

PBAT-Gate Battery Monitoring System

Installation & Operation Manual

V4.0



DFUN DFUN(ZHUHAI)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.

Date	Reviser	Version	Content description
18-09-28	Wen	3.4	New monomer, string upgrade. New internal resistance test time interval selection. Report query allows multiple selections.
18-09-28	Wen	3.4.1	Modify the frame diagram. Introduction to the Gateway Hardware Display. Modify the interface diagram and the gateway display to be consistent. Adding the SNMP Browser Software Usage Notes.
18-12-05	Wen	3.4.2	Change version number is 3.4.2 Fix some descriptive text in the document
18-12-29	Wen	3.5.0	New SNMP WALK feature. New 4G SMS sending Module. New SMS Alert Basic Information Customization. New SN code, device model settings.
18-01-24	Wen	3.5.0	Add 2G and 4G network system.
19-04-11	Wen	3.6.0	Add 2Z model gateway to connect to 4 PBAT600. Remove the report page and merge it into the history data page. Other optimizations: read and write data optimization, CPU/ memory occupation optimization, fluency optimization, interface beauty optimization.
19-07-19	Wen	3.6.2	New SNMP trap function. New technical indicators.

			New SIM SMS configuration.
19-11-28	Wen	3.6.3	Add and improve the function description of address configuration Add traditional language Add 4G cloud upload Add local query and export database
20-01-18	Wen	3.7.0	Add project backup settings
20-01-18	Wujc	3.9.1	Historical records increase environmental data
2023-04-01	Eddy	4.0	Some hardware changes:phy,net modle,etc. webpage changes:real time data interface.

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Chapter1. Introduction

PBAT-GATE battery monitoring system is used for performing the testing of various battery strings, comprehensive measurement to determine battery performance, and the fault battery will be displayed, and trigger corresponding alarm. It can effectively activate and maintain the battery, realize the automation of battery detection and failure expected detection, and can self-diagnose and automatically maintain the battery string by monitoring the running status of the battery and its various operating parameters in real time. This system is an intelligent battery monitoring and maintenance system that can realize remote signaling, telemetry and remote control by using a network. Real-time accurate grasp of the actual operating status and health status of the battery string, timely discover the problems in using of the battery string, and achieve automatic maintenance. Allow the battery string to maintain a voltage balance during floating charge, so that each battery unit maintains the optimal active state, improve battery string backup time and operating life, timely discover the backward battery and automatically perform online activation and maintenance, greatly reducing labor and maintenance cost etc, improve the safety of battery use, and reduce the accident rate, effectively carry out energy conservation and emission reduction, and create good economic and social benefits for the users.

Product Features:

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

2) Intelligent adjust the parameters sampling frequency under charge and discharge status, improve the accuracy of calculation.

3) Advanced measurement algorithms, not need to perform large current discharge, no damage to the battery .

4) Detecting the run/idle state of the battery, intelligent switching the operating/sleeping of the system, achieving low energy consumption.

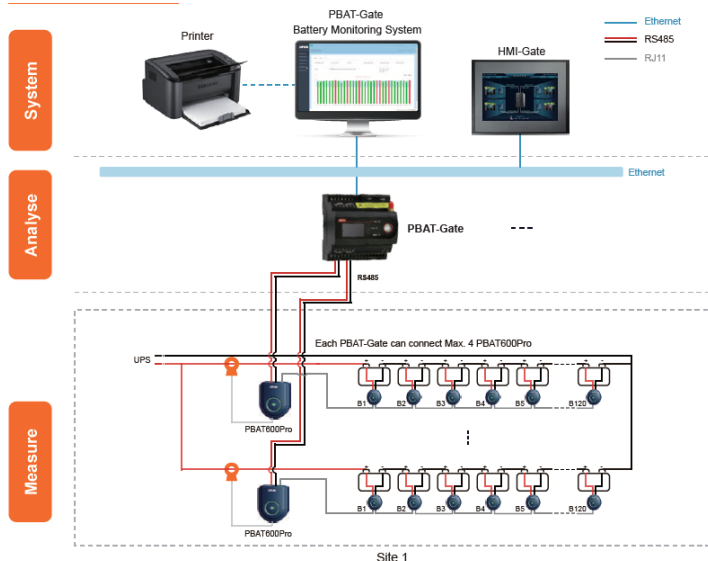
5) The ring network topology is adopted, and a double-chain structure is automatically formed when a disconnection occurs in the communication ring to ensure communication stability.

6) Distributed deployment and Ethernet network management, can be seamlessly adapted to any on-site environment.

7) Detailed historical data records, complete alarm event management, provide data support such as battery maintenance, failure analysis and report generation.

8) A variety of alarm settings, to make the unexpected events can be found quickly.

1.1 System Structure



PBAT-GATE battery monitoring system consists of a gateway module, cell sensor module, string sensor module, hall sensor, temperature and humidity sensor (optional) etc., functions of each module are shown as below:

Item	Description
Gateway	Realize the function of battery data acquisition, control, and upload, as well as events alarm record
Cell sensor module	Monitoring the voltage, temperature, resistance and alarms of battery cell
String sensor module	Monitoring the voltage, current, temperature, resistance and alarms of battery string
Hall sensor	Current measuring

1.2 Application Range

- 1) Support monitoring 2V or 12V battery cell
- 2) Support monitoring battery string with 1-480 battery cells
- 3) String voltage measurement range is 20-800VDC
- 4) Current measurement range is -1000A~+1000A
- 5) With flexible installation and scalability features, it's suitable for scenarios with high reliability requirements such as finance, railway transportation, telecommunication, electricity, mining etc.

1.3 Measurement parameters

PBAT-GATE system provides a full range of measurement functions, can fully meet the battery network monitoring requirements.

Item	Support or not	Note
Battery cell Voltage	•	
Battery cell Temperature	•	
Battery cell Resistance	•	
Battery cell average voltage	•	
Battery cell average temperature	•	
Battery cell average resistance	•	
String voltage	•	
String current	•	
Record		
Maximum storage12 months history record	•	
Maximum storage12 months alarm record	•	
Logging record	•	
Resistance test record	•	

Chapter2. Installation and Wiring

2.1 Environment

- 1) Standard operating temperature: $-10^{\circ}\text{C} \sim +55^{\circ}\text{C}$
- 2) Operating temperature limit: $-25^{\circ}\text{C} \sim +55^{\circ}\text{C}$
- 3) Storage temperature: $-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$
- 4) Working humidity: 5% ~ 95%RH, No condensation or icing

2.2. Installation and Usage

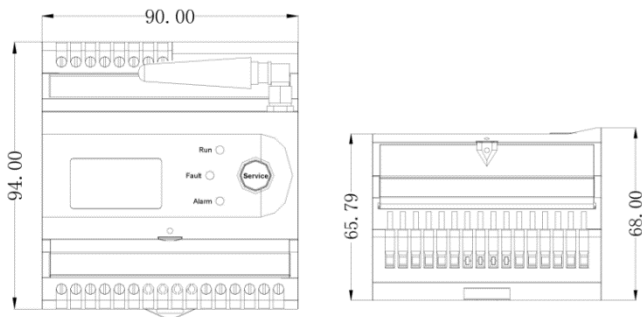
PBAT-GATE battery monitoring system is consisted of gateway module, cell sensor module and string sensor module.

2.2.1 Gateway module

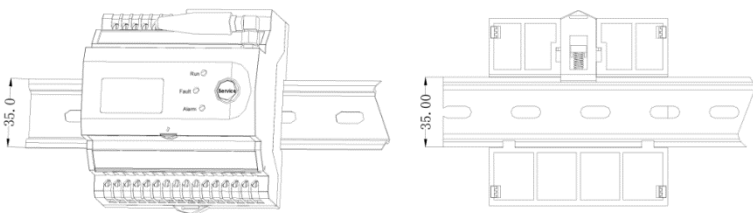
Using rail installation, to fixed on the rail through 2 fixed sliders. The installation rail size must be strictly in accordance with the following figure to ensure the correct installation for the device.

Model: Gate 2ZL/4CL

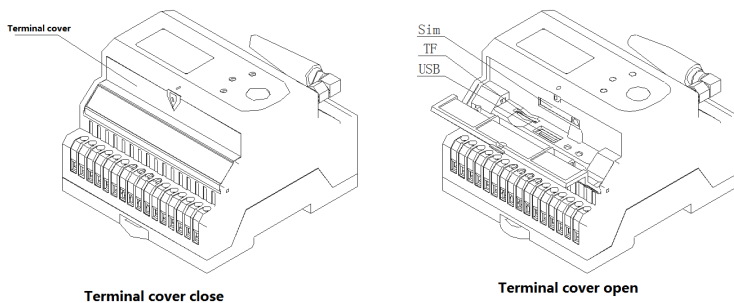
1) Dimension



2) Installation



3) Flip



4) Main terminal definitions (Gate 4CL) :

NO.	Symbol	Definition
1	24V+	DC 24V power supply positive terminal input
2	24V-	DC 24V power supply negative terminal input
3	Null	Null
4	Null	Null

5	Null	Null
6	Null	Null
7	RS485A B-	RS485A communication port(-)
8	RS485A A+	RS485A communication port(+)
9	RS485A SHEL	RS485A Shield
10	RS485B B-	RS485B communication port(-)
11	RS485B A+	RS485B communication port(+)
12	RS485B SHEL	RS485B Shield
13	RS485D SHEL	RS485D Shield
14	RS485D A+	RS485D communication port(-)
15	RS485D B-	RS485D communication port(+)
16	RS485C SHEL	RS485C Shield
17	RS485C A+	RS485C communication port(-)
18	RS485C B-	RS485C communication port(+)
	LAN1	Ethernet Port 1 (10M/100M)
	LAN2	Ethernet Port 2 (10M/100M)
	SIM(Cover)	SIM(Extensible GPRS)
	TF(Cover)	TF Card(Standard)

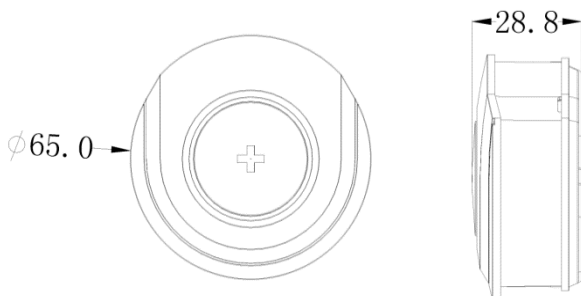
Main terminal definitions (Gate 2ZL) :

NO.	Symbol	Definition
1	24V+	DC 24V power supply positive terminal input
2	24V-	DC 24V power supply negative terminal input
3	Null	Null
4	Null	Null

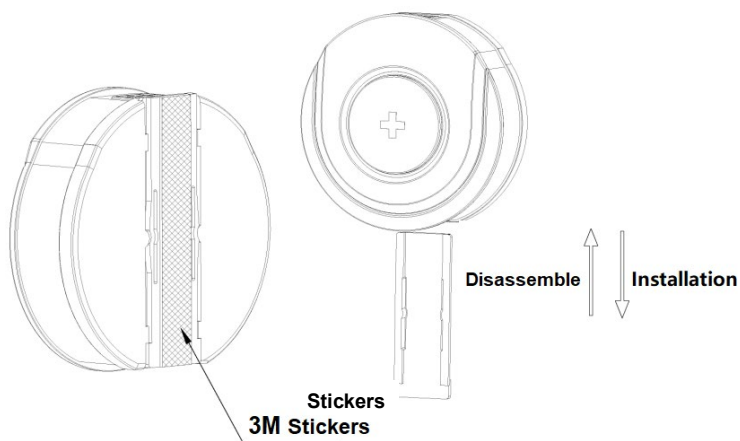
5	RL11	Relay output (passive)
6	RL12	Relay output (passive)
7	RS485A B-	RS485A communication port(-)
8	RS485A A+	RS485A communication port(+)
9	RS485A SHEL	RS485A shield
10	RS485B B-	RS485B communication port(-)
11	RS485B A+	RS485B communication port(+)
12	RS485B SHEL	RS485 shield
13	+I1	4-20mA - I1 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 input
	LAN1	Ethernet port 1 (10M/100M)
	LAN2	Ethernet port 2 (10M/100M)
	SIM(Cover)	SIM(Extensible GPRS)
	TF(Cover)	TF Card(Standard)

2.2.2 Cell Sensor module

1) Dimension



2) Installation



3) 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	IN	Communication IN, connected to previous cell sensor (OUT) or PBAT600 (OUT).
8	OUT	Communication OUT, connected to next cell sensor (IN) or PBAT600 (IN)

Note:

a. The device uses a four-wire method to measure the internal resistance of the battery. V+ Sense and V- Sense connected to the battery terminal directly. To keep the measurement accuracy described in the technical specification sheet, please use the equipped connection cable between cell sensor and the battery.

