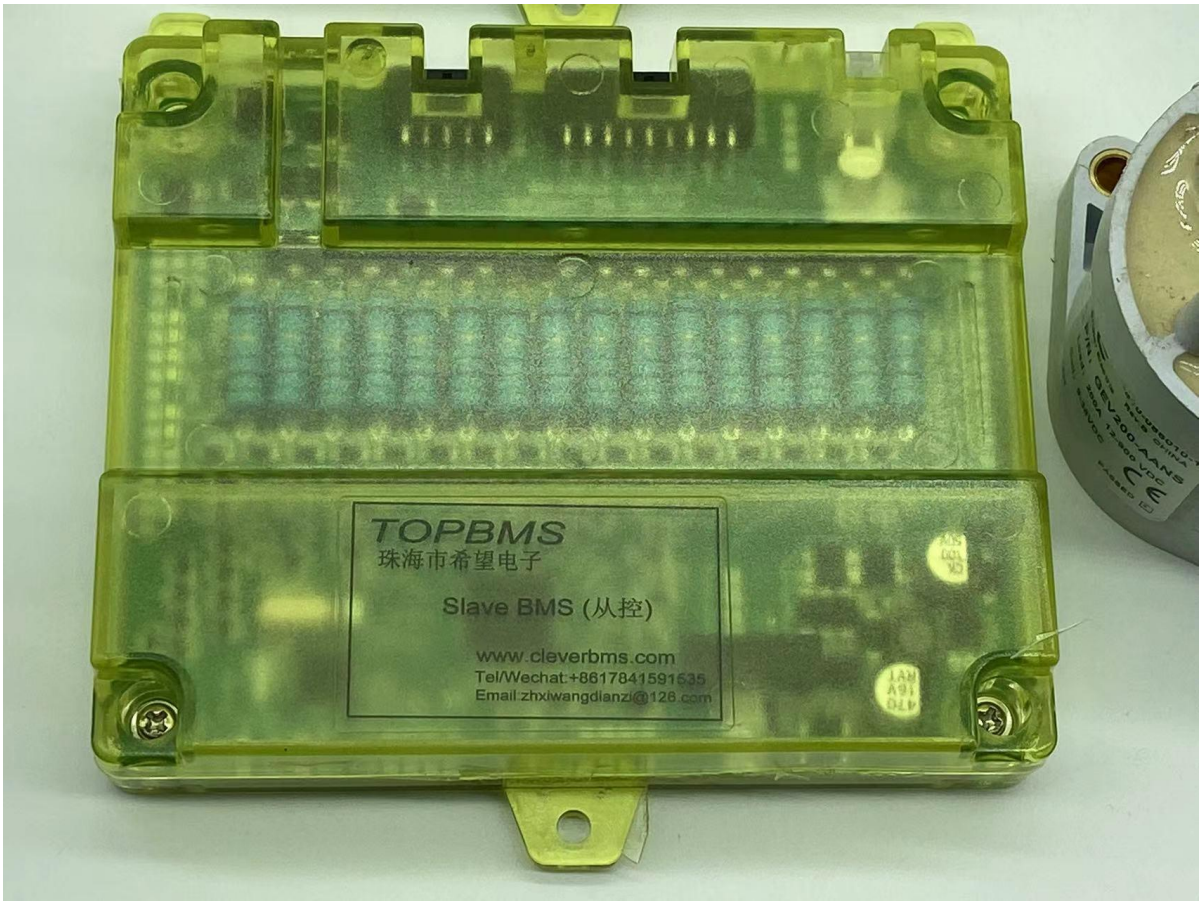
Slave BMS (BIC)

Slave BMS (BIC)，功能：采集每个电芯单体的电压；采集单体电芯温度；对每个单体电芯进行电压均衡；与 BMC 进行数据交换，将采集的信息传送给 BMC，接收 BMC 的控制指令。

Slave BMS (BIC); Function: Collect the voltage of each cell; Collecting the temperature of single cell Voltage equalization is carried out for each cell. Slave BMS Exchange data with Master BMS(BMC), transmit collected data to BMC, and receive control commands from BMC.



特性参数 Features:

- 每个 Slave BMS(BIC)支持 3 串 至 16 串，支持多个 BIC 组合。理论上支持超过 1000 串。

Each Slave BMS(BIC) can take 3 to 16 strings, and multiple BIC combinations are supported. It can supports more than 1000 strings.

