
PBAT-Gate 3.3

**MODBUS PROTOCOL
AND REGISTER LIST**

V1.05

ZHUHAI PILOT TECHNOLOGY CO.,LTD

www.pmac.com.cn

Content

Chapter 1 Introduction	1
1.1 Purpose of the Communication Protocol.....	1
1.2 Version of Communication Protocol.....	1
Chapter 2 Detailed Description of the PABT-GATE Modbus Protocol.....	2
2.2 Modes of Transmission	2
2.3 Description of the Modbus Packet Structure	2
2.4 Abnormal response.....	3
Chapter 3 Packet Communication	4
3.1 Read Holding Registers (Function Code 03H).....	4
Chapter 4 Description of PBAT-GATE Registers.....	5
4.1 Real-time Date of Battery	5
4.2 Real-time Data of cells.....	7
4.3 Real-time Data of PBAT6X-X2.....	8
4.4 Alarm Register.....	21

Chapter 1 Introduction

This document describes the input and output command, information and data of the PBAT-GATE under MODBUS communication mode. So it is convenient for the 3rd part using and developing

1.1 Purpose of the Communication Protocol

The purpose of the PBAT-GATE MODBUS communications protocol is to allow setup information and measured data to be efficiently transferred between a MODBUS Master Station and a PBAT-GATE. It includes:

- 1) Allowing setting and reading all PBAT-GATE set-up parameters from a MODBUS Master Station.
- 2) Allowing reading all data measured by a PBAT-GATE and SOE (Event log).

1.2 Version of Communication Protocol

This document is proper for all versions of PBAT-GATE meters. If any change happens later, it will be declared.

Chapter 2 Detailed Description of the PABT-GATE Modbus

Protocol

The following rules define the protocol rules for information transfer between a MODBUS Master device and the PBAT-GATE in a RS-485 serial communications loop:

- 1) All communications on the RS-485 loop conforms to a MASTER/SLAVE scheme. In this scheme, information and data is transferred between a MODBUS MASTER device and up to 32 SLAVE monitoring devices.
- 2) The MASTER will initiate and control all information transfer on the RS-485 communications loop.
- 3) Under no circumstances will a SLAVE device initiate a communications sequence.
- 4) All communications activity on the RS-485 loop occurs in the form of "PACKETS", a packet being simply a serial string of 8-bit bytes. The maximum number of bytes contained within one packet is 255. The bytes that comprise a packet consist of standard asynchronous serial data, according to 8-bit data bits, 1 stop bit, no parity bit way to transfer, which are generated using equipment similar to that used for RS-232C.
- 5) The packages from MASTER are named request. The packages from SLAVE are named response.
- 6) Under any circumstance, Slave can just respond one request.

2.2 Modes of Transmission

MODBUS protocol supports ASCII and RTU modes of transmissions. The PBAT-GATE supports only the RTU mode of transmission with 8 data bits, no parity, and one stop bit.

2.3 Description of the Modbus Packet Structure

Every MODBUS packet consists of four fields:

- 1) The Address Field
- 2) The Function Field
- 3) The Data Field
- 4) The Error Check Field

2.3.1 Address Field

The address field is 1-byte long and identifies which slave device the packet is for. Valid addresses range between 1 and 247. The slave device whose address matches the value in this field will perform the command specified in the packet. The packet matching the slave device is its own address in this field.

2.3.2 Function Field

The function field is 1-byte long and tells the addressed slave which function to perform. Slave response packet should include same function field byte as request. The Modbus functions supported by PBAT-GATE are listed as below:

Function Code	Meaning	Action
0x01	Read Relay Status	Obtains ON/ OFF information of one or more relay in PBAT-GATE (0/1)
0x03	Read Holding Registers	Obtains the current value in one or more holding registers of the PBAT-GATE
0x05	Relay control	Write 0xFF00 to close (ON) the relay Write 0x0000 to open (OFF) the relay
0x10	Preset Multiple Registers	Places specific binary values into a series of consecutive holding registers of the PBAT-GATE

2.3.3 Data Field

The length of Data Field is varies in length depending on its function. In general, MODBUS supports “BIG INDIAN” mode, it means high-order byte first, low-order byte second.