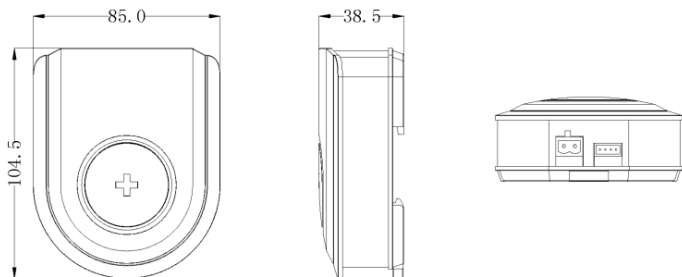
b. The IN port of the host only exists on some hosts that support ring communication, If the host used does not have an IN port, the OUT port of the last module of the battery pack can be suspended.

4) Breathing light illustration

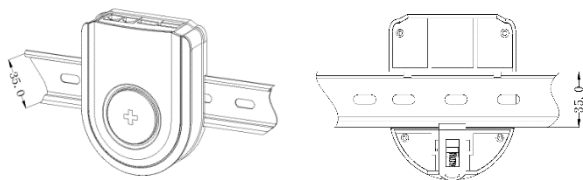
NO.	Symbol	Color	Description
1	RUN	Green	Device running indicator
2	ALARM	Red	Alarm indicator(When an set event alarm occurs, the alarm trigger action is lighting, then the light is lighting on)

2.2.3 String Sensor module

1) Dimension



2) Installation



3) Main terminals definition

No.	Symbol	Definition
1	+24V	DC 24V power supply positive terminal input
2	-24V	DC 24V power supply negative terminal input
3	Hall Terminal	Hall sensor input
4	-	String voltage measure -
5	+	String voltage measure +
6	RS485+	RS485 communication port(+)
7	RS485-	RS485 communication port(-)
8	COM1	DL-BUS communication, RJ11 port
9	COM2	DL-BUS communication, RJ11 port

4) Definition of indicator

Symbol	Definition
RUN L1 (GREEN)	Running normal
ALARM L2 (RED)	Alarm

2.3 Order Information

The complete model specifications and the meaning of each code are shown as below:

Model: Gate		
Gateway Module (Support 1-4 battery strings, up to 120 units cell sensors for each string)		
4CL	4*RS485	Pick one of two
2ZL	2*RS485	
	4 *Passive switch input 2*Analog input (DC 4-20mA) 1*Relay output	
Model: 600		
600	String Sensor (One for each string)	Required
Model: 61		
Cell Sensor (One unit for one battery),-xx refers to different models		
61-02	Support 2V battery unit acquisition	Pick one of 61-XX
61-06	Support 6V battery unit acquisition	
61-12	Support 12V battery unit acquisition	

2.4 Power Supply

Module	Power Supply	Note
--------	--------------	------

Gate	DC18V-36V, 5W	24VDC power supply
600	12V-36V DC	24VDC power supply
61-02	2V DC	2V battery unit power supply
61-06	6V DC	6V battery unit power supply
61-12	12V DC	12V battery unit power supply

Chapter3. Display and Operation instruction

3.1 Summary

The gate way has a monochrome liquid crystal display, and the menu switching function is realized by the screen switching button on the Gate panel. If not press operation within 30s, the display will OFF automatically, and will be displayed again till perform the operation.

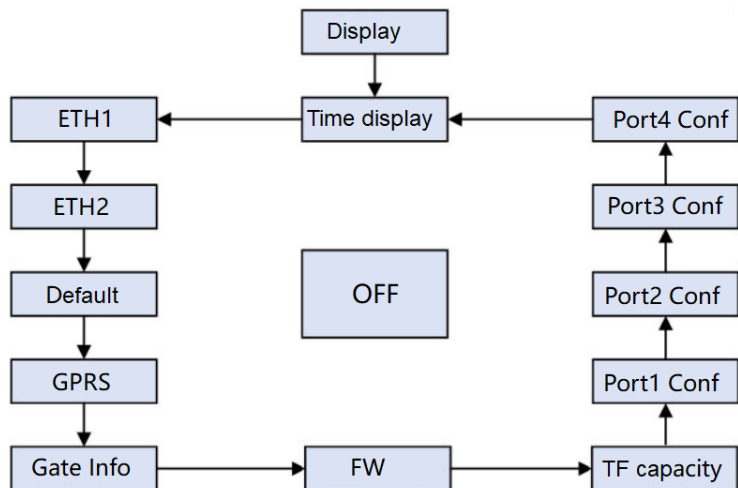
3.2 Button Function

Brief introduction of menu prompt function:

Gateway panel has only one button to control the screen switch, the screen cycle display can be achieved by pressing the button.

3.3 Data Query

Gateway display menu structure show as below:



3.3.1 Startup display

Data Display: Gateway is loading.	
--	--

3.3.2 Time display interface

Data Display: Display current time.	
--	--

3.3.3 Network port configuration

Data display: IP address, gateway address, subnet mask The network port 2 is displayed in the same way as the network port 1.	 ETH 1 CONF IP Address : 192.168.1.156  ETH 1 CONF NetMask : 255.255.255.0
--	--

3.3.4 Default gateway interface

Data Display: Default gateway IP	GateWay GateWay IP : 192.168.1.1
--	--

3.3.5 Gateway Information Display Interface

Data Display: Gateway serial number	GateInfo Series number BMS1501019000
---	--

3.3.6 Gateway software Version Interface

Data Display: Software version number	Version Version : 3.4.1-2018/10/22
---	--

3.3.7 SIM Status Info

Data Display: SIM Status SIM Signal	 The image shows a black rectangular display area. At the top, the text 'SIM States' is written in white. Below this, there is a white icon of a SIM card with the letters 'NG' inside. To the right of the icon is a white question mark. Further right are three white vertical bars of increasing height, representing signal strength. To the far right is the number '06' in white.
--	--

3.3.8 Serial port display interface

Data Display: Sequentially displaying baud rate, data bit, parity, and stop bit of serial port. The display way of serial 2, 3, 4 configuration is same as serial port 1	 The image shows a black rectangular display area. At the top, the text 'Channel 1' is written in white. Below this, the text '9600 8 N 1' is written in white.
---	---

Chapter4. Webpage description

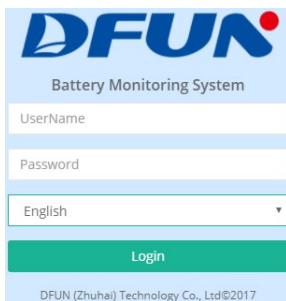
4.1 Summary

PBAT-Gate provides web configuration and data viewing function for battery management and debugging. Web page can use to perform basic operation parameter configuration, view the real-time data, historical data and address map, and system firmware upgrade.

4.2 Login

Connect the gateway to PC via Ethernet cable (can use laptop or smart phone to login the gateway if there is a wireless router in the local area network), then open a browser (only support Firefox, Chrome

browser, does not support IE browser), enter the gateway IP address on the browser, then will pop-up the login page, the system provide Chinese (simplified/traditional) and English language as selection.

The image shows a web-based login interface for the DFUN Battery Monitoring System. At the top is the DFUN logo in blue with a red dot. Below the logo, the text "Battery Monitoring System" is centered. The login form consists of three input fields: "UserName", "Password", and a language selection dropdown menu currently set to "English". Below these fields is a green "Login" button. At the bottom of the page, the text "DFUN (Zhuhai) Technology Co., Ltd©2017" is displayed.

Default factory login information:

Username: admin

Password: admin

The default display language can be changed under "Setting -- Project Setting -- Project Details" page

4.3 Real-time Data

Click "Real-time Data" to show the battery management information page:



The real-time data page manages the battery voltage, current, temperature, internal resistance, and connection status of the battery cell sensors etc. The upper left corner displays the project logo and user name information, while the lower right corner displays the current software version.

Click the switch tab to switch battery and environment battery info(show as chart):



battery info(show as table):

Battery

Environment

String Voltage: 216.52V

String Current: 0A

SOC: 99%

Status: Equalized Charge

Balance Degree: 95.6%

Balance Switch: ON

Chart

Table

Device	Voltage(V)	Temperature(°C)	Ohmic(μΩ)	SOC(%)	SOH(%)
1	13.535	24	4.6	99	75
2	13.546	24.2	0	99	100
3	13.513	24.1	0	99	100
4	13.547	24.1	0	99	100
5	13.443	24.1	0	99	100
6	13.495	24.3	0	99	100
7	13.585	24	0	99	100
8	13.685	24.2	0	99	100
9	13.617	24	0	99	100
10	13.639	24.2	0	99	100
11	13.658	24	0	99	100
12	13.624	24.2	0	99	100

1 / 2

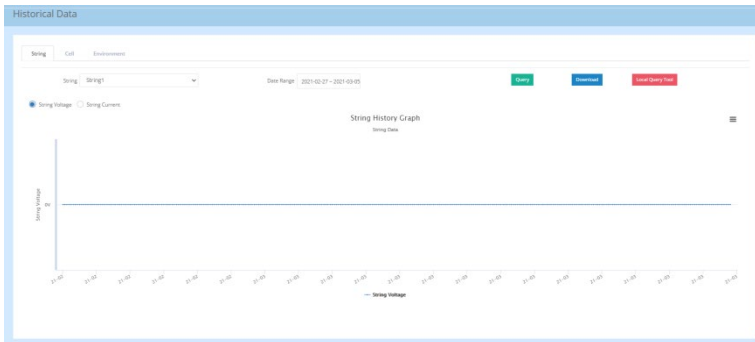
environment info:

Battery		Environment	
		 Temperature: N/A Humidity: N/A	
Digital Input Type		ON/OFF Status	
DI1		1	
DI2		1	
DI3		1	
DI4		1	

