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## Chapter one About JBDTools

JBDTools software is an intelligent protection board developed by Dongguan JiaBaiDa Technology Co. Ltd., which is used to monitor the battery data, modify the parameters of the protection board and other functions. The software user interface user-friendly, easy to carry out the operation, the editing interface as shown below (Figure 1):

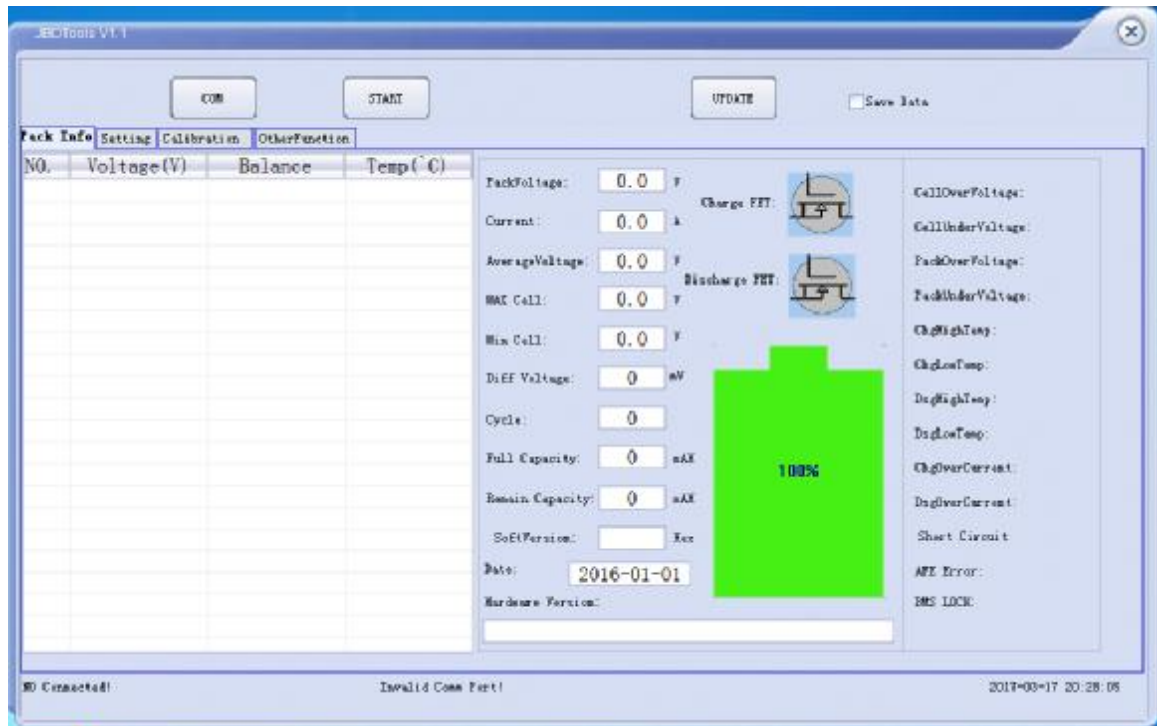


Figure 1

The software window is mainly divided into battery information, parameter setting, calibration and other functions; interface description in detail, the font size is reasonable and the spacing between the columns of reasonable size, complete display of all the content, the user are more convenient to use.

## Chapter two the Use of JBDTools Software

### 2.1 Use of the environment

JBDTools can be installed on windowsXP , Windows7 and above system. It through the serial port to connect with intelligent protection board for data communication, serial port for USB to RS232. It suitable for most computer use.

### 2.2 Set the communication port

JBDTools provide COM port setting, click on the button shown in Figure 2, It will pop up Figure 3 shows the COM setting option, the host will automatically identify the available serial port.

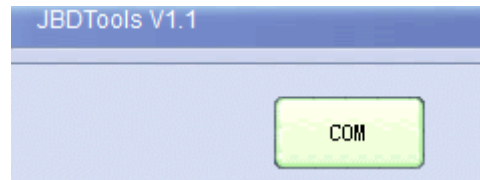


Figure 2



Figure 3

If you open the PC software ,but it does not scan to the serial number, you can click the refresh button, you can [refresh](#) the COM port which is not occupied, and then click the OK button to exit. , The host computer software will automatically record the last COM port settings, if the next time to open the PC software, will automatically select the last open serial port, if your serial port tool has not changed, It does not need to change.

### 2.3 Establish communication

After setting the COM port, click the [start](#) button to start communication with the intelligent protection board, you can read the basic information of the battery pack, including: single voltage, capacity, number of cycles, protection status, charge and discharge current, MOSFET status and some basic factory information. Specific data shown in Figure 4.

