PBAT-Gate Battery Monitoring System

Installation & Operation Manual

V3.3

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PILOT (HENGQIN) CO., LTD.

Danger and warning!

This device can be installed only by professionals.

The manufacturer shall not be held responsible for any accident caused by the failure to comply with the instructions in this manual.

Risks of electric shocks, burning, or explosion

- This device can be installed and maintained only by qualified people.
- Before operating the device, isolate the voltage input and power supply and short-circuit the secondary windings of all current transformers.
- Use appropriate voltage tester to make sure the voltage has been cut-off.
- Put all mechanical parts, doors, or covers in their original positions before energizing the device.
- Always supply the device with the correct working voltage during its operation.

Failure to take these preventive measures could cause damage to equipment or injuries to people.

Content

Chapter 1 Introduction

The battery monitoring system is used for the performance testing of various battery strings, comprehensive measurement to determine battery performance, and the failure of the battery will display and alarm, the battery can also be effectively activated maintenance, Can be real-time monitoring of the battery running status and its operating parameters, the battery pack self-diagnose and automatically make the appropriate maintenance, you can use the network to achieve remote, telemetry, control intelligent monitoring system. Real-time running status and health status of the battery strings, timely detection of the battery used in the process of the problems and to achieve automatic maintenance function. Keep the battery string in voltage balance while floating charge, so that each unit of the battery to maintain the best active state, improve the battery backup time and operating life, timely detection of backward battery and automatic on-line activation maintenance, this greatly reduces the manpower, material and other maintenance costs, improve the safety of battery use to reduce the accident rate, effective energy-saving emission reduction, for the use of units to create a good economic and social benefits.

Product Features:

（1）Real-time monitoring of the battery voltage, charge and discharge current, resistance, temperature, SOC, SOH

（2）Intelligent adjust parameters sampling frequency under the charging and discharging status, improve the accuracy of calculation

（3）Advanced measurement algorithms, without the need for large current discharge, will not damage the battery health

（4）Detect the battery's Commissioning/idle status, intelligent switching systems Run /Sleep, achieve low power consumption

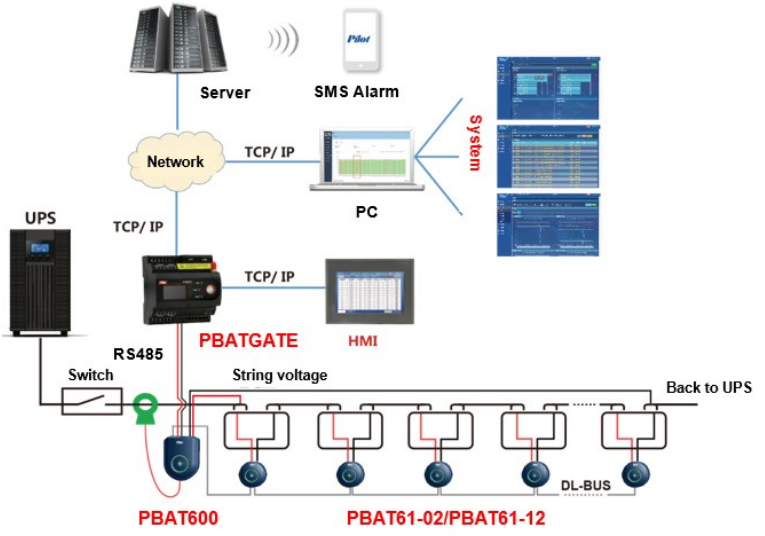
（5）Ring network topology, Communication within the ring circuit occurs automatically forma double-stranded structure, to ensure the communication stability

（6）Distributed deployment and Ethernet network management, can adapt to any environment seamlessly site

（7）Detailed historical data recording, sound alarm event management, provide battery maintenance, failure analysis, report generation from data support

（8）A variety of alarm linkage, So quickly found unexpected events

1.1 System Structure



PBAT battery monitoring system consists of a gateway module, single acquisition module, battery pack collection module, Hall sensors, temperature and humidity sensors and datacenters, each module functions as following:

Module Name	Illustration
Gateway	Realization battery data acquisition, control, alarm and event logging upload
Single acquisition module	Measuring single cell voltage, temperature, resistance and alarm indication
Pack collection module	Measuring the pack voltage and current parameters
Current sensor	Current sensor

1.2 Applications

PBAT battery monitoring system:

（1） Support to monitor single unit 2V or 12V battery

（2） Support to monitor single group 1-120 units cell snesors.

（3） Measurement Maxim group voltage 20-800V

（4） Measurement current -1000A---+1000A

（5）Flexible installation, scalability for high reliability requirements such as finance, railways, telecommunications, electricity, mining and other occasions;

1.3 Measurement

Provide a full range of measurement functions, can fully meet the battery network monitoring requirements. PBAT measurement functions as following:

Items	Support or not	Note
Single Cell Voltage	●	
Single Cell Temperature	●	
Single Cell Resistance	●	
Group average Single Cell Voltage	●	
Group average Single Cell Temperature	●	
Group average Single Cell Resistance	●	
Group Voltage	●	
Serial Current	●	
Record		
Maximum storage12monthshistory data	Maximum storage12months history data	Maximum storage12monthshi story data
Maximum storage12monthsof alarms data	Maximum storage12months of alarms data	Maximum storage12monthsof alarms data
Logging record	Logging record	Logging record
Resistance testrecord	Resistance testrecord	Resistance testrecord

Chapter 2 Installation and Wiring

2.1 Environment

（1）Standard operating temperature：-10℃～ +55℃

（2）Operating temperature limit：-25℃～+55℃

（3）Storage temperature：-40℃～ +70℃

（4）Working humidity：5% ～ 95%RH，Non-condensing

2.2. Installation and Usage

PBAT battery monitoring system is divided into a gateway module, Cell Sensor module, String Sensor module.

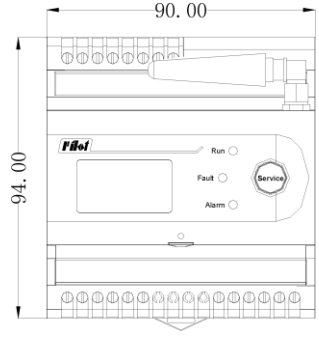
2.2.1 Gateway module

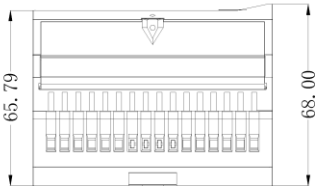
Use rail installation, fixed on the rail.

The size of the installation must be strictly in accordance with the following figure, in order to ensure the correct installation of equipment.

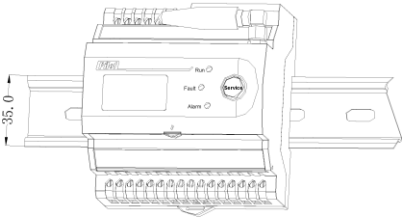
Model：GateL4

（1）Dimension





(2) Installation



(3) The main terminal definitions (Gate L4 4CG) **:**

NO.	Symbol	Definition
1	24V+	24V DC power supply positive terminal input
2	24V-	24V DC power supply negative terminal input
3	Null	Null
4	Null	Null
5	Null	Null
6	Null	Null
7	RS485A B-	RS485A-
8	RS485A A+	RS485A+
9	RS485A SHEL	RS485A Shield
10	RS485B B-	RS485B-

11	RS485B A+	RS485B+
12	RS485B SHEL	RS485B Shield
13	RS485D SHEL	RS485D Shield
14	RS485D A+	RS485D+
15	RS485D B-	RS485D-
16	RS485C SHEL	RS485C Shield
17	RS485C A+	RS485C+
18	RS485C B-	RS485C-
	LAN1	Port 1 (10M/100M)
	LAN2	Port 2 (10M/100M)
	TF(Cover)	TF Card(Standard)

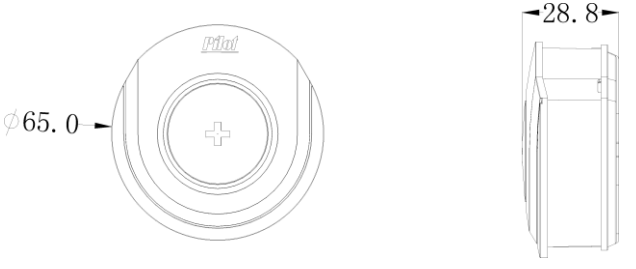
The main terminal definitions（Gate L4 2ZG）:

NO.	Symbol	Definition
1	24V+	24V DC power supply positive terminal input
2	24V-	24V DC power supply negative terminal input
3	Null	Null
4	Null	Null
5	RL11	Relay output（passive）
6	RL12	Relay output（passive）
7	RS485A B-	RS485A-
8	RS485A A+	RS485A+
9	RS485A SHEL	RS485A communication line shield
10	RS485B B-	RS485B-
11	RS485B A+	RS485B+

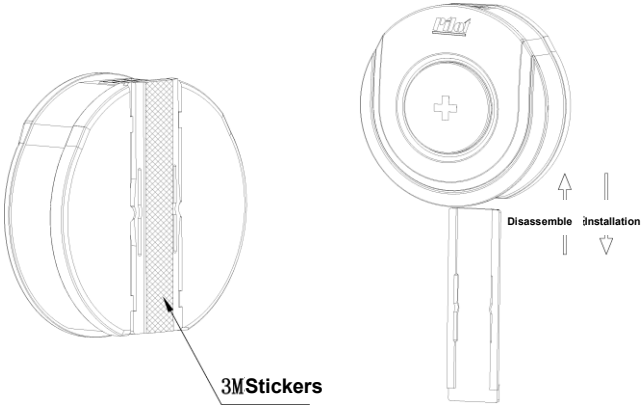
12	RS485B SHEL	RS485B communication line shield
13	+I1	4-20mA I1 input +
14	COM	4-20mA I1(2) input +
15	+I2	4-20mA I2 input +
16	S1	Switch input 1
17	S2	Switch input 2
18	S3	Switch input 3
19	S4	Switch input 4
20	Scom	Common port of switch port
	LAN1	Ethernet 1 (10M/100M)
	LAN2	Ethernet 2 (10M/100M)

2.2.2 Cell Sensor module

(1) Dimension



(2) Installation



(3) The main terminal definitions:

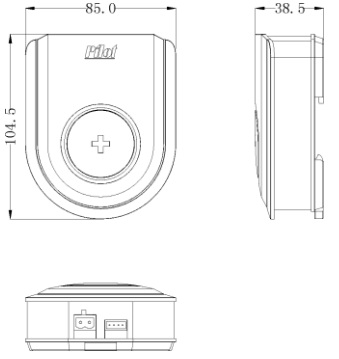
No.	Symbol	Definition
1	V- Bat	DC Power supply input -
2	V- Sense	Negative voltage terminal
3	PTC	Temperature terminal
4	PTC	Temperature terminal
5	V+ Sense	Positive voltage terminal
6	V+ Bat	DC Power supply input +
7	COM 1	Series 1
8	COM 2	Series 2

(4) Indicate light illustration

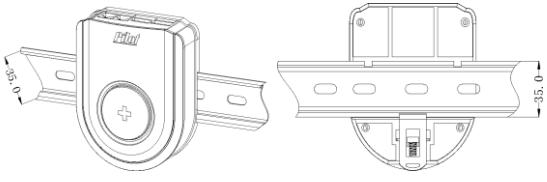
NO.	Symbol	Color	Definition
1	RUN	Green	Device running indicator
2	ALARM	Yellow	Alarm indicator(When the user-defined event alarm occurs, the alarm is triggered and the alarm light is on)

2.2.3 String Sensor module

(1) Dimension



(2) Installation



(3) Definition of main terminal

No.	Symbol	Definition
1	+24V	24V DC power supply positive terminal input
2	-24V	24V DC power supply negative terminal input
3	Hall Terminal	Group Current Hall Sensor connect
4	-	Group voltage measure -
5	+	Group voltage measure +

6	RS485+	RS485+
7	RS485-	RS485-
8	COM1	BM-BUS communication，RJ11 port
9	COM2	BM-BUS communication，RJ11 port

（4）Definition of indicator

Symbol	Definition
RUN L1（GREEN）	Device running normally
ALARM2（RED）	Alarming

2.3 Order Information

The complete model specifications and the meaning of each code are shown in the following table:

Model： Gate		
Gateway Module (Support 1-4 group string battery, maxim 120 units cell sensors)		
4CG	4*RS485	pick one of two, 4CG support up to 4 groups of battery, 2ZG support up to 2 groups of battery,
2ZG	2*RS485 4 *Passive switch input 2*Analog input (DC 4-20mA) 1*Relay output	
Model： 600		
600	String Sensor (each group should be equipped with 1 piece)	Required
Model： 61		
Cell Sensor (one battery for one unit),-xx refers to different models		
61-02	Support 2V battery unit acquisition	Pick one of two
61-12	Support 12V battery unit acquisition	Pick one of two

2.4 Power Supply

Module	Power Supply	Note
Gate	18V-36V DC 5W	24VDC power supply
600	12V-36V DC	24VDC power supply
61-02	2V DC	2V battery unit power supply
61-12	12V DC	12V battery unit power supply

Chapter 3Display and Operation instruction

3.1 Summary

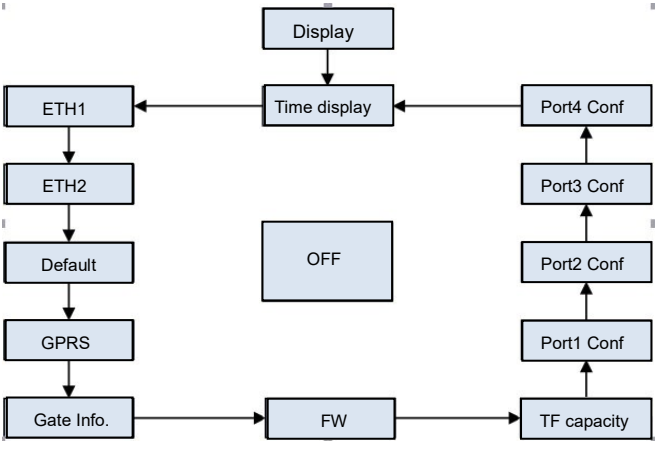
within 30s, the display will OFF automatically, until the key operation will be displayed again.

3.2 Key features

Gate panel has only one button to control the screen switch, you can press the button to achieve the screen cycle display.

3.3 Data Query

Following is GATE display menu structure:



3.3.1 Time Display Interface

Data Display： Displays the current battery gateway time	

3.3.2 Network port configuration

Display interface IP address, gateway address, subnet mask The network port 2 is displayed in the same way as the network port 1.	 

3.3.3 Default gateway interface

Data Display: Default gateway IP	

3.3.4 Gateway Information Display Interface

Data Display : Gateway serial number	

3.3.5 Gateway software Version Interface

Data Display : Software version number	

3.3.6 SIM Status Info

Data Display : SIM Status SIM signal	

3.3.7 Serial port display interface

Data Display : Sequentially displaying the number of the baud rate, number of data bits, parity, and data bit settings. Serial 2, 3, 4 configuration display and serial port 1 is the same	

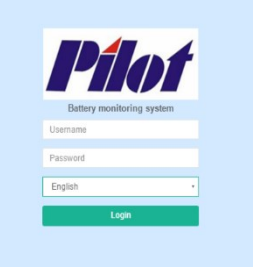
Chapter 4 Webpage Illustration

4.1 Summary

Gate provides web configuration and data viewing for battery management and debugging. Web page can do basic operation parameter configuration, the battery current and historical data, log files from the gateway, engineering view, system firmware upgrade.

4.2 Login

Connect the gateway to a PC(if there is LAN wireless router, you can use your tablet or smart phone to log in), open the IE browser(supportsIE9 +,Firefox, chrome and other browsers),enter the gateway IP address on address bar



Factory default setting

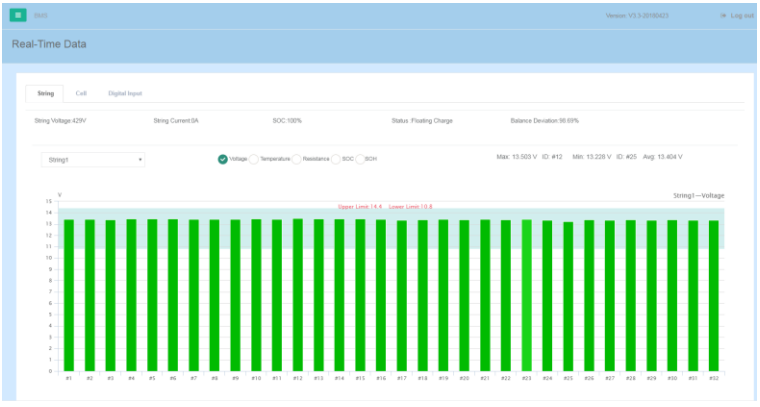
User Name: admin Password: admin

Notice: If you are modify the user name or password, and forgot the password, the following super Account can be used for support. (Distinguish between uppercase and lowercase)

Super Account：Super Admin Super Password： PilotGate6

4.3 Real-time Data

After a normal login, click on the left menu bar [Real-time Data] to show the battery management information page:

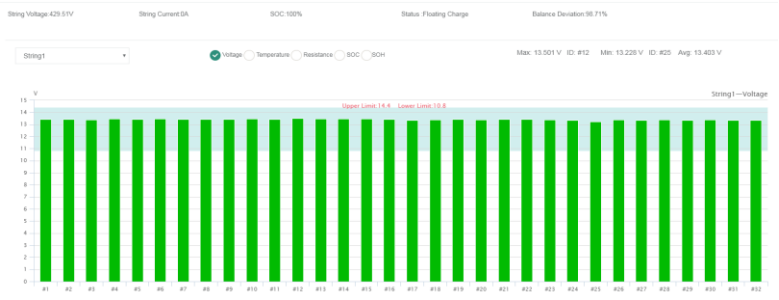


Real-time data page manage battery voltage, current, temperature, internal resistance, and battery collector connection status.

