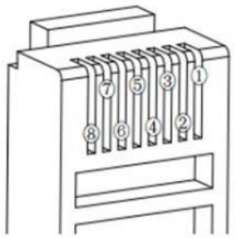
Lithium Iron Battery BMS Modbus Protocol V1.0

1. Revision History

Version	Update Date	Update Content
V1.0	2025.06.05	Initial Release

2. Pin Definitions

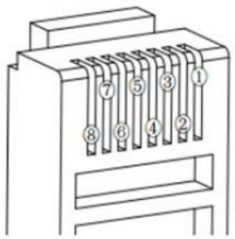
RS485 Interface



- ① NC(Not connected, not allowed for other functions)
- ② A (RS485 bus signal)
- ③ B (RS485 bus signal)
- ④ GND (Power ground/communication ground)
- ⑤ 12V- (Negative power terminal)
- ⑥ O/F(Open/Float signal)
- ⑦ O/F 12V+(Open/Float signal, 12V positive, 200mA load capacity)
- ⑧ NC(Not connected)

Notes:

- RS485 initial baud rate: 9600bps



- ① NC(Not connected, not allowed for other functions)
- ② NC(Not connected, not allowed for other functions)
- ③ NC(Not connected, not allowed for other functions)
- ④ GND (Power ground/communication ground)
- ⑤ CAN cascading auxiliary signal
- ⑥ CAN-H (CAN bus signal)
- ⑦ CAN cascading auxiliary signal
- ⑧ CAN-L (CAN bus signal)

Notes:

- The initial CAN baud rate is 500 Kbps

3. Protocol Definition

3.1 Format

Field	Length	Description
Start Delimiter	-	>10ms
Address Code	1 BYTE	Range: 01H～F7H (1～247), 00H broadcast address, all slave devices respond but don't return commands
Function Code	1 BYTE	Operation type code
Starting Address	2 BYTE	Register address
Data Length	2 BYTE	Read/write data length
CRC Check	2 BYTE	CRC checksum for address code, function code, and data
End Delimiter	-	>10ms

3.2 Specifications

1. **Start Delimiter:** >10ms
2. **Address Code:** 1 byte, range: 01H～F7H (decimal 1～247). 00H is broadcast address (all slaves respond but don't return commands)
3. **Function Code:** 1 byte

Command Name	Data Access Type	Function Code	Error Code
Read single or multiple word registers	WORD	03H	83H
Write single word register	WORD	06H	86H
Write continuous N word registers	WORD	10H	90H
Restore factory defaults	No byte access	78H	F8H
Clear history records	No byte access	79H	F9H

4. **Starting Address:** 2 bytes
5. **Data Length:** 2 bytes
6. **CRC Check:** 2 bytes, CRC checksum of address code, function code, and data bytes
7. **End Delimiter:** >10ms

Important Notes:

1. Data addresses and data are 2 bytes, with high byte sent first, then low byte; whereas CRC is sent with low byte first, then high byte.
2. Error code for server frame data errors, client returns error exception response function code: Error code = Function code | 80H
3. Exception code description:
   - 01H -- Unsupported function code
   - 02H -- Incorrect PDU starting address or PDU starting address + data length exceeds legal range
   - 03H -- Data for reading registers or writing registers is too long
   - 04H -- Client failed to read or write registers
   - 05H -- Incorrect checksum in server data

3.3 Examples

1) Reading Registers

Request:

Description	Bytes	Command
Device address	BYTE	01H～F7H
Function code	BYTE	03H
Starting address	WORD	0000H～FFFFH
Number of words to read	WORD	0001H～007DH
Checksum	WORD	CRC checksum of all above bytes

Normal Response:

Description	Bytes	Command
Device address	BYTE	01H～F7H
Function code	BYTE	03H
Data length	BYTE	01H～FAH
Data content	WORD	Read data (high byte first, then low byte)
...	WORD	Read data (high byte first, then low byte)
Checksum	WORD	CRC checksum of all above bytes

Exception Response:

