

1. Summarize

GTBMS005A-MC17, a battery management system consists of a GTBMS005A-MB host master, several GTBMS005A-VT/CR voltage sampling modules and a GTBMS005A-CH current/temperature sampling module, detecting all cells' voltage in the battery pack , total current of the pack and the surrounding temperature . Detailed performances as follow :

A. The host master consists of a LCD screen and managing calculator , the screen displays total voltage and current of the pack 、storage electrical quantity (SOC — which rises when it being charged and falls when it being discharged and memorize when the power is shutted off)、the highest cell's voltage and its number 、 the lowest cell's voltage and its number; the next page displays watte-hour consumption、 the highest and the lowest temperature among all the monitoring points; press the key to display the voltage of each cell.

B. System voltage and the temperature collect board adopt modularization structure , every module manages 10 battery and 1 road temperature. The battery collecting board but adapting to an electric motor car distributes broader characteristic , follow the battery box to disperse installation, between require mains lead and a little data communication to link up only.

C. The amount of voltage and temperature sampling boards management battery can be set from 1~ N (N ≤ 10) flexible, connecting method adopts N +1; Temperature can be set to have or have no depends on need.

D. Current sampling board provides a loop current sampling data, Hall sensor is used as current sensor.

E. The host provides USB interface and CAN Bus which is compatible with *ISO 11898 standard* completely.

F. The host provides USB interface that can be connected with computer , and provides data saving function , the saving time is 30s , it can save all data within 7 days and receive all data through the BMS application software .

G. The host provides alarm interface: voltage upper/lower limit alarm、 voltage cut upper/lower limit、 temperature upper limit alarm、 over current alarm, etc.

H. The system provides 3 keys – “Fist page”、 “last page”、 “next page”. Choose “fist page”, you can inquire all information except that on “first page” through pressing “last page” and “next page”, last pressing “last page” for 8s under “first page ” state to have data (that is saved by system) set, including reserve electric quantity and watte-hour consumption; when system gets in alarm station,

press “last page ”and “next page ” at the same time, which can clear all alarm station except voltage cut lower limit、nod invalid and voltage cut upper limit, all signal except cut alarm will be negated within 2 minutes and return to normal state after 2 minutes. Keep pressing “next page” for 8s you can see “system parameter set ” interface, system parameter including : the number of batteries that ara managed by each voltage/temperature sampling board , temperatrue measuring valid , choose the invalid , voltage upper/lower limit alarm and cut set, temperature upper limit alarm set , current upper limit alarm set, rated capacity, capacity calibration, system time, etc.

Major technical target :

Power supply.....	user provides DC12V
Range of voltage measuring0~+5 V
Voltage measuring accuracy	±(0.3% FS + 0.2% RD)
Voltage display resolution	1mV
Hall sensor	
Current measuring range	0~300 A
Current measuring accuracy	± 0.5%
Current display differentiate rate	0.1A
Temperature measuring range	-10℃ ~ 85℃
Temperature measuring accuracy	± 1 ℃
Minimum sampling period (voltage)	0.5 s
Ampere-hour accumulative total minimum period	0.1s
Ampere-hour display accuracy.....	0.1Ah
Ampere-hour measuring upper limit:	> 1000 Ah
Alarm contact parameter	
The largest on-off voltage	30Vdc
the largest on-off current	1A

Note: The above LCD display and the type of Hall and connecting method can be set depends on the customer’s need according to ordering contract.

2. Connection

1. The system connection principle diagram is on attached diagram.
2. The main controller connection diagram is on attached diagram.

There is a DB25 linker on the left side lower of controller body, linker define is on the attached.

3. The set of V-T sampling board:

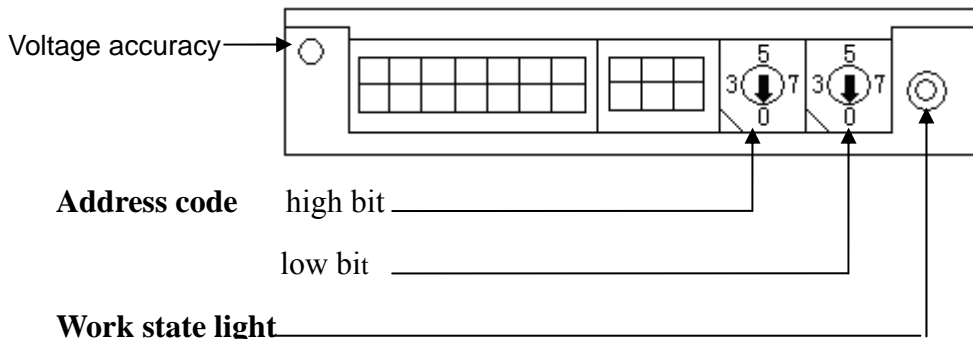
- **Address set**

When there is only a pack(group battery) in system, address of the sampling board begins from No.0 and ends at No.n, address number which is between No.0 and No.n can not be lack, otherwise, the rest that is after the lack number will be seen as the invalid board.

