Master BMS(BMC)Instructions

Battery Management Controller，电池管理控制器。BMS 系统的核心控制器。其它所有的控制器，都按照 BMC 控制指令运行。主要功能是将电池组的所有的单体电压、总电压、总电流、单体温度、电量等进行汇总统计，计算并确定当前电池组状态；发出均衡控制指令；发送 BMS 状态数据的 CAN 报文；输出充电、放电控制信号；整个 BMS 系统的故障诊断、通信功能、用户控制命令响应等。

BMC (Battery Management Controller)，Core controller of BMS(Battery Management system)， All the other cotrollers (BSC) follow BMC' s instructions. Its main function is to collect the data of the battery pack， including individual voltage， total voltage， total current，individual temperature， battery capacity，make a summary and work out the battery pack status; It issues instructions of balance control; It sends Can protocals of BMS status data; It outputs charging and discharging control signals; It also takes charge of fault diagnosis， communications， command response of user control etc.

图片仅供参考

特点和应用参数

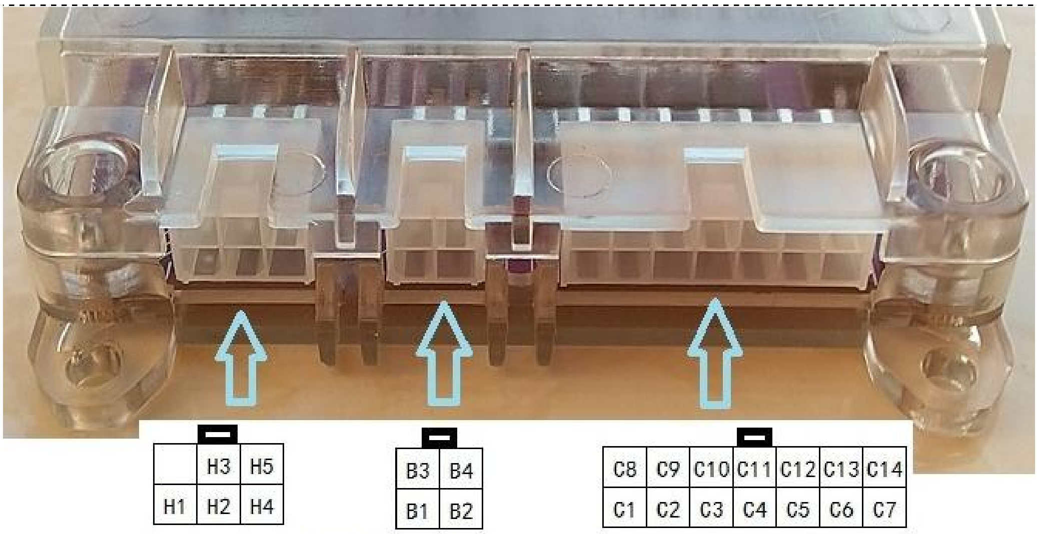
Characteristics and Application

- 低压供电：额定 12V，10-28V 直流电压，建议 12V-15V 之间。
- Low voltage power supply: Rated voltage 12V， Range 10-28VDC， 12V-15V is recommended

- 休眠关机后 0 电流，不消耗 12V 启动电池，防止下一次无法黑启动。工作期间 BMC 自身电流典型值小于 60 毫安。（条件：在 14V 供电、不包含接触器、BIC 采集器、以及其它附件的情况下）
- 0 current after sleep shutdown,and it will not consume starting battery(12V),can support black start.The typical current value of the BMC in working condition is less than 60mA.
- 支持 CAN 数据通信功能，可读取电池组所有数据状态，方便客户适配各种 PCS、逆变器、充电机等。
- Support can data communication function, and it can read all the data status of the battery pack,to adapt to all kinds of PCS, inverters, and chargers etc.
- 提供状态信号输出功能，具有较高的输出电流能力，可直接驱动线圈类，比如继电器或接触器
- Output of Status signal, high capacity of output current,it can drive the coil load directly, as relay or contactor.
- 12V 低压控制电路，与高压电池总电压电流检测电路之间，设计了绝缘隔离。额定隔离耐压 1500VDC，无特殊要求时，建议用于 500VDC 以下的系统。超高压系统，可提供更高的绝缘耐压版本。
- 12V low-voltage control circuit,total voltage and current detection circuit of High voltage battery
- 电流测量：可以匹配各种规格的常见的分流器，电流测量范围宽广。从几安开始，最高可超过几千安。
- 总电压检测直接支持 400VDC，精度±1V；简单扩展后可达 850VDC，最高可超过几千伏，请联系我们。
- 工作温度范围：-40℃至 85℃，湿度：20%-90%RH 无冷凝，绝对不可以结露，否则高压漏电。务必做好防护。海拔<2000 米以下使用，超过 2000 米需要加强绝缘处理。
- 防护等级：无，需要用户整机做好灰尘、潮湿、震动、高低温等等的防护。
- 外形尺寸在本文最后，典型重量：130g

