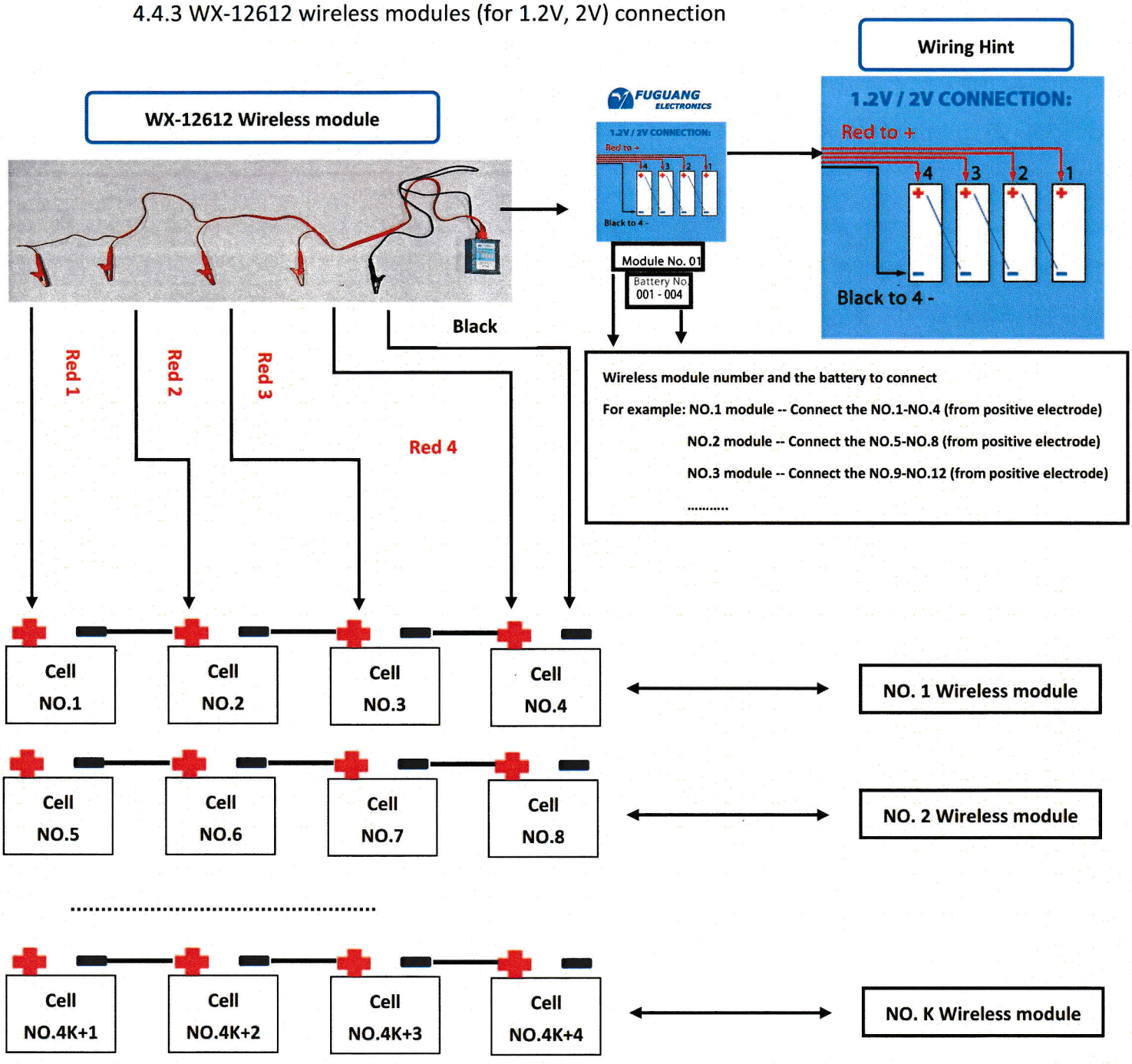
4.4.2 WX-2612 wireless modules (for 12V, 6V) connection



4.4.2.1 Read the module number from the label in the modules, fined the right batteries to connect with. Do not connect the modules to 4 batteries no adjacent like NO.1, 3, 8, 9; it will damage the module immediately!

4.4.2.2 Use the alligator clips (1 red, 1 black, 4 yellow) to connect modules with the batteries, please follow the right wiring rule "Yellow 1 to Yellow 4, from long to short", and the wiring hint also print on the label of modules.

4.4.3 WX-12612 wireless modules (for 1.2V, 2V) connection



4.4.3.1 Read the module number from the label in the modules, fined the right batteries to connect with. Do not connect the modules to 4 batteries no adjacent like NO.1, 3, 8, 9; it will damage the module immediately!

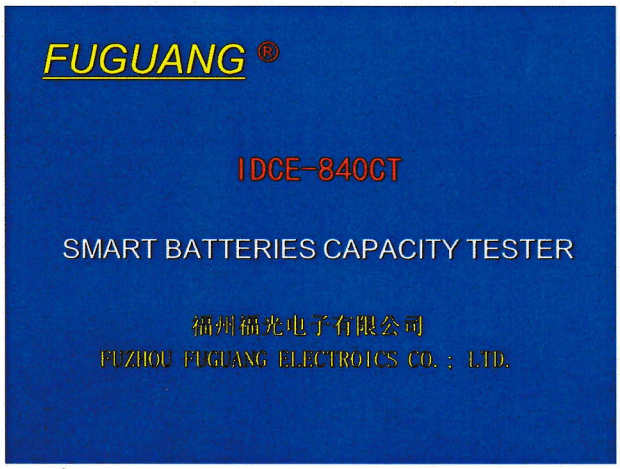
4.4.3.2 Use the alligator clips (4 red, 1 black) to connect modules with the batteries, please follow the right wiring rule "Red 1 to Red 4, from long to short", and the wiring hint also print on the label of modules.

4.5 Starting Up and Input Operation

4.5.1 after the main machine connection, turn on the power switch to start up IDCE-860CT

4.5.2 In the welcome interface, you can see the FUGUANG logo, the type name, tester name, and our company name. Press any key into main menu, if 10 more seconds without press, the system will jump to main menu automatically.

