

Communication protocol between monitoring platform and BMS

Version information

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| --- | --- | --- | --- |
| Versi | Date | Description | Author |
|  | V20191124 | First draft |  |
|  | V20200325 | Update some description information, change 0xa10 to 0xd2, special  charger switch command |  |
|  | V20200325 | Determine the baud rate of transmitted data 115200 |  |
|  | V20200329 | Update the optimization instruction table and redefine the data  identification code |  |
|  | V20200329 | Add a command to read all data at once |  |
|  | V20200427 | Write the ID and write the date of the factory for description |  |
|  | V20200429 | Add 0xb7 address software version number |  |
|  | V20200429 | Detailed description of 0x8b and 0x8c addresses |  |
|  | V20200508 | Optimize 0x84 address unit: 0.1A to 0.01A |  |
|  | V20200512 | 0x81 address name to redefine the temperature in the battery box |  |
|  | V20200512 | 0xa0 0xa1 name redefine |  |
|  | V20200512 | Add to 0x8b address alarm bit |  |
|  | V20200526 | Add restart system ID 0xbb |  |
|  | V20200615 | Add 0xb8 identification version change v2.0 |  |
|  | V20200713 | Add 0xbc identification to restore factory initialization version change v2.1 |  |
|  |  | Add 309 fault information |  |
|  | V20200825 | Add 0xBE 0xBF |  |
| V2.4 | 20201204 | Add 0xc0 to redefine current field data | NEEY |
| V2.5 | 20201217 | Add necessary field reporting description | NEEY |
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### summary

This protocol defines the communication protocol between the monitoring platform and the

battery terminal, and defines the message format, transmission mode, communication mode,etc.

### Reference standard

The communication uses TCP transmission in 2G GPRS, GAT1 in 4G, socket interface mode,

rs232ttl serial port, content custom communication format, and baud rate of 115200.

### Network topology

This protocol is a point-to-point or bus mode between BMS, GPS, Bluetooth, PC and terminal.

### Protocol content

### Communication rules

In the communication process, the equipment has both active reporting frame and passive respons

frame.

Refer to the communication data format for details. The interval between packets shall be at least 100ms,

and the longest reply packet shall not exceed 5S. Broadcast regularly. If it is sleeping, send activation

information at the control end, activate BMS, and then communicate

### Frame format

Frame is the basic unit of transmitting information. It includes start character, length, command word,

transmission type, information field, end ID, and checksum. The specific format is shown in Table 1. If

there is no mandatory description in the data unit, the low byte is on the right and the high byte is on the left. Sending is to send the high bit first and then the low bit.

Table. 1 frame format

|  |  |  |  |
| --- | --- | --- | --- |
| NUM | Frame unit | Length | Remarks |
| 1 | STX | 2 | Start frame：0x4E(78"N") 0x57(87"W") |
| 2 | LENGTH | 2 | Frame length |
| 3 | BMS terminal number | 4 | 4 byte ID |
| 4 | Command word | 1 | Refer to command word description, |
| 5 | Frame source | 1 | 0. BMS, 1. Bluetooth, 2. GPS, 3. PC upper computer |
| 6 | Transmission type | 1 | 0. Read data, 1. Reply frame, 2. BMS active upload |
| 7 | Frame information unit | N | Information field BMS setting data identification code |
| 8 | Record number | 4 | The upper 1 byte is random code, meaningless (reserved for encryption), and the lower 3 bytes are random code  record number |
| 9 | End identification | 1 | 0X68 |
| 10 | Checksum | 4 | Accumulated Checksum (High 2 bytes for CRC not enabled fill 0, Low 2 |

### Frame Starter Field

Two bytes.The first byte is 0x4e and the second byte is 0x57.

### Length Domain

L: Two bytes, all data bytes except the first two characters include the checksum and the length field itself.

## BMS terminal number ()

Four bytes in total: FF FF FF FF FF has a maximum 8-bit administrative backup number and a low 24-bit terminal number. (The highest byte is the default 00 and the low 3-byte is the one-dimensional ID number.

