

Lithium Iron Battery BMS

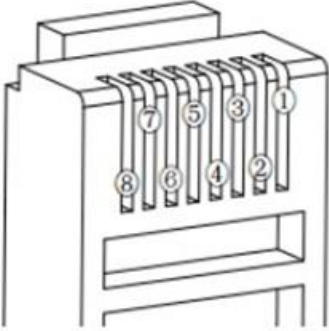
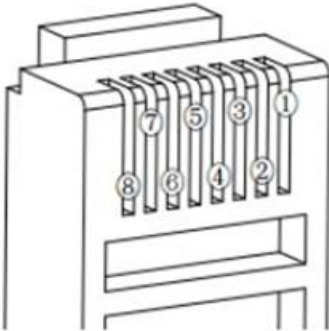
Modbus Protocol V1.7

1. Update records

version	Updated	update content	Author	Review
V1.0	2019.02.05	First draft release	Gao Yi	Huang Chengcheng
V1.1	2019.02.13	Add comments to the content of each line	Gao Yi	Huang Chengcheng
V1.2	2019.06.28	Added: 1) Address 61440: ACP-Broadcast 2) Address 61441: ACP-Configure 3) Address 61442: ACP-Shake	Huang Chengcheng	Huang Feng
V1.3	2019.08.22	The broadcast address is changed from 00H to FFH The default address F7H remains unchanged	Huang Chengcheng	Huang Feng
V1.4	2019.08.22	Added: 1) Address 5224: Lock Control 2) Address 5225: Test Ready	Huang Chengcheng	Huang Feng
V1.5	2019.08.23	1. Which registers are marked with symbols 2. Address change: 1) 5122~5129: Battery name (It turned out to be 5122-5127) 2) 5130~5131: Software Version (It turned out to be 5128-5129) 3) 5132~5141: Manufacturer Name	Huang Chengcheng	Huang Feng

		(It turned out to be 5122-5127)		
V1.6	2019.11.21	<p>1. Add the definition of register 5107 (status2) bit0 ~ bit7</p> <p>2. Increase bit0, bit4, bit5 of register 5106 (status1)</p> <p>Definition, modify the definition of bit9 and bit10</p> <p>3. Correct the unit of register 5050 and mark the type of register 5052 as signed</p>	Huang Chengcheng	Huang Feng
V1.7	2020.3.10	<p>Added: 5226~5227 addresses are defined as unique identification codes</p> <p>New: 5228 address is defined as charging power setting</p> <p>New: 5229 address is defined as the discharge power setting</p>	Chen Jialu	Huang Feng

2. Pin definition:

<p>RJ45 通讯接口</p> 	①	NC (idle, other functions are not allowed)
	②	A (RS485 bus signal)
	③	B (RS485 bus signal)
	④	GND (power ground/communication ground)
	⑤	12V-
	⑥	O/F
	⑦	O/F (12V+) 200mA load capacity
	⑧	NC
	Description: RS485 initial baud rate 9600bps	
<p>RJ45 通讯接口</p> 	①	NC (idle, other functions are not allowed)
	②	NC (idle, other functions are not allowed)
	③	NC (idle, other functions are not allowed)
	④	GND (power ground/communication ground)
	⑤	CAN cascade auxiliary signal
	⑥	CAN-H (CAN bus signal)
	⑦	CAN cascade auxiliary signal
	⑧	CAN-L (CAN bus signal)
	Description: CAN initial baud rate 500Kbps	

3. Agreement definition:

1. Format:

Start character	address code (1BYTE) (1BYTE)	function code (2BYTE) (2BYTE)	starting address (2BYTE)	Data length	CRC check	Terminator
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2. Description

- 1) Start character: >10ms
- 2) Address code: 1 byte, range: 01H ~ F7H (decimal 1 ~ 247) , 00H is the broadcast address, all slaves respond, but do not return commands
- 3) Function code: 1 byte

Command name	Access data type	function code	Error code
Read single or multiple word registers	WORD	03H	83H
Write a single word register	WORD	06H	86H
Write consecutive N word registers	WORD	10H	90H
Restore factory default	No byte access	78H	F8H
Clear history	No byte access	79H	F9H

- 4) Starting address: 2 bytes
- 5) Data length: 2 bytes
- 6) CRC check: 2 bytes, CRC checksum of each byte of address code, function code and data
- 7) Terminator: >10ms

note:

- 1) The data address and data are 2 bytes, **Send high byte first, then low byte; while CRC is to send low bit first, then high bit .**
- 2) The error code means that there is an error in the frame data sent by the server, and the abnormal response function code returned by the client: error code = function code | 80H
- 3) Exception code description