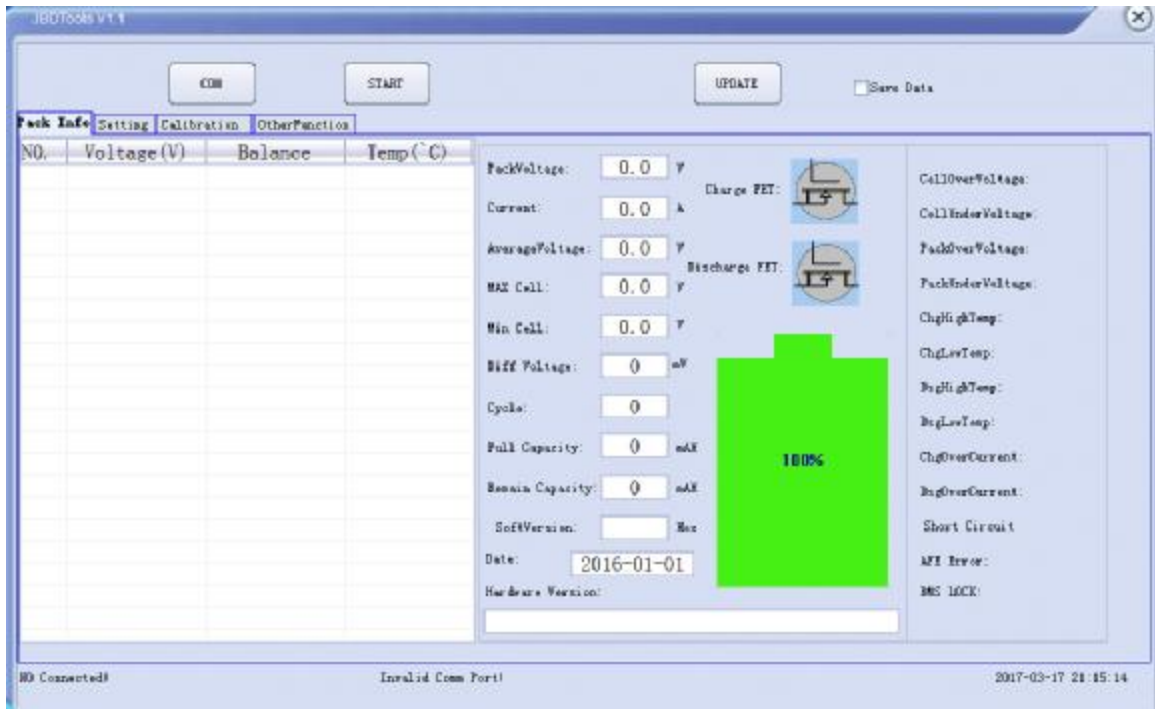


Figure 4

There have two MOSFET, one control charge, the other control discharge.  
 If over charged, the charge MOSFET will turn off,  
 If over discharge, the discharge MOSFET will turn off.

Eg: set the over discharge protect is 2.8V, smart board detect 2.8V, so trigger over discharge protect, discharge MOSFET turn off, even the voltage rise to 2.83V also turn off, only more then 2.85V( release voltage) then will trun on again.



## 2.4 Parameter settings

Parameter settings page is mainly intelligent protection board of some of the protection parameters set, the specific content shown in Figure 5:

