The Communication Protocol Between 48V-15S/16S Lithium Battery Module and Inverter (RS485)

1 Scope of application

Used for communication interface and protocol specification between 48V SLPO series BMS and inverter.

2 Interface definition

The communication adopts the RS485 interface, the protocol follows the definition of MODBUS-RTU, the inverter is used as the master device, and the BMS is used as the slave device.

2.1 Electrical Standard

Interface: RS485 interface;
Baudrate: 9600bit/s;
Data bit: 8 bits;
Stop Bit: 1 bit;
Check bit: No.

2.2 Address definition

The BMS address is distinguished by the dial code (1~15, when the dial code is empty, the soft address is used, and the default value is 170 (0xAA)).

2.3 Related Abbreviations

U16: 16-bit unsigned integer data;
S16: 16-bit signed integer data;
R/W/RW: read-only / write only / read and write.

3 Register Data Sheet

3.1 Battery Real-time Data Sheet

Only read real-time data, including battery status, measured electrical parameters and other data, obtain through 03H / 04H.

Register address	Description	Format	Read/Write	Comments
0	Reserved	U16	R	Undefined, can be used to extend the warning state.
1	Warning message	U16	R	See Appendix 1
2	Running status	U16	R	See Appendix 2
3	Total voltage	S16	R	±xx.xxV
4	Current	S16	R	±xx.xA
5	SOC	S16	R	XXX%
6	SOH	S16	R	XXX%
7	Cycles	S16	R	Xxxx times
8	Number of batteries	S16	R	Indicates how many battery voltages are valid. It is a fixed value.

Register	Description	Format	Read/Write	Comments
9~24	Voltage of 1st ~16th batteries	S16	R	x.xxxV, reserved when the bit is unused or invalid.
25	Heatsink temperature	S16	R	±Xx.x°C
26	Battery temperature acquisition 1	S16	R	±Xx.x°C
27	Battery temperature acquisition 2	S16	R	±Xx.x°C
28	Battery temperature acquisition 3	S16	R	±Xx.x°C
29	Overvoltage status of 1st ~8th battery	U16	R	Every 2 bits indicate one battery status, 0=normal.
30	Overvoltage status of 9th ~16th battery	U16	R	Every 2 bits indicate one battery status, 0=normal.
31	Undervoltage status of 1st ~8th battery	U16	R	/
32	Undervoltage status of 9th~16th battery	U16	R	/
33	Over temperature warning	U16	R	Every 2 bits indicate the over-temperature warning status of one temperature acquisition point, 0=normal, 1=warning, 2=fault. B1B0: indicate the over-temperature status of the Heatsink. B3B2/B5B4/B7B6/B9B8: indicate the over-temperature status of the 4 battery acquisition points respectively.
34	Low-temperature warning	U16	R	Same as above.
35	Battery temperature acquisition 4	S16	R	±Xx.x°C
36	Vp voltage	U16	R	xx.xxxV
37-63	Reserved	/	/	/

3.2 Device Information Data Sheet

Only read device information. This data is fixed data and will not change, obtain through 03H / 04.

Register	Description	Format	Read/Write	Comments
5000	Device ID	8byte	R	BCD encoding, every 4 bits indicate a number.
5004	Rated voltage	U16	R	xx.xxV
5005	Rated current	U16	R	xx.xA
5006	Rated capacity	U16	R	xx.xAH
5007	Function support	U16	R	D8: WIFI_AP; D9: WIFI_STA; D10: BLE
5008	Rated voltage of single battery	U16	R	xx.xxxV
5009	Rated capacity of single battery	U16	R	xx.xAH
5010	Number of batteries in parallel	U16	R	/
5011	Number of batteries in series	U16	R	/

5012	485 address	U16	RW	Use this address to communicate with the device.
5013	Master version number	U16	R	/
5014	Slave version number	U16	R	/
5015	Version release number	U16	R	/
5016	Inverter protocol version	U16	R	/
5017	Year, month	U16	R	The upper 8 bits indicate year (0~99), and the lower 8 bits indicate month (1~12).
5018	Day, hour	U16	R	The upper 8 bits indicate day (1~31), and the lower 8 bits indicate hour (0~23).
5019	Minute, second	U16	R	The upper 8 bits indicate minute (0~59), and the lower 8 bits indicate second (0~59).
5020~5063	Reserved	/	R	/

3.3 Device Information Data Sheet

Time calibration, can read and write information, obtain through 03H (reserved), and set through 10H.