Click the switch TAB to switch group information, cell information and digital input information,

as shown in the figure below.

Group info：



Cell info:

Device	Voltage(V)	Temperature(℃)	Resistance(mΩ)	SOC(%)	SOH(%)
1	13.415	25.3	5.633	100%	79%
2	13.44	25.3	6.372	100%	68%
3	13.39	25.2	6.368	100%	68%
4	13.462	25	5.581	100%	79%
5	13.439	25.4	6.112	100%	72%
6	13.457	25	6.244	100%	70%
7	13.434	24.8	6.568	100%	65%
8	13.432	24.6	6.272	100%	69%
9	13.424	24.5	6.035	100%	73%
10	13.446	24.1	5.996	100%	74%
11	13.432	24.2	5.826	100%	76%
12	13.503	24	5.758	100%	77%
13	13.472	23.8	6.111	100%	72%
14	13.479	23.8	7.224	100%	53%
15	13.457	24.2	6.036	100%	73%

Previous Next Page:1/3

Digital input info:

Digital Input Type	ON-OFF Status
DI1	1
DI2	1
DI3	1
DI4	1

4.4 History data

Click the left menu bar“Historical data”, display the battery history data page:

Click the switch TAB to switch group information, cell information.

Query historical data base on time period and parameter type. (time period can't longer than 30 days, and the final date should late than the starting data), the rectangle will judge whether is normal or abnormal of the measure value. When it is abnormal, the testing point will have red point sign.

Query historical data base on time period and parameter type. (time period can't longer than 30 days, and the final date should late than the starting data), the rectangle will judge whether is normal or abnormal of the measure value. When it is abnormal, the testing point will have red point sign.

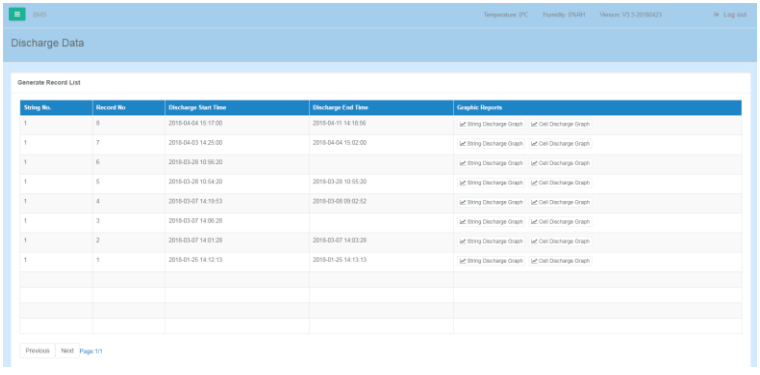
Note:

PBAT-Gate can Max. storage history alarm record for 2 years. For those record that longer than 5 years, the Gate will delete the oldest 1 months data.

Historical data will work after the Gate insert TF Card, in accordance with the maximum

load capacity calculation (240 monomer collector) of voltage, current, temperature, the internal resistance of the measuring point were recorded. Recommended TF card capacity is greater than or equal to 8G

4.5 Discharge Data



Click the menu in the left side “Discharge Data”, display battery discharge data page:

Display different time period discharge record list.

Query discharge historical data of string monitor in a time period (including string voltage, string current).

Query discharge historical data of cell monitor in a time period (including voltage, temperature, internal resistance). The default curve shows less than 3cells data curve. The curve for more than 3cellsis hidden, click on the line can be displayed.

Note:

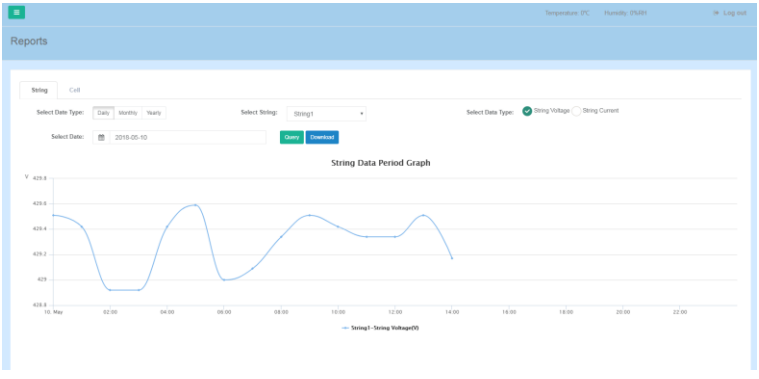
PBAT-Gate can Max. storage history alarm record for 2 years. For those record that longer than 2 years, the Gate will delete the oldest 1 months data.

Historical data will work after the Gate insert TF Card, in accordance with the maximum

load capacity calculation (240 monomer collector) of voltage, current, temperature, the internal resistance of the measuring point were recorded. Recommended TF card capacity is greater than or equal to 8G

4.6 Reports

Click the menu in the left side “Reports”, display report page, including string battery data reports and cell battery reports.



User can select day, month, year as date type. When select “day”, can display any one of the day’s detail data. When select “Month”, can display each day’s average data of one month. When select “year”, can display each month’s average data of one year.

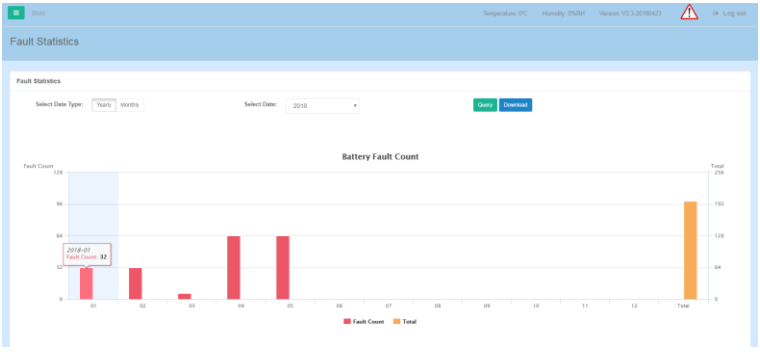
Can select multi string sensor for query data.

Can select any one of the measure point (string voltage, string current, SoC).

When select “day”, then customer can select any one of the day. When select “month”, then customer can select 12 months of the year. When select “year”, then can only select year time.

4.7 Fault Statistics

Click the menu in the left side “Fault statistics”, display fault statistics page



When select “year”, it can display each months alarm statistics quantity. When select “month”, it can display each day of the month’s alarm statistics quantity.

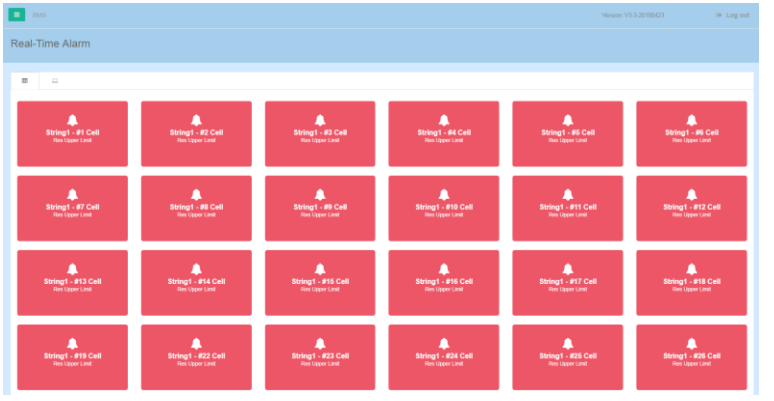
When select “month”, can select 12 months of the year. When select “year”, can only select year time.

Click “Query” then it will display the period of the present alarm quantity. When click “Download” then it will download the present data as excel format files.

