BATTERY TESTING EQUIPMENT

A Division of Storage Battery Systems, LLC

SBS-200CT

BATTERY DISCHARGE CYCLER

USER MANUAL

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Contents

OPERATING INSTRUCTIONS

PC SOFTWARE INSTRUCTIONS

ATTENTION

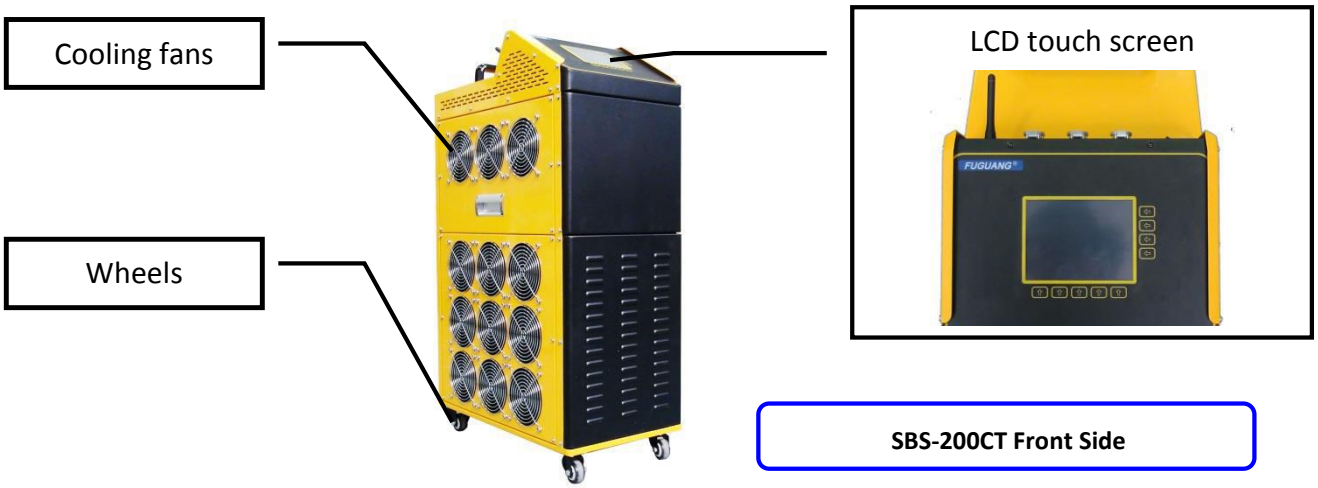
a) For testing safety and efficiency, please read the manual before operation.
b) If the user requires the capacity estimation for each cell in the battery groups, wireless modules are essential accessories. Without them, the PC analysis software can't provide the voltage records and estimate the capacity.
c) If overheating or over-current equipment failure occurs during a test, the warning alarm will activate automatically. Please turn off the AC power source to avoid further damage.

OPERATING INSTRUCTIONS

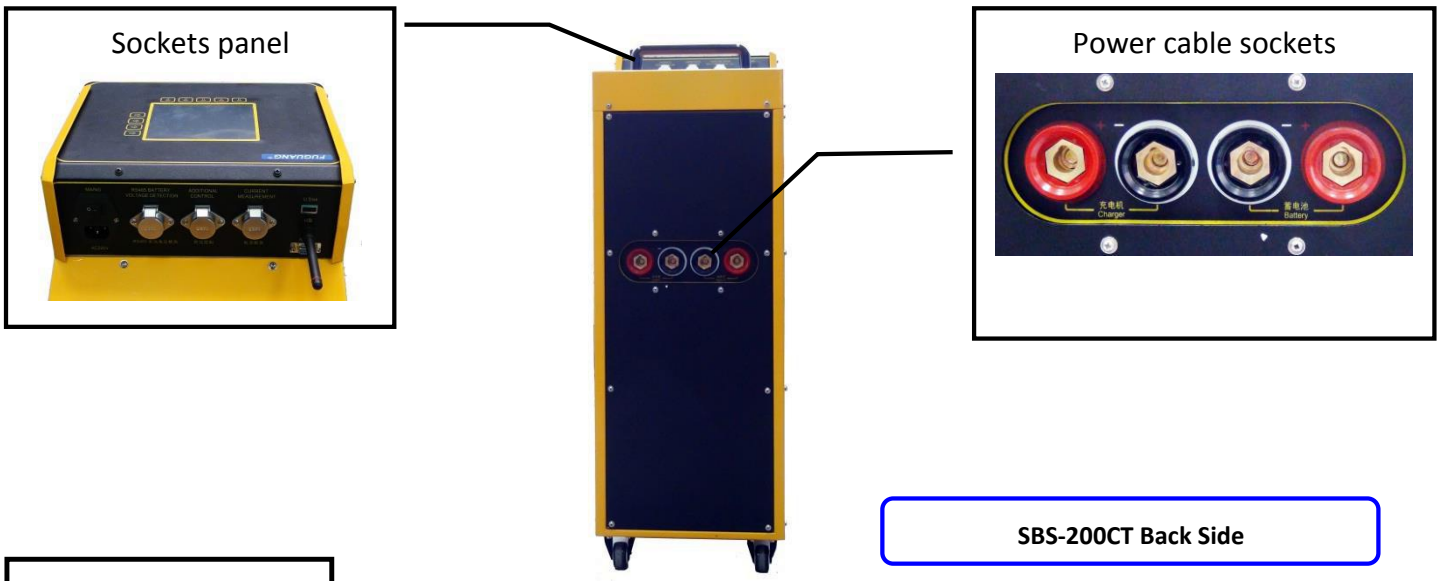
1. Environment

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

2. Main Tester Description



SBS-200CT Front Side



SBS-200CT Back Side

3. Wireless Module Description

SBS-200CT Socket Panel

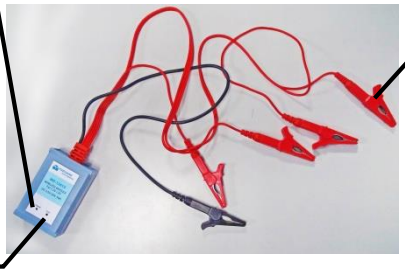
Power light (green)

Alligator clip
(4 yellow, 1 red, 1 black)

Communication light (red)

Wireless module for 2V/6V/12V

Power light (green)



Alligator clip
(4 red, 1 black)

Communicate light (red)

Wireless module for 1.2V/2V

4. Main Machine Connection

4.1 AC power source connection

SBS-200CT Socket Panel

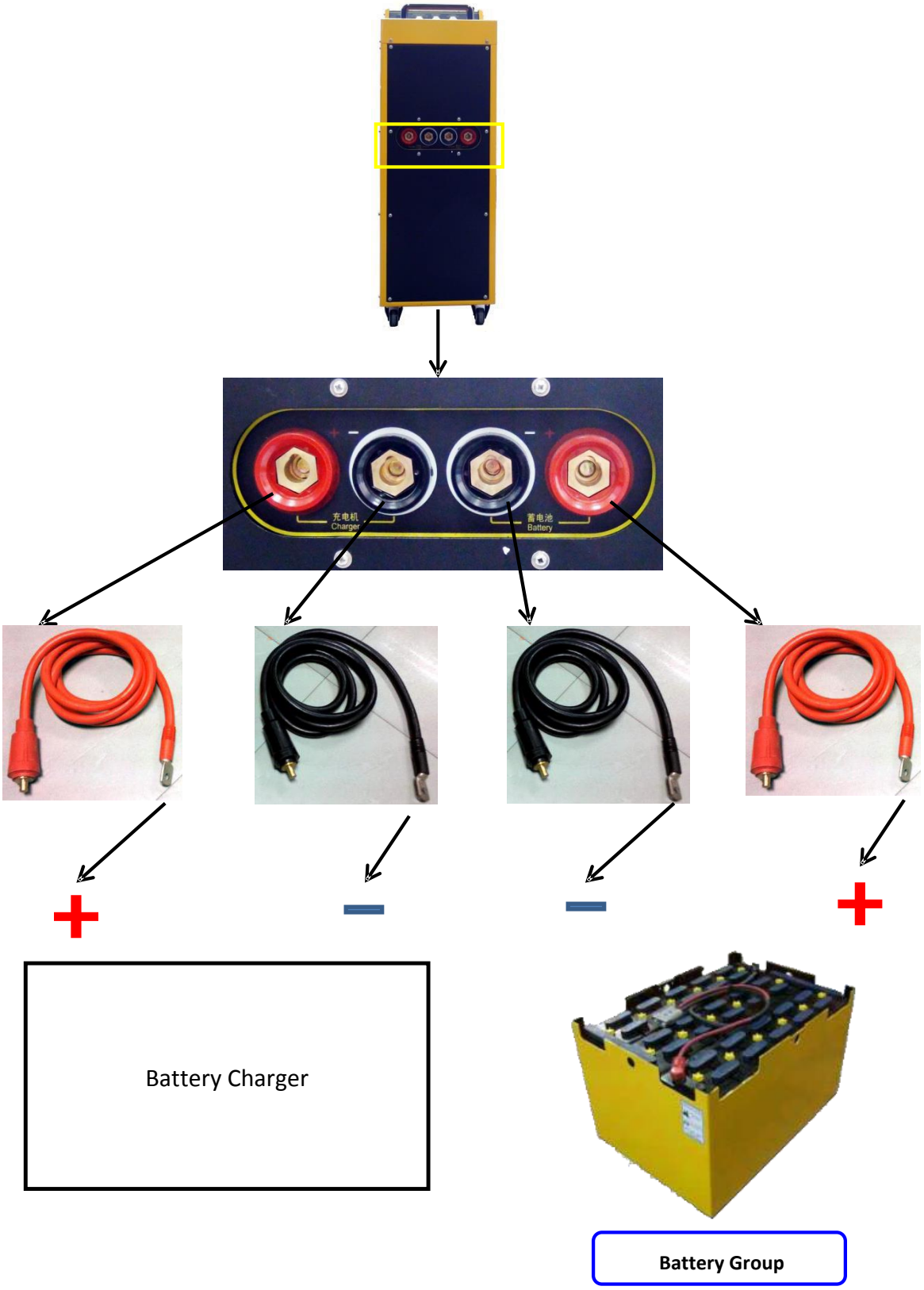
110V 60Hz Power Source
(Optional: 220V 50Hz)

Power supply cord

4.2 Power Cable Connection

Connect SBS-200CT with the battery group being tested and battery charger.

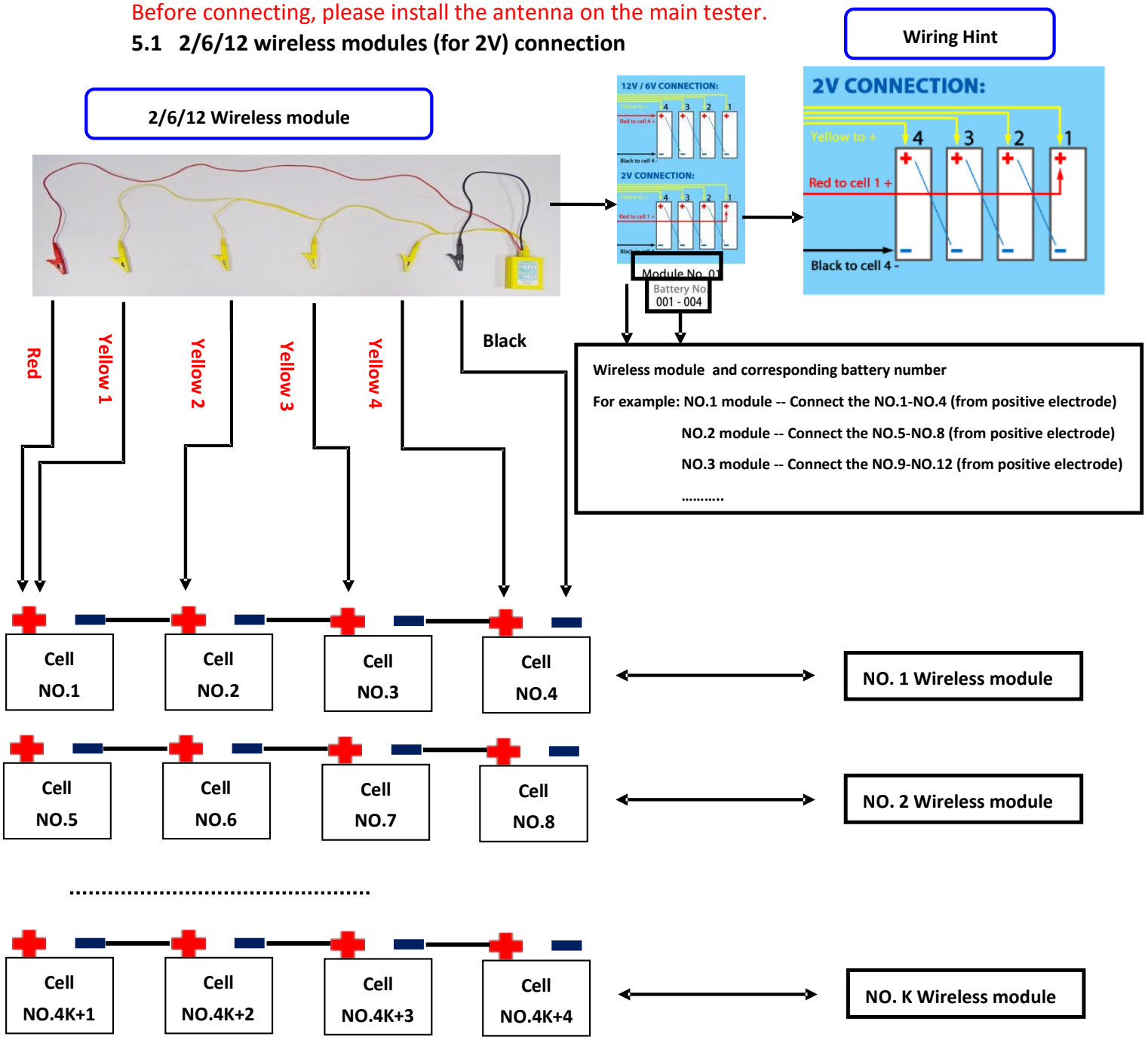
(Only connect to the battery group being tested if charger isn't being utilized)



5. Wireless Module Connection

Before connecting, please install the antenna on the main tester.

