

This protocol is used for BMS8T, BMS16T and BMS24T to communicate with an external device through RS232 by UART. Open source code can be used as described on <https://github.com/Tobi177/venus-chargerybms>

1. Report cells voltage (main control board)

Packet header	Command	Data length	Voltage per Cell				Wh	Ah	Check sum
			No 1	No 2	...	No 24			
2bytes	1byte	1byte	2bytes	2bytes	...	2bytes	4bytes	4bytes	1byte
24 24	56	2D	The high byte first then low byte	Low byte 1st	Low byte 1st	

2. Report measure value (main control board)

Packet header	Command	Data length	Charge End voltage of cell	Current Mode	Current	Battery Temps		SOC	Check sum
						T1	T2		
2bytes	1byte	1byte	2bytes	1 byte	2bytes	2bytes	2bytes	1byte	1byte
24 24	57	0F	The high byte first then low byte						

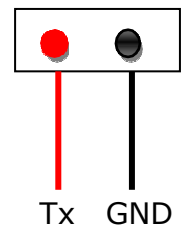
3. Report cells impedance (main control board)

Packet header	Command	Data length	Current Mode 1	Current 1	Cell impedance				Check sum
					No 1	No 2	...	No 24	
2bytes	1byte	1byte	1 byte	2bytes	2bytes	2bytes	...	2bytes	1byte
24 24	58	28	Charge or discharge	The low byte first then high byte	The low byte first then high byte				

4. Notes:

	True Value (Float)	Formula to calculate Decimal values	Hex values
Current (A)	22.8 A	$((\text{byte } 1 \times 256) + (\text{byte } 2)) / 10$	00 AC
Current 1 (A), It is instant current when measure cell impedance	22.8 A	$((\text{byte } 1) + (\text{byte } 2 \times 256)) / 10$	E4 00
Current mode	0 or 1 or 2	Direct	00 (Discharge) 01 (Charge) 02 (Storage)
Current mode 1 means battery is in charging or discharging when cell impedance is measured	0 or 1	Direct	00 (Discharge) 01 (Charge)
Cell impedance (mΩ)	0.1mΩ	$(\text{byte } 1) + (\text{byte } 2 \times 256)/10$	01 00
Cell Voltages (V)	3.325 V	$((\text{byte } 1 \times 256) + (\text{byte } 2)) / 1000$	0C FD
Temperatures (°C)	13.1 °C	$((\text{byte } 1 \times 256) + (\text{byte } 2)) / 10$	00 83
Battery Capacity (Wh)	47578.742	$((b1) + (b2 \times 256) + (b3 \times 256 \times 256) + (b4 \times 256 \times 256 \times 256))/1000$	76 FE D5 02
Battery Capacity (Ah)	922.723	$((b1) + (b2 \times 256) + (b3 \times 256 \times 256) + (b4 \times 256 \times 256 \times 256))/1000$	63 14 0E 00
SOC (0-100%)	91%	Direct	5B

- Data length: From The packet header to check sum(include checksum)
- Checksum calculation: Sum all packet bytes and calc the sum mod 256
- Command 0X56 is sent every 2 seconds
- Command 0X57 is sent every 1 second
- Command 0X58 is sent every time the current change between charge & discharge



5. Hardware configuration:

- Please note that the TX signal from BMS is RS232 and is inverted
- The TX signal voltage level is +5V and -5V
- The 2-pin port labeled COM3 on the BMS is used to connect to an external reading device

6. Baud rate is 115200

Warning,

1. This communication protocol is used for BMS8T, BMS16T and BMS24T
2. The BMS only send out data, it DOESN'T receive any data
3. When using an external device to read the BMS, please correct communication protocol after main unit is updated

Update history:

Main unit version	Description
V1.21	Add current mode send out - only send out positive current value even in discharge
V1.22	Add SOC send out
V1.24	Add Wh user setup and also Wh & Ah send out
V1.25	Add cell impedance measurement and also mΩ /current that measure impedance send out