For example,

One 16 byte register value is 0x12AB; register is transmitted in below sequence:

High-order byte = 0x12

Low-order byte = 0x0AB

2.3.4 Error Check Field

In Modbus RTU mode, the 16-bit Cyclic Redundancy Check (CRC-16) is used. The sending device calculates a 16-bit value, based on the information stored in the address, function and data fields using the CRC-16 algorithm and appends it to the end of the packet. The receiving device performs the same calculation upon the reception of a packet. If the result does not match the checksum stored in the packet, transmission errors have occurred and the packet will be ignored by the receiving device.

For detail of CRC16 parity arithmetic, please refer to the appendix.

2.4 Abnormal response

If a Modbus master device sends a non effective command to a PBAT-GATE or attempts to read a non effective holding register, an exception response will be generated. The exception response consists of the slave address, function code, error code, and error check field. The high order bit of the function code is set to 1 to indicate that the packet is an exception response.

Below list describes the meanings of exception codes:

Function Code	Meaning
01 illegal function code	PBAT-GATE-Modbus support the function code include: 01H, 02H, 03H, 05H, and 10H. This code means the slave device receive an illegal function code, or the PBAT-GATE receive the error command.
02 illegal function code	PBAT-GATE receive the address referenced in the data field is an invalid address or the request register is not in the valid register range.
03 illegal function code	The requested register number is too long.

Chapter 3 Packet Communication

Two MODBUS functions are supported by the PBAT-GATE. The standard MODBUS protocol supports only 16-bit registers, which limit the maximum value of any measurement to 65535.

Section 3.1 will describe the format of Read/ Response Packet of holding register.

3.1 Read Holding Registers (Function Code 03H)

This command packet requests that the PBAT-GATE responds all valid registers. The value of reserved registers is 0.

Request Packet (Master→PBAT-GATE)			Response Packet(PBAT-GATE→Master)	
Unit ID/ Slave address	1 byte		Unit ID/ Slave address	1 byte
03 H (Function Code)	1 byte		03 H (Function Code)	1 byte
Start register address	2 byte		Byte num.(2 * register num.)	1 byte
Registers num.	2 byte		First register data	2 byte
CRC check code	2 byte		Second register data	2 byte
			
			CRC check code	2 byte

Modbus-TCP 协议:

97 76 00 00 00 06 04 04 00 7D 00 7D

	Example	Length	Explain	Remark
Map	0x97	1	Identifier Hi	Client request:
	0x96	1	Identifier Lo	
	0x0000	2	Protocol identifiers	Header handle
	0x0006	2	Length	
	0x04	1	Element ID	Slave address
Function code	0x04	1		Function code
Data	0x007D	1	Start register	Register address
	0x007D	2	The number of registers	
Verify				

Chapter 4 Description of PBAT-GATE Registers

All PBAT-GATE measured and setup parameters are treated as HOLDING REGISTERS having addresses **4xxxx** when communicating in MODBUS protocol. According to the MODBUS Protocol, in response to a request for register **4xxxx** of a particular slave device, the MODBUS master reads register **xxxx-1** from the slave . For example register 40011 corresponds to register 10.