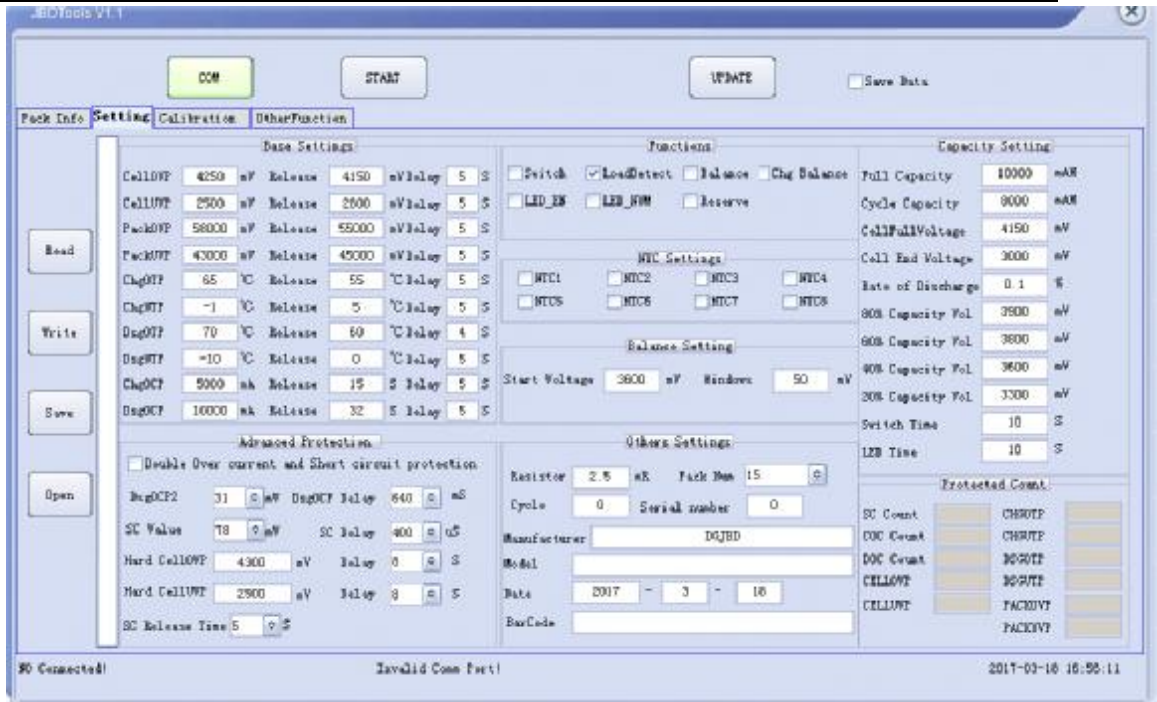


Figure 5

The main contents are as follows:

1. **Basic protection parameters configuration content:** single overvoltage, monomer undervoltage, the whole group overvoltage, the whole group undervoltage, charging high and low temperature, discharge high and low temperature, charge overcurrent and discharge overcurrent protection value, Protection delay. Customers can set parameters according to their own need.

**CellOVP:** cell over voltage protect, the value of over charge protect.

**CellUVP:** cell under voltage protect, the value of over discharge protect.

**ChgOTP:** charge over Temperature protect, if detect high temperature, the BMS will enter protect status.

**ChgUTP:** charge under Temperature protect, if detect low temperature, the BMS will enter protect status.

**DsgOTP:** discharge over Temperature protect, if detect high temperature, the BMS will enter protect status.

**DsgUTP:** discharge under Temperature protect, if detect low temperature, the BMS will enter protect status.

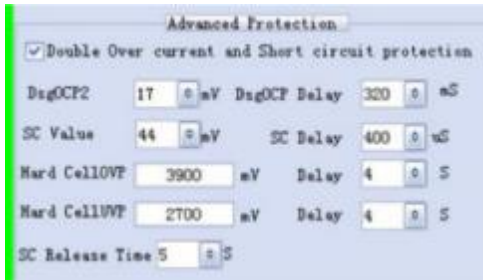
**ChgOCP:** charge over current protect, in charge status, if detect high current, the BMS will enter protect status.

**DsgOCP:** discharge over current protect, in discharge status, if detect high current, the BMS will enter protect status.

**Release:** eg: over charge protect is 4.25V, release is 4.15V, this mean, detect 4.25V, then trigger over charge protect, charge MOSFET turn off, only the voltage discharge to 4.15V, then the charge MOSFET will turn on, then can charge again. 4.25V to 4.15V, the board stop charge.

2. **Advanced protection:** including secondary overcurrent, short circuit protection, hardware

overvoltage, hardware undervoltage protection settings. secondary overcurrent protection value and short circuit protection value is set in voltage form, converted into current mode  $I = V / R$ , where V represents the set protection value and R is the current sense value.



**Dsg OCP2:** discharge over current protect stage 2, if the Inrush current is too high, will trigger over current protect, you can set the value high, to avoid Inrush current, normal use default value.

if the board can work well, do not care, if triggered by Inrush current, you can set more high.

Inrush current for your reference

[https://en.wikipedia.org/wiki/Inrush\\_current](https://en.wikipedia.org/wiki/Inrush_current)

**SC Value:** similar to the Dsg OCP2, set the value high to avoid Inrush current, if the board can work well, do not care, if triggered by Inrush current, you can set more high.

**Hard Cell OVP:** this board have software over charge protect, also have hardware protect, double protect,

Eg: software is 3.9V hardware is 4V, if software can not protect, then hardware will protect, so Double insurance.

