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	3D	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 Temp		SOC	Discharge End voltage of cell	Charge status	Discharge Status	Check sum
						T1	T2					
2bytes	1byte	1byte	2bytes	1 byte	2bytes	2bytes	2bytes	1byte	2bytes	1 byte	1 byte	1byte
24 24	57	0F	The high byte first then low byte						The high byte first then low byte	1 or 0	1 or 0	

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	((byte 1 x 256) + (byte 2)) / 10	00 AC
Current 1 (A), It is instant current when measure cell impedance	22.8 A	((byte 1) + (byte 2 x 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	(byte 1) + (byte 2 x 256)/10	01 00
Cell Voltages (V)	3.325 V	((byte 1 x 256) + (byte 2)) / 1000	0C FD
Battery Temperatures (℃)[1]	13.1 ℃	((byte 1 x 256) + (byte 2)) / 10	00 83
Battery Capacity (Wh)	47578.742	((b1) + (b2 x 256) + (b3 x 256 x 256) + (b4 x 256 x 256 x 256))/1000	76 FE D5 02
Battery Capacity (Ah)	922.723	((b1) + (b2 x 256) + (b3 x 256 x 256) + (b4 x 256 x 256 x 256))/1000	63 14 0E 00
SOC (0-100%)	91%	Direct	5B
Charge status	0 or 1	direct	1 : Over Charge Protection(P) Voltage trigger, stop charging 0 : Over Charge Release(R) Voltage Trigger, recovery charge
Discharge status	0 or 1	direct	1 : Over discharge Protection(P) Voltage trigger, stop discharging 0 : Over discharge Release(R) Voltage Trigger, recovery discharge

(1) Battery temperature is (signed int) 0xff21 NOT unsigned int. take a FF21 data from COM3 sample, the FF21 is (signed int) 0xff21 NOT unsigned int. the actual decimal data is -223 (65536-65313), then divided by 10, so the temperature is -22.3 celsius degree.

- Data length: From The packet header to check sum(include check sum), more details as below
- 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
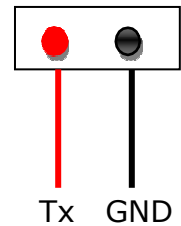
5. Hardware configuration:
   - Please note that the TX signal from BMS is RS232 and is inverted
   - The TX signal voltage level is +5V and -5V
   - The 2-pin port labeled COM3 on the BMS is used to connect to an external reading device

6. Baud rate is 115200

Tx   GND

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
4. The GND of RS232 port of BMS cannot connect to cell 1- or battery negative which is in monitoring.

About data length：

Command 56, the effective data length depends on cell counts, each cell voltage is 2 bytes,

● for BMS24T , the data length is 3D (total 61 bytes), if connect 24S Battery to BMS24T, such as:

24 24 56 **3D** 01 DB 01 D0 04 80 08 79 08 88 08 92 08 7E 08 8D 08 69 08 6A 08 7A 08 6F 08 93 08 79 08 71 08 62 08 6E 08 79 08 79 08 60 08 7B 08 78 08 82 08 62 20 A1 07 00 10 27 00 00 83   TOTAL 61 bytes

if connect to 22S battery to BMS24T, the effective data length is 57 bytes, cell 23 and 24 (4 bytes) should be ignored.

● for BMS16T , the data length is 2D (total 45 bytes), if connect 8S Battery to BMS16T, the effective data length is 1D (29 bytes)

● for BMS8T , the data length is 1D (total 29 bytes), if connect 4S Battery to BMS8T, the effective data length is 15（21 Bytes)

Command 58, for BMS8T, 16T, and 24T, the data length depends on cell counts, each cell impedance is 2 bytes,

● for 4S battery, the data length is 10 (16 bytes)

● for 8S battery, the data length is 18 (24 bytes)

● for 16S battery, the data length is 28 (40 bytes)

● for 24S battery, the data length is 38 (56 bytes)

● for 22S battery, the data length is 34 (52 bytes)

Command 57, the data length is always 13

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
V1.26	Add Discharge End voltage of cell, and charge, discharge status

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 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	
	B1	B2	B1	B1	B1	B2	B1	B2	B1	B2	B1	B2	B1	B2	B1	B2	B1	B2	B1	B2
Hex:	24	24	56	2D	0C	FD	0D	04	0D	04	0D	02	0D	03	0D	04	0D	06	0D	01
Decimal:	36	36	86	45	12	253	13	4	13	4	13	2	13	3	13	4	13	6	13	1
Float Value:					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	
	B1	B2	B1	B1	B1	B1	B2	B1	B2	B1	B2	B1	B2	B1	B2	B1	B2	B1	B2
Hex:	24	24	58	28	01	E4	00	01	00	03	00	03	00	03	00	02	00	03	00
Decimal:	36	36	88	40	1	228	0	1	0	3	0	3	0	3	0	2	0	3	0
Float Value:					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	01	00	00	00	05	00	02	00	03	00	03	00	CC
0	0	0	0	1	0	1	0	1	0	0	0	5	0	2	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
	B1	B2	B1	B1	B1	B2	B1	B1	B2	B1	B2	B1	B2	B1	B1
Hex:	24	24	57	0F	0E	24	01	00	E4	00	83	00	84	5B	27
Decimal:	36	36	87	15	14	36	1	0	228	0	131	0	132	91	39
Float Value:					3.620		1	22.8		13.1		13.2		91	
Formula:	N/A		N/A	N/A	Volt Form		N/A	((byte 1 x 256) + (byte 2))/10						N/A	N/A