

# Modbus/RTU communication protocol

## 1. Protocol format

### 1. Modbus RTU communication protocol overview

Electrical interface: RS485 half duplex

Baud rate: 9600/38400/115200 (adjustable)

Address: 0-255 (adjustable)

Error detection: CRC16

Bits per byte: 1 start bit, 8 data bits (least significant bit sent first), no parity, 1 stop bit.

Supported modbus function codes:

03 (0x03) function code: read holding register

06 (0x06) function code: write save register

10 (0x10) function code: write save register

### Battery Information Register (0x1000-0x1036)

Register Address	Length	Register Name	Data Type	Physical Quantity	Access	Function Code	Scale	Description
0x1000	2	Cell_Num	unsigned int	total number of strings	R	03	1	Currently supports up to 32 strings
0x1001	2	Run_Time	unsigned int	Equipment runtime	R	03	1	Record the effective running time of the equipment
0x1002	2	HSOC	unsigned int	battery health	R	03	1	battery health
0x1003	2	Voltage	unsigned int	Total cell voltage	R	03	0.01 V	The total battery voltage, if the value read by this register is 5630, it is 56.30V
0x1004	2	CurCadc	unsigned int	real-time current	R	03	0.1A	Current=CurCadc/10-1000 ; charge is negative and discharge is positive, if the value of reading this register is 9800, it means the charging current is 20A
0x1005	2	Temp1	unsigned int	Temp1	R	03	0.1°C	Temperature = Temp1/10-40; if the value of this register is 755, it is 35.5°C
0x1006	2	Temp2	unsigned int	Temp2	R	03	0.1°C	Ditto
0x1007	2	Temp3	unsigned int	Temp3	R	03	0.1°C	Ditto
0x1008	2	Temp4	unsigned int	Temp4	R	03	0.1°C	Ditto
0x1009	2	Temp5	unsigned int	Temp5	R	03	0.1°C	Ditto
0x100A	2	Temp6	unsigned int	Temp6	R	03	0.1°C	Ditto

0x100B	2	Tmax	unsigned int	maximum temperature	R	03	0.1°C	Ditto
0x100C	2	Tmin	unsigned int	lowest temperature	R	03	0.1°C	Ditto
0x100D	2	Vmax	unsigned int	single monomer highest voltage	R	03	1mV	The value of this register is 3560 is 3560mV
0x100E	2	Vmin	unsigned int	The minimum voltage of the monomer	R	03	1mV	Ditto
0x100F	2	VmaxminNo	unsigned int	The number of strings corresponding to the highest and lowest voltage of the monomer	R	03	1	The high byte of this register corresponds to the number of strings with the highest voltage, and the low byte corresponds to the number of strings with the lowest voltage.
0x1010	2	RSOC	unsigned int	Percentage of remaining battery power	R	03	1%	0%-100%
0x1011	2	FCC	unsigned int	System full capacity	R	03	0.01 AH	The value of this register is 6000 is 60.00AH
0x1012	2	RC	unsigned int	The current remaining capacity of the battery pack	R	03	0.01 AH	The value of this register is 5080 is 50.80AH
0x1013	2	CycleCount	unsigned int	Cycle discharge times	R	03	1	The value of this register is 60, which means 60 cycles
0x1014	2	PROTECT	unsigned int	reason for protection	R	03	/	See list of reasons for protection
0x1015	2	ALARM	unsigned int	Alarm level	R	03	/	Divided into 1,2,3 levels Level 3 is the most serious
0x1016	2	PackStatus	unsigned int	system status	R	03	/	See PackStatus table
0x1017	2	VCell1	unsigned int	Voltage corresponding to a single cell	R	03	1mV	The value of this register is 3560 is 3560mV
0x1018	2	VCell2	unsigned int		R	03	1mV	Ditto
0x1019	2	VCell3	unsigned int		R	03	1mV	Ditto