Remark : For li-ion nmc battery (3.7v),each Slave BMS(BIC) can take 3 to 14strings

For Lifepo4 battery (3.2v),each Slave BMS(BIC) can take 3 to 16strings

For LTO battery (2.3v),each Slave BMS(BIC) can take 3 to 16strings

- 非常高的单体电压采样精度：典型±0.002V；

High accuracy of cell voltage sampling ; Typical accuracy ±0.002V;

- 单体电芯测量范围支持 0.5V 至 4.75V，支持目前世界上绝大部分的电池类型

  Single cell measurement range is 0.5V to 4.75V, which can support most of the various batteries in the world

- 电芯温度检测范围-40℃至 100℃，典型精度±1.5℃，具体见温度采样端口定义表

  Cell temperature detection range -40℃ to 100℃, typical accuracy ±1.5℃,

- 非常低的采样线消耗：休眠期间小于 0.1uA；

  Very low consumption when cell measurement: less than 0.1uA during sleep mode

- 全自动定时超高精度采样线补偿，采样线的长度、内阻，以及均衡电流，在规定范围内（见表 3），对采样电压影响小于 1mV

  Fully automatic timing high precision compensation when long balancing wires, balancing wires length, internal resistance, and balanced current, within the specified range (see Table 3), The tolerance on the sampling voltage is less than 1mV

- 常规供货的产品，供电通信端口，与电压温度采样端口之间隔离，额定隔离耐压 1500VDC，无特殊要求时，建议用于 800VDC 以下的系统。超高压系统，可提供更高的绝缘耐压版本。

- 供电和通信使用专用接线，避免从电池串供电产生的不均匀耗电等一系列问题。

  Special wiring is used for power supply and communication to avoid a series of problems such as uneven power consumption caused by battery string power supply.

- 均衡电路有温度监控，防止 PCB 温度过高，大约超过 60℃至 65℃，自动停止均衡。

  The balance circuit of each slave bms has temperature monitoring to prevent the PCB temperature from being too high;

  When more than 60 ° C to 65 ° C, automatically stop the balance.

- 工作温度：-40℃至 85℃。可定制更极限的温度范围。

  Operating temperature: -40℃ to 85℃. More extreme temperature ranges can be customized.

- 湿度：20%-90%RH 无冷凝，绝对禁止潮湿甚至结露，否则高压漏电。务必做好防护。

  Humidity: 20%-90%RH Non-condensing, absolutely avoid moisture and even condensation, otherwise high voltage leakage. Be sure to protect yourself.

- 海拔 2000 米以下使用，超过 2000 米需要加强绝缘处理。

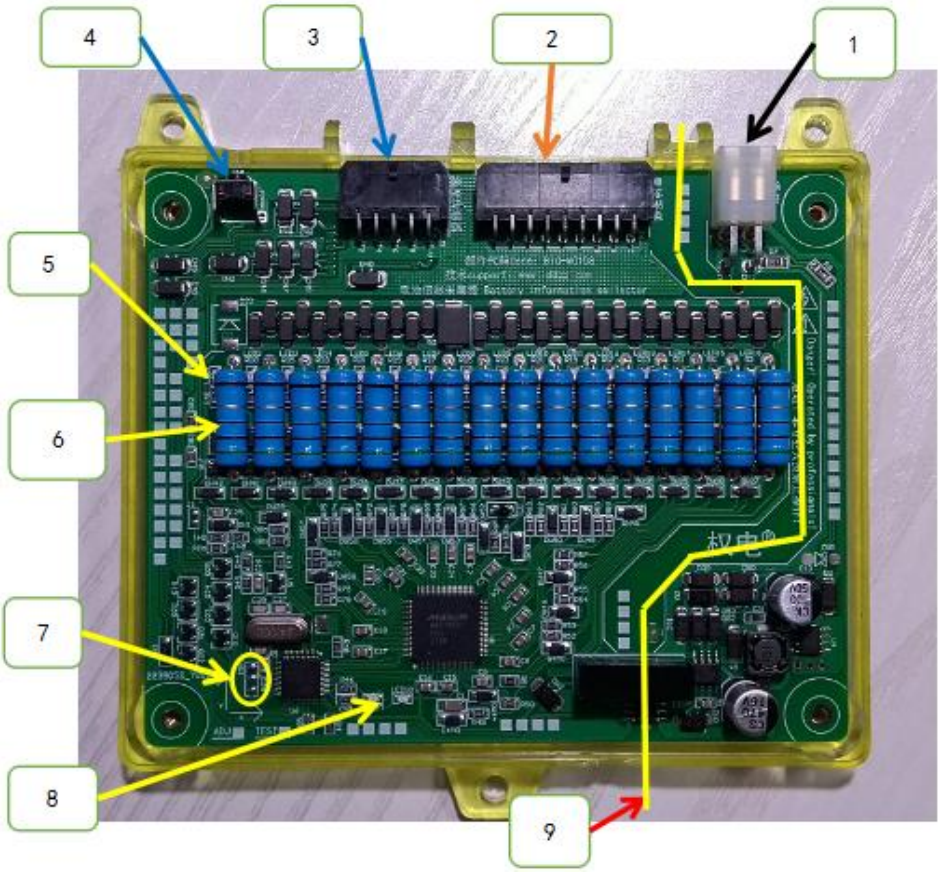
  Use under this condition : Above sea level 2000 meters below , more than 2000 meters sea level . you need to strengthen insulation treatment.

