

1. Summarize

GTBMS005A-MC16 a battery management system consists of a colorful led screen with touch panel, a GTBMS005A-MC11 host controller, GTBMS005A-VT voltage、temperature sampling modules and current sampling module , detecting all cells' voltage of the battery pack , total current of the pack and the surrounding temperature . Detailed performances as follow:

A. The host master consists of a colorful screen and managing calculator , the screen displays total voltage and current of the pack 、 storage electrical quantity (SOC)、 maximal temperature , you can examine all the sampled data that includes each cell's voltage 、 temperature 、 capacity、 energy and so on through the screen; you can set the system running parameters through the screen , the running parameters includes the choice whose number of batteries that sampling modules manage 、 cell's voltage upper/lower limit alarm 、 temperature upper limit alarm 、 the highest charging current、 current upper limit alarm 、 the biggest voltage differences 、 charging cycle times 、 battery health index 、 SOC initialization 、 rated capacity、 storage electrical quantity calibration coefficient、 and so on .

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 $1 \sim N$ ($N \leq 10$) 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 CAN Bus (cable) which is compatible with *ISO 11898 standard* completely.

F. The host provides USB interface that can be connected with computer, it can receive all data through the BMS application software,.

G. The host provides alarming interface, voltage upper/lower limit, temperature upper limit

alarm, over current 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 range30~500 A

Current measuring accuracy ± 0.5%

Current display differentiate rate0.1A

Temperature measuring range0℃ ~ 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

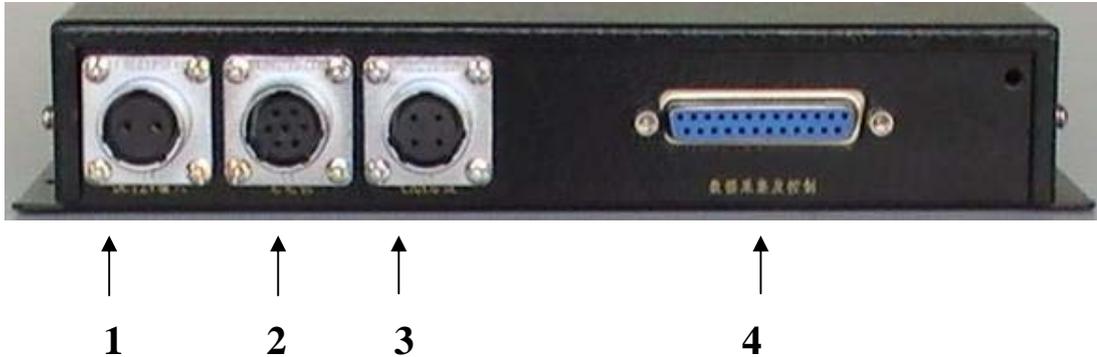
The largest on-off voltage30Vdc

the largest on-off current 1A

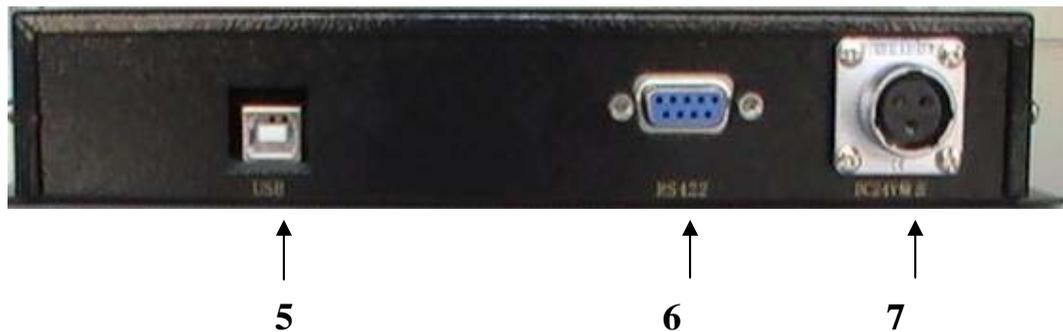
Note: The above correspondence interface of touch-screen display and host, and connecting method can be set depends on the customer's need according to ordering contract.

2. Connection

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



- (1) DC+12V INPUT.(Direct current low voltage power is connected outside)
- (2) Charger.
- (3) CAN Bus interface.
- (4) Interface of data sampling modules and alarm output.