4.5.3 IDCE-860CT input way: press on the screen directly



The welcome screen

The main menu

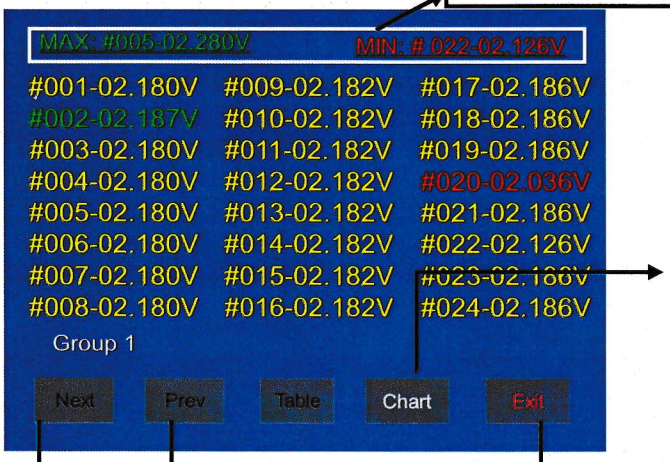
4.6 Check the Connection of the Wireless Modules

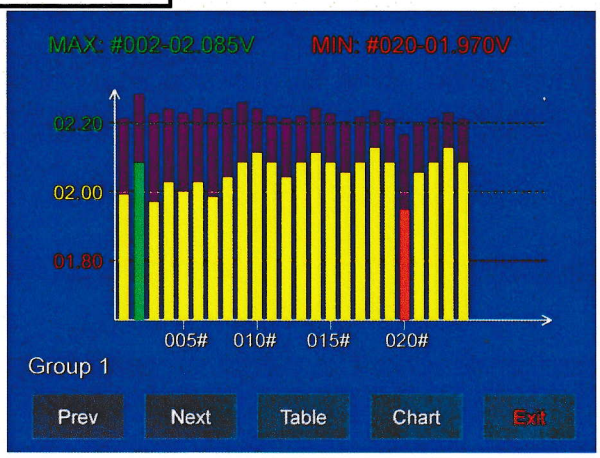
4.6.1 Press "BatteryView" in the main menu into the table interface, if all wireless modules connected, you can see the voltage of each battery. If the voltages of some batteries are not showed, please check the wireless modules connection

Table

The highest & lowest voltage battery in battery group

Chart





One screen can show 24 batteries
If over 24 cells, press "Next" "Prev" to see more data

Back to the main menu

4.6.2 Press "Chart" to see the histogram of each battery

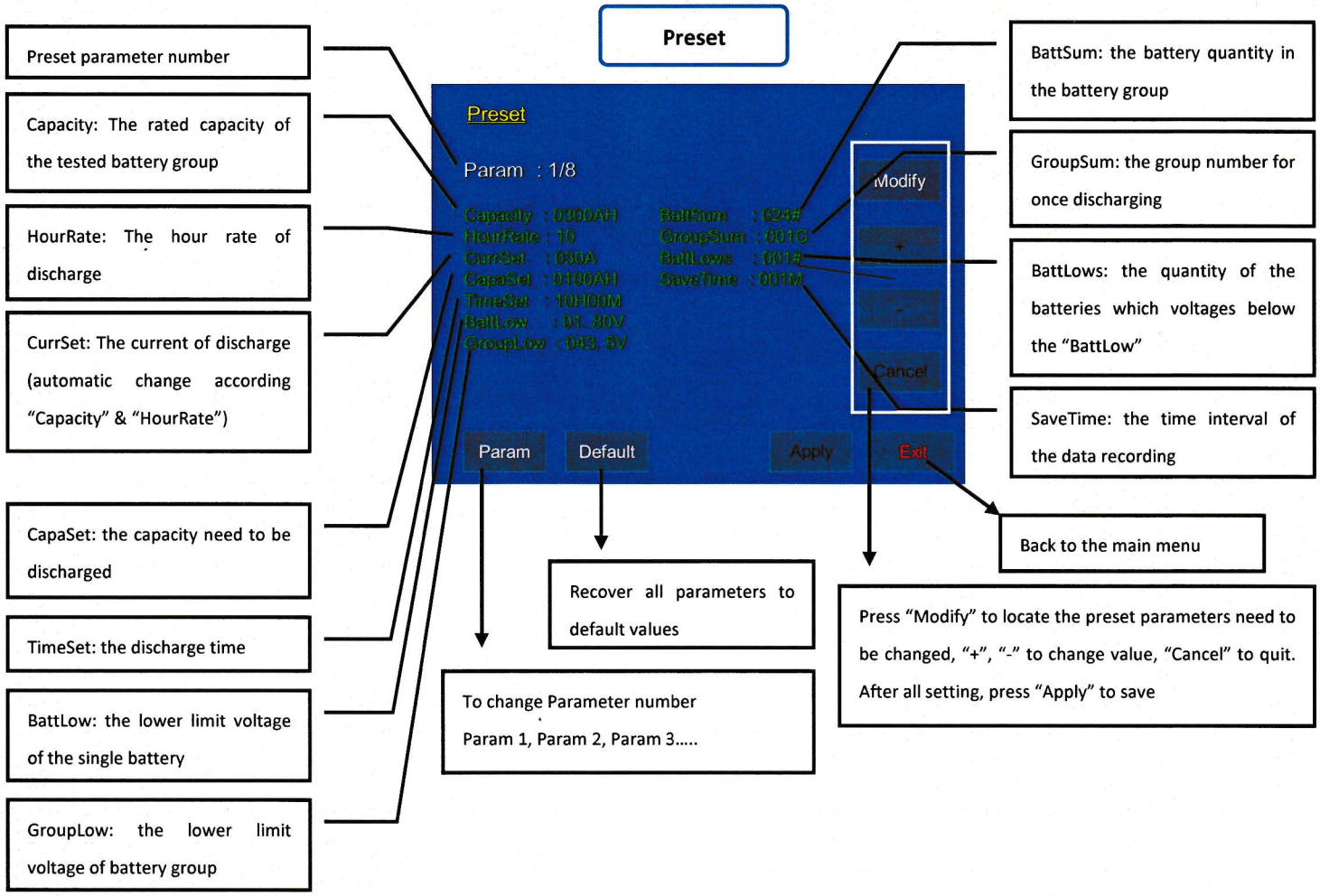
4.6.3 Both in the table and chart interface, one screen only can show 24 batteries, if the tested battery group has more than 24 batteries, please press "Next" & "Prev" to see more.

4.6.4 Press "Exit" go back to the main menu

4.7 The Preset Function (No Essential Operation)

4.7.1 The preset function provides 8 locations to save the discharge test; you can load the same setting in the repeated test. No need to set all parameters again. Of course IDCE-860CT can support manual setting in the discharge interface without presetting.