- 典型重量：210g

  Weight:210g

内部线路板（PCB）的功能布局（如果需要供货裸板，请联系我方）

Layout of internal circuit board (PCB)



1. 供电和通信插座：与 BMC 进行通信

1. Power supply and communication socket: communicates with the Master BMS(BMC)

2. 电芯电压采样插座：依次连接电池组串的各个正负极串联点，采样每个单体电芯电压。

2. Cell voltage sampling socket: Connect each positive and negative point of the battery in series , and sample the voltage of each cell.

3. 电芯温度采样插座：连接温度传感器，监测电池组温度。

3. Cell temperature sampling socket: Connect the temperature sensor to monitor the battery temperature

4. 操作按键，按下后，将允许改动参数

4. Press the button to allow parameters to be changed

5. 均衡指示灯

5. Balance light

6. 大功率均衡电阻

6. High power equalizing resistance

7. 测试点，用于固件升级

7. Test point for firmware upgrade

8. 指示灯 LED17、LED18 为通信和采样指示灯。调试系统时，用来观察状态。

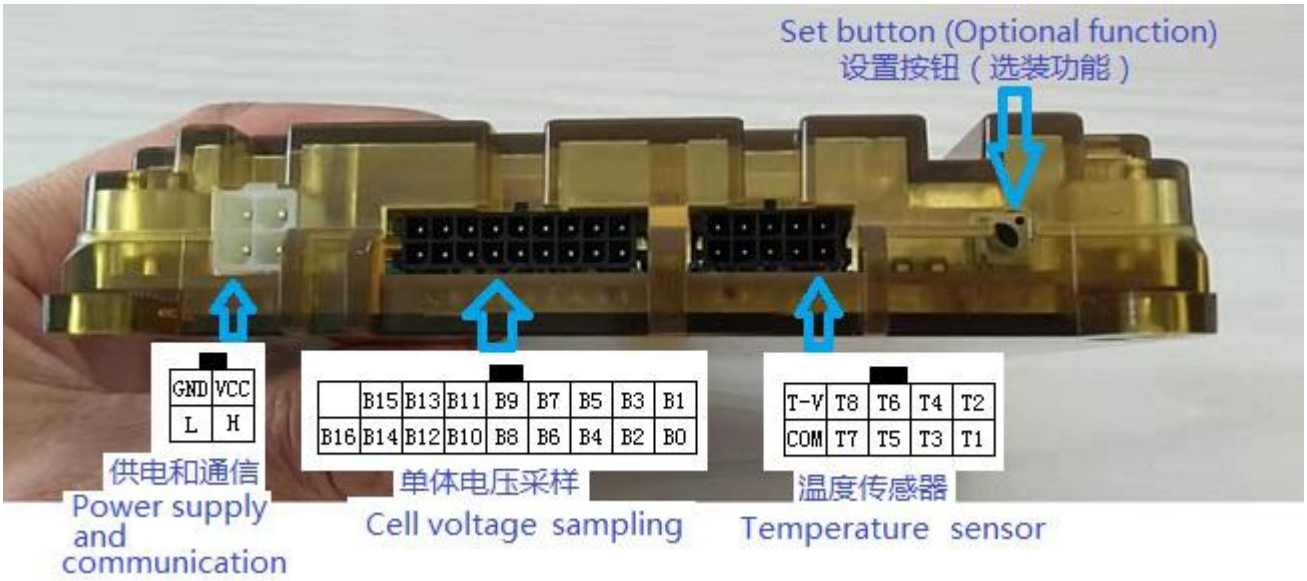
8. Indicators LED17 and LED18 are communication and sampling indicators separately .