4.1 Real-time Date of Battery

Register Address	Access	Definition	Data Type	Remark
44809	RW	Voltage of string 1#	Float 32 ABCD	× 0.01, Unit: V, Higher word is first, lower is second
44810				
44811	RW	Voltage of string 2#	Float 32 ABCD	×1, Unit: V, Higher word is first, lower is second
44812				
44813	RW	Voltage of string 3#	Float 32 ABCD	×1, Unit: V, Higher word is first, lower is second
44814				
44815	RW	Voltage of string 4#	Float 32 ABCD	×1, Unit: V, Higher word is first, lower is second
44816				
44817	RW	Current of string 1#	Float 32 ABCD	×1, Unit: A, Higher word is first, lower is second
44818				
44819	RW	Current of string 2#	Float 32 ABCD	×1, Unit: A, Higher word is first, lower is second
44820				
44821	RW	Current of string 3#	Float 32 ABCD	×1, Unit: A, Higher word is first, lower is second
44822				
44823	RW	Current of string 4#	Float 32 ABCD	×1, Unit: A, Higher word is first, lower is second
44824				
44825	RW	SOC of string 1#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower
44826				

				is second□
44827	RW	SOC of string 2#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
44828				
44829	RW	SOC of string 3#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
44830				
44831	RW	SOC of string 4#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
44832				
44833	RW	Equilibrium of string 1#	Float 32 ABCD	×0.1, Unit: %, Higher word is first, lower is second
44834				
44835	RW	Equilibrium of string 2#	Float 32 ABCD	×0.1, Unit: %, Higher word is first, lower is second
44836				
44837	RW	Equilibrium of string 3#	Float 32 ABCD	×0.1, Unit: %, Higher word is first, lower is second
44838				
44839	RW	Equilibrium of string 4#	Float 32 ABCD	×0.1, Unit: %, Higher word is first, lower is second
44840				
44841	RW	Battery status of string 1#	Float 32 ABCD	×1, Higher word is first, lower is second 0 - floating charge 1 - equalizing charge 2 - discharge 3 - standing 4 - abnormal
44842				
44843	RW	Battery status of string 2#	Float 32 ABCD	×1, Higher word is first, lower is second 0 - floating charge 1 - equalizing charge 2 - discharge 3 - standing
44844				

				4 - abnormal
44845	RW	Battery status of string 3#	Float 32 ABCD	x1, Higher word is first, lower is second 0 - floating charge 1 - equalizing charge 2 - discharge 3 - standing 4 - abnormal
44846				
44847	RW	Battery status of string 4#	Float 32 ABCD	x1, Higher word is first, lower is second 0 - floating charge 1 - equalizing charge 2 - discharge 3 - standing 4 - abnormal
44848				
45817	RW	String1_Resistance Balance (%)	Float 32 ABCD	x1, Unit:%, High word first, low word second
45818				
45819	RW	String2_Resistance Balance (%)	Float 32 ABCD	x1, Unit:%, High word first, low word second
45820				
45821	RW	String3_Resistance Balance (%)	Float 32 ABCD	x1, Unit:%, High word first, low word second
45822				
45823	RW	String4_Resistance Balance (%)	Float 32 ABCD	x1, Unit:%, High word first, low word second
45824				
45825	RW	String1_ Remaining time	Float 32 ABCD	x1, Unit:h, High word first, low word second
45826				
45827	RW	String2_ Remaining time	Float 32 ABCD	x1, Unit:h, High word first, low word second
45828				
45829	RW	String3_ Remaining time	Float 32 ABCD	x1, Unit:h, High word first, low word second
45830				
45831	RW	String4_ Remaining time	Float 32 ABCD	x1, Unit:h, High word first, low word second

4.2 Real-time Data of cells

Register Address	Access	Description	Type	Remark
Number of cells in battery				
40001	RW	Number of cell 1#(channel 1)	Float 32 ABCD	x1, Higher word is first, lower is second
40002				

40003	RW	Number of cell 2#(channel 2)	Float 32 ABCD	×1, Higher word is first, lower is second
40004				
40005	RW	Number of cell 3#(channel 3)	Float 32 ABCD	×1, Higher word is first, lower is second
40006				
40007	RW	Number of cell 4#(channel 4)	Float 32 ABCD	×1, Higher word is first, lower is second
40008				

