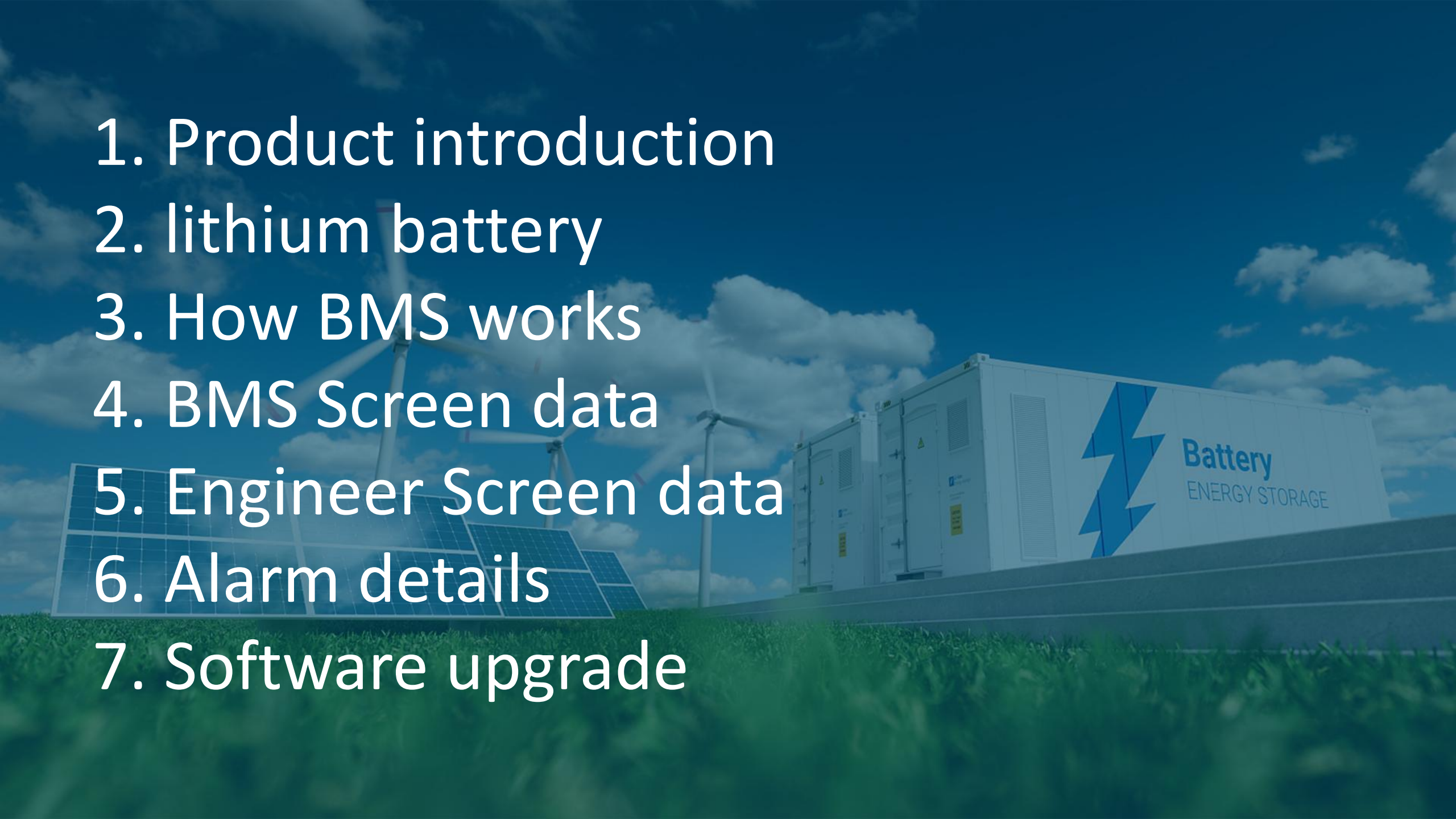
《Lithium ion battery system training》

Ecube

2020.11.25



1. Product introduction
2. lithium battery
3. How BMS works
4. BMS Screen data
5. Engineer Screen data
6. Alarm details
7. Software upgrade

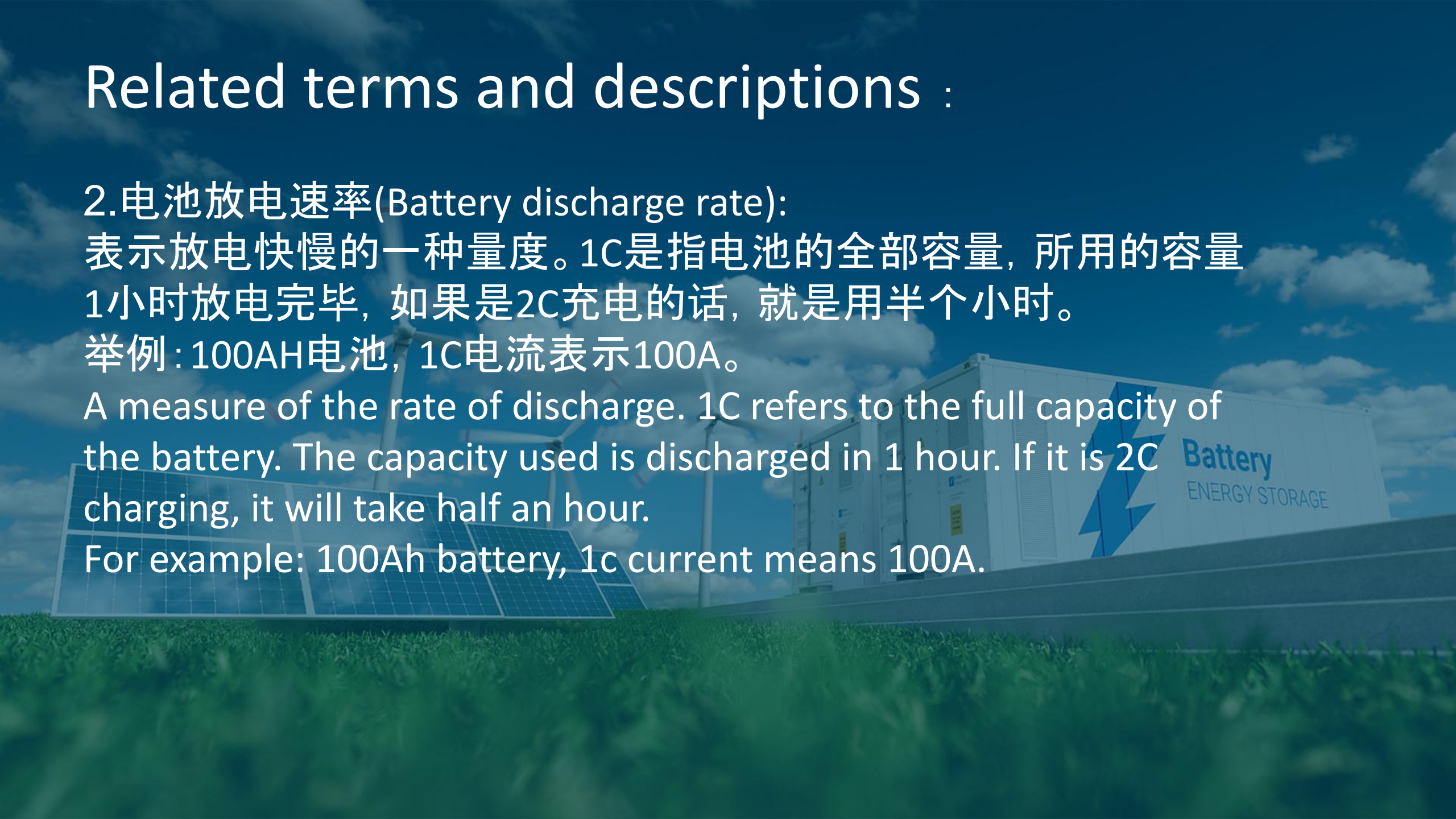
相关术语(Related terms and descriptions):

1.AH:
AH反映电池容量大小的指标。相同电压的电池，安时数大的容量大;相同安时数的电池，电压高的容量大。通常以电压和安时数共同表示电池的容量，如3.2V/17AH、3.2V/24AH、3.2V/38AH、3.2V/65AH、3.2V/100AH。

Ah is the index of battery capacity. The battery with the same voltage has a large capacity with a large ampere hour; a battery with the same ampere hour has a large capacity with a high voltage. Usually, the capacity of the battery is represented by voltage and ampere hour, such as 12V / 17ah, 12V / 24Ah, 12V / 38ah, 12V / 65ah, 12V / 100Ah.

Related terms and descriptions：

2.电池放电速率(Battery discharge rate):
表示放电快慢的一种量度。1C是指电池的全部容量，所用的容量1小时放电完毕，如果是2C充电的话，就是用半个小时。
举例：100AH电池，1C电流表示100A。
A measure of the rate of discharge. 1C refers to the full capacity of the battery. The capacity used is discharged in 1 hour. If it is 2C charging, it will take half an hour.
For example: 100Ah battery, 1c current means 100A.



Related terms and descriptions：

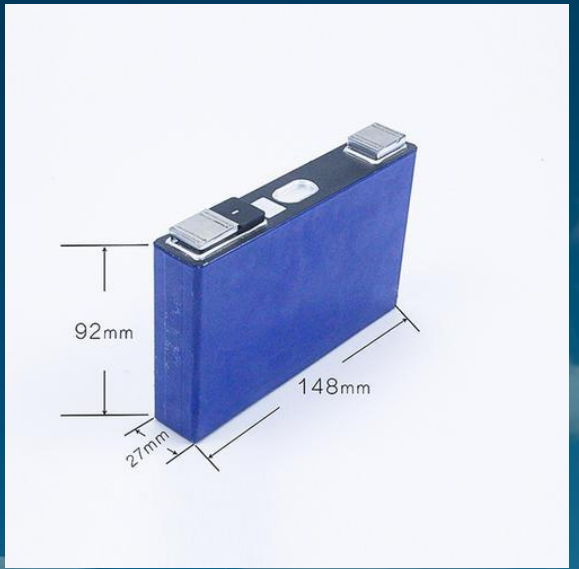
3.BMU
BMU表示电池模块监控单元。
BMU means battery module monitor unit.

4. BCU
BCU表示电池系统控制单元
BCU means the battery control unit.

Related terms and descriptions：

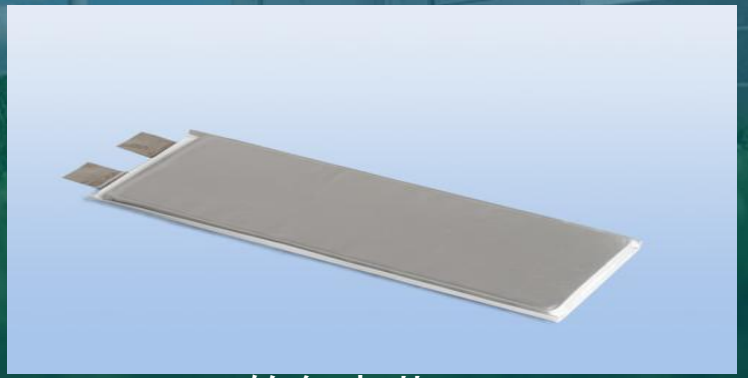
5.电芯(Cell)：
电芯分为柱状，方形，软包，如图所示。
锂离子电池电芯电压范围为2.5V-3.7V。

The cell is divided into cylinder, square and soft package, as shown in the figure.
The cell voltage range of lithium-ion battery is 2.5v-3.7v.



方形铝壳电芯


柱状电芯

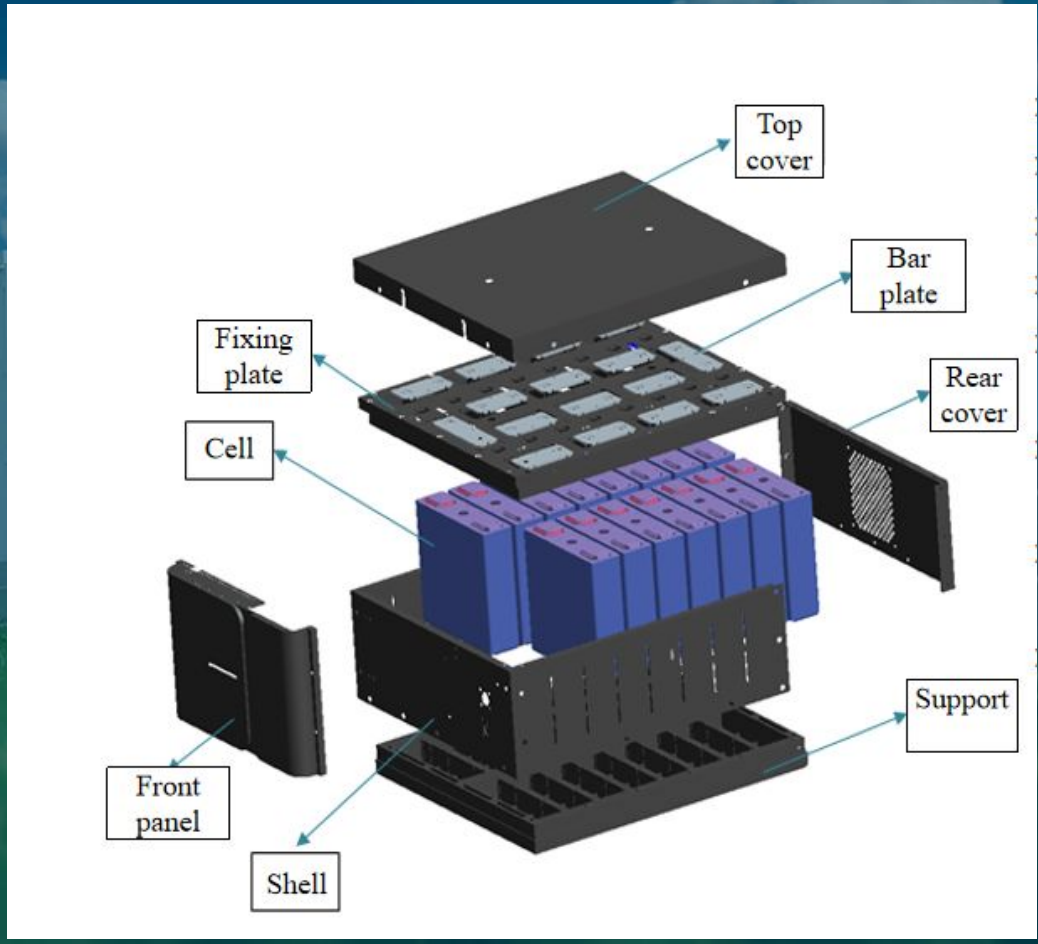

软包电芯

Related terms and descriptions：

6.模块(Module)：

16个电芯通过焊接加工，就会组成一个电池模块。

16 cells will form a battery module.



Related terms and descriptions：

7.电池系统(Battery system)

系统由电池柜，电池模块和BMS组成。
BMS分为BMU和BCU单元。
BCU包含控制箱和显示屏。

The system consists of battery cabinet, battery module and BMS.
BMS is divided into BMU and BCU units.
The BCU contains the control box and display screen.

我们的系统分为92AH和80AH

1. Product introduction

- EBC512/92-LFP-ABMS (92AH Battery system)

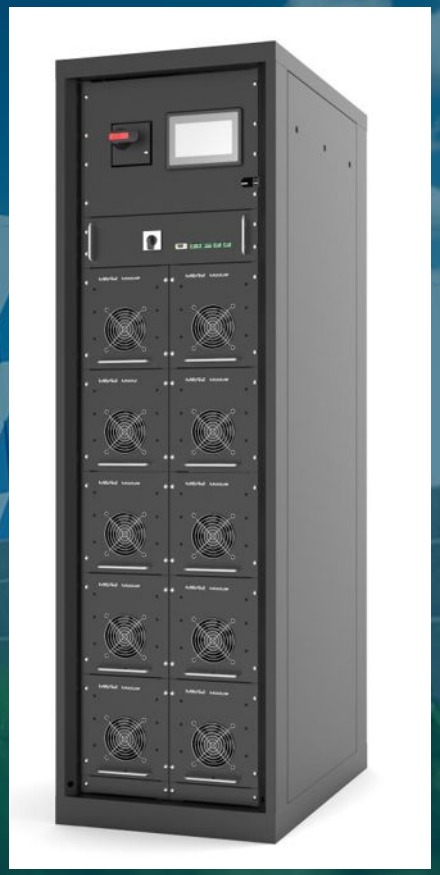
Total voltage：±256V

Cell specification ：92AH,3.2V

Number of cells ：16*5*2=160 series.

16 cells per module.

10 modules per system.



1. Product introduction

- EBC480/80-LFP-ABMS (80AH Battery system)

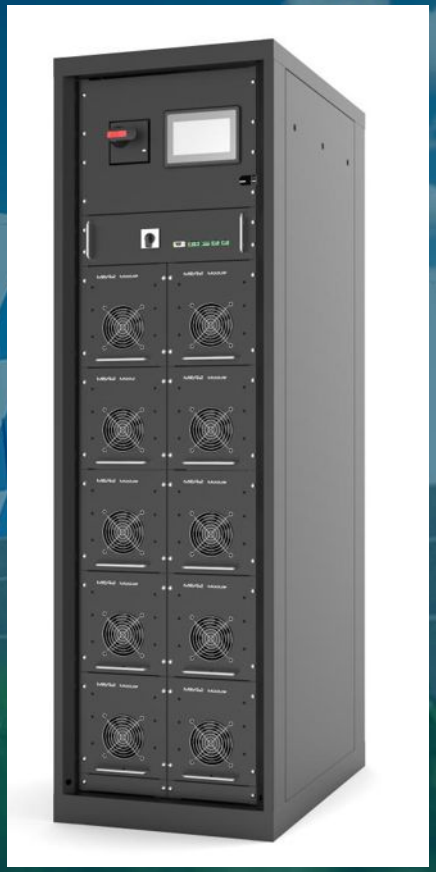
Total voltage：±240V

Cell specification ：40AH*2,3.2V

Number of cells ：15*5*2=150 series.