Press "Preset" in the main menu into the preset function interface



4.7.2 "CapaSet", "TimeSet", "BattLow", "GroupLow" are all the discharging stop conditions, any of them is reached, the discharge will stop automatically

4.7.3 For 1 battery group discharging, please keep "GroupSum" in "001G", if you need 2-4 groups parallel discharge once time, they need 2-4 times wireless modules, and the current will be 1/2-1/4 for each group.

4.7.4 If you want the discharging to stop when one bad batteries reaches the "BattLow", please keep "Battlows" in "001#". If you want the discharging to stop when N bad batteries reach the "BattLow", you can set the "BattLows" to the number you need.

4.7.5 If you don't need wireless modules in the discharge, please set the "BattSum" to "000#". "BattLow" will stop work to end the discharging.

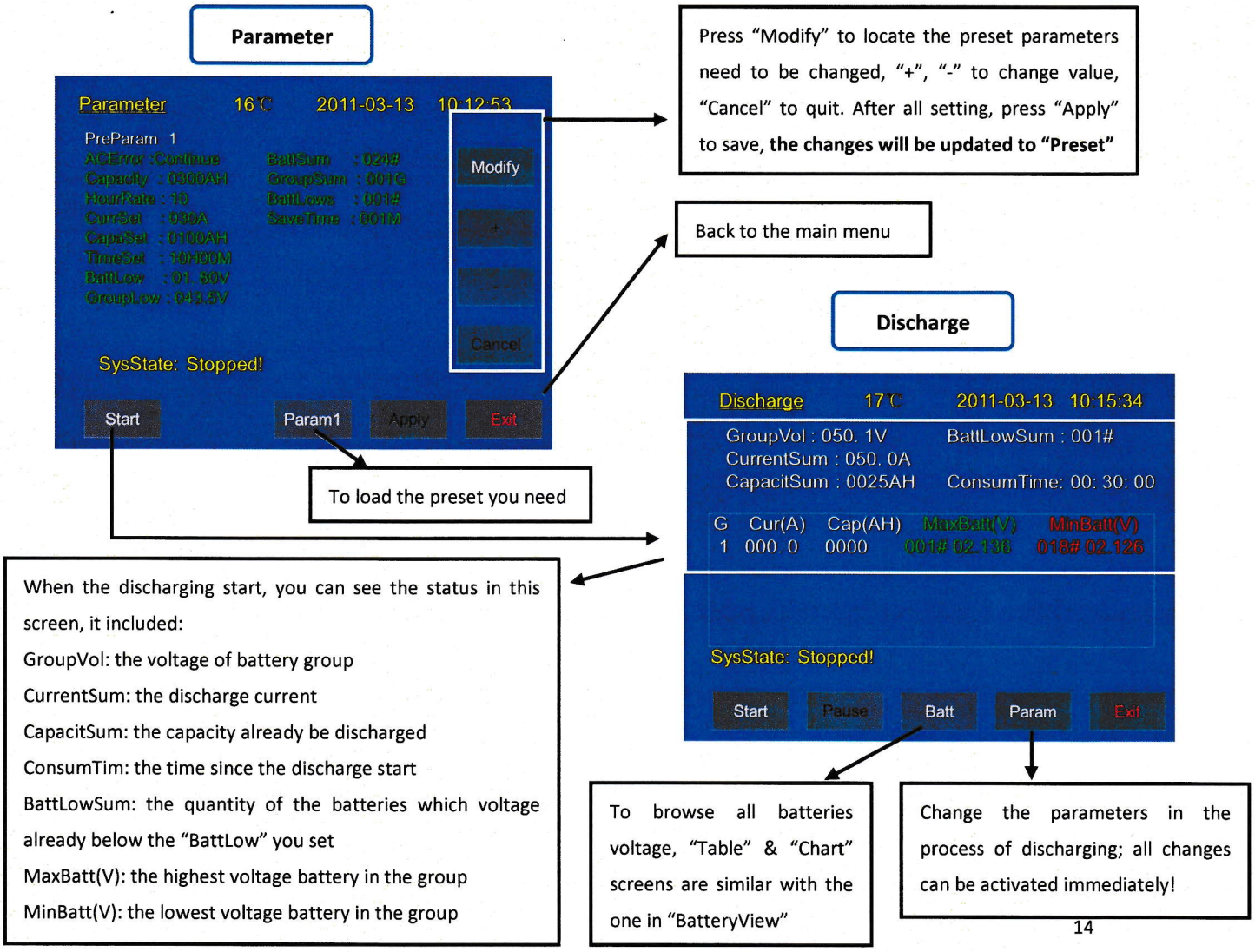
4.8 Discharge

4.8.1 Press "Discharge" in the main menu into the parameter interface

4.8.2 In parameter interface, you can see all same parameters in the "Preset", you can re-edit the discharge parameters here and "Apply" to save them.

4.8.3 Press "Start" into the discharge interface, press the "Start" again to start discharging (please remember to turn on the DC power switch first)

4.8.4 Manual stop the discharge: press "Pause" to pause the discharge, and press "Stop" to end the discharge, or press "Start" to continue the discharge.



4.8.5 Press "Param" to change the parameters during the discharging (if necessary), all changes can be activated immediately and the discharging will not be stopped.

4.8.6 "SysState:" in the discharge interface will help you know the status of the discharging.