4.3 Real-time Data of PBAT6X-X2

Register Address	Access	Description	Type	Remark
Voltage of string 1#				
40009	RW	Voltage of cell 1# in string 1#	Float 32 ABCD	×1, Unit: V, Higher word is first, lower is second
40010				
40011	RW	Voltage of cell 2# in string 1#	Float 32 ABCD	×1, Unit: V, Higher word is first, lower is second
40012				
40013	RW	Voltage of cell 3# in string 1#	Float 32 ABCD	×1, Unit: V, Higher word is first, lower is second
40014				
40015	RW	Voltage of cell 4# in string 1#	Float 32 ABCD	×1, Unit: V, Higher word is first, lower is second
40016				
...	
...	
40245	RW	Voltage of cell 119# in string 1#	Float 32 ABCD	×1, Unit: V, Higher word is first, lower is second
40246				
40247	RW	Voltage of cell 120# in string 1#	Float 32 ABCD	×1, Unit: V, Higher word is first, lower is second
40248				
Temperature of string 1#				
40249	RW	Temperature of cell 1# in string 1#	Float 32 ABCD	×1, Unit: ℃
40240				

				Higher word is first, lower is second
40251	RW	Temperature of cell 2# in string 1#	Float 32 ABCD	×1, Unit: ℃ Higher word is first, lower is second
40252				
40253	RW	Temperature of cell 3# in string 1#	Float 32 ABCD	×1, Unit: ℃ Higher word is first, lower is second
40254				
40255	RW	Temperature of cell 4# in string 1#	Float 32 ABCD	×1, Unit: ℃ Higher word is first, lower is second
40256				
...
...
40485	RW	Temperature of cell 119# in string 1#	Float 32 ABCD	×1, Unit: ℃ Higher word is first, lower is second
40486				
40487	RW	Temperature of cell 120# in string 1#	Float 32 ABCD	×1, Unit: ℃ Higher word is first, lower is second
40488				
Internal resistance of string 1#				
40489	RW	Internal resistance of cell 1# in string 1#	Float 32 ABCD	×1, Unit: mΩ, Higher word is first, lower is second
40490				
40491	RW	Internal resistance of cell 2# in string 1#	Float 32 ABCD	×1, Unit: mΩ, Higher word is first, lower is second
40492				
40493	RW	Internal resistance of cell 3# in string 1#	Float 32 ABCD	×1, Unit: mΩ, Higher word is first, lower is second
40494				
40495	RW	Internal resistance of cell 4# in string 1#	Float 32 ABCD	×1, Unit: mΩ, Higher word is first, lower is second
40496				
...	
...	
40725	RW	Internal resistance of	Float 32 ABCD	×1,

40726		cell 119# in string 1#		Unit: mΩ, Higher word is first, lower is second
40727	RW	Internal resistance of cell 120# in string 1#	Float 32 ABCD	×1, Unit: mΩ, Higher word is first, lower is second
40728				
SOC of string 1#				
40729	RW	SOC of cell 1# in string 1#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
40730				
40731	RW	SOC of cell 2# in string 1#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
40732				
40733	RW	SOC of cell 3# in string 1#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
40734				
40735	RW	SOC of cell 4# in string 1#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
40736				
...	
...	
40965	RW	SOC of cell 119# in string 1#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
40966				
40967	RW	SOC of cell 120# in string 1#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
40968				
SOH of string 1#				
40969	RW	SOH of cell 1# in string 1#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
40970				
40971	RW	SOH of cell 2# in string 1#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
40972				
40973	RW	SOH of cell 3# in	Float 32 ABCD	×1,

40974		string 1#		Unit: %, Higher word is first, lower is second
40975	RW	SOH of cell 4# in string 1#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
40976				
...	
...	
41205	RW	SOH of cell 119# in string 1#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
41206				
41207	RW	SOH of cell 120# in string 1#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
41208				

