Q/SZQY Enterprise standard of Growatt New Energy Co., Ltd.

Q/SZQY—20002—2018

Growatt BMS CAN-Bus-protocol-low-voltage

	File name: Growatt BMS CAN-Bus-protocol-low-voltage_Rev_04	Version number: V1

Rev.	Change	author
V1.01 2018/6/1: Our agreement BMS Protocol_CAN_20180601		Wei Wei
V1.02	2018/11/13: 1. CAN ID: 0x312 to increase the number of battery cells; 2. CANID: 0x315~0x318 to increase the voltage of cells 1 to 16; 3. CAN ID: 0x320 to increase the battery model to 6532; 2018/12/6: 1. CANID: 0x319 Add battery type definition Byte0 bit0-bit1 (00: lithium iron phosphate battery/01: ternary battery/10: lithium titanate battery/11: reserved); 2. CAN ID: 0x320 remove battery model 6532, Byte6-Byte7 are used as Date & Time;	Wang Min
V1.03	2019/02/19: 1. CAN ID: 0x0319 Add the highest and lowest voltage of the reporting unit 2. Add the definition and description of the CAN wiring port of the energy storage machine 3. CANID: 0x315~0x318 is defined as an optional option, and the battery can choose to report; 4. CAN ID: 0x0319 Add the ID of the battery that reports fault protection when connected in parallel	Demon
V1.04	2019/02/22: 1. CAN ID: 0x321 Add remote upgrade report information (ATL)	Demon

1. CAN communication method

ÿ CAN bus specifications CAN Bus adopts

standard frames, and the bus transmission rate is 500kbps

ÿData mode is big-

endian, and the high byte of data is stored in the low byte of the address. The following data types are used in the protocol

and are defined as follows: Serial number data type	Type definition	data length (bytes)	
1	Byte	unsigned char	1
2	Uint16	unsigned short int	2
3	Uint32	unsigned int	4
4	Sint8	signed char	1
5	Sint16	signed short int	2
6	Sint32	signed int	4
7	FP32	float	4

ÿIn communication

mode, after the energy storage device sends a query command or control command frame, the battery pack

device responds with data; the inverter replies with data per second (standard frame/decimal): 0x301: 11-22-33-44-55-

66-77-88; ÿ Interface definition
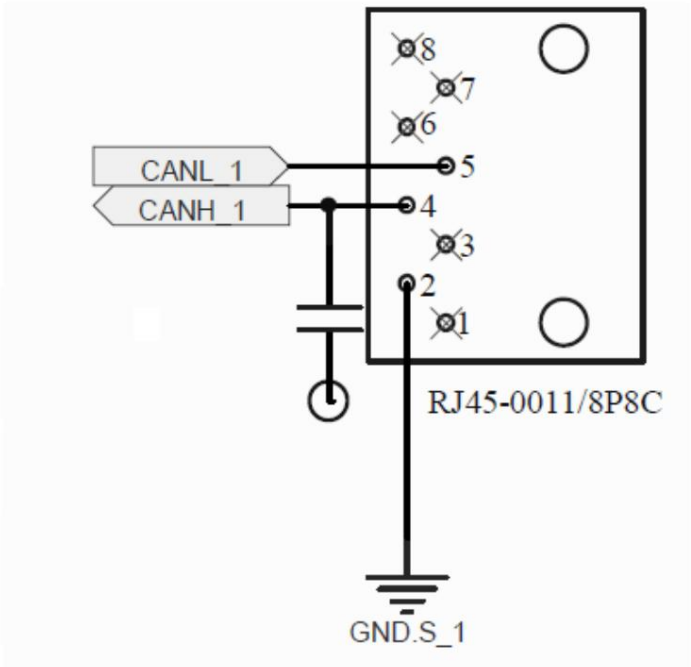
ÿ Explanation of terms

SP: energy storage machine

Cell: battery cell

Pack: A battery pack that encapsulates the BMS system, generally containing multiple batteries