内部参考图

端子编号识别



引脚编号 PIN number

配套 BMC 主机的线束插头，为 4.2mm 间距双排规格，习惯上叫做 5557 系列端子，市场上大量有卖。可以参考资料包中的 Molex 系列插头规格书。Harness plug of supporting BMC host, It is a double row specification with a spacing of 4.2mm, It is conventionally called 5557 series terminal, Refer to the Molex Series Plug specification in the data package.

端子编号定义表 Terminal definition table

1、BIC 供电通信端口		
No	Name	Description
B1	CAN-L	CAN communication cable. Connect to Slave BMS (BIC). If the cable is too long, it is recommended to use shielded cables. Cable data H and cable data L are twisted pair cables wrapped in the shielding layer, and the shielding layer is connected to the negative of power supply . No built-in 120 Ohm terminal resistor is available. Connect the 120 Ohm terminal resistor to an appropriate position. The braud rate is 250K. Select an appropriate cable.
B2	CAN-H	
B3	BIC Negative -	The output supplies power to the slave bms . The output voltage is the input power supply of the Master Bms . After the Master bms is shut down, the power supply to the port is turned off. The continuous output current should not exceed 1.5A and the instantaneous peak value should not exceed 6A. If more slave bms are connected to the master bms and it exceeds power supply capacity of master bms , Please use a relay to expand the current.
B4	BIC Positive +	
● 本端口专用于为 BIC 提供供电和通信，不能连接其它设备。 This port is used to supply power and communicate with the slave bms and cannot be connected to other devices. ● 如果有多个 BIC，只需将每个 BIC 的供电通信端口的 4 针，一对一并联即可，具体参考推荐电路图。 If there are multiple slave bms,you just connect the 4 pins of the power supply communication port of each slave bms in one-to-one parallel, refer to the recommended wiring diagram for details. ● 通常直接并联约 20 至 30 个 BIC 可以稳定通信，如果连接更多 BIC，请联系我们。 Max 30 slave bms can be connected directly in parallel to Master bms if stabilize communication;please contact us if you connect more Bics,		

2、总电压电流检测端口 Total voltage and Total current detection port		
No	Name	Description
H1	Total Positive	电池组总输出正极电压采样。此端口会产生微小耗电，设计电路时，考虑电池组关机后此端口不能继续耗电。 Battery total positive： voltage sampling. This port will generate a small power consumption;wnen design the circuit, Please consider that this port can not continue to consume power after the battery pack is shut down.

H2	No connection/ Empty	该端口空余的原因是在总电压测量的正负极之间拉开足够的绝缘距离。 The reason for the port to be empty is to put a sufficient insulating distance between the total positive and total negative terminals of the battery pack
H3	Total Negative	电池组总输出负极电压采样 Battery total negative: voltage sampling
H4	Shunt Positive	电流检测分流器的毫伏信号输入。 Signal input for current measurement if shunt. H3、H4、H5，必须正确连接至分流器的“指定接线点位”上。这 3 条信号线，任意 2 个之间压差超过 3V，将损坏 BMC。请参考电路图 Terminal H3, H4, and H5 must be properly connected to the "specified connection point" of the shunt. If the voltage difference between any two of the three signal cables exceeds 3V, the master bms will be damaged. Please refer to the wiring diagram
H5	Shunt Negative	

- 总电压检测和电流检测需要进行参数标定，电压电流显示值、电量统计计算才能显示正常，请看参数设定部分。

  The total voltage measurement and current measurement need to be calibrated, and the voltage and current value and SOC calculation can be displayed correctly . Please refer to the parameter setting chapter.
- 如果环境恶劣，例如潮湿、高海拔，请务必电路板涂装绝缘漆，甚至用耐高压硅胶处理爬电距离；