# Command word description

A byte that defines the transmission capabilities of this frame.

|  |  |  |
| --- | --- | --- |
| Command Code | Command Items | Remarks |
| 0x01 | Activation directive | When the BMS hibernates, the control side must activate the command first to communicate with the BMS. Received  Do other things after you reply. |
| 0X02 | Write instructions | Configure BMS parameter instructions, |
| 0X03 | Read instructions | Read BMS ID data, |
| 0x05 | Password directives | To modify a parameter, the first command must be correct before it can be changed |
| 0x06 | Read all data | Read the ID table all at once |

* + 1. **Frame Source Description**

1 byte. 0.BMS, 1.Bluetooth, 2.GPS, 3, PC upper computer relative to both receiver and receiver

# Transport type

1 byte: 0 for request frame and 1 for answer frame.2 Represents

voluntary reporting.As long as 5-Bluetooth, 2-GPS, 3-PC host and 4-BMS are launched first, the reply is 1.

### Record number

One byte high is a random code and three bytes low is a record code

# End Code Field

One byte 0x68

# Check Code Domain

High 2-byte CRC16 is temporarily not used, and the checksum identifies the sum of all data from the start to the end.

# Communication data format

## Example: GPS Read (All, Single) Data Reference

|  |  |  |  |
| --- | --- | --- | --- |
| NUM | Frame unit | Length bytes |  |
| 1 | STX | 2 | Start Frame： 0x4E(78"N") |
| 2 | LENGTH | 2 | Frame Length |
| 3 | BMS Terminal number | 4 | 4 byte ID |
| 4 | Command word | 1 | Write instructions with reference to |
| 5 | Frame Source | 1 | 0. Data box, 1. Bluetooth, 2. GPS, 3, PC PC PC |
| 6 | Transport type | 1 | 0.Read data, 1.Answer frame 2.Data box active upload |
| 7 | Data Identification Code | 1 | Read a single data reference (5.1 table);Read all data and fill in 0x00 |
| 8 | Record number | 4 | High 1 byte is meaningless for random code (keep encryption), and low 3 bytes is record number |
| 9 | End Identity | 1 | 0x68 |
| 10 | Checksum | 4 |  |



BMS Response

|  |  |  |  |
| --- | --- | --- | --- |
| NUM | Frame unit | Length |  |
| 1 | STX | 2 | Start Frame：0x4E(78"N") 0x57(87"W") |
| 2 | LENGTH | 2 |  |
| 3 | Terminal number | 4 |  |
| 4 | Command word | 1 |  |
| 5 | Frame Source | 1 | 0. Data box, 1. Bluetooth, 2. GPS, 3, PC PC PC |
| 6 | Transport type | 1 | 0.Read data, 1.Answer frame 2.Data box active upload |
| 7 | ID + Data | 1+N | ID + Data |
| 8 | Record number | 4 | High 1 byte is meaningless for random code (keep encryption), and low 3 bytes is record number |
| 9 | End Identity | 1 | 0X68 |
| 10 | Checksum | 4 |  |



## Example: GPS Writing Data Reference

|  |  |  |  |
| --- | --- | --- | --- |
| NUM | Frame unit | Length bytes |  |
| 1 | STX | 2 | Start Frame：0x4E(78"N") 0x57(87"W") |
| 2 | LENGTH | 2 | Frame Length |
| 3 | BMS Terminal Number | 4 | 4 byte ID |
| 4 | Command word | 1 | Write instructions with reference to commands |
| 5 | Frame Source | 1 | 0. Data box, 1. Bluetooth, 2. GPS, 3, PC PC PC |
| 6 | Transport type | 1 | 0.Read data, 1.Answer frame 2.Data box active upload |
| 7 | ID + Data | 1+N | ID + Data |
| 8 | Record number | 4 | High 1 byte is meaningless for random code (keep encryption), and low 3 bytes is record number |
| 9 | End Identity | 1 | 0x68 |
| 10 | Checksum | 4 |  |
|  |  |  |  |