Register Address	Access	Description	Type	Remark
Voltage of string 2#				
41209	RW	Voltage of cell 1# in string 2#	Float 32 ABCD	×1, Unit: V, Higher word is first, lower is second
41210				
41211	RW	Voltage of cell 2# in string 2#	Float 32 ABCD	×1, Unit: V, Higher word is first, lower is second
41212				
41213	RW	Voltage of cell 3# in string 2#	Float 32 ABCD	×1, Unit: V, Higher word is first, lower is second
41214				
41215	RW	Voltage of cell 4# in string 2#	Float 32 ABCD	×1, Unit: V, Higher word is first, lower is second
41216				
...	
...	
41445	RW	Voltage of cell 119# in string 2#	Float 32 ABCD	×1, Unit: V, Higher word is first, lower is second
41446				

41447	RW	Voltage of cell 120# in string 2#	Float 32 ABCD	×1, Unit: V, Higher word is first, lower is second
41448				
Temperature of string 2#				
41449	RW	Temperature of cell 1# in string 2#	Float 32 ABCD	×1, Unit: ℃ Higher word is first, lower is second
41450				
41451	RW	Temperature of cell 2# in string 2#	Float 32 ABCD	×1, Unit: ℃ Higher word is first, lower is second
41452				
41453	RW	Temperature of cell 3# in string 2#	Float 32 ABCD	×1, Unit: ℃ Higher word is first, lower is second
41454				
41455	RW	Temperature of cell 4# in string 2#	Float 32 ABCD	×1, Unit: ℃ Higher word is first, lower is second
41456				
...
...
41685	RW	Temperature of cell 119# in string 2#	Float 32 ABCD	×1, Unit: ℃ Higher word is first, lower is second
41686				
41687	RW	Temperature of cell 120# in string 2#	Float 32 ABCD	×1, Unit: ℃ Higher word is first, lower is second
41688				
Internal resistance of string 2#				
41689	RW	Internal resistance of cell 1# in string 2#	Float 32 ABCD	×1, Unit: mΩ, Higher word is first, lower is second
41690				
41691	RW	Internal resistance of cell 2# in string 2#	Float 32 ABCD	×1, Unit: mΩ, Higher word is first, lower is second
41692				
41693	RW	Internal resistance of cell 3# in string 2#	Float 32 ABCD	×1, Unit: mΩ, Higher word is first, lower is second
41694				

41695	RW	Internal resistance of cell 4# in string 2#	Float 32 ABCD	×1, Unit: mΩ, Higher word is first, lower is second
41696				
...	
...	
41925	RW	Internal resistance of cell 119# in string 2#	Float 32 ABCD	×1, Unit: mΩ, Higher word is first, lower is second
41926				
41927	RW	Internal resistance of cell 120# in string 2#	Float 32 ABCD	×1, Unit: mΩ, Higher word is first, lower is second
41928				
SOC of string 2#				
41929	RW	SOC of cell 1# in string 2#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
41930				
41931	RW	SOC of cell 2# in string 2#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
41932				
41933	RW	SOC of cell 3# in string 2#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
41934				
41935	RW	SOC of cell 4# in string 2#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
41936				
...	
...	
42165	RW	SOC of cell 119# in string 2#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
42166				
42167	RW	SOC of cell 120# in string 2#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
42168				
SOH of string 2#				
42169	RW	SOH of cell 1# in string 2#	Float 32 ABCD	×1, Unit: %,
42170				

				Higher word is first, lower is second
42171	RW	SOH of cell 2# in string 2#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
42172				
42173	RW	SOH of cell 3# in string 2#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
42174				
42175	RW	SOH of cell 4# in string 2#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
42176				
...	
...	
42405	RW	SOH of cell 119# in string 2#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
42406				
42407	RW	SOH of cell 120# in string 2#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
42408				