For example:

address number of Sampling board	battery number
0	1 ~ 10
1	11 ~ 20
2	21 ~ 30
3	31 ~ 40
n	nx 101 ~ n x 1010

Note: No.1 battery is voltage high level of battery pack. (The total voltage positive port)



Address value= high address x 10 + low address x 1;

For example: No.24 address (No.25 module):

Circumrotate address code high bit to 2; circumrotate address code low bit to 4

address value= address high bit ×10+address low bit ×1=2×10+4×1=24

work state light: after the power being on (6p linker), the work state light works , if it corresponds with host controller , the light will glitter.

- **Connect of temperature**

See the attached.

- **battery voltage accuracy adjustment**

Adjust rheostat W1 of V-T sampling board to calibrate the voltage true value according with the sampling value. (static state)

4. Set of current sampling board

- **Address set**

The address of voltage sampling board is from 0 to n , so the address of current sampling board is n+2;

For example: the address of voltage sampling board is from 0 to 12, the address of current sample is $12+2=14$.

Detailed addressing method see V-T sampling module set • address set.

- **Adjustment of current accuracy**

Adjust rheostat W1 of current sampling board to calibrate current true value according with the sampling value (static state) .

- **Connection of current sensor**

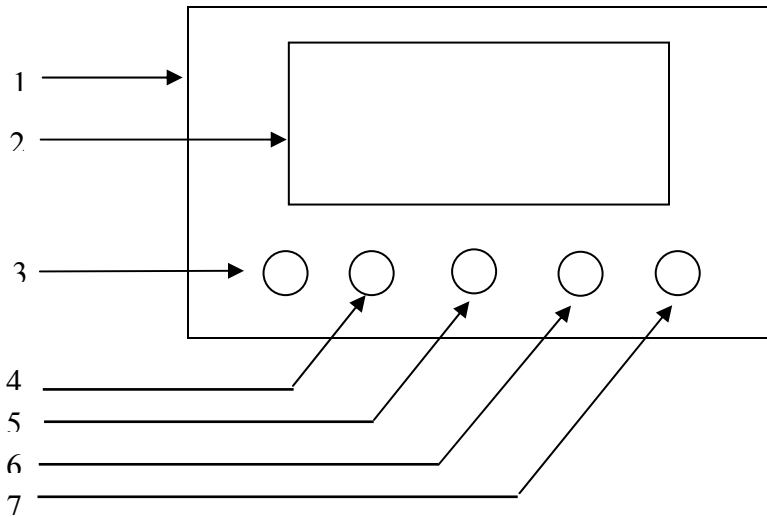
See attached diagram, please.

3. Operating

A. Host controller

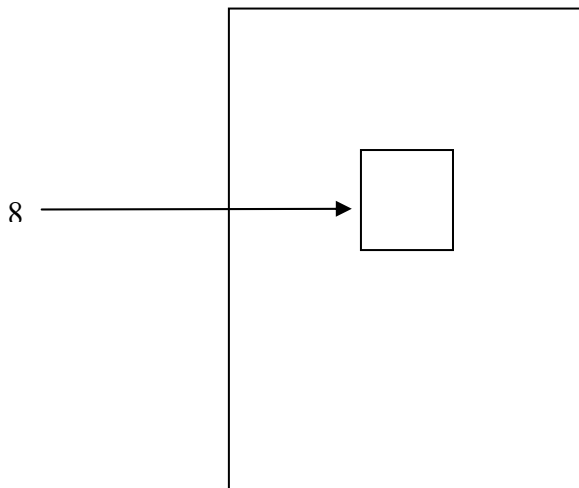
There are three keys (a red one —first page, 2 black keys—last page and next page), a DB25 linker , a switch and a USB jack on the host controller.