Example Hex data from BMS:

```

24 24 57 0F 0E 24 01 00 E6 00 81 00 84 5B 27
24 24 57 0F 0E 24 01 00 E4 00 81 00 84 5B 25
24 24 57 0F 0E 24 01 00 E1 00 83 00 84 5B 24
24 24 56 2D 0C FD 0D 04 0D 04 0D 02 0D 03 0D 04 0D 06 0D 01 0D 08 0D 02 0D 05 0C FE 0D 06 0C FB 0D 0F 0C FC 76 FE D5 02 63 14 0E 00 95
24 24 58 28 01 E4 00 01 00 03 00 03 00 03 00 02 00 03 00 00 00 00 00 01 00 01 00 01 00 00 00 05 00 02 00 03 00 03 00 CC
24 24 57 0F 0E 24 01 00 E4 00 83 00 84 5B 27
68 3A 3A 33 0D 0A
    
```

Data Conversion Example:

Byte No:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Comment:	Header		Command	Data Length	Cell 1		Cell 2		Cell 3		Cell 4		Cell 5		Cell 6		Cell 7		Cell 8	
Hex:	B1	B2	B1	B1	B1	B2	B1	B2	B1	B2	B1	B2	B1	B2	B1	B2	B1	B2	B1	B2
Decimal:	36	36	86	45	12	253	13	4	13	4	13	2	13	3	13	4	13	6	13	1
Float Value:	N/A		N/A	N/A	3.325		3.332		3.332		3.33		3.331		3.332		3.334		3.329	
Formula:	N/A		N/A	N/A	((byte 1 x 256) + (byte 2))/1000															

21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Cell 9		Cell 10		Cell 11		Cell 12		Cell 13		Cell 14		Cell 15		Cell 16		Wh				Ah				Check Sum
B1	B2	B1	B2	B1	B2	B1	B2	B1	B2	B1	B2	B1	B2	B1	B2	B1	B2	B3	B4	B1	B2	B3	B4	B1
0D	08	0D	02	0D	05	0C	FE	0D	06	0C	FB	0D	0F	0C	FC	76	FE	D5	02	63	14	0E	00	95
13	8	13	2	13	5	12	254	13	6	12	251	13	15	12	252	118	254	213	2	99	20	14	0	149
3.336		3.33		3.333		3.326		3.334		3.323		3.343		3.324		47578.742				922.723				
((byte 1 x 256) + (byte 2))/1000																((b1)+(b2*256)+(b3*256*256)+(b4*256*256*256))/1000								N/A

Byte No:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Comment:	Header		Command	Data Length	Mode	Current		Cell 1		Cell 2		Cell 3		Cell 4		Cell 5		Cell 6	
Hex:	B1	B2	B1	B1	B1	B1	B2	B1	B2	B1	B2	B1	B2	B1	B2	B1	B2	B1	B2
Decimal:	36	36	88	40	1	228	0	1	0	3	0	3	0	3	0	2	0	3	0
Float Value:	N/A		N/A	N/A	N/A	1	22.8	0.1	0.3		0.3		0.3		0.2		0.3		
Formula:	N/A		N/A	N/A	N/A	((byte 1) + (byte 2 x 256))/10													

20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Cell 7		Cell 8		Cell 9		Cell 10		Cell 11		Cell 12		Cell 13		Cell 14		Cell 15		Cell 16		Check Sum
B1	B2	B1	B2	B1	B2	B1	B2	B1	B2	B1	B2	B1	B2	B1	B2	B1	B2	B1	B2	B1
00	00	00	00	01	00	01	00	00	00	05	00	02	00	03	00	03	00	03	00	CC
0	0	0	0	1	0	1	0	0	0	5	0	2	0	3	0	3	0	3	0	204
0.0		0.0		0.1		0.1		0.1		0.0		0.5		0.2		0.3		0.3		
((byte 1) + (byte 2 x 256))/10																				N/A

Byte No:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Comment:	Header		Command	Data Length	EOC	Mode	Current		Temp 1		Temp 2		SOC	Check Sum	
Hex:	B1	B2	B1	B1	B1	B2	B1	B2	B1	B2	B1	B2	B1	B2	B1
Decimal:	36	36	87	15	14	36	1	0	228	0	131	0	132	91	39
Float Value:	N/A		N/A	N/A	3.620	1	22.8	13.1		13.2		91	91		
Formula:	N/A		N/A	N/A	Volt Form	N/A	((byte 1 x 256) + (byte 2))/10					N/A	N/A		