博强科技
Richpower Technology

BQ BMS ModBus RTU Protocol

Port Support: RS485/RS232

Hardware BMS: BMS014

Version : V0.3

Date : 2019/04/22

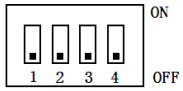
博强科技
Richpower Technology

1. Communication Parameters

1.1 Configuration:

Baud Rate：9600
Parity bit：No
Data Bits：8
Stop Bit：1

BMS code switch:



Communication slave address depend on BMS code switch value. It's range: 0～15.

Swith				Value	Swith				Value
4	3	2	1		4	3	2	1	
OFF	OFF	OFF	OFF	0	ON	OFF	OFF	OFF	8
OFF	OFF	OFF	ON	1	ON	OFF	OFF	ON	9
OFF	OFF	ON	OFF	2	ON	OFF	ON	OFF	10
OFF	OFF	ON	ON	3	ON	OFF	ON	ON	11
OFF	ON	OFF	OFF	4	ON	ON	OFF	OFF	12
OFF	ON	OFF	ON	5	ON	ON	OFF	ON	13
OFF	ON	ON	OFF	6	ON	ON	ON	OFF	14
OFF	ON	ON	ON	7	ON	ON	ON	ON	15

1.2 Port features:

RS232:BMS ignore resqust address number and response self data with self address;
RS485:BMS response which is self address only.

2. Frame format of communication data

2.1 List of function code supported:

Function code	Meaning	Notes
0X01	Read Coil status	Suppored data block PIC/SFA
0X0F	Write Coil status	
0X04	Read command	Suppored data block PIA/PIB/SPA/SCA/HIA/VIA
0X10	Write command	

2.2 0X04 Command

2.2.1 Host node sending

Item	0	1	2	3	4	5	6	7
Field definition	ADDR	CMD	MSB	LSB	MSB	LSB	LSB	MSB
Explanation	BMS address	Type of command(0x04)	Beginning register address		Resister number n		CRC	

2.2.2 Slave node Normal response

Item	0	1	2	3|4...	3+2n	4+2n
Field definition	ADDR	CMD	Length	...	LSB	MSB
Explanation	BMS address	Type of command	2n	register value...	CRC	

2.3 0X10 Command

2.3.1 Host node sending

Item	0	1	2	3	4	5	6	7|8...	7+2n	8+2n
Field definition	ADDR	CMD	MSB	LSB	MSB	LSB	Length	...	LSB	MSB
Explanation	BMS address	Type of command (0x10)	Beginning register address		Resister number n		2n	Resister Value ...	CRC	

2.3.2 Slave node Normal response

Item	0	1	2	3	4	5	6	7
Field definition	ADDR	CMD	MSB	LSB	MSB	LSB	LSB	MSB
Explanation	BMS address	Type of command	Beginning register address		Resister number n		CRC	

2.4 0X01 Command

2.4.1 Host node sending

Item	0	1	2	3	4	5	6	7
Field definition	ADDR	CMD	MSB	LSB	MSB	LSB	LSB	MSB
Explanation	BMS address	Type of command(0x01)	Beginning coil address		Bits number n		CRC	

2.4.2 Slave node Normal response

Item	0	1	2	3...	4+N	5+N
Field definition	ADDR	CMD	Length	...	LSB	MSB
Explanation	BMS address	Type of command	Bytes length N	Coil value...	CRC	

批注 [A1]: 请求是 bits 数目，回复是 Bytes 数目，多出部分填 0

2.5 0X0F Command

2.5.1 Host node sending

Item	0	1	2	3	4	5	6	7	8+N	9+N
Field definition	ADDR	CMD	MSB	LSB	MSB	LSB	Length	...	LSB	MSB
Explanation	BMS address	Type of command (0x0F)	Beginning coil address		Bits number n		Bytes number N	Coil Value ...	CRC	

2.5.2 Slave node Normal response

Item	0	1	2	3	4	5	6	7
Field definition	ADDR	CMD	MSB	LSB	MSB	LSB	LSB	MSB
Explanation	BMS address	Type of command	Beginning coil address		Bits number n		CRC	