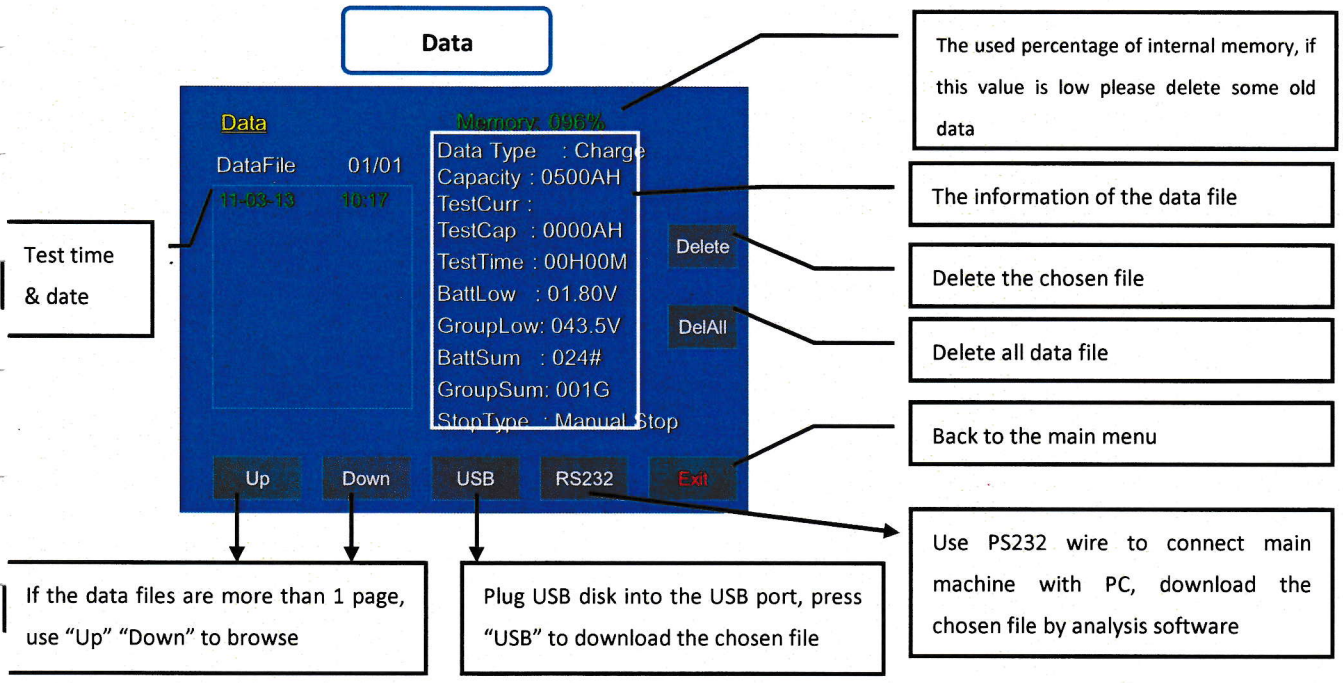
4.9 Download the Data to PC

4.9.1 IDCE-860CT provides two ways to record the test data:

a) Use the RS232 wire to connect main machine with PC, by analysis software, the real time test data can be download during the test.

b) Internal memory always save all testing data, you can download the data by USB disk or RS232 wire to PC.

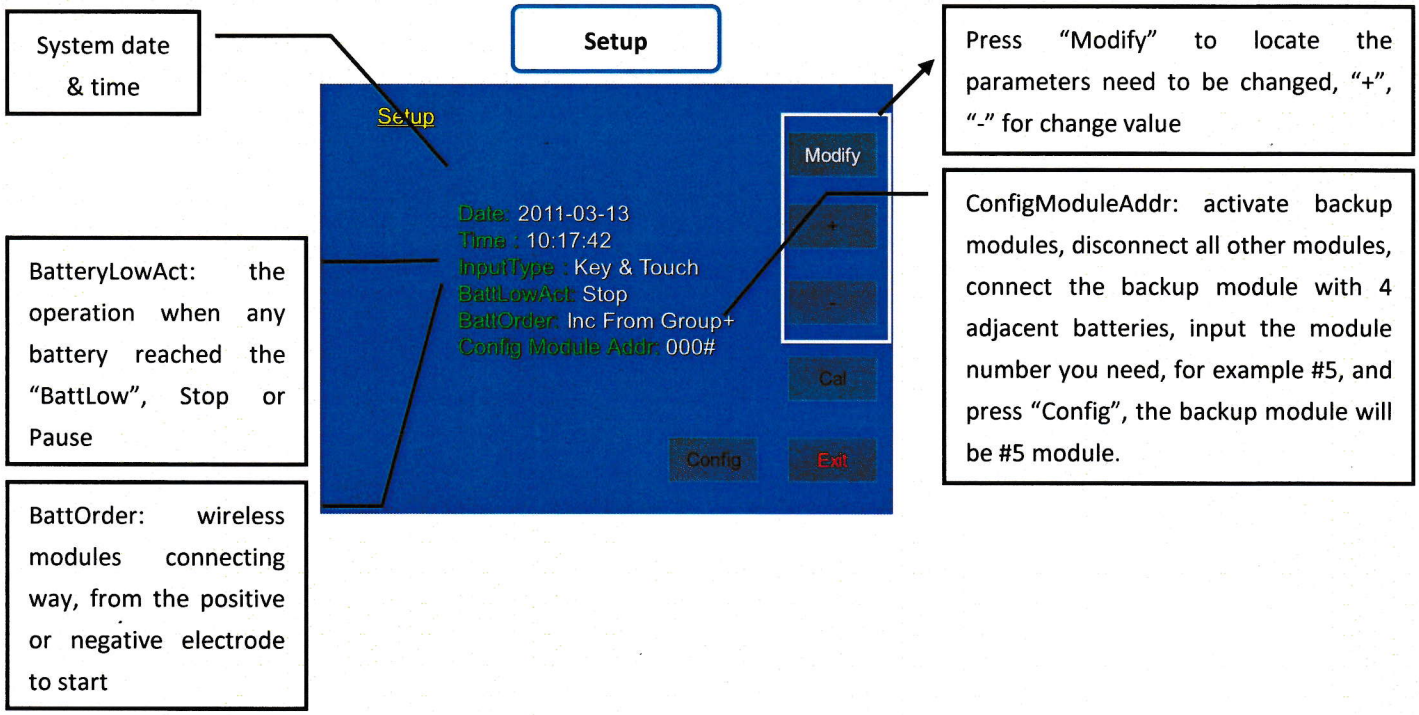
4.9.2 Press "Data" in the main menu into the data interface