It is Used to observe the status when debugging the system

9. 绝缘区域：将电池组采样部分，和通信部分隔离绝缘，防止电池组高压，串入 BMC 的低压部分。

9. Insulated area: Isolate the sampling part and the communication part to prevent the high voltage of the battery pack from entering the low voltage part of the slave bms

Slave BMS(BIC):Plug terminal definition



注意：信号线束请自行制作，少量样品我方默认提供插头，可自行压线。

批量应用，建议寻找第三方专业的线束厂采购线束和插头。插头规格请参考附件文件。单体电压和温度使用 43025 系列插头，通信和供电使用 5557 系列。

请注意，设置按钮的金属支架与电池组不绝缘，必须使用绝缘的材料去按压按钮！以防触电！

Terminal definitions of Communication and power plug (Table 1)		
No	Name	Description
GND	Negative of Power supply	Power Supply Input 。Operation Voltage Range ： DC 10V-28V ;Recommend 12V-16V, Power supply current: when 14V power supply, average about 22mA
VCC	Positive of Power supply	
H	CAN-H	CAN communication cable. Connect to Master BMS (BMC). 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.
L	CAN-L	

- BMC 有专用的 4 针端口，专门与 BIC 进行一对一连接，由 BMC 内部统一提供供电，以及 CAN 通信。

  Master BMS (BMC) has a dedicated 4-pin port for one-to-one connection to the Slave bms(BIC), Power supply comes from within BMC, and CAN communication between Master and Slave are done via the port .

- BMC 与 BIC 的 CAN 通信是专用的。请不要连接其它的 CAN 设备。

  CAN communication cable between master bms and slave bms is used dedicatedly . Please do not connect other CAN devices to this cable.

- 关闭供电时，BIC 自动休眠，均衡电路被关闭，电芯电压采样线消耗电流降低到 0.1uA 以下。

  When the power supply is turned off, the slave bms automatically sleeps, the equalization is turned off, and the current consumed by the voltage sampling wires of each cell is reduced to less than 0.1uA.

Terminal definition of Cell temperature sampling socket (Table 2)		
No	Name	Description
T1 至 T8	Temp sensor	1st temp senosr goes to T1 and COM, 2nd temp senosr goes to T2 and COM, ...and so forth
COM	Common Point	Nagative wire of all temp senosrs go to the common point
T-V	Temperature bias signal	The pin outputs a signal voltage that provides the current bias of the temperature detection circuit. If the recommended 10K 3435 thermistor is used, this pin should not be connected . If you do not use the recommended thermistor, please contact us for instructions.

- 温度采集点测量温度范围：-40℃至 100℃，

  Temperature collection point measurement temperature range: -40℃ to 100℃,

- 温度采集点支持：0 至 8 个采样点，根据项目实际情况，需要几个就连接几个，然后在软件中对应设定。

  Temperature collection point support: 0 to 8 sampling points, according to the actual situation of the project, the need to connect several, and then the corresponding setting in the software.

- 建议的热敏电阻适配型号：MF52 10K 3435，当您采购 slave bms (BIC)样品时，将会附送无封装无防护的热敏电阻供测试使用。批量应用后，您可自行购买带封装、方便安装的成品探头。其它型号的热敏电阻，需联系我们匹配。

  Recommended temp sensor model: MF52 10K 3435. When you purchase slave bms (BIC) samples, you will receive an unpackaged and unprotected thermistor for testing. After mass application, you can purchase your own finished probe with package and easy installation. Other models of thermistors, need to contact us to match.

- 温度采样误差：-15℃至 60℃范围时误差±1.5℃（使用 1%精度的温度探头时）；超出此范围温度精度变差。温度检测的精度，可以按要求定制。

  Temperature sampling tolerance : -15℃ to 60℃ plus ±1.5℃ (when using 1% accuracy temperature probe); Temperature accuracy deteriorates beyond this range. The accuracy of temperature detection can be customized according to requirements.

- 热敏电阻探头必须做好绝缘，不能碰到任何线路、导电的物体！固定在有效测温点。

  The thermistor probe must be insulated and cannot touch any wire or conductive object! Fixed at the effective temperature measurement point.