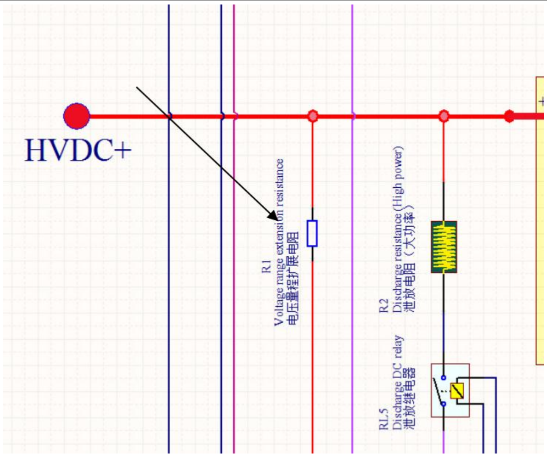
  If the environment is harsh, such as humidity, high altitude, be sure to paint the circuit board with insulating paint, and even use high-pressure silicone to deal with the creepage distance;
- 电池组最高电压在 400V 以下，H1 可以直接输入总正极进行检测，如果最高超过 400V，请按照扩展总电压量程的方法操作。

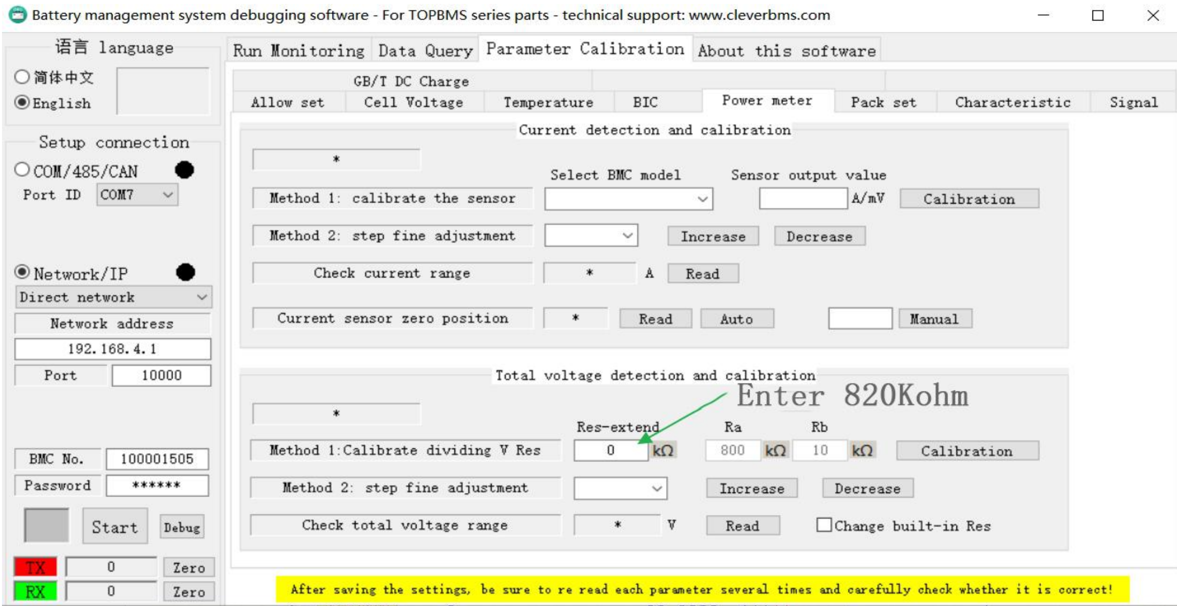
  If the maximum voltage of the battery pack is below 400V, Terminal H1 can go directly into the total positive for measurement. If the maximum voltage exceeds 400V, extend the total voltage range.