Register Address	Access	Description	Type	Remark
Voltage of string 3#				
42409	RW	Voltage of cell 1# in string 3#	Float 32 ABCD	×1, Unit: V, Higher word is first, lower is second
42410				
42411	RW	Voltage of cell 2# in string 3#	Float 32 ABCD	×1, Unit: V, Higher word is first, lower is second
42412				
42413	RW	Voltage of cell 3# in string 3#	Float 32 ABCD	×1, Unit: V, Higher word is first, lower is second
42414				
42415	RW	Voltage of cell 4# in string 3#	Float 32 ABCD	×1, Unit: V, Higher word is first, lower is
42416				

				second
...	
...	
42645	RW	Voltage of cell 119# in string 3#	Float 32 ABCD	×1, Unit: V, Higher word is first, lower is second
42646				
42647	RW	Voltage of cell 120# in string 3#	Float 32 ABCD	×1, Unit: V, Higher word is first, lower is second
42648				
Temperature of String 3#				
42649	RW	Temperature of cell 1# in string 3#	Float 32 ABCD	×1, Unit: ℃ Higher word is first, lower is second
42650				
42651	RW	Temperature of cell 2# in string 3#	Float 32 ABCD	×1, Unit: ℃ Higher word is first, lower is second
42652				
42653	RW	Temperature of cell 3# in string 3#	Float 32 ABCD	×1, Unit: ℃ Higher word is first, lower is second
42654				
42655	RW	Temperature of cell 4# in string 3#	Float 32 ABCD	×1, Unit: ℃ Higher word is first, lower is second
42656				
...
...
42885	RW	Temperature of cell 119# in string 3#	Float 32 ABCD	×1, Unit: ℃ Higher word is first, lower is second
42886				
42887	RW	Temperature of cell 120# in string 3#	Float 32 ABCD	×1, Unit: ℃ Higher word is first, lower is second
42888				
Internal resistance of string 3#				
42889	RW	Internal resistance of cell 1# in string 3#	Float 32 ABCD	×1, Unit: mΩ, Higher word is first, lower is second
42890				
42891	RW	Internal resistance of	Float 32 ABCD	×1,

42892		cell 2# in string 3#		Unit: mΩ, Higher word is first, lower is second
42893	RW	Internal resistance of cell 3# in string 3#	Float 32 ABCD	×1, Unit: mΩ, Higher word is first, lower is second
42894				
42895	RW	Internal resistance of cell 4# in string 3#	Float 32 ABCD	×1, Unit: mΩ, Higher word is first, lower is second
42896				
...	
...	
43125	RW	Internal resistance of cell 119# in string 3#	Float 32 ABCD	×1, Unit: mΩ, Higher word is first, lower is second
43126				
43127	RW	Internal resistance of cell 120# in string 3#	Float 32 ABCD	×1, Unit: mΩ, Higher word is first, lower is second
43128				
SOC of string 3#				
43129	RW	SOC of cell 1# in string 3#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
43130				
43131	RW	SOC of cell 2# in string 3#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
43132				
43133	RW	SOC of cell 3# in string 3#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
43134				
43135	RW	SOC of cell 4# in string 3#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
43136				
...	
...	
43365	RW	SOC of cell 119# in string 3#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
43366				

43367	RW	SOC of cell 120# in string 3#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
43368				
SOH of string 3#				
43369	RW	SOH of cell 1# in string 3#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
43370				
43371	RW	SOH of cell 2# in string 3#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
43372				
43373	RW	SOH of cell 3# in string 3#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
43374				
43375	RW	SOH of cell 4# in string 3#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
43376				
...	
...	
43605	RW	SOH of cell 119# in string 3#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
43606				
43607	RW	SOH of cell 120# in string 3#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
43608				

Register Address	Access	Description	Type	Remark
Voltage of string 4#				
43609	RW	Voltage of cell 1# in string 4#	Float 32 ABCD	×1, Unit: V, Higher word is first, lower is second
43610				
43611	RW	Voltage of cell 2# in string 4#	Float 32 ABCD	×1, Unit: V, Higher word is first, lower is second
43612				
43613	RW	Voltage of cell 3# in	Float 32 ABCD	×1,