- (5) USB interface ----- to connect computer.
 - (6) RS422 ----- Colorful screen correspondence.
 - (7) DC+24VOUTPUT ----- Colorful screen power interface
- Detailed interface definition is on attached diagram.

3. The set of V-T sampling board:

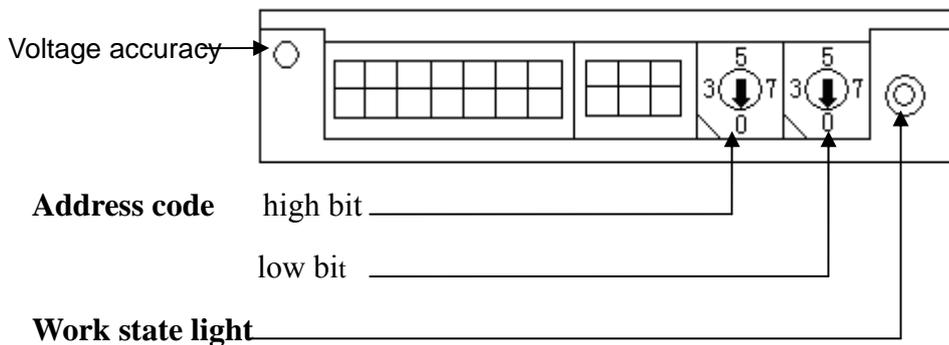
- **Address set**

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	n x 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

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)

- **Adjustment of current accuracy**

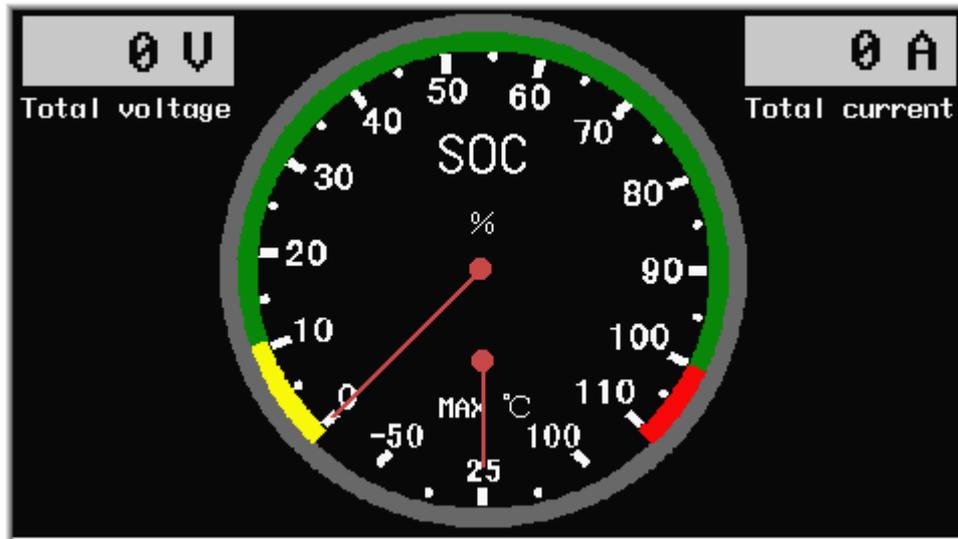
Adjust rheostat W1 of current sampling board to calibrate current true value according with the sampling value (static state) .

- **Connection of current sensor**

See attached diagram, please.

3.Operating

GTBMS 005A-MC16 battery management colorful screen first page interface as follow:

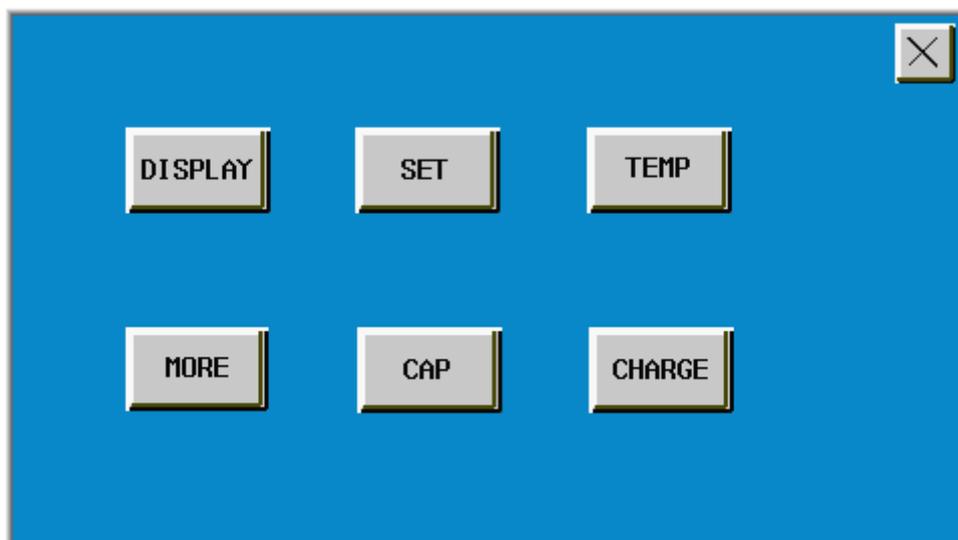


Panel longer finger: pack storage electrical quantity, which is SOC.

Panel shorter finger: maximal temperature of the pack.

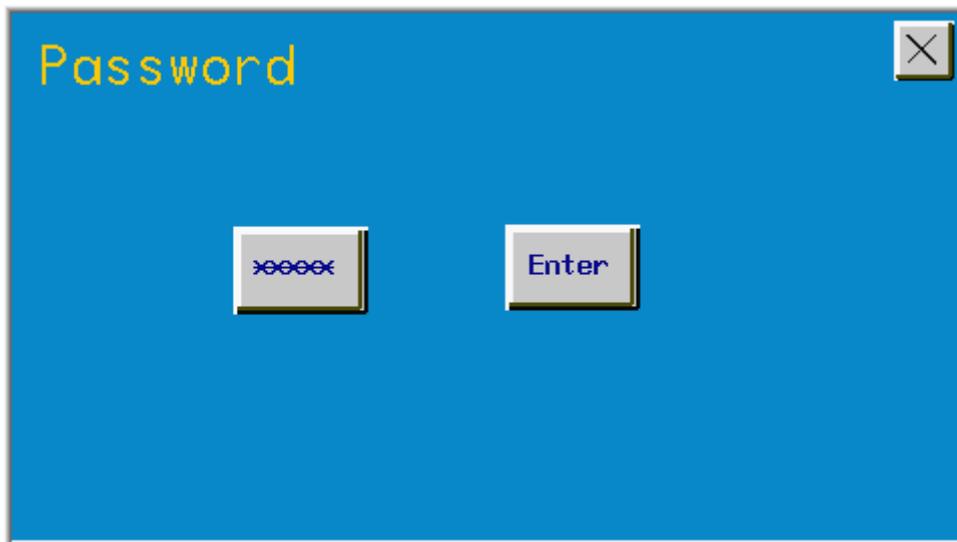
Battery management system menu key is at the central area, the password is on the back of the host. You can examine all data of the pack; you can set system running parameter, after set , system memories automatically , and save when it is cut-off .

Choose system menu key, the interface as follow:

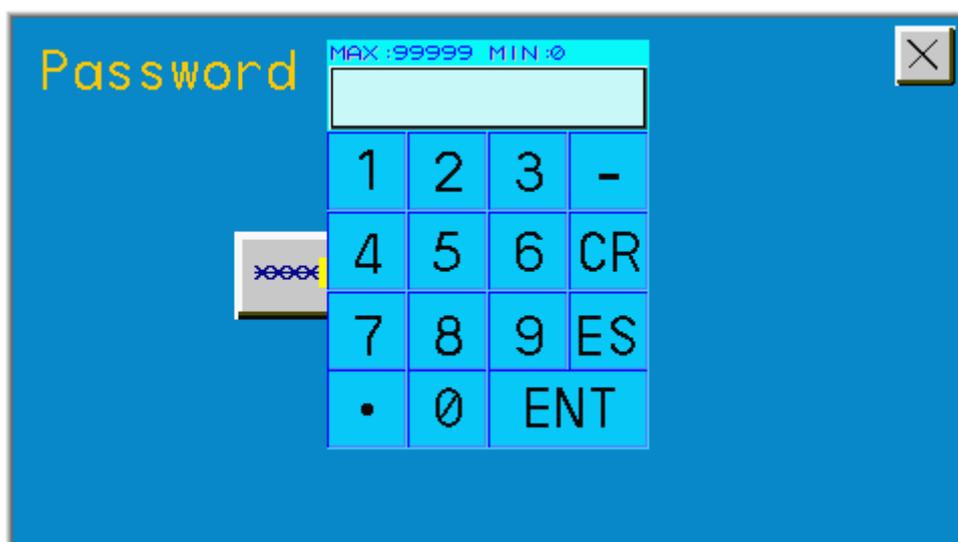


Choose “SET” key when the system is used first time to set the system running parameter, the running parameters includes the choice whose number of batteries that