- a, 01H-unsupported function code
- b, 02H-PDU start address is incorrect or PDU start address + data length is out of the legal range c, 03H-read register data or write register data is too long
- d, 04H - The client fails to read or write registers
- e, 05H - The data check code sent by the server is incorrect

3. Examples:

- 1) Read the register

request:

description	Number of bytes	command
Device address	BYTE	01H ~ F7H
function code	BYTE	03H
starting address	WORD	0000H ~ FFFFH
Number of words read	WORD	0001H ~ 007DH
Check code	WORD	CRC checksum of all the above bytes

Normal response:

description	Number of bytes	command
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Device address	BYTE	01H ~ F7H
function code	BYTE	03H
Data length	BYTE	01H ~ FAH
Data content	WORD	Read data (high bit first, then low bit)
...	WORD	Read data (high bit first, then low bit)
Check code	WORD	CRC checksum of all the above bytes

Abnormal response:

description	Number of bytes	command
Device address	BYTE	01H ~ F7H
Error code	BYTE	83H
Exception code	BYTE	N (N=1, 2, 3, 4)
Check code	WORD	CRC checksum of all the above bytes

2) Write a single register

request:

description	Number of bytes	command
Device address	BYTE	01H ~ F7H
function code	BYTE	06H
starting address	WORD	0000H ~ FFFFH
data input	WORD	0000H ~ FFFFH
Check code	WORD	CRC checksum of all the above bytes

Normal response:

description	Number of bytes	command
Device address	BYTE	01H ~ F7H
function code	BYTE	06H
starting address	WORD	0000H ~ FFFFH
data input	WORD	0000H ~ FFFFH
Check code	WORD	CRC checksum of all the above bytes

Abnormal response:

description	Number of bytes	command
Device address	BYTE	01H ~ F7H
Error code	BYTE	86H
Exception code	BYTE	N (N=1, 2, 3, 4)
Check code	WORD	CRC checksum of all the above bytes

3) Write consecutive N registers

request:

description	Number of bytes	command
Device address	BYTE	01H ~ F7H

function code	BYTE	10H
starting address	WORD	0000H ~ FFFFH
Write bytes	WORD	0001H ~ 007DH
Number of words	BYTE	1 times the number of bytes
Data content	WORD	Data written (high bit first, then low bit)
...	WORD	Data written (high bit first, then low bit)
Check code	WORD	CRC checksum of all the above bytes

Normal response:

description	Number of bytes	command
Device address	BYTE	01H ~ F7H
function code	BYTE	10H
starting address	WORD	0000H ~ FFFFH
Write bytes	WORD	0001H ~ 007DH
Check code	WORD	CRC checksum of all the above bytes

Abnormal response:

description	Number of bytes	command
Device address	BYTE	01H ~ F7H
Error code	BYTE	90H
Exception code	BYTE	N (N=1, 2, 3, 4)
Check code	WORD	CRC checksum of all the above bytes

4) Restore the factory default

request:

description	Number of bytes	command
Device address	BYTE	01H ~ F7H
function code	BYTE	78H
Supplement data	WORD	0000H
Supplement data	WORD	0001H
Check code	WORD	CRC checksum of all the above bytes

Normal response:

description	Number of bytes	command
Device address	BYTE	01H ~ F7H
function code	BYTE	78H
Supplement data	WORD	0000H
Supplement data	WORD	0001H
Check code	WORD	CRC checksum of all the above bytes

Abnormal response:

description	Number of bytes	command
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Device address	BYTE	01H ~ F7H
Error code	BYTE	F8H
Exception code	BYTE	N (N=1, 2, 3, 4)
Check code	WORD	CRC checksum of all the above bytes

5) Clear history

request:

description	Number of bytes	command
Device address	BYTE	01H ~ F7H
function code	BYTE	79H
Supplement data	WORD	0000H
Supplement data	WORD	0001H
Check code	WORD	CRC checksum of all the above bytes

Normal response:

description	Number of bytes	command
Device address	BYTE	01H ~ F7H
function code	BYTE	79H
Supplement data	WORD	0000H
Supplement data	WORD	0001H
Check code	WORD	CRC checksum of all the above bytes

Abnormal response:

description	Number of bytes	command
Device address	BYTE	01H ~ F7H
Error code	BYTE	F9H
Exception code	BYTE	N (N=1, 2, 3, 4)
Check code	WORD	CRC checksum of all the above bytes