2.6 Error Code

2.6.1 Abnormal response of format from slave node

Item	0	1	2	3	4
Field definition	ADDR	CMD+128	Err Code	LSB	MSB
Explanation	Controller address	Type of command +128	Error Code	CRC parity	

2.6.2 Error code defined

Error Code	Defined	Notes
0x01	illegal function	Function that does not supporded
0x02	Illegal data address	Register address that does not supporded
0x03	Illegal data value	Data value is not allowed
0x04	Salve device failure	Salve node fault
0x05	Acknowledge	Need master waiting
0x06	Slave device busy	
0x08	Memory parity error	
0x0A	Gateway path unavailable	
0x0B	Gateway target device failed to respond	
0x81	No history record	
Others	Reservation	

3. Data information

TA01:

Relative Address	Name	名称	R/W	Data type	Bytes	Unit
Pack Info. A(电池信息 PIA)						
1000	Pack Voltage	总压	R	UINT16	2	10mV
1001	Current	电流	R	INT16	2	10mA
1002	Remaining capacity	剩余容量	R	UINT16	2	10mAH

1003	Total Capacity	总容量	R	UINT16	2	10mAH
1004	Total Discharge Capacity	总放电容量	R	UINT16	2	10AH
1005	SOC	电荷状态	R	UINT16	2	0.1%
1006	SOH	健康度	R	UINT16	2	0.1%
1007	Cycle	循环次数	R	UINT16	2	1
1008	Averag of Cell Votage	平均电芯电压	R	UINT16	2	1mV
1009	Averag of Cell Temperature	平均电芯温度	R	UINT16	2	0.1K
100A	Max Cell Voltage	最高电芯电压	R	UINT16	2	1mV
100B	Min Cell Voltage	最低电芯电压	R	UINT16	2	1mV
100C	Max Cell Temperature	最高电芯温度	R	UINT16	2	0.1K
100D	Min Cell Temperature	最低电芯温度	R	UINT16	2	0.1K
100E	System Events	系统事件概要	R	HEX	2	TB01
100F	High Termperature Work time per year	高温工作时间	R	UINT16	2	H
1010	Deep discharge times per year	深放电次数	R	UINT16	2	---
…..						
Pack Info. B(电池信息 PIB)						
2000	Cell1 Voltage	电芯01 电压	R	UINT16	2	1mV
2001	Cell2 Voltage	电芯 02 电压	R	UINT16	2	1mV
2002	Cell3 Voltage	电芯 03 电压	R	UINT16	2	1mV
2003	Cell4 Voltage	电芯 04 电压	R	UINT16	2	1mV
2004	Cell5 Voltage	电芯 05 电压	R	UINT16	2	1mV
2005	Cell6 Voltage	电芯 06 电压	R	UINT16	2	1mV
2006	Cell7 Voltage	电芯 07 电压	R	UINT16	2	1mV
2007	Cell8 Voltage	电芯 08 电压	R	UINT16	2	1mV
2008	Cell9 Voltage	电芯 09 电压	R	UINT16	2	1mV
2009	Cell10 Voltage	电芯 10 电压	R	UINT16	2	1mV
200A	Cell11 Voltage	电芯 11 电压	R	UINT16	2	1mV
200B	Cell12 Voltage	电芯 12 电压	R	UINT16	2	1mV
200C	Cell13 Voltage	电芯 13 电压	R	UINT16	2	1mV
200D	Cell14 Voltage	电芯 14 电压	R	UINT16	2	1mV
200E	Cell15 Voltage	电芯 15 电压	R	UINT16	2	1mV
200F	Cell16 Voltage	电芯 16 电压	R	UINT16	2	1mV
2010	Cell temperature 1	电池温度 1	R	UINT16	2	0.1K
2011	Cell temperature 2	电池温度 2	R	UINT16	2	0.1K
2012	Cell temperature 3	电池温度 3	R	UINT16	2	0.1K
2013	Cell temperature 4	电池温度 4	R	UINT16	2	0.1K
2014	Cell temperature 5	电池温度 5	R	UINT16	2	0.1K
2015	Cell temperature 6	电池温度 6	R	UINT16	2	0.1K
2016	Cell temperature 7	电池温度 7	R	UINT16	2	0.1K
2017	Cell temperature 8	电池温度 8	R	UINT16	2	0.1K
2018	Environment Temperature	环境温度	R	UINT16	2	0.1K