Description	Bytes	Command
Device address	BYTE	01H～F7H
Error code	BYTE	83H
Exception code	BYTE	N (N=1, 2, 3, 4)
Checksum	WORD	CRC checksum of all above bytes

2) Writing Single Register

Request:

Description	Bytes	Command
Device address	BYTE	01H～F7H
Function code	BYTE	06H
Starting address	WORD	0000H～FFFFH
Write data	WORD	0000H～FFFFH
Checksum	WORD	CRC checksum of all above bytes

Normal Response:

Description	Bytes	Command
Device address	BYTE	01H～F7H
Function code	BYTE	06H
Starting address	WORD	0000H～FFFFH
Write data	WORD	0000H～FFFFH
Checksum	WORD	CRC checksum of all above bytes

Exception Response:

Description	Bytes	Command
Device address	BYTE	01H～F7H
Error code	BYTE	86H
Exception code	BYTE	N (N=1, 2, 3, 4)
Checksum	WORD	CRC checksum of all above bytes

3) Writing Continuous N Registers

Request:

Description	Bytes	Command
Device address	BYTE	01H～F7H
Function code	BYTE	10H
Starting address	WORD	0000H～FFFFH
Number of bytes to write	WORD	0001H～007DH
Quantity of words	BYTE	1x number of bytes
Data content	WORD	Write data (high byte first, then low byte)
...	WORD	Write data (high byte first, then low byte)
Checksum	WORD	CRC checksum of all above bytes

Normal Response:

Description	Bytes	Command
Device address	BYTE	01H～F7H
Function code	BYTE	10H
Starting address	WORD	0000H～FFFFH
Number of bytes to write	WORD	0001H～007DH
Checksum	WORD	CRC checksum of all above bytes

Exception Response:

Description	Bytes	Command
Device address	BYTE	01H～F7H
Error code	BYTE	90H
Exception code	BYTE	N (N=1, 2, 3, 4)
Checksum	WORD	CRC checksum of all above bytes

4) Restore Factory Defaults

Request:

Description	Bytes	Command
Device address	BYTE	01H～F7H
Function code	BYTE	78H
Padding data	WORD	0000H
Padding data	WORD	0001H
Checksum	WORD	CRC checksum of all above bytes

Normal Response:

Description	Bytes	Command
Device address	BYTE	01H～F7H
Function code	BYTE	78H
Padding data	WORD	0000H
Padding data	WORD	0001H
Checksum	WORD	CRC checksum of all above bytes

Exception Response:

Description	Bytes	Command
Device address	BYTE	01H～F7H
Error code	BYTE	F8H
Exception code	BYTE	N (N=1, 2, 3, 4)
Checksum	WORD	CRC checksum of all above bytes

5) Clear History Records

Request:

Description	Bytes	Command
Device address	BYTE	01H～F7H
Function code	BYTE	79H
Padding data	WORD	0000H
Padding data	WORD	0001H
Checksum	WORD	CRC checksum of all above bytes

Normal Response:

Description	Bytes	Command
Device address	BYTE	01H～F7H
Function code	BYTE	79H
Padding data	WORD	0000H
Padding data	WORD	0001H
Checksum	WORD	CRC checksum of all above bytes

Exception Response:

Description	Bytes	Command
Device address	BYTE	01H～F7H
Error code	BYTE	F9H
Exception code	BYTE	N (N=1, 2, 3, 4)
Checksum	WORD	CRC checksum of all above bytes