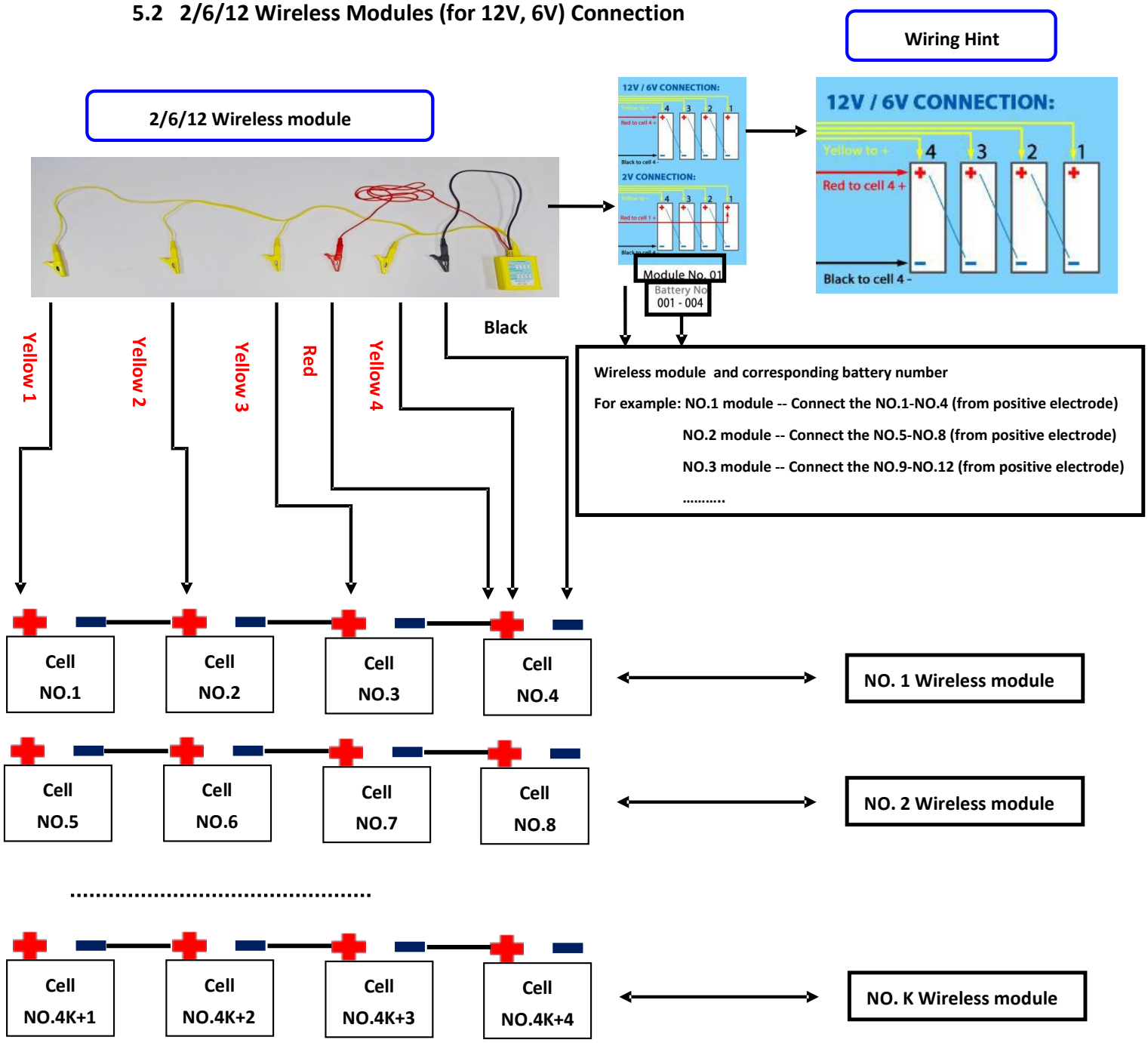
5.1 2/6/12 wireless modules (for 2V) connection



5.1.1 Please note the module number on the labeled modules and connect to the corresponding batteries. Do not connect the modules to 4 batteries/cells that are not in sequence, (EX: NO.1,3,8,9) - this will damage the modules.

5.1.2 Use the alligator clips (1 red, 1 black, 4 yellow) to connect the modules to the Batteries; please follow the right wiring rule “Yellow 1 to Yellow 4, from long to short”. A wiring diagram is available on the module’s label.

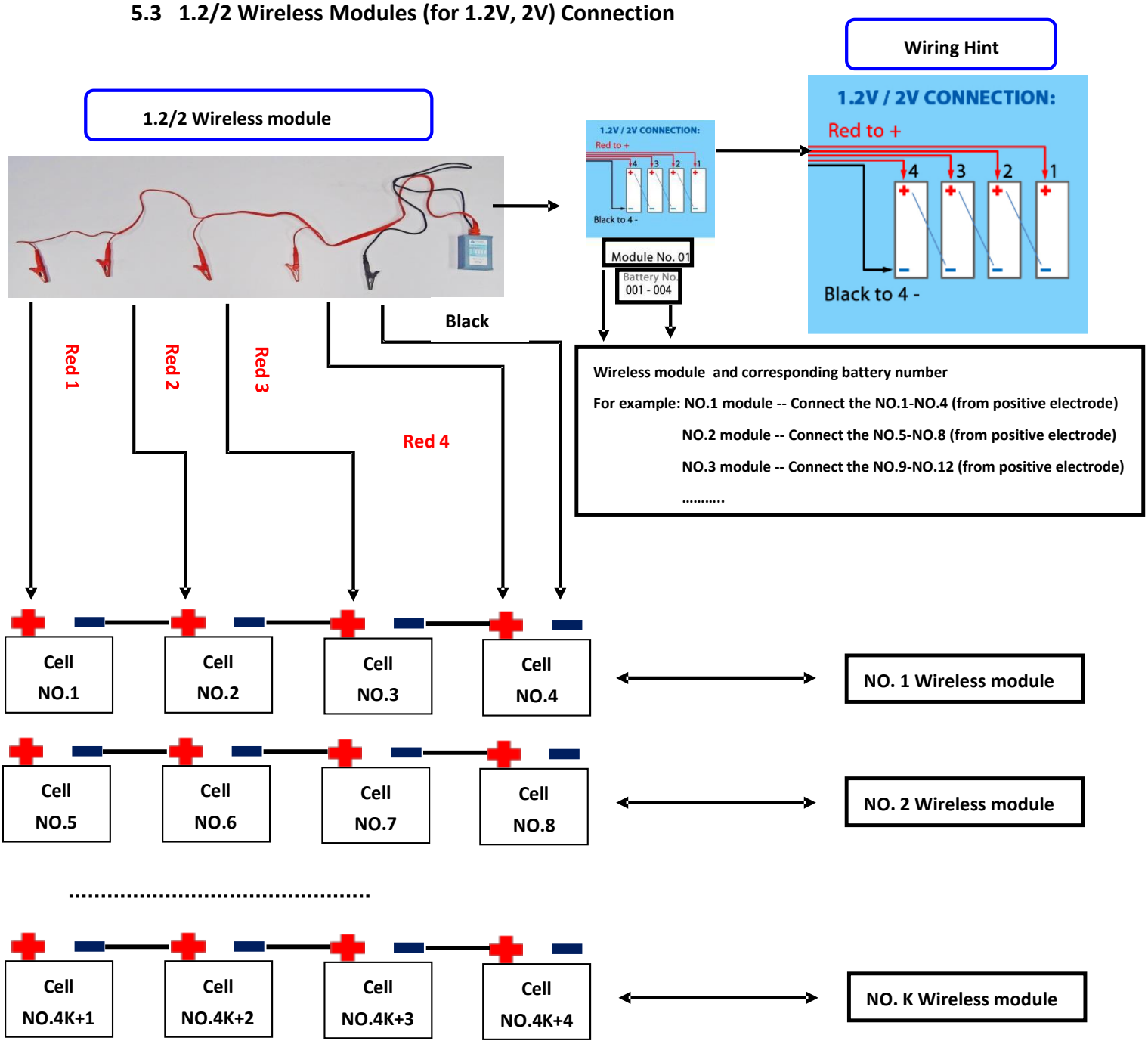
5.2 2/6/12 Wireless Modules (for 12V, 6V) Connection



5.2.1 Please note the module number on the labeled modules and connect to the corresponding batteries. Do not connect the modules to 4 batteries/cells that are not in sequence, (EX: NO.1,3,8,9) - this will damage the modules.

5.2.2 Use the alligator clips (1 red, 1 black, 4 yellow) to connect the modules to the batteries, please follow the right wiring rule “Yellow 1 to Yellow 4, from long to short”. A wiring diagram is available on the module’s label.

5.3 1.2/2 Wireless Modules (for 1.2V, 2V) Connection



5.3.1 Please note the module number on the labeled modules and connect to the corresponding batteries. Do not connect the modules to 4 batteries/cells that are not in sequence, (EX: NO.1,3,8,9) - this will damage the modules.

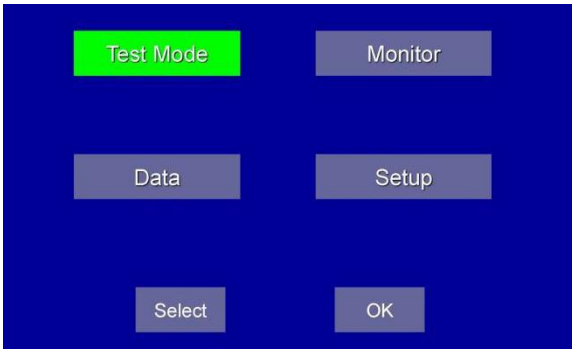
5.3.2 Use the alligator clips (1 red, 1 black, 4 yellow) to connect the modules to the batteries, please follow the right wiring rule “Yellow 1 to Yellow 4, from long to short”. A wiring diagram is available on the module’s label.

6. Starting Up And Input Operation

6.1 After the main tester is connected, turn on the power switch.

6.2 On the welcome screen, you can see our company name & logo and the tester name. Press any key to access the main menu, after 10 seconds, the system will automatically open the main menu.