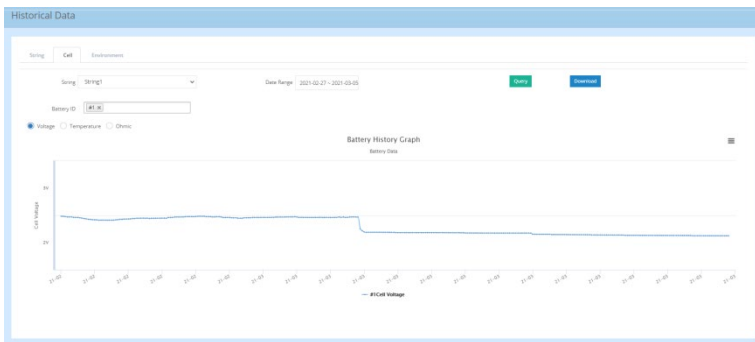
Note: PBAT-GATE-4CL model does not display DI submenu

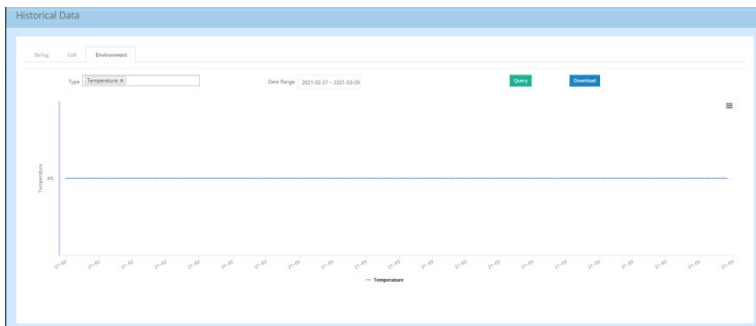
4.4 Historical data

Click “Historical data” at the left menu to view battery history data:



Click switch tab to switch string and Cell Information.





1) There are two ways to query battery string historical data: time period and parameter type

2) There are two ways to query battery cell historical data: time period and parameter type (support query up to 60pcs battery ID each time)

3) Provide local query tool to download data to local when querying a large amount of historical data

Instructions for local query tool:

1) Download .DB files and GateTools zip file to the same directory on the PC

2) Unpack the Gatetools zip file into the current directory and copy all .DB files to the directory where exe resides

3) Run exe file to query or export data. The exported Excel table is located in the directory where exe resides.

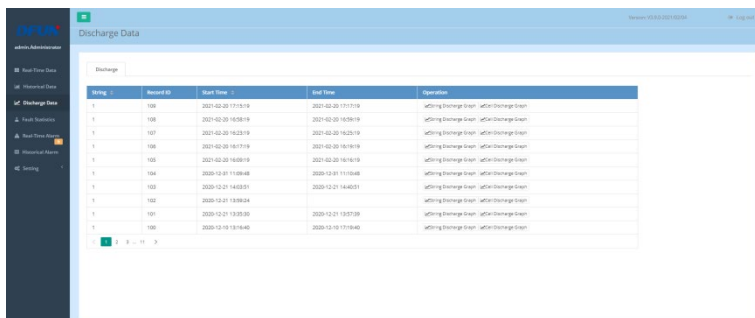
Note:

1) The gateway stores the history alarm record data up to 1 year. When the record exceeds 1 year, the data of the oldest month in the year will be deleted.

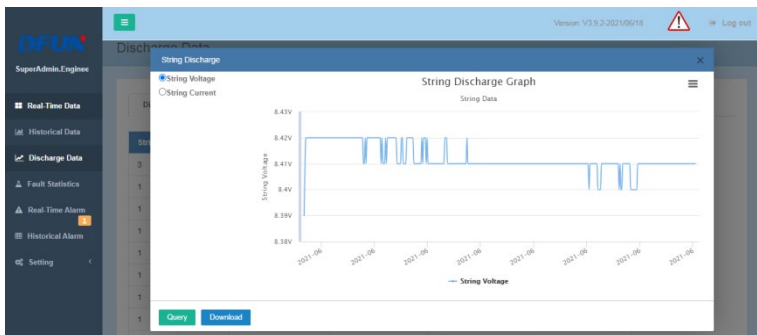
2) It's needed to insert a TF card into the gateway to achieve historical data record, recorded according to the voltage, current, temperature and internal resistance measuring point of the maximum load (240 cell sensors).the TF card capacity is recommended to be greater than or equal to 8G.

4.5 Discharge Data

Click “Discharge Data” at the left menu to view battery discharge data page:



S/N	Record ID	Start Time	End Time	Operation
1	106	2021-02-20 17:13:19	2021-02-20 17:17:19	Warning Discharge Group - Warning Discharge Group
1	106	2021-02-20 16:58:19	2021-02-20 16:59:19	Warning Discharge Group - Warning Discharge Group
1	107	2021-02-20 16:23:19	2021-02-20 16:25:19	Warning Discharge Group - Warning Discharge Group
1	106	2021-02-20 16:17:19	2021-02-20 16:18:19	Warning Discharge Group - Warning Discharge Group
1	105	2021-02-20 16:08:19	2021-02-20 16:16:19	Warning Discharge Group - Warning Discharge Group
1	104	2020-12-31 11:08:48	2020-12-31 11:10:48	Warning Discharge Group - Warning Discharge Group
1	103	2020-12-31 14:03:51	2020-12-31 14:40:51	Warning Discharge Group - Warning Discharge Group
1	102	2020-12-31 13:08:24		Warning Discharge Group - Warning Discharge Group
1	101	2020-12-31 13:05:30	2020-12-31 13:07:39	Warning Discharge Group - Warning Discharge Group
1	100	2020-12-19 10:16:40	2020-12-19 17:16:40	Warning Discharge Group - Warning Discharge Group



- 1) Display different time period discharge record list.
- 2) Query the historical data display (including group voltage and group current) of the group collector for a certain discharge time period. After querying, you can click "download" to download the data under the current conditions into an excel file.
- 3) Query the historical data display (including voltage, temperature, internal resistance) of the single-cell collector during a certain discharge period, and query the discharge curve of up to 60 batteries. After querying, you can click "Download" to download the data under the current conditions into an excel file .

4.6 Fault Statistics

Click "Fault statistics" at the left menu to view the battery fault count on the page:



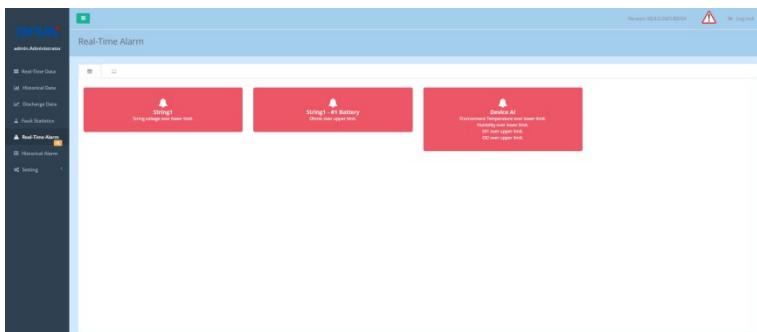
1) When select “Yearly” in “Date type”, and each month alarm statistics quantity will be displayed. If select “Monthly” in “Date type”, then every day alarm statistics quantity will be displayed.

2) When select “Monthly” in “Date type”, 12 months of the year can be selected. When select “Yearly”, and only year can be selected.

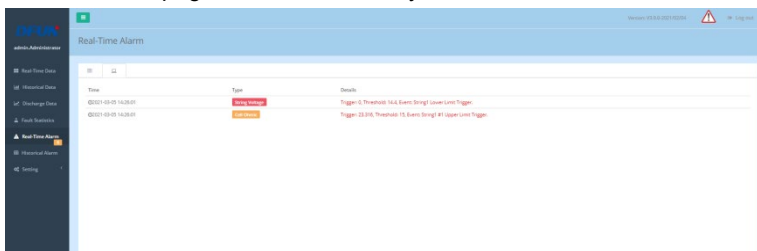
3) Click “Query” then it will display the period of the present alarm quantity. The present data can be downloaded as excel format file by clicking “Download”.

4.7 Real-Time alarm

Click “Real-Time alarm” at the left menu to view the detail information for the present battery alarm.



The second page shows the recently alarm information.



The real-time alarm will be reset when the gateway is restarted or reconfigured.

4.8 Historical Alarm

Click "Historical Alarm" at the left menu to view historical alarm records.

Time	String/Category	Type	Details	Value
2021-03-05 14:26:01	String1	Call Close	Trigger 20.016 Threshold 10.0 Event String1 #1 Upper Limit Trigger	20.016
2021-03-05 14:26:01	String1	String Voltage	Trigger 0 Threshold 14.4 Event String1 Lower Limit Trigger	0
2021-03-05 08:44:14	String1	Call Connection	Trigger 1 Threshold 0.0 Event String1 #01 Call Connection Normal	1
2021-03-05 08:44:14	String1	Call Connection	Trigger 1 Threshold 0.0 Event String1 #02 Call Connection Normal	1
2021-03-05 08:44:14	String1	Call Connection	Trigger 1 Threshold 0.0 Event String1 #03 Call Connection Normal	1
2021-03-05 08:44:08	String1	Call Voltage	Trigger 2 1770 Threshold 1.0 Event String1 #2 Lower Limit Recover	2.177
2021-03-05 08:44:08	String1	Call Voltage	Trigger 2 148 Threshold 1.0 Event String1 #3 Lower Limit Recover	2.148
2021-03-05 08:44:08	String1	Call Voltage	Trigger 2 148 Threshold 1.0 Event String1 #4 Lower Limit Recover	2.148
2021-03-05 08:44:08	String1	Call Voltage	Trigger 2 153 Threshold 1.0 Event String1 #5 Lower Limit Recover	2.153
2021-03-05 08:44:08	String1	Call Voltage	Trigger 2 162 Threshold 1.0 Event String1 #6 Lower Limit Recover	2.162

1) There are three options of “string”, “string +cell”, and “AD” under alarm message query.

2) The end time must be greater than or equal to the start time, and the maximum time span for data query can only support one year.

3) Click the "Query" button to display the data under the current conditions into the table. Click the "Download" button to download the data under the current conditions as an excel file.

4) Click the switch tab can switch to SMS records interface:

ContactTime	TargetCell	Contents	SendTime	Result
-------------	------------	----------	----------	--------

SMS records page display the last 100 SMS messages with contacts, contents, send time and sending result.

4.9 Setting

Click “Setting” at left menu to open the menu of setting page.

4.9.1 Network Setting

“Setting”→“Parameter Setting”→“Network Setting”

The screenshot shows the 'Local Settings' page with two columns for LAN1 and LAN2. Each column contains input fields for IP Address, Subnet Mask, Gateway, and DNS. LAN1 values are 192.168.20.83, 255.255.255.0, 192.168.20.1, and 202.96.128.86. LAN2 values are 192.168.16.2, 255.255.255.0, 192.168.1.1, and 202.96.128.86. At the bottom left are 'Save' and 'Cancel' buttons.

LAN1	LAN2
IP Address: 192.168.20.83	IP Address: 192.168.16.2
Subnet Mask: 255.255.255.0	Subnet Mask: 255.255.255.0
Gateway: 192.168.20.1	Gateway: 192.168.1.1
DNS: 202.96.128.86	DNS: 202.96.128.86

IP address, subnet mask, gateway, DNS information can be configured under this page. Please follow the correct network parameters for the configuration.