Front view as follow:



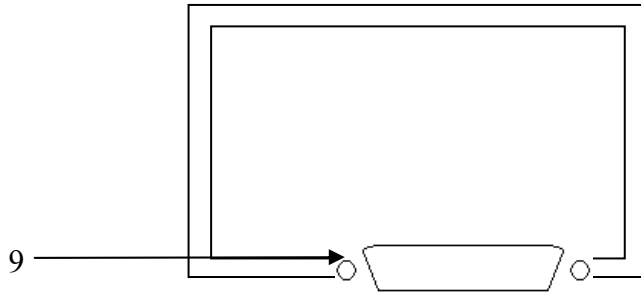
- 1 ----- the body
- 2 -----display (green)
- 3 -----“first page” (red)
- 4 -----“last page” (black)
- 5 -----“next page” (black)
- 6 -----alarm light
- 7 -----LCD back lighting switch

Side view as follow:



8 -----USB jack

Rear view:



9 -----DB25 linker

“first page”: display first page information, including total voltage、total current、reserve electric quantity、 the highest cell and its number、 the lowest cell and its number、 SOC.

“last page”: display all information except that on first page, including watta-hour consumption、 highest temperature and its number、 lowest temperature and its number and each cell’s voltage.

“next page”: the same as “last page”.

USB jack : communicate controller with computer, upload sampled data to computer to edit、 draw and print.

LCD back lighting switch: control the controller whether lighten the back lighting , can reduce consuming power.

DB25 linker: the interface of controller、 sampling modules 、 alarm output and so on.

B. System parameter

System setting includes: sampling modules information setting、 alarm parameter setting and other information setting.

Sampling modules information setting is to set the number of batteries that are managed by each V-T sampling board and whether sample temperature.

Alarm parameter setting includes: voltage upper limit alarm、 voltage upper limit cut、 voltage lower limit alarm、 voltage lower limit cut、 temperature upper limit alarm、 current upper limit alarm、 maximal voltage difference alarm ,etc.

Other information setting includes: rated capacity、 capacity calibrate、 system time, etc.

System can be set after being installed, and it can save all parameters that have been set automatically and work according with the setting.

Keep pressing “next page” for 8s, you can see “password entering” interface, password consists of 5 numbers. Because system is the indemnity of reliable running, password must be known by technical staff only, the others can not get into the system unless authorization..

System setting interface as follow:

No.	Amount	temperature
0	10	0
First	Last page	Next page

No.: all address of V-T boards that are managed by controller, except current boards.

Amount: the number of batteries that managed by V-T board in “No.”, the default is 10.

Temperature: V-T sampling board whether sample temperature, the default is “0”.

“0”- not sample, “1”-sample

The number in black frame is present editing content, it will increase 1 if press “last page” and will reduce 1 if press “next page” , and enter if press “first page”, after pressing “first page”, black frame will line down automatically.

If you press “last page” and “next page” at same time to save and exit when valid data (the number in black frame) is under editable state, the data won't be saved. You should press “first page” to exit editable state and then press the two keys at the same time .

You should set the number of batteries that are managed by all sampling modules in system before you use it, system will save the setting automatically.

Please pay attention to the “amount” must be “0”, which is relevant to the address that next the last bit of valid sampling module. For example, there are 7 voltage sampling modules in the system, and relevant address is 0~6; so the “amount” that is relevant to “No.=7” must be “0”.

After setting sampling modules, press “last page” and “next page” keys at the same time, you can get into next setting interface, the interface as follow:

Vt alarm upper limit	4.10	V
Vt cut upper limit:	4.30	V
Vt alarm lower limit:	3.60	V
Vt alarm lower limit:	3.10	V

Voltage alarm upper limit:

When the largest cell voltage is larger than this value, the system will provide alarm interface and a group of relay contacts (passive) to alarm while buzzer alarm. Normally, relay common contacts are switched on with N.C. contacts and cut off with N.O. contacts. When it's alarming, common contacts are switched on with N.O. contacts and cut off with N.C. contacts. When it's alarming, if the largest cell voltage drop and it's 5mV lower than the value, the alarm will stop. Press "last page" and "next page" at the same time while it's alarming, you can stop alarming for 2 minutes. If the voltage is still higher than the value after 2 minutes, the system will alarm again. The data is the base of charger adjusting.

Voltage cut upper limit:

When the largest cell voltage is larger than this value, the system will provide a warn interface to alarm while buzzer alarm, which can not be screened or reseted. The alarm won't stop until the controller power is cut-off. The data is the base of charger controlling output

Voltage alarm lower limit:

When lowest cell voltage is lower than the value, the system will lighten the panel and provide warn interface to alarm while buzzer alarm. When it's alarming, press "last page" and "next page" to stop alarming for 2 minutes. If the voltage is still lower than the value after 2 minutes, it will alarm again. If the lowest cell voltage rise and is 5mv larger than the value, the alarm will stop. The value is the base of motor controller reducing output power. When it's charging (with our charger), it won't alarm.