6.3 SBS-200CT input: press on the touch screen directly



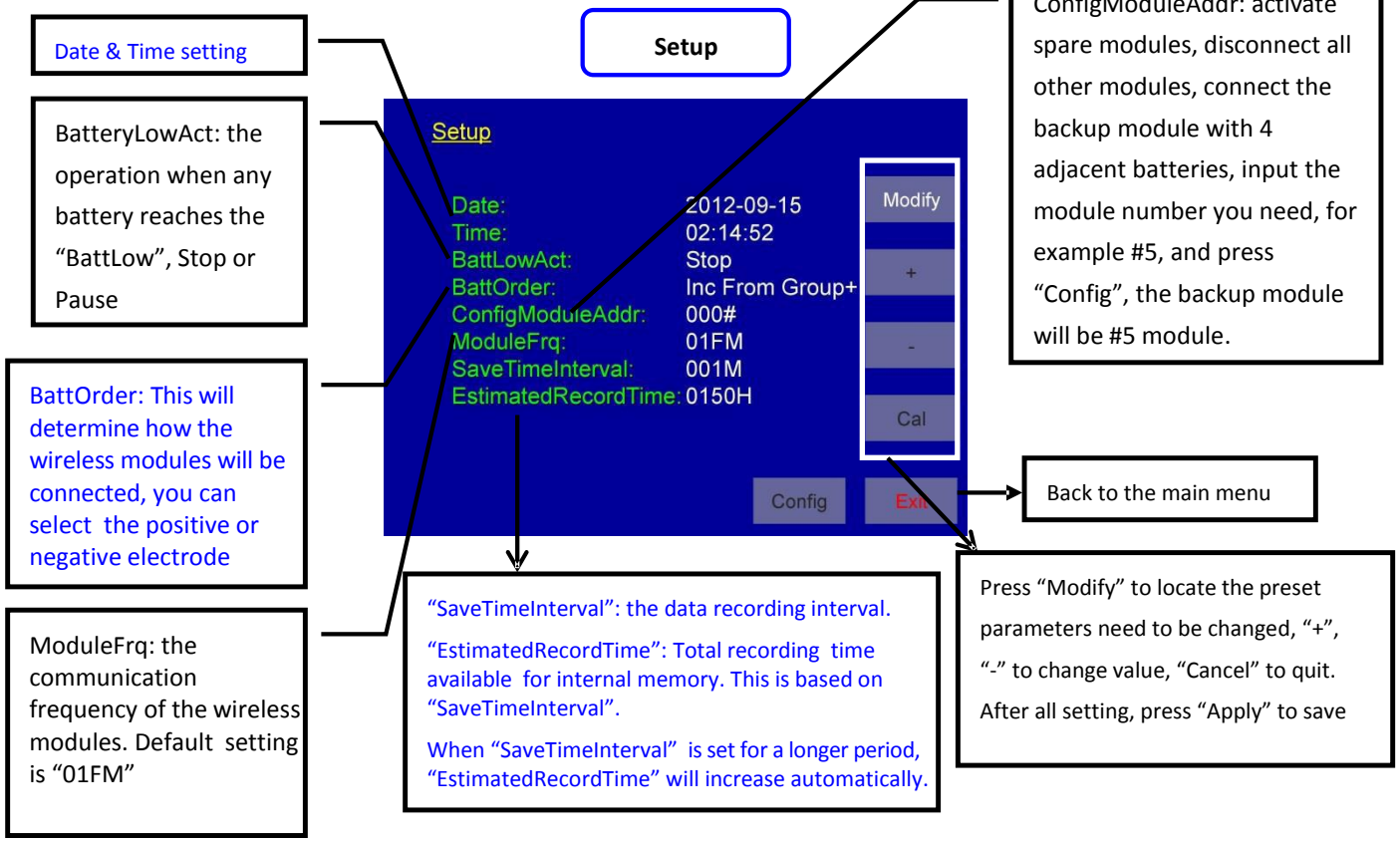
Main Menu

7. Important Settings Before Testing

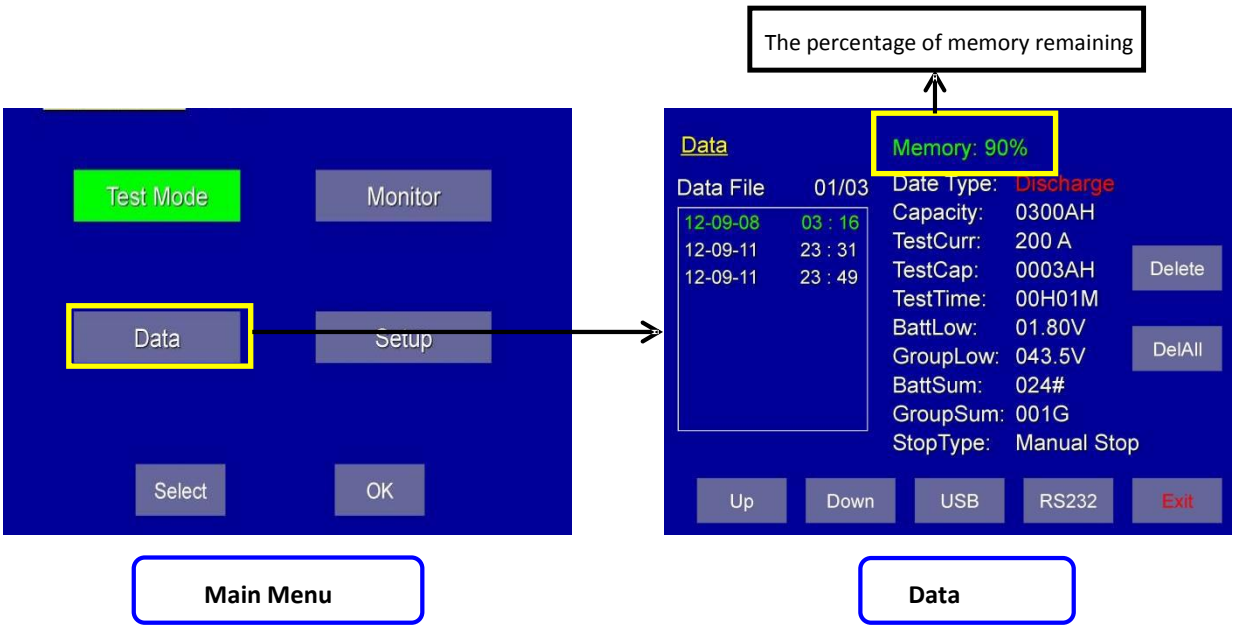
Please remember to check the settings before each test.

Other settings will be introduced in "12. Setup interface"

7.1 Press "Setup" on the main menu screen to enter Setup menu

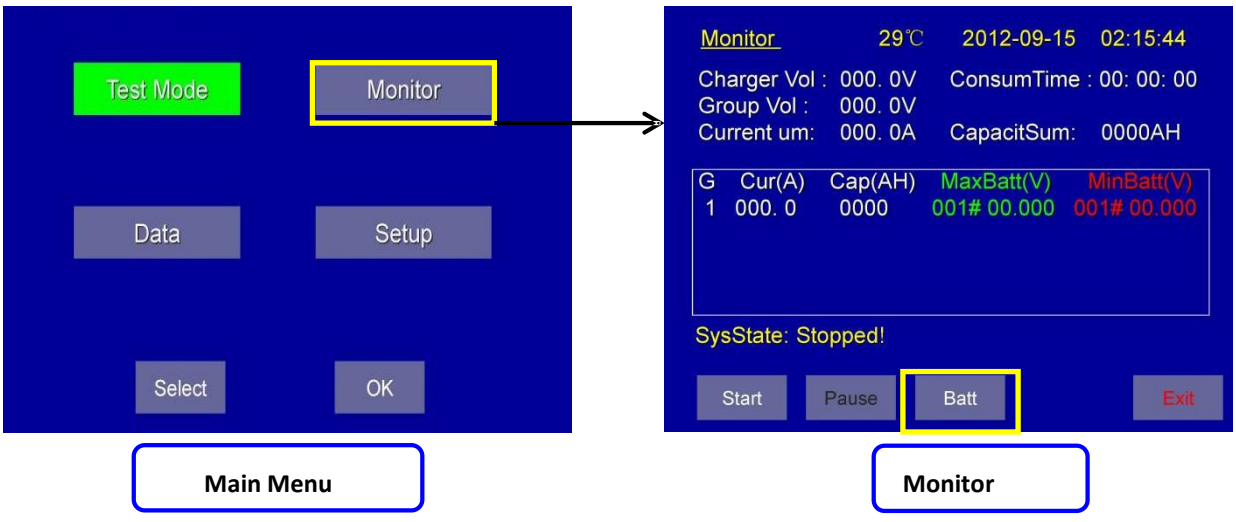


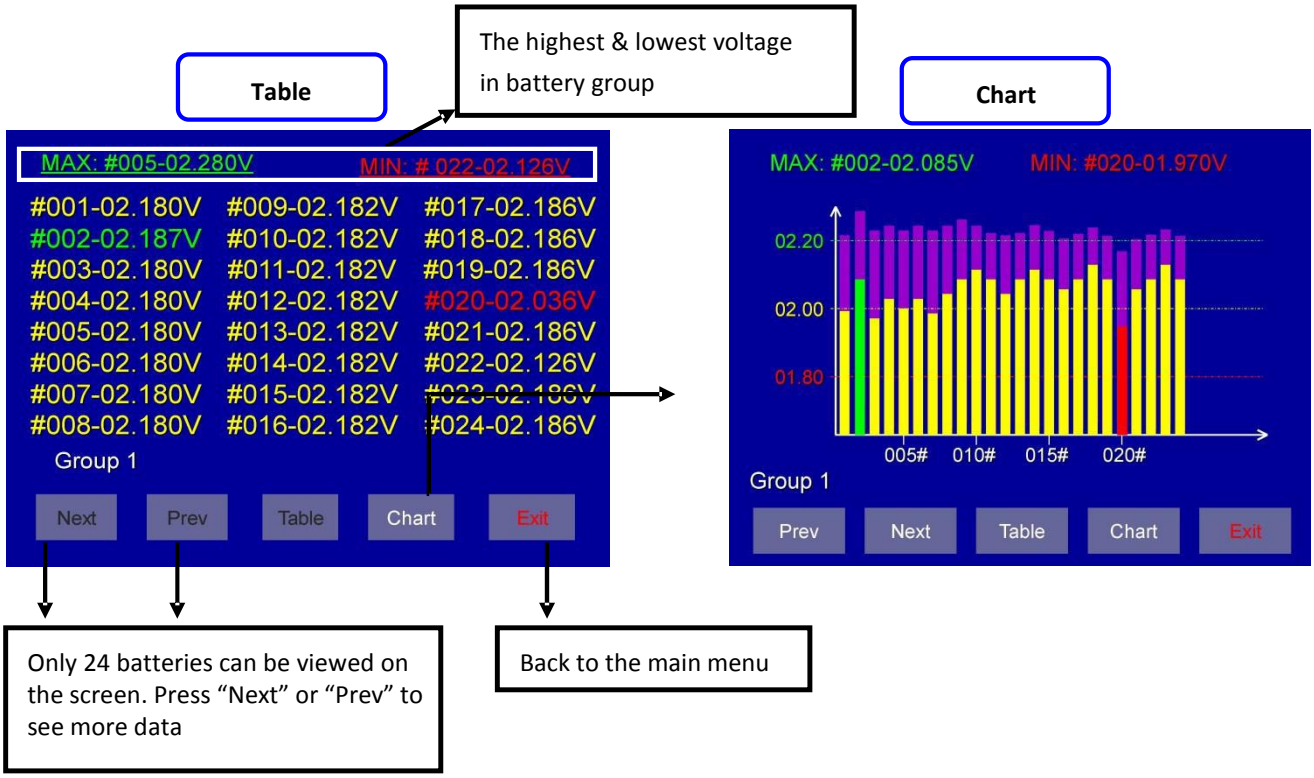
7.2 Set the date and time; this will be the Data File name of the recorded test data.
7.3 Set "BattOrder", the sequence of wireless modules connecting from the positive or negative electrode.
7.4 Set "SaveTimeInterval", the data recording interval. The shorter the recording interval the more memory the test will utilize; the longer the recording interval, the less internal memory will be used.
If the internal memory is totally empty, It can record:
150 hours for 1 min interval,
300 hours for 2 min interval,
600 hours for 3 min interval,
….
To check the unit's remaining memory, press "Data" in the Main Menu



8. View Individual Cell Voltages

8.1 Press "Monitor" in the main menu, then Press "Batt" to access individual cell monitoring. If all wireless modules are connected correctly, you can see the voltage of each battery. If the voltages of some batteries are not visible, please check the wireless modules connection.