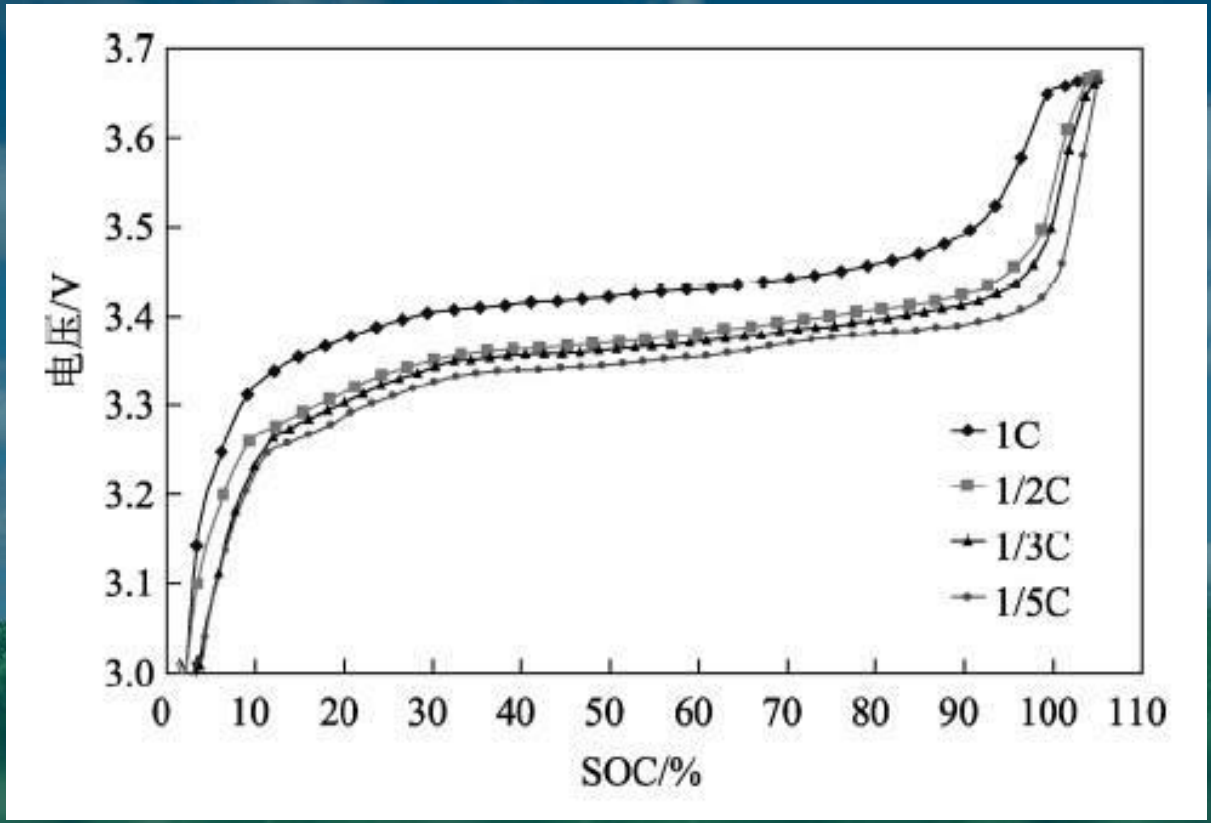
16 series cells per module.

10 modules per system.



2. lithium battery

电芯充电特性曲线:
Charging characteristic curve of cell ：



充电最高电压:3.65V
Max charging voltage: 3.65V

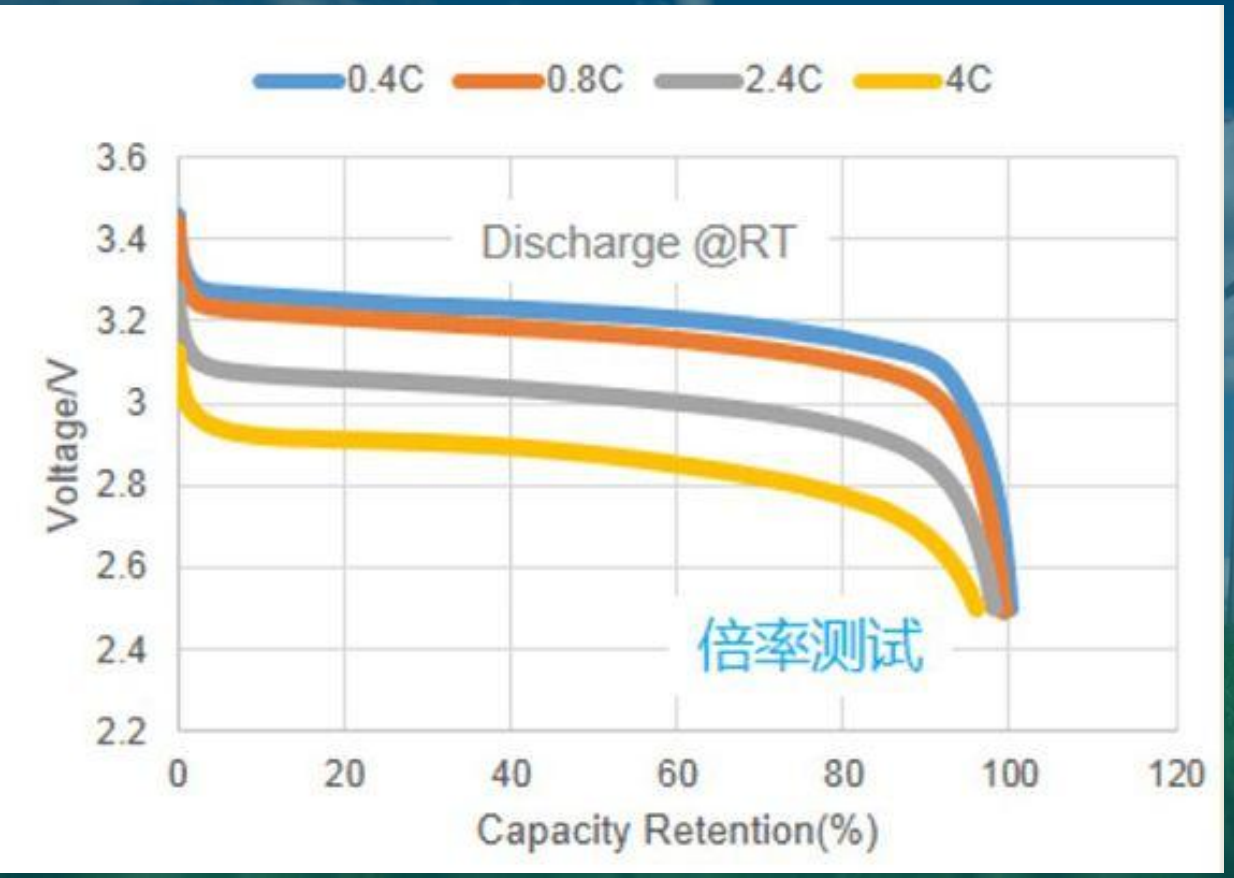
不同充电电流，电压曲线不同。
The voltage curve is different with different charging current.

电压平台阶段:3.2-3.4V
Voltage platform stage: 3.2-3.4v.

充满电静置一段时间后,电压会下降到3.33V-3.4V。
The voltage will drop to 3.33v-3.4v after standing for a period of time with full charge.

2. lithium battery

电芯放电特性曲线:
Discharge characteristic curve of cell：



放电最低电压:2.5V
Minimum discharge voltage: 2.5V

不同的放电电流，电压曲线不同。
Different discharge current, voltage curve is different.

电压平台阶段:3-3.2V
Voltage platform stage: 3-3.2v.

电池放电完毕后，电池电压会恢复到3V左右。
After the battery is discharged, the battery voltage will return to about 3V.

2. lithium battery

电芯的不一致性(Cell inconsistency):

原因(reason):
1.制造过程中存在工艺上的问题和材质的不均匀等问题
2. 投入使用后，电池组中各个电池的电解液密度、温度和通风条件、自放电程度及充放电过程等差别的影响
1. There are some problems in the **manufacturing process**, such as process problems and uneven materials
2. The influence of electrolyte density, temperature and ventilation conditions, self discharge degree and charge discharge process of each battery in the battery pack after being put into use

现象(Phenomenon):
电压不一致，内阻不一致，容量不一致，温升不一致.
Voltage, internal resistance, capacity, temperature rise inconsistency.

2. lithium battery

短板效应：
一只木桶要想盛满水，必须每块木板都一样平齐且无破损，如果这只桶的木板中有一块不齐，这只桶就无法盛满水。因此一只木桶能盛多少水，并不取决于最长的那块木板，而是取决于最短的那块木板。这便是短板效应。

Short board effect:
In order to fill a bucket with water, each board must be the same level and undamaged. If one of the boards in the bucket is uneven, the bucket cannot be filled with water. Therefore, how much water a bucket can hold does not depend on the longest board, but on the shortest board. This is the short board effect.

2. lithium battery

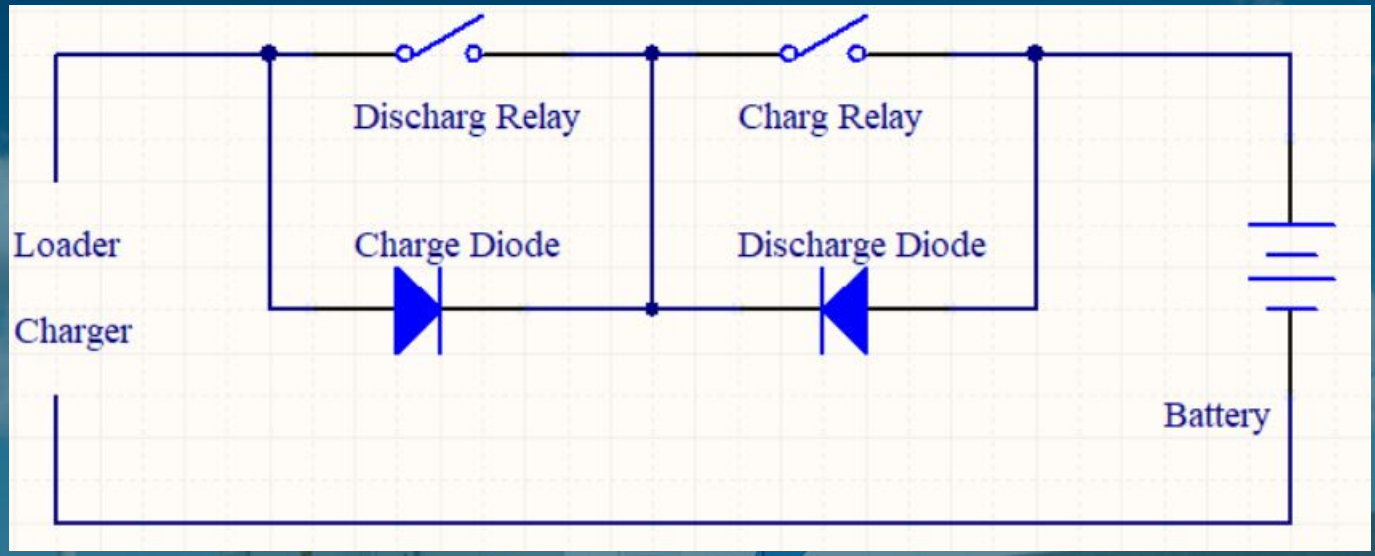
由于电池系统是由很多电芯串联组成的，电芯不一致会直接影响到电池系统容量。这种现象称为“短板效应”。
如果想让电池系统有良好的工作性能，需要保证电芯的一致性。
也就是让每一节电芯容量尽量保持一致。这就是电芯均衡控制需要做的工作。

Because the battery system is composed of many cells in series, the inconsistent cells will directly affect the capacity of the battery system. This phenomenon is called "short board effect".
If you want the battery system to have good performance, you need to ensure the consistency of the battery cells.
That is to make the capacity of each cell as consistent as possible. This is what the cell equalization control needs to do.

3. How BMS works

功率单元电路介绍(Introduction of power unit circuit):

主功率单元如图所示，总共分为充电继电器，放电继电器，充电二极管，放电二极管;左侧为输入输出端(UPS)，右侧为电池组。电池工作模式分为启动，静置，充电，放电，待充电，待放电，锁定模式，下面来详细介绍。



As shown in the figure, the main power unit is divided into charging relay, discharge relay, charging diode and discharging diode; the left side is the input and output terminal (UPS), and the right side is the battery pack. Battery operation mode is divided into start, Alone, charge, discharge, wait charge, wait discharge, lock mode, the following to introduce in detail.

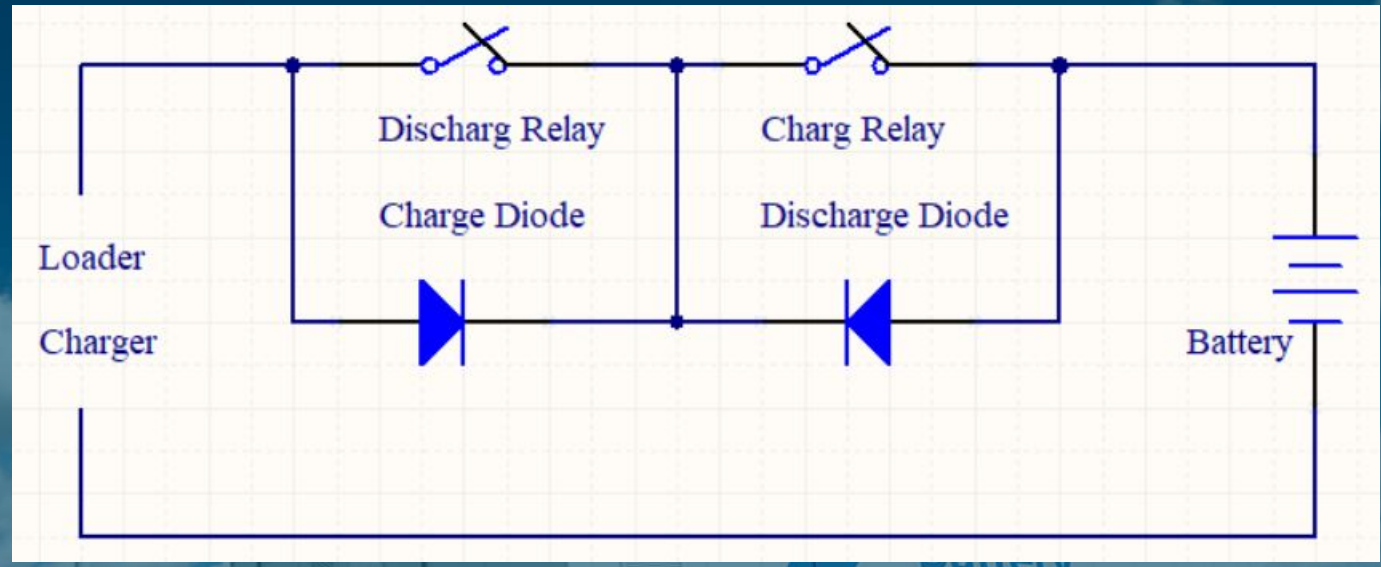
3. How BMS works

静置模式(Alone Mode)：

静置模式时，充电继电器和放电继电器闭合，电池直接接到UPS侧，

●当UPS充电器电压大于电池电压时，电池开始充电，并转换为充电模式。

●当UPS需要放电时，电池开始放电，并转换为放电模式。



In the Alone mode, the charging relay and discharge relay are closed, and the battery is directly connected to the ups side,

● When the ups charger voltage is greater than the battery voltage, the battery starts to charge and changes to charging mode.

● When the ups needs to be discharged, the battery begins to discharge and changes to discharge mode.

3. How BMS works

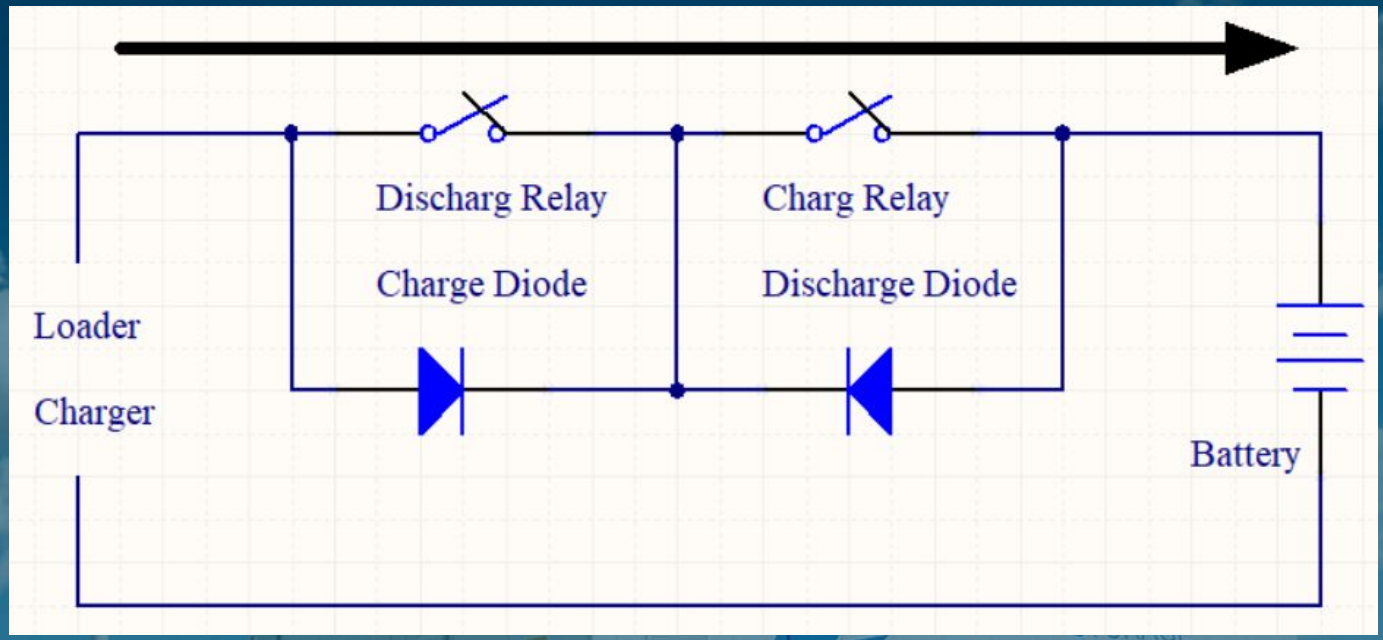
充电模式(Charge Mode)：

充电模式时，电流方向如图所示。

●当充电电流为0时，电池转为静置模式。

●当电池单体电压保护，充电过温保护，充电过流保护时，电池转为待放电模式。

●当电池故障时，电池转为锁定模式。



In charging mode, the current direction is shown in the figure.