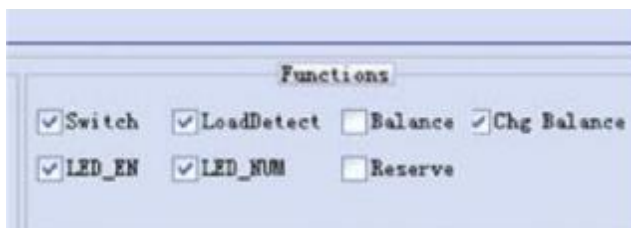
**Hard Cell UVP:** similar to Hard Cell OVP, hardware over discharge protect.

Eg: software is 3.1V, you can set the hardware to 2.9V,

Once the software protection fails, the hardware can be protected, double insurance.

If software detect 3.1V not action(cut off), continue discharge to 2.9V, hardware will detect, then hardware action, cut off, so double insurance.

**3. Function configuration:** Mainly on whether some functions of protection board are open, including electronic switch function, the load detection function after short circuit, equalization function, balanced mode, LED function, LED number and so on. Where the equilibrium mode is valid after checking the balance function.





**Switch:** Most users do not need this feature, some special customers need to add a switch to control the protection board, need to lead out. Default is disable.

**Load detect:** after short protect, if BMS detect the load, then do not release, only the load removed then release protect status.

After short, if load not remove then BMS cut off, if load removed then BMS turn on again.

**Balance:** turn on balance function.

**Chg balance:** turn on the balance function during charge.

If disabel Chg balance, then static balance, eg: the difference of battery more then 0.4V, then balance work.

Enable is charge balance.

Disable is static balance.

balance	Chg balance	
on	on	charge balance
on	off	static balance
off	off	no balance
off	on	no balance

**Static balance** open condition

1. No charge and discharge current. Just battery and BMS.  
( charge current is 0A, discharge current is 0A)
2. Battery voltage more then the balance voltage.  
( eg: battery 1 is 3.65V, balance voltage (start voltage) is 3.6V )
3. The difference of battery voltage more then the setting windows value  
(eg: windows is 30mV, battery 1 is 3.65V, balance voltage is 3.6V, so  $3.65-3.6=50mV$  more then 30mV, so balance led turn on )

**Charge balance** open condition

1. In charge stage, **have charge current.**  
( eg: charge current is 0.5A)
2. Battery voltage more then the balance voltage  
( eg: battery 1 is 3.65V, balance voltage (start voltage) is 3.6V )
3. The difference voltage of battery and balance voltage more then the setting windows value.  
( eg: windows is 30mV, battery 1 is 3.7V, battery 2 is 3.6V,  $3.7-3.6=100mV$   $100mV > 30mV$ , so balance led turn on)