Note: The network segment of the two Ethernet ports cannot be the same!

Cloud settings

The screenshot shows the 'Cloud Settings' page. On the left, there are settings for Server Switch (ON), Server IP (192.168.23.144), Server Port (8080), Server Path (/CloudUpload), File Type (json), and Is Compress (No). On the right, there are settings for Relative Data Interval (60), Burst Data Interval (10), Heartbeat Interval (60), Failed File Interval (10), Callback Interval (0), and Priority Upload (None). A 'Save' button is at the bottom center.

Server Switch	Server IP	Server Port	Server Path	File Type	Is Compress	Relative Data Interval	Burst Data Interval	Heartbeat Interval	Failed File Interval	Callback Interval	Priority Upload
ON	192.168.23.144	8080	/CloudUpload	json	No	60	10	60	10	0	None

- 1) Before using the cloud upload service, please insert the SIM card and restart the gateway to check whether the SIM card signal of the gateway is normal
- 2) Turn on the cloud upload service function. Turning on this function

will disable the SMS alert sending function

- 3) Fill in the uploaded IP, port, path and other information, support real-time data interval, heartbeat packet interval and other settings
- 4) Cloud upload service supports PBAT real-time data, gateway AI/DI data upload
- 5) This function uses the 4G band signal of the SIM card to upload

Steps and detection of card insertion:

Open the top cover of the panel, insert the SIM card, the size of the card is 15mm X 25mm, and confirm the frequency band of the operator of the mobile phone card (you can call the local operator), and the frequency band supported by the SIM module (refer to Chapter 10 Technology Indicator), after confirming plug-in, restart the gateway; and the SIM STATUS menu interface displayed on the LCD of the gateway displays OK, and there is a digital signal, and the digital signal value is greater than 0. If the signal is not displayed normally, please check whether the local frequency band supports the SIM card Whether the installation size is correct and whether the gateway antenna is connected.

SNMP-Trap IP address

See Chapter 6 of this document for details.

4.9.2 Serial Port Setting

“Setting” → “Parameter Setting” → “Serial Port Setting”

The image shows a software interface for configuring four serial ports: COM1, COM2, COM3, and COM4. Each port configuration panel includes the following settings:

- Baudrate:** 9600
- Byte:** 8
- Stop:** 1
- Parity:** NONE

Each panel also features 'Save' and 'Cancel' buttons at the bottom.

1) 4 COM ports information can be checked under this interface, including baud-rate, data bit, stop bit and parity, and only baud-rate can be modified. Default parameters of the 4 COM ports is 9600, 8, 1, none.

2) This setting can change the serial parameter configuration of the gateway only, not the PBAT600 serial port parameters.

3) PBAT-GATE-2ZL model does not display COM3 and COM4 information

Serial debugging

The image shows a serial debugging interface. At the top, there is a dropdown menu set to 'COM1' and three buttons: 'Start Debugging' (green), 'Stop Debugging' (blue), and 'Clear' (orange). Below these is a section titled 'Communication Message' containing a table with multiple rows for logging data.

1)The serial port debugging function can select each channel, and output and receive messages

2)Support stop and clear debugging messages

4.9.3 AI/DI setting

“Setting” → “Parameter Setting” → “AI/DI Setting”

The screenshot shows the 'AI/DI Setting' page. On the left is a sidebar with navigation options: 'Main Menu', 'Basic Data', 'Parameter Setting', 'Alarm Setting', and 'System Setting'. The 'Parameter Setting' option is selected. The main area is titled 'AI/DI Setting' and is split into two panels. The left panel, 'Analog Input Setting', shows settings for AI1 and AI2. AI1 is configured for Temperature/°C with a range from -10 to 85. AI2 is configured for Humidity/Humidity with a range from 0 to 100. A 'Save' button is at the bottom. The right panel, 'Digital Input Setting', shows settings for DI1, DI2, DI3, and DI4, all set to 'String1 CH1 OFF Status'.

- 1) The input parameters of the outside connected device can be modified, mainly is the minimum and maximum value of the AI input.
- 2) No need to modify except for special needs, and please use this function along with temperature and humidity sensor recommended
- 3) PBAT-GATE-4CL model does not display this menu

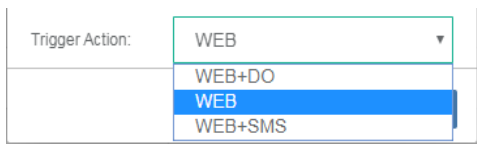
Note:

If the DI and AI functions fail, please check whether the gateway device setting is correct after excluding physical connection problem.
“Setting”-> “Project setting”-> “Project details”-> “Gateway Device”

4.9.4 Alarm setting

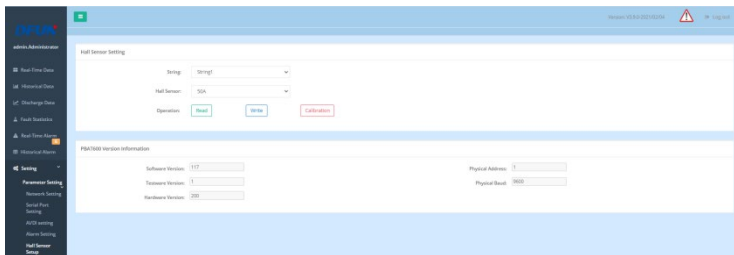
“Setting” → “Parameter Setting” → “Alarm Setting”

Trigger action can be selected as below:



4.9.5 Hall Sensor Setting

“Setting” → “Parameter Setting” → “Hall Sensor Setting”



- 1) Set the Hall specification zero point and calibration.
- 2) The read button is to read the currently set Hall specifications. After modifying from the drop-down box, click Set to set the selected specifications.
- 3) The zero point calibration function is used for Hall zero calibration. The Hall sensor must be taken out of the circuit and clicked under the condition of no current passing. If you cannot confirm the specifications, please confirm the settings with the engineer first.
- 4) After version 3.1, the status display of version 600, version number and physical address are added at the bottom.

4.9.6 Function Setting

“Setting” → “Parameter Setting” → “Ohmic measurement”

The screenshot shows the 'Ohmic Measurement' configuration page. On the left is a sidebar with navigation options like 'Admin', 'Parameter Setting', 'Function Setting', and 'Project Setting'. The main area is titled 'Ohmic Measurement' and contains several settings. At the top, there's a 'String' dropdown set to 'String1', an 'Ohmic Measurement Interval Type' dropdown set to 'hour', and an 'Ohmic Measurement Interval Time' input field set to '30'. Below these are 'Read' and 'Write' buttons. To the right, there's a 'Battery ID' dropdown set to '1' and two buttons: 'Manual Measuring Cell' and 'Manual Measuring All'. Below this is a section for 'String1 String Status' with a 'Status Device Connection Exception' button. The bottom section is 'Balancing Setup', which includes a 'String' dropdown (String1), 'Balance Enable' (On/Off), 'LED Enable' (On/Off), 'Balance Degree (%)' (97), and 'Balance Interval' (120). It also has 'Read' and 'Write' buttons.

Select the internal resistance test interval as required

Manual measuring all: Internal resistance tests are carried out for all battery strings, and it may take a while to complete a round of test;

Manual measuring cell: select one battery of a certain string for internal resistance testing;

Note: Ohmic measurement is automatically controlled by PBAT600.

Balance settings

The screenshot shows the 'Balancing Setup' configuration page. It features a 'String' dropdown set to 'String1', 'Balance Enable' (On/Off), 'LED Enable' (On/Off), 'Balance Degree (%)' (97), and 'Balance Interval' (120). At the bottom, there are 'Read' and 'Write' buttons.

1) Set the equalization when the equalization is lower than the set value (for example, 90% means that when the equalization is lower than 90%, turn on the equalization function)

- 2) Set the equalization interval time, the minimum interval between two equalization functions to prevent damage to the battery
- 3) The maximum balance can be set to 99.5%
- 4) Light control enable: control the switch state of PBAT and single light

4.9.7 Time setting

“Setting → Parameter setting → Time setting”

Sync Time Setting

Enable: ☒ Yes ☐ No

Sync Time Zone: (GMT +8:00) Beijing, Perth, Singapore, Hong Kong

NTP Server: time-a.nist.gov

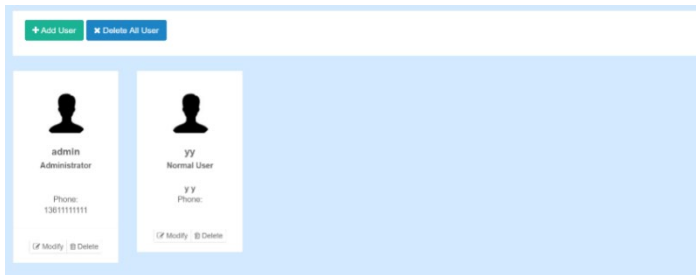
Sync time every day: 01:07

Sync with PC Time:

- 1) The time zone can be selected accordingly, Beijing time zone (East 8 District) is as default.
- 2) The NTP server can be its domain name or IP address like time-a.nist.gov.
- 3) The gateway will connect NTP server when calibration time is reach, then perform the calibration automatically.
- 4) Click the "Sync" button can synchronize the time of the gateway with the connected computer.

4.9.8 User setting

“Setting” → “Parameter setting” → “User setting”



1) Click “Add user” button to add a user, the user parameters including username, password, user identity, contact information and SMS alarm.

2) Click “Delete all user” can delete all users, please be careful to use

3) Click “Modify” button can edit the user information.

4) Click “Delete” button can delete a single user.

4.9.9 Firmware Upgrade

1) Gateway Upgrade

Click “Settings”->“Gateway Settings”->“Gateway Firmware Upgrade” on the left menu bar to display the gateway firmware upgrade page



1) Please don't open or log in multiple web pages at the same time, and ensure that only one web page is reserved before upgrading

2) Add the upgrade file

3) Click the green button to upload the file and wait a minute till the gateway is restarted

4) After the file upload is completed, the gateway will start upgrading automatically. Please don't perform any other operation during the upgrade process, and the longest upgrade time may least about 5 minutes. The gateway will restart automatically after the upgrade is completed, please login the website again after the gateway is restarted

5) Please clear the browser cache after the upgrade is completed, the browser cache must be cleared first (including at least three basic items: browsing records, cookies and other website data, cached images and files), and login the gateway again

Notes:

(1) Please manual restart the gateway first for the gateway which version is lower than Gate3.4 (press the circular "service" button on the gateway at least 10 seconds, and release. When "Reboot" is pop up means the restart operation is successful). Continue the firmware upgrade after the gateway is restarted.

(2) Please do not modify the name of the online upgrade file, or it may cause upgrade failure due to uploading wrong file, and the file name cannot contain special characters

2)String and cell upgrade:



String upgrade:

1. Choose the upgrade file
2. Click “Confirm” to upload the file
3. Click the “Start 600 upgrade” button to upgrade the string sensor, refresh the web page after the upgrade is completed

Cell upgrade:

1. Choose the upgrade file
2. Click “Confirm” to upload the file
3. Click “Write cell upgrade file” and wait for the file to be written
4. Click “Cell upgrade” to send the upgrade command to cell sensors
5. Click “Cancel upgrade” can cancel the current cell sensor upgrade process
6. If there any cell sensor upgrade failure, please click “Failed re-upgrade” to upgrade the failed cell sensor(s). Please don't perform any other operation before all the cell sensors are upgraded successfully

Note:

When the system function needs to be upgraded, upgrade the firmware file to the gateway on this page. Before upgrading, please consult the technicians, and illegal upgrading operations are

prohibited.