43614		string 4#		Unit: V, Higher word is first, lower is second
43615	RW	Voltage of cell 4# in string 4#	Float 32 ABCD	×1, Unit: V, Higher word is first, lower is second
43616				
...	
...	
43845	RW	Voltage of cell 119# in string 4#	Float 32 ABCD	×1, Unit: V, Higher word is first, lower is second
43846				
43847	RW	Voltage of cell 120# in string 4#	Float 32 ABCD	×1, Unit: V, Higher word is first, lower is second
43848				
Temperature of string 4#				
43849	RW	Temperature of cell 1# in string 4#	Float 32 ABCD	×1, Unit: ℃ Higher word is first, lower is second
43850				
43851	RW	Temperature of cell 2# in string 4#	Float 32 ABCD	×1, Unit: ℃ Higher word is first, lower is second
43852				
43853	RW	Temperature of cell 3# in string 4#	Float 32 ABCD	×1, Unit: ℃ Higher word is first, lower is second
43854				
43855	RW	Temperature of cell 4# in string 4#	Float 32 ABCD	×1, Unit: ℃ Higher word is first, lower is second
43856				
...
...
44085	RW	Temperature of cell 119# in string 4#	Float 32 ABCD	×1, Unit: ℃ Higher word is first, lower is second
44086				
44087	RW	Temperature of cell 120# in string 4#	Float 32 ABCD	×1, Unit: ℃ Higher word is first, lower is second
44088				

Internal resistance of string 4#				
44089	RW	Internal resistance of cell 1# in string 4#	Float 32 ABCD	×1, Unit: mΩ, Higher word is first, lower is second
44090				
44091	RW	Internal resistance of cell 2# in string 4#	Float 32 ABCD	×1, Unit: mΩ, Higher word is first, lower is second
44092				
44093	RW	Internal resistance of cell 3# in string 4#	Float 32 ABCD	×1, Unit: mΩ, Higher word is first, lower is second
44094				
44095	RW	Internal resistance of cell 4# in string 4#	Float 32 ABCD	×1, Unit: mΩ, Higher word is first, lower is second
44096				
...	
...	
44325	RW	Internal resistance of cell 119# in string 4#	Float 32 ABCD	×1, Unit: mΩ, Higher word is first, lower is second
44326				
44327	RW	Internal resistance of cell 120# in string 4#	Float 32 ABCD	×1, Unit: mΩ, Higher word is first, lower is second
44328				
SOC of string 4#				
44329	RW	SOC of cell 1# in string 4#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
44330				
44331	RW	SOC of cell 2# in string 4#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
44332				
44333	RW	SOC of cell 3# in string 4#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
44334				
44335	RW	SOC of cell 4# in string 4#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
44336				

...	
...	
44565	RW	SOC of cell 119# in string 4#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
44566				
44567	RW	SOC of cell 120# in string 4#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
44568				
SOH of string 4#				
44569	RW	SOH of cell 1# in string 4#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
44570				
44571	RW	SOH of cell 2# in string 4#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
44572				
44573	RW	SOH of cell 3# in string 4#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
44574				
44575	RW	SOH of cell 4# in string 4#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
44576				
...	
...	
44805	RW	SOH of cell 119# in string 4#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
44806				
44807	RW	SOH of cell 120# in string 4#	Float 32 ABCD	×1, Unit: %, Higher word is first, lower is second
44808				

