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version	instructions	note
V101	Original version, standard frame format	
V102	Increases the cumulative discharge timing	

# BMS-CAN communication protocol

## 1 overview

This protocol specifies the communication protocol between the BMS and other nodes in the automotive CAN network.

## 2 Definition of Terms

BMS: Battery Management System.

Can: Controller Area Network;

## 3 Physical interface

This agreement adopts CAN2.0A standard, and the frame format adopts standard frame.Communication baud rate is 250kbps.

The communication between the BMS and the instrument is point-to-point one-way communication, that is, the BMS sends data to the instrument, and the instrument only receives and interprets the data for display.

## 4 Data convention

In the data transmission of this protocol, low-byte first-send mode (small-end) is adopted for multi-byte data, except for special instructions. For the battery's total current value, a positive value indicates discharge and a negative value indicates charge.

The data format of this Agreement is defined as follows:

CANJD		Data fields
FUNC	on	DATA
3	8	0 ~ 64

Func is the function code that represents the frame data type.

SA is the source address, here represents the address of the BMS, fixed as 0xF4.

Data refers to DATA domain information, and the frame length of this protocol is fixed at 8 bytes.

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# Parameter group number

The parameter group number is assigned as follows:

The serial	The name of the	describe	FUNC	ID	The sender	Message cycle
1	BATT ST	Battery status	0x02	0x02F4	BMS	20ms
2	CELL VOLT	Batteries voltage information	0x04	0x04F4	BMS	100ms
3	CELL TEMP	The cell temperature 4	0x05	0x05F4	BMS	100ms
	ALMJNFO	The alarm information	0x07	0x07F4	BMS	100ms

Messages of battery status, cell voltage and cell temperature are sent periodically after power on, and alarm message is event contact

Heuristic sending.

## 6 Message Definition

### 6.1 Battery Status (BATT ST) ID: 0x02F4

This message defines power battery status information. The specific format is as follows: The

	parameter	Start bit A	length of The scope of	The resolution of	The offset	unit	note
1	BattVolt	0	16	0 ~ 1000	0	V Total	voltage of battery
2	BattCurr	16	16	- 400 ~ 1000	0.1	- 400. A Total	battery current pack
3	SOC	32	8	0-100.	1	% The	residual capacity
4	DischgTime	48	16	0 ~ 65535	1	h	Discharge time

02F4 13 01 D7 11 33 XX 64 00

Represents: voltage 27.5V, current 56.7A (precision: 0.1A), SOC51%, discharge time 100h.

### 6.2 Cell voltage (CELL\_VOLT)ID: 0x04F4

This message defines the cell voltage information. The specific format is as follows: The

	parameter	Start bit A	length of The scope of	The resolution	The offset	unit	note
serial	MaxCellVolt	0	16	0 ~ 5000	0 mV	Maximum cell	voltage
2	MaxCvNO	16	8	1-250.	1		Highest monomer position
3	MinCellVolt	24	16	0 ~ 5000	0 mV	Minimum cell	voltage
4	MinCvNO	40	8	1-250.	1		Lowest cell position

For example: 04F4 8C 0A 05 92 09 08 XX XX

Represents: the highest cell voltage is 2700mV, corresponding cell number is 5;The lowest cell voltage is 2450mV, and the corresponding cell number is 8.

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6.3 Cell temperature (CELL\_TEMP)ID: 0x05F4

This message defines the cell temperature information. The specific format is as follows: The

	parameter	Start bit A	length of The scope of	The	The offset	unit	note
serial	1 MaxCellTemp 2	0	8	- 50 ~ 200	1	- 50	° c. Maximum cell temperature
	MaxCellNO	8	8	1-250.	1	1	Maximum temperature position
3	MinCellTemp 4	16	8	- 50 ~ 200	1	- 50	° c. Minimum cell temperature
	MinCellNO	24	8	1-250	1	1	Lowest temperature position
5 AvrgCellTemp		32	8	- 50 ~ 200	1	- 50	° c. Average cell temperature

For example: 05F4 48 06 2F 01 3F XX XX XX

Represents: the highest cell temperature is 22°C, corresponding cell number is 6;The minimum cell temperature is -3°C, corresponding cell number is 1.Average cell temperature is 13 °C.