4. PDU Address Allocation Table

PDU Address (Hex)	Bytes	R/W	Unit	Description	Type	Data Parsing	Return Data	Parsing Example
1388	2	R	Integer	Number of Cells: M				max 16
1389	2	R	0.1V	Cell 1 voltage				
138A	2	R	0.1V	Cell 2 voltage				
138B	2	R	0.1V	Cell 3 voltage				
138C	2	R	0.1V	Cell 4 voltage				
138D	2	R	0.1V	Cell 5 voltage				
138E	2	R	0.1V	Cell 6 voltage				
138F	2	R	0.1V	Cell 7 voltage				
1390	2	R	0.1V	Cell 8 voltage				
1391	2	R	0.1V	Cell 9 voltage				
1392	2	R	0.1V	Cell 10 voltage				
1393	2	R	0.1V	Cell 11 voltage				
1394	2	R	0.1V	Cell 12 voltage				
1395	2	R	0.1V	Cell 13 voltage				
1396	2	R	0.1V	Cell 14 voltage				
1397	2	R	0.1V	Cell 15 voltage				
1398	2	R	0.1V	Cell 16 voltage				
1399	2	R	Integer	Number of Cell Temperature: N				max 16
139A	2	R	0.1°C	Temperature of cell 1				
139B	2	R	0.1°C	Temperature of cell 2				
139C	2	R	0.1°C	Temperature of cell 3				
139D	2	R	0.1°C	Temperature of cell 4				
139E	2	R	0.1°C	Temperature of cell 5				
139F	2	R	0.1°C	Temperature of cell 6				
13A0	2	R	0.1°C	Temperature of cell 7				
13A1	2	R	0.1°C	Temperature of cell 8				
13A2	2	R	0.1°C	Temperature of cell 9				
13A3	2	R	0.1°C	Temperature of cell 10				
13A4	2	R	0.1°C	Temperature of cell 11				
13A5	2	R	0.1°C	Temperature of cell 12				
13A6	2	R	0.1°C	Temperature of cell 13				
13A7	2	R	0.1°C	Temperature of cell 14				
13A8	2	R	0.1°C	Temperature of cell 15				
13A9	2	R	0.1°C	Temperature of cell 16				
13AC	2	R	Integer	Number of Environment Temperature				Max: 2
13AD	2	R	0.1°C	Environment Temperature 1				Value: 250
13AE	2	R	0.1°C	Environment Temperature 2				Value: 250
13AF	2	R	Integer	Number of Heater Temperature				Max 2
13B0	2	R	0.1°C	Heater Temperature 1				
13B1	2	R	0.1°C	Heater Temperature 2				
13B2	2	R	0.01A	Current	Signed			
13B3	2	R	0.1V	Module voltage				
13B4~13B5	4	R	0.001AH	Remain capacity				
13B6~13B7	4	R	0.001AH	Module total capacity				

Alarm and Status Registers

PDU Address (Hex)	Bytes	R/W	Description	Bit Definition
13EC~13ED	4	R	Cell voltage Alarm info	**Bit31-Bit30**: Cell 16 voltage **Bit29-Bit28**: Cell 15 voltage **Bit27-Bit26**: Cell 14 voltage **Bit25-Bit24**: Cell 13 voltage **Bit23-Bit22**: Cell 12 voltage **Bit21-Bit20**: Cell 11 voltage **Bit19-Bit18**: Cell 10 voltage **Bit17-Bit16**: Cell 9 voltage **Bit15-Bit14**: Cell 8 voltage **Bit13-Bit12**: Cell 7 voltage **Bit11-Bit10**: Cell 6 voltage **Bit9-Bit8**: Cell 5 voltage **Bit7-Bit6**: Cell 4 voltage **Bit5-Bit4**: Cell 3 voltage **Bit3-Bit2**: Cell 2 voltage **Bit1-Bit0**: Cell 1 voltage For each cell: 00: normal, 01: below lower limit (protection), 10: above higher limit (protection), 11: other alarm
13EE~13EF	4	R	Cell Temperature Alarm info	**Bit31-Bit30**: Temperature of cell 16 **Bit29-Bit28**: Temperature of cell 15 **Bit27-Bit26**: Temperature of cell 14 **Bit25-Bit24**: Temperature of cell 13 **Bit23-Bit22**: Temperature of cell 12 **Bit21-Bit20**: Temperature of cell 11 **Bit19-Bit18**: Temperature of cell 10 **Bit17-Bit16**: Temperature of cell 9 **Bit15-Bit14**: Temperature of cell 8 **Bit13-Bit12**: Temperature of cell 7 **Bit11-Bit10**: Temperature of cell 6 **Bit9-Bit8**: Temperature of cell 5 **Bit7-Bit6**: Temperature of cell 4 **Bit5-Bit4**: Temperature of cell 3 **Bit3-Bit2**: Temperature of cell 2 **Bit1-Bit0**: Temperature of cell 1 For each temperature: 00: normal, 01: below lower limit (protection), 10: above higher limit (protection), 11: other alarm
13F0~13F1	4	R	Other Alarm info	**Bit31-Bit30**: Temperature of BMS board **Bit29-Bit28**: Reserve (Environment Temperature 1) **Bit27-Bit26**: Reserve (Environment Temperature 2) **Bit25-Bit24**: Heater Temperature 1 **Bit23-Bit22**: Heater Temperature 1 **Bit21-Bit20**: Charge current **Bit19-Bit18**: Discharge current **Bit17-Bit16**: Reserve **Bit15-Bit14**: Reserve **Bit13-Bit12**: Reserve **Bit11-Bit10**: Reserve **Bit9-Bit8**: Reserve **Bit7-Bit6**: Reserve **Bit5-Bit4**: Reserve **Bit3-Bit2**: Reserve **Bit1-Bit0**: Reserve For each item: 00: normal, 01: below lower limit (protection), 10: above higher limit (protection), 11: other alarm