4.9.10 Email Settings

Expand the menu on the left and find [System Settings]→[Parameters Settings]→[Email Settings] to show Email Settings page

Send Email Settings

SMTP Server: Password:

Port: Confirm Password:

Sending Mailbox:

Operation:

Receiving Mailbox List

Name	Mailbox	Operation

Email Alarm period has set by 1 minute, all alarm messages would be sent as package every minute, and the message would not be sent again once it had sent successfully. **Please note that network settings on the system must be set successfully before email alarm settings.**

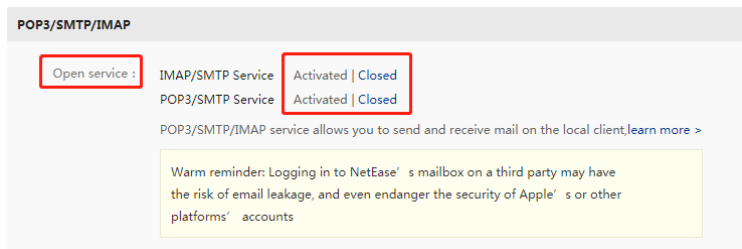
DTL: According to deliver email successfully, email account settings would also need to be done. Email account, account authority code, port number and server address would need to be entered on the email account settings website. The example below would use 163 Mailbox to explain.

Launch browser and login to the email account, click on Settings and

choose 'POP3/SMTP/IMAP'



Turn on IMAP/SMTP service and POP3/SMTP service.



Click on 'Add New Authority Code' button, get the code on the pop-up window after verification and copy the code to Email Settings on the system.

Authorized
password
management :

The authorization code is a special password used to log in to a third-party mail client.

Applicable to logging in to the following services: the services you open (such as POP3/IMAP/SMTP), Exchange/CardDAV/CalDAV services.

Use Equipment	Activation Time	Operations
Device 1	2021.7.26	Delete

Add Authorization Password

Account Security Verification



Please use your mobile phone [redacted] to send a text message, and then click "I have sent" to verify

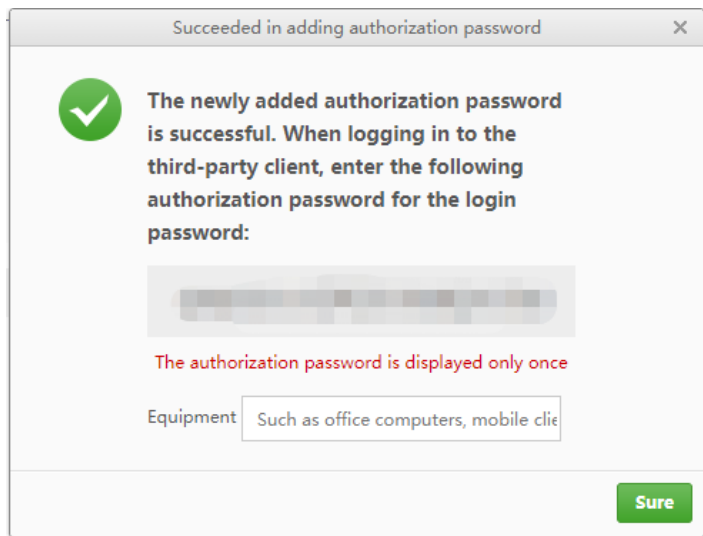


Scan QR code with mobile phone
Send SMS quickly

Scan code unsuccessful ?
Try [Send SMS manually](#) (SMS fee is charged by the operator)
[The phone number has been changed and can't be verified ?](#)

I have sent

Cancel



Looking for SMTP server address as mailbox server to key in into email settings in the system. The port number would be 25 if no specified declare.

Tips

Server Address : POP3 Server: pop.163.com

SMTP Server: smtp.163.com

IMAP Server: imap.163.com

Security Support : POP3/SMTP/IMAP services all support SSL connection

After configuring the settings of delivering email account and

receiving email account, email services in the system would need to be restarted to take effect.

4.9.11 Project Details

“Setting” → “Project Setting” → “Project Details”

Project Information

Information Setting

Project Name: P101

Room Name: Room1

Gateway Name: Gateway1

Device Name: D001

Company Name: Zhuhai P101 Technology Co., Ltd.

Company Website: <http://www.p101.com.cn>

Language Type: CHINESE / ENGLISH / English

Gateway Model: P101 GATE 001

Gateway ID: 00101011111

Gateway Device: 0010101

Data Recording Interval

History Record Switch: Turn On

History Time Interval: 0.5h

Discharge Record Switch: Turn On

Discharge Time Interval: 1min

Delete Record Setting

Select Date Type: Monthly

Start: - End:

Delete Alarm Record Delete GATE Record Delete History Record

Storage Capacity

Total Capacity: 7.4G Used Capacity: 1.3G

Login Setting

Please clear the browser cache and refresh the web after uploading.

Login User: Login User

User Login: User Login

Choose File Upload Choose File Upload

1) The project information can be modified accordingly under this interface

2) The language of default login and alarm template would be changed accordingly after change, and it may impact the language for

SMS information sending

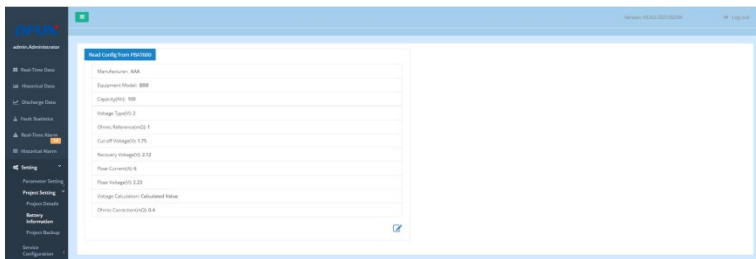
- 3) Only PBAT-GATE-2ZL can support the model modification
- 4) Gateway device settings only support 2Z gateway for customized functions.
- 5) The data recording intervals is used to set the record interval for historical data and discharge curve.
- 6) Historical data, alarm data and SMS data can be deleted according by yearly, monthly and daily, please be careful to use this function
- 7) The storage capacity of the gateway memory card can be checked under this page
- 8) The logo setting is used to set the login logo and user logo

Note:

- The label model on the gateway side must correspond to the model on the web page. After changing the corresponding model on the web page, you must restart the gateway to make it effective.
- The gateway SN code and gateway model settings are added to the version above 3.5. The SN code, device model and other information are located on the label on the side of the gateway. If this information is not set correctly, it will affect the 4G SMS function.

4.9.12 Battery Information

“Setting” → “Project Setting” → “Battery Information”



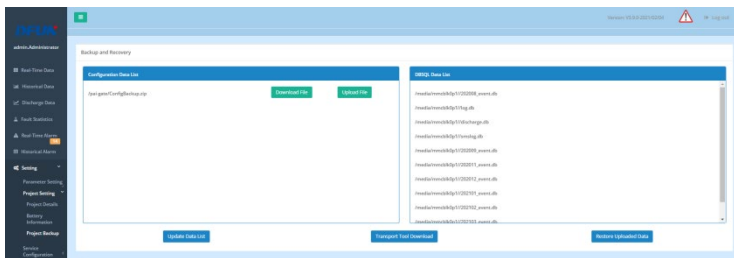
Please enter the battery information of manufacturer, equipment model, capacity(AH), voltage type(V), ohmic reference(mΩ), cut-off voltage, recovery voltage, float current, float voltage, voltage calculation type and ohmic correction correctly.

Note:

- 1) Measured value: The real-time measured string voltage(wiring)
- 2) Calculated value: Accumulation of all battery cell voltage.

4.9.13 Project backup

“Setting” → “Project Setting” → “Project backup”



- 1) PBAT-GATE supports the backup and recovery of all parameters

settings, service configuration and project settings and other configuration, please refer to configuration data list for more details

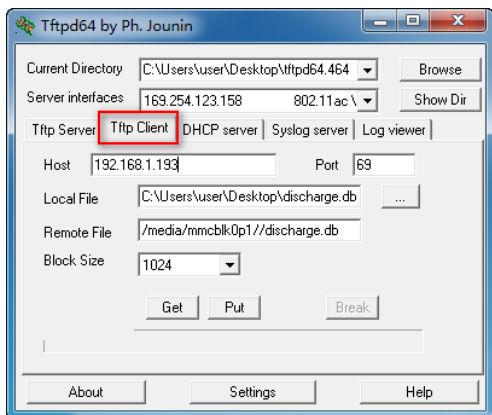
2) PBAT-GATE supports the backup and recovery of all historical data, historical alarms and discharge data, please refer to the DBSQL data list for more details

3) Update data list: update the backup contents of configuration data list and DBSQL data list

4) Transfer tool download: it's used to download or upload configuration list, due to the large database file size and the limited gateway memory space

5) Restore uploaded data: it's used to manually restore the data of the successfully uploaded configuration file (refer to the configuration data list for more details)

Steps of using transfer tool (take upload / download discharge.db database for example)



- 1) Download the tool
- 2) Unzip and open the “tftpd64.exe” (please do not drag out directly, or it may cause exception open)
- 3) Click “Tftp client” to switch to the client page
- 4) Server interfaces: it's referring to host server interface(data upload over PC), so please choose the computer IP as the host service interface(local IP/wireless IP)
- 5) Host: Fill in the IP address of the gateway
- 6) Port: TFTP port, it's fixed to 69
- 7) Local file: local computer file storage location (absolute path), manually filled in, the file name must be consistent with the file name on the gateway
- 8) Remote file: the file storage location (absolute path) of the target server. The file path to be uploaded or downloaded can be copied from the DBSQL data list

9) Block size: the block size of the files to be downloaded or uploaded, it determines the transmission speed.(Generally is 1024k)

10) Get: download the file from the target server file location to the local computer file location for data backup (gateway -> PC)

11) Put: upload the file from the local computer file location to the target server file location for data recovery (PC -> gateway)

Take downloading the discharge.db database (file storage location: / media / mmcblk0p1 /) to the computer desktop (the file storage location is C: users / user / desktop) as an example:

Local file: *C: users / user / desktop\ discharge.db*

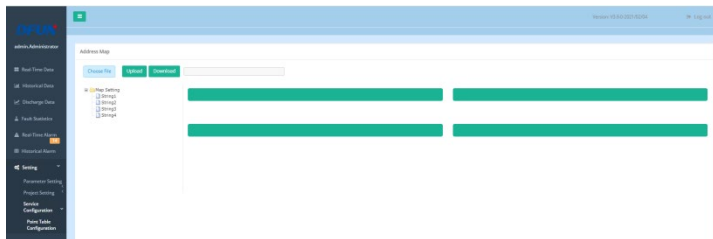
Remote file: */ media / mmcblk0p1/ discharge.db*

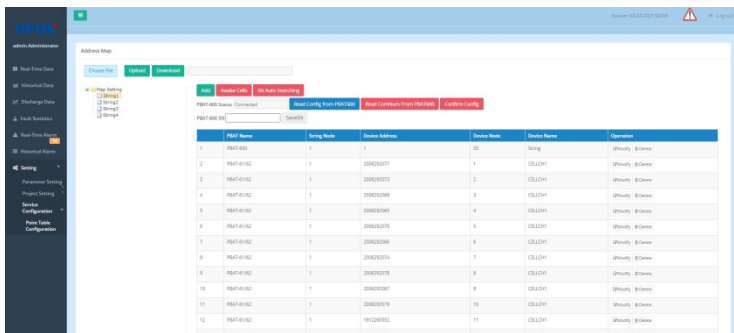
Then run “Get” to download the backup file, a window will pop-up after the download is completed, please click “OK”.