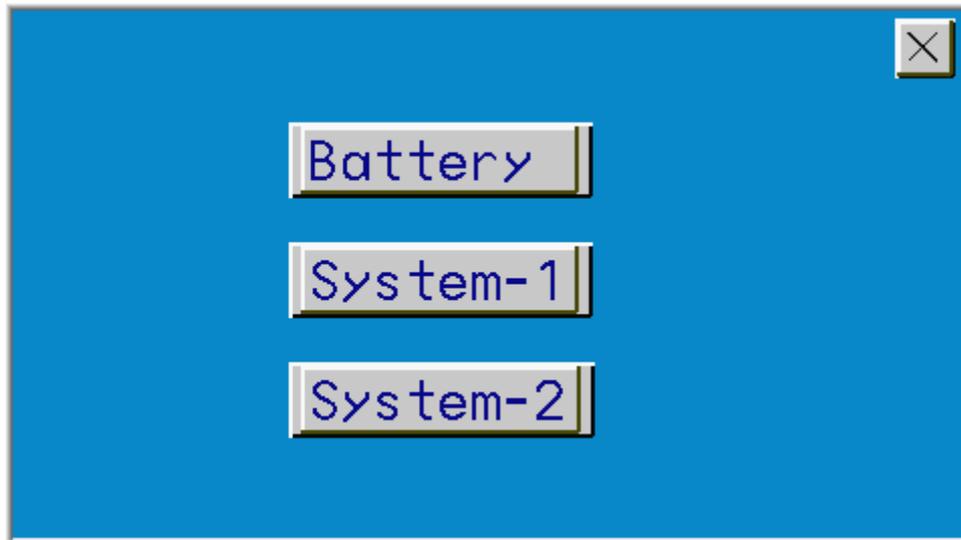
sampling modules manage、 cell's voltage upper/lower limit alarm 、 temperature upper limit alarm 、 current upper limit alarm 、 the voltage difference largest upper limit alarm 、 SOC initialization 、 rated capacity 、 storage electrical quantity calibration coefficient and so on . Choose “SET” key , the interface as follow :



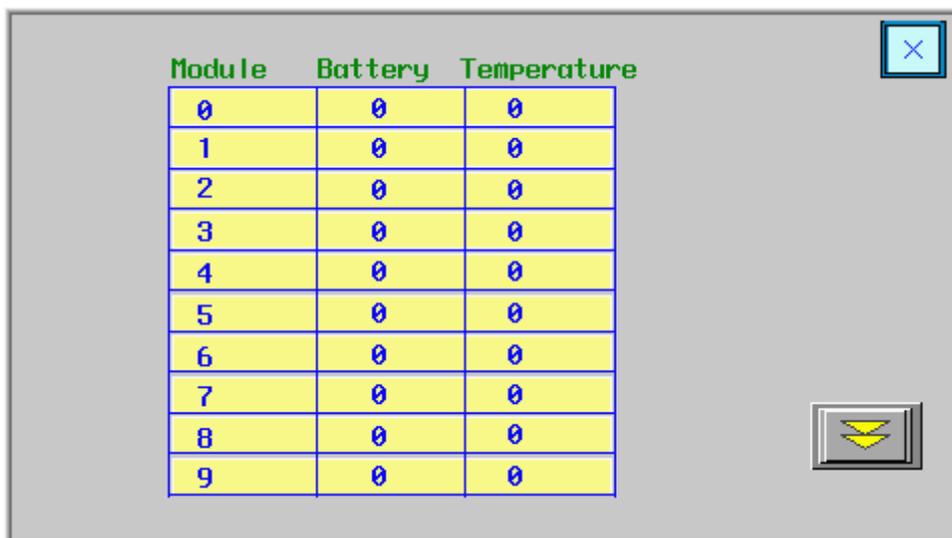
✧ Choose “ ××××× ” the dialog box will popup from original interface, interface as follow:



The password is on the back of host controller, press the number key, you can input the password, the password consists of five numbers, press the “ENT” key after input the password, digital dialog box will be back, then press “enter” key, if the password is wrong it will bomb out dialog box to notice you; if the password is right, you will see the interface as follow:



★ You can set the number of sampling modules: the interface as follow:



The numbers in "Module" are the relevant address of sampling module.