● When the charging current is 0, the battery turns to the AloneMode.

● When the battery cell voltage protection, charging over temperature protection, charging over-current protection, the battery will turn to WaitDischargeMode.

● When the battery fails, the battery will turn to LockMode.

3. How BMS works

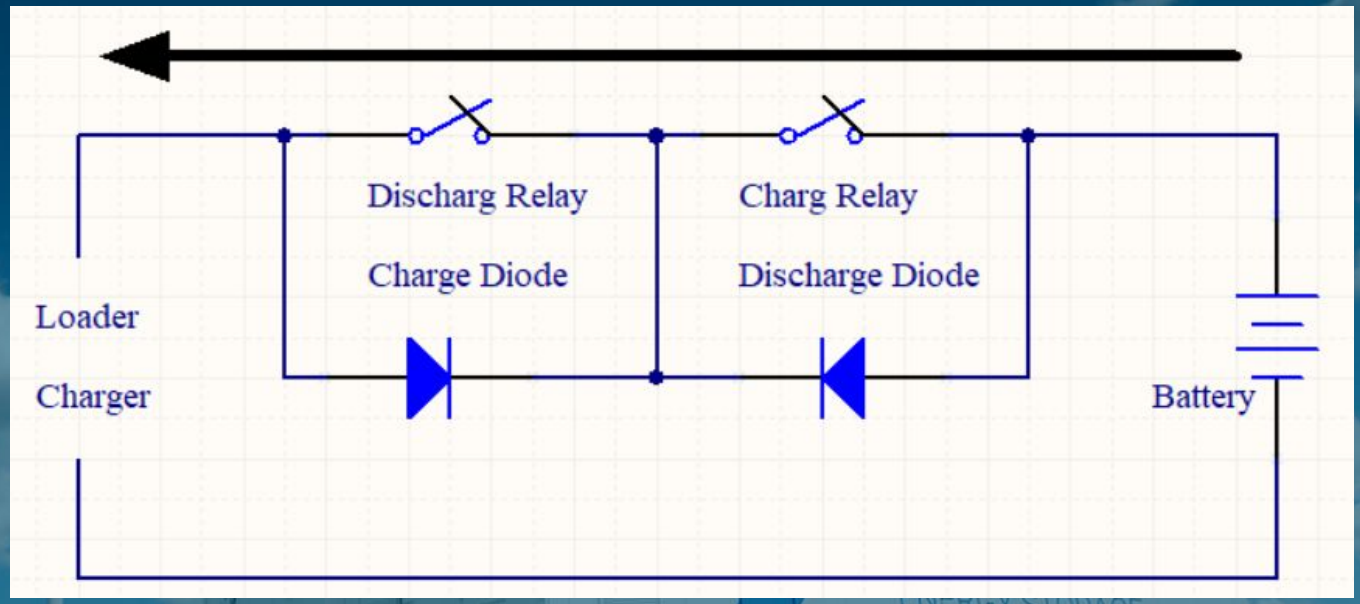
放电模式(Discharge mode):

放电模式时，电流方向如图所示。

●当放电电流为0时，电池转为静置模式。

●当电池欠压，放电温度保护，放电过流保护时，转为待充电模式。

●当系统故障时，转为锁定模式。



In discharge mode, the current direction is shown in the figure.

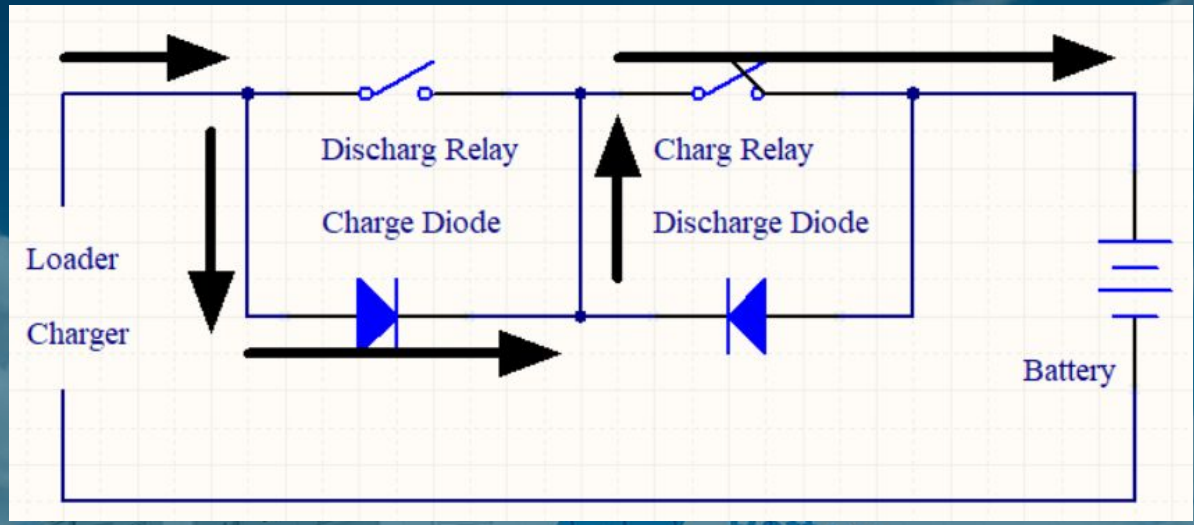
● When the discharge current is 0, the battery turns to AloneMode.

● When the battery under voltage, discharge temperature protection, discharge over-current protection, turns to the WaitchargMode.

● When the system fails, switch to LockMode.

3. How BMS works

待充电模式(WaitChargeMode):



待充电模式时，放电继电器断开，电池不能放电。此时，如果充电器工作，电流会通过充电二极管和充电继电器给电池充电，当主控检测到有充电电流时，闭合放电接触器，转为充电模式。

●系统转为待充电模式一般是由于电池电量过低。

In WaitchargeMode, the discharge relay is disconnected and the battery cannot be discharged. At this time, if the charger works, the current will charge the battery through the charging diode and charging relay. When the master control detects the charging current, it will close the discharge contactor and switch to ChargeMode.

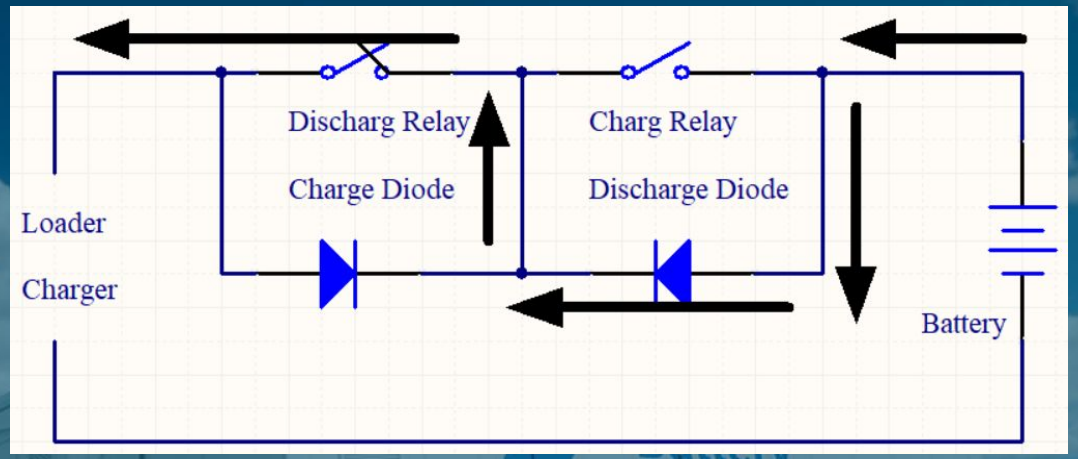
● When the system is switched to ChargeMode, it is generally due to low battery power.

3. How BMS works

待放电模式(WaitDischargeMode):

待放电模式时，充电继电器断开，充电器无法给电池充电。如果此时UPS需要放电，电池电流通过放电继电器和放电二极管为UPS供电，当主控检测到电池有放电电流时，闭合充电继电器并转为放电模式。

●系统转为待放电模式一般是由于电池充满电。



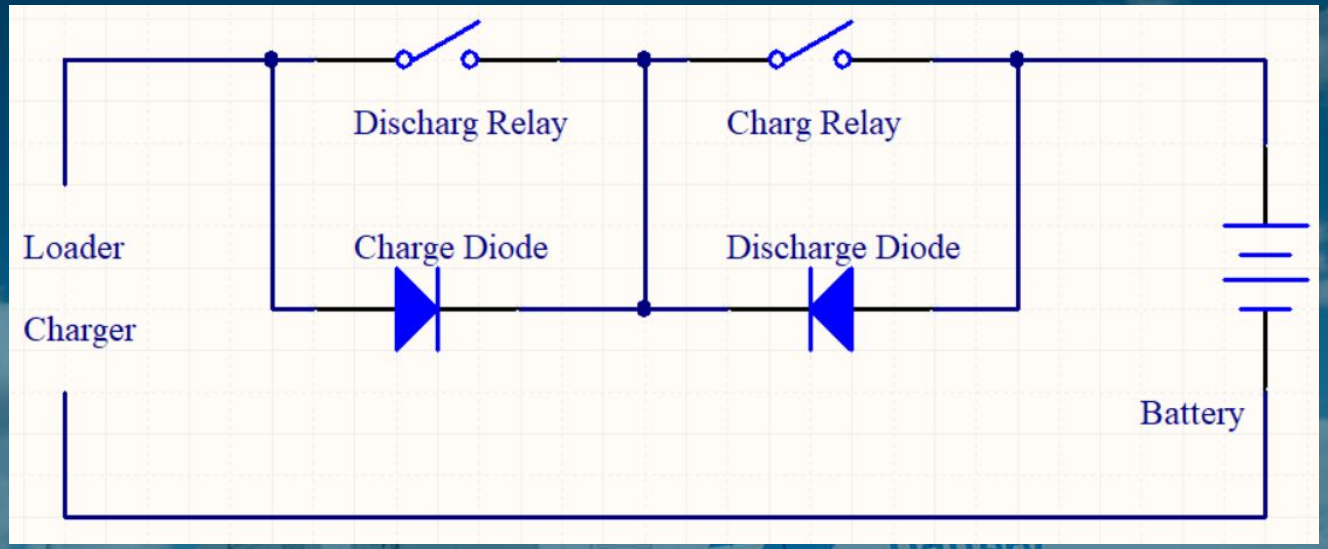
In the WaitDischargeMode, the charging relay is disconnected and the charger cannot charge the battery. If the ups needs to be discharged at this time, the battery current supplies power to the ups through the discharge relay and discharge diode. When the master control detects that the battery has discharge current, it will close the charging relay and switch to Discharge Mode.

● the system is generally switched to the mode to be WaitDischargeMode because the battery is full of electricity.

3. How BMS works

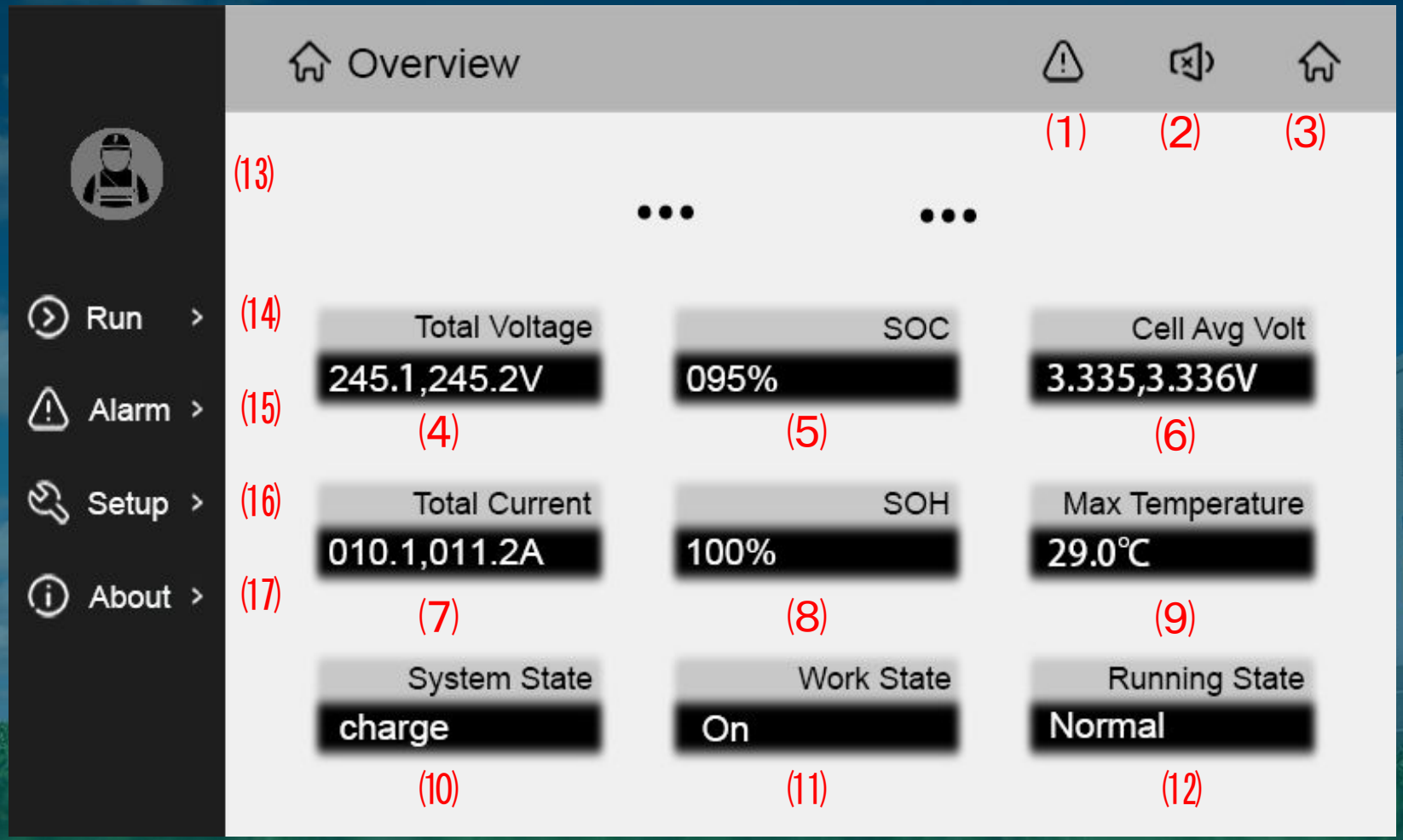
锁定模式(LockMode)：

锁定模式时，充电继电器和放电继电器都断开。此时电池系统不能充电和放电。
手动关机，EPO关机，系统故障时，会转换为该模式。



In lock mode, both charging and discharging relays are disconnected. At this time, the battery system cannot be charged and discharged.
Manual shutdown, EPO shutdown, system failure, will switch to this mode.

4. BMS data



1. 当前告警快捷键(Current alarm shortcut key)
2.消除告警音(Eliminate alarm tone)
3.回到主页面(Back to the main page)
4.电池总电压(Total voltage)
5.电池容量SOC(Battery capacity)
6. 电芯平均电压(Cell average voltage)
7. 充电放电电流(Charge or discharge current)
8.电池健康度(Battery health)
9.电池系统最高温度(maximum temperature)
10.系统状态(System State)
11. 工作状态(Working State)
12.告警状态(Alarm State)
13.登录工程师模式(Engineer mode login)
14.查看运行信息(system data)
15.查看当前告警和历史记录(Alarm)
16.基本参数设置(Parameter settings)
17.版本号信息(Software version number)

4. BMS data

首页信息详细介绍(Home page information details:):

- 电池总电压(Total voltage)

  在静置，充电，放电，等待充电模式时为电池总电压，
  在锁定和待放电模式时，显示为充电器电压。
  The total voltage of the battery in the Alone, charge, discharge, wait charg mode,
  In the lock and wait discharge mode, the charger voltage is displayed.

- 系统状态(System State)

  分为上电模式，启动模式，静置模式，充电模式，放电模式，待充电模式，待放电模式，锁定模式。
  It can be divided into PowerOn mode, Start mode, Alone mode, Charge mode, Discharge mode, Waitcharge mode, Waitdischarge mode, and Lock mode.