BMS Response

|  |  |  |  |
| --- | --- | --- | --- |
| NUM | Frame unit | Length bytes |  |
| 1 | STX | 2 | Start Frame：0x4E(78"N") 0x57(87"W") |
| 2 | LENGTH | 2 |  |
| 3 | Terminal number | 4 |  |
| 4 | Command word | 1 |  |
| 5 | Frame Source | 1 | 0.BMS, 1.Bluetooth, 2.GPS, 3, PC host |
| 6 | Transport type | 1 | 0.Read data, 1.Answer frame 2.BMS active upload |
| 7 | Identification Code | 1 | Write a single data reference (5.1 table); |
| 8 | Record number | 4 | High 1 byte is meaningless for random code (keep encryption), and low 3 bytes is record number |
| 9 | End Identity | 1 | 0X68 |
| 10 | Checksum | 4 |  |

Sign Code Note: (Background Data Identification Code 0x00 when reading all data)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Use instruction | Data Identificatio | Name | byte | | type |  |
| R | 0x79 | Single battery voltage | 3 \*n | | HEX | The first byte is the battery number, followed by the voltage value MV, when reading all the data  0 x 79 followed by a byte length data,  And then each set of three bytes represents the battery voltage. |
| R | 0x80 | Reader tube temperature |  | 2 | HEX | Over 100 percent of the 0 -- 140 (- 40 to 100 degrees C) temperature is negative, such as 101 being negative 1 degrees (100 benchmarks) |
| R | 0x81 | Read the temperature in the battery box |  | 2 | HEX | 0-140 (- 40 to 100 ℃), the part exceeding 100  is the negative temperature, as above (100 reference) |
| R | 0x82 | Read battery temperature |  | 2 | HEX | 0-140 (- 40 to 100 ℃), the part exceeding 100 is the negative temperature, as above (100 reference) |
| R | 0 X 83 | Total battery voltage |  | 2 | HEX | 0. 01 V 3500 \* 0 . 01 = 35 . 0 0 v  Minimum unit: 10 MV |
|  |  | Current data |  | | Hex | 10000 ( 10000-11000) \* 0.01 = -10.00a  (discharge) |
| R | 0 X 85 | Remaining battery | 1 | | HEX | SOC， 0 - 100%, |
| R | 0 X 86 | Number of NTC | 1 | | HEX | Two battery temperature sensors, |
| R | 0 X 87 | Number of battery cycles |  | 2 | HEX |  |
| R | 0 X 89 | Total battery cycle capacity | 4 | | HEX | Ah |
| R | 0x8a | Total number of battery strings |  | 2 | HEX |  |
|  |  |  |  | |  |  |

# 5.1 BMS Set Data Identification Code





|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| R | 0x8b | Battery warning | 2 | HEX | Bit 0: low capacity alarm 1. Alarm 0 is normal. |
| message |  |  | Only warning  Bit 1: MOS tube overtemperature alarm 1, |
|  |  |  |  |  | alarm 0, normal, alarm |
|  |  |  |  |  | Bit 2: charging overvoltage alarm 1, alarm 0, |
|  |  |  |  |  | normal, alarm |
|  |  |  |  |  | Bit 3: discharge undervoltage alarm 1, alarm 0, |
|  |  |  |  |  | normal, alarm |
|  |  |  |  |  | Bit 4: battery over temperature alarm 1, alarm |
|  |  |  |  |  | 0, normal, alarm |
|  |  |  |  |  | Bit 5: charging overcurrent alarm 1, alarm 0, |
|  |  |  |  |  | normal, alarm |
|  |  |  |  |  | Bit 6: discharge overcurrent alarm 1, alarm 0, |
|  |  |  |  |  | normal, alarm |
|  |  |  |  |  | Bit 7: cell differential pressure alarm 1, alarm 0, |
|  |  |  |  |  | normal, alarm |
|  |  |  |  |  | Bit 8: overtemperature alarm in battery box 1, |
|  |  |  |  |  | alarm 0, normal, alarm |
|  |  |  |  |  | Bit 9: battery low temperature alarm 1, alarm |
|  |  |  |  |  | 0, normal, alarm |
|  |  |  |  |  | Bit 10: monomer overvoltage alarm 1, alarm 0, |
|  |  |  |  |  | normal, alarm |
|  |  |  |  |  | Bit 11: monomer undervoltage alarm 1, alarm |
|  |  |  |  |  | 0, normal, alarm |
|  |  |  |  |  | Bit 12: 309\_ A protection 1 alarm 0 normal, |
|  |  |  |  |  | alarm |
|  |  |  |  |  | Bit 13: 309\_ B protection 1 alarm 0 normal, |
|  |  |  |  |  | alarm |
|  |  |  |  |  | 14 bits: reserved |
|  |  |  |  |  | 15 bits: reserved |
|  |  |  |  |  | Example: 0x0001: indicates low capacity alarm |
|  |  |  |  |  | value |
|  |  |  |  |  | 0x0001 > low capacity alarm  0x0002 > over temperature alarm of power  board |