The numbers in "Battery" are the number of sampling modules management batteries that are relevant to this line address(0-10 batteries) and could be modified. The important is the address number of "battery" next to the last available sampling modules must be set as "0". For example, there are 7 voltage sampling modules in system, the address is "0-6", so the "battery" of address=7 must be set as "0".

The numbers in "Temperature" are the sampling modules that are relevant to this line address whether sample temperature (0 not sample,1 sample).

When the number of batteries、 temperature or no temperature and choosing the number in frame are set ,there is a digital dialog box popup ,input relevant value, press "ENT" key ,if the

number you input exceeds the range, the number will not be affirmed, press “X”key to back to parameter setting interface, press “” key to turn pages.

✧ Choose “sys-1” key ,the interface as follow:



Voltage alarm upper limit:

When the largest cell voltage is larger than this value, the system will provide scroll word and a group of relay contacts (passive) to alarm while buzzer alarm . 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. When it’s alarming, if the largest cell voltage drop and it’s 5mV lower than the value, the alarm will stop. The data is the base of charger current adjusting, during the charging, if any cell voltage is larger than the value, charger will adjust output current until the largest cell voltage in the pack is lower than the value and constant-current charge at adjusted current, if charge adjust output current is lower than 0.025C (rating capacity), charger will stop charging, the charging finish.

Voltage cut upper limit:

When the largest cell voltage is larger than this value, the system will provide scroll word while buzzer alarm. The alarm won’t stop until the power is cut-off. The data is the base of charger cut-off output current, during the charging, if any cell voltage is larger than the value, the BMS will control the charger stop charging..

Voltage alarm lower limit:

When lowest cell voltage is lower than the value, the system will provide scroll word

while buzzer alarm. When it's alarming, if the lowest cell voltage rise and is 5mv larger than the value, the alarm will stop. The data is the base of motor controller reducing output power.

Voltage cut lower limit:

When the lowest cell voltage is lower than the value, the system will provide scroll word 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 won't stop until the power is cut-off.

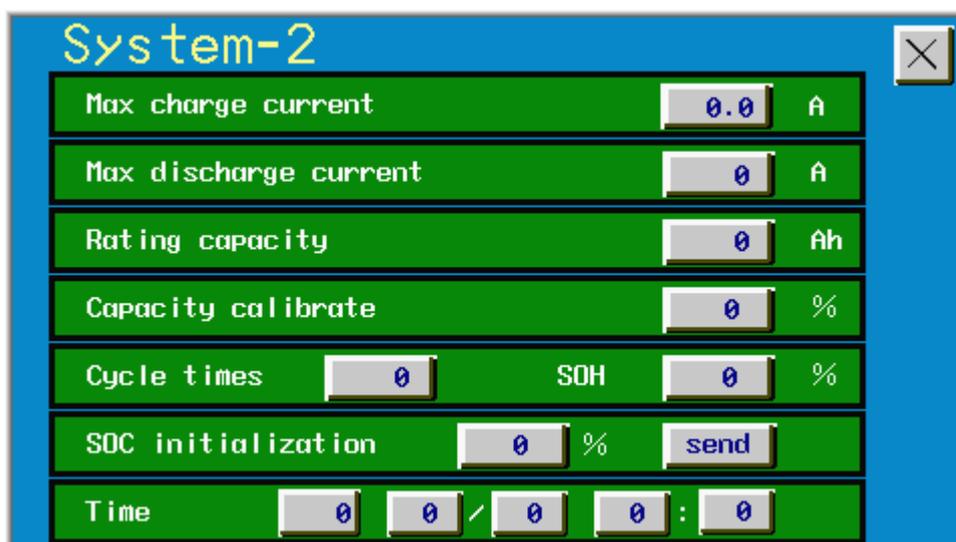
Delta voltage alarm:

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 scroll word and buzzer alarm. When it's alarming, if the difference is lower than the value, the alarm will stop.