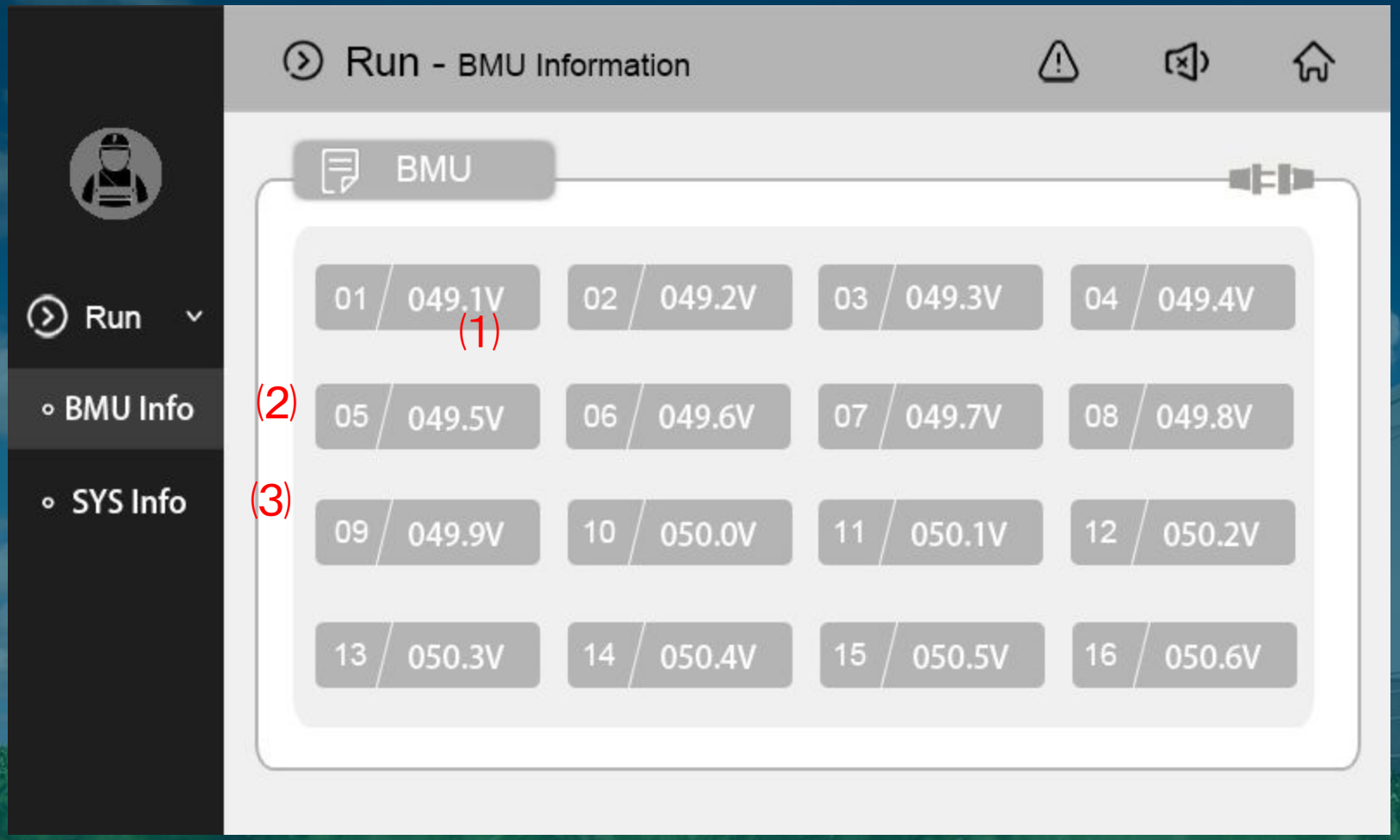
- 工作状态(Work State)

  开机，关机(on, off)

- 告警状态(Running State)

  正常，告警，故障(Normal, alarm, fault)

4. BMS data



1.对应的电池模块电压，点开之后可以查看模块内部电芯单体电压信息

1.The corresponding battery module voltage can be opened to view the voltage information of single cell in the module.

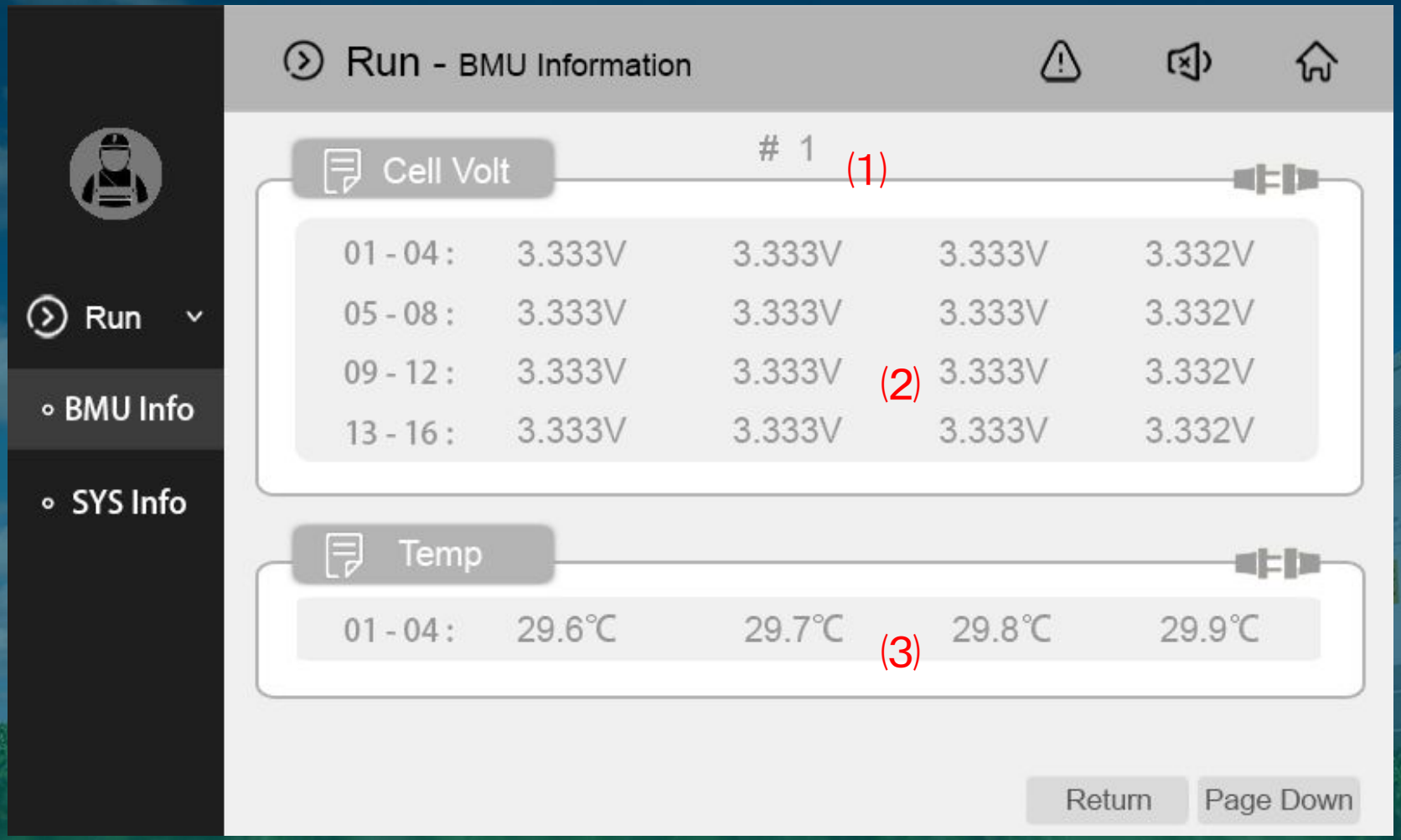
2. 查看BMU信息

2.View BMU information

3.查看电池系统整体信息

3.View the overall information of battery system.

4. BMS data

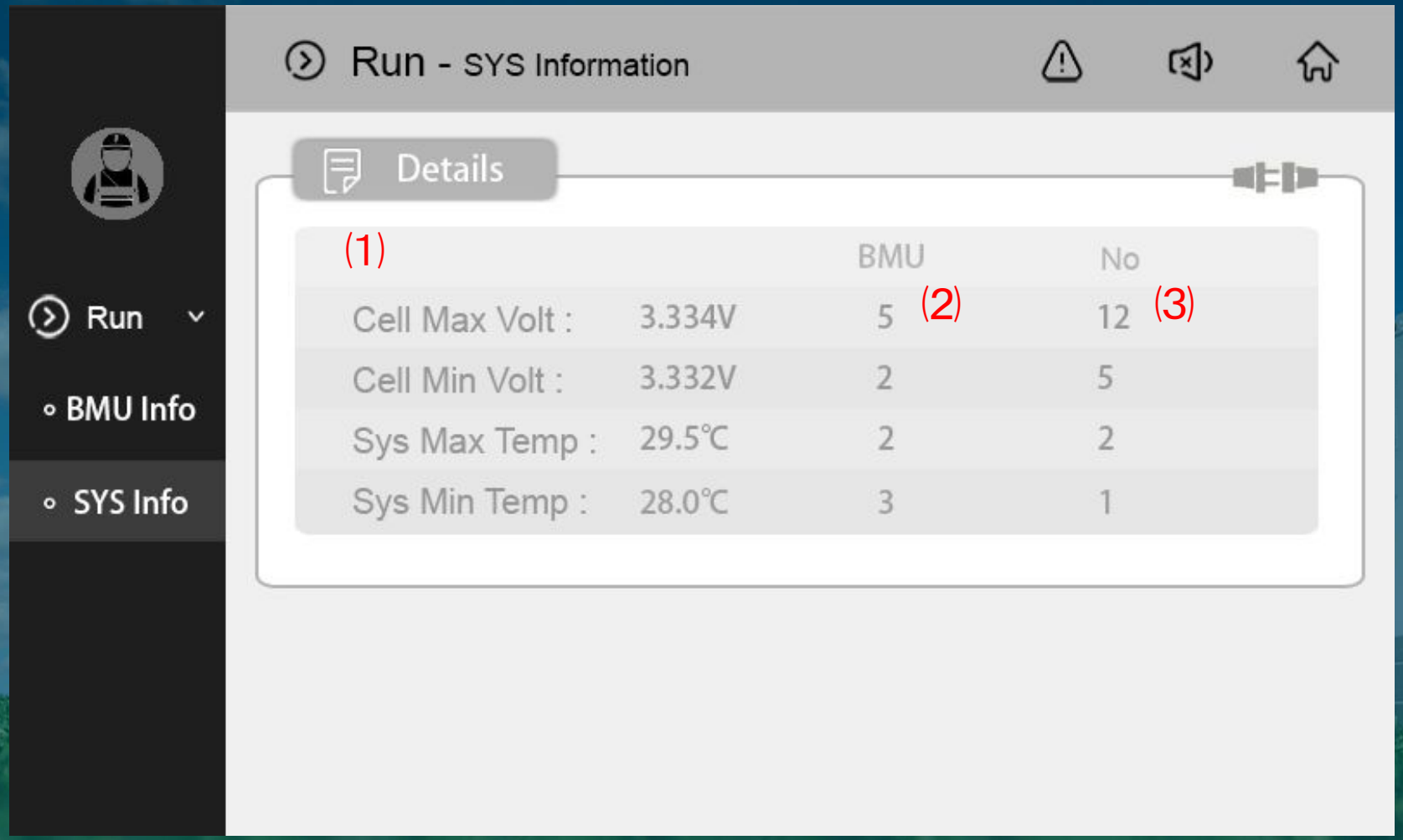


1. 模块编号
Module number

2. 对应编号模块的内部单体信息
Internal unit information of corresponding number module

3.对应编号模块内部采样温度
Internal sampling temperature of corresponding numbered module

4. BMS data

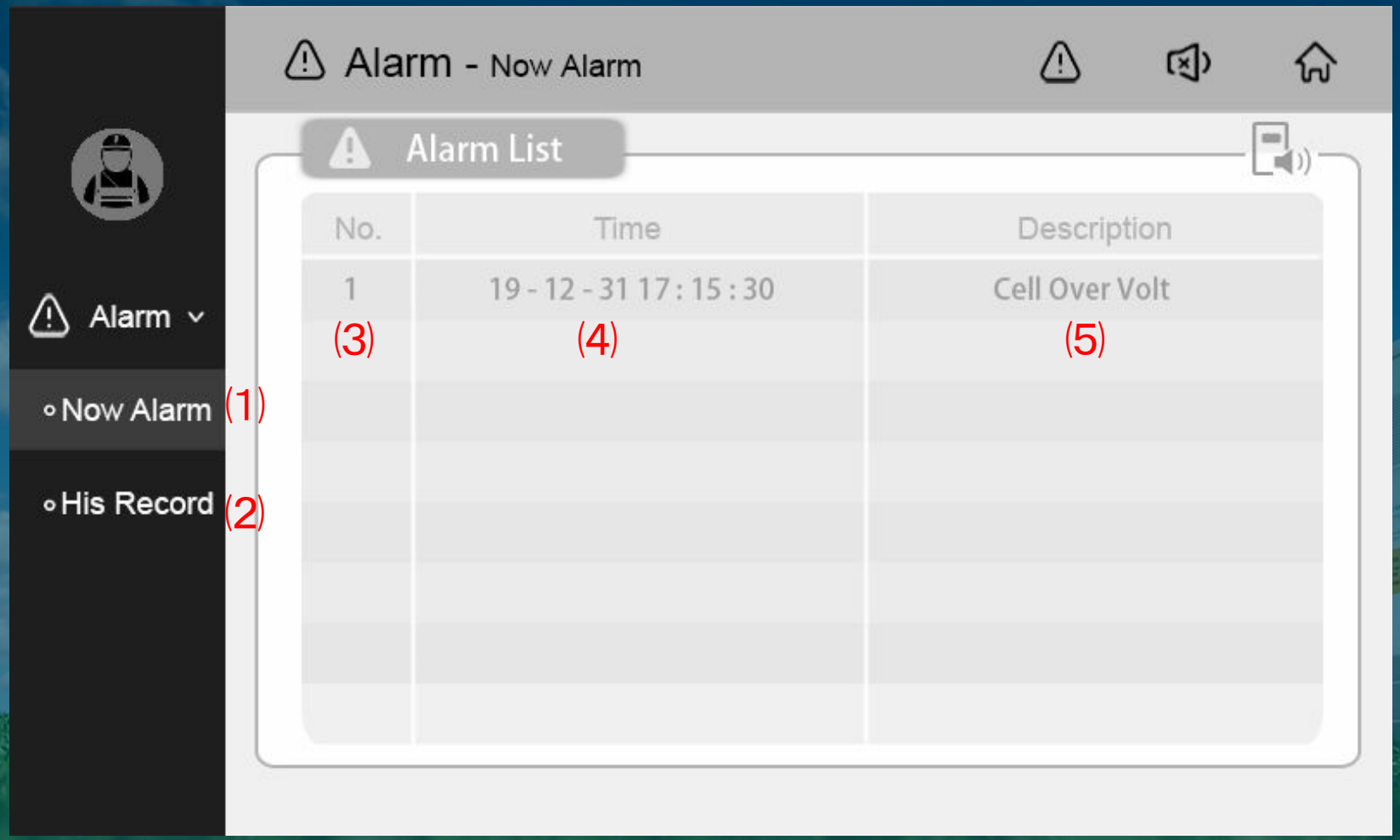


1. 电池系统最高单体电压，最低单体电压，最高温度，最低温度信息及位置编号。
The maximum cell voltage, minimum cell voltage, maximum temperature, minimum temperature information and position number of the battery system.

2.模块编号
Module number

3.模块内部单体位置编号
Unit position number inside the module

4. BMS data



1.切换到当前告警页面
Switch to the current alarm page

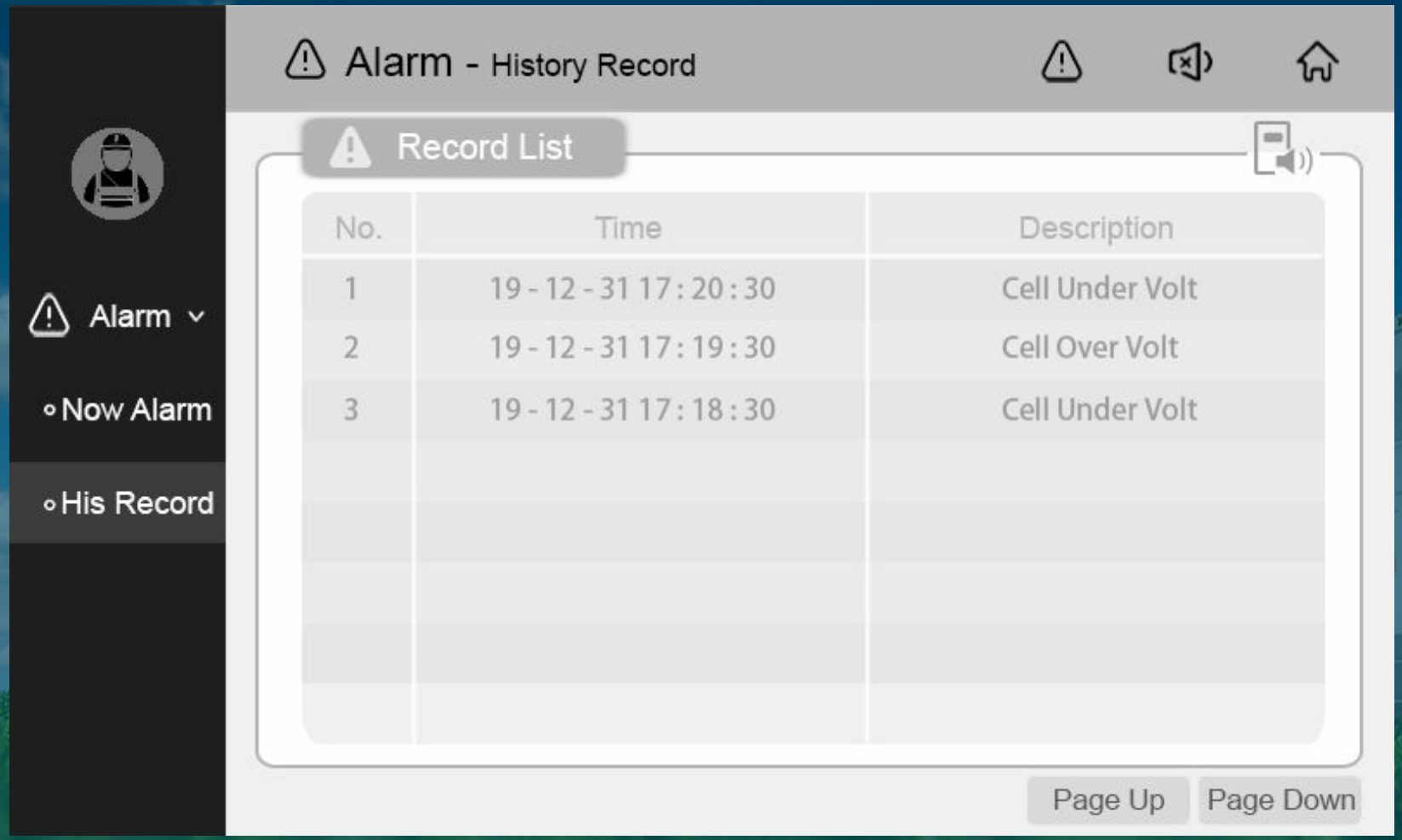
2.切换到历史告警页面
Switch to the history alarm page