批注 [A2]: 上位机忽略

2019	Power temperature	功率温度	R	UINT16	2	0.1K
…..						
Pack Info. C(电池信息 PIC)						
3000	Cells voltage 08-01low alarm state	电芯08-01电压低	R	HEX	1	1：alarm
3008	Cells voltage 16-09low alarm state	电芯16-09电压低	R	HEX	1	1：alarm
3010	Cells voltage 08-01high alarm state	电芯08-01电压高	R	HEX	1	1：alarm
3018	Cells voltage 16-09 high alarm state	电芯16-09电压高	R	HEX	1	1：alarm
3020	Cell 08-01 temperature Tlow alarm state	电芯温度08-01低	R	HEX	1	1：alarm
3028	Cell 08-01 temperature high alarm state	电芯温度08-01高	R	HEX	1	1：alarm
3030	Cell 08-01 equalization event code	电芯 08-01 均衡事件代码	R	HEX	1	1:on 0:off
3038	Cell 16-09 equalization event code	电芯 16-09 均衡事件代码	R	HEX	1	1:on 0:off
3040	System state code	系统状态代码	R	HEX	1	See TB09
3048	Voltage event code	电压事件代码	R	HEX	1	See TB02
3050	Cells Temperature event code	电芯温度事件代码	R	HEX	1	See TB03
3058	Environment and power Temperature event code	环境温度、功率温度事件代码	R	HEX	1	See TB04
3060	Current event code1	电流事件代码 1	R	HEX	1	See TB05
3068	Current event code2	电流事件代码 2	R	HEX	1	See TB16
3070	The residual capacity code	剩余容量告警	R	HEX	1	See TB06
3078	The FET event code	FET 状态代码	R	HEX	1	See TB07
3080	battery equalization state code	均衡状态代码	R	HEX	1	See TB08
3088	Hard fault event code	硬件失效代码	R	HEX	1	See TB15
…..						
System Parameter (电池配置参数 SPA)						
4000	**Ntc number**	**电芯温度数目**	R	UINT16	2	----
4001	**Cell number serial battery**	**串联电池节数**	R/W	UINT16	2	----
…..						
History Info（历史数据 HIA）						
7000	Remaining record No.	剩余数据条目	R	UINT32	4	---
7002	Record Date	日期和时间	R	8Btyes	8	See TB13
7006	System state code	系统状态代码	R	HEX	1	See TB09
	Voltage event code	电压事件代码	R	HEX	1	See TB02
7007	Cells Temperature event code	电芯温度事件代码	R	HEX	1	See TB03
	Environment and power Temperature event code	环境温度、功率温度事件代码	R	HEX	1	See TB04
7008	Current event code 1	电流事件代码 1	R	HEX	1	See TB05
	Current event code 2	电流事件代码 2	R	HEX	1	See TB16

批注 [A3]: Note:0bit is cell09,the same as bellow in this data block.

批注 [A4]: 涉及电芯电压与温度数据是需要先读取此配置以剔除无效数据

批注 [A5]: 获取历史数据请求使用非标，起始寄存器固定为 0X7000;寄存器数目为 55AA 时请求第一条历史记录；寄存器数目为 AA55 时请求下一条历史记录。