Charge balance setting DEMO

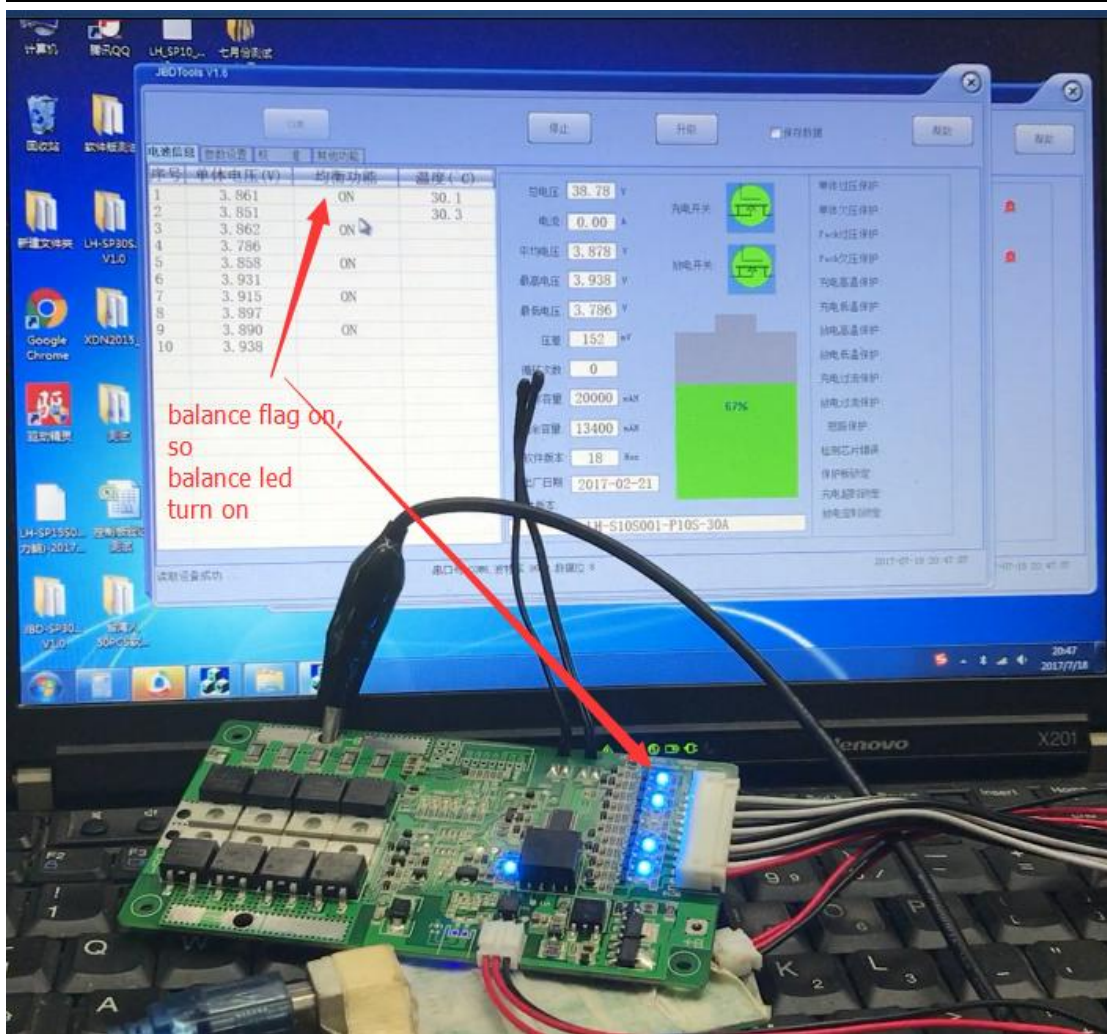


The screenshot shows the 'Functions' section with the following options:  Switch,  LoadDetect,  Balance,  Chg Balance,  LED\_EN,  LED\_NUM, and  Reserve. The 'Balance' and 'Chg Balance' checkboxes are highlighted with a yellow box. Below this is the 'NTC Settings' section with checkboxes for NTC1 through NTC8. The 'Balance Setting' section at the bottom is also highlighted with a yellow box and contains 'Start Voltage' set to 3600 mV and 'Windows' set to 50 mV.

Static balance setting DEMO

This screenshot is similar to the first one but with different checkbox selections. In the 'Functions' section,  Balance and  Chg Balance are highlighted with a yellow box. The 'Balance Setting' section at the bottom is also highlighted with a yellow box, showing 'Start Voltage' at 3600 mV and 'Windows' at 50 mV.

Balance LED DEMO



**LED NUM:** show the capacity of battery, right now, the board no capacity led, so do not care.  
Eg: 5 led light is 100%, 4 led light is 80%, 3 led is 75% capacity.  
**Reserve:** software reserver, do not care,

**4.NTC configuration:** different series of protection, NTC number is not consistent, It has been set up before shipment, It do not need to change.

**5. Equalization configuration:** balance function, mainly to set the equilibrium open voltage and equalization accuracy; in the balance function is enabled and the work mode is correct, When the battery voltage is greater than the equilibrium opening point, and the maximum difference is greater than the equilibrium accuracy, the balance function will be turned on. After the equalization function is turned on, if the maximum pressure difference is below the equilibrium accuracy, or the battery voltage is lower than the equilibrium open voltage, the balance function will stop working.

Eg: LiFePO4 batter, set the balance value is 3.6V, if detect more then 3.6V, then will start balance function,

Balance Setting

Start Voltage  mV    Windows  mV

6. **Other information:** mainly contains the number of strings of the battery, the sense resistor resistance, leave the factory time and some other information. Which in addition to the number of battery strings and galvanometer resistance will affect the protection board working conditions, other settings on the working status of the protection board has no effect.

The factory has been set up, do not need to change.

Others Settings

Resistor  mR    Pack Num

Cycle     Serial number

Manufacturer

Model

Date  -  -

BarCode

7. **Capacity setting:** the main set some information of battery capacity, because the intelligent protection board with automatic learning capacity function, but the range is set, the maximum learning bias of 25%, each intelligent correction of 10%. So need according to the actual situation of the battery pack to set,

Nominal Capacity: The actual capacity of the battery pack;

Cyclic capacity: the cumulative discharge capacity of the battery that has been applied to a cycle.

Full of voltage: the average battery voltage of the battery pack reaches this value when the battery pack is full;

Discharge cut-off voltage: When the average battery voltage is less than this value, the battery is considered empty.

Self-discharge rate: the number of self-discharge capacity for the battery pack, the general value will be relatively small.

80% capacity voltage ~ 20% capacity voltage: the initial power on our protection board will be based on the average voltage control of these data to calculate the battery capacity, no other purposes.