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

8.3 In both table and chart screens, only 24 batteries can be viewed at one time; if the tested battery group has more than 24 batteries, press "Next" & "Prev" scroll to the rest

8.4 Press "Exit" go back to the main menu

9. Start Testing

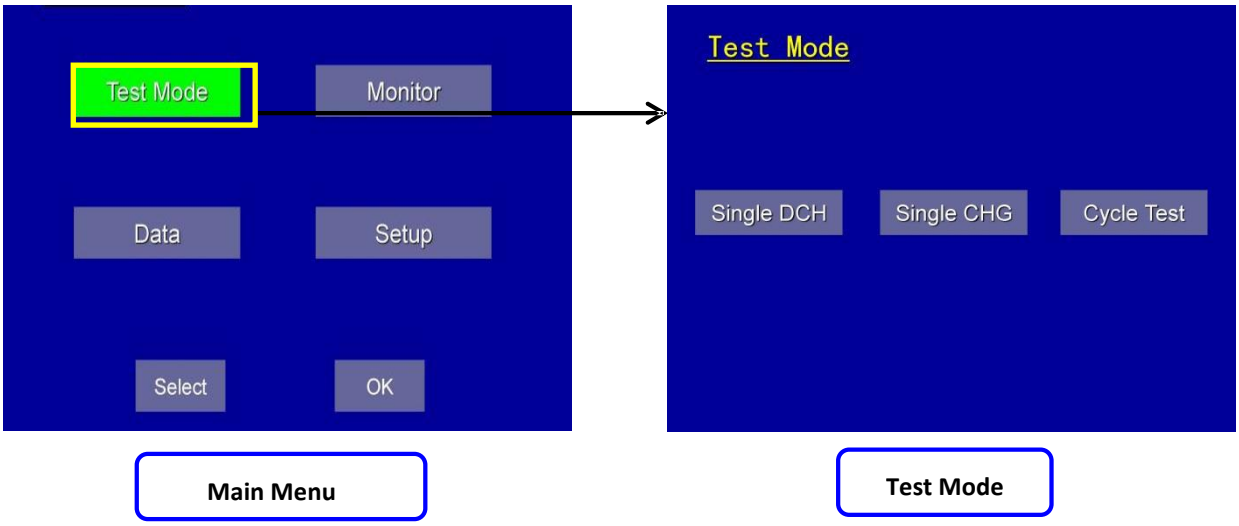
9.1 Test Mode Selecting

Press "Test Mode" in main menu to select the test mode.

"SingleDCH"----------Single discharge test

"SingleCHG"----------Single charge monitoring

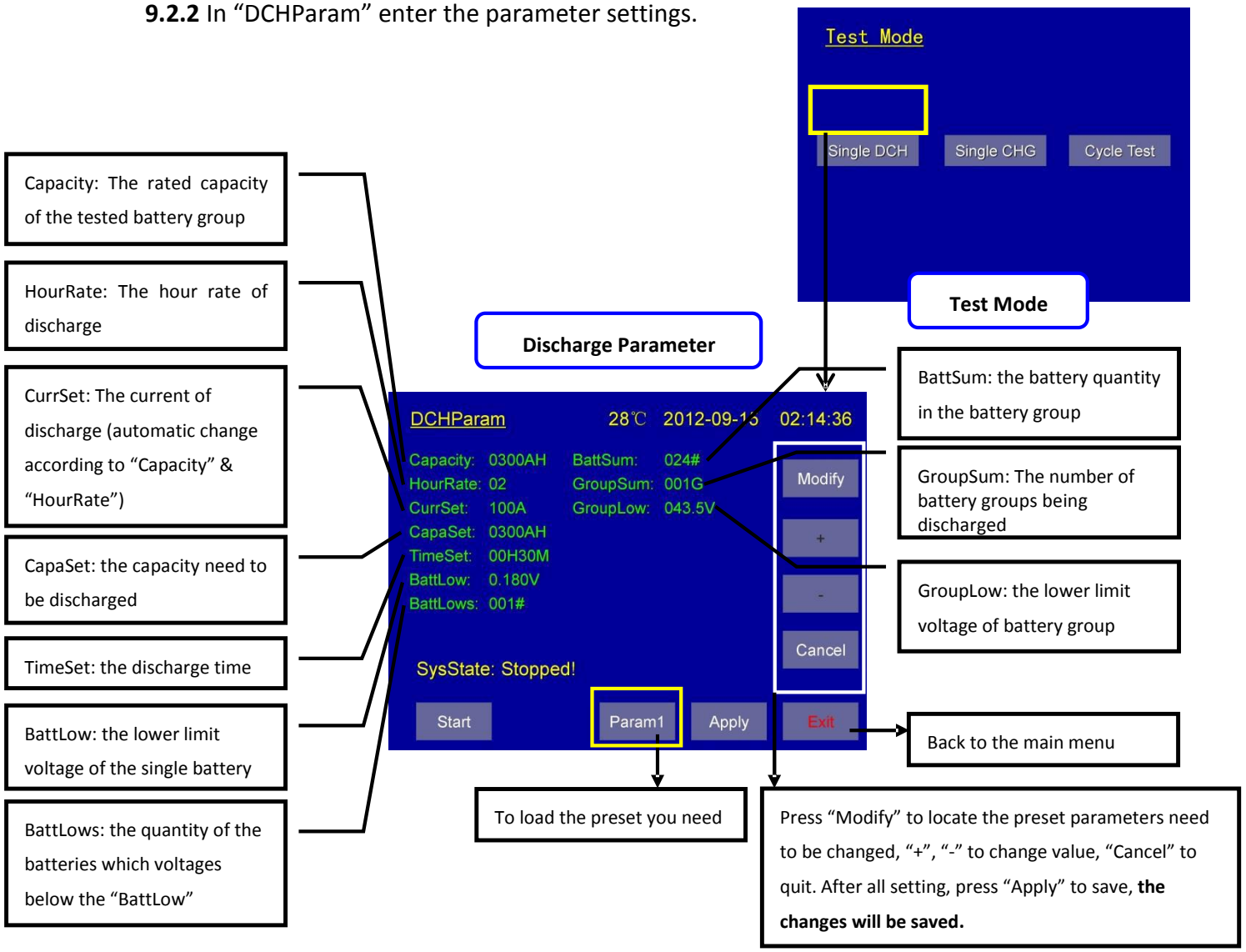
"CycleTest"----------Charge/discharge cycle test



9.2 Single Time Discharge Test

9.2.1 Press "SingleDCH" to enter single discharge test mode

9.2.2 In "DCHParam" enter the parameter settings.



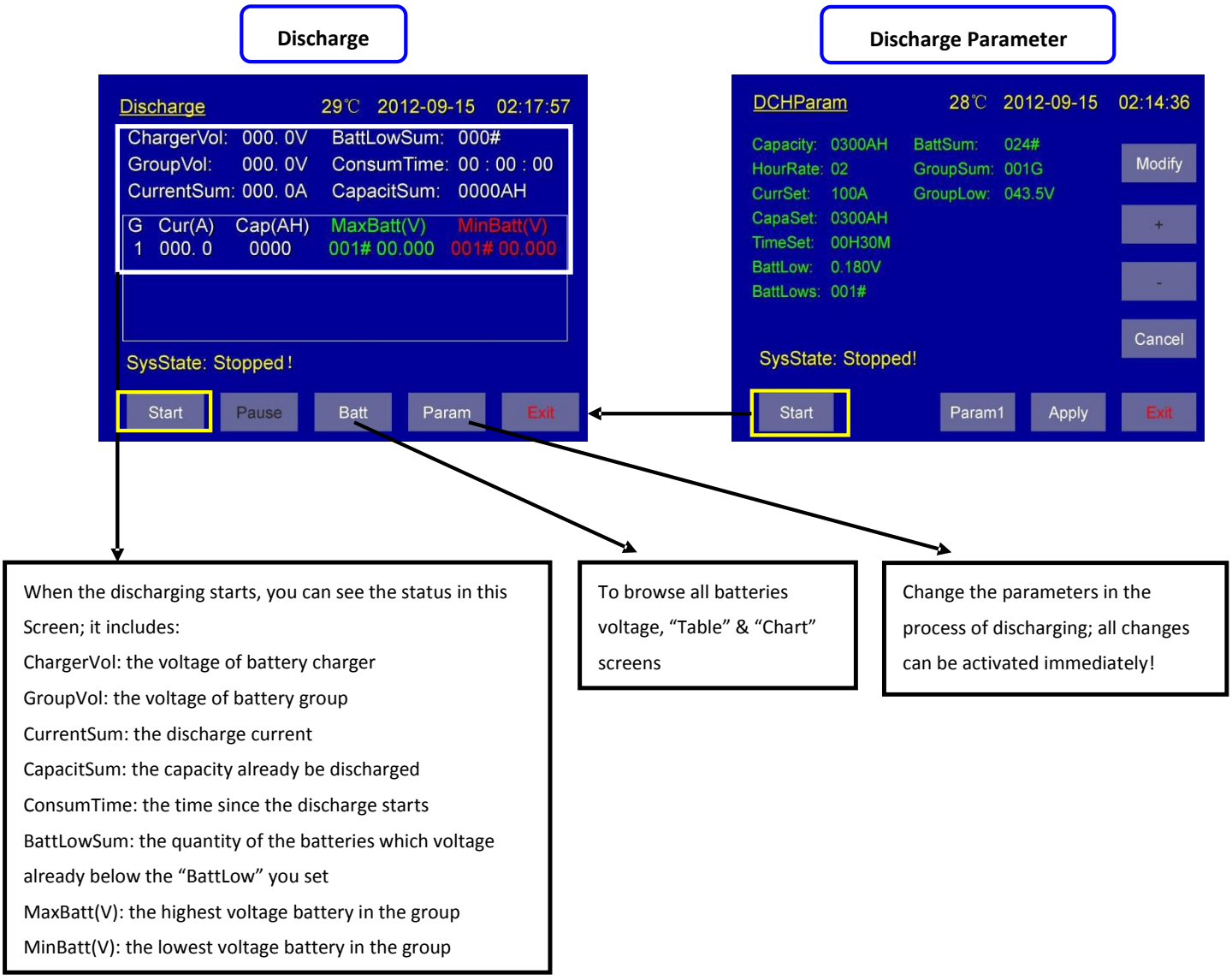
9.2.2.1 "CapaSet", "TimeSet", "BattLow", "GroupLow" are all discharging stop Conditions; if any of them are reached, the discharge will be stopped automatically

9.2.2.2 For 1 battery group being discharged, please keep "GroupSum" in "001G", if 2-4 groups will be parallel discharged simultaneously, they need 2-4 times the wireless modules and the current will be 1/2-1/4 for each group.

9.2.2.3 If you want discharging to stop when one battery reaches the "BattLow" parameter, keep "Battlows" at "001#". If you want the discharging to stop when X no. of batteries reaches the "BattLow", set the "BattLows" parameter to that number ("00X#").

9.2.2.4 If you don't need wireless modules in the discharge, please set the "BattSum" to "000#". "BattLow" will be disabled as a parameter.

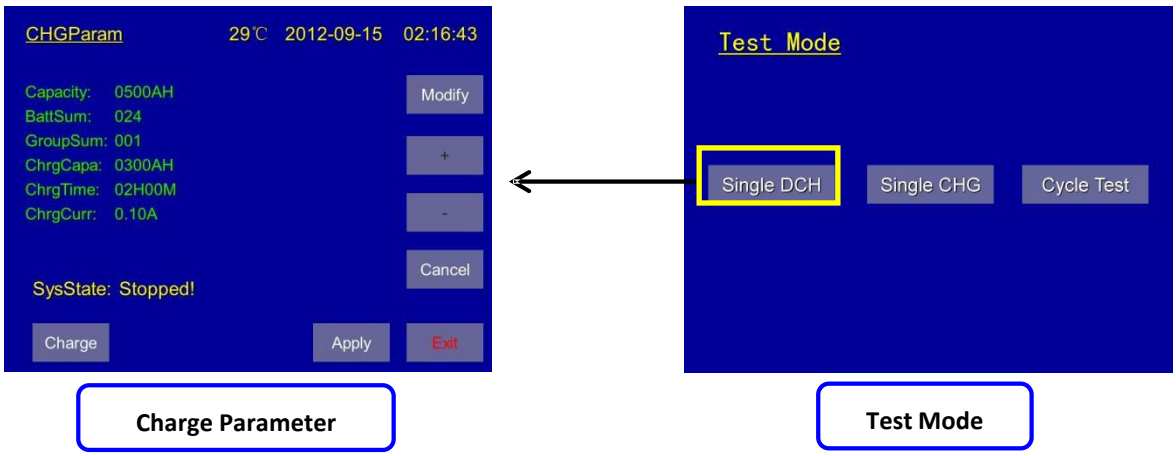
9.2.3 Press "Start" to enter discharge mode, then press "Start" again to start the discharge. You will hear the sound of the internal breaker.