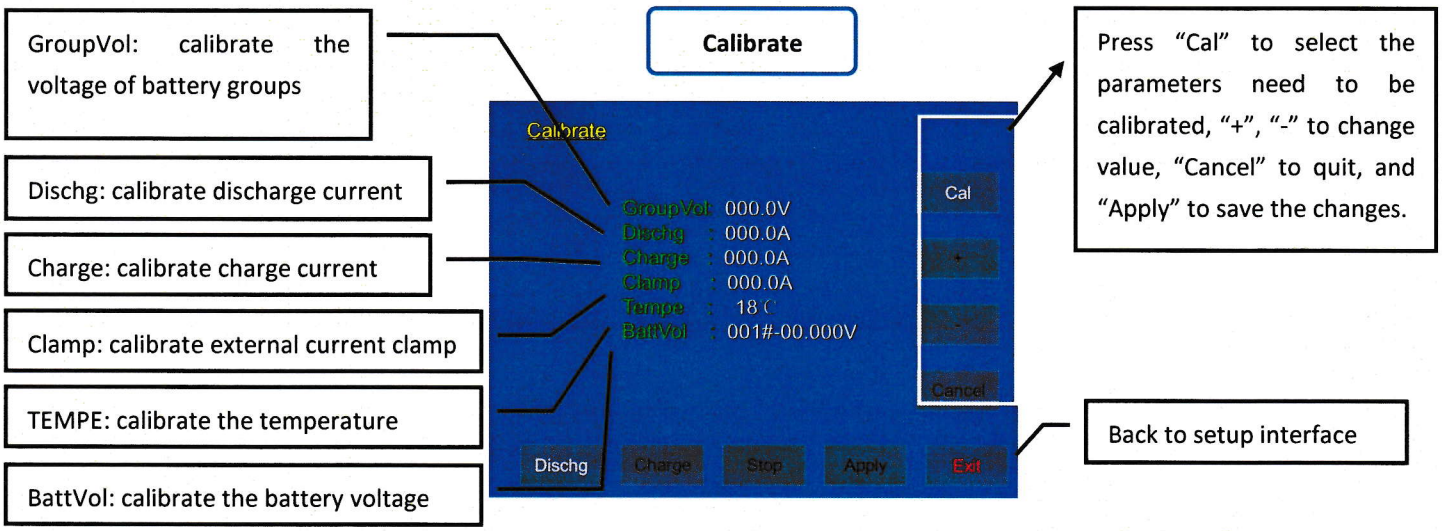
4.10 System Setup, Activate Backup Modules & Calibration(No Essential Operation)

4.10.1 Press "Setup" in the main menu into setup interface

4.10.2 In setup interface, you can use "ConfigModuleAddr" to activate the backup modules for replacing the malfunctioned old one.



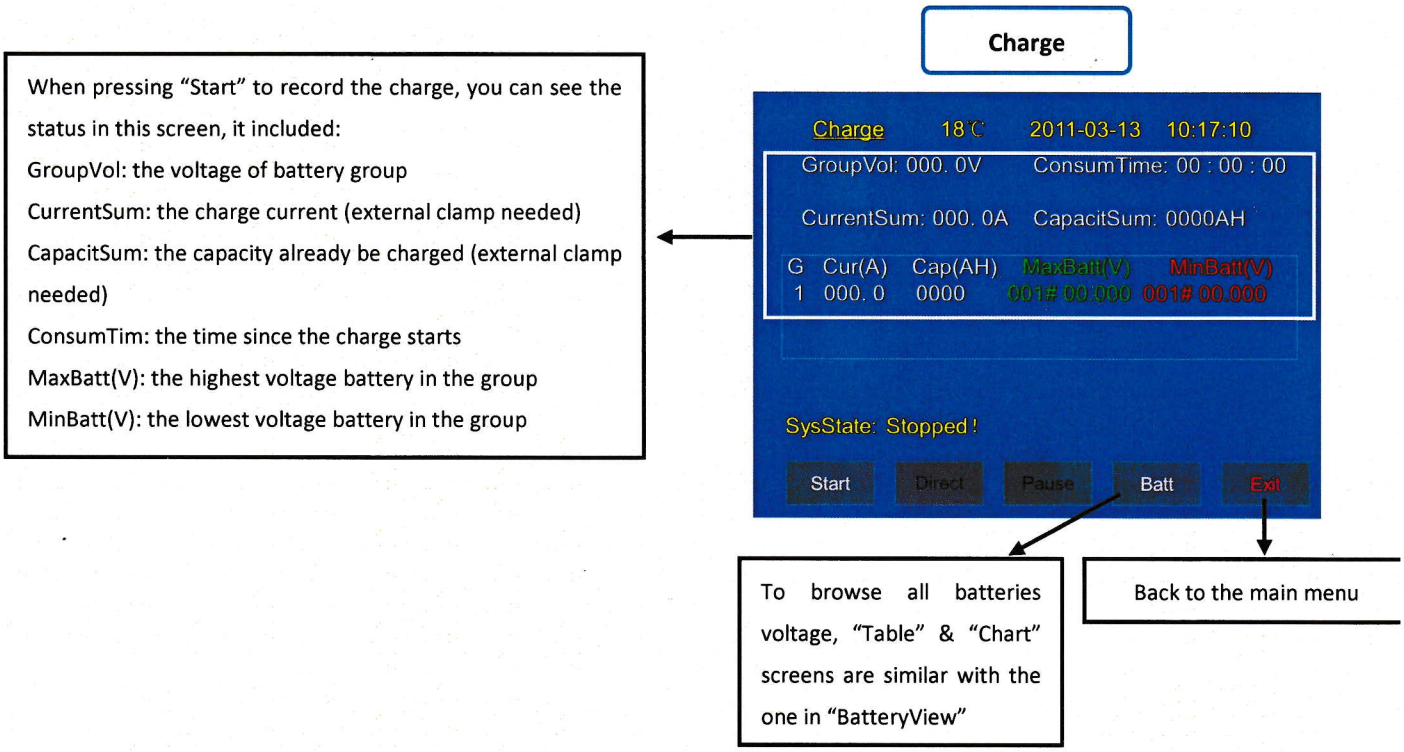
4.10.3 IDCE-860CT provide calibration function, if you have high accuracy instrument, you can calibrate the tester by yourself. Change the date to 2099-12(year-month), the "Cal" button will be activated. Press "Cal" into calibration interface.



4.11 Charge Monitoring Function

4.11.1 Although IDCE-860CT can't charge the test battery group, it provides charge monitoring function to record the process of charging.