Parameter settings main operation, in the page of parameter settings have 4 buttons on the left:

1. **Read parameters:** read the parameters from the protection board , and then displayed in the PC software, In the process of reading, progress bar will show the progress of real-time read such as Figure 6.

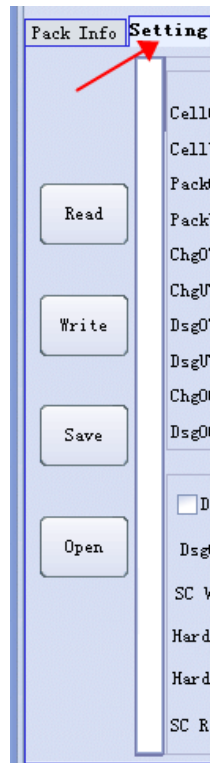


Figure 6

2. **Write parameters:** its main function is to set the value of PC software settings to the protection board, the protection board will work in accordance with its set parameters, the write parameters must be approved to release the parameters set correctly, if the parameter is set wrong, then the protection board will can not work, there are two general operating procedures:

- a. First read the parameters, adjust and confirmation ,then click to write;
- b. First import the previously saved parameter file, confirm and then click to write.

In the process of writing, there will be a progress bar, as shown in Figure 7, the final show OK after the success of writing, if the progress bar is not shown OK it means write failure, please try again.



Figure 7

**3. Save the parameters:** This function is to save the PC software parameters in the form of files (\*.fig), its name can be set by the user, like Figure 8.

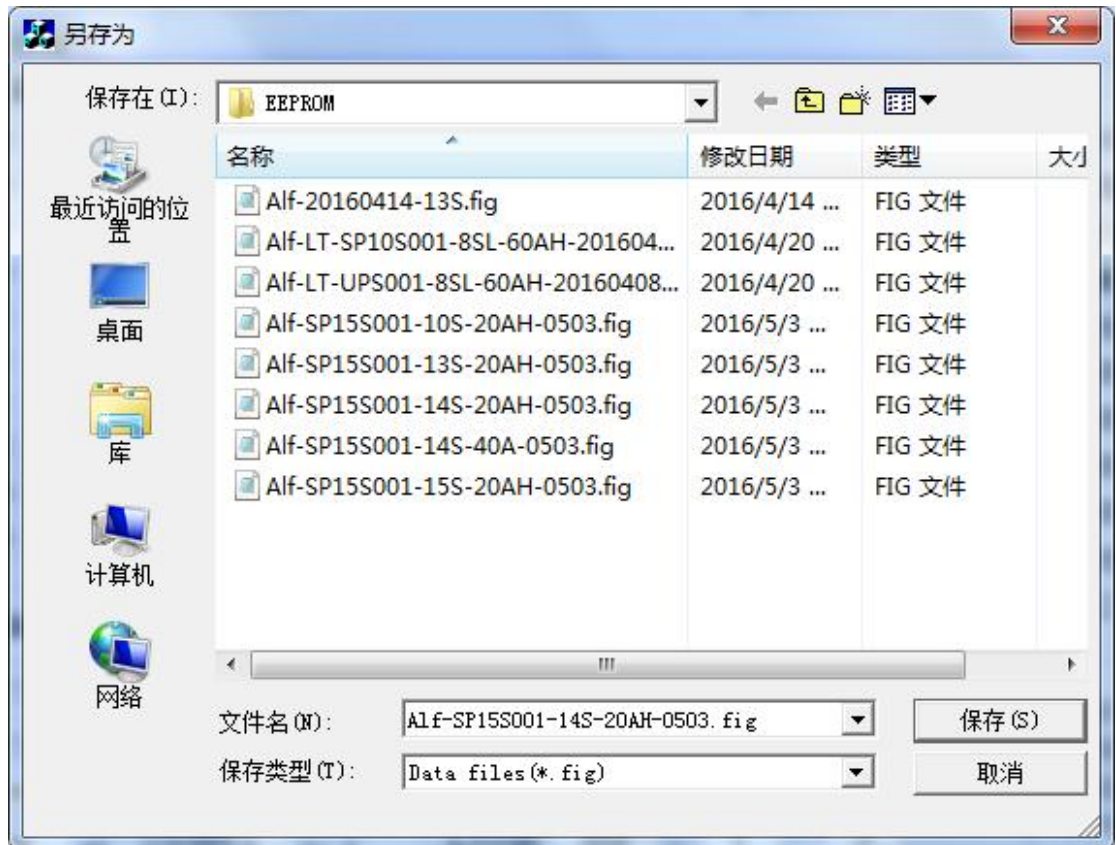


Figure 8

**4. Open the file:** its function to open the previously saved parameters to the PC software, It can be used to view or modify, and then write or save. See Figure 9 for details.