FCC: battery full load capacity

RM: remaining capacity

2. CAN message

CAN ID: 0x311

Byte 0	Battery charge	Unit: 0.1V	Uint16, 2`s
Byte 1	voltage		complement
	Recommended charging voltage (CV)		
Byte 2	Charge current limit charge	Unit: 0.1A	Uint16, 2`s
Byte 3	current limit		complement
Byte4	Discharge current limit	Unit: 0.1A	Uint16, 2`s
Byte 5	discharge current limit		complement
Byte 6	Status	Bit0~11	**Table1**
Byte 7			

Table1: Status bits

Bit Index	content	comment
0	status	00 : soft_starting
1		01 : stand by
		10 : charging
		11 : discharging
2	Error bit flag	1 : "Error" byte valid
		0 : "Error" byte Invalid 0 :
3	Cell balance status	unbalance
		1 : balance
4	sleep status	0 : disable
		1 : enable
5	Output Discharge status	0 : disable
		1 : enable
6	Output Charge status	0 : disable
		1 : enable
7	Battery terminal status	0 : terminal connected
		1 : terminal open
8	Master box Operation Mode 00: Standalone 01:	
9		Parallel
		10: Parallel ready
10	SP Status	00 : none
11		01 : stand by
		10 : charging
		11 : discharging

"Master box Operation Mode": There is no special control in the current SP program, all

The controls are performed by the BMS itself without any   , SP is only identify the state. In the current energy storage program

special control, all the control is done by the battery BMS itself, and the energy storage machine is only used to identify the state.

CAN ID: 0x312

Byte 0	protection	**Table 1**	
Byte 1	protection	**Table 2**	
Byte 2	warning	**Table 3**	
Byte 3	warning warning	**Table 4**	
Byte4	Pack Number The number of batteries connected in parallel	1~254	Uint8
Byte 5	"X"	Example: 0xAA manufacturer code	
Byte 6	"X"	Example: 0xBB	
Byte 7	Total Cell Number Total number of batteries	1~254	Uint8

Table 1

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
DisCharge over current	charge over current	SCD (Short Circuit Discharge) protection	Cell over voltage	Cell under voltage	module over voltage	module under voltage	soft start fail

Table 2

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	bit 0
OTD (Over Temperatusre Discharge) protection	OTC (Over temperature Charge) protection	UTD (Under temperature Discharge) protect the action	UTC (Under Temperature Charge)protsection	System m error	Delta V Fail		

Table 3

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
DisCharge over current	charge over current		Cell over voltage	Cell under voltage	module over voltage	module under voltage	

Table 4

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	bit 2	Bit 1	Bit 0
OTD (Over Temperature Discharge) protection	OTC (Over Temperature Charge)protsection	UTD (Under temperature Discharge)prote action	UTC (Under temperature Charge) protect the action		Delta V Fail	pack before re turn off	internal communication fail

CAN ID: 0x313

Byte 0	Voltage of single module or average module voltage of	Unit: 0.01V	Sint16, 2`s complement
Byte 1	system The voltage of a single module or the average voltage of the system		
Byte 2	Module or system total current	Unit: 0.1A	Sint16, 2`s complement
Byte 3	Single or total system current		
Byte4	Cell maximum	Unit: 0.1ÿ	Sint16, 2`s complement
Byte 5	temperature battery maximum temperature		
Byte 6	SOC of single module or average value of system	Unit: 1%	Uint8
Byte 7	SOH		Bit 0~ Bit6 SOH Counters Bit7: SOH Flag

CAN ID: 0x314

Byte 0	Gauge RM	10mAh	Current capacity
Byte 1			
Byte 2	Gauge FCC	10mAh	Normal fully charged capacity
Byte 3			
Byte4	Delta V	1mV	Difference between the max cell voltage and the min
Byte 5			
Byte 6	Cycle Count	h	
Byte 7			

CAN ID: 0x319

Byte 0	Request & battery type	**Table** 5	
Byte 1	Maximum cell voltage	1mV	Uint16
Byte 2			
Byte 3	Minimum cell voltage	1mV	Uint16
Byte4			
Byte 5	Maximum cell voltage number	1	Uint8
Byte6	Minimum cell voltage number	1	Uint8
Byte7	Protect pack ID Faulty battery address	1	Uint8

Note : When the batteries are connect in parallel ,Cell number starts with the mainfram ,and then the slave .When reporting the highest or lowest voltage of a cell , all the cells should be counted.