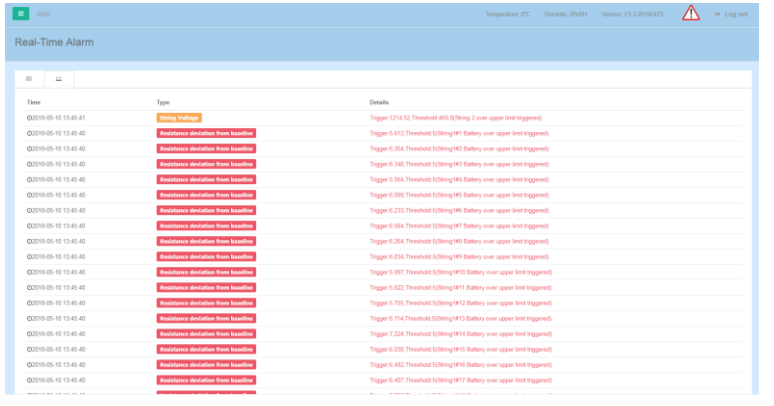
4.8 Real-Time alarm

Click the menu in the left side “Real-Time alarm”, display detail information for the present alarm battery (the alarm which is not deal with).

The first page shows the battery warning message now;



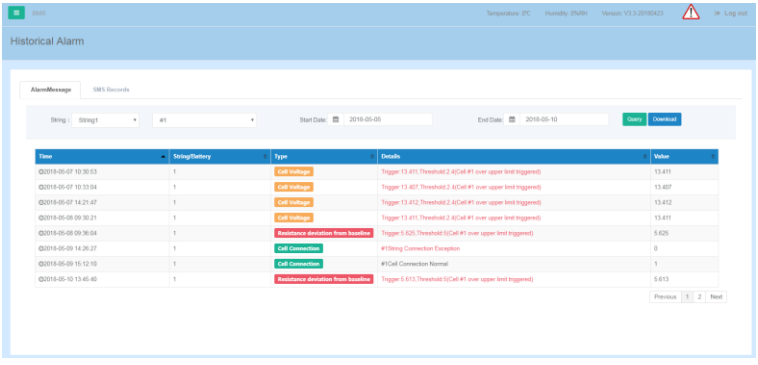
The second page shows the recent 200 untreated alarm information.



When the gateway is restarted or reconfigured, the real-time alarm display will be reset.

4.9 Alarm History

Click the menu in the left side “Alarm History”, display historical alarm records.



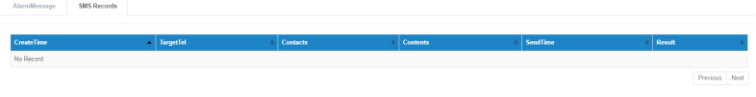
When the first checkbox string is selected, multiple cells or all cells can be selected; When the second checkbox string is selected, the alarm of the choosing string is queried.

The end time must be greater than or equal to the start time, with maximum support for the cross one year query data.

Click the "query" button to display the data in the current condition to the table, and support sorting and paging. Click the "download" button to download the data from the current condition to the excel file.

Click the switch TAB to switch alarm message and sms records.

SMS sending record:



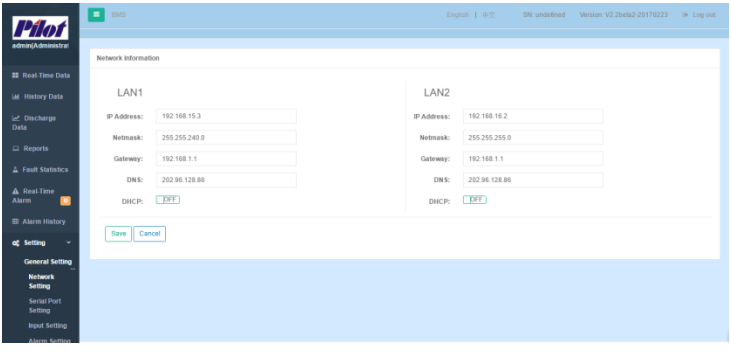
SMS records page record the last 100 SMS messages with contacts, content, time of delivery, whether to send a successful message.

4.10 Setting

Click the menu in the left side “setting”, then it will display submenu.

4.10.1 Network Setting

Click the menu in the left side “Setting”→”General Setting”→”Network Setting”, then it will display network parameter setting page.



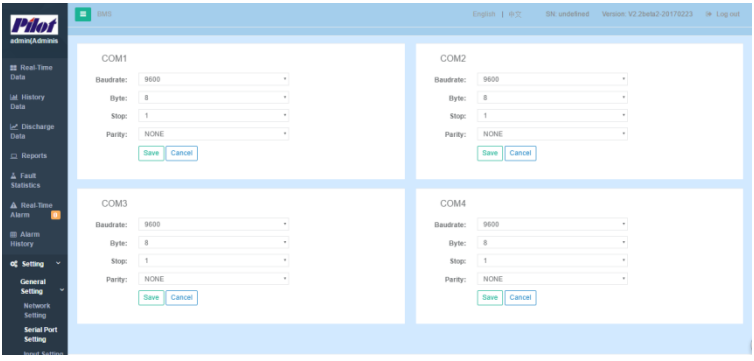
Network port can be configured dual NIC IP address, subnet mask, gateway, DNS information. Please follow the correct network parameters to configure.

Note:

Dual network card network segment does not allow the same!

4.10.2 Serial Port Setting

Click the left menu bar “Setting” ->“General Setting” ->“Serial Port Setting” to display the serial port configuration page.

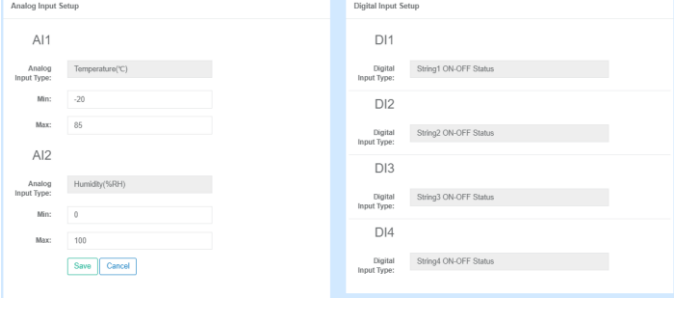


Display configuration 4-channel serial port configuration, including baud rate, data bits, stop bits, parity bit. 4 channels Default parameters: baud rate: 9600, data bits: 8, stop bit: 1, parity: none.

This setting changes the Gate's own serial parameter configuration, not to change the PBAT600 serial port parameters, to change the 600 serial parameters, please contact the professional staff.

4.10.3 Input setting

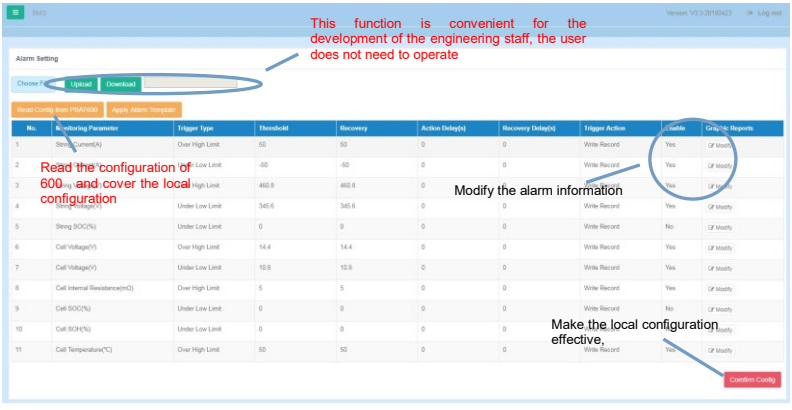
Click the left menu bar “Setting” ->“General Setting” ->“Input Setting” to display the AI and DI port configuration page.



You can modify the minimum and maximum values of the AI input. Generally it is not recommended to modify it yourself.

4.10.4 Alarm setting

Click the left menu bar “Setting” ->“General Setting” ->“Serial Port Setting” to display the Alarm setting page.



You can modify the alarm settings information.

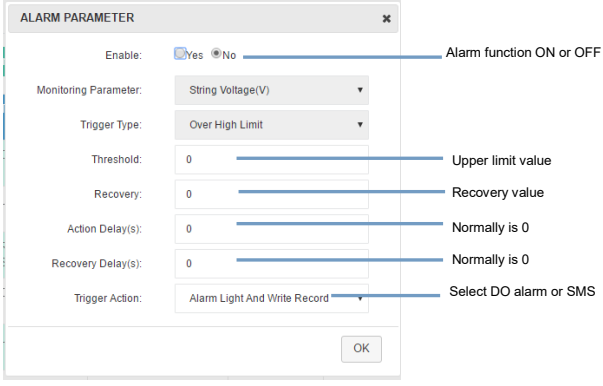
You can upload the modified alarm settings file.