- 温度传感器的这部分电路，在 BIC 的内部线路中，与单体电压采样插座是连通的（高压），因此，温度传感器的两条线还需要做好与 BMS 低压供电、电池包外壳的耐电压绝缘防护。

  This part of the circuit of the temperature sensor, the internal circut of the slave bms, is connected to the single voltage sampling socket (high voltage), therefore, the two wires of the temperature sensor need to be well insulated with the low-voltage power supply of the BMS and the battery pack housing.

- 温度采样线通常 50 公分长度以内可以不用屏蔽。具体根据现场情况确定。

  Temperature sampling wires are usually less than 50 cm long without shielding. The specific situation depends on the site.

Terminal definition of Single voltage sampling socket (Table 3)		
No	Name	Description
B0	Negative of each moldule	The negative of the first cell in one battery module
B1 to B16	Sampling wires position	B1 接第 1 节电池的正极，B2 接第 2 节电池的正极，.....详见接线图 B1 goes to positive of the 1st cell;B2 goes to positive of the 2nd cell, B3 goes to positive of the 3rd cell, and so forth; for more details , please go to the wiring diagram

- 单体电芯电压检测支持：0.5V - 4.5V。为保证精度，请不要靠近极限使用。

  Single cell voltage detection support: 0.5V-4.5V. To ensure accuracy, please do not go to the limit when usage

- 最低均衡开启电压支持：约 2.3V。设定时尽量不要低于此值。有更低要求的，请联系我们。

  Minimum balanced starting voltage support: about 2.3V. Try not to lower this value when setting. If you require lower setting, please contact us.

- 采样期间，电芯采样线消耗电流（均衡关闭时）：约 8uA，其中最低编号和最高编号的采样线要流过大约 64uA 的电流。关机后，小于 0.1uA；

  During the sampling , the current consumed by the cell sampling wire (when the balance is off) : about 8uA, in which the lowest and highest numbered sampling wires the current is 64uA. After BMS shutdown, less than 0.1uA;

- 采集串数支持：3-16 串可设定。由于每个 BIC 的最低总电压不能低于 9V，所以最少串数有限制。例如：4.2V 三元电池最低 3 串，3.2V 铁锂电池最低 4 串，2.4V 钛酸锂电池最低 5 串。

  Balancing wires number : 3-16 wires which support 3-16strings of cells ; you can set it according to the following rule . Since the minimum total voltage per BIC cannot be less than 9V, there is a limit to the minimum number of strings. For example: 4.2V Li-ion NMC battery: minimum 3 strings, 3.2V LiFepo4 battery: minimum 4 strings, 2.4V lithium titanate battery minimum 5 strings.

- 必须先从最低 B0 端子开始使用，依次接 B1、B2、B3.....如果 16 串没有用完，其它未使用的采样线需要和当前 BIC 的最高电压端连接。（至少 B16 需要连接最高电压）

You shall start with the B0 terminal and then take terminal B1, B2, and B3..... in sequence If the 16 wires are not used up, other unused sampling lines need to be connected to the highest voltage terminal of the current BIC. (At least TERMINAL B16 needs to be connected to the highest voltage)

单个 BIC 采样最高总电压，请不要超过 60V，注意，是极限电压，不是额定电压。

Single Slave bms can take the maximum total voltage 60V ; Note : please do not exceed 60V, note that this is the limit voltage, not the rated voltage.

极限 4.2V 的三元电池，60÷4.2 = 14.2857，不超过 14 串；
极限 4.35V 的聚合物电池，60÷4.35 = 13.793，不超过 13 串；
极限 3.65V 的磷酸铁锂电池，60÷3.65 = 16.438，正好能用到全部的 16 串。

Single slave bms can take Max 14 strings of li-ion nmc batteries
Single slave bms can take Max 16 strings of Lifepo4 batteries
Single slave bms can take Max 16 strings of LTO batteries

- 极限电压在 60V 时，虽然可以稳定的运行，但采样精度、参数会变差。其中单体电压误差增大约±0.01V。

The limit of sampling voltage is 60V, although the slave bms can run , the sampling accuracy and parameters will become worse. The single voltage error increases about ±0.01V

- 电压采样线长度支持：理论上不限定长度；内阻要求小于 5 欧；但受限于自然环境的闪电浪涌、电磁场干扰等，建议不超过 5 米，越短越好。

Voltage sampling wire length : theoretically no limit,but the internal resistance should be less than 5 ohms; However, due to the influence of natural environment of lightning surges, electromagnetic field interference, it is recommended not to exceed 5 meters, the shorter the better.