4.11.2 Press "Charge" in the main menu into charge interface, and press "start" to record the charge process.



5. PC software instruction

5.1 Main Functions

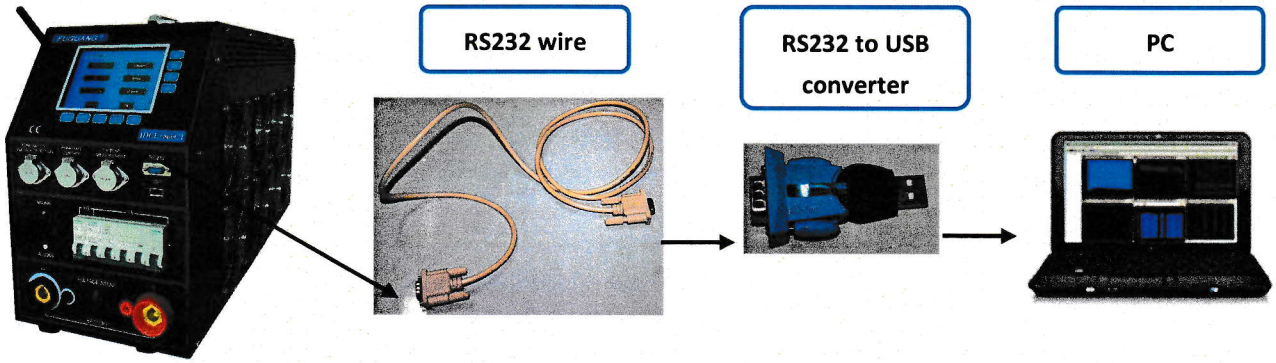
a) Recording the real time discharge data by connecting main machine with PC
b) Read, display and save the downloaded USB data.
c) Generate EXCEL test report

5.2 Install Analysis Software to PC

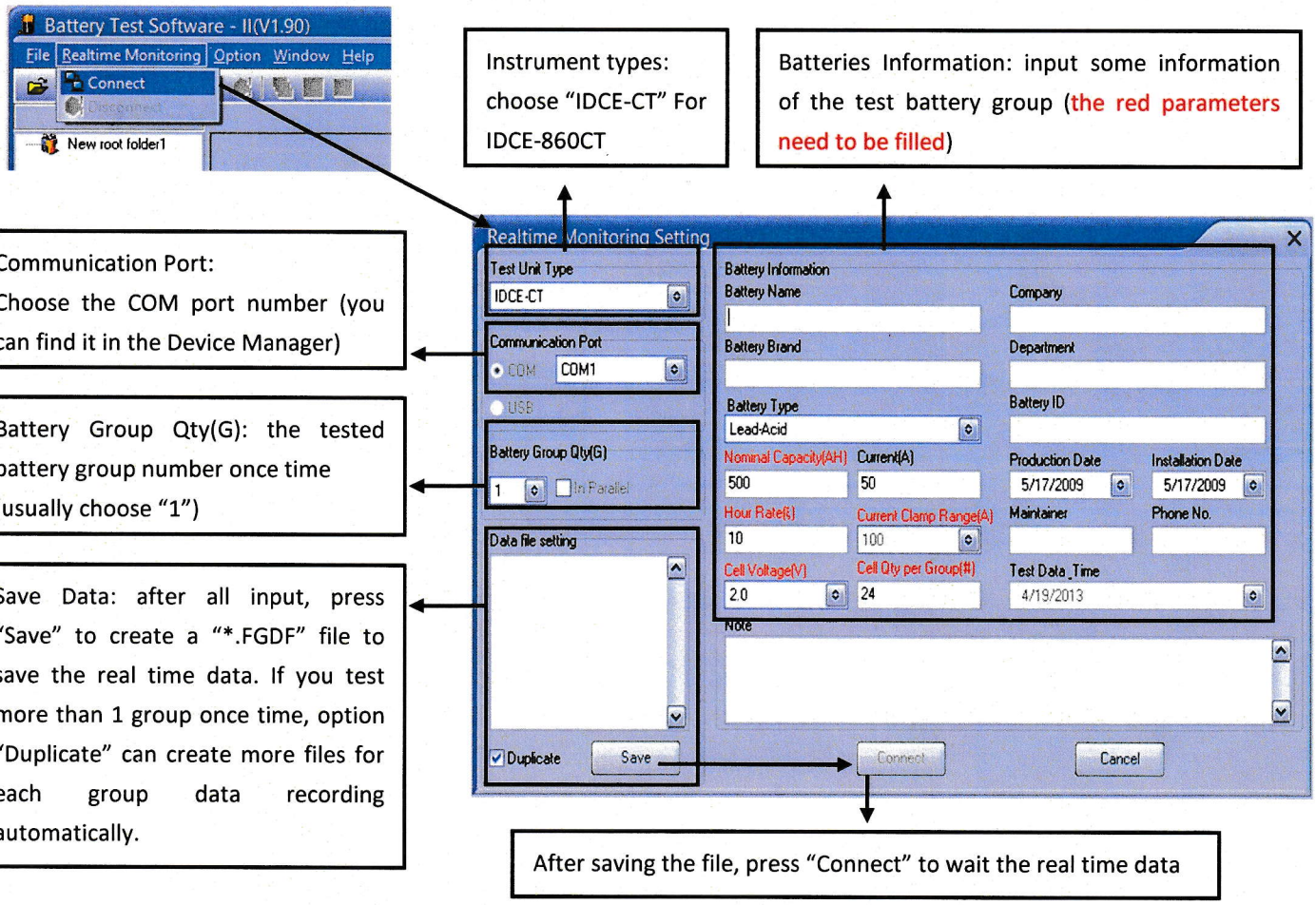
5.2.1 Please find the install program of analysis software in the CD-ROM.
5.2.2 According the prompts to finish the installation.
5.2.3 After the installation, you can click the desktop icon to open the software.