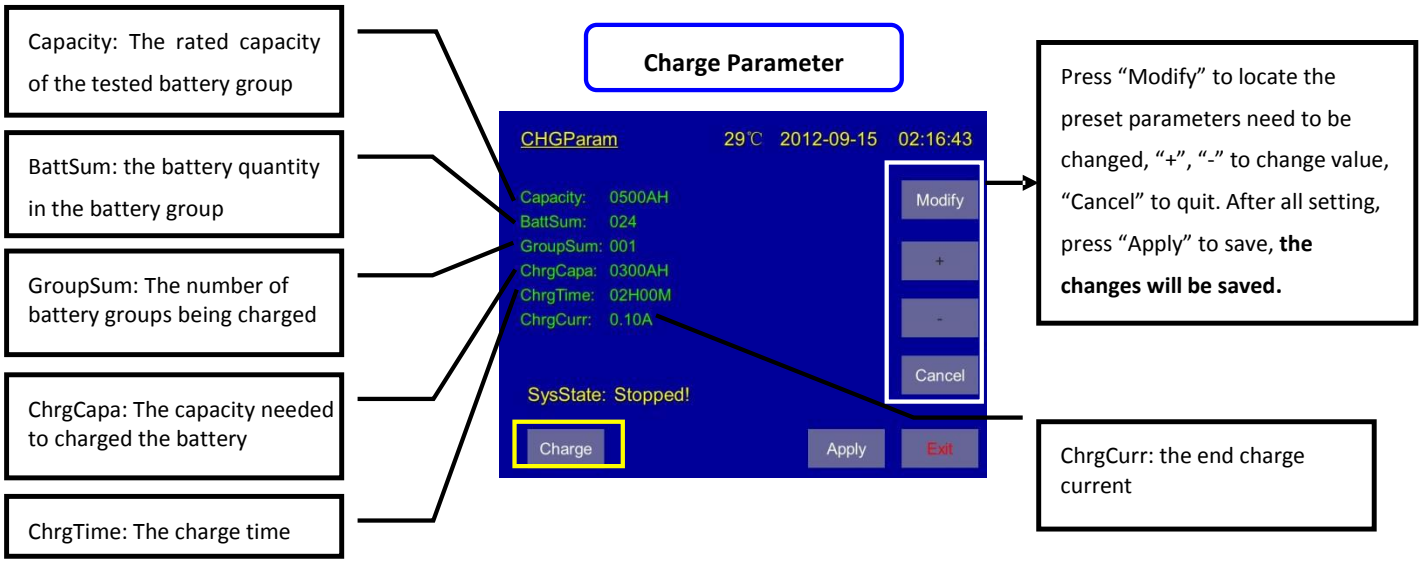
9.2.4 To manually stop the discharge: press "Pause" to pause the discharge, and press "Stop" to end the discharge or "Start" to continue the discharge.
9.2.5 Press "Param" to change the parameters during the discharging (if necessary), all changes can be activated immediately and the discharging will not be stopped.
9.2.6 "SysState:" in the discharge interface it will help you know the status of the discharge.

9.3 Single Charge Monitoring

9.3.1 Press “SingleCHG” to enter single charge monitoring mode.

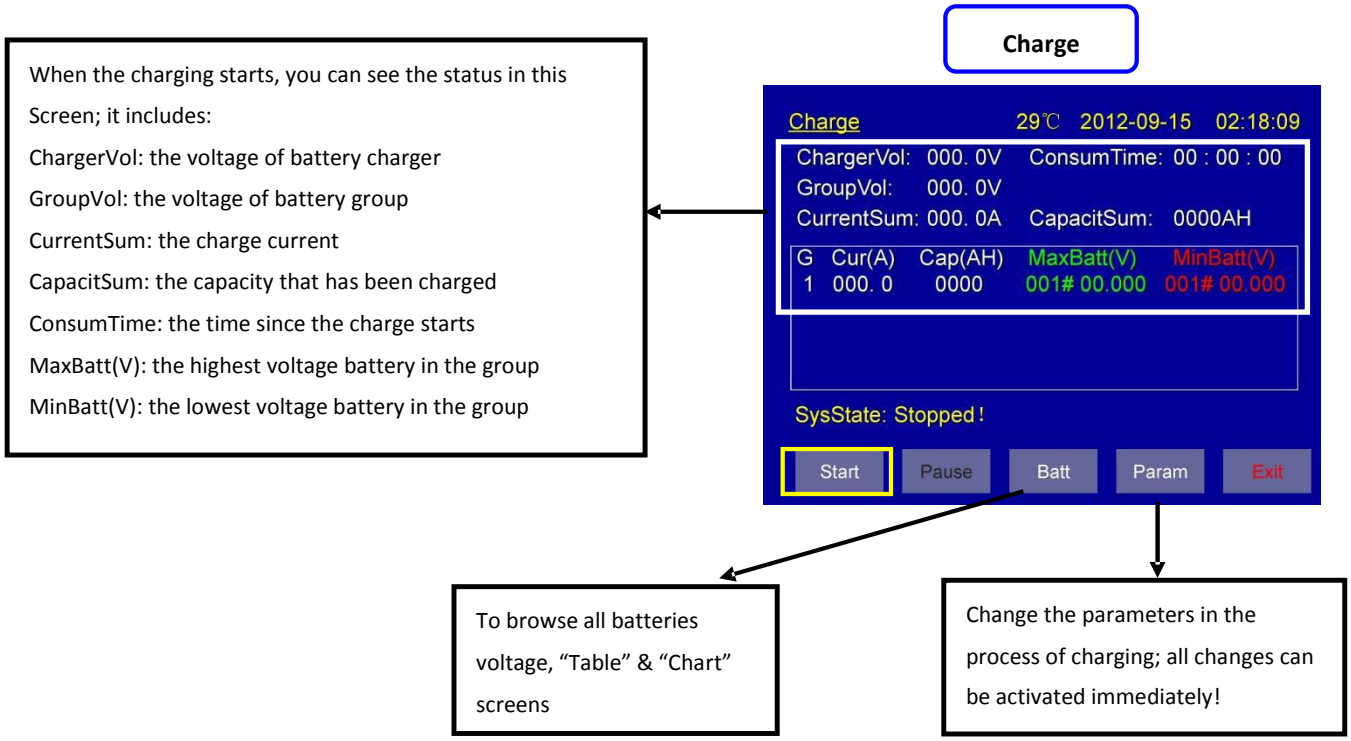


9.3.2 in “CHGParam” (Charge parameter interface), finish all parameters setting.



9.3.2.1 “ChrgCapa”, “ChrgTime”, “ChrgCurr” are all the charging stop conditions; if any of them are reached, SBS-200CT will cut the channel between battery group and battery charger automatically.

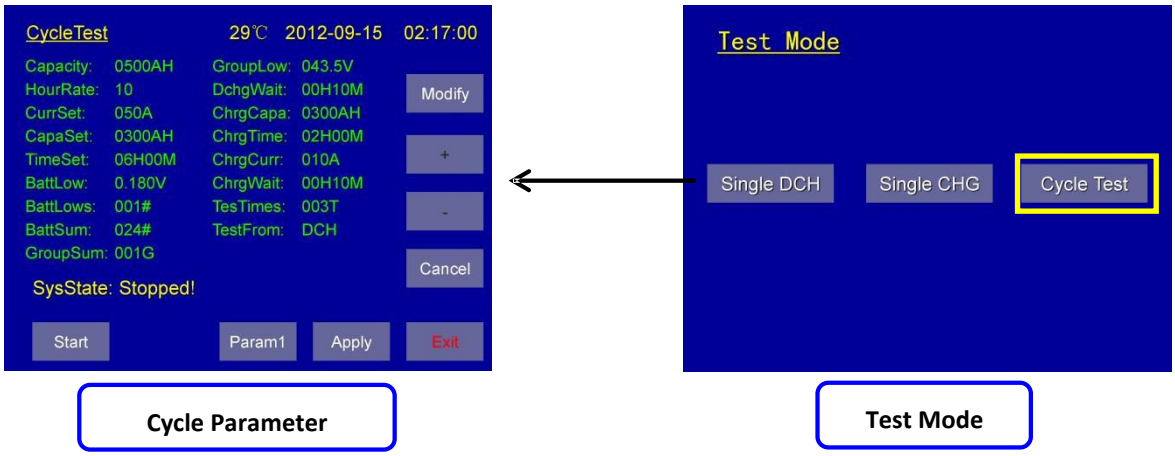
9.3.3 Press “Charge” into Charge interface, and Press “Start” again to start charge Monitoring. (You will hear the sound of internal breaker.) SBS-200CT will monitor the current and voltage from the battery charger.



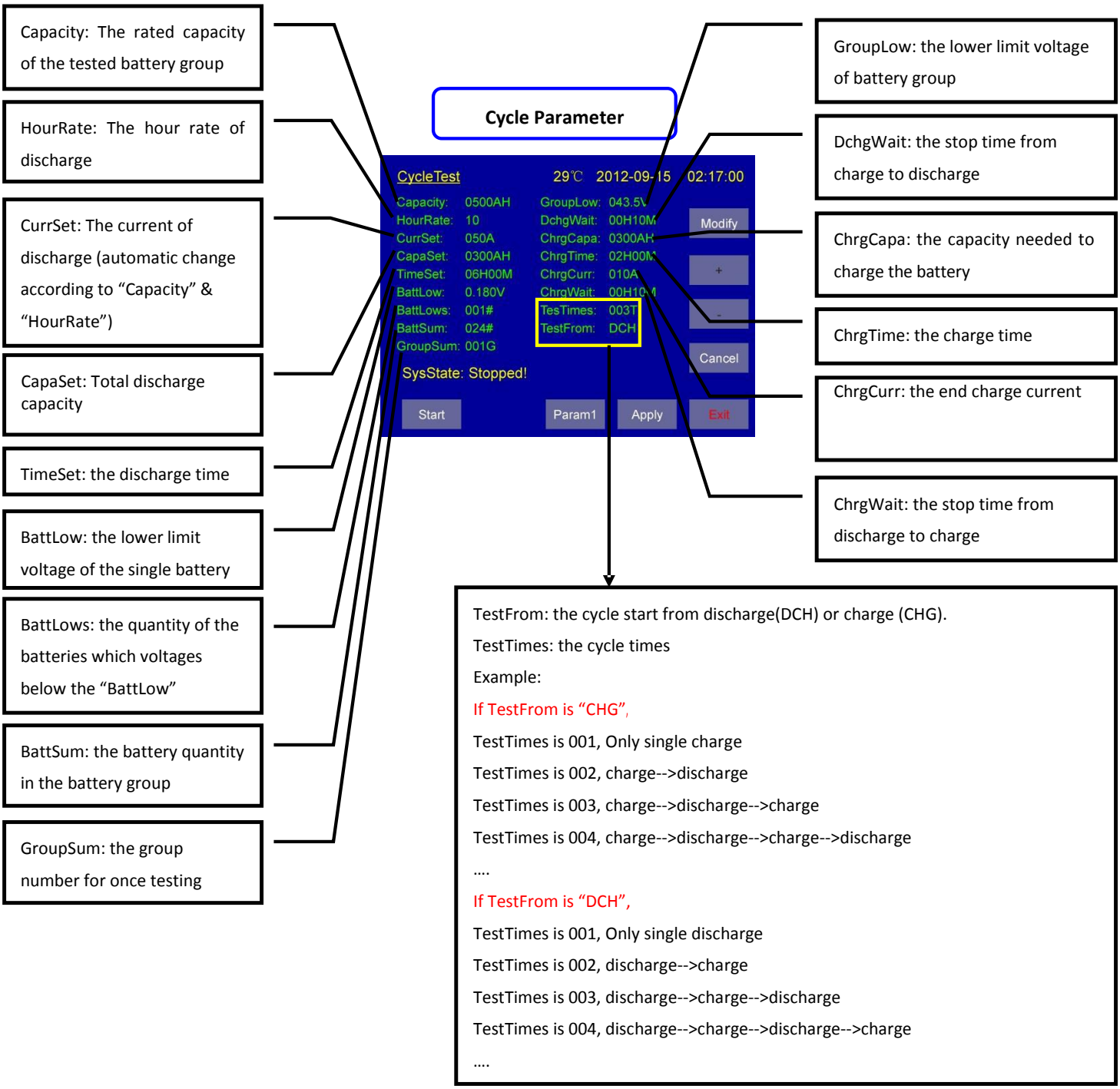
9.3.4 To manually stop the charge: press “Pause” to pause the charge, and press “Stop” to end the charge, or press “Start” to continue the charge.
9.3.5 Press “Param” to change the parameters during the charge (if necessary), all changes can be activated immediately and the charging will not be stopped.
9.3.6 “SysState:” in the charge interface it will help you know the status of the charging.

9.4 Charge/Discharge Cycle Test

9.4.1 Press “CycleTest” into charge/discharge cycle mode,



9.4.2 in “CycleTest” (cycle parameter interface); finish all parameter settings.