Register	Description	Format	Read/Write	Comments
9000	Time: year, month	U16	RW	The upper 8 bits indicate year (0~99), and the lower 8 bits indicate month (1~12).
9001	Time: day, hour	U16	RW	The upper 8 bits indicate day (1~31), and the lower 8 bits indicate hour (0~23).
9002	Time: minute, second	U16	RW	The upper 8 bits indicate minute (0~59), and the lower 8 bits indicate second (0~59).

3.4 Warning Record Table

Warning record, read-only information, obtained by 03H.

Register	Description	Format	Read/Write	Comments
1000	Number of warning records	U16	R	Max. 100 warning records
1001	the first warning record year, month	U16	R	/
1002	the first warning record day, hour	U16	R	/
1003	the first warning record minute, second	U16	R	/
1004	Type of the first warning record	U16	R	See Appendix 3
1005	Additional information of the first warning record	U16	R	See Appendix 3
1006	the second warning record year, month	U16	R	/
1007	the second warning record day, hour	U16	R	/
1008	the second warning record minute, second	U16	R	/
1009	Type of the second	U16	R	/

	warning record			
1010	Additional information of the second warning record	U16	R	/
	......			
1496	the 100th warning record year, month	U16	R	Max.100 warning records
1497	the 100th warning record day hour	U16	R	/
1498	the 100th warning record minute, second	U16	R	/
1499	Type of the 100th warning record	U16	R	/
1500	Additional information of the 100th warning record	U16	R	/

4 Appendix

4.1 Appendix 1 Warning Message

Register address 1 bit	Description	Read/Write	Comments
B1B0	Restrictor status	R	0: no warning, 3: fault
B3B2	Short circuit protection	R	0: no warning, 1: warning 2: fault
B5B4	Over temperature	R	0: no warning, 1: warning 2: fault. Take the highest warning level among the 5 temperature acquisitions.
B7B6	Low temperature	R	0: no warning, 1: warning 2: fault. Take the highest warning level among the 5 temperature acquisitions.
B9B8	Overcurrent by charge	R	0: no warning, 1: warning 2: fault
B11B10	Overcurrent by discharge	R	0: no warning, 1: warning 2: fault
B13B12	Single battery overvoltage	R	0: no warning, 1: warning 2: fault. Take the highest warning level among all battery voltages.
B15B14	Single battery undervoltage	R	0: no warning, 1: warning 2: fault. Take the highest warning level among all battery voltages.

4.2 Appendix 2 Operation Status

Register	Description	Read/Write	Comments
B1B0	System status	R	10: discharge; 11: charge; 01: standby; 00: unsure/invalid
B2	Discharge MOS switch status	R	0: disconnect; 1: connect
B3	Charge MOS switch status	R	0: disconnect; 1: connect
B4	Unused	/	/

4.3 Appendix 3 Warning Record

Warning type	Description	Comments

0~3	Invalid data	/
4	Short circuit protection recovery	/
5	Short circuit protection level 1	/
6	Short circuit protection level 2	/
7	Reserved	/
8	Total overvoltage recovery	/
9	Total overvoltage level 1	/
10	Total overvoltage level 2	/
11	Reserved	/
12~15	Total undervoltage	/
16~19	Charge overcurrent	/
20~23	Discharge overcurrent	/
24~27	Single battery overvoltage	/
28~31	Single battery undervoltage	/
32~35	Temperature too high	/
36~39	Temperature too low	/
40~43	SOC too low	/
44~47	SOH too low	/
48~51	Acquisition fault	/
52~55	WIFI fault	/
56~59	BLE fault	/
60~63	Other faults	/