Same operation steps for upload recovery data(Put)

4.9.14 Point table configuration

“Setting” → “Service configuration” → “Point table configuration”





1) The address under each COM can be added, modified and deleted in this page.

2) After the one-key search address reads the 600 configuration, a window will pop up to prompt the current 600 address configuration. The user can choose to confirm to write into the gateway configuration, or click Cancel to abandon the writing.

3) After the address configuration is complete, click Confirm configuration to complete the address mapping operation

4) Support one-key wake-up of all monomers.

5) Support the import and export of address configuration table.

SN auto-searching:

1. Please confirm the PBAT600 status is “connected” first, if not, please check the wiring between PBAT600 and gateway.

2. Click SN auto-searching after confirm the status of PBAT600 is connected

3. Save the searched address to confirm the configuration

Modify device address information:

1. “Add”: add battery string and cell sensor information.

2. Modify/Delete: modify or delete the information of PBAT600 or cell sensor

3. It supports reading the number of cell sensor from PBAT600 directly

4. It supports reading address configuration information from PBAT600 directly.

5. The item number cannot be repeat or jumping.

Chapter5. Data Acquisition Function

5.1 Summary

PBAT-Gate provides four RS485 ports to collect the real-time data, and equips with multiple alarm settings and resistance measurement functions.

5.2 System composition

Acquisition module is consisted of string sensor and cell sensor.

1) Cell sensor: it's used to monitor the battery cell parameters like voltage, temperature and resistance

2) String sensor: it's responsible for the measurement of string voltage and current

3) PBAT-GATE-4CL equips four RS485 interfaces, PBAT-GATE-2ZL equips with two RS485 interfaces.

4) Each RS485 port can support connecting up to 120pcs cell sensors(up to 240pcs battery cells)

5) Each gateway supports connecting up to 4 battery strings, and the battery string number should correspond to the RS485 ports

6) All nodes of the same RS485 channel must belong to the same battery string.

7) All cell sensors in the same battery string should be unique

The combination is as follows:

String number assigned	Channel classification	note
PBAT-gate-4CL String 1: #1-60 String 2: #1-60 String 3: #1-60 String 4:# 1-60	RS485-A: 1-120(61) (String 1) 1-240(62)	Gateway supports connecting 4 battery strings. And the number of cell sensor in each string cannot over 120pcs, the total number of cell sensor with one gateway cannot over 480pcs(1-2 solution is 960pcs).
	RS485-B: 1-120(61) (String 2) 1-240(62)	
	RS485-C: 1-120(61) (String 3) 1-240(62)	
	RS485-D: 1-120(61) (String 4) 1-240(62)	
PBAT-gate-2ZL String 1: #1-60 String 2: #1-60	RS485-A: 1-120(61) (String 1) 1-240(62)	Gateway supports connecting 2 battery strings. And the number of cell sensor in each string cannot over 120pcs, the total number of cell sensor with one gateway cannot over 240pcs(1-2 solution is 480pcs).
	RS485-B: 1-120(61) (String 2) 1-240(62)	

Chapter6. Data Forwarding Function

6.1 Summary

In addition to the ability to view data on the web, Gate also supports data forwarding. Data center software can read all real-time data of the collector through Modbus TCP or SNMP for unified monitoring. This gateway supports multi-host TCP connections, and theoretically does not limit the number of connections, but in practice it is recommended to limit the number of connections to less than 10.

6.2 Forwarding Meter Communication Protocol

The protocol of Gate forwarding supports Modbus-TCP and SNMP forwarding functions. The OID protocol meter corresponding to SNMP can be referred to 《PBATGate-SNMP_OID meter _v1.2_20190719.xls》.

6.3 Data Forwarding Function

Detailed SNMP OID Reference File:

PBATGate-SNMP_OID Meter_V1.2_20190719.xlsx

Detailed SNMP Software Reference File:

iReasoning MIB Browser Instructions for Use _20181119.docx,

MG-SOFT MIB Browser Instructions for Use _20181119.docx

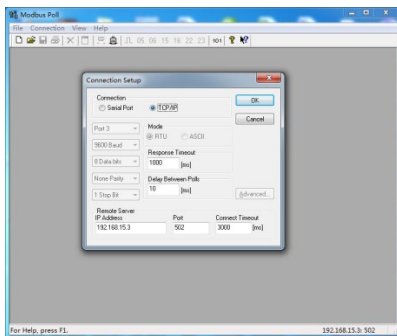
6.3.1 Modbus-TCP Forward

According to section 5.2, the configuration of data readout allows the user to connect to the gateway using Modbus-TCP enabled client

software for real-time data readout.

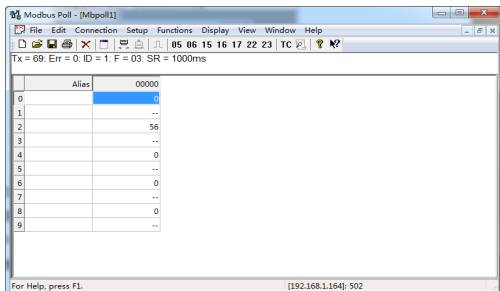
Modbus-Poll is taken as an example to illustrate:

1) Choose TCP/IP connection mode, fill in IP address as gateway address (192.168.15.3 in this case), port number 502.



2) Create a new Modbus query, click [setup] → [read/write definition] in the menu bar, and set the starting address of the register read from the slave machine to 0 and the number of registers read to 10.

3) Set the starting address of the register read and set the display format [display] → [float inverse].



4) Real-time data of batteries can be read sequentially after the

above configuration. A frame of message can only read 512 test points. When the number of real-time measurement points needed to be acquired is large, it needs to be read in segments.

5) When multiple data centers need to read the gateway data at the same time, they can connect to port 502 of the gateway at the same time. It is recommended that the maximum number of connections should not exceed 10

6.3.2 SNMP Forward

SNMP is a network management standard based on the TCP/IP protocol suite. It is a standard protocol for managing network nodes (such as servers, workstations, routers, switches, etc.) in an IP network. SNMP enables network administrators to improve network management performance, identify and resolve network problems, and plan network growth in a timely manner. The network administrator can also receive notification messages of network nodes and alarm event reports through SNMP to learn about network problems.

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

The most common default communication strings are public (read-only) and private (read/write), in addition to many vendor-specific default communication strings. Some form of default communication string can be found on almost all network devices running SNMP.

This device only supports the GET command and public communication strings for security reasons.

6.3.2.1 OID Definition

The SNMP protocol of the device implements an extension module based on net-snmp, which can achieve real-time data acquisition of corresponding nodes, and has snmp-get/snmp-walk reading function.

For versions above 3.5, the initial OID node address is 1.3.6.1.4.1.8072.3400, the string sub-node start address is 1.3.6.1.4.1.8072.3400.1. The starting address of string one single node is 1.3.6.1.4.1.8072.3400.2.1. The starting address of string two single node is 1.3.6.1.4.1.8072.3400.2.2. The starting address of string three single node is 1.3.6.1.4.1.8072.3400.2.3. The starting address of string four single node is 1.3.6.1.4.1.8072.3400.2.4.

The detailed setting of OID please refer to "PBAT-Gate3.4.1 SNMP_OID meter_V1.1.xlsx".

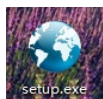
6.3.2.2 OID Query

Solution 1(Recommend):

All forwarding information of SNMP node can be queried easily by SNMP MIB software, take "iReasoning MIB Browser software" as an example.

1. Installation

Download and install iReasoning Mib-Browser software.



2. Import MIB file

Import the S_Gate.mib file of gateway

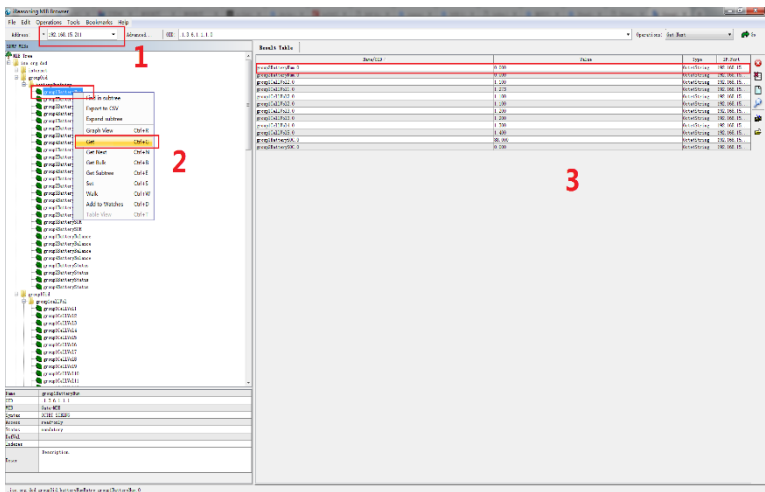
Note:

The directory path of the MIB file should not be too long, and the directory name should not be used in any language other than English.



3. Obtain node value

- 1) Enter the IP address of gateway
- 2) Use "Get" to obtain the node value of needed
- 3) Check the obtained value is right or not

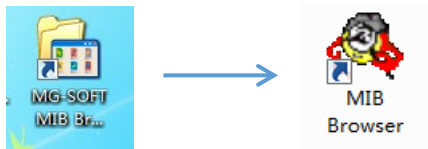


Solution 2:

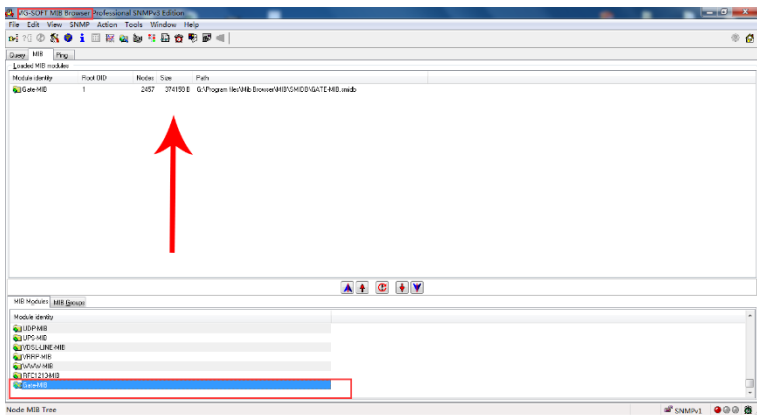
All forwarding information of SNMP node can be queried easily by SNMP MIB software, take “MG-SOFT MIB Browser” as an example.