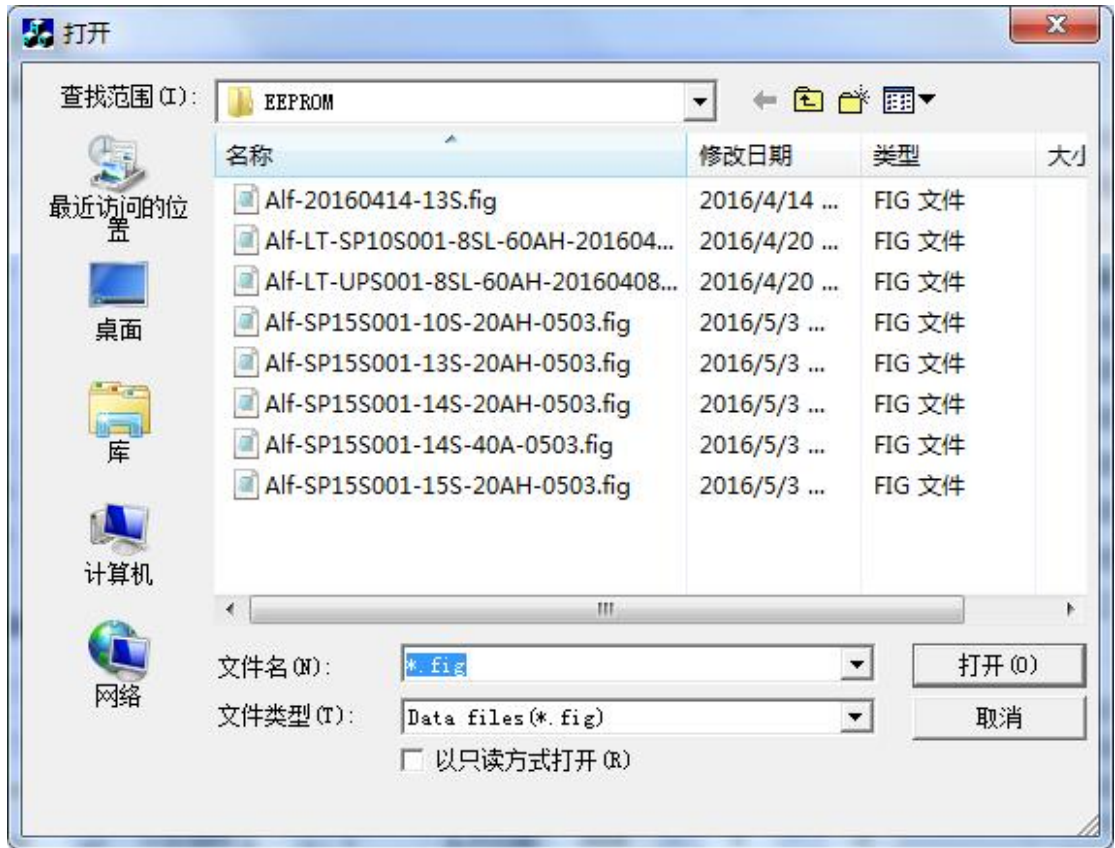
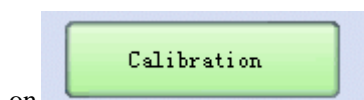


Figure 9

## 2.5 calibration function

Calibration function: used to calibrate the battery voltage, current, temperature.

Monolithic voltage calibration and temperature calibration: This function supports one or more calibrations, but you need to fill in the corresponding place .the click



on It will start calibration, calibration will be successful after the pop-up a successful check box.

Current calibration: static calibration, charge current calibration, discharge current calibration.

Static calibration: the current state as 0 current, and the charge current calibration factor and discharge current calibration system will restore to the default data.

Charge calibration: only calibrate the charge state, fill in the edit box like Figure 11 which you actually measure value of the charge current, without sign, such as , 1A fill 1000 and then click the charge current calibration button.



Figure 11

Discharge calibration: only calibrate the discharge state, fill in the edit box like Figure 12 which you actually measure value of the discharge current, without sign, such as , 1A fill 1000 and then click the charge current calibration button.

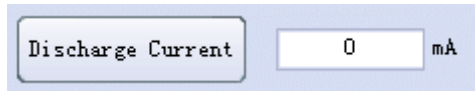


Figure 12

## 2.6 upgrade function



This function menu mainly through the host computer to upgrade the smart protection board program, click on the pop-up will be shown in Figure 13 prompt box, select the file (\* .hex) path, and then click to download, and then wait until the progress of 100% , See Figure 14 for details.