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| R | 0x8C | Battery status information | 2 |  | 1. bit:charging MOS state 1 on 0 off this is for uploading prompt 2. bit:discharge MOS tube status 1 on 0 off. This is for uploading prompt. 3. bit：The status of equalizing switch is 1 on and 0 off. This is for uploading prompt 4. bit：The battery is disconnected. 1 is normal. 0 is disconnected.   This is an upload prompt,  Bits 4-15: reserved example: 00 01: indicates that the charging MOS tube is on |
| RW | 0x8e | Total voltage overvoltage protection | 2 | HEX | 1000 - 15000 ( 10 MV) minimum unit: 10 MV |
| RW | 0x8f | Total voltage undervoltage protection | 2 | HEX | 1000 - 15000 ( 10 MV) minimum unit: 10 MV |
| RW | 0 X 90 | Single overvoltage protection | 2 | HEX | 1000 -- 4500 MV, |
| RW | 0x91 | Monomer overvoltage recovery voltage | 2 | HEX | 1000 -- 4500 MV, |
| RW | 0x92 | Single overvoltage protection delay | 2 | HEX | 1 - 60 sec |
| RW | 0x93 | Differential voltage protection value | 2 | HEX | 0 - 1000 MV |
| RW | 0x94 | Discharge overcurrent protection value | 2 | HEX | 1 - 1000A |
| RW | 0x95 | Discharge overcurrent delay | 2 | HEX | 1 - 60 sec |
| RW | 0x96 | Charging overcurrent protection value | 2 | HEX | 1 - 1000A |
| RW | 0x97 | Charging overcurrent delay | 2 | HEX | 1 - 60 sec |
| RW | 0x98 | Equalizing starting voltage | 2 | HEX | 2000 - 4500 MV |



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| RW | 0x99 | Equalizing opening differential | 2 | HEX | 10 - 1000 MV |
| RW | 0 x9a | Active equalization switch | 1 | HEX | 0 off or 1 on |
| RW | 0x9b | Power tube temperature protection value | 2 | HEX | 0 -- 100 ℃ |
| RW | 0x9f | Temperature protection value in battery box | 2 | HEX | 0 - 100 ℃ |
| RW | 0 xa 0 | Recovery value of battery in box | 2 | HEX | 40 -- 100 ℃ |
| RW | 0 xa 1 | Battery temperature difference | 2 | HEX | 40 -- 100 ℃ |
| RW | 0 xa 2 | Battery charging high temperature protection value | 2 | HEX | 5 - 20 ℃ |
| RW | 0 xa 3 | High Temperature Protection Value for Battery Charging | 2 | HEX | 0 - 100 ℃ |
| RW | 0 xa 4 | High Temperature Protection Value for Battery Discharge | 2 | HEX | 0 - 100 ℃ |
| RW | 0 xa 5 | Charging cryoprotection value | 2 | HEX | - 45 ℃ /+ 25 ℃(No datum - signed data) |
| RW | 0 xa 6 | Recovery value of charge cryoprotection | 2 | HEX | - 45 ℃ /+ 25 ℃(No datum - signed data) |
| RW | 0 xa 7 | Discharge cryoprotection value | 2 | HEX | - 45 ℃ /+ 25 ℃(No datum - signed data) |
| RW | 0 xa 8 | Discharge Low Temperature Protection Recovery Value | 2 | HEX | - 45 ℃ /+ 25 ℃(No datum - signed data) |