You can download the modified alarm settings file.

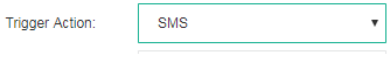
Make the modified or uploaded configuration file effective.

Upload and download function is only for the use of engineering staff configuration, do not arbitrarily change the contents of the upload file.

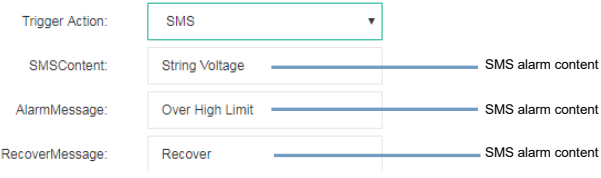
Alarm editing interface:



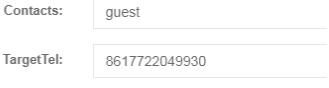
Change the trigger action can choose SMS alarm



Set the SMS contents, alarm message and recover message you want to send.



Set contact and tel on “Project Details” page:

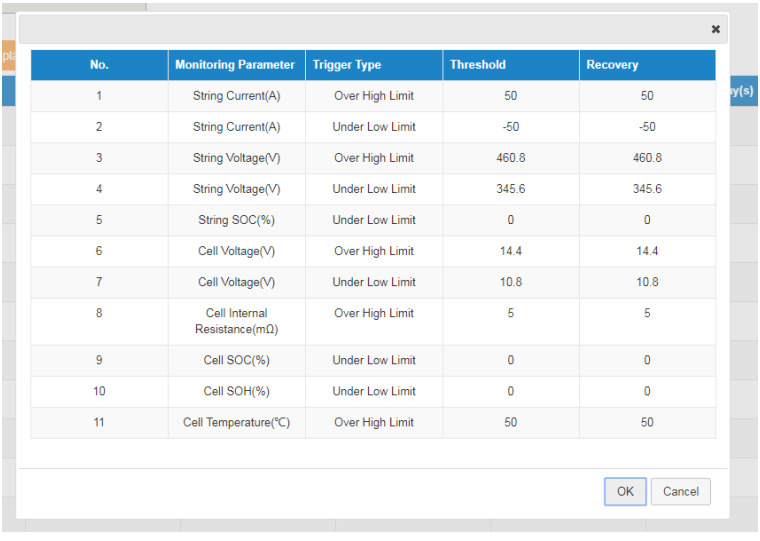


Read 600 alarm：

Click to Get, the page will pop up to read the 600 alarm configuration, the user can confirm

the confirmation and then click to confirm.

Pop-up page display :

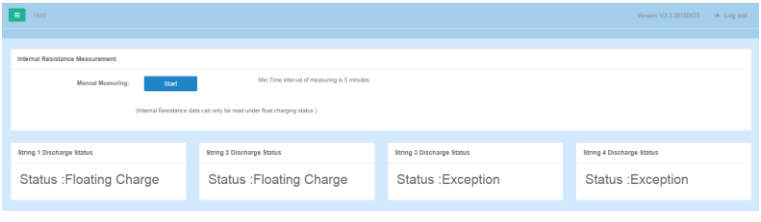


No.	Monitoring Parameter	Trigger Type	Threshold	Recovery
1	String Current(A)	Over High Limit	50	50
2	String Current(A)	Under Low Limit	-50	-50
3	String Voltage(V)	Over High Limit	460.8	460.8
4	String Voltage(V)	Under Low Limit	345.6	345.6
5	String SOC(%)	Under Low Limit	0	0
6	Cell Voltage(V)	Over High Limit	14.4	14.4
7	Cell Voltage(V)	Under Low Limit	10.8	10.8
8	Cell Internal Resistance(mΩ)	Over High Limit	5	5
9	Cell SOC(%)	Under Low Limit	0	0
10	Cell SOH(%)	Under Low Limit	0	0
11	Cell Temperature(℃)	Over High Limit	50	50

OK Cancel

4.10.5 Resistance Measurement

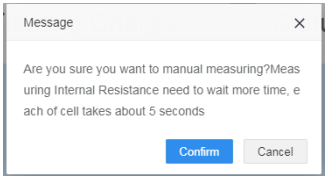
Click the left menu bar “Setting” ->“General Setting” ->“Resistance Measurement” to display the resistance measurement page.



Click the pop-up prompt "Are you sure you want to test the internal resistance manually?"

Testing the internal resistance need to wait for a long time, each monomer takes about 5

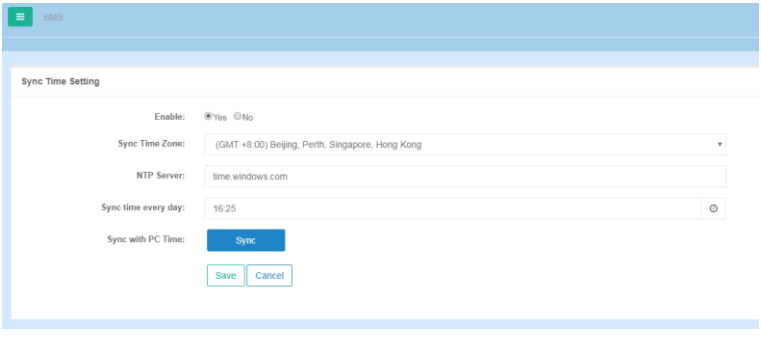
seconds.



Note：Automatic measurement of internal resistance controlled by, the default is 24 hours test once.

4.10.6 Time setting

Click the left menu bar “Setting” ->“General Setting” ->“Time setting”to display the time setting page.



Select the time zone, the default Beijing time zone (East 8 District).

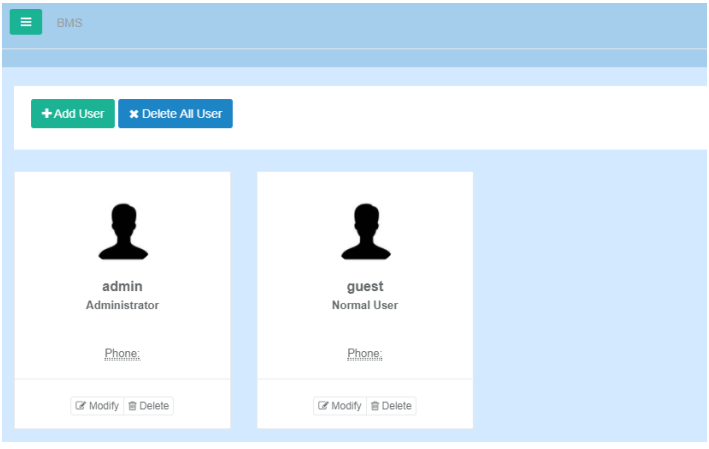
The calibration time server can be the domain name or IP address of the NTP server : time-a.nist.gov.

Calibration time, that gateway will connect NTP server for automatic calibration.

Click the "Sync" button to synchronize the gateway and computer time.

4.10.7 User Manager

Click the left menu bar “Setting” ->“General Setting” ->“User Manager” to display the user manager page



You can add a user, the user parameters including user names, passwords, user identity, surname, name and contact information.

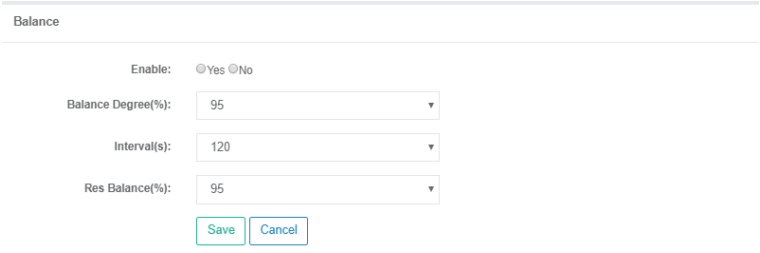
You can delete all users(except the SuperAdmin), and you will be prompted before deleting them.

Click “Modify” to modify a specified user.

Click “Delete” to delete the specified user, there will be prompted before the deletion.