Temperature upper limit:

When the highest environment temperature is higher than the value, the system will provide scroll word and a group relay contracts to alarm. When it's alarming, if the highest temperature drop and is 4°C lower than the value , the alarm stop. Relay contracts state the same as “Voltage cut upper limit” . The value is the base of motor reducing output power.

✧ Choose “sys-2” key ,the interface as follow:



Max charge current:

If you use our charger, the value is the largest output current, or the value is invalid.

Max discharge current:

When it's discharging, if the total current is higher than the value, the system will provide scroll word and a group relay contracts to alarm and buzzer at the same time.

Rating 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.

Cycle times: the value screen a display is charging times can be used to clear.

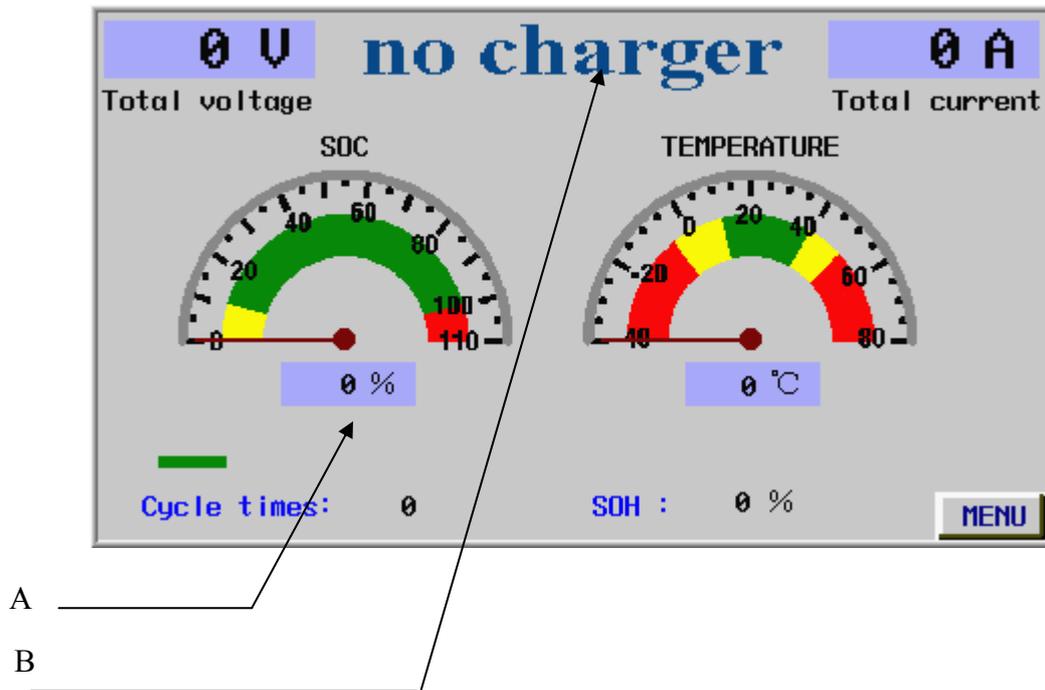
SOH: the value is battery group health state, can be used to set.

SOC initialization : Rest electrical quantity initialization. Every time it gets into "system-2", this value is 0%. The first time you use this system, you need to set the pack's rest electrical quantity, the value should be set as 0%~ 105%, you should choose "send" key after your set, or the value you set will be invalid. Suggest set at 100% after the first normal charging.

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

NODE INVALID ALARMING: when the host controller fails to communicate with sampling modules, the system will provide scroll word and a group relay contracts to alarm and buzzer at the same time. This alarm output relay uses the same group contacts with "voltage cut lower limit". The value is the base of motor controller reducing output power.

Choose "CHARGER", the interface as follow:



A: SOC state indicator: when it's charging, the indicator scrolls to display. When it's not charging, the number in indicator is the current SOC value.