Note: When the batteries are connected in parallel, the number of the battery cells starts from the master, then the first slave, the second slave, etc., and the highest or lowest voltage of the single cells reported in parallel is calculated for all the cells together.

Table 5

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
charge enable	Discharge enable	request force charge I* Strong Charge Mark 1	request force charge II* strong charging mark 2			00: lithium iron phosphate battery 01: ternary battery 10: lithium titanate battery 11: reserved	

Please use bit 5, the SOC range is: 5~10%. Bit 4 is NULL.

In this case, inverter itself should set a threshold of SOC: after force charge, only when battery SOC is higher than this threshold then inverter will allow discharge, to avoid force charge and discharge status change frequently.

CAN ID: 0x320

Byte 0	Manufacturer Name XX		ASCII *1 Byte 0 = "0x00"
Byte 1			Byte 1 = "0x01"
Byte 2	Hardware version		range: 1~9
Byte 3	Software version		range: 1~9
Byte 4	Date & Time 1		See **Date & Time bits**
Byte 5	Date & Time 2		See **Date & Time bits**
Byte 6	Date & Time 3		See **Date & Time bits**
Byte 7	Date & Time 4		See **Date & Time bits**

*1 Note: Manufacturer Name is the capital letter of the abbreviation of the battery manufacturer;

Date & Time bits Table

Bit Index	content	comment
0 ~ 5	second	0~59
6 ~ 11	minutes	0~59
12 ~ 16	hours	0~23
17 ~ 21	day	1~31
22 ~ 25	month	1~12
26 ~ 31	year	2000~2063

File name: Growatt BMS CAN-Bus-protocol-low-voltage_Rev_04   Version number: V1

CAN ID: 0x321

Byte 0	Update status Update status	Table6	
Byte 1	Update schedule of single pack single battery upgrade		range: 0~100
Byte 2	progress programming ID of pack upgrade battery address		
Byte 3	Update Successful count The number of successful updates		
Byte 4			
Byte5			
Byte 6			

Table6

Bit 5~Bit7 Bit 3~Bit 4	Bit 1 ~ Bit 2	Bit 0
	00: Slave normal 01: Slave programming 10: Slave update successful 11: Slave update fail	00: Master normal 01: Master programming 10: Master update successful 11: Master update fail	0 : normal Normal operation 1: programming upgrade

The following parameters do not need to be reported when **the battery is connected in parallel, but can be reported when it single.**

CAN ID: 0x315

Byte 0	Cell 1 Voltage	1mV	Uint16
Byte 1			
Byte 2	Cell 2 Voltage	1mV	Uint16
Byte 3			
Byte 4	Cell 3 Voltage	1mV	Uint16
Byte5			
Byte 6	Cell 4 Voltage	1mV	Uint16
Byte 7			

CAN ID: 0x316

Byte 0	Cell 5 Voltage	1mV	Uint16
Byte 1			
Byte 2	Cell 6 Voltage	1mV	Uint16
Byte 3			
Byte 4	Cell 7 Voltage	1mV	Uint16
Byte5			

Byte 6	Cell 8 Voltage	1mV	Uint16
Byte 7			

CAN ID: 0x317

Byte 0	Cell 9 Voltage	1mV	Uint16
Byte 1			
Byte 2	Cell10 Voltage	1mV	Uint16
Byte 3			
Byte 4	Cell 11 Voltage	1mV	Uint16
Byte5			
Byte 6	Cell 12 Voltage	1mV	Uint16
Byte 7			

CAN ID: 0x318

Byte 0	Cell 13 Voltage	1mV	Uint16
Byte 1			
Byte 2	Cell14 Voltage	1mV	Uint16
Byte 3			
Byte 4	Cell 15 Voltage	1mV	Uint16
Byte5			
Byte 6	Cell 16 Voltage	1mV	Uint16
Byte 7			