Voltage cut lower limit:

When the lowest cell voltage is lower than the value, the system will lighten the panel and provide warn interface and a group relay contracts to alarm and buzzer at the same time. Normally, relay common contracts are switched on with N.C. contacts and cut off with N.O. contacts, When it's alarming, common contracts are switched on with N.O. contacts and cut off with N.C. contacts. The alarm can not be screened or reset. The alarm won't stop until the controller power is cut-off. When it's charging (with our charger), it won't alarm.

Press "last page" and "next page" at the same time, you can see the setting interface as follow:

Largest charging current:	200	A
Largest discharging current:	90	A
Temperature upper limit:	50	°C
Largest voltage difference:	500	mV
First	Last page	Next page

Largest charging current:

The current value that charger gets into constant current charging phase.

Largest discharging current:

When total current is higher than this value, the system will provide a warn interface to alarm while buzzer alarm. Press “last page” and “next page” to stop alarming for 2 minutes. If the current is still higher than the value after 2 minutes, it will alarm again. When it’s alarming, total current drops and is lower than the value, the alarm will stop. Relay contracts state is the same as “Voltage alarm upper limit”.

Temperature upper limit:

When the highest environment temperature is higher than the value, the system will provide a warn interface to alarm while buzzer alarm. It use the same group contracts with “Voltage cut upper limit” . The value is the base of motor controller adjusting output power.

Largest voltage difference:

The value is the difference between the largest cell voltage and lowest cell voltage. When the difference settles for this value, the system will provide a warn interface to alarm while buzzer alarm. When it’s alarming, if the difference is lower than the value, the alarm will stop. Press “last page” and “next page” to stop alarming for 2 minutes. If the difference is still higher than the value after 2 minutes, it will alarm again.

Rated capacity:	200	A
Capacity calibrate :	90A	
Time :	2008 12/3 8 : 16	
First	Last page	Next page

Rated capacitance: rated capacitance of cell, SOC value is 100%.

Capacitance calibrate:

It's only relevant to charging capacity, and being that case, pay attention to Hall sensor set orientation , please . For example: storage capacity modify=95%, when charge capacity calculate value is 200Ah; charge capacity after being modified=200Ah x 95% = 190Ah. The parameter must be lower than 100% to compensate the capacity wastage when being discharging.

Time: System memory the data associated time. The system will memory it after once set.

Nods invalid alarm:

When the system controller can't communicate with sampling modules, the system will provide a warn interface and a group of relay contacts (passive) to alarm while buzzer alarm. It use the same group contracts with "voltage cut lower limit". It is the base of motor controller reducing output power.

After all setting, press "last page" and "next page" at the same time to return to first page.

Be sure that the system is connected well, and then connect BMS with charger through CAN Bus, detailed connection way see diagram "GTBMS005A-MC17 connection define". Confirm the connection correctness of input/output. If the director light on the host controller panel is lightened, the charging starts, and if the light is black out, the charging finished.

There are 3 phases during charging course:

a. Precharging:

During the precharge course, BMS controls charger charging at 0.05C (rating capacity), after a minute, if the cell lowest voltage is higher than "voltage cut lower limit", the charger will convert to constant current charging phase; if the cell lowest voltage is lower than "voltage cur lower limit", the charger will charge at this current, if the cell lowest voltage is higher than "voltage cut lower limit", the charger will convert to constant current charging phase, or the charging will be stopped.

b. Constant charging:

During this course, BMS controls charger charging at "largest charging current", if "largest charging current" is higher than the charger's largest output current, the charger will charging at largest output current. When is charging, if the cell largest voltage is higher than "voltage alarm upper limit", the charger will convert to trickle charging phase.

c. Trickle charging:

During this course, BMS controls charger inducing output current until the cell largest voltage is 5mV lower than "voltage alarm upper limit", the charger will charge at the current that has been adjusted. The course will cycle until the output current reduces to 0.025C, the charger will stop charging. The charging finishes.

4. English define

V total

Total Voltage

I total

Total Current

E remain

Electricity remain

V max

Voltage maximum

V min

Voltage minimum

W out

Watt out

T max

Temperature maximum

T min

Temperature minimum

C rated

Capacitance rated

T communication

Periods communication