7009	The residual capacity code	剩余容量告警	R	HEX	1	See TB06
	The FET event code	FET 状态代码	R	HEX	1	See TB07
700A	Battery equalization state code	均衡状态代码	R	HEX	1	See TB08
	Hard failt event code	硬件失效代码	R	HEX	1	See TB15
700B	Pack Voltage	总压	R	UINT16	2	10mV
700C	Current	电流	R	INT16	2	10mA
700D	Remaining capacity	剩余容量	R	UINT16	2	10mHA
700E	Cell1 Voltage	电芯 01电压	R	UINT16	2	1mV
700F	Cell2 Voltage	电芯 02 电压	R	UINT16	2	1mV
7010	Cell3 Voltage	电芯 03 电压	R	UINT16	2	1mV
7011	Cell4 Voltage	电芯 04 电压	R	UINT16	2	1mV
7012	Cell5 Voltage	电芯 05 电压	R	UINT16	2	1mV
7013	Cell6 Voltage	电芯 06 电压	R	UINT16	2	1mV
7014	Cell7 Voltage	电芯 07 电压	R	UINT16	2	1mV
7015	Cell8 Voltage	电芯 08 电压	R	UINT16	2	1mV
7016	Cell9 Voltage	电芯 09 电压	R	UINT16	2	1mV
7017	Cell10 Voltage	电芯 10 电压	R	UINT16	2	1mV
7018	Cell11 Voltage	电芯 11 电压	R	UINT16	2	1mV
7019	Cell12 Voltage	电芯 12 电压	R	UINT16	2	1mV
701A	Cell13 Voltage	电芯 13 电压	R	UINT16	2	1mV
701B	Cell14 Voltage	电芯 14 电压	R	UINT16	2	1mV
701C	Cell15 Voltage	电芯 15 电压	R	UINT16	2	1mV
701D	Cell16 Voltage	电芯 16 电压	R	UINT16	2	1mV
701E	Cell temperature 1	电池温度 1	R	UINT16	2	0.1K
701F	Cell temperature 2	电池温度 2	R	UINT16	2	0.1K
7020	Cell temperature 3	电池温度 3	R	UINT16	2	0.1K
7021	Cell temperature 4	电池温度 4	R	UINT16	2	0.1K
7022	Cell temperature 5	电池温度 5	R	UINT16	2	0.1K
7023	Cell temperature 6	电池温度 6	R	UINT16	2	0.1K
7024	Cell temperature 7	电池温度 7	R	UINT16	2	0.1K
7025	Cell temperature 8	电池温度 8	R	UINT16	2	0.1K
7026	Environment temperature	环境温度	R	UINT16	2	0.1K
7027	Power temperature	功率温度	R	UINT16	2	0.1K
.....						
Version Info(版本信息 VIA)						
8000	Factory Names	制造商名称	R	ASCII	20	
800A	Device Names	设备名称	R/W	ASCII	10	
800F	Firmware Version	固件版本	R	ASCII	2	
8010	QR Code	二维码	R/W	ASCII	30	
.....						

批注 [A6]: 上位机不显示

批注 [A7]: 内填写小端在前

批注 [A8]: 写入时不足长度填 0；读取时 0 或者\n 或者\r 截断其它合法 ASCII 字段显示。

TB01:

INDEX	Definition	备注
Bit0	Over Voltage Protection	单体或者总压过压保护
Bit1	Under Voltage Protection	单体或者总压欠压保护
Bit2	Charge over current protection	充电一级或者充电二级过流保护
Bit3	Discharge over current protection	放电一级或者放电二级过流保护
Bit4	Short/Inverse current protection	短路保护或者反接保护
Bit5	High temperature protection	充电过温保护或者放电过温保护或者环境过温保护或者功率过温保护
Bit6	Low temperature protection	充电欠温保护或者放电欠温保护或者环境欠温保护
Bit7	Residual capacity of battery alarm	剩余容量告警
Bit8	Discharging	放电中
Bit9	Chargeing	充电中
Bit10	Charge Online	充电器在线
Others	Reservation	保留

TB02:

	definition
Bit0	Cell over voltage alarm
Bit1	Cell over voltage protection
Bit2	Cell under voltage alarm
Bit3	Cell under voltage protection
Bit4	Pack over voltage alarm
Bit5	Pack over voltage protection
Bit6	Pack under voltage alarm
Bit7	Pack under voltage protection

TB03:

INDEX	Definition
Bit0	Charge high temperature alarm
Bit1	Charge high temperature protection
Bit2	Charge low temperature alarm
Bit3	Charge low temperature protection
Bit4	Discharge high temperature alarm
Bit5	Discharge high temperature protection
Bit6	Discharge low temperature alarm
Bit7	Discharge low temperature protection