接线时，请先做好插头，然后连接所有的电芯采样线到电池，最后仔细检查线序是否正确，确认无误后才能连接 BIC！连线顺序没有要求，但要确保接线必须正确！否则将会损坏 BIC！

When wiring, please do the plug first, and then connect all cell sampling wires to the battery, and finally carefully check whether the wiring sequence is correct,

and confirm that it is correct before connecting the slave bms ! Please make sure the wiring is correct! Otherwise the BIC will be damaged!

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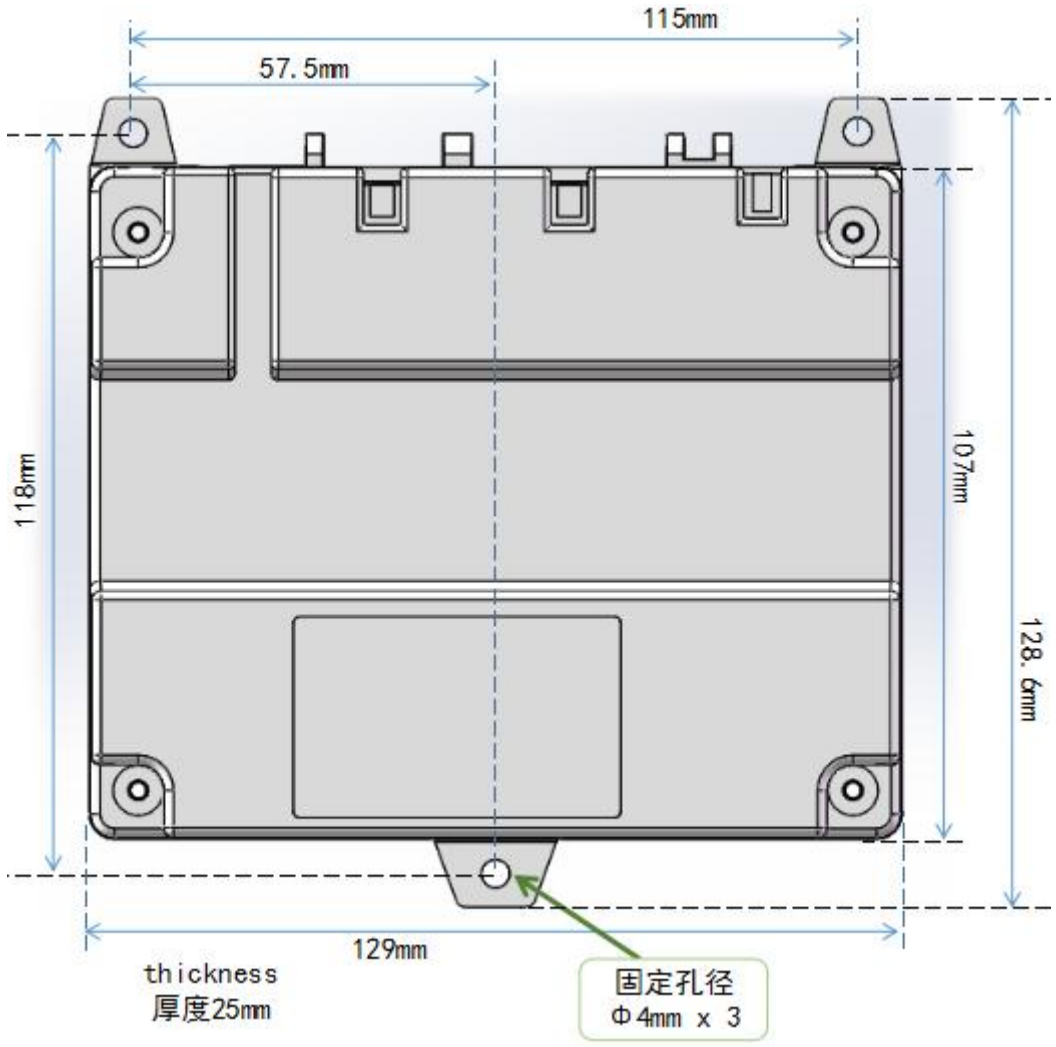
115mm
57.5mm
118mm
107mm
128.6mm
129mm
thickness
厚度25mm
固定孔径
Φ4mm x 3