3.告警编号
Alarm number

4.告警时间
Alarm time

5.告警内容
Alarm content

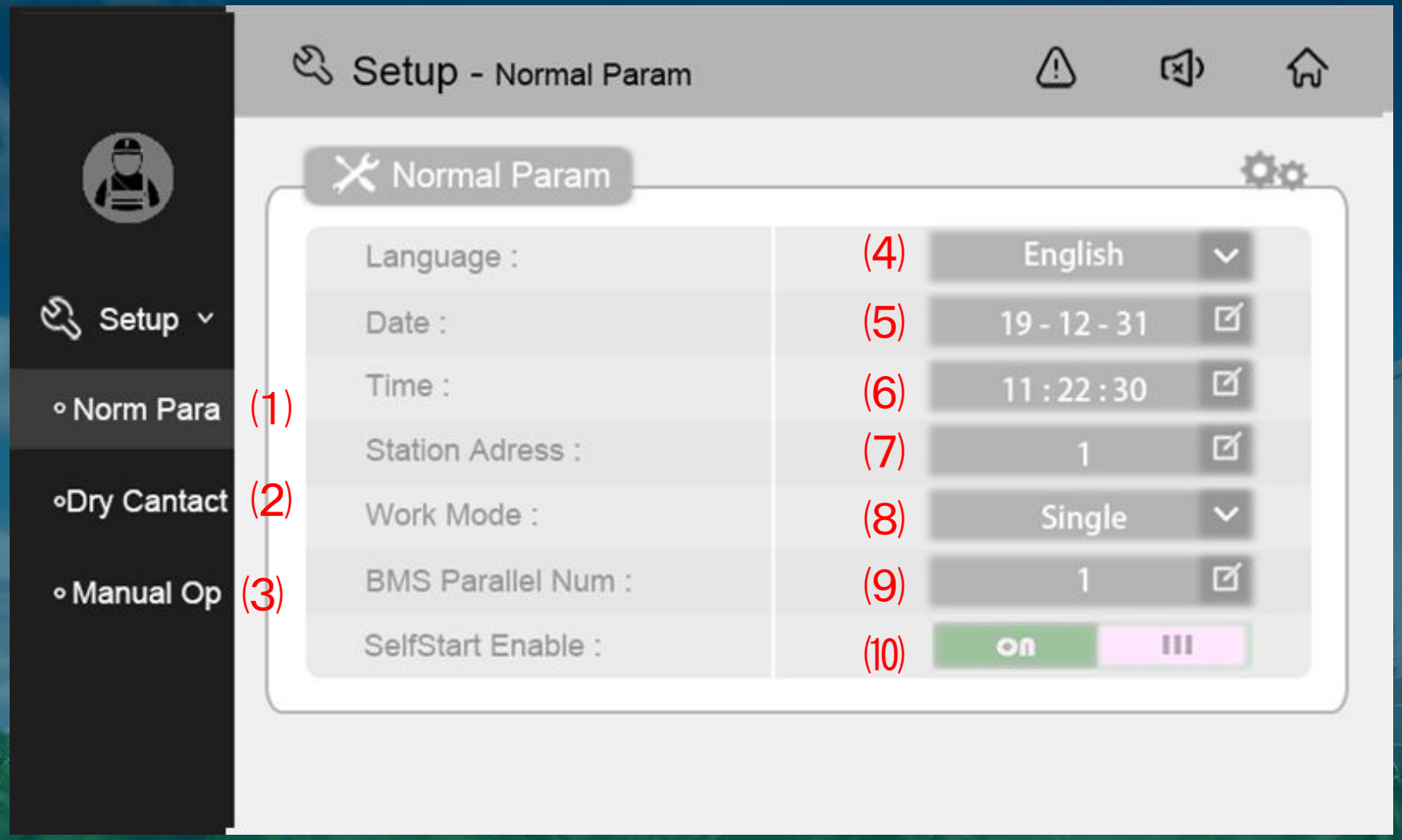
4. BMS data



内容同当前告警

The content is the same as the current alarm

4. BMS data



1.基本参数设置(Basic parameter setting)
2.干接点设置(Dry contact setting)
3.手动操作(Manual operation)
4.语言设置(Language settings)
5.日期设置(Date setting)
6.时间设置(time setting)
7.站地址设置(Station address setting)
8.并机设置(Parallel setting)
9.并机数量设置(Parallel machine quantity setting)
10.自启动使能(Self start enable)

4. BMS data

设置详细介绍(Detailed description of settings)：

5.日期设置(Date setting)

日期的格式为：YY-MM-DD,”-”也需要输入

The format of the date is YY-MM-DD, "-" also needs to be input

6.时间设置(time setting)

时间的格式为：hh:mm:ss,”:”也需要输入

The format of time is: HH: mm: SS, ":" also needs to be input

7.站地址设置(Station address setting)

站地址表示的是设备的通信地址，在并机时或与PC通信时使用，其他情况下不需要更改，保持默认为1

The station address represents the communication address of the device, which is used in parallel or when communicating with PC. in other cases, it does not need to be changed, and the default value is 1.

4. BMS data

设置详细介绍(Detailed description of settings)：

8.并机设置(Parallel setting)

并机使用时设置为“parallel”，单机使用时设置为“Signal”

Set to "parallel" for parallel operation and "signal" for single machine

9.并机数量设置(Parallel machine quantity setting)

例：3台电池并机使用，3台系统全部设置为3

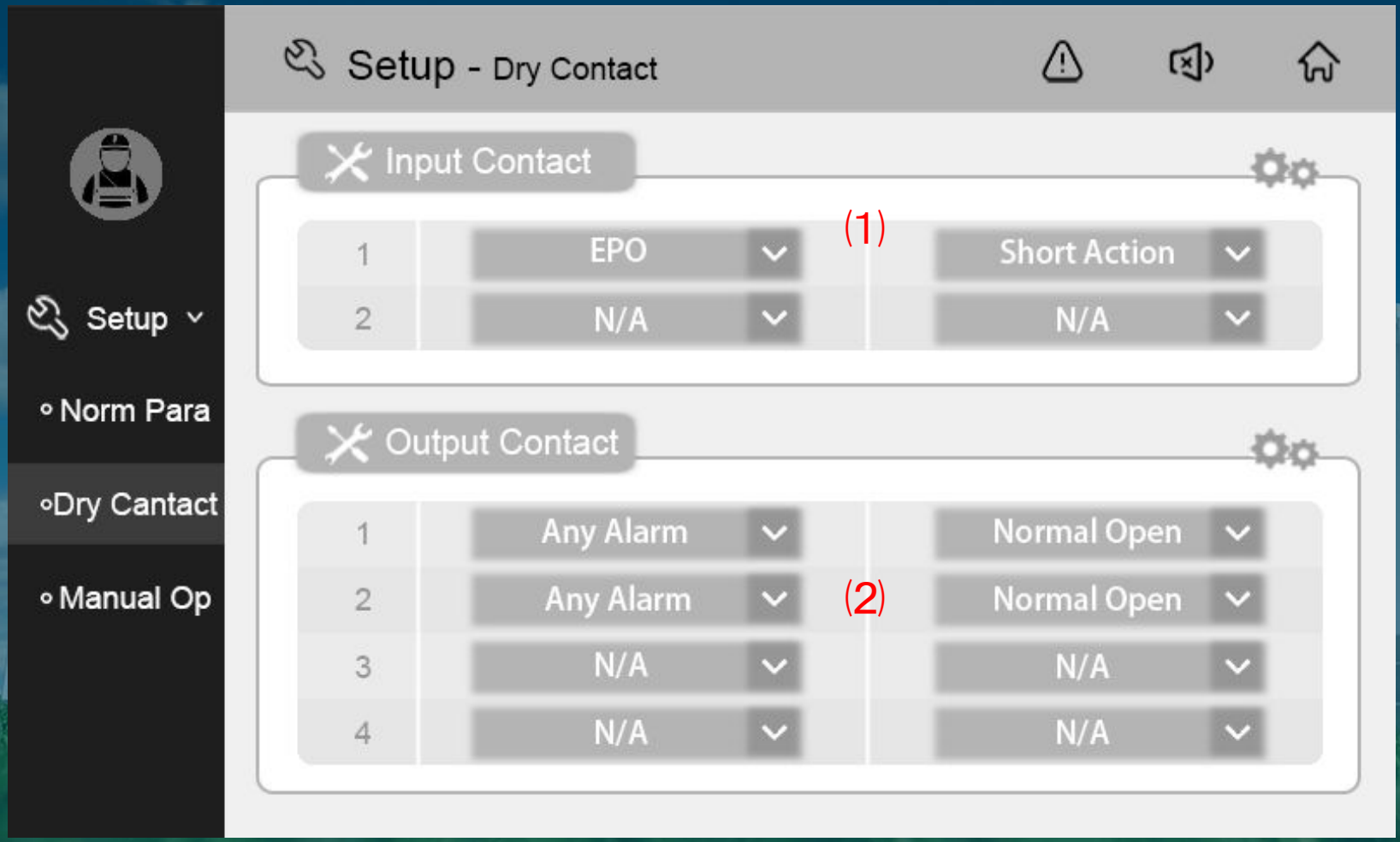
Example: three batteries are used in parallel, and all three systems are set to 3

10.自启动使能(Self start enable)

打开后，系统上电后不需要再手动开机

After Self start enable turn on, the system does not need to be started manually after system power on.

4. BMS data



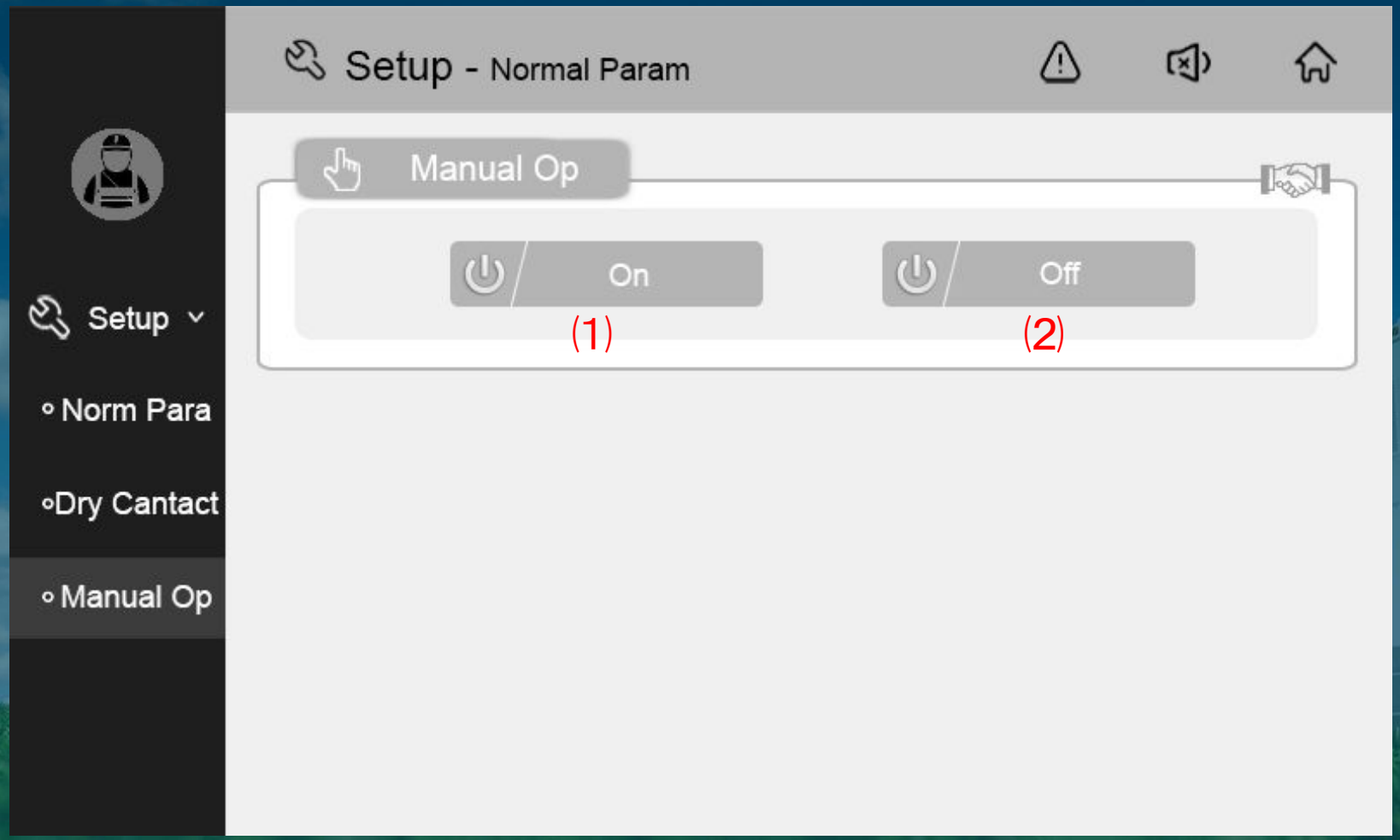
1.输入干接点设置(Input dry contact)
None:无动作
None:No action

EPO:紧急停止
EPO:Emergency stop

BSTS:脱扣，只支持有断路器的电池系统
BSTS:Battery trip, Only battery systems with circuit breakers are supported

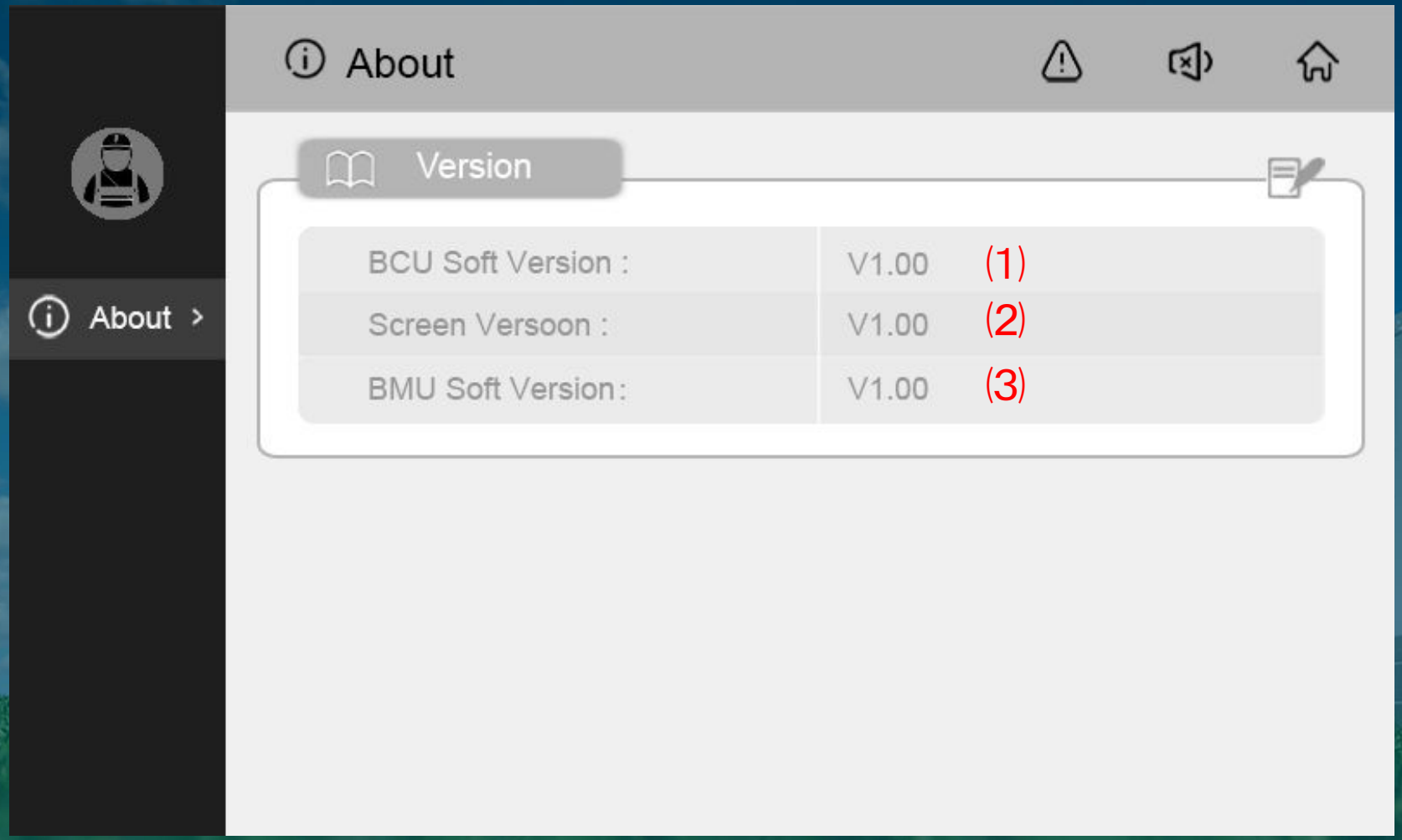
2.输出干接点设置(Output dry contact)
根据不同的设置，在系统产生不同类型的报警时，断开或闭合
According to different settings, when the system generates different types of alarms, it will open or close。

4. BMS data



1.系统开机(System startup)
自启动没有使能时，需要手动开机才能使系统正常开机工作。
When the auto start is not enabled, it needs to be started manually to make the system work normally.
2.系统关机
系统需要关闭时，需要手动关机。
When the system needs to be shut down, it needs to be shut down manually.