TB04:

INDEX	Definition
Bit0	High environment temperature alarm
Bit1	High environment temperature protection
Bit2	Low environment temperature alarm

Bit3	Low environment temperature protection
Bit4	Power high temperature protection
Bit5	Reservation
Bit6	Reservation
Bit7	Reservation

TB05:

INDEX	Definition
Bit0	Charge current alarm
Bit1	Charge over current protection
Bit2	Charge Second level current protection
Bit3	Discharge current alarm
Bit4	Discharge over current protection
Bit5	Dischager Second level current protection
Bit6	Output short circuit protection
Bit7	Second over current latch up(Type BMS)

TB16:

INDEX	Definition
Bit0	Output short latch up
Bit1	Inverse current protection(Specific BMS)
Bit2	Reservation
Bit3	Reservation
Bit4	Reservation
Bit5	Reservation
Bit6	Reservation
Bit7	Reservation

TB06:

INDEX	Definition
Bit0	Reservation
Bit1	Reservation
Bit2	Residual capacity of battery alarm
Bit3	Reservation
Bit4	Reservation
Bit5	Reservation
Bit6	Reservation
Bit7	Reservation

TB07:

INDEX	Definition
Bit0	Discharge FET on
Bit1	Charge FET on
Bit2	Current limiting FET on
Bit3	Heating on
Bit4	Reservation
Bit5	Reservation
Bit6	Reservation
Bit7	Reservation

TB08:

INDEX	Definition
Bit0	Equilibrium module to open
Bit1	Static equilibrium indicate
Bit2	Static equilibrium overtime
Bit3	Equalization temperature limit
Bit4	Cell failure alarm
Bit5	Reservation
Bit6	Reservation
Bit7	Reservation

TB09:

INDEX	Definition
Bit0	Discharge
Bit1	Charge
Bit2	Floating charge
Bit3	Full charge
Bit4	Standby mode
Bit5	Turn off
Bit6	Reservation
Bit7	Reservation

TB10:

INDEX	Definition
Bit0	High environment temperature alarm
Bit1	High environment temperature protection
Bit2	Low environment temperature alarm
Bit3	Low environment temperature protection
Bit4	Power high temperature protection
Bit5	Cell temperature low heating
Bit6	Reservation
Bit7	Reservation

TB11:

INDEX	Definition
Bit0	Residual capacity alarm
Bit1	Intermittent charge
Bit2	External switch control
Bit3	Static standby and sleep mode
Bit4	History data recording
Bit5	Reservation
Bit6	Auto-Limited Charge
Bit7	Reservation

TB12:

INDEX	Definition
Bit0	Buzzer indicator
Bit1	LCD display
Bit2	Reservation
Bit3	Reservation
Bit4	Reservation
Bit5	Reservation
Bit6	Reservation
Bit7	Reservation

TB13:

INDEX	Definition	Data limited	Data type	Bytes	Unit
0	Year_Low	1—9999	UINT16	1	Year
1	Year_High			1	
2	Month	1—12	UINT8	1	Mon
3	Day	1—31	UINT8	1	Day
4	Hour	0—23	UINT8	1	H
5	Minute	0—59	UINT8	1	Min
6	Second	0—59	UINT8	1	s
7	Reservation		UINT8	1	---

TB14:

INDEX	Definition	Data type	Bytes	Unit
0	Set the start date	8 Bytes	8	**See TB13**
8	Set the end date	8 Bytes	8	**See TB13**
16	SpaceTime_Low	UINT16	1	s
	SpaceTime_High		1	

TB15:

INDEX	Definition	Note
Bit0	NTC Fault	Wire break or short
Bit1	AFE Fault	AFE Comm. Error
Bit2	Charge Mosfets Fault	Mosfets short
Bit3	Discharge Mosfets Fault	Mosfets short
Bit4	Cell Fault	Large Voltage different
Bit5	Reservation	
Bit6	Reservation	
Bit7	Reservation	