1. Installation

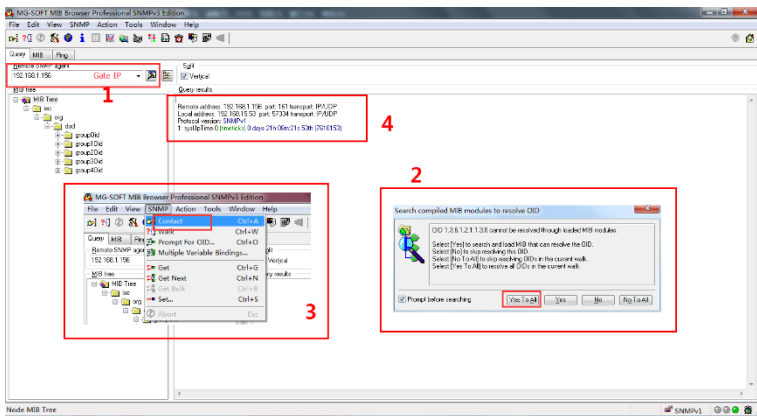
Buy mib browser software from 3rd party supplier, and install it.



2. Compile

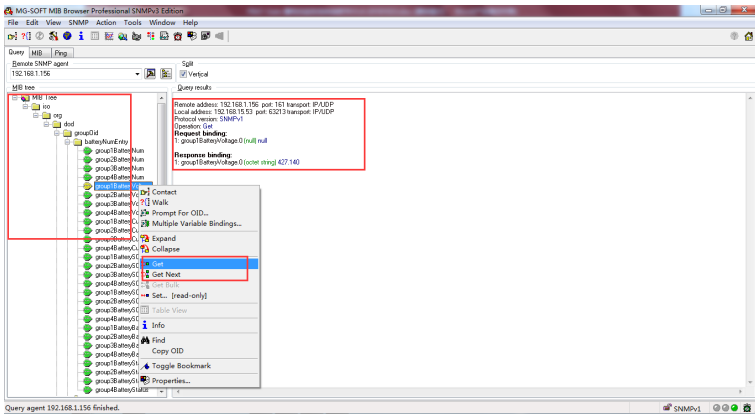


Open MIB Browser software, find out the saved compile file in MIB interface, double click to upload to Browser.



Change to “Query” interface, and enter the gateway IP address, upload interface will pop-up, and choose “Yes to all”, to connect IP, system nodes information can be obtained when connection is fine.

4. Import list



Click node list, and select the needed SNMP node, click right button “Get” to obtain the related node information.

6.3.2.3 SNMP Trap Configuration

Click “Setting” → “Service Configuration” → “Forward Point Meter” to switch to the SNMP display page.

SNMP Trap IP Address

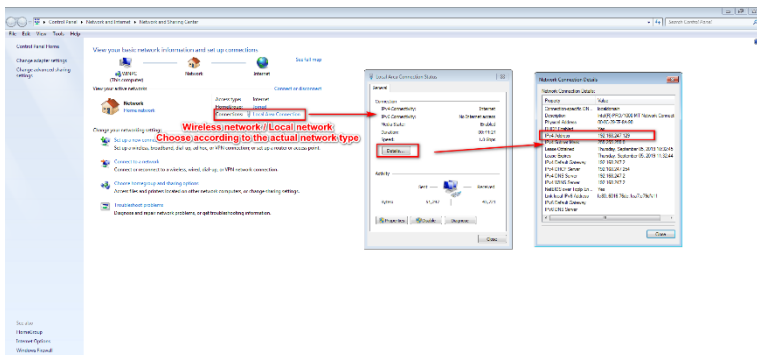
Manager IP	172.20.2.37	Save
------------	-------------	------

1) According to the gateway connection mode, get the IP of the local area network where the gateway is located.

2) Enter IP address and click Save.

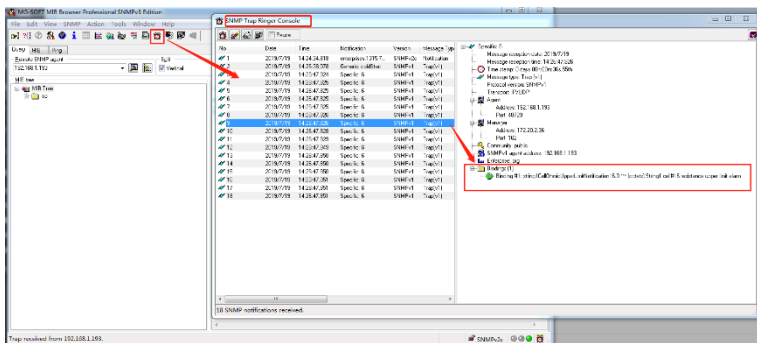
3) use SNMP software to view trap information.

LAN IP acquisition method:



Software Trap view method:

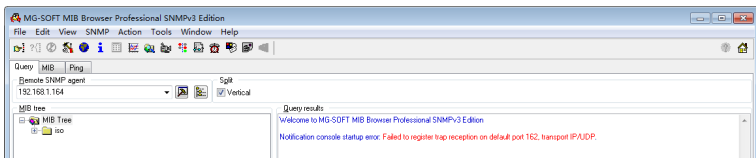
Mg-soft MIB Browser software to view Trap information



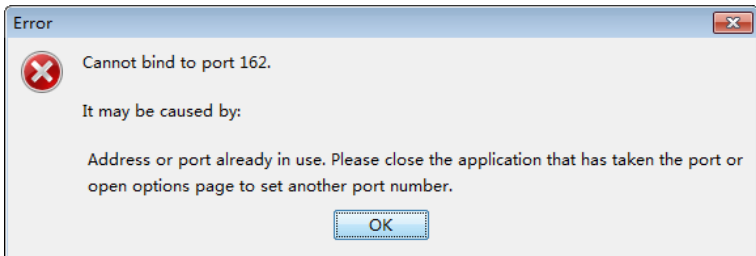
Solution of SNMP TRAP 162 Port Occupied:

When using the Trap function of SNMP software, there may be 162 port errors related prompts. Different SNMP MIB software prompts may be different, but the general errors are the same, as shown in the figure:

MG-SOFT MIB Browser

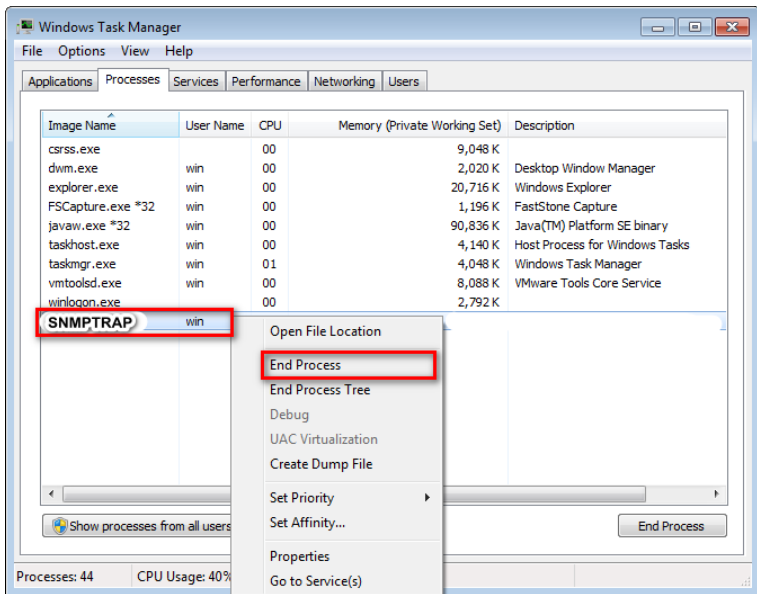


iReasoning MIB Browser

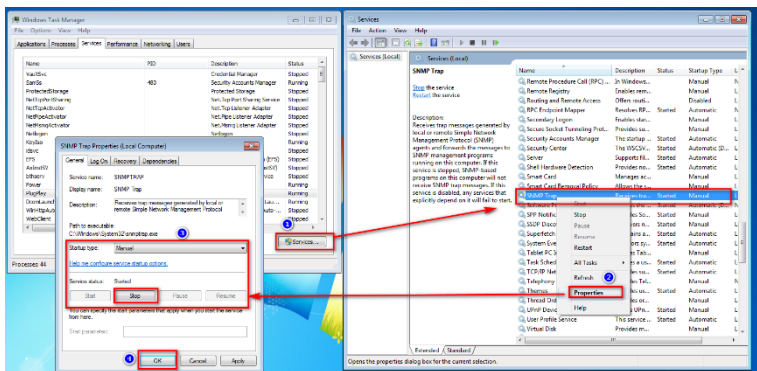


The solutions to such problems are as follows

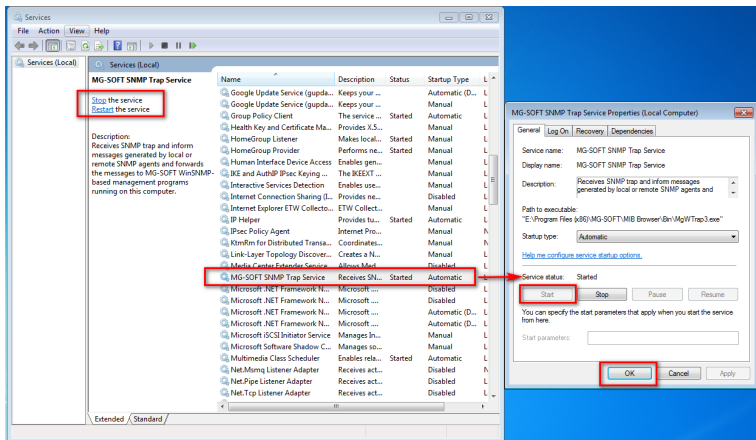
- 1) Find out if there is a SNMP TRAP process in the process menu of the resource manager, and if so, end the process.



2) Stop SNMP TRAP service on Windows system



3) Find out whether SNMP MIB Browser is equipped with Trap service, if so, launch it, and if not, no processing is required (mg-soft MIB Browser is equipped with mg-soft SNMP Trap Server service, and iReasoning MIB Browser is equipped with no Trap service of its own)



4) Re-open the Trap function of the SNMP MIB Browser software. If the error prompt related to the 162 port is not present, the Trap information can be obtained normally.

Chapter7. Alarm System

7.1 Summary

There is a user-definable alarm system that can monitor all electrical parameters of the battery system and set linkages, measurement value of alarm can be set.

7.2 Alarm Analysis

7.2.1 Alarm Judge Type

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

7.2.2 Alarm Object Type

Analogue setting system can monitor all electrical parameter, including 11 items, show as below:

Over Limit Type	Parameter Type
Upper Limit	Cell voltage
	Cell temperature
	Cell impedance
	String voltage
	String current
Lower Limit	Cell voltage
	String voltage
	String current
	SOH
	String SOC
	Cell SOC

7.2.3 Alarm Action Condition

After defined monitoring parameters, it needs to set the action condition.

For example: Define the upper limit action of string current.

Message

Enable:

☒Yes
☐No

Alarm Type:

Cell Voltage(V)

Trigger Type:

Over High Limit

Threshold:

14.6

Recovery:

14.6

Trigger Action:

WEB

OK

Cancel

The setting enablement is that the trigger type is set to exceed the upper limit, the threshold value is 2.5, and the trigger action is written record and alarm light. The hysteresis value, trigger delay and recovery delay are kept at 0.

