Lithium power battery management system

BMS005A specification
Content

1. **Product structure** ................................................................. 2
   1.1 connection structure ....................................................... 2
   1.2 central controller ............................................................ 3
   1.3 voltage, current, Insulation resistance collection module .......... 4
   1.4 color touch display 5.6 inch ............................................. 6
   1.5 connection wires ............................................................. 7

2. **System setting and application** ......................................... 8
   2.1 Technical Specifications ................................................... 8
   2.2 system setting ............................................................... 8
   2.3 application areas .......................................................... 19
   2.4 Accessories ............................................................... 19
   2.5 disk use method ........................................................... 19

3. **Frequently asked and questions** ...................................... 19
   3.1 Notice ................................................................. 19
   3.2 FAQ ................................................................. 20
   3.3 Contact us .............................................................. 20
1. **Product structure**

BMS005A-MC11 consists of central controller (BMS005A-MC11) data collection modules (Volt/Tem module, current module, Insulation resistance module), display, current sensor and wires.

1.1 **connection structure**

- **Introduction**: Monitor total voltage, total current, remaining capacity (SOC), highest temperature in a battery pack. It can display each cell voltage, temperature collection point in a module. You can set up system working parameters. It contains that a module manages how many cells, battery upper limit and lower limit beep warn voltage, battery upper limit and lower limit cutting off voltage, temperature upper limit beep warns, biggest recharging current, current upper limit beep warns, voltage difference beep warns, recharging times, SOH, SOC initialize, rated capacity, Reserve capacity correction factor, system clock and so on.
1.2 Central controller

Introduction: Provide total voltage, total current, module temperature, monomer voltage, SOC, SOH, cycle time and so on; Communicate with chargers and motor controllers with CAN BUS. Store all the data. It can be downloaded to the computer.
(2) 7-pin not used

(3) CAN interface. (4-pin, charger and motor controller)

(4) Data collection modules communication interface and beep warns output

(5) DC+24V output — 3-pin, color touch display power interface.

(6) RS422 — color touch display communication interface.

(7) USB interface — Datas can be downloaded to the computer.

1.3 Voltage, Current, Insulation resistance sample module

- **Introduction:** Voltage collection module is used for collecting voltage data. Each module can get 10 cells voltage and equips one temperature collection point. Data communicates with central controller through DB25 socket {pic 3 (4)}. There is one current collection module in each BMS. It is often arranged after the voltage module at last and collects current. Current sensor (hall) according to peak-discharge can be chosen (100A, 200A, 300A, 500A, 1000A).
Connection: +, −, M the last pin isn’t used. Corresponding connection by marking, wrong connection easily leads to Hall corruption. When recharge, current direction accords to hall.
DIP switch setting:

Voltage module: For example, there are five voltage modules. According to the direction of the above fig9, from left to right (tens to ones) settings for each module: 0 0, 0 1, 0 2, 0 3, 0 4, ...; (Accord to modules connection sequence at DB25 communication wire).

If more than 10 modules, and address Carry, from left to right [tens to ones] followed by 1 1, 1 2, 1 3 ... ...)

Current modules: a voltage module address for the last voltage number +0 2, this case set up to 06 (from No. 04 the last voltage module is calculated +0 2)

Notice: As the method, set up any quantity modules.

Arrows indicate the correct direction; Power supply connected, normal communications, light flash. Always bright but not flash, there is no normal communication. The light is dark, the power is not connected.
1.4 color touch display  (5.6inch)