Four, PDU address allocation table

PDU address (Decimal)	Word reading Festival / write		unit	description	Class data type	Parsing	return Back to number according to	Analysis example
5000	2	R	Integer	Number of Cell:M				M: max 16
5001	2	R	0.1V	Cell 1 voltage				
5002	2	R	0.1V	Cell 2 voltage				
5003	2	R	0.1V	Cell 3 voltage				
5004	2	R	0.1V	Cell 4 voltage				
5005	2	R	0.1V	Cell 5 voltage				
5006	2	R	0.1V	Cell 6 voltage				
5007	2	R	0.1V	Cell 7 voltage				
5008	2	R	0.1V	Cell 8 voltage				
5009	2	R	0.1V	Cell 9 voltage				
5010	2	R	0.1V	Cell 10 voltage				
5011	2	R	0.1V	Cell 11 voltage				
5012	2	R	0.1V	Cell 12 voltage				
5013	2	R	0.1V	Cell 13 voltage				
5014	2	R	0.1V	Cell 14 voltage				
5015	2	R	0.1V	Cell 15 voltage				
5016	2	R	0.1V	Cell 16 voltage				
5017	2	R	Integer	Number of CellTemperature: N				max 16
5018	2	R	0.1 °C	Temperature of cell 1				
5019	2	R	0.1 °C	Temperature of cell 2				
5020	2	R	0.1 °C	Temperature of cell 3				
5021	2	R	0.1 °C	Temperature of cell 4				
5022	2	R	0.1 °C	Temperature of cell 5				
5023	2	R	0.1 °C	Temperature of cell 6				
5024	2	R	0.1 °C	Temperature of cell 7				
5025	2	R	0.1 °C	Temperature of cell 8				
5026	2	R	0.1 °C	Temperature of cell 9				
5027	2	R	0.1 °C	Temperature of cell 10				
5028	2	R	0.1 °C	Temperature of cell 11				
5029	2	R	0.1 °C	Temperature of cell 12				
5030	2	R	0.1 °C	Temperature of cell 13				
5031	2	R	0.1 °C	Temperature of cell 14				
5032	2	R	0.1 °C	Temperature of cell 15				
5033	2	R	0.1 °C	Temperature of cell 16				
5034	2	R		Reserve				

5035	2	R	0.1 °C	Temperature of BMS board					
5036	2	R	Integer	Number of Environment Temperature					Max: 2
5037	2	R	0.1 °C	Environment Temperature 1					
5038	2	R	0.1 °C	Environment Temperature 2					
5039	2	R	Integer	Number of Heater Temperature					Max 2
5040	2	R	0.1 °C	Heater Temperature 1					
5041	2	R	0.1 °C	Heater Temperature 2					
5042	2	R	0.01A	Current	Have symbol number				
5043	2	R	0.1V	Module voltage					
5044~5045	4	R	0.001A H	Remain capacity					
5046~5047	4	R	0.001A H	Module total capacity					
5048	2	R	Integer	Cycle number					
5049	2	R	0.1V	Charge voltage limit					
5050	2	R	0.1V	Discharge voltage limit					
5051	2	R	0.01A	Charge current limit					
5052	2	R	0.01A	Discharge current limit	Have symbol number				
5053~5099	9 4	R		Reserve					
5100~5101	4	R		Cell voltage Alarminfo		Bit31 Bit30 Bit29 Bit28 Bit27 Bit26 Bit25 Bit24 Bit23 Bit22 Bit21 Bit20 Bit19	Cell 16 voltage Cell 15 voltage Cell 14 voltage Cell 13 voltage Cell 12 voltage Cell 11 voltage Cell 10	00: normal 01: below lower limit (act as protection) 10: above higher limit (act as protection) 11: other alarm	

					Bit18	voltage			
					Bit17	Cell 9			
					Bit16	voltage			
					Bit15	Cell 8			
					Bit14	voltage			
					Bit13	Cell 7			
					Bit12	voltage			
					Bit11	Cell 6			
					Bit10	voltage			
					Bit9	Cell 5			
					Bit8	voltage			
					Bit7	Cell 4			
					Bit6	voltage			
					Bit5	Cell 3			
					Bit4	voltage			
					Bit3	Cell 2			
					Bit2	voltage			
					Bit1	Cell 1			
					Bit0	voltage			
5102~ 5103	4			Cell Temperature Alarminfo	Bit31		00: normal		
					Bit30	Temperat ure of cell 16	01: below lower limit (act as protection)		
					Bit29		10: above higher limit (act as protection)		
					Bit28	Temperat ure of cell 15	11: other alarm		
					Bit27				
					Bit26	Temperat ure of cell 14			
					Bit25				
					Bit24	Temperat ure of cell 13			
					Bit23				
					Bit22	Temperat ure of cell 12			
					Bit21				
					Bit20	Temperat ure of cell 11			