5.3 Real Time Recording During the Testing

5.3.1 Use the RS232 connector to connect the main machine with PC



5.3.2 Choose "Connect" in "Realtime monitoring" menu to open "Real-time Monitoring Links" interface.



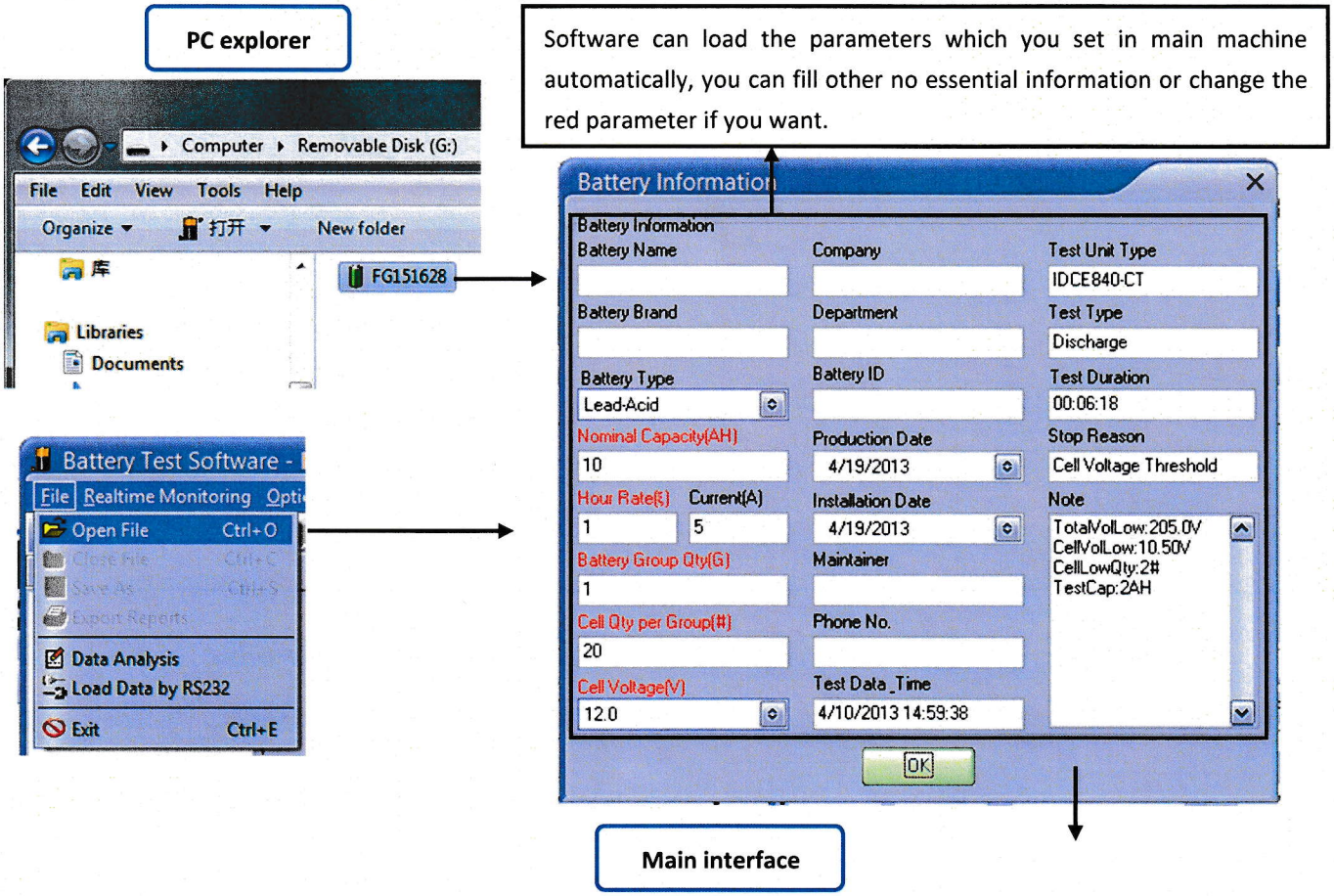
5.3.3 Start the discharge in the main machine, and the real time data to update the PC software interface. Please input the red parameters correctly in the batteries information, it can affect the result of capacity evaluation.

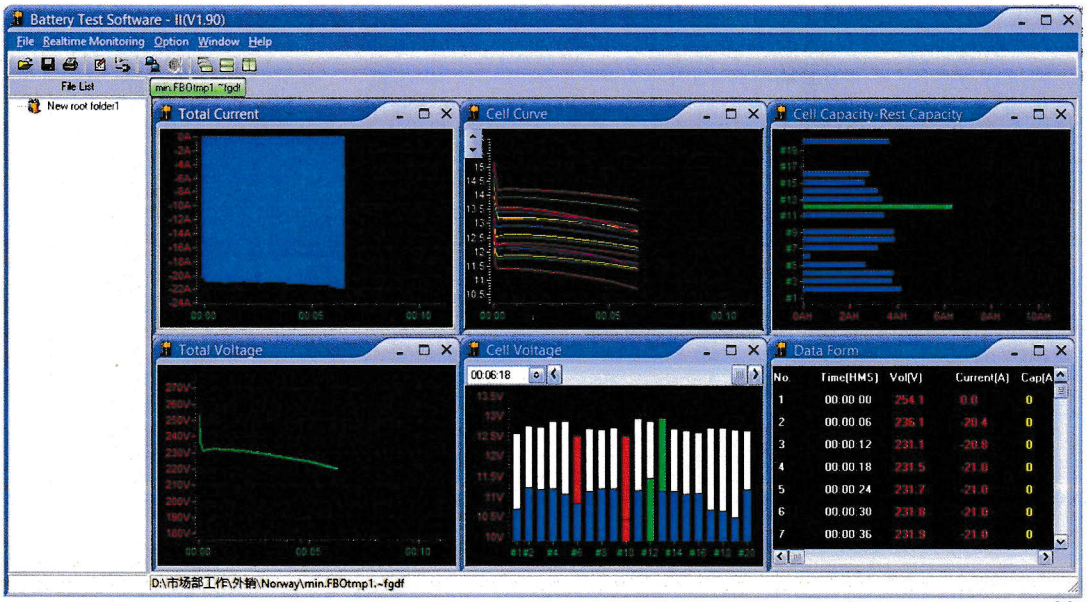
5.3.4 The real time data can be saved simultaneously, even though you close the software in the process of discharging, the data file still can show the records before closing.

5.4 Download Data File from USB Disk

5.4.1 Download the data file from the main machine, you can find the data file named "Fxxxxxxxx.FBO". ("xxxxxx" is the time & date of data downloading.)

5.4.2 Double click the file to activate "Battery information" interface. Or you can open the software first and choose "Open file" in "file" menu.