9.4.2.1 "CapaSet", "TimeSet", "BattLow", "GroupLow" are all the discharging stop conditions, if any of them are reached, the discharge will be stopped automatically

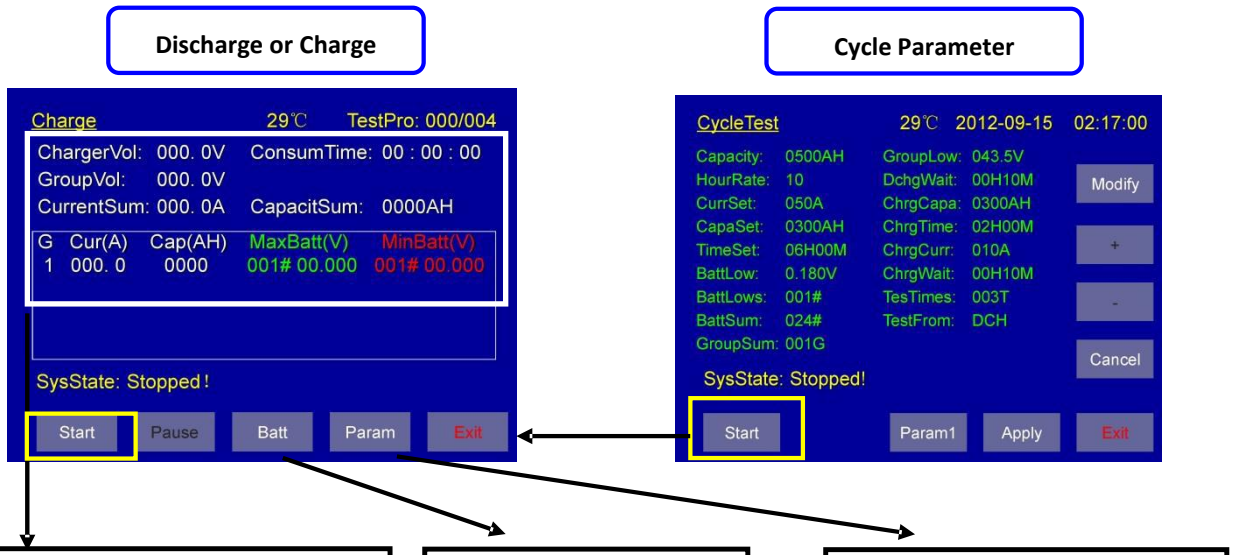
9.4.2.2 "ChrgCapa", "ChrgTime", "ChrgCurr" are all the charging stop conditions, any of them is reached, SBS-200CT will cut the channel between battery group and battery charger automatically

9.4.2.3 For discharging 1 battery group, please keep "GroupSum" in "001G"; if 2-4 groups are parallel discharged at one time, you will need 2-4 times the wireless modules, and the current will be ½ - ¼ for each group.

9.4.2.4 To stop discharging when one battery reaches the "BattLow" parameter, keep "Battlows" at "001#". If you want the discharging to stop when X no. of batteries reaches the "BattLow", set the "BattLows" parameter to that number ("00X#").

9.4.2.5 If the wireless modules are not needed during the discharge, please set the "BattSum" to "000#". "BattLow" will be disabled as a parameter.

9.4.3 Press "Start" in the cycle menu,
If you set "TestFrom" to "DCH", the cycle will start from Discharge.
If you set "TestFrom" to "CHG", the cycle will start from Charge.
Press "Start" again to start discharge or charge (you will hear the sound of the internal breaker). SBS-200CT will start all discharge/charge cycles. When a stop condition is reached, it will go to the next step automatically.



In discharge interface:

ChargerVol: the voltage of battery charger

GroupVol: the voltage of battery group

CurrentSum: the discharge current

CapacitSum: the capacity already be discharged

ConsumTime: the time since the discharge starts

BattLowSum: the quantity of the batteries which voltage already below the "BattLow" you set

MaxBatt(V): the highest voltage battery in the group

MinBatt(V): the lowest voltage battery in the group

In charge interface:

ChargerVol: the voltage of battery charger

GroupVol: the voltage of battery group

CurrentSum: the charge current

CapacitSum: the capacity already be charged

ConsumTime: the time since the charge starts

MaxBatt(V): the highest voltage battery in the group

MinBatt(V): the lowest voltage battery in the group

To browse all batteries' voltage, "Table" & "Chart" screens

Change the parameters in the process of discharging or charging; all changes can be activated

9.4.4 Manually stop the cycle: press "Pause" to pause the cycle, and press "Stop" to end the cycle, or press "Start" to continue the cycle.

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

9.4.6 "SysState" in the discharge or charge interface it will help you know the status of the discharge or charge.

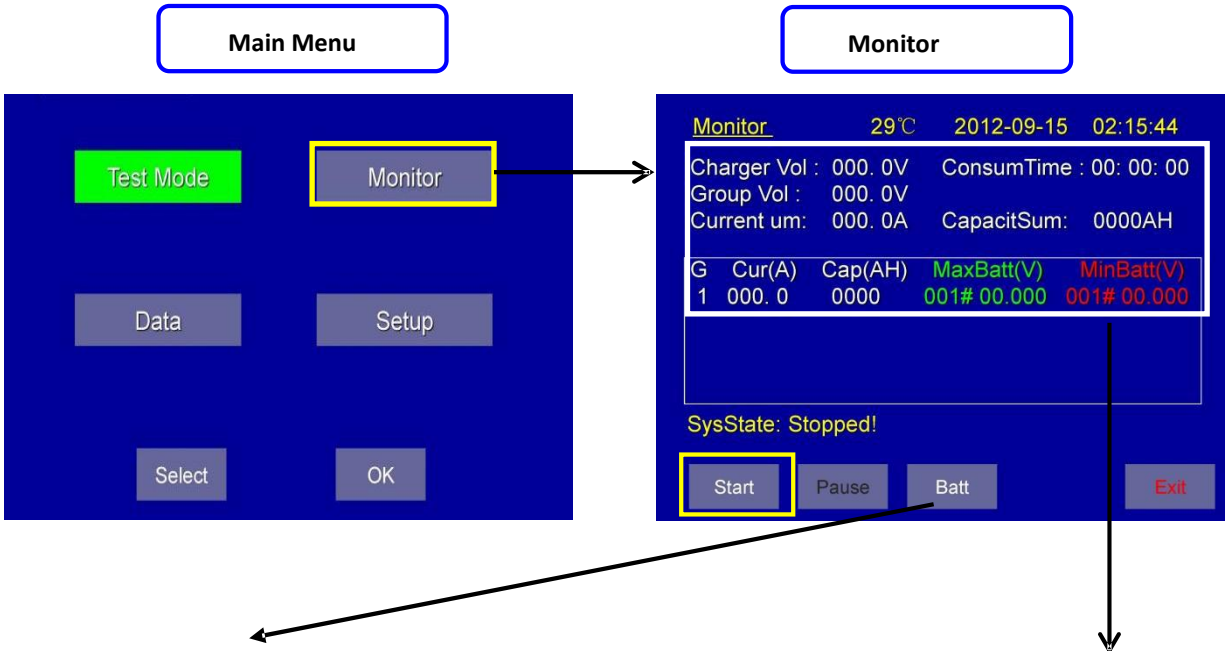
9.4.7 "TestPro" will show you the recent step and the step number of the whole cycle.

10. Monitor Function

The SBS-200CT provides an interface for monitoring the batteries freely. It can monitor and record all cell voltages during discharge, charge or floating charge. For this function, the SBS-200CT only needs to connect with an AC power source with the wireless modules connected to each cell.

10.1 Press “Monitor” in the main menu into “Monitor” menu.

10.2 Press “Start” to start monitoring.



To browse all batteries voltage, “Table” & “Chart” screens

When the monitoring starts, you can see the status in this screen, it includes:

ChargerVol: the voltage of battery charger

GroupVol: the voltage of battery group

CurrentSum*: the discharge or charge current

CapacitSum*: the capacity already be charged or discharged

ConsumTime: the time since the charge starts

MaxBatt(V): the highest voltage battery in the group

MinBatt(V): the lowest voltage battery in the group

Note: external current clamp needed for parameters with *.

10.3 To manually stop monitoring: press “Pause” to pause the monitoring, and press “Stop” to end the monitoring, or press “Start” to continue the monitoring.

10.4 “SysState” in the monitoring interface it will help you know the status of the monitoring.

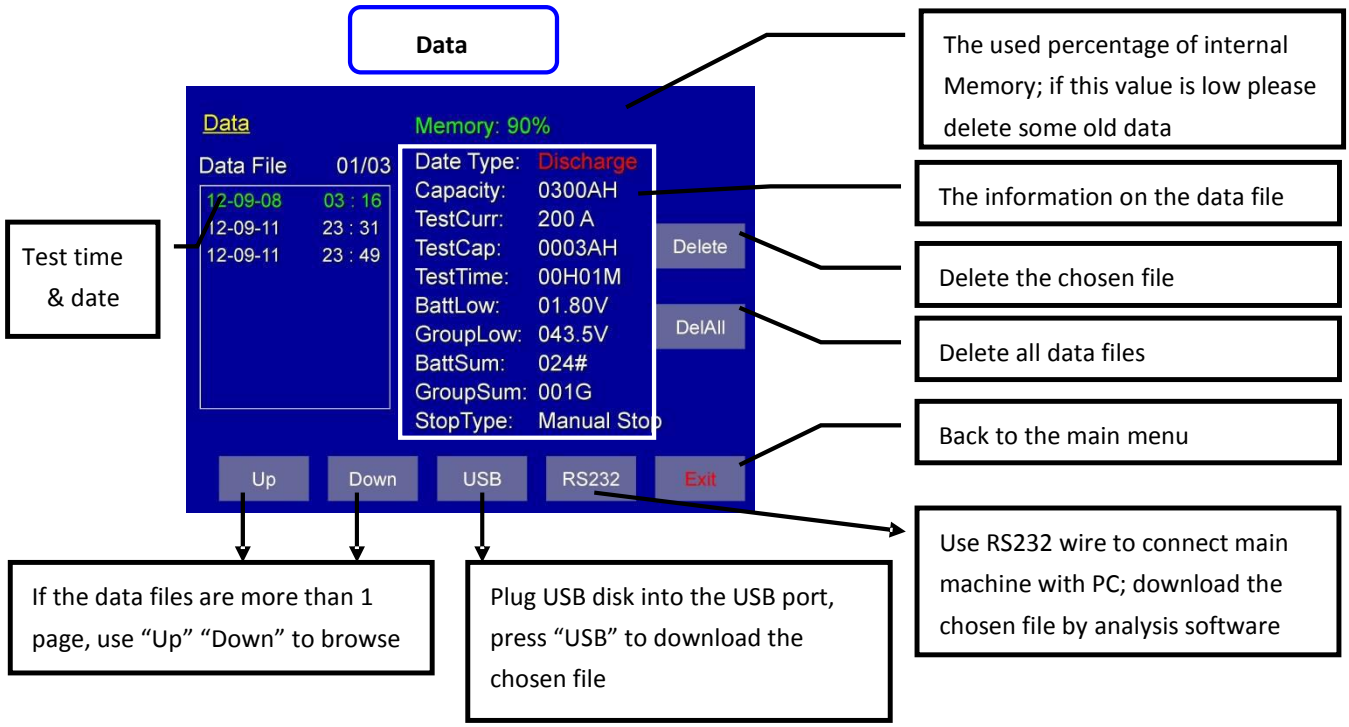
11. Download The Data To PC

SBS-200CT provides two ways to record the test data:

a) Use the RS232 cable to connect to the main unit with a PC or laptop. The analysis software will display data in real time on the PC which can be downloaded during the test.