B: Charger state:

no charger: the charger is not connected

ready: the charger gets ready, can charge

charging: the charger is charging

stop: the charger has stopped charging

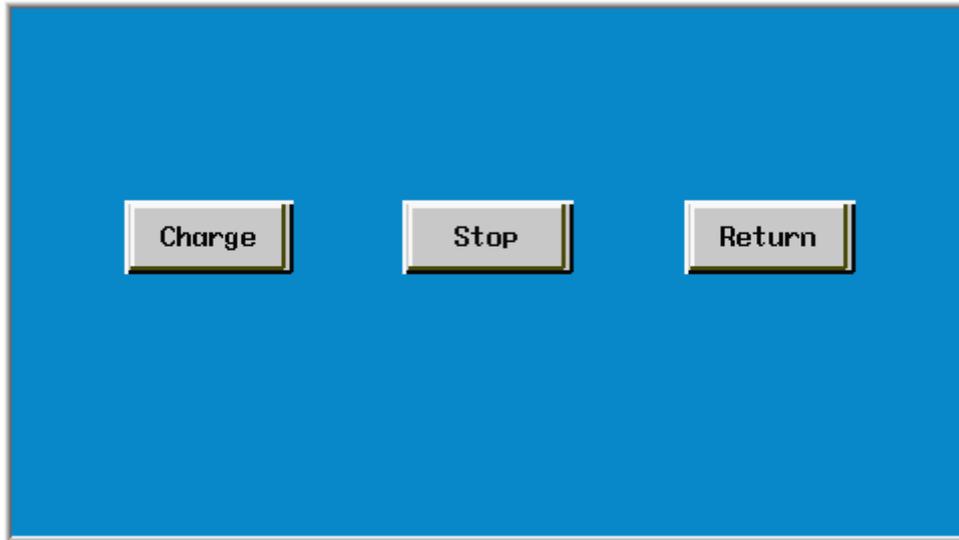
cycle times : charging cycle times

SOH: battery group health index

SOC: residual electrical quantity

Temperature: battery group highest circumstance temperature.

Choose "MENU", the interface as follow:

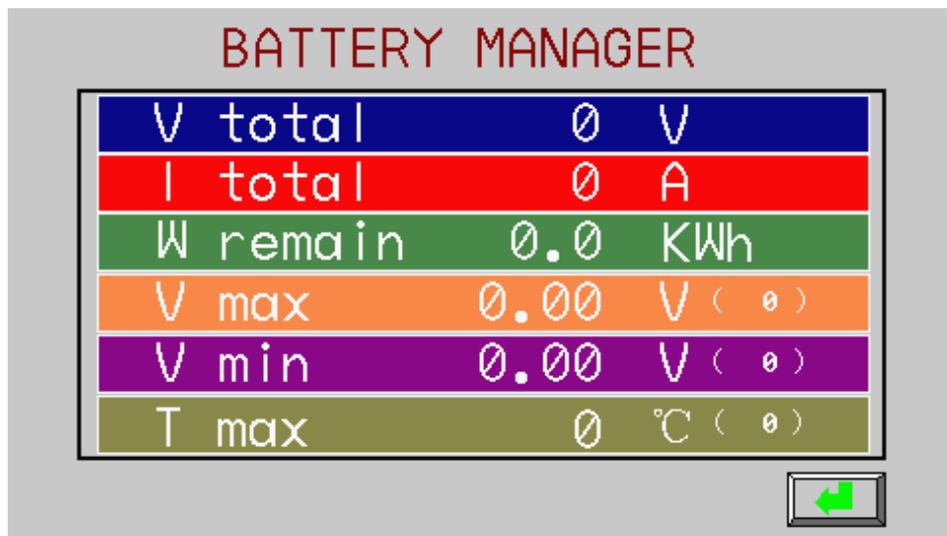


Charge: when the charger's state is "ready", choose this key to charge

Stop: choose this key to stop all output

Return: choose this key to back to homepage

Choose the "DISPLAY" key in the menu, the interface as follow :



Choose the "TEMP" key, the interface as follow :

sample temperature sample temperature

1	0 °C	6	0 °C
2	0 °C	7	0 °C
3	0 °C	8	0 °C
4	0 °C	9	0 °C
5	0 °C	10	0 °C



Monitoring point temperature default is 0°C , if there are 2 monitoring points , it will display 2 temperature value .

Choose “MORE” key , the interface as follow :

NO.	VOLTAGE	NO.	VOLTAGE
1	0.000 V	6	0.000 V
2	0.000 V	7	0.000 V
3	0.000 V	8	0.000 V
4	0.000 V	9	0.000 V
5	0.000 V	10	0.000 V



You can examine each cell's voltage. The default is 0.000V.

Choose “CAP” , the interface as follow :