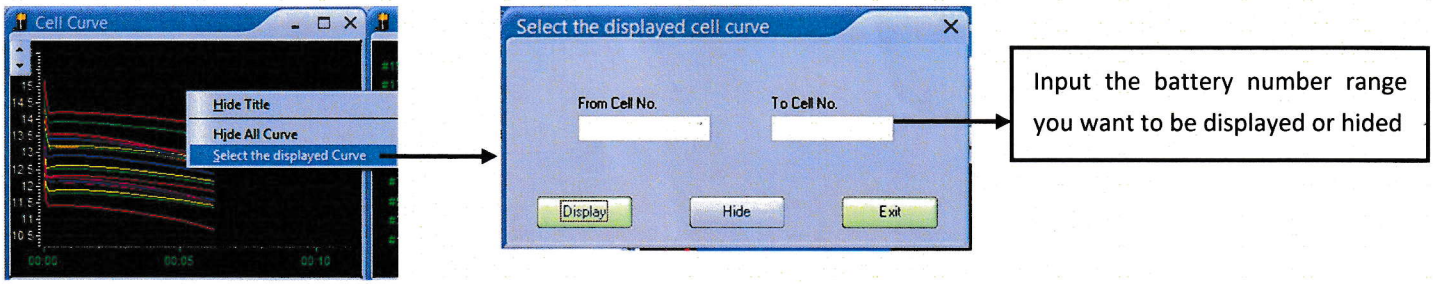




5.4.3 In the main interface, you can see 6 windows to show all necessary testing information:

a) Total current chart: the current during the discharging (the value is minus because discharging)

b) Cell curve: the voltage curve of each battery, it can be added and deleted by right click menu.



c) Cell capacity- rest capacity: show the rest capacity, actual capacity and capacity percent of each battery (it can be chosen to be displayed by right click menu)

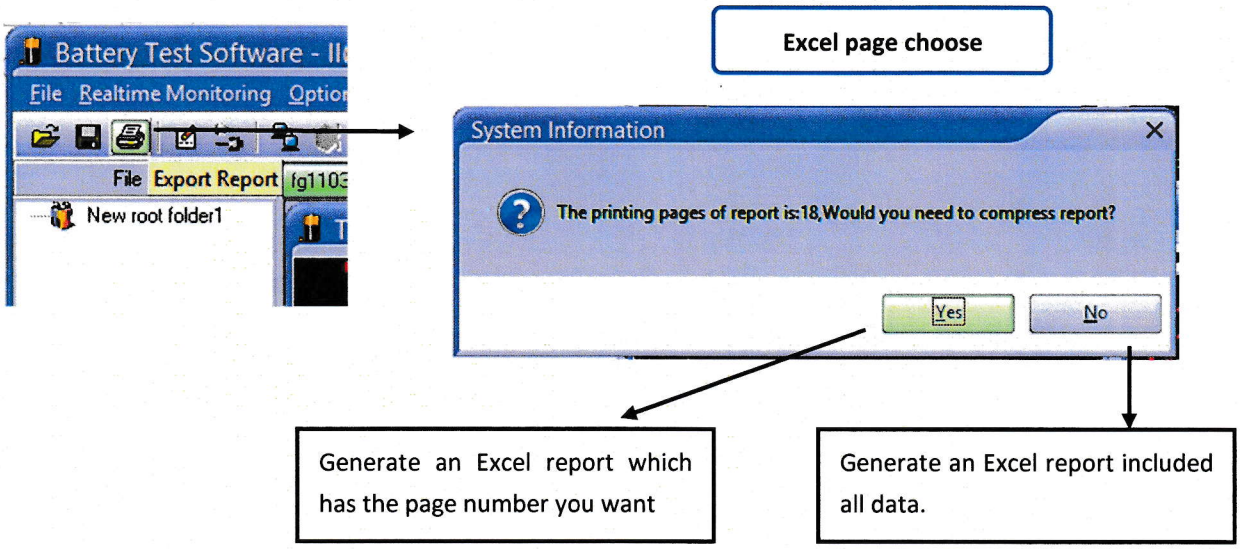
d) Data form: show the each discharge data by time-interval during the discharging

e) Cell voltage: each battery voltage can be displayed by bar chart, the bar chart can show you the initial and end voltages. Using the scroll bar on the top of this window, you can locate to any time in the testing to see the relevant result.

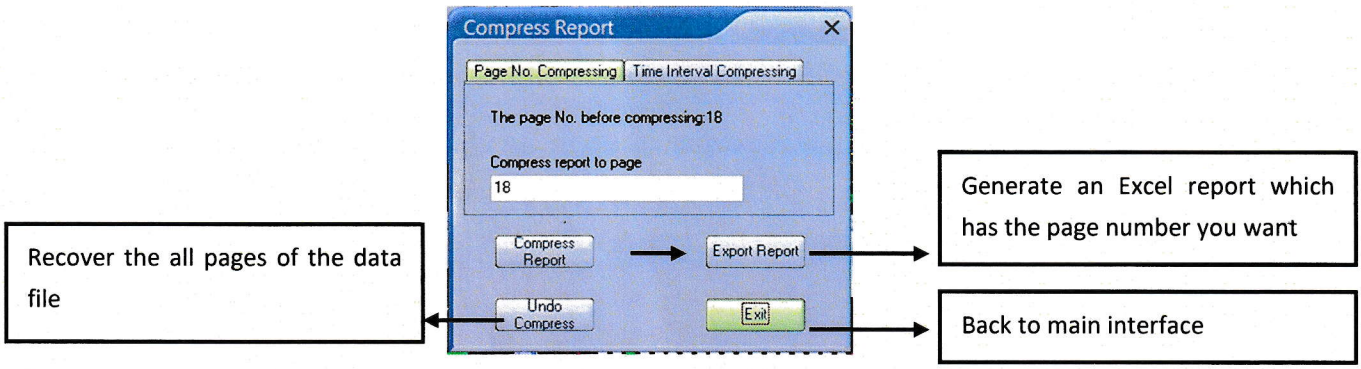
f) total voltage: the voltage curve of battery group in the discharging process

5.5 Generate Excel Test Report

5.5.1 Press  icon to generate a report, and in the "system information" window, it can show you the page number of report; choose "No" to generate Excel report which includes all information. If you don't need a report which have so many pages, press "Yes" to Generate a Excel report which has the page number you want



5.5.2 In the "compress report" interface, input the page number you want, and press "compress report" to decease the page number and press "Export Report" to save the Excel report.



6. Attentions

6.1 For the testing safety and efficiency, please read the manual before operation.

6.2 In the process of discharge, we advise that the operator can leave the testing spot.

6.3 Please check the type name to ensure the voltage range of application, using the wrong type of IDCE-CT would cause serious damage.

6.4 If the user requires the capacity estimation for each cell in the battery groups, wireless modules are essential accessories. Without them, PC analysis software can't provide the voltage dropping record to estimate the capacity.

6.5 If overheat, over current, equipment failure happen in the discharging, the warning alarm would activate automatically. Please turn off the DC input switch to avoid a further damage.

7. After-Sale Service

Fuguang Electronics provide free repair in defects liability period and technical consulting service for lifetime. If you have any technical problems or advices, please contact us:

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