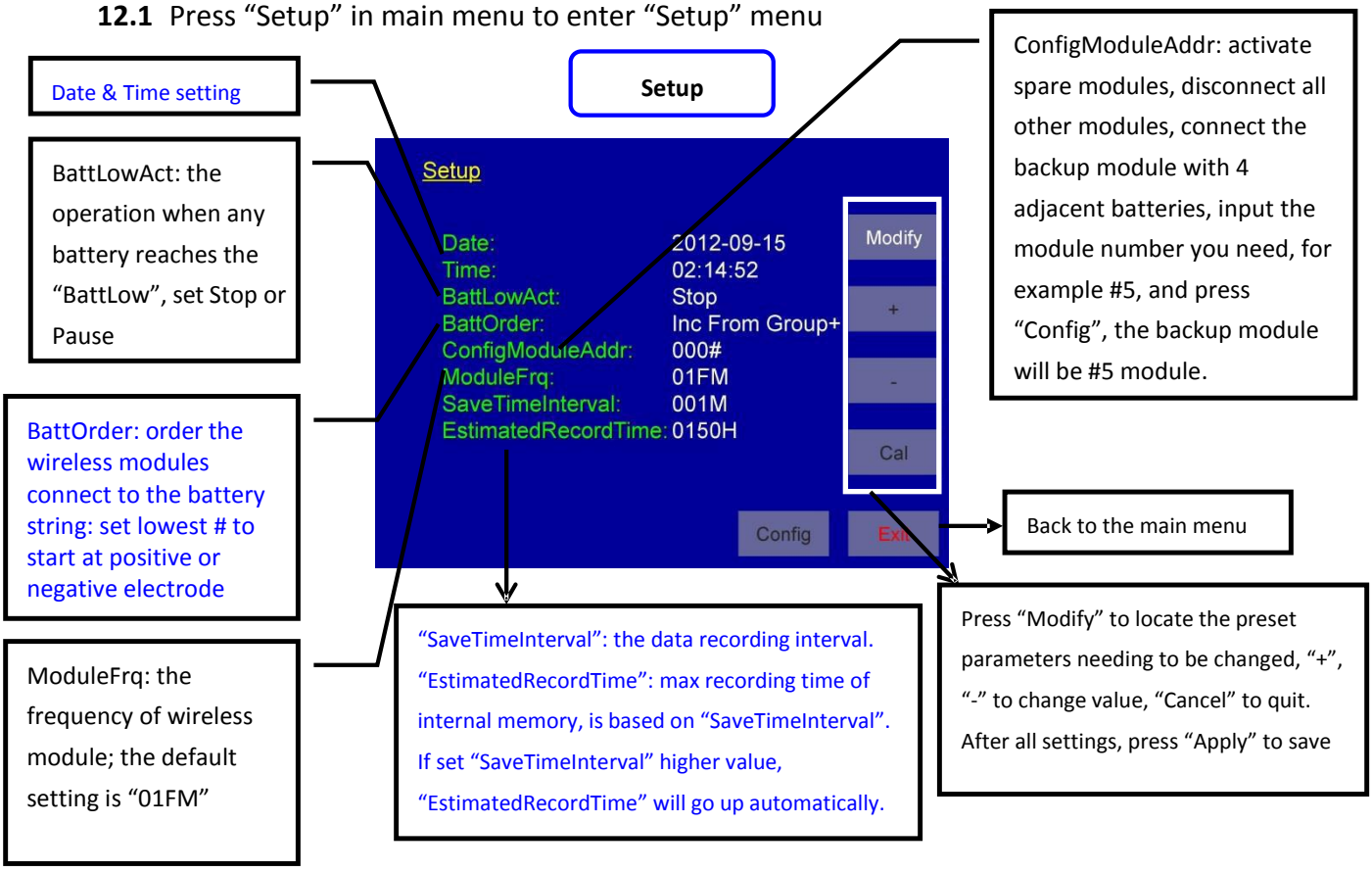
b) The internal memory saves all of the testing data. You can download the data via USB disk or RS232 cable to a PC or laptop.

11.1 Press "Data" in the main menu to access the "Data" menu



12. Setup Interface

12.1 Press "Setup" in main menu to enter "Setup" menu



In "**7. Some Important Settings Before Testing**" we already introduced some parameters in the "Setup" menu. Please read below for more settings.

12.2 BatteryLowAct: the operation when any battery reaches the "BattLow", set Stop or Pause. (Usually, "Stop" is recommended.)

12.3 ModuleFrq: the frequency of wireless module. All wireless modules provided are set at the default frequency of "01FM".

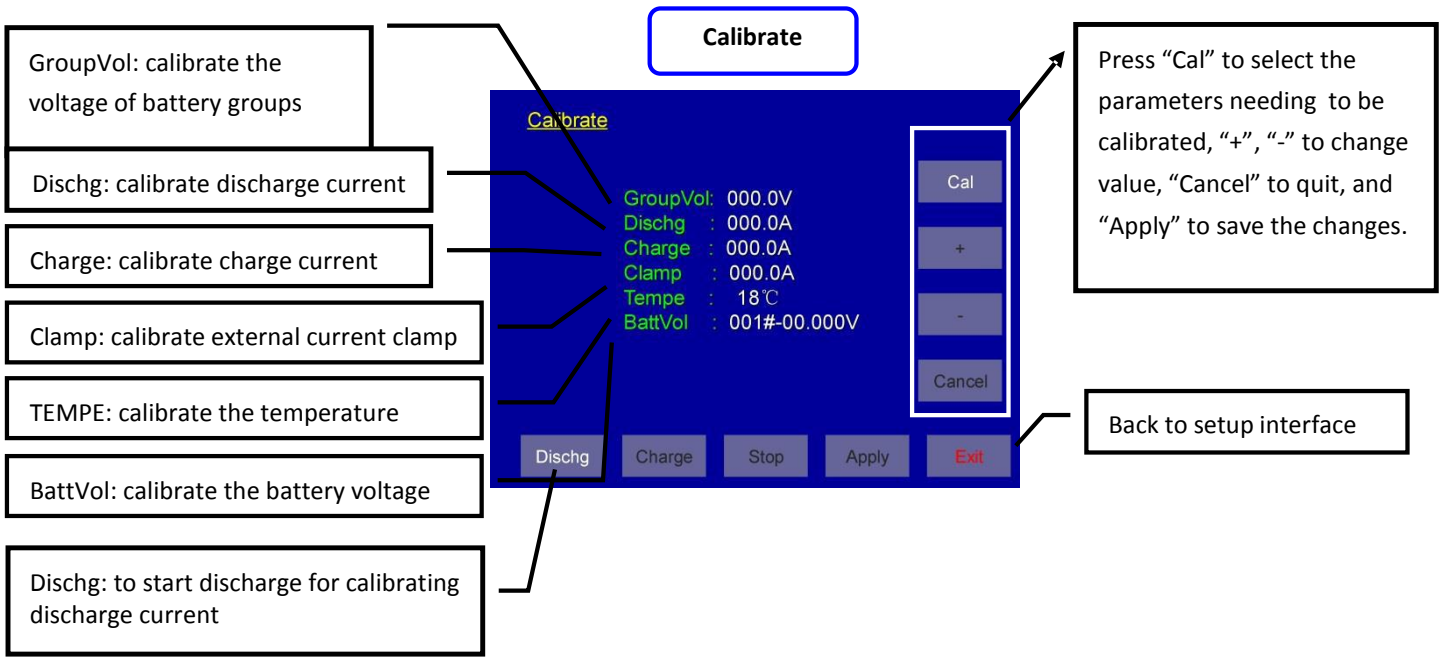
If you need 2-3 units of the SBS-200CT working in the same area at the same time, the wireless modules may need to be set to different frequencices to avoid interference.

For example:
Set the first set of modules to "01FM", and work with wireless modules in "FM1" (Currently shown on label of the modules)
The second set, set to "02FM", and work with wireless modules in "FM2"
The third set, set to "03FM", and work with wireless modules in "FM3"

12.4 ConfigModuleAddr: To activate spare modules, disconnect all other modules, connect the backup module with 4 adjacent batteries, input the module number you need, (for example #5), then press "Config"; the backup module will now be the #5 module.

13. Calibration Interface

The SBS-200CT provides a calibration function; if you have high accuracy instruments, you can calibrate the tester. Change the date to 2099-12 (year-month), and the "Cal" button will be activated. Press "Cal" to enter the "Calibrate" menu.



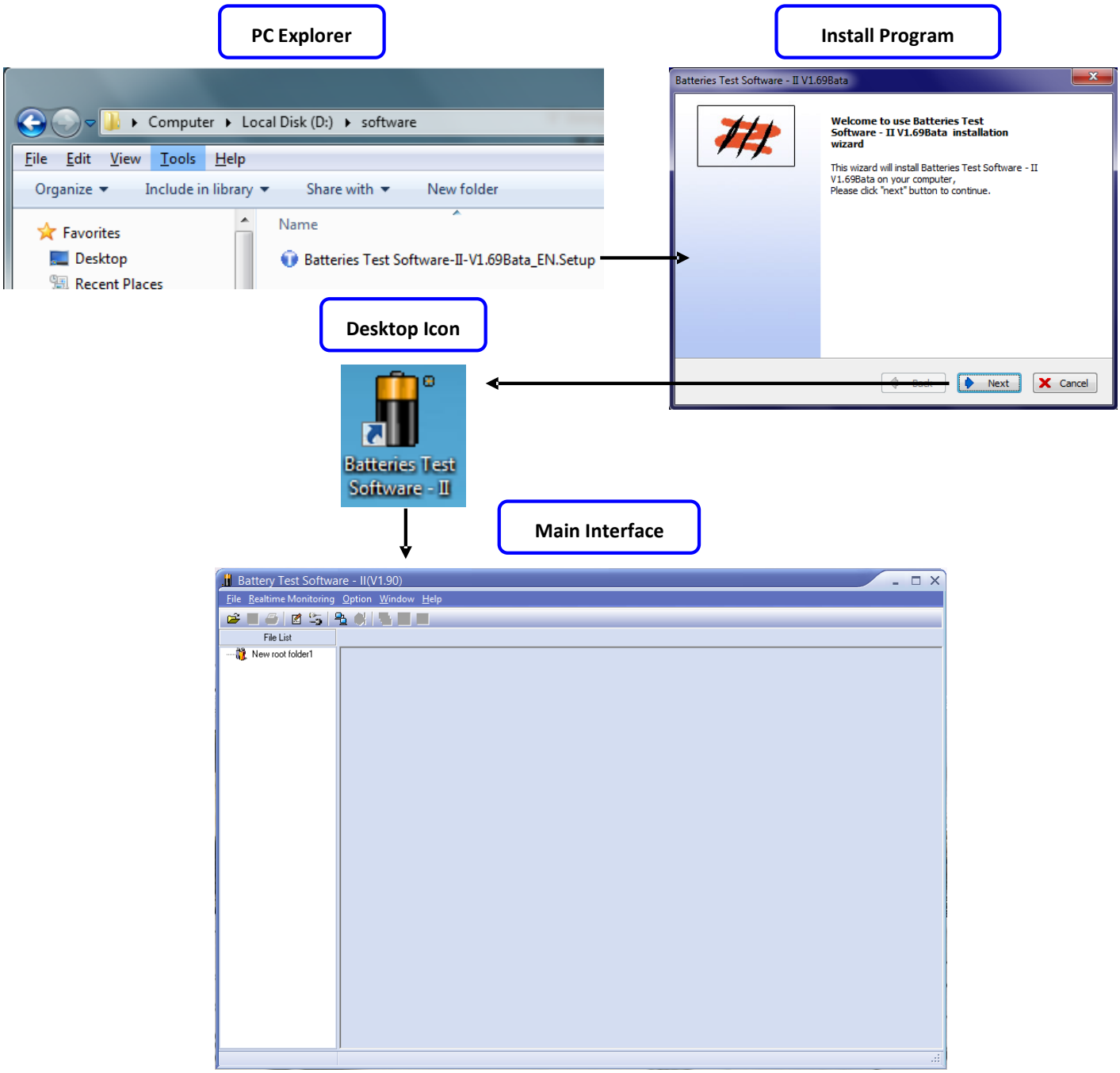
PC Software Instruction

14. Software Main Functions

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

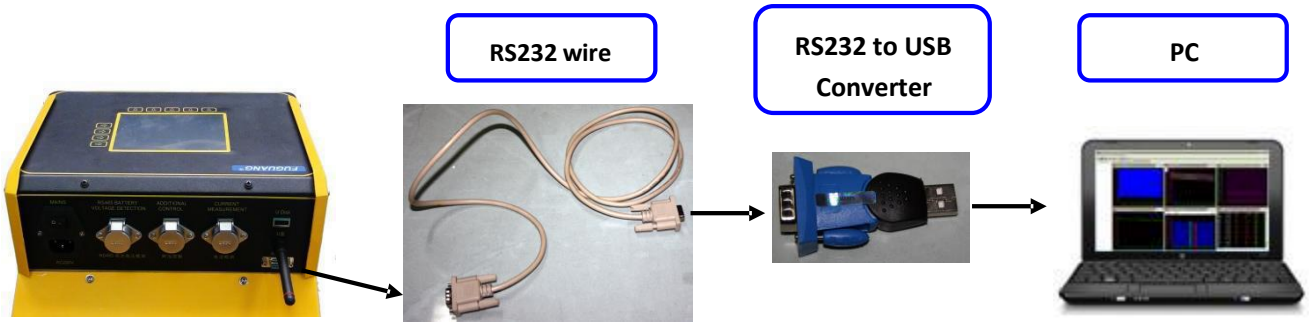
15. Install Analysis Software To PC

15.1 Please find the install program of analysis software on the CD-ROM.
15.2 Following the prompts, finish the installation.
15.3 After the installation, you can click the desktop icon to open the software.