6.4 Fault information (ALM\_INFO) ID: 0x07F4

The alarm message is sent by event trigger. When there is an alarm, BMS sends the message periodically. If there is no alarm

message, it will not be sent.When multiple alarms occur at the same time, the alarm number will be displayed circularly on the

instrument interface, up to 4 alarm numbers can be displayed circularly.The alarm number is shown in the order of alarm occurrence

as priority. The specific format is as follows:

Alarm no.	parameter	Start bit A	length of The scope of	The	The offset	unit	note
1	Monomer overvoltage	0	2	0 ~ 3	1	0	The alarm level
2	Monomer undervoltage	2	2	0 ~ 3	1	0	
3	Total voltage overvoltage	4	2	0 ~ 3	1	0	
4	Total voltage undervoltage	6	2	0 ~ 3	1	0	
5	The pressure difference of	8	2	0 ~ 3	1	0	
6	Discharge flow	10	2	0 ~ 3	1	0	
7	Charging flow	12	2	0 ~ 3	1	0	
8	The temperature is too high	14	2	0 ~ 3	1	0	
9	The temperature is too low	16	2	0 ~ 3	1	0	
10	Temperature difference is too large	18	2	0 ~ 3 0 ~	1	0	
11	SOC is too low	20	2	3	1	0	
12	Insulation is too low 22		2	0 ~ 3	1	0	
13	High voltage interlock fault	24	2	0 ~ 3	1	0	
14	External communication	26	2	0 ~ 3	1	0	
15	Internal communication	28	2	0 ~ 3	1	0	

Alarm level: 0 for no alarm, 1 for serious alarm, 2 for important alarm, 3 for general alarm

07F4 43 00 20 00 XX XX XX XX

Represents: monomer overpressure, level 3 alarm;Total voltage undervoltage, level 1 alarm;Too low SOC, level 2 alarm.

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## 7 Test cases

### 7.1 Normal state

Normal state only displays SOC, voltage value, hour meter and other information.In normal state, only battery status message, cell

voltage message and cell temperature message are sent, and no alarm message is sent.

CANJD	data	Data meaning	The instrument shows
0x02F4	13 01 D7 11 33 XX 64 00	Voltage 27.5V, current 56.7A, SOC51%, discharge time 100h	The main interface displays the voltage of 27.5, the SOC display of 51%, the quantity grid is 2 grids, and the current is not displayed

### 7. 2 Low battery

When the electric quantity is too low alarm (SOCX20%) occurs, the main interface does not display the voltage, but displays the

current alarm number. If it is a single alarm, the corresponding cell number of the single alarm will be displayed at the hour meter.

CANJD	data	Data meaning	The instrument shows
0x02F4	EI 00 8A 10 10 XX XX XX	Voltage 22.5V, current 23.4 A, SOC was 16%	The alarm number 11 is displayed on the main interface, and the "AL" symbol flashes at the same time.SOC displays 16%, power grid is 1, current is not displayed
0x07F4	00 00 30 00 XX XX XX XX	Too low SOC 3 level alarm	

### 7.3 Excessive and low monomer voltage

CANJD	data	Data meaning	The instrument shows
0x04F4	8C 0A 05 92 09 08 XX XX	Maximum monomer voltage 2700mV, The corresponding cell number is 5;The lowest one	The alarm number 1 and 2 are displayed on the main interface, and the "AL" symbol flashes.The cell numbers 5 and 8 corresponding to the alarm are displayed at the hour meter
0x07F4	0F 00 00 00 XX XX XX XX	Body voltage 2450mV, pressure level 3 alarm single underpressure level 3 alarm	

### 7.4 Cell temperature is too high and too low

CANJD	data	Data meaning	The instrument shows
0x05F4	48 06 2F 01 3F XX XX XX	The maximum temperature of the cell is 22°C, and the corresponding cell number is 6.The minimum cell temperature	The alarm number 8 and 9 are displayed on the main interface, and the "AL" character number flashes.The cell numbers 6 and 1 corresponding to the alarm are displayed at the hour meter
0x07F4	00 CO 03 00 XX XX XX XX	Monomer over temperature level 3 alarm is 13°C	

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