Status Registers

PDU Address (Hex)	Bytes	R/W	Description	Bit Definition
13F2	2	R	Status1	**Bit15**: Module under voltage: UV 1: Trigger(Protect), 0: Normal **Bit14**: Charge over temp 1: Trigger(Protect), 0: Normal **Bit13**: Charge under temp 1: Trigger(Protect), 0: Normal **Bit12**: Discharge over temp 1: Trigger(Protect), 0: Normal **Bit11**: Discharge under temp 1: Trigger(Protect), 0: Normal **Bit10**: Discharge over current1 1: Trigger(Protect), 0: Normal **Bit9**: Charge over current1 1: Trigger(Protect), 0: Normal **Bit8**: Cell over voltage 1: Trigger(Protect), 0: Normal **Bit7**: Cell under voltage 1: Trigger(Protect), 0: Normal **Bit6**: Module over voltage 1: Trigger(Protect), 0: Normal **Bit5**: Discharge over current2 1: Trigger(Protect), 0: Normal **Bit4**: Charge over current2 1: Trigger(Protect), 0: Normal **Bit3**: Using battery module power 1: Using, 0: Not **Bit2**: Discharge MOSFET 1: On, 0: Off **Bit1**: Charge MOSFET 1: On, 0: Off

				Bit0: Short circuit 1: Trigger(Protect), 0: Normal
13F3	2	R	Status2	**Bit15**: Effective charge current 1: Effective, 0: Normal **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
13F4	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 voltage 10 1: Error, 0: Normal **Bit8**: Cell voltage 9 1: Error, 0: Normal **Bit7**: Cell voltage 8 1: Error, 0: Normal **Bit6**: Cell voltage 7 1: Error, 0: Normal **Bit5**: Cell voltage 6 1: Error, 0: Normal **Bit4**: Cell voltage 5 1: Error, 0: Normal **Bit3**: Cell voltage 4 1: Error, 0: Normal **Bit2**: Cell voltage 3 1: Error, 0: Normal **Bit1**: Cell voltage 2 1: Error, 0: Normal **Bit0**: Cell voltage 1 1: Error, 0: Normal
13F5	2	R	Charge, discharge status	**Bit7**: Charge enable 1: Yes, 0: Request stop charge **Bit6**: Discharge enable 1: Yes, 0: Request stop discharge **Bit5**: Charge immediately 1: Yes, 0: Normal **Bit4**: Charge immediately 1: Yes, 0: Normal **Bit3**: Full charge request 1: Yes, 0: Normal **Bit2**: Reserve **Bit1**: Reserve **Bit0**: Reserve

PDU Address (Hex)	Bytes	R/W	Description	Bit Definition
1467	2	RW	Device ID	Range: 3~247