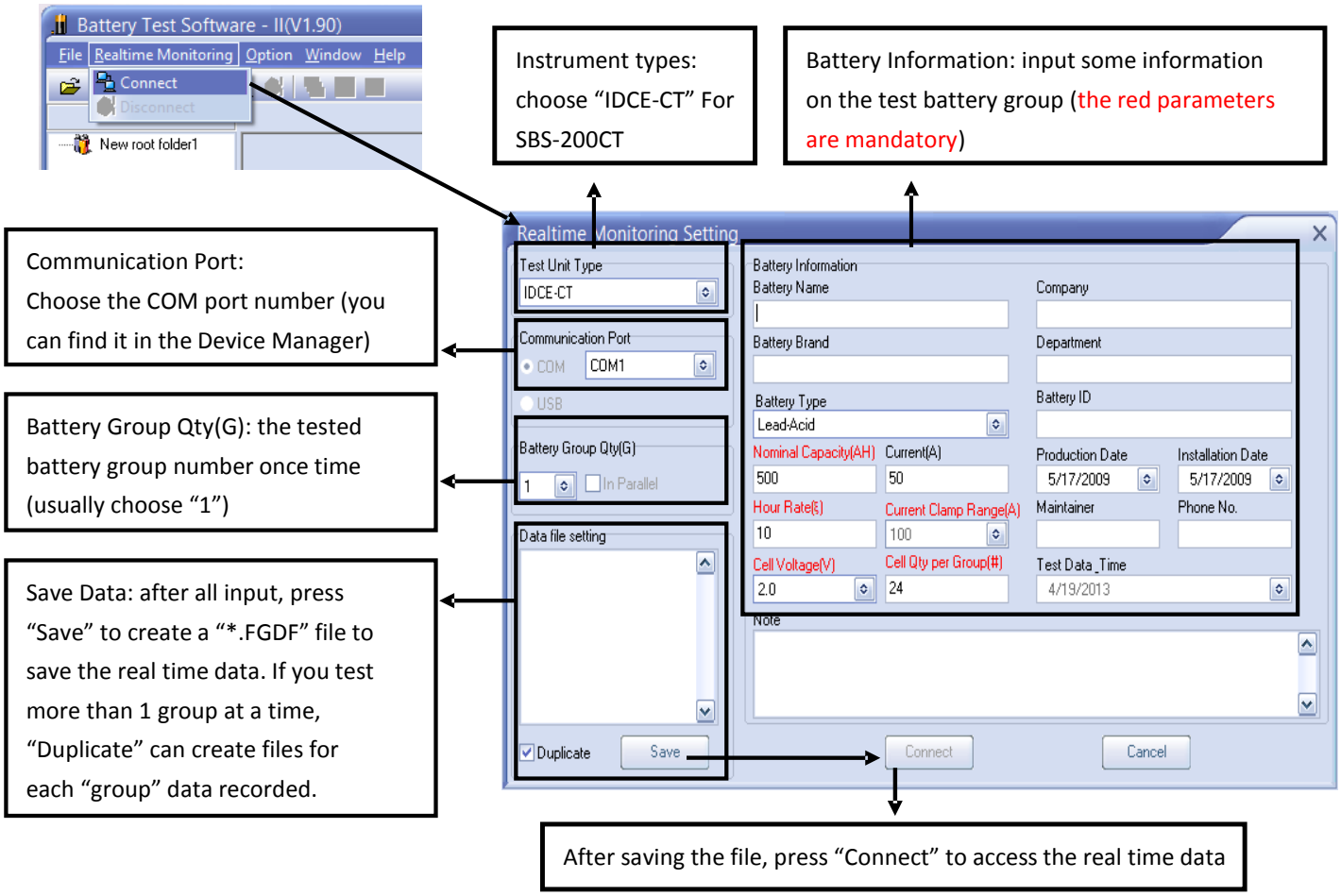


16. Real Time Recording During The Testing

16.1 Use the RS232 connector to connect the main machine with a PC



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



16.3 Start the discharge and the real time data will update automatically on the PC.

16.4 The real time data can be saved simultaneously. If the software is closed during the discharge, the data file will display the readings up to the point of the software being closed.

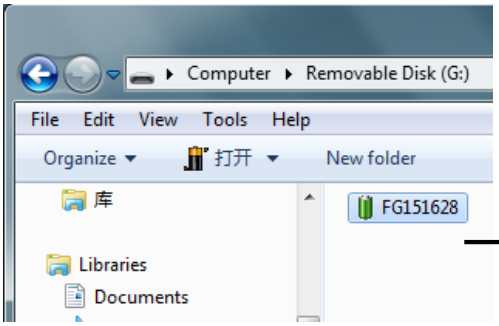
17. Download Data File From USB Disk

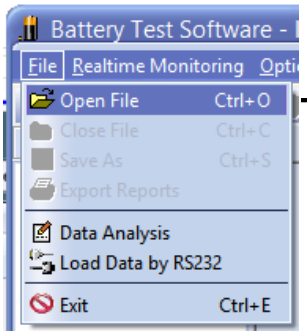
17.1 To download the data file from the SBS-200CT, you can find the data file named "Fxxxxxxxx.FBO". ("xxxxxx" is the time & date of data downloading.)

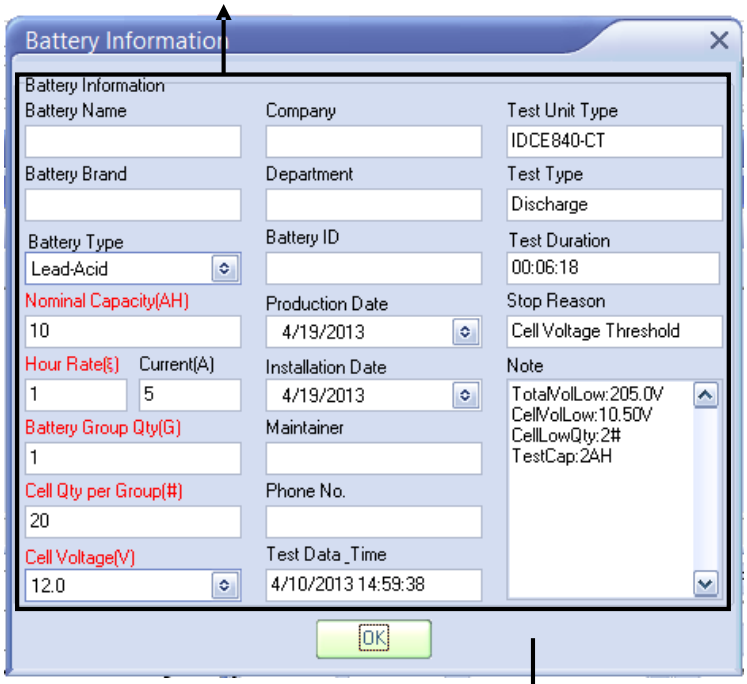
17.2 Double click the file to access "Battery Information" menu or you can open the software first and choose "Open File" in "File" menu.

PC Explorer

The software can load the parameters which you set in main machine automatically and you can fill in the other non essential information or change the mandatory parameters here.





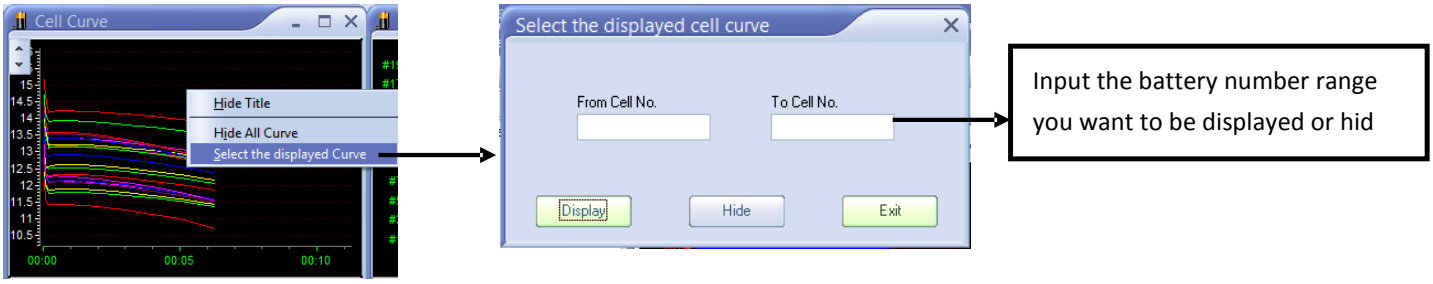


Main Interface

17.3 In the main menu, you can see six windows that show all the necessary testing information:

a) Total current chart: the current during the discharging (the values are negative because of discharging)

b) Cell curve: the voltage curve of each battery. They can be added and deleted by right clicking on the chart



c) Cell capacity-rest capacity: shows the rest capacity, actual capacity and capacity percent of each battery (it can be displayed by right clicking on the chart)

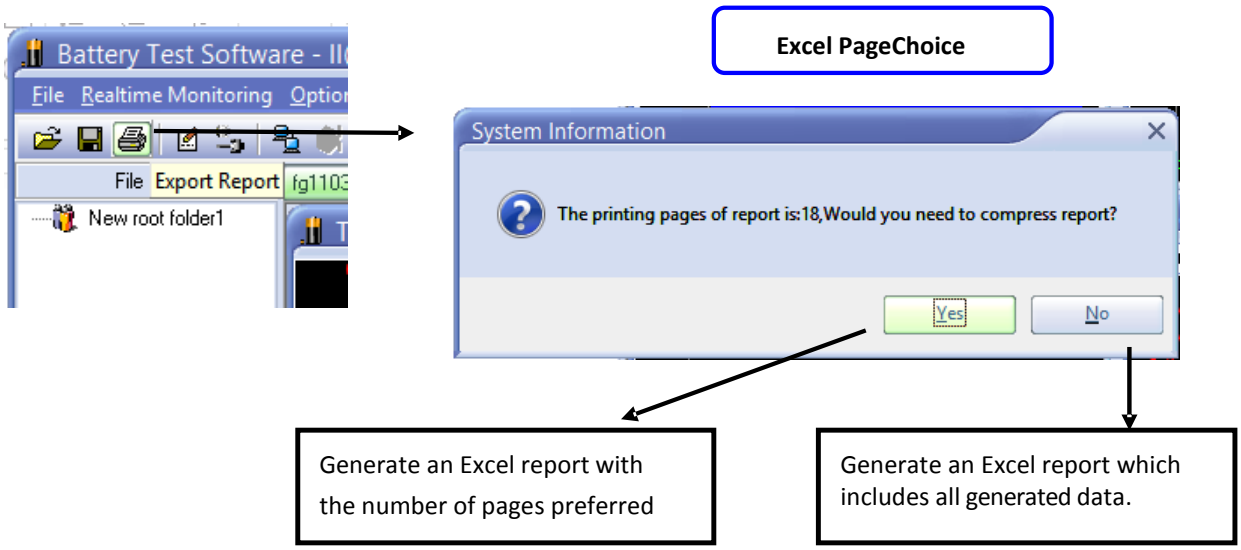
d) Data form: shows the discharge data by time-interval during the discharge

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 scroll at any time during the test to see the relevant results.

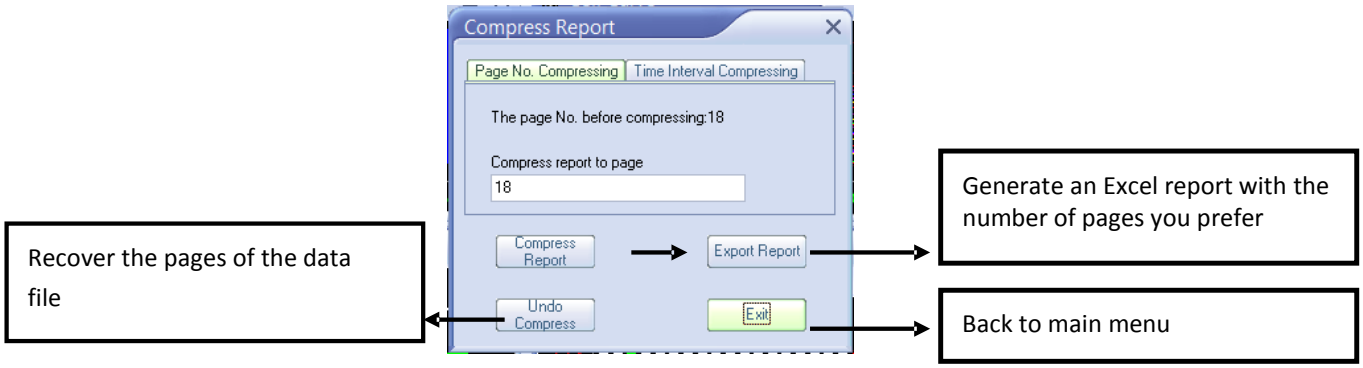
f) Total voltage: the voltage curve of battery group during the discharging process

18. Generate Excel Test Report

18.1 Press  icon to generate a report. In the "System Information" window, it will indicate the number of pages generated for the report. Choose "No" to generate an Excel report which includes all of the information generated. To reduce the number of pages generated, press "Yes" to generate an Excel report which has the page number you prefer.



18.2 In the “compress report” screen, input the page number you want, and choose “compress report” to decease the page number. Then choose “Export Report” to save the Excel report.



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