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| RW | 0 xa 9 | Number of battery strings settings | 1 | HEX | 3 - 32 |
| RW | 0 xaa | Battery Capacity Settings | 4 | HEX | AH |
| RW | 0 xab | Charging MOS switch | 1 | HEX | 0 OFF 1 ON |
| RW | 0 xac | Discharge MOS switch | 1 | HEX | 0 OFF 1 ON |
| RW | 0 xad | Current Calibration | 2 | HEX | 100 MA- 20000 MA |
| RW | 0 xae | Protective Board Address | 1 | HEX | This site is reserved and used in cascade, |
| RW | 0 xaf | Battery type | 1 | HEX | 0: lithium iron phosphate, 1: ternary, 2: lithium titanate |
| RW | 0xb0 | Sleep Wait Time | 2 | HEX | Second data, for reference, |
| RW | 0xb1 | Low Capacity Alarm Value | 1 | HEX | 0 -- 80 % |
| RW | 0xb2 | Modify parameter password | 10 | HEX | For temporary reference, fix a password, |
| RW | 0xb3 | Special Charger Switch | 1 | HEX | 0 OFF 1 ON |
| RW | 0 Xb 4 | Device ID Code | 8 | Code | Example 60300001 (60 - nominal voltage level: defined according to the voltage level, for example, 60 is 60V  Series 48 is 48V series; 3 - material system: according to the system definition of battery material, for example, iron lithium code is 1 manganese acid code 2 ternary code 3; 00001 - production serial number: according to group n of the model produced by the manufacturer in the current month, the number is n (for example, group 1 of a model, n is 00001)) |



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| RW | 0 Xb 5 | Date of production | 4 | Code | Example 2004 - production year: take the last two digits according to the actual production year; List the batteries produced in 2020, year code 20;  Production month: from January to December; character |
| RW | 0xb6 | System working time | 4 | HEX | Reset when leaving the factory, unit: Min |
| R | 0xb7 | Software Version Number | 15 | Code | NW\_ 1 \_ 0 \_ 0 \_ 200428 |
| RW | 0xb8 | Start Current Calibration | 1 | HEX | 1: Start Calibration 0: Turn off calibration |
| RW | 0xb9 | Actual battery capacity | 4 | HEX | AH |
| RW | 0 x BA | Naming of factory ID | 24 | Code | Column: "BT 3072020120000200521001"  \*Product name: BT for batteries  \*Material system: lithium-iron code 1;Manganic acid code 2;Ternary code 3   * Voltage level: 48V series 48;60 V Series 6072 V Series 72 * Capacity level: 20 for 20AH specification   \*Cycle life: 04 marks for 400 cycles, 12 marks  for 1200 cycles   * Factory Code: English code of battery manufacturer for low-speed vehicles, if the English code of the manufacturer is less than four digits, the character 0 is used to complement it.   \*Year of production: two digits after actual year of production;List the battery year code "19" produced in 2019  \*Month of production: January-December  \*Date of production: 01 - 31  \*Production Pipeline Number: According to Group N of the model produced on the day of the manufacturer's production date, the number is N (example: Group 1 of a model, 001) |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| W | 0 x BB | Restart the system | 1 | HEX | 1: Restart the system |
| W | 0 x BC | Restore factory settings | 1 | He X | 1: Recovery (restore only factory-based parameters) |
| W | 0 x BD | Remote Upgrade Identity | 1 | He X | 1 Start (wait for identification reply when file is posted) |
| W | 0 x BE | Core Low Voltage Off GPS | 2 | Hex | Unit: MV (power off to GPS when low voltage is detected) |
| W | 0 x BF | Core Low Voltage Recovery GPS | 2 | Hex | Unit: MV (power to GPS when recovery voltage value is detected) |
| R |  | Protocol Version Number | 1 |  | Default value: 0 x 00  0 x 01: redefine 0 x 84 current data in 10 MA, the highest bit is 0 for discharge and 1 for |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

[Note]

1. In all fields of 0x79 ~ 0xb9, R or RW marked should be reported, for the old version that has been shipped, upgrade as far as possible;If upgrade is not convenient, please contact our technical support at 13755639263/13480924112
2. 0xBA manufacturer ID name, this field is mainly used for switching cabinets, if there is a need for switching cabinets, this field must be added.