pic 11 display back

pic 12 display bottom

1.5 wires

<table>
<thead>
<tr>
<th>Figure</th>
<th>name</th>
<th>remark</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DB25 Connection</td>
<td>Central controller and modules communication interface, beep warns output.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. DB25 connect with central controller</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. 6P connect with modules</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. 3P warn output (switch)</td>
</tr>
<tr>
<td>Wire Type</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td>3-pin color display power supply wire</td>
<td>Used for powering for display 1. 3-pin, connect with central controller 2. Another side connect with (pic11 display back) O type end.</td>
<td></td>
</tr>
<tr>
<td>Battery sample wire</td>
<td>Used for collect data 1. 14P, connect with voltage, collect data. 2. OT soldering terminal, connect with battery end.</td>
<td></td>
</tr>
<tr>
<td>Current collection wire</td>
<td>Used for collecting loop current 1. 4p, connect with hall sensor 2. 5557-4P, connect with current module 4p end.</td>
<td></td>
</tr>
<tr>
<td>2-pin input power (Don't provide)</td>
<td>Used for supplying power to central controller. 1. 2-pin connect with central controller. 2. Connect with power supply</td>
<td></td>
</tr>
<tr>
<td>4pin CAN communication wire</td>
<td>Communicate with charger and motor controller 1. 4pin, connect with central controller 2. 3. connect CAN communication equipment (connector prepared by users)</td>
<td></td>
</tr>
</tbody>
</table>
## 2 System setting and application

### 2.1 Technical Specifications

- **Power supply**: User provides DC24V
- **Range of voltage measuring**: DC0~+5V
- **Voltage measuring accuracy**: ±(0.3%RD+0.2%FS)
- **Voltage display resolution**: 1mV
- **Hall sensor**
  - **Current measuring range**: 0~500A (1000A)
  - **Current measuring accuracy**: ±0.5%
  - **Current display resolution**: 0.1A
- **Temperature measuring range**: 10~85°C
- **Temperature measuring accuracy**: ±1°C
- **Minimum sampling period (voltage)**: 0.5 s
- **Minimum sampling period (current)**: 0.1 s
- **Ah accumulative total minimum period**: 0.1 s
- **Ah display accuracy**: 0.1Ah
- **Ah measuring upper limit**: >1000Ah
- **IR measuring range**: >2MΩ
- **IR measuring accuracy**: ±10%
- **Warn index**
  - **The largest switch voltage**: 30Vdc
The largest switch current ................................................................. 1A

2.2 parameter setting

After starting the system into the home page. As below:

Pic 13 system interface (SOC/TEM)

- Choose “Chinese” or "English" version

Pic 14 system interface

After choosing system menu as below:
The first time use the BMS, press “set” key, Initial Settings. The required password in the central controller's back. (Password: 31766); After setting up system parameter, it can memorize and save.

A. The next page as below:

Choose “xxxxx” key, input the password:
Input (Password: 31766) then go into the next page:

- “Battery” option is used for setting up battery quantity and temperature.
Pic19 system interface (address set)

- “Module” column is module address. It begins with 0. More than 10, turn to the next page.
- “Battery” column is battery quantity which one module manages (0–10 cells). Input number to change.
  Notice: For example, there are five modules, you need set up 0~4 location.
- “Temperature” column is whether it needs collect temperature. 0 is no, 1 is yes. Input number to change. Usually, we set up this as 1.

Option “System-1” content:

System-1
**Pic 20 system interface (system-1)**

The following parameters accords to battery situation, users set up these Initialization.

**Table 1: System_1 parameter**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage alarm max limit</td>
<td>When recharging, one of cells voltage reaches the value, BMS will warn and control charger to balance charging process.</td>
</tr>
<tr>
<td>Voltage cut max limit</td>
<td>One of cells voltage reaches the value, will warn and stop charging. Only shut off the power, warn can stop.</td>
</tr>
<tr>
<td>Voltage alarm min limit</td>
<td>When discharging, one of cells voltage reaches the value, BMS will warn and controller motor controller to reduce out power. Avoid over-discharge. Voltage will be raised.</td>
</tr>
<tr>
<td>Voltage cut min limit</td>
<td>One of cells voltage reaches the value, will warn and disconnect joint. Only shut off the power, warning can stop. We suggest that make the joint connect with motor controller.</td>
</tr>
<tr>
<td>Delta voltage alarm</td>
<td>The difference value between the highest voltage and the lowest voltage. It reaches the value, beep warns.</td>
</tr>
<tr>
<td>Temperature alarm max limit</td>
<td>When the temperature is higher than the value, beep warns. It shares the joint with voltage upper limit warning</td>
</tr>
</tbody>
</table>