4.10.8 Balancing Setup

Click the left menu bar “Setting” -> “General Setting” -> “Balancing Setup” to display the setting page



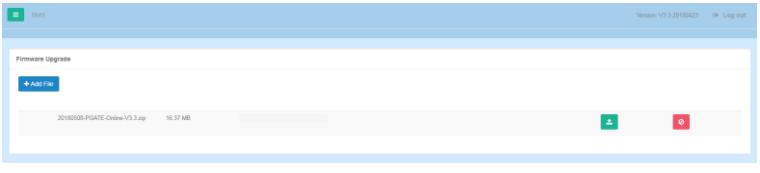
Set the balance when the balance is lower than the set value (if 90% means that the balance is turned on when the balance is lower than 90%)

Set the interval time, the minimum interval for each balancing function execution, to prevent damage to the battery

Res Balance(%):Used for internal resistance balance judgment, used for data upload. No effect on balancing.

4.10.9 Gateway Firmware Upgrade

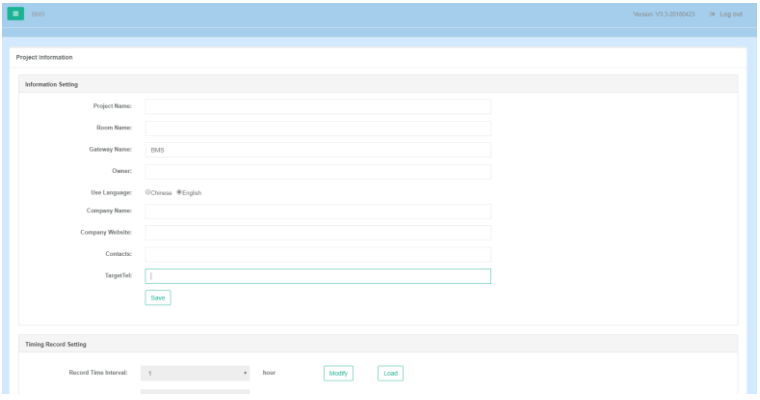
Click the left menu bar “Setting” -> “General Setting” -> “Gateway firmware upgrade” to display the gateway firmware upgrade page.



Attention : When the system needs to be upgraded, perform a firmware upgrade on this page. Be sure to consult a technician before upgrading.

4.10.10 Project Details

Click the left menu bar “Setting” -> “Project Setting” -> “Project Details” to display the project details page.



Mainly displays the information at the head and bottom of the page.

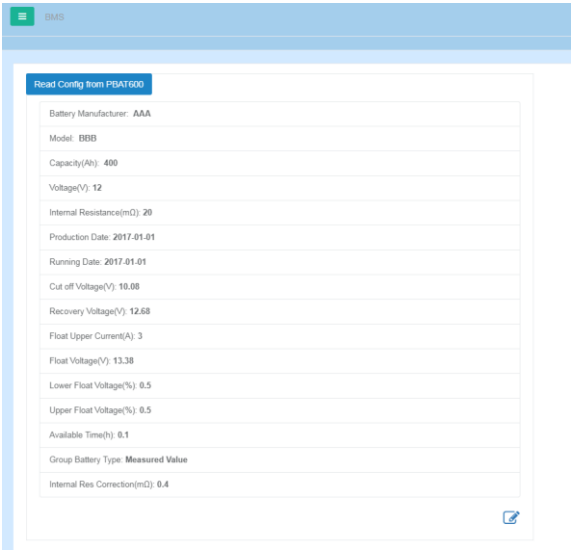
Modifying a language can change the default language when you log in and import warning template , and affect the language used when sending text messages.

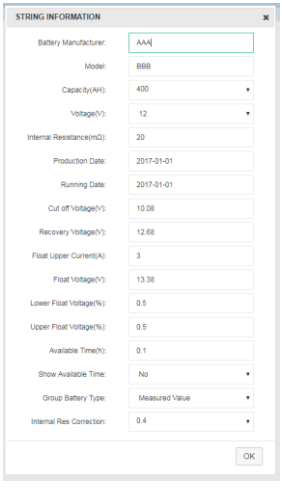
The timing record setting set the interval time of record historical data.

Logo settings for the login screen Logo display and the upper left corner of the user's Logo display

4.10.11 Battery Information

Click the left menu bar “Setting” -> “Project Setting” -> “Battery Information” to display the battery information page.


BMS
Read Config from PBAT600
Battery Manufacturer: AAA
Model: BBB
Capacity(Ah): 400
Voltage(V): 12
Internal Resistance(mΩ): 20
Production Date: 2017-01-01
Running Date: 2017-01-01
Cut off Voltage(V): 10.08
Recovery Voltage(V): 12.68
Float Upper Current(A): 3
Float Voltage(V): 13.38
Lower Float Voltage(%): 0.5
Upper Float Voltage(%): 0.5
Available Time(h): 0.1
Group Battery Type: Measured Value
Internal Res Correction(mΩ): 0.4


STRING INFORMATION
Battery Manufacturer: AAA
Model: BBB
Capacity(AH): 400
Voltage(V): 12
Internal Resistance(mΩ): 20
Production Date: 2017-01-01
Running Date: 2017-01-01
Cut off Voltage(V): 10.08
Recovery Voltage(V): 12.68
Float Upper Current(A): 3
Float Voltage(V): 13.38
Lower Float Voltage(%): 0.5
Upper Float Voltage(%): 0.5
Available Time(h): 0.1
Show Available Time: No
Group Battery Type: Measured Value
Internal Res Correction: 0.4
OK

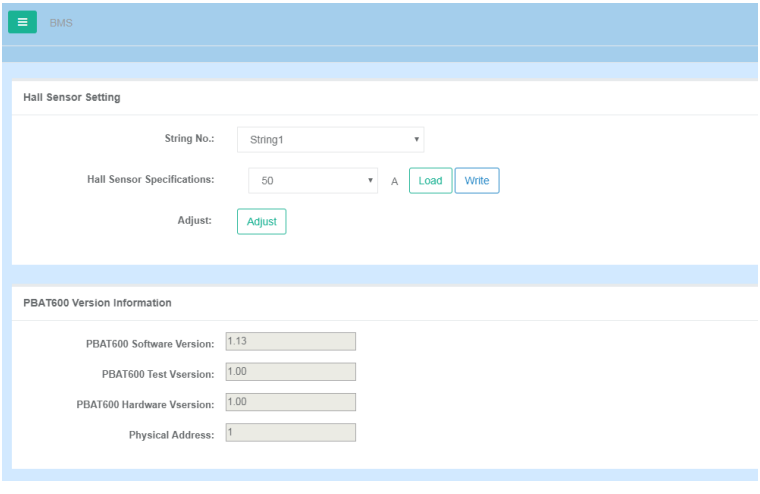
Displays the added battery string data. Including the manufacturer, model, capacity, voltage type, internal resistance reference value, generation time, commissioning time, cut-off voltage, recovery voltage, float current limit, float current limit.

Note: The battery voltage display selects the measured value: the actual measured group voltage value;

Cell superimposed value: Accumulation of all cell voltages = String voltage.

4.10.12 Hall sensor Setup

Click the left menu bar “Setting” -> “Project Setting” -> “Hall Setup” to display the Hall setup page.



Set Hall specifications and calibrate CT.

Read : the Read button is to read the current set of 500 Hall specifications, from the drop-down box to modify the click settings can be set to select the specifications to 500.

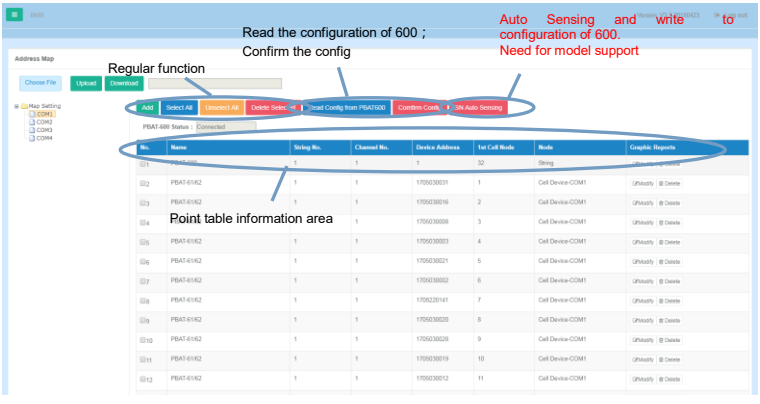
Zero calibration : Zero calibration function is used for Hall calibration, be sure to remove the

Hall sensor from the line, placed under no current conditions.

PBAT600 version info : When the communication is successful, the PBAT600 version information is displayed

4.10.12 Address Map

Click the left menu bar “Setting” -> “Service Configuration” -> “Address Map” to display the address map page.



You can add or remove the Collector Device Address Table for each COM in bulk.

Examples: First, add PBAT600.

Second, Auto Sensing all cell sensor SN address.

Final, Enable the Config.