					Bit19	Temperat ure of cell 10			
					Bit18				
					Bit17	Temperat ure of cell 9			
					Bit16				
					Bit15	Temperat ure of cell 8			
					Bit14				
					Bit13	Temperat ure of cell 7			
					Bit12				
					Bit11	Temperat ure of cell 6			
					Bit10				
					Bit9	Temperat ure of cell 5			
					Bit8				
					Bit7	Temperat ure of cell 4			
					Bit6				
					Bit5	Temperat ure of cell 3			
					Bit4				
					Bit3	Temperat ure of cell 2			
					Bit2				
					Bit1	Temperat ure of cell 1			
					Bit0				
5104~5105	4	R		Other Alarminfo	Bit31	Temperat ure of BMS board	00: normal 01: below lower limit (act as protection) 10: above higher limit (act as protection) 11: other alarm		
					Bit30				
					Bit29	Environme ntTempera			
					Bit28				

						Bit14	Effective discharge current	1: Effective 0: Normal		
						Bit13	Heater on	1: On 0: Off		
						Bit12	Reserve			
						Bit11	Fully charged	1: Full 0: Normal		
						Bit10	Reserve			
						Bit9	Reserve			
						Bit8	Buzzer	1: On 0: Off		
						Bit7	Discharge high temp	1: Trigger(Warn) 0: Normal		
						Bit6	Discharge low temp	1: Trigger(Warn) 0: Normal		
						Bit5	Charge high temp	1: Trigger(Warn) 0: Normal		
						Bit4	Charge low temp	1: Trigger(Warn) 0: Normal		
						Bit3	Module high voltage	1: Trigger(Warn) 0: Normal		
						Bit2	Module low voltage	1: Trigger(Warn) 0: Normal		
						Bit1	Cell high voltage	1: Trigger(Warn) 0: Normal		
						Bit0	Cell low voltage	1: Trigger(Warn) 0: Normal		
5108	2	R		Status3		Bit15	Cell voltage 16	1: Error 0: Normal		
						Bit14	Cell voltage 15	1: Error 0: Normal		
						Bit13	Cell voltage 14	1: Error 0: Normal		
						Bit12	Cell voltage 13	1: Error 0: Normal		
						Bit11	Cell voltage 12	1: Error 0: Normal		
						Bit10	Cell voltage 11	1: Error 0: Normal		
						Bit9	Cell	1: Error		

5122~ 5129	1 6	R	ASIC II	Battery name				
5130~ 5131	4	R	ASIC II	Software Version				
5132~ 5141	2 0	R	ASIC II	Manufacturer Name				
5142~ 5199	1 1 6	R		Reserve				
5200	2	R W	0.1V	Cell over voltage limit				
5201	2	R W	0.1V	Cell high voltage limit				
5202	2	R W	0.1V	Cell low voltage limit				
5203	2	R W	0.1V	Cell under voltage limit				
5204	2	R W	0.1 °C	Charge over temperature limit				
5205	2	R W	0.1 °C	Charge high temperature limit				
5206	2	R W	0.1 °C	Charge low temperature limit	Have symbol number			
5207	2	R W	0.1 °C	Charge under temperature limit	Have symbol number			
5208	2	R W	0.01A	Charge over2 current limit				
5209	2	R W	0.01A	Charge over1 current limit				
5210	2	R W	0.01A	Charge high current limit				
5211	2	R W	0.1V	Module over voltage limit				
5212	2	R W	0.1V	Module high voltage limit				
5213	2	R W	0.1V	Module low voltage limit				
5214	2	R W	0.1V	Module under voltage limit				
5215	2	R	0.1 °C	Discharge over				

		W		temperature limit					
5216	2	R W	0.1 °C	Discharge high temperature limit					
5217	2	R W	0.1 °C	Discharge low temperature limit	Have symbol number				
5218	2	R W	0.1 °C	Discharge under temperature limit	Have symbol number				
5219	2	R W	0.01A	Discharge over2 current limit	Have symbol number				
5220	2	R W	0.01A	Discharge over1 current limit	Have symbol number				
5221	2	R W	0.01A	Discharge high current limit	Have symbol number				
5222	2	R W	Integer	Shutdown command			0: Don't care 1: Shutdown		
5223	2	R W	Integer	Device ID			Range: 3~247		
5224	2	W	Integer	Lock Control			Lock:0x5a5a Unlock:0xa5a5		
5225	2	W	Integer	Test Ready			Test begin:0x5a5a Test over:0xa5a5		
5226~ 5227	4	R W	Integer	Unique identification code			Unique identifier recognize: 0xFFFFFFFF		
5228	2	R W	%	Charge powe%			Charging power setting default 0X64		
5229	2	R W	%	Discharge powe%			Discharge power setting default 0X64		
5230~ 5299	1 4 1	R W		Reserve			Reserved		
61440	2	W	Integer	ACP-Broadcast		0			
61441	2	W	Integer	ACP-Configure			Range:1~254		
61442	2	W	Integer	ACP-Shake			Range:1~254		