4. BMS data



1.BCU软件版本(BCU software version)

2.显示屏软件版本(Display software version)

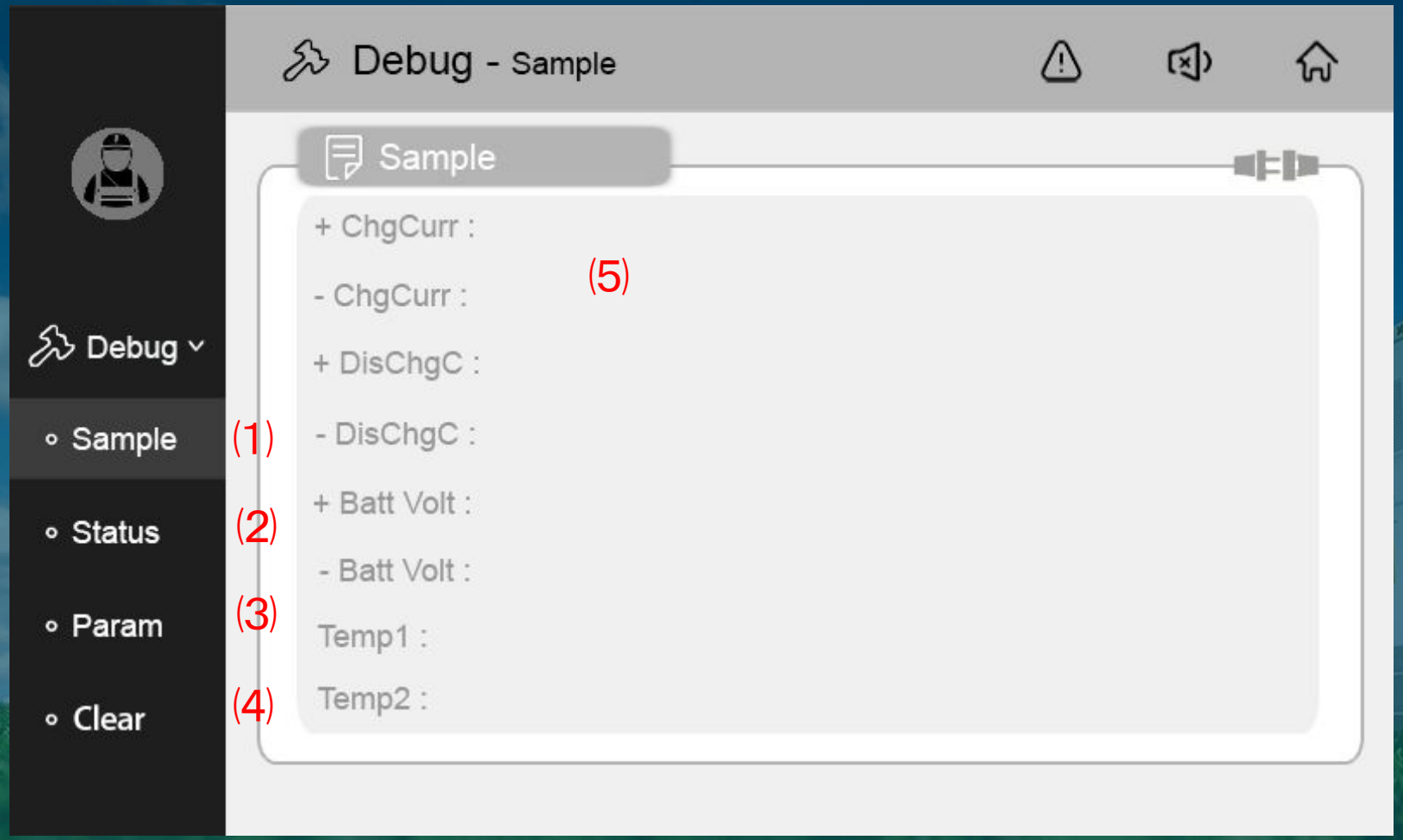
3.BMU软件版本号(BMU software version number)

5. Engineer data

工程师模式登录:
第一步:点击用户头像
第二步:输入密码123456并登录
第三步:点击调试打开调试页面

Engineer mode login:
Step 1: click on the user's Avatar
Step 2: enter the password 123456 and log in
Step 3: click debug to open the debug page

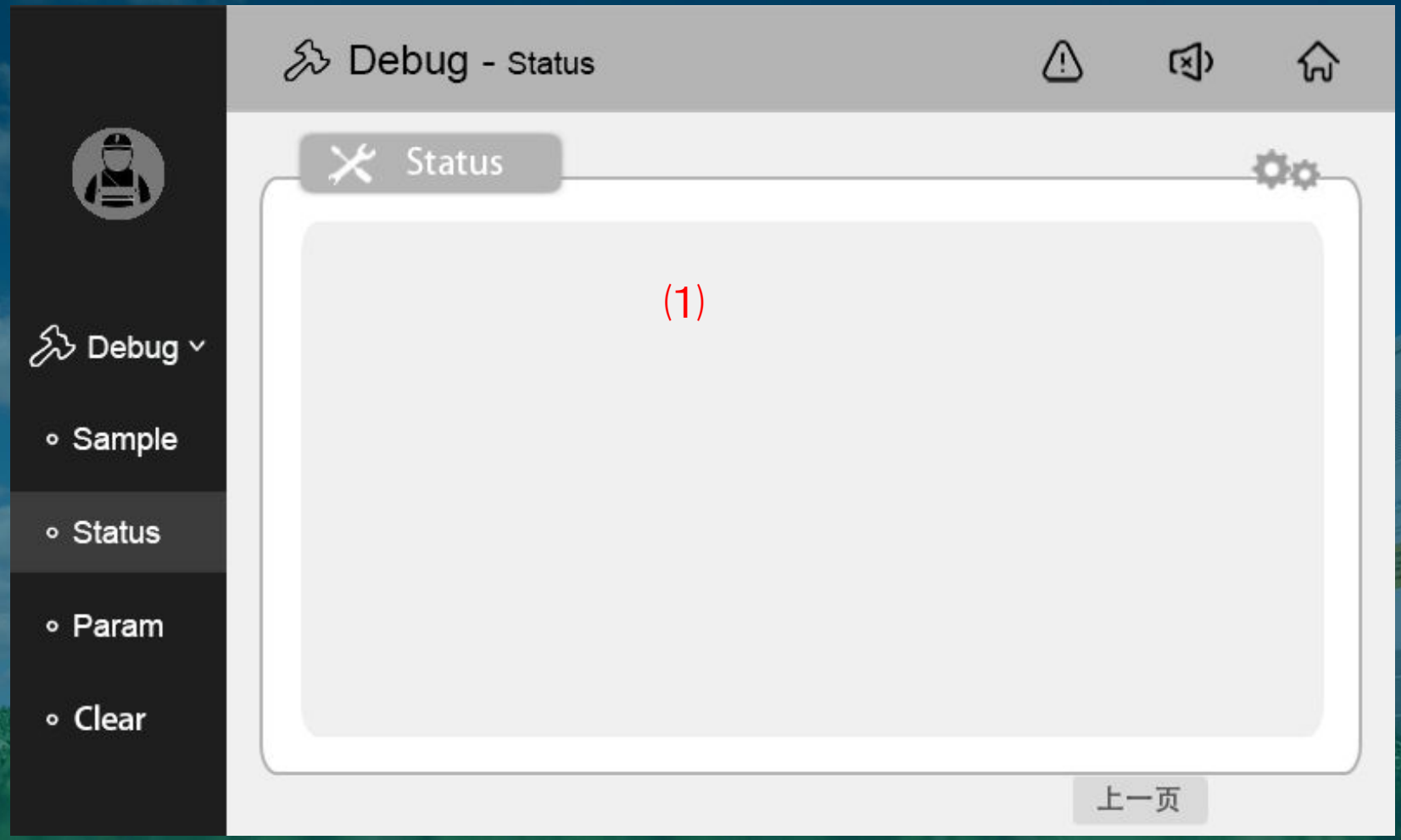
5. Engineer data



1. 采样调试信息(Sampling debugging information)
2.状态调试信息(Status debugging information)
3.参数调整(Parameter adjustment)
4.清除历史记录和恢复出厂设置
Clear history and restore factory settings
5.采样调试信息数据
Sampling and debugging information data.

调试信息是生产调试过程中工程师查看的信息，不同的程序版本，显示的数据也不相同，需要对应程序得知数据表示的意义。
Debugging information is the information that engineers view in the process of production and debugging. Different program versions display different data. The corresponding program needs to know the meaning of data representation

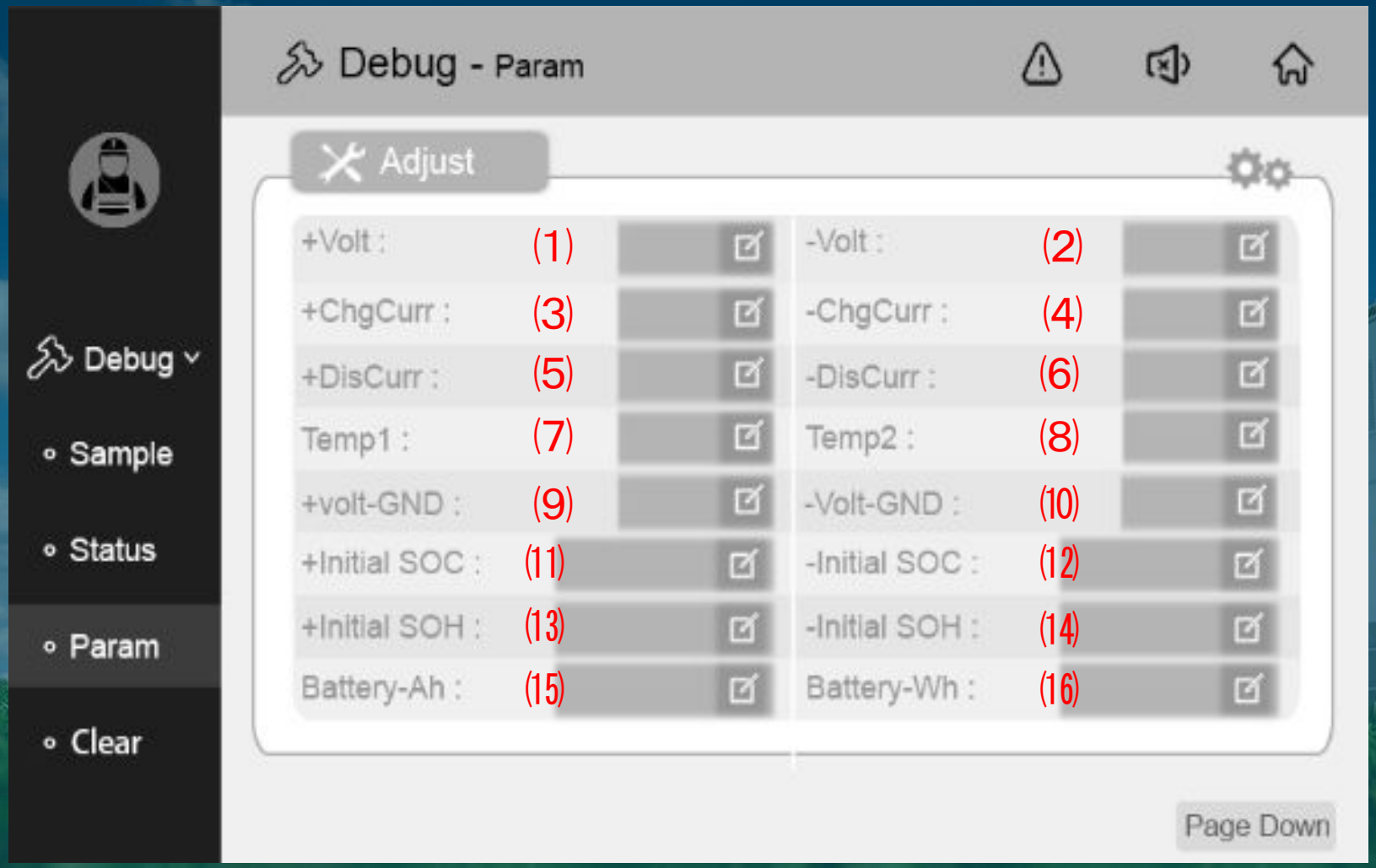
5. Engineer data



1. 状态调试信息数据
Status debugging information data.

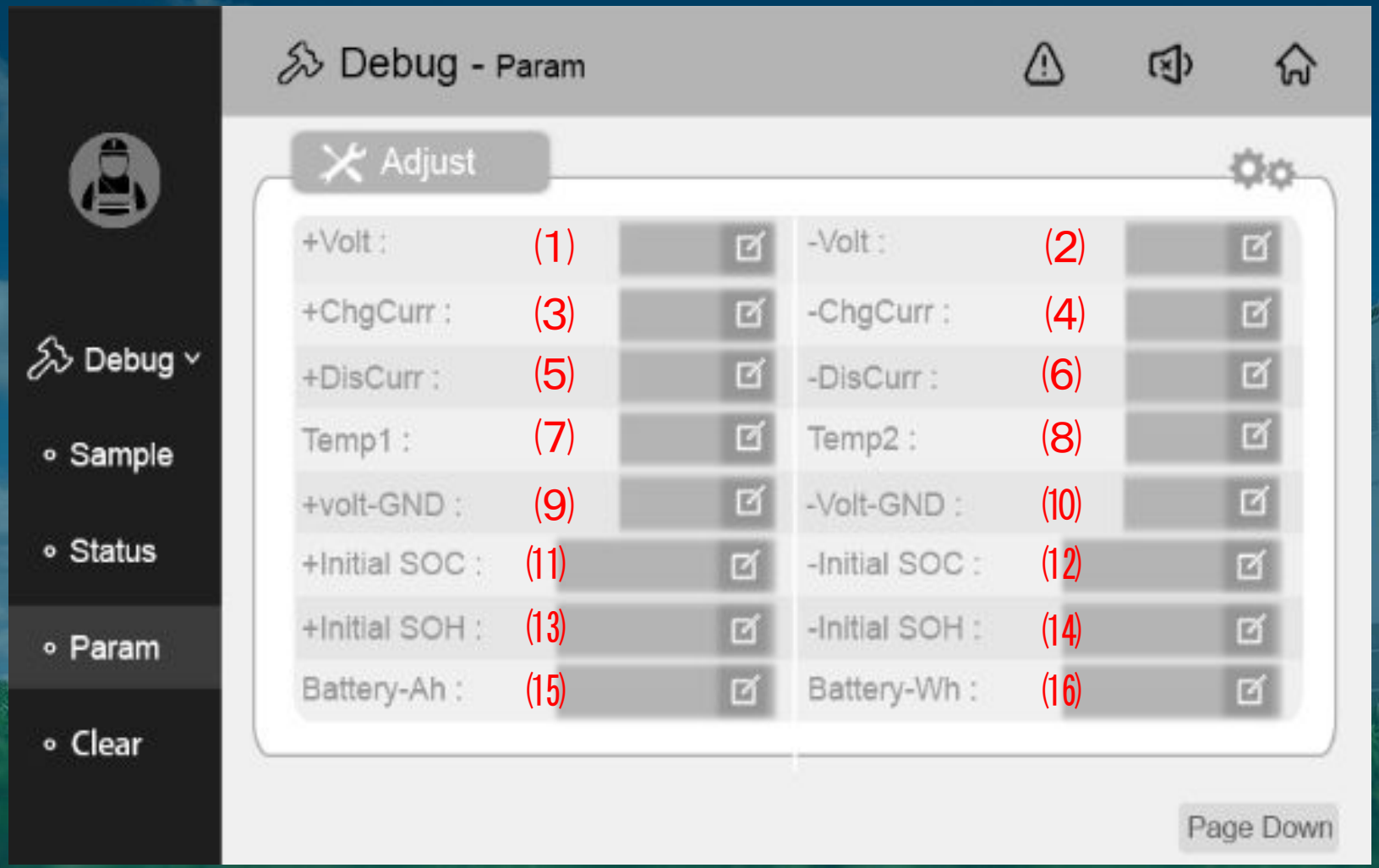
当设备运行异常时，采样调试信息和状态调试信息对于我们有重要的参考价值。
When the equipment is running abnormally, the sampling debugging information and the state debugging information have important reference value for us.