An event record can be generated when the voltage of a single section is higher than 2.5V.

7.2.4 Alarm Holding Time

After the alarm object meets the threshold condition, it needs to meet the time specification before it can be activated. The alarm is not activated if the alarm object is within the limit within the entire delay period. The unit of the action delay is second, and the value ranges from 0 to 65535. Setting to 0 means that the alarm channel is activated as soon as the monitored object exceeds the limit.

7.2.5 Alarm Hysteresis Value

After the alarm object meets the threshold condition and generates an alarm, the real-time value of the object needs to be restored to the range specified by the hysteresis value to prevent the alarm. This value prevents the real-time value of the object from fluctuating frequently and causing repeated alarm output. The value range is set according to the actual object.

For example, the upper limit of the cell voltage alarm is 2.5V, and the hysteresis value is 2.3V. When the cell sensor collects $>2.5V$, an alarm is generated. When the collector is at 2.4V, the alarm is not removed. When the switch returns to 2.5V, the alarm is not generated repeatedly. The alarm is not activated until the voltage recovers $<2.3V$.

The value range of the hysteresis value is set according to the characteristics of the measuring point and the site environment. Setting to 0 means that once the real-time value is not within the limit value, and “Alarm Recovery Time” is set to 0, the alarm is immediately cleared.

7.2.6 Alarm Recovery Time

After the alarm object meets the threshold condition and returns to the threshold condition, it does not immediately alarm. Instead, it waits for the “alarm recovery value” to continue until the “alarm recovery time” is cleared. This value prevents the alarm from being generated after the alarm is generated. The resulting jump causes the object to suddenly fail to meet the alarm threshold condition and is misjudged as the alarm.

Setting to 0 means that once the detected object does not meet the threshold condition and the “hysteresis value” is 0, the alarm is immediately cleared.

7.2.7 Alarm Trigger Activation

When an alarm object generates an alarm, the corresponding linkage action can be set to remind the maintenance personnel. Trigger actions including:

Trigger Action	Illustration
LED Light	Alarm---ON Cancel---OFF (Alarm light including gateway panel light and sensor light)
Event Record	record alarm and alarm removed
DO (2ZL version)	Can be connected to sound and light alarm for alarm
Message alarm	Send alarm generation and end information to the customer's mobile phone through the SMS module

7.2.8 SMS Configuration

1. Insert the SIM card

1) Open the top cover and insert the SIM card(the size of the card is

15mm X 25mm)

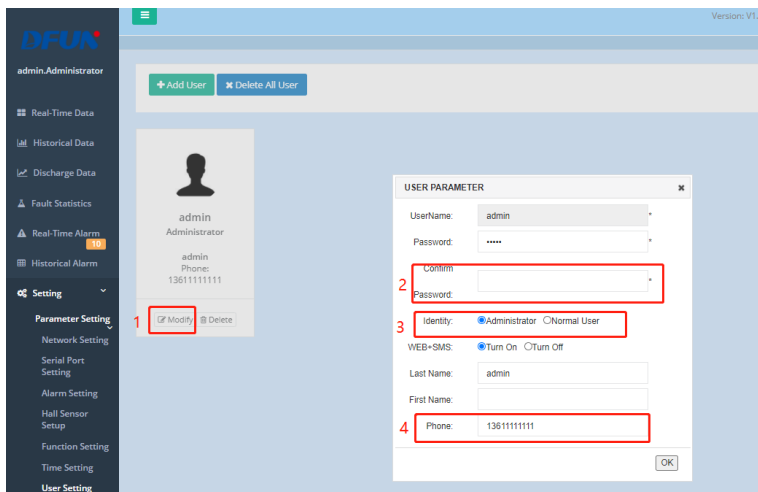
2) Make sure the frequency band of the SIM card (please contact the local operator) can meet the requirement (refer to Chapter 10)

3) Restart the gateway after confirm the SIM card is well inserted, and the SIM STATUS is ok show on the LCD, meanwhile there is a digital signal larger than 0

4) If the signal is not displayed normally, please check if the local frequency band of the SIM card and the SIM card size can meet the requirements, and check if the antenna is well connected.

2. Cell phone number configuration

“Setting” → “Parameter setting” → “User setting”



1) Please don't forget to add international area number to the phone number, such as China:8618201234567.

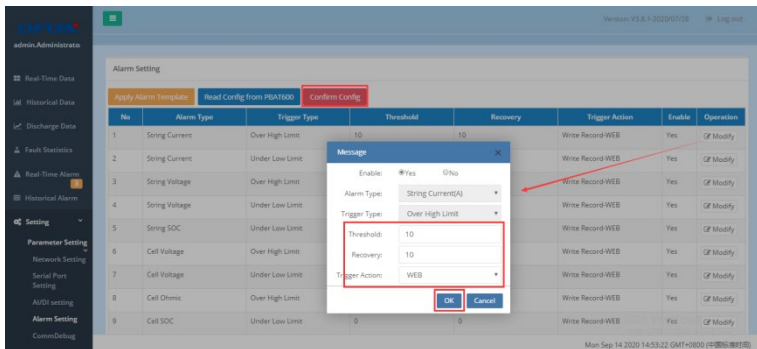
2) If you use a gateway with a 4G module to send SMS, you must correctly fill in the SN code and device model corresponding to the gateway. For details, please refer to the [Project Details] settings.

3. Alarm configuration

“Setting” → “Parameter setting” → “Alarm setting”

1) Select “SMS+WEB” trigger action, and edit the information to be sent.

2) Click “Ok” to confirm all of the settings



Note: Please confirm if the cloud function is off, before turning on the SMS alarm sending function(“Setting”-> “Parameter setting”-> “Cloud setting”).

Chapter8. Auxiliary Function

8.1 Communication

PBAT-Gate supports up to four RS485 interface and is independent of each other, and normally each RS485 port can only support connect one PBAT600(default address: 1 ; baud-rate:9600).

PBAT-Gate supports up to two RJ45 Ethernet interfaces, independent of each other, and can meet the 10BaseT/ 100BaseTX Ethernet standard under the IEEE-802.3 term

8.1.1 Communication Protocol

The 2 Ethernet ports support MODBUS-TCP protocol, for more details please refer to the “PBAT-gate modbus protocol” manual.

8.1.2 Communication Interface Anti-strong Electric

The RS485 communication interface has the function of anti-strong electricity, short time (within 5 minutes) strong electricity access (220VAC) will not burn out, and the communication function can be restored to normal after the strong electricity is removed.

8.2 Clock

During the operation of the battery monitoring system, the accuracy of the built-in real-time clock needs to be ensured. Therefore, the NTP server is built in, the NTP timing function is enabled, and the time of NTP timing is configured, and the clock is synchronized when the system runs to the NTP synchronization time. Or manually sync in the web page. Please refer to section 4.10.6 for details.

8.3 Restful upload function

Restful general upload is supporting json and xml format, http and https protocol. According to the settings of collecting data from each cell sensor to set timing to upload. For more detail about communication protocol, please refer to “XGate6 Cloud Platform Interface.docx”.

Chapter9. State of charge

9.1 SOC calculating description

The gateway supports battery cell SOC calculation at a frequency of once per minute. The SOC value in the first minute of the startup is invalid, and the SOC value in the first minute after the parameter is reconfigured is invalid.

Please use the default recommended parameters below:

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

“Setting”-> “Project setting” -> “Battery information”

The [recovery voltage] of the battery can be updated by calculation after a complete charging and discharging process in actual use (take the average value of the recovery voltage of all batteries in each group of batteries, generally requiring removal of the maximum and minimum), modify the configuration The parameters are used, the SOC of the

battery will be closer to the characteristics of the actual battery. The SOC that has not undergone a complete charge and discharge process is calculated from the default parameters and the current battery state, and the error will be greater than the error after a complete charge and discharge.

Note:

When the voltage level of the battery is changed through the configuration software (for example, 2V is changed to 12V, or 12V is changed to 2V), the characteristic parameters of the battery will be restored to the default characteristic parameters under the voltage level, and the original parameters will be lost. Please switch the battery When voltage level, be sure to know this risk.

The default [recovery voltage] value is the optimal value obtained by a large number of experiments. If there is no special situation (such as the reference value provided by the battery manufacturer, etc.), please do not change it.

Chapter10. Technical Specification

Hardware index		
CPU	ARM Cortex-A8 800MHz	
Memory	DDR3 512MB	
ROM	Nand Flash 512MB	
Ethernet interface	2x10/100M	
Number of acquisition	Gate6-2ZL	• 2 RS485 interfaces • 2 AI 4-20mA

interfaces		• 4 DI passive switches • 1 DO(AC220V/5A DC30V/5A)
	Gate6-4CL	•4 RS485 interfaces
SIM	Gate6-2ZL Gate6-4CL	• TDD-LTE B38/B39/B40/B41 • FDD-LTE B1/B3/B8 • TD-SCDMA B34/B39 • WCDMA/HSDPA/HSPA+ B1/B8 • CDMA 1X/EVDO BC0 • GSM/GPRS/EDGE 900/1800 MHz • Standard SIM Card (15mm×25mm)
TF interface	Standard 8G, maximum support for 32GB Micro-SD TF card	
Work Environment		
Working Power Supply	AC 85-265V or DC 100-300V (P1)、DC18-36V (P2)	
Power Dissipation	<5W	
Ambient Temperature	Operating Temperature -15℃ ~ +55℃， Storage Temperature -25℃ ~ +70℃。	
Relative Humidity	5-95%, No condensation	
Dimension		
L × W × H	96mm × 96mm × 13.5mm	

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)	III
Electrical fast transient	GB/T17626.4-2008	III

burst immunity	(IEC61000-4-4:1998)	
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

Chapter11. Maintenance and Trouble shooting

Possible Problems	Possible Causes	Possible Solutions
After adding control power, the equipment is not displayed.	The power supply failed to be added to the device	1. Check whether the correct operating voltage is added on the 24V and 24V-terminals of the equipment. 2. Check whether the control power supply is burned or not.
Abnormal internal resistance	All internal resistance values are 0	Click on the manual internal resistance test operation on the web page
	the individual internal resistance is particularly large	Measuring line contact problem, reconnecting measuring line

Incorrect current measurement	No hall sensor calibration	When the string current is zero, Hall zeroing is performed on the web page.
	Hall configuration specification configuration error	Check that the specifications of the Hall are consistent with the specifications displayed on the web page.
The collector is not consistent with the gateway alarm	PBAT600 and GATE alarm parameters are inconsistent	Click to confirm the configuration button on the alarm parameter web page
One-click search for address does not search for singletons	The total length of line 11 is more than 50 m	Replace the long line of RJ11 and reduce the length of RJ11 communication line
	RJ11 line resistance is too large	Replace all RJ11 lines
	Individual communication lines do not conform to the "left in right out" principle	Modify the connection sequence of single RJ11 communication interface
PBAT600 and GATE communication interrupt	Incorrect RS485 wiring	1. Check whether the RS485 line is connected. 2. Whether the A and B of RS485 are connected reversely

	Parameter configuration is not normal	1. Baud rate mismatch (default: 9600) 2. Setting address mismatch (default 1)
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Notice:

- The information stated in this manual can be modified without prior notice due to update need
- DFUN (ZHUHAI) CO.,LTD. reserves the right to interpret the information stated.

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