4.4 Alarm Register

Alarm of battery				
44849	RW	Alarm of string 1#	Float 32 ABCD	×1, Higher word is first, lower is second Different bits indicate different alarm types , Bit 1 indicates that the alarm type is generated , Bit 0 indicates that the alarm type is not generated , Bit0:alarm for upper limit of string voltage. Bit1:alarm for lower limit of string voltage. Bit2:alarm for upper limit of string current. Bit3: Hall sensor disconnection alarm Bit4: alarm for lower limit of SOC. Bit5: alarm for lower limit of string current.
44850				
44851	RW	Alarm of string 2#	Float 32 ABCD	...
44852				
44853	RW	Alarm of string 3#	Float 32 ABCD	...
44854				
44855	RW	Alarm of string 4#	Float 32 ABCD	...
44856				
45833	RW	String1_Charge Current over	Float 32 ABCD	normal: 0
45834				alarm: 1
45835	RW	String2_Charge Current over	Float 32 ABCD	normal: 0
45836				alarm: 1
45837	RW	String3_Charge Current over	Float 32 ABCD	normal: 0
45838				alarm: 1
45839	RW	String4_Charge Current over	Float 32 ABCD	normal: 0
45840				alarm: 1
45841	RW	String1_Discharge Current over	Float 32 ABCD	normal: 0
45842				alarm: 1
45843	RW	String2_Discharge Current over	Float 32 ABCD	normal: 0
45844				alarm: 1
45845	RW	String3_Discharge Current over	Float 32 ABCD	normal: 0
45846				alarm: 1

45847	RW	String4_Discharge Current over	Float 32 ABCD	normal: 0 alarm: 1
45848				
45849	RW	String1_Voltage imbalance	Float 32 ABCD	normal: 0 alarm: 1
45850				
45851	RW	String2_Voltage imbalance	Float 32 ABCD	normal: 0 alarm: 1
45852				
45853	RW	String3_Voltage imbalance	Float 32 ABCD	normal: 0 alarm: 1
45854				
45855	RW	String4_Voltage imbalance	Float 32 ABCD	normal: 0 alarm: 1
45856				
45857	RW	String1_Res imbalance	Float 32 ABCD	normal: 0 alarm: 1
45858				
45859	RW	String2_Res imbalance	Float 32 ABCD	normal: 0 alarm: 1
45860				
45861	RW	String3_Res imbalance	Float 32 ABCD	normal: 0 alarm: 1
45862				
45863	RW	String4_Res imbalance	Float 32 ABCD	normal: 0 alarm: 1

Alarm of cell				
44857	RW	Alarm of cell 1# in string 1#	Float 32 ABCD	×1, Higher word is first, lower is second Different bits indicate different alarm types , Bit 1 indicates that the alarm type is generated , Bit 0 indicates that the alarm type is not generated , Bit0: alarm for upper limit of cell voltage. Bit1: alarm for lower limit of cell voltage. Bit2: alarm for upper limit of temperature. Bit3: alarm for lower limit of temperature Bit4: alarm for upper limit of average voltage. Bit5: alarm for lower limit of average voltage. Bit6: reserved
44858				

				Bit7: alarm for upper limit of internal resistance. Bit8: alarm for lower limit of SOC Bit9: alarm for lower limit of SOH. bit10: alarm for connection status
44859	RW	Alarm of cell 2# in string 1#	Float 32 ABCD	...
44860				
44861	RW	Alarm of cell 3# in string 1#	Float 32 ABCD	...
44862				
44863	RW	Alarm of cell 4# in string 1#	Float 32 ABCD	...
44864				
...	
...	
45813	RW	Alarm of cell 119# in string 4#	Float 32 ABCD	...
45814				
45815	RW	Alarm of cell 120# in string 4#	Float 32 ABCD	...
45816				

Battery Connect Status				
45879	RW	Sring1_Cell1_Connect status	Float 32 ABCD	Bit0:Connect status, normal: 1 suspend: 0
45880				
45881	RW	Sring1_Cell2_Connect status	Float 32 ABCD	Bit0:Connect status, normal: 1 suspend: 0
45882				
45883	RW	Sring1_Cell3_Connect status	Float 32 ABCD	Bit0:Connect status, normal: 1 suspend: 0
45884				
45885	RW	Sring1_Cell4_Connect status	Float 32 ABCD	Bit0:Connect status, normal: 1 suspend: 0
45886				
...	
...	
46835	RW	Sring4_Cell119_Connect status	Float 32 ABCD	...
46836				
46837	RW	Sring4_Cell120_Connect status	Float 32 ABCD	...
46838				