5. Engineer data



1.正电压采样校准
(Positive voltage sampling calibration)
2.负电压采样校准
(Negative voltage sampling calibration)
3.正充电电流采样校准
(Positive charging current sampling calibration)
4.负充电电流采样校准
(Negative charging current sampling calibration)
5.正放电电流采样校准
(Positive discharge current sampling calibration)
6.负放电电流采样校准
(Negative discharge current sampling calibration)

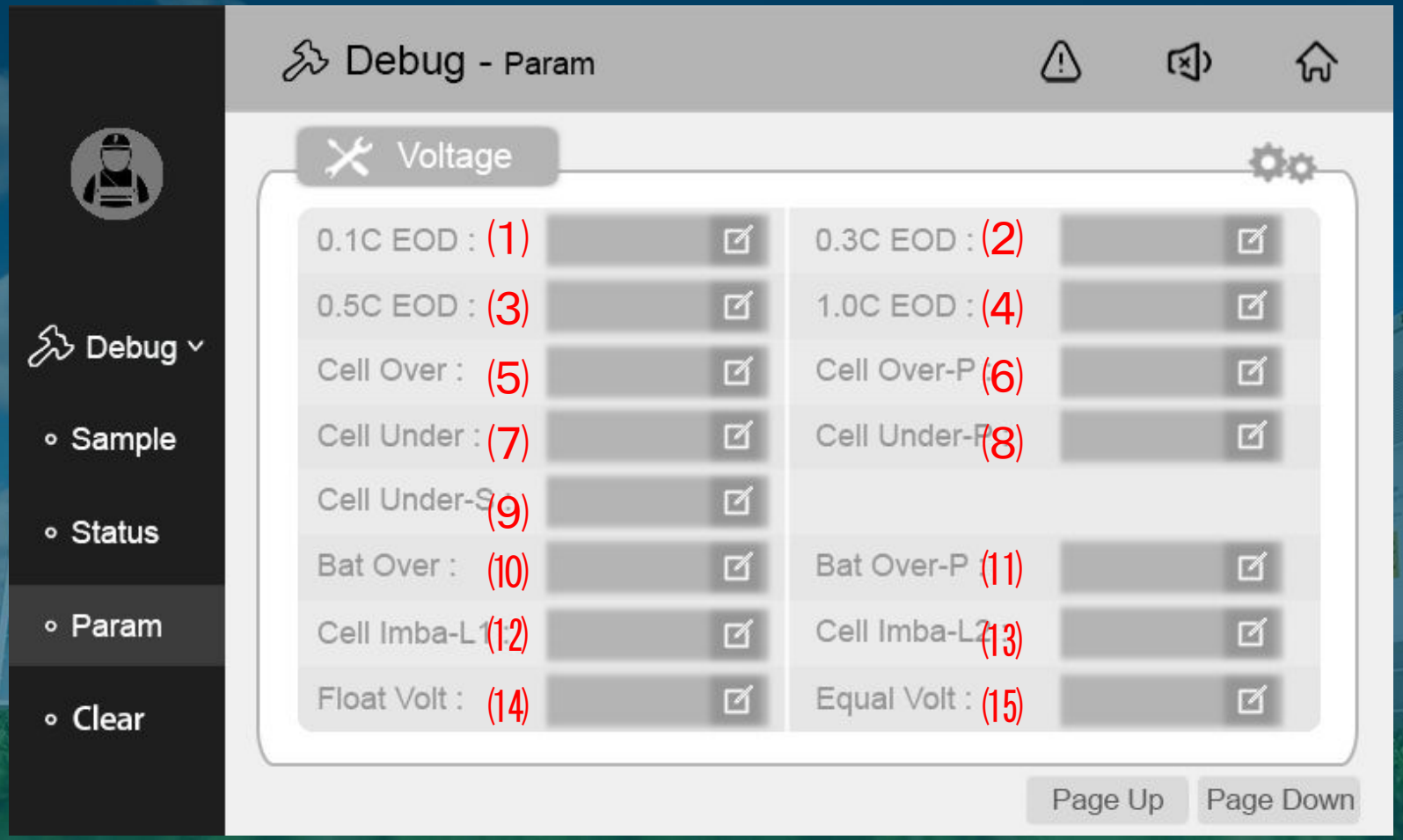
5. Engineer data



7.控制箱1号温度采样校准
(No.1 temperature sampling calibration of control box)
8.控制箱2号温度采样校准
(No.2 temperature sampling calibration of control box)
11.SOC调整(SOC adjustment)
13.SOH调整(SOH adjustment)
15.电池标准AH数
(Standard ah number of battery)

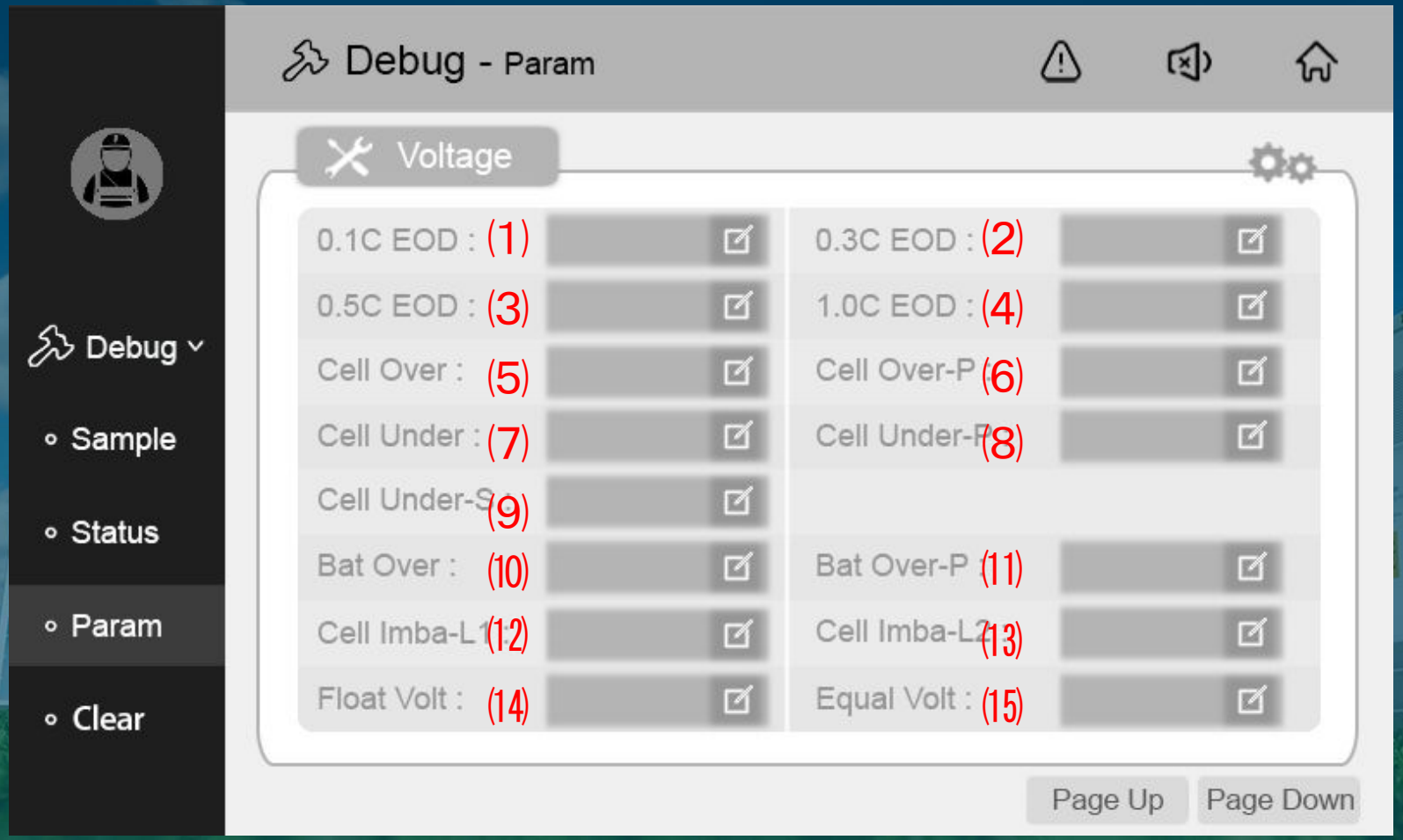
9.暂未使用(Not used yet)
10.暂未使用(Not used yet)
12.暂未使用(Not used yet)
14.暂未使用(Not used yet)
16.暂未使用

5. Engineer data



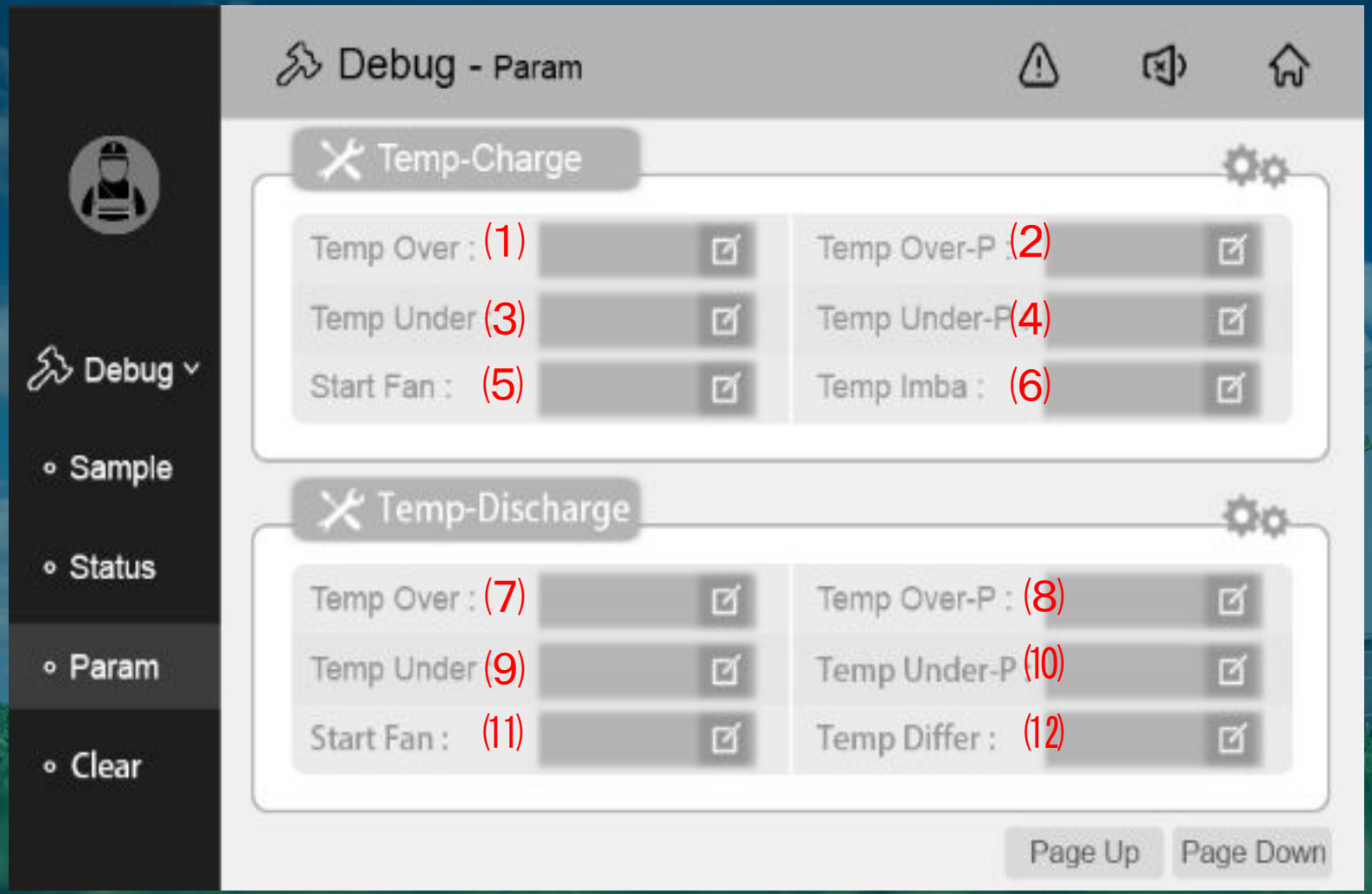
1.暂未使用(Not used yet)
2.暂未使用(Not used yet)
3.暂未使用(Not used yet)
4.暂未使用(Not used yet)
5.单体过压告警参数
(Unit overvoltage alarm parameters)
6.单体过压保护参数
(Unit overvoltage protection parameters)
7.单体欠压告警参数
(Unit undervoltage alarm parameters)
8.平均单体欠压保护参数
(Average unit undervoltage protection parameters)
9.单体欠压保护参数
(Single undervoltage protection parameters)

5. Engineer data



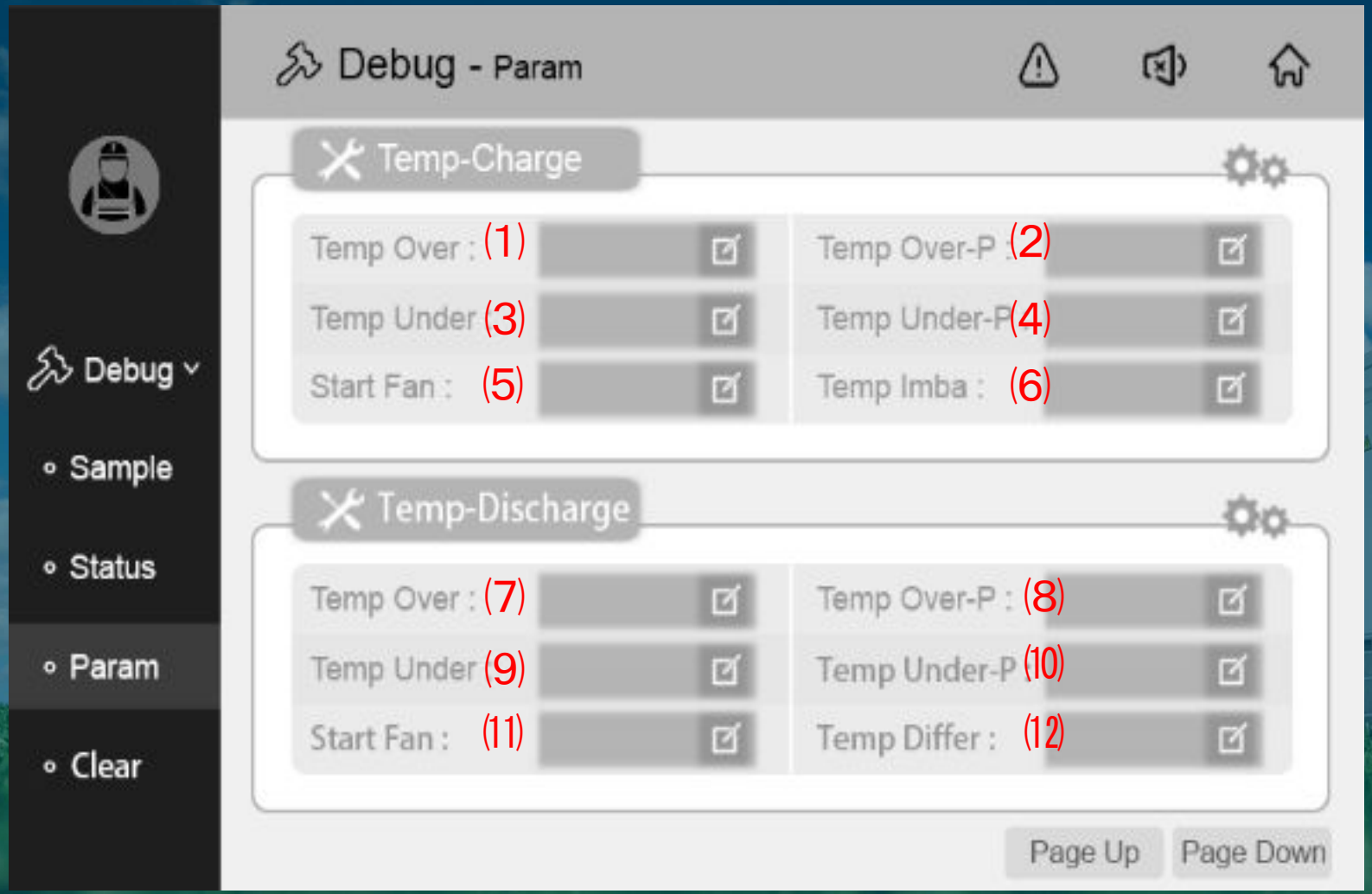
10.总电压过压告警参数
(Total voltage overvoltage alarm parameters)
11.总电压过压保护参数
(Total voltage overvoltage protection parameters)
12.单体不均衡1级
(Cell imbalance level 1)
13.单Monomer体不均衡2级
(Cell imbalance level 2)
14.浮充电压
(Floating charge voltage)
15.均充电压
(Equalizing charg voltage)

5. Engineer data



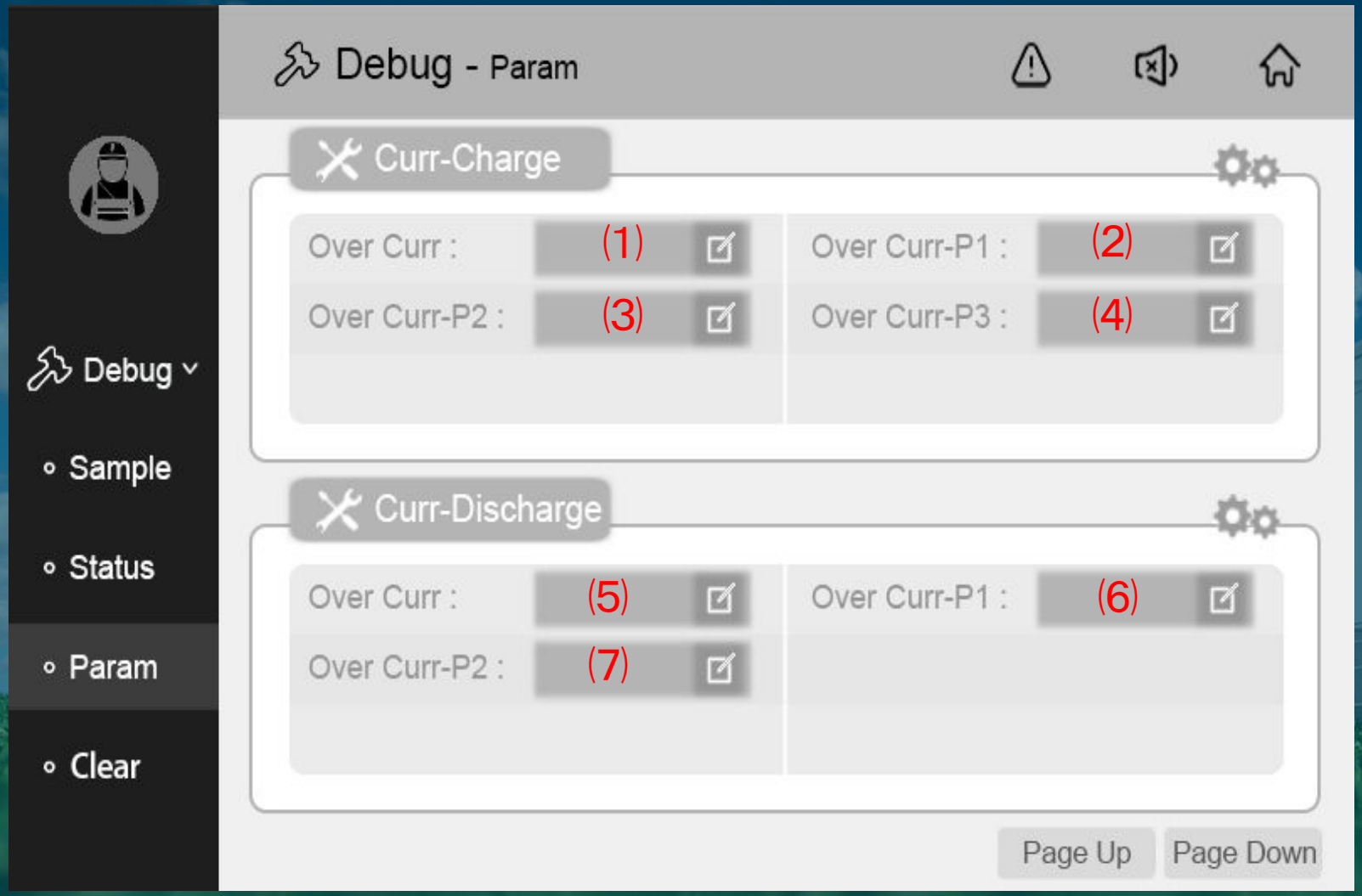
1.充电过温告警
(Over temperature alarm of charging)
2.充电过温保护
(Over temperature protection of charging)
3.充电低温告警
(Low temperature alarm of charging)
4.充电低温保护
(Charging low temperature protection)
5.充电过温启动风机
(Over temperature charging to start the fan)
6.暂未使用(Not used yet)