- Option “System-2” content:
### Table 2: System_2 parameter

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max charge current</td>
<td>Output maximum current. The function is effective for the chargers which can communicate with our BMS.</td>
</tr>
<tr>
<td>Max discharge current</td>
<td>BMS allows the maximum discharging current. If more, will warn.</td>
</tr>
<tr>
<td>Rating capacity</td>
<td>Rated capacity of single cell. Consistent with the SOC.100%</td>
</tr>
<tr>
<td>Capacity calibrate</td>
<td>Notice current sensor fix direction. Notice the direction of fixing hall. Pic 8. Amend the capacity loss during charging and discharging.</td>
</tr>
<tr>
<td>Cycle times</td>
<td>Times of Charge and discharge</td>
</tr>
<tr>
<td>SOH</td>
<td>Battery pack Health status, can set 0.</td>
</tr>
<tr>
<td>SOC initialization</td>
<td>Suggest that setting 100% after normal charging at the first time. Choose “send”, can set successfully.</td>
</tr>
</tbody>
</table>
B. Choose "CHARGE" button:

Pic 22 system interface (Charge state)

A: SOC status. When charging, this bar scrolls. Static value displays the SOC.
B: Charger Status Indicator.

Press "Menu", choose the next steps. Charge, stop or return:
Charging process is divided into three stages (chargers must communicate with the BMS):
1. Pre-Charge 2. Constant current charging 3. trickle-charge

Table 3: Charging state marking
<table>
<thead>
<tr>
<th>No charger</th>
<th>Charger is not connected</th>
<th>Cycle times</th>
<th>Charge cycle times</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ready</td>
<td>Charger is ready, you can charge</td>
<td>SOH</td>
<td>Battery health index</td>
</tr>
<tr>
<td>Charging</td>
<td>Is charging</td>
<td>SOC</td>
<td>remaining capacity</td>
</tr>
<tr>
<td>Stop</td>
<td>Stop charging</td>
<td>Temperature</td>
<td>The maximum ambient temperature</td>
</tr>
<tr>
<td>Return</td>
<td>Back homepage</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

C. Choose “First” button, return homepage:

D. Press “TEMP” button, you can see the temperatures of each module managing.

E. Choose the “More “button, can check the each cell voltage. Default :0.000V:
F. Choose the “CAP”, check the remaining Capacity.

2.3 Application areas

Electric buses, cars, three trucks, bicycles, yachts, golf cart, sightseeing car, clean cars, deep-sea exploration device auxiliary battery powered, underwater experimental devices, 3G communications base stations, electric power, wind power, sun Energy and other auxiliary power battery pack.
2.4 Accessories

- Disk (Wiring diagram, Chinese and English specification, USB drive, upper computer software (used for download data from system))
- Specification
- Operation process

2.5 Using method of disk

- If you want to install the data for testing, please connect with pc. At first, run the USB driver, after that, install the client-side software. Choose the corresponding USB COM port, download dates.
- BMS central controller can save seven days' data. Cycle and update the oldest data. When download the data, from the oldest to the newest about several hours. If connects with PC through USB all the time, can download persistently. It has a little time delay.

3. FAQ

3.1 Notice

1. The display should be placed in the shade to avoid in the sunlight, prevent display placed in the high-temperature environment, leading to damage.
2. Modules are coated with three anti-paint, waterproof, moisture-proof, still can not be directly immersed in water, so as to avoid corrosion of the module internal components moldy.
3. Supply power has a strict demand. At the beginning of design, should ensure that there will be no big power devices in the supply power branch, and avoid power supply appearing any voltage fluctuation.
4. BMS, wiring harness plugs should pay attention to press that buckle plug above at first, do not directly pull out, or will break.

Notice the top label of hall, ensure the right current direction to avoid break
the BMS.

5. Our BMS communicates with chargers and motor controller by CAN protocol. For an effective management of over-charging and over-discharging. Please ensure that.

3.2 Q&A

1. Q: When should the system parameter be set?
   A: Products have an initial data; customers get the BMS and set it by the actual situation.

2. Q: Why does the battery quantity display wrongly?
   A: Please check whether the communication wires, and module address, software setting are right.

3. Q: How long does the soc need to proofread?
   A: After using longer, accord to battery situation and circumstance proofreading again.

4. Q: There is a BMS, but still over-charge and discharge?
   A: Whether the charger and motor controller communicate with our BMS and the wire is good.

5. Q: Module indicator is always bright or not bright?
   A: Check the communication and supply power. Normal situation is flash.