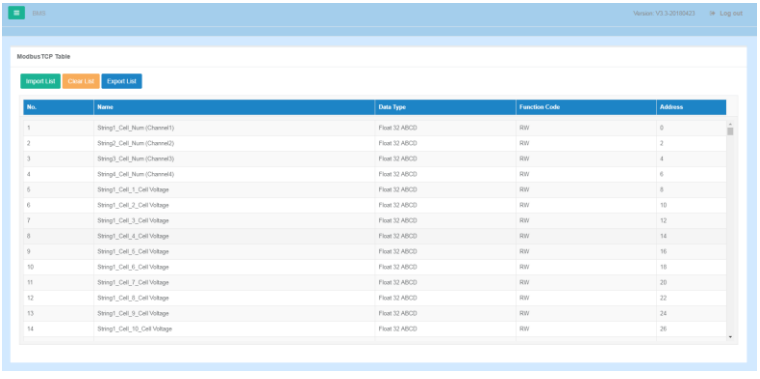
Click to Get the 600 configuration, the pop-up window prompts the current 600 address configuration, the user can choose to confirm the writing to the gateway configuration, or click to cancel the writing.

Name	String No.	Channel No.	Device Address/SN	Battery numbers/Cell Node	Node
PBAT-600	1	1	1	1	String
PBAT-61/62	1	1	1612210001	1	Cell Device-COM2

OK Cancel

4.10.13 Forward Table

Click the left menu bar “Setting” -> “Service Configuration” -> “Register List” to display the ModbusTCP Forward Table page.



Can be loaded, empty, and export the collector table.

V3.1 support alarm information forwarding, refer to *Gateway protocol V3.1*.

Note: Before uploading the gateway data, please click "Import List"

Chapter 5 SNMP Agent

5.1 Summary

SNMP is a network management standard based on TCP/IP protocol and is a standard protocol for managing network nodes (such as servers, workstations, routers, switches, etc.) in IP networks.SNMP can enable network administrators to improve network management efficiency, timely discover and solve network problems and plan network growth.The network administrator can also receive the notification message of network node and the alarm event report through SNMP to learn the problems of the network.

The communication string contains two main types of commands: the GET command, the SET command.The GET command reads data from the device, which is usually an operational parameter, such as the connection state, interface name, and so on.

The most common default communication strings are public (read only) and private (read/write), along with many vendor private default communication strings.Almost all network devices running SNMP can find some form of default communication string.

This device only supports using the GET command from the security aspect, and only supports the use of public communication strings.

5.2 OID Define

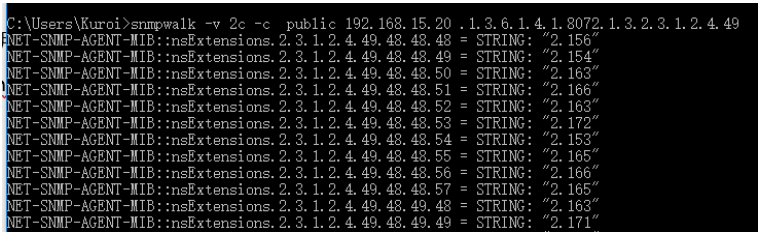
This equipment is the SNMP protocol implementation based on.net - SNMP extension module, start the OID 1.3.6.1.4.1.8072.1.3.2.3.1.2.4 node address, group of child nodes starting address 1.3.2.3.1.2.4. 8072.1.3.2.3.1.2.4.48, group a child node of the starting address 1.3.2.3.1.2.4. 8072.1.3.2.3.1.2.4.49,Group two child nodes starting address 1.3.2.3.1.2.4 8072.1.3.2.3.1.2.4.50, set the third node starting

address 1.3.2.3.1.2.4. 8072.1.3.2.3.1.2.4.51, group of four children starting address 1.3.2.3.1.2.4. 8072.1.3.2.3.1.2.4.52

5.3 Data Query

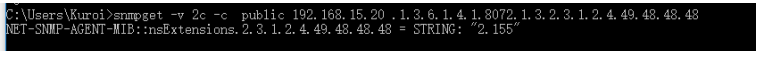
Using snmpwalk command can traverse the nodes under all child nodes, such as a child node to traverse the group under all the data, can use

snmpwalk -v 2c -c public 192.168.1.XX .1.3.2.3.1.2.4.8072.1.3.2.3.1.2.4.49



Using the snmpget command, you can obtain data for the specified node, for example, to obtain the data of the single voltage 1 under the group node, can use

snmpget -v 2c -c public 192.168.1.XX .1.3.2.3.1.2.4.8072.1.3.2.3.1.2.4.49.48.48.48



Chapter 6 Data collection

6.1 Summary

PBAT-GATE gateway provide 4 channel RS485 communication, collect battery data at setting time, equipped with Control linkage alarm, inner resistance testing

6.2 Collector function

Collector module including single cell unit collector and battery group collector. Each battery group should equip with same quantity single cell unit collector and 1 group collector

（1）. Single cell unit collector will charge each battery cell voltage, temperature and inner resistance

（2）. Group collector will charge battery group’s group voltage, serial current, group temperature

（3） Each gateway equip with 4 channel RS485 port

（4） Each RS485 channel connect maxim 60 pieces single cell collector

（5） Each gateway support maxim 4 group battery connection

（6）Node on one RS485 channel must be attributed to the same battery group

（7） Each group single cell unit should be separate ID number (ID number same as slave address)

Can choose following Combinations:

Group Number	Channel	Note
4CG: Group 1, Group 2、Group 3, Group 4： Group 1 battery number: 1-50 Group 2 battery number: 1-50 Group 3 battery number: 1-50 Group 4 battery number: 1-50	RS485-A: 1-120(61) (Group 1) 1-240(62) RS485-B: 1-120(61) (Group 2) 1-240(62) RS485-C: 1-120(61) (Group 3) 1-240(62) RS485-D: 1-120(61) (Group 4) 1-240(62)	The gateway connect with 4 group battery. Number of each group cannot be more than 120. Number of 4 groups cannot be more than 480，The total quantity of batteries cannot be more than 960.
2ZG: Group 1, Group 2: Group 1 battery number: 1-50 Group 2 battery number: 1-50	RS485-A: 1-120(61) (Group 1) 1-240(62) RS485-B: 1-120(61) (Group 2) 1-240(62)	The gateway connect with 2 group battery. Number of each group cannot be more than 120. Number of 4 groups cannot be more than 240, The total quantity of batteries cannot be more than 480.

Chapter 7 Data Forwarding Function

7.1 Summary

PBAT-GATE support both web view function and data forward function.

This gateway support multi-Host TCP connection, In theory there is no limit on the number of connections, but the actual use is recommended to limit the number of connections no more than 20

7.2 Forwarding table configuration

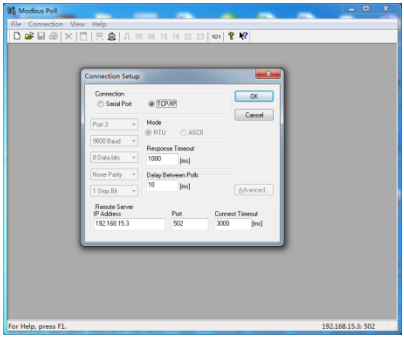
The user configures the forwarding table according to the required detection point. Click on the "Setting"→"Service Configuration"→"Register List", Display the forwarding point table page, click the load forwarding table, you can select the required points to generate. Click the export the table to generate the EXCEL file.

7.3 Data Forwarding Function

Configuration the forwarding table base on Chapter 5.2, the user can read the real time data by the software which connect with gateway through modbus TCP

We are using modbus Poll as sample:

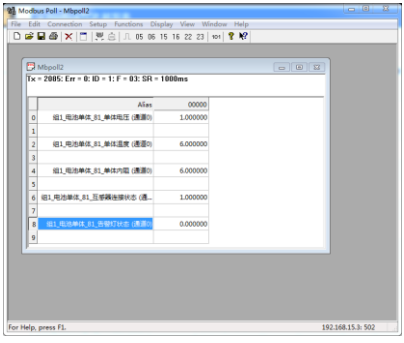
1.Choose TCP/IP connection, input IP address (here is 192.168.15.157), port number 502



2. Set up new modbus query, click [Setup] -> 【read/write definition】, set the slave register

starting address is 0 and reading register number is 10

3.Setthe read register starting address and display format【display】->【float inverse】



4.After configuration, can sequentially to read the battery real-time data, one message can read maxim 512 measuring point. When a larger number of measuring points need to get real-time data, can divide into several sections

5.If there are several data center need to read the data from gateway at the same time, can connect all of them to port 502 on the gateway. Suggest maxim number no more than 20.