电压量程扩展：How to do voltage measurement Range Extension

总电压检测标定实例：电池组 3.2V*192 串，最高总电压 3.6*192=691.2V，超过了 BMC 默认的约 400V 量程，需要扩展总电压量程。每扩展 100V 大约需要串联 200K 的电阻。选择 820K/1W 电阻串联到总电压检测的信号线中。软件中扩展电阻输入 820，Ra、Rb 不改动。点击标定，软件提示“Done”。读取总电压量程，显示 815V，满足最高电压值的测量。

Take example of Total voltage measurement and calibration : Battery pack 3.2V*192 in series, the maximum total voltage 3.6*192=691.2V, exceeds the measurement range of about 400V of the master bms , It need to expand the total voltage range. Approximately 200K resistance in series is required for every 100V extension. Select 820K/1W resistors connected in series to the signal wire for total voltage measurement. For the expanded resistance ,enter 820 in the PC software, Ra, Rb remain unchanged. Click " Calibration", and the software shows "Done". Read the total voltage range, showing 815V, to be in line with the highest voltage





- 电池放电，电流值为正；电池充电，电流值为负。如果有错误可能是 H4 H5 接反。

  Battery discharge, current value is positive; The battery is charged and the current value is negative. If there is an error, it may be the H4 and H5 connected reversely

- 分流器推荐使用热电势低的材质，例如锰铜材质。否则没有电流情况下也会出现数值漂移。
- 市场上常见的分流器为 75mV 规格，假设选用 300A75mV 的，BMC 满量程为 40mV，经过标定后实际的电流检测量程为 40÷75×300=160A。

  The standard shunt on the market is 75mV If 300A75mV is selected, the BMC full scale is 40mV, and the actual current meansurement range after calibration is 40÷75×300=160A.

- 如果选用霍尔电流传感器，请联系我们取得技术支持。

  If you choose a Hall current sensor, please contact us for technical support.

3、控制和供电端口 Control Port and Power supply ports

No	Name	Description
C7，C14	Positive of Power Supply	BMC 低压 12V 供电电源输入。允许 10-28V 直流电压范围。电源电流的输出能力要足够，防止电压瞬间被拉低不足 10V 而导致出错。 Master BMS Low voltage 12V power supply. 10-28V DC voltage range is allowed. The output of the power supply current should be capable to prevent the voltage from being pulled down by less than 10V instantly, resulting in errors.
C5，C12	Negative of Power Supply	
C13	放电开机/关机信号 Discharge power on/off signal	该端口输入 1 次 12V，触发 BMC 唤醒，并执行放电控制；再次输入 12V，关闭放电控制，这时如果没有充电信号输入，BMC 将关机。 Input 12V at first via the port to trigger the master bms to wake it up and execute discharge control. Input 12V again to turn off the discharge control. At this time, if there is no charge signal input, the master bms will shut down. 通过软件改参数，可以将该端口改为：仅打开放电控制。放电控制还可以配置为自动打开，具体查看参数配置部分文档。 By modifying the parameters in the PC software, you can change the port to enable discharge control only. Discharge control can also be configured to automatically turn on , see the specific parameter configuration section of the document. 该端口禁止长期接通 12V，否则产生不必要耗电。建议用自复位按钮。 Do not add 12V to this port for a long period of time. Otherwise, unnecessary power consumption is generated. A self-reset button is recommended.
C4	放电关机信号 Discharge shutdown signal	该端口输入 1 次 12V，将控制 BMC 关闭放电控制，如果此时没有充电信号，BMC 将休眠。禁止长期接通 12V，否则产生不必要耗电。建议用自复位按钮。 When 12V is input via the port, the Master bms disables the discharge control. If no charging signal is input , the master bms goes to sleep. Do not connect 12V for a long time; otherwise, unnecessary power consumption is generated. A self-reset button is recommended.
C6	充电器接入信号	该端口持续输入 12V 时，不论 BMC 当前是否被放电控制唤醒，将执行充电控制。如果 BMC 设定为自动开启放电，在电池状态允许时，放电控制也将启动；当 12V 撤销时，BMC 禁止充电控制流程，这时如果没有开启放电，BMC 将休眠。 推荐用法：当充电电源准备好时，通过小继电器等，触发此信号。 When 12V is added to the port for long time , the charge control is performed regardless of the master bms wake-up by the discharge control. If the master bms is set to automatically start discharge, discharge control will also start when the battery status is allowed When 12V is cutoff , the master bms disables the charge control process. In this case, if the discharge is not enabled, the master bms goes to sleep. Recommended usage: When the charging power supply is ready, through the small relay, etc., to trigger this signal.
C2	CAN-H	BMS 系统数据通信端口，没有内置 120 欧终端电阻，需要在合适的位置增加。 No built-in 120 ohm resistor in the BMS CANBus communication port,, you needs to add 120 ohm resistor at the appropriate location. 1、连接各种功能模块：国标充电桩通信引导模块、预充电模块、绝缘检测、
C3	CAN-L	