0x101A	2	VCell4	unsigned int		R	03	1mV	Ditto
0x101B	2	VCell5	unsigned int		R	03	1mV	Ditto
0x101C	2	VCell6	unsigned int		R	03	1mV	Ditto
0x101D	2	VCell7	unsigned int		R	03	1mV	Ditto
0x101E	2	VCell8	unsigned int		R	03	1mV	Ditto
0x101F	2	VCell9	unsigned int		R	03	1mV	Ditto
0x1020	2	VCell10	unsigned int		R	03	1mV	Ditto
0x1021	2	VCell11	unsigned int		R	03	1mV	Ditto
0x1022	2	VCell12	unsigned int		R	03	1mV	Ditto
0x1023	2	VCell13	unsigned int		R	03	1mV	Ditto
0x1024	2	VCell14	unsigned int		R	03	1mV	Ditto
0x1025	2	VCell15	unsigned int		R	03	1mV	Ditto
0x1026	2	VCell16	unsigned int		R	03	1mV	Ditto
0x1027	2	VCell17	unsigned int		R	03	1mV	Ditto
0x1028	2	VCell18	unsigned int		R	03	1mV	Ditto
0x1029	2	VCell19	unsigned int		R	03	1mV	Ditto
0x102A	2	VCell20	unsigned int		R	03	1mV	Ditto
0x102B	2	VCell21	unsigned int		R	03	1mV	Ditto
0x102C	2	VCell22	unsigned int		R	03	1mV	Ditto
0x102D	2	VCell23	unsigned int		R	03	1mV	Ditto
0x102E	2	VCell24	unsigned int		R	03	1mV	Ditto
0x102F	2	VCell25	unsigned int		R	03	1mV	Ditto
0x1030	2	VCell26	unsigned int		R	03	1mV	Ditto
0x1031	2	VCell27	unsigned int		R	03	1mV	Ditto
0x1032	2	VCell28	unsigned int		R	03	1mV	Ditto
0x1033	2	VCell29	unsigned int		R	03	1mV	Ditto
0x1034	2	VCell30	unsigned int		R	03	1mV	Ditto
0x1035	2	VCell31	unsigned int		R	03	1mV	Ditto
0x1036	2	VCell32	unsigned int		R	03	1mV	Ditto

## 2. 03 function code read register

### 1. Command specific format (data is in hexadecimal)

Addr	Fun	Reg start		Data		CRC16	
		REG Hi	REG Low	REG Hi	REG Low	REG Low	REG Hi
01H	03H	00H	00H	00H	06H	C5H	C8H
Address	Function code	Register start address		Number of data read		Cyclic redundancy check code	

### 2. Read data instance

Use the 03 function to read 1 to 3 strings of voltage from the control board

query data frame	01	03	10	18	00	03	81	0C			
return dataframe	01	03	06	0C	AF	0C	AB	0C	AC	82	6C

illustrate:

01: slave address

03: Function code

06: Hexadecimal, decimal is 6, indicating that there are 6 bytes of data behind

82 6C: Cyclic Redundancy Check Code

The first string of voltage:  $0x0CAF \times \text{resolution}$  namely:  $0x0CAF \times 0.001 = 3.247V$

The second string of voltage:  $0x0CAB \times \text{resolution}$  ie:  $0x0CAB \times 0.001 = 3.243V$

The third string of voltage:  $0x0CAC \times \text{resolution}$  namely:  $0x0CAC \times 0.001 = 3.244V$

### Protection Reason Definition Table

Bit	7	6	5	4	3	2	1	0
high byte	NC	NC	NC	Discharge low temperature protection	Discharge high temperature protection	Charging low temperature protection	Charging high temperature protection	Cell undervoltage
low byte	Monomer overpressure	Total voltage undervoltage	total pressure overpressure	discharge overcurrent	Charge overcurrent	Discharge secondary overcurrent	Differential pressure protection	Short circuit protection

### System Status Definition Table PackStatus

Bit	7	6	5	4	3	2	1	0
high byte	NC	NC	NC	NC	NC	NC	NC	NC
low byte	Charging	Discharging	NC	NC	NC	NC	Charge enable	Discharge enable