Chapter 8 Alarm System

8.1 Summary

PBAT with customer customized alarm system, can monitor battery monitoring system all parameters and set the linkage, set the alarm parameter (no quantity limit), support all the measuring point over limit alarm.

8.2 Alarm Analysis

8.2.1 Alarm Judge Type

There are two types: Upper Limit and Lower Limit, the value can be customized

8.2.2 Alarm Object Type

Analogue setting system can monitor all electrical parameter, totally 22 items, as following

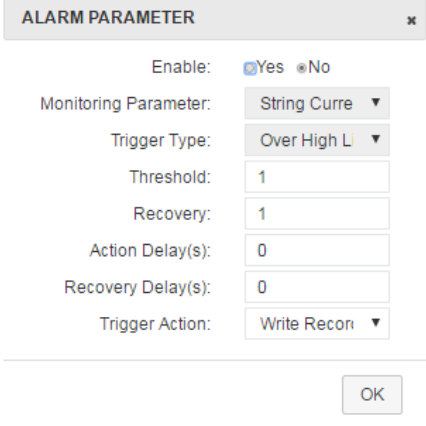
Over Limit Type	Parameter Type
Upper Limit	Single Cell unit voltage
	Single Cell unit temperature
	Single Cell unit inner resistance over than group average percentage
	Battery group voltage
	Battery group current
	SOC
Lower Limit	Single Cell unit voltage
	Single Cell unit temperature
	Single Cell unit inner resistance over than group average percentage
	Battery group voltage
	Battery group current

	SOC
Timing records	Single Cell unit voltage
	Single Cell unit temperature
	Single Cell unit inner resistance
	Battery group voltage
	Battery group current
	SOC

8.2.3 Alarm Action Condition

After define monitoring parameters, need to set the action condition

For example: define single cell unit voltage upper limit action



Set the battery group number, event type set as upper limit, limit value 2.5V, trigger action is [Event Record]. The Hysteresis value, hold time, recovery time is 0

If the voltage over than 2.5V, there will be one event record information

8.2.4 Alarm Holding Time

When the alarm object fulfill over limit condition, still need fulfill the time requirement can be absolutely activated. In the total delay time, if the alarm object return back to the limit value, then will not be activated. The unit for activation delay is second, value range is 0-65535. If set the value to 0, it means the alarm will be activated at the moment object over limit

8.2.5 Alarm Hysteresis value

When the alarm object be activated, alarm will be cancelled after real time value return back to hysteresis value setting range. This value in order to avoid the object real time value frequently fluctuation at limit value which will cause to repeat alarm output. The range can be set according to the actual object

For example: set the single cell unit voltage alarm upper limit is 2.5V, hysteresis value is 2.3V, when collector got value >2.5V will alarm, at 2.4V, alarm not cancel, return back to 2.5V will not repeat alarm. Until the voltage <2.3V, alarm be cancelled

Hysteresis value be set according to measuring point on site environment, if setting value is 0, it means at the moment the real time value within the limit range, and [Alarm return time] is 0, [Revert] is yes, will cancel alarm immediately. Because of collector's repoll time interval is long, so suggest to set this value in actual application is 0

8.2.6 Alarm Recovery Time

When alarm object fulfill over limit condition and return back to not fulfill over limit condition, the alarm not be cancelled immediately, but to wait the alarm recovery value continue to [Alarm holding time], then cancel alarm. if setting value is 0, it means at the moment the object not fulfill over limit condition, and [Hysteresis value] is 0, [Revert] is yes, will cancel alarm immediately. Because of collector's repoll time interval is long, so suggest to set this value in actual application is 0

8.2.7 Alarm Trigger Activation

When the alarm object generates an alarm, you can set the corresponding linkage

action to remind the maintenance staff, Trigger activation including:

Trigger Activation	Illustration
LED Light	Alarm---ON Cancel---OFF (Alarm light including gateway panel light and collector light)
Event Record	record alarm and cancel
DO(2ZG version)	Can be connected to sound and light alarm for alarm

Attention：If use the 2ZG version, only support 2*RS485.

Chapter 9 Auxiliary Function

9.1 Communication

PBAT-GATE with maxim 4 RS485 port, 4 of them independent from each other. PBAT600, PBAT61-02, PBAT61-12

Please refer to following wiring example, in the actual application, In order to prevent signal reflection, normally need to add on parallel an approximately120-ohm resistor by the end of network

PBAT-GATE with 2 port RJ45, support IEEE-802.3 Ethernet standard10BaseT/100BaseTX

9.1.1 Communication media

Communication use standard 22# shielded Twisted Pair, total length no more than 1200 meter long

9.1.2 Communication Protocol

RS485 port to support the international common MODBUS-RTU protocol. Please refer to the corresponding "_MODBUS communication protocol" manual for the specific agreement.

9.1.3 Communication Parameter

Whether the instrument can communicate with the master is the premise of whether the communication parameters are set correctly. Communication Parameter including:

1. Meter address ID

2. Baud rate: 4800, 9600

9.1.4 Communication port against strong electrical function

Short time (within 5 minutes) strong electricity connection (220V AC) no damage, after move away strong electricity will recovery back to normal communication

9.2 Clock

Battery monitoring system built in NTP server and with time synchronization function. For

details, see chapter 5.5.2

Chapter 10 SOC remaining capacity

10.1 SOC Remaining capacity calculating Description

Gate supports the SOC calculation of a single cell, calculated once per minute. The SOC value within one minute of the first start is invalid and the SOC value in the first minute after the parameter is reconfigured is invalid.

Battery SOC calculation, without modification in the case, the use of the default battery characteristics parameters:

Battery voltage rating	2V	12V
Float charge range	-1A to +1A	-1A to +1A
Cut-off voltage	1.75V	10.8V
Recovery voltage	2.12V	12.68V

The default battery parameters can be configured by "Setting"→"Project settings"→"Battery information"

Battery [recovery voltage] in actual use, after a complete charge and discharge process, you can update by calculation(Take the average value of the recovery voltage of all the batteries in each group, general requirements to remove the maximum and minimum) , modify the configuration parameters for use , the battery SOC will be closer to the actual battery characteristics. It has not been a complete charging and discharging process the SOC is obtained with current battery status parameters calculated default , the error will be greater than after a complete charge and discharge.

Note:

When the configuration software to replace the battery voltage level (Such as 2V change to

12V, or 12V change to 2V ），The battery's characteristic parameters will be restored to the voltage level of the default feature parameters, the original parameters will be lost，be sure to understand this risk when switching battery voltage levels.

The default [recovery voltage] value for a large number of experimental access to the optimal value, if no special circumstances（Such as battery manufacturers to provide reference value, etc.） do not change.

Chapter 11 Maintenance and Trouble shooting

Problems	Causes	Solutions
No display after power on	Power supply failure	1.Check 24V+ & 24V- terminal and make sure with correct power supply 2.Check the fuse of power supply whether be burned
Measuring value wrong or incompatible with target	voltage measurement wrong	1.Check the connection 2.Check whether measurement voltage compatible with device rated parameter
	Current measurement wrong	1.Check whether measurement current compatible with device rated parameter 2.Check Hall sensor setting
Cannot communication with UP side device	Communication address wrong	Check device address
	Baud rate wrong	Check device baud rate
	Did not add resistor by the end of network	Check whether add 120 ohm resistor
	communication interference	Check communication shield
	Communication interruption	Check communication cable

Chapter 12 Technical Specification

Dimension	Panel：96mm（L）× 96mm（W）× 13.5mm（H）	
IP	Panel：	IP
	Back & Side：	
Power Supply	Power selection：12~36VDC	

Item	Reference Standard	Class
Sasser immunity	GB/T17626.12-1998 (IEC61000-4-12:1995)	III
Electrostatic discharge immunity	GB/T17626.2-2006 (IEC61000-4-2:2001)	III
RFEMS	GB/T17626.3-2006 (IEC61000-4-3:1998)	IV
Electrical fast transient burst immunity	GB/T17626.4-2008 (IEC61000-4-4:1998)	III
Surge Immunity	GB/T17626.5-2008 (IEC61000-4-5:2005)	III
RF conducted immunity	GB/T17626.6-2008 (IEC61000-4-6:1998)	III
Power frequency magnetic field immunity	GB/T17626.8-2008 (IEC61000-4-6:2001)	III
Electromagnetic mission limits	GB/T14598.16-2002 (IEC60255-25:2000)	OK
Power frequency immunity	GB/T17626.8-2008 (IEC61000-4-8:2001)	A

Notice:

- PILOT reserves the right to modify this manual without prior notice in view of continued improvement.
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