		接触器烧结模块、蓝牙、WIFI 联网通信模块、显示屏等。 1. The port is used to connect various modules: National standard charging communication adaption module, pre-charging module, insulation detection, contactor sintering preventation module, Bluetooth, WIFI communication module, display , etc. 2、连接其它的控制器，例如 PLC 控制器、EMS 系统、PCS 等连接； 2. The port is used to connect other controllers, such as PLC controller, EMS system, PCS connection; 3、客户读取 BMS 各种数据，进行二次开发，打造客户自己的电池应用程序。 3, BMS data can be checked via this port , redevelopment can be done via this port to create their own battery applications.
C8	充电控制信号输出 Charge control signal output	BMS 当前是否允许充、放电的状态信号输出。与 CAN 通信报文的充、放电接受能力数据同步对应。当 CAN 报文的充、放电接受电流能力为 0 时，本端口对应输出无信号；否则输出有信号。 BMS Indicates if the output signals of charging and discharging status are allowed . It is synchronized with the charge and discharge acceptance data of CAN communication protocals . When the charging and discharging accepting current of CAN protocals is 0, no output signal is generated by the this port. Otherwise the output has a signal. 如果充、放电设备没有通信控制接口，而仅有信号控制接口，则可用此信号控制允许充电、允许放电。 If the charging and discharging device has no canbus communication interface, but only the signal control interface, the signal can be used to control the charging and discharging. 该端口可直接驱动继电器、接触器等线圈类负载。 The port can directly drive coil loads such as relays and contactors.
C9	放电控制信号输出 Discharge control signal output	
C10	分压接触器输出 Output of voltage divider Contactors	通常用于驱动分压接触器，接通电池串的直流主回路。详见参考电路图。BMS 系统自检正常后吸合。一旦发生某些严重故障，比如单体电压严重过高过低（不是超过了充放电保护值，而是极限保护值，说明充放电失控。请看参数设定文档说明）、通信失败等，将断开分压继电器。 It is usually used to drive the contactor () and connect the DC main circuit of the battery string. See the reference wiring diagram for details. The relay will work after master BMS self-test is ok . Once some serious faults occurs, such as the cell voltage is seriously too high and too low (not exceeding the charge and discharge protection value, but reach the limit protection), it indicates that the charge and discharge are out of control. Please see the parameter setting document description), communication failure, etc., will disconnect the contactor . 驱动分压接触器数量较多、驱动线圈电流较大时，请用继电器扩流。 When the quantity of driving voltage divider contactors is large and the drive coil current is large, Please use the contactor to expand the current.
C11	状态信号输出 Status signal output	该端口可直接驱动继电器、接触器等线圈类负载。 The port can directly drive coil loads such as relays and contactors.

		目前，该端口暂时设定为：在 BMS 进入正常工作后，打开信号输出；当 BMS 关机的前几秒、发生某些故障时，信号关闭输出。 该端口也可根据客户要求进行定制。 At present, the port is set to: perform the signal output after the BMS work well ; In the first few seconds of the BMS shutdown, and some fault occurs, the port cut off the signal output. The port can also be customized according to customer requirements.
C8、C9、C10、C11，均为下拉控制，每个端口长期持续 0.5A，峰值 3A 输出能力。下拉含义：当有信号输出时，这个端子将由内部开关接通到 BMC 负极，那么这个端子和正极之间就可以得到电压，从而驱动负载。 C8, C9, C10, C11, all pull-down controls, each port has long-term 0.5A, peak 3A . Drop-down control means: When there is a signal output, this terminal will be connected to the master bms negative terminal by the internal switch, then the voltage between this terminal and the positive terminal can be obtained, thereby driving the load.		
C1	辅助供电输出 Backup power output	BMS 开机后，该端口输出一个电压，用于某些扩展功能模块的供电，BMS 关机后，该端口断电，防止消耗低压电池电量。输出电流能力：长期持续小于 0.5A，峰值小于 4A。 After Master BMS is powered on, the port outputs a voltage to supply power to some extended modules. After Master BMS is powered off, the port is powered off to prevent low-voltage battery power consumption. Output current capacity: long-term duration less than 0.5A, peak less than 4A.

5、Master BMS Laout Dimension