5. Engineer data



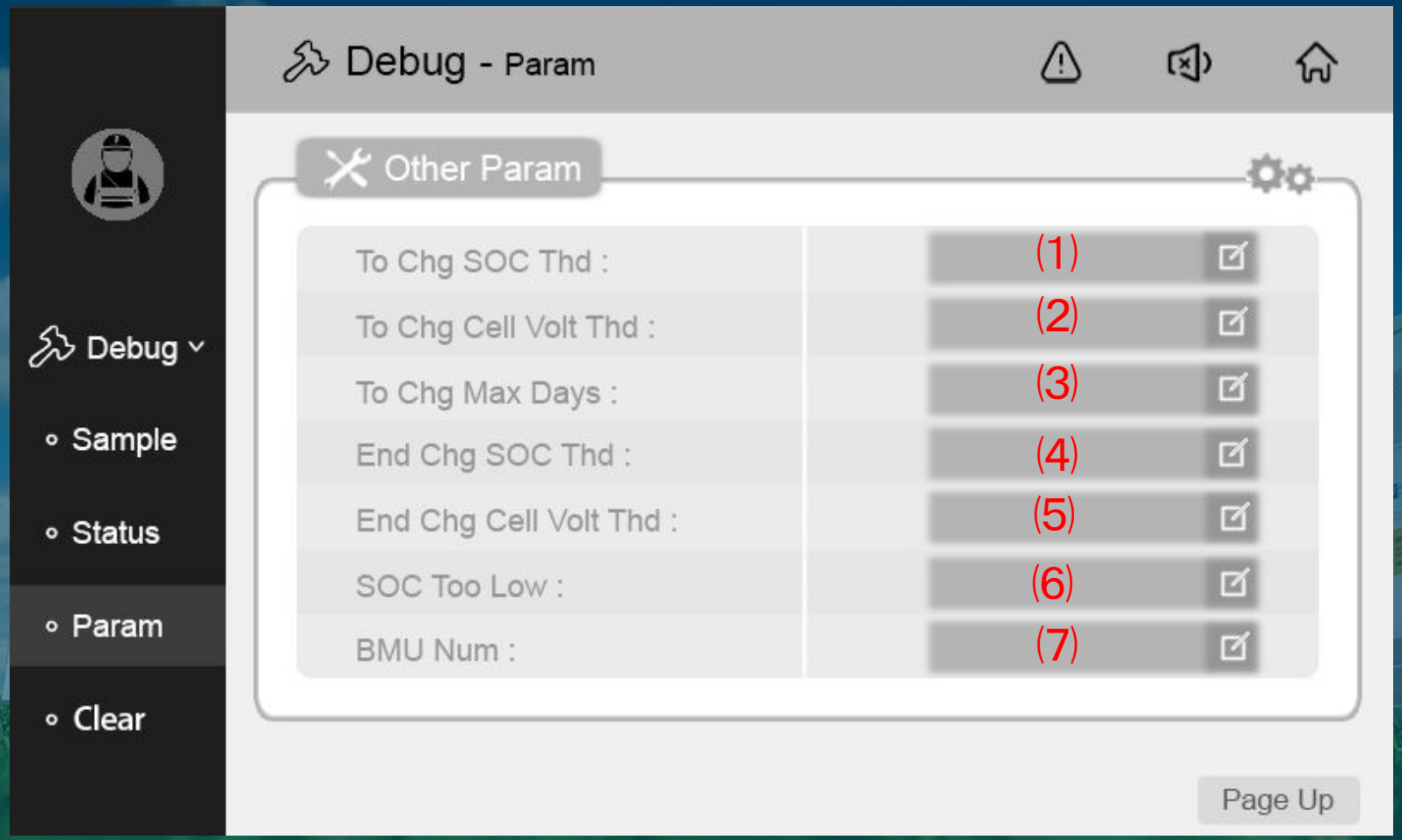
7.放电过温告警
(Discharge over temperature alarm)
8.放电过温保护
(Discharge over temperature protection)
9.放电低温告警
(Discharge low temperature alarm)
10.放电低温保护
(Discharge low temperature protection)
11.放电过温启风机
(Over temperature discharge fan)
12.电芯温度不均衡告警
(Cell temperature imbalance alarm)

5. Engineer data



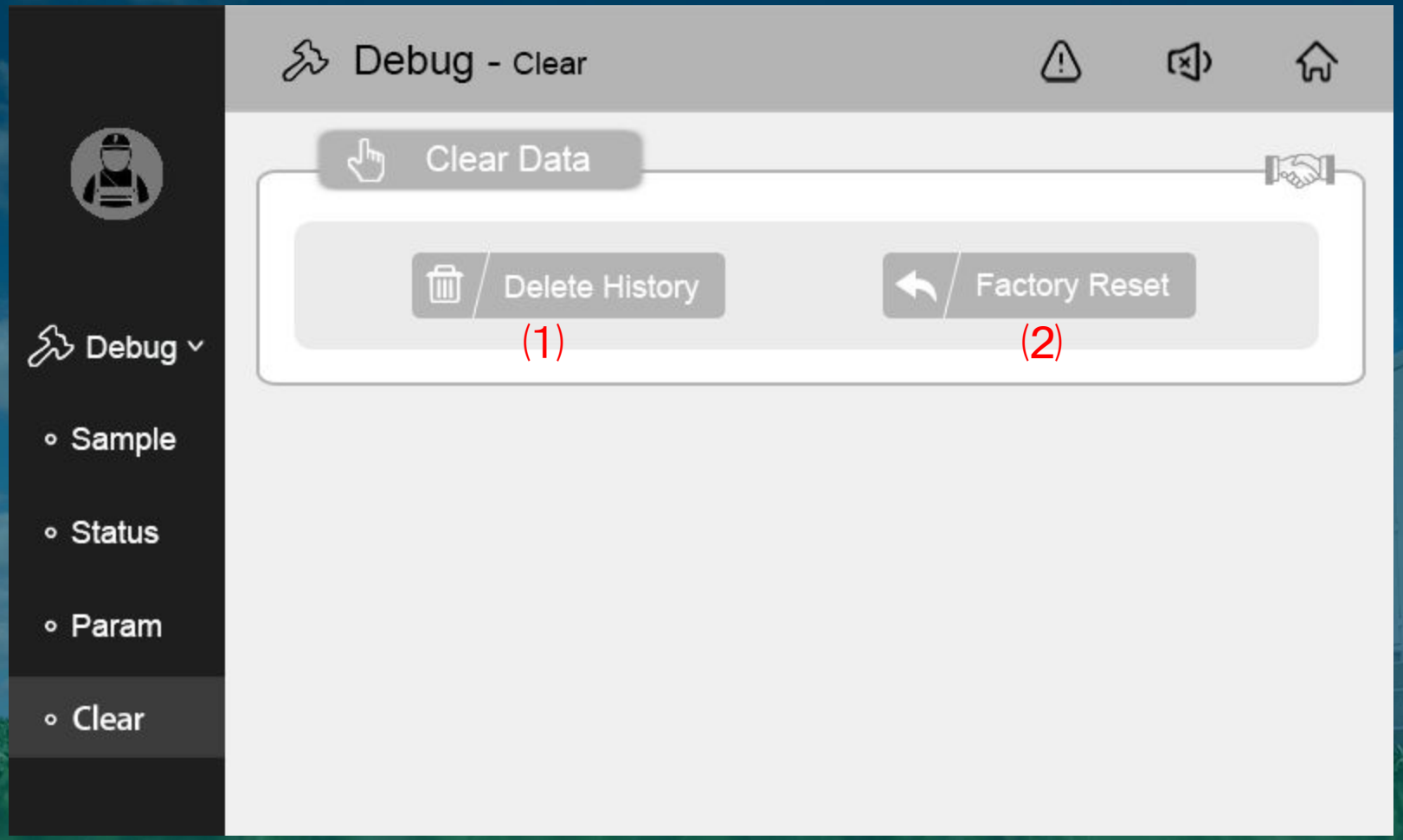
1.充电过流告警
(Charging over current alarm)
2.充电过流保护1级
(Charging overcurrent protection level 1)
3.充电过流保护2级
(Charge over current protection level 2)
4.充电过流保护3级
(Charge over current protection level 3)
5.放电过流告警
(Discharge over current alarm)
6.放电过流保护1级
(Discharge over current protection)
7.放电过流保护2级
(Discharge over current protection level 2)

5. Engineer data



1.暂未使用(Not used yet)
2.暂未使用(Not used yet)
3.暂未使用(Not used yet)
4.暂未使用(Not used yet)
5.暂未使用(Not used yet)
6.SOC过低告警
(SOC low alarm)
7.BMU个数
(Number of BMUs)

5. Engineer data



1.清除历史记录(Clear history)
将所有的历史记录数据清除
Clear all history data

2.恢复出厂设置(Restore factory settings)
将所有的设备参数恢复为出厂值，不包含校准参数
Restore all equipment parameters to factory values, excluding calibration parameters

6. Alarm details

1.Cell Over Volt
单体电压过压告警，在电池充电时，最高单体电压大于3.55V时会出现该告警，单体电压低于3.5V时，该告警消失。
When the battery is charging, the alarm will appear when the maximum cell voltage is higher than 3.55v, and it will disappear when the cell voltage is lower than 3.5V.

2. Cell Under Volt
单体电压欠压告警，一般出现在电池放电时。最低单体电压低于3V时会出现该告警，最低单体电压高于3.1V时，该告警消失。
The cell under voltage alarm usually occurs when the battery is discharging. The alarm will appear when the minimum cell voltage is lower than 3V, and will disappear when the minimum cell voltage is higher than 3.1V.

3. Chg Over Temp Alm
充电过温告警，当电芯温度大于充电过温告警值时，出现此告警，提示用户电芯温度较高。
Charging over temperature alarm. When the battery core temperature is greater than the charging over temperature alarm value, this alarm will appear to prompt the user that the battery core temperature is high.

4. Chg Under Temp Alm
充电低温告警，电池充电时，温度低于充电低温告警参数时出现此告警，提示用户电芯温度过低。
Low temperature alarm of charging. When the battery is charged, the alarm will appear when the temperature is lower than the low temperature alarm parameter, indicating that the battery cell temperature is too low.

6. Alarm details

5.Dischg Over Temp Alm
放电过温告警，当温度高于放电过温告警参数值时，出现此告警，提示用户电芯过热
When the temperature is higher than the parameter value of discharge over temperature alarm, this alarm will appear to prompt the user that the cell is overheated.

6. Dischg Under Temp Alm
放电低温告警，当电池温度低温放电低温告警温度值时，出现此告警，提示用户当前电芯温度过低。
Low temperature discharge alarm, when the battery temperature low temperature discharge low temperature alarm temperature value, this alarm appears, indicating that the current cell temperature is too low.

7. Dischg Over Curr
放电过流告警，当电池放电电流大于放电过流告警值时，出现此告警，提示用户当前放电电流过大
When the battery discharge current is greater than the discharge over-current alarm value, this alarm will appear to show the user that the current discharge current is too large
8. Chg Over Curr
充电过流告警，当电池充电电流大于充电过流告警值时，出现此告警，提示用户当前充电电流过大
When the battery charging current is greater than the charging over-current alarm value, this alarm will appear to prompt the user that the charging current is too large now.

6. Alarm details

9. Chg Over Volt
总过压告警，当电池总电压大于充电过压告警参数值时，出现此告警，提示用户当前充电电压高。
Total overvoltage alarm: when the total battery voltage is greater than the charging overvoltage alarm parameter value, this alarm will appear to show the user that the current charging voltage is high.

10. Soc Too Low
SOC过低，当电池SOC低于SOC过低参数值时，出现此告警，提示用户SOC过低。
SOC is too low. When the battery SOC is lower than the SOC low parameter value, this alarm will appear to show the user that the SOC is too low.

11. Cell Volt Unbalance
单体电压不均衡，当系统最高单体电压和最低单体电压压差大于不均衡2级参数时，出现此告警，提示用户系统中单体电芯电压一致性降低。
When the voltage difference between the highest unit voltage and the lowest unit voltage is greater than the unbalanced Level 2 parameter, this alarm will appear, indicating that the consistency of cell voltage in the system is reduced.

6. Alarm details

12. Bsu Comm Err

电池模块通信异常，当系统电池模块数设置与实际电池模块不匹配，或BCU和BMU通信断开，或BMU工作异常时，会出现此告警，提示用户电池系统内部存在故障，此时由于BCU不能完整的检测到电芯电压，如果充电不能对电芯进行有效的保护，因此出现此告警时，系统只能放电，不能充电。遇到这种状态时，表示系统存在故障，应该及时解决。

The battery module communication is abnormal. When the number of battery modules in the system does not match with the actual battery module, or the communication between BCU and BMU is disconnected, or the BMU is working abnormally, this alarm will prompt the user that there is an internal fault in the battery system. At this time, because BCU can not completely detect the battery voltage, if charging can not effectively protect the battery, the system will only Can discharge, not charge. In this case, it indicates that there is a fault in the system, which should be solved in time.

13. Cell Over Volt-P

单体电压过压保护，一般在充电时出现，当电芯电压充电到3.65V时，出现此告警，表示有电池电芯电压高于3.65V，不能再继续充电，此时BMS断开充电接触器，转为等待放电模式。

Single voltage over-voltage protection generally appears during charging. When the cell voltage is charged to 3.65v, this alarm will appear, indicating that the battery cell voltage is higher than 3.65v and cannot continue charging. At this time, BMS disconnects the charging contactor and turns to wait for discharge mode.

6. Alarm details

14. Avg Under Volt-P

平均单体电压保护，一般在电池放电时出现，表示电池平均单体电压低于2.8V，电池不能再继续放电，BMS断开放电继电器，转为等待充电模式，电池放电结束。

The average cell voltage protection generally appears when the battery is discharged, which means that the average cell voltage of the battery is lower than 2.8V, and the battery can no longer discharge. BMS disconnects the electric relay and turns to wait for charging mode, and the battery is discharged.

15. Cell Under Volt-P

电池单体欠压保护，一般在电池放电时出现，表示电池单体电压低于2.5V，电池不能再继续放电，BMS断开放电继电器，转为等待充电模式，电池放电结束。

Under voltage protection of single battery usually occurs when the battery is discharged, which means that the voltage of single battery is lower than 2.5V, and the battery can not continue to discharge. BMS disconnects the electric relay and turns to wait for charging mode, and the battery is discharged.

6. Alarm details

16. Chg Over Temp-P
17. Chg Under Temp-P
18. Dischg Over Temp-P
19. Dischg Under Temp-P

温度保护，表示电池系统存在过温或低温情况，此时电池不能再充电或放电，否则会出现危险或损坏。

Temperature protection means that the battery system has over temperature or low temperature. At this time, the battery can not be recharged or discharged, otherwise it will be dangerous or damaged.

20. Dischg Over Curr-P1
21. Dischg Over Curr-P2
22. Chg Over Curr-P1
23. Chg Over Curr-P2
24. Chg Over Curr-P3

充电或放电过流告警，根据不同等级的电流，保护时间有所差异。出现此告警说明充电或放电电流大于设定的保护值。

Charging or discharging over-current alarm, according to different levels of current, the protection time is different. The alarm indicates that the charging or discharging current is greater than the set protection value.

6. Alarm details

25. Chg Over Volt-P
充电过压保护，表示充电器电压大于电池充电过压保护值，出现此告警，请确定充电器电压等级和电池电压等级是否匹配，防止出现过充现象。
Charging over-voltage protection means that the charger voltage is greater than the battery charging overvoltage protection value. If this alarm occurs, please confirm whether the charger voltage level and battery voltage level match to prevent overcharge.

26. Chg Contact Err
27. Dis Contact Err
充电继电器和放电继电器异常，出现的原因是继电器无法断开和继电器无法闭合。出现此告警表示系统存在故障，无法正常充电或放电，如果充电或放电，BMS不饿能提供有效的保护，可能会导致电芯损坏及其他危险发生。
The charging relay and discharge relay are abnormal. The reason is that the relay cannot be disconnected and the relay cannot be closed. The alarm indicates that there is a fault in the system, which can not be charged or discharged normally. If charging or discharging, BMS can provide effective protection, which may lead to cell damage and other hazards.

28. EPO Off
紧急关机，当输入干接点动作关机时，会出现此告警，表示系统断开输出并关机。
Emergency shutdown: when the input dry contact acts, this alarm will appear, indicating that the system has disconnected the output and shut down.

7. Software upgrade

1.92AH电池系统升级(92ah battery system upgrade)

微芯公司的dsPIC6012A芯片，升级使用ICD3或ICD4，升级方法和UPS类似。

The chip dsPIC6012A of microchip company is upgraded to icd3 or icd4, and the upgrade method is similar to UPS(CMS).

2.80AH电池系统升级(80AH battery system upgrade)

使用的芯片是ST公司的STM32F107VC。升级分为两种方式：

J-link编程器升级(BCU升级)

CANBus升级(BMU升级)

The chip used is STM32f107VC of ST company. There are two ways to upgrade:

J-link programmer upgrade(used for BCU upgrade)

CANbus upgrade(used for BMU upgrade)


Battery
ENERGY STORAGE