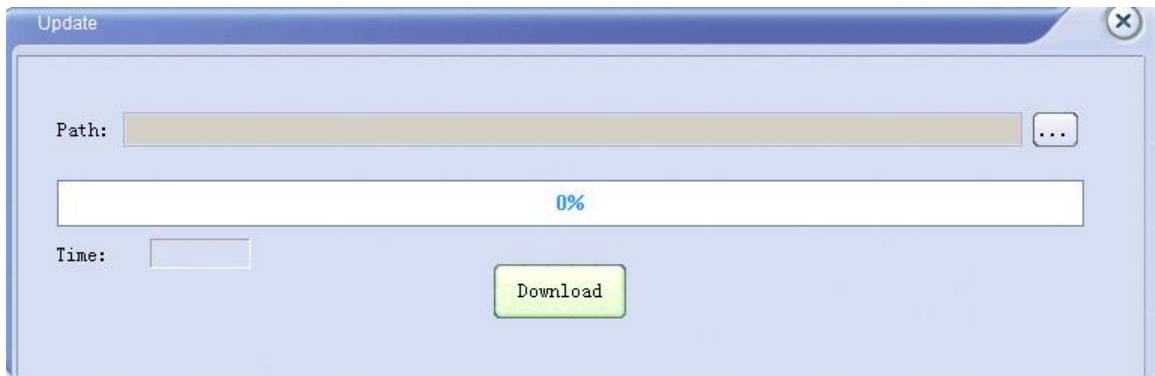


Figure 13



Figure 14



## 2.7 Save the data function

Save Data

Operation button:

Click the button will pop up like Figure 15, save the file type of excel , the user can name, and then submit to save. Then you will save the saved file under the path you selected. After establishing the communication, it will save a record every 1 second , including the basic information of the battery pack.

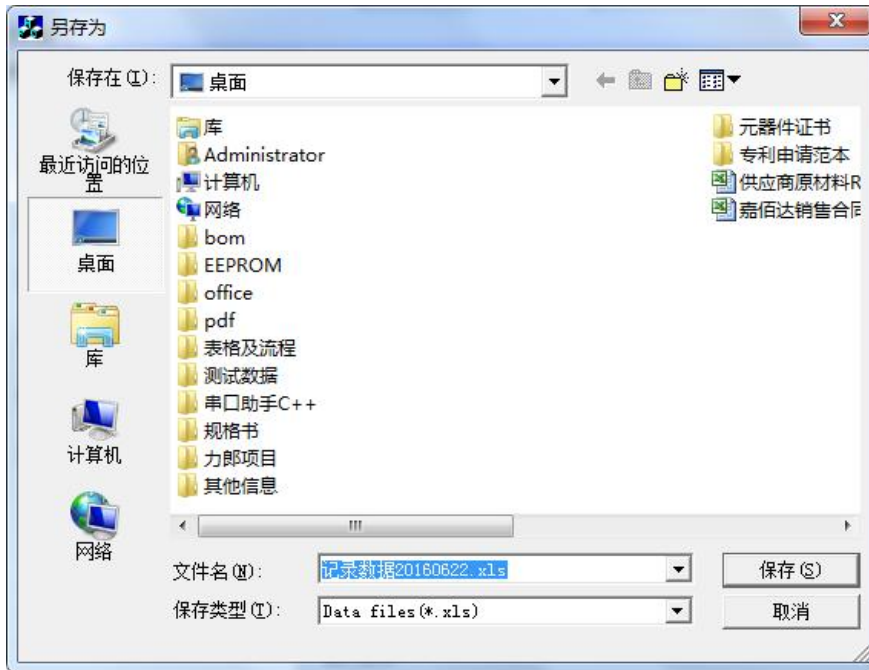


Figure 15

## 2.8 other functions



**Just for RD test!! do not care!!**

Mainly contains some test functions: edit the remaining capacity, control MOS tube, balanced test function, and MODBUS protocol debugging tools.

Edit the remaining capacity: You can change the remaining capacity of the battery pack at any time, mainly for testing.

Control the MOS tube: the main control charge and discharge MOSFET, open or close the charge and discharge circuit. It also can be used for intelligent lock car function: Our smart protection board can be connected to Bluetooth communication, if the phone inside the APP increase this command, you can lock the battery through the Bluetooth, the battery does not charge and discharge, unlock also through the Bluetooth APP to unlock.

Equalization control: forces the corresponding equalization to open, to test whether the equalization circuit is valid.

**R & D personnel testing, ordinary users do not need attention.**