

MODBUS Protocol between UPS(SMPS) and BMS**(Version V01.05)**

Version	Modify	Date	
V01.01	Init	04-21-2015	
V01.02		08-13-2015	
V01.03	ID arrangement	09-16-2015	
V01.04	Register definition	10-19-2015	
V01.05	Register re-definition	11-30-2015	
V01.06	Add Register for Temp	06-21-2017	

1. Data format

1.1 Data byte format

Start bit(1)	Data bits (8bits,LSB->MSB)	Stop bit(1)
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1.2 Baud rate

Baud rate: 9600~19200. (Default baud rate: 19200)

Reading time interval: **100ms**

1.3 Packet format

Master : UPS/SMPS

Master BMS : 0x10 (Battery module ID-0), Slave BMS: battery module 0x01~0x0f

Address: the ID of the BMS, from 0x01 to 0x10; the default slave address is 0x10(master BMS), battery module ID is 0, as the below table No. 16 in yellow.

No.	Module Address	Battery Module ID	ID Arrangement			
1	0x01	1	ON	ON	ON	OFF
2	0x02	2	ON	ON	OFF	ON
3	0x03	3	ON	ON	OFF	OFF
4	0x04	4	ON	OFF	ON	ON
5	0x05	5	ON	OFF	ON	OFF
6	0x06	6	ON	OFF	OFF	ON
7	0x07	7	ON	OFF	OFF	OFF
8	0x08	8	OFF	ON	ON	ON
9	0x09	9	OFF	ON	ON	OFF
10	0x0a	10	OFF	ON	OFF	ON
11	0x0b	11	OFF	ON	OFF	OFF
12	0x0c	12	OFF	OFF	ON	ON
13	0x0d	13	OFF	OFF	ON	OFF
14	0x0e	14	OFF	OFF	OFF	ON
15	0x0f	15	OFF	OFF	OFF	OFF
16	0x10(Master)	0	ON	ON	ON	ON

1.3.1 Packet send from master

Slave Address	Function code	Starting address(Hi)	Starting address(Lo)	Numbers of data(Hi)	Numbers of data(Lo)	CRC (Lo)	CRC (Hi)
8bit	8bit	8bit	8bit	8bit	8bit	8bit	8bit

1.3.2 Packet response by slave

Slave Address	Function code	Byte count	Data 1 (Hi)	Data1 (Lo)	Data n (Hi)	Data n: (Lo)	CRC (Lo)	CRC (Hi)
8bit	8bit	8bit	8bit	8bit	8bit	8bit	8bit	8bit

2.Function Code

2.1 Read registers

Send by the master SMPS

Slave Address	Function Code	Address (Hi)	Address (Lo)	Num of register(Hi)	Num of register(Lo)	CRC (Lo)	CRC (Hi)
0x01-0x10	0x03	0x00	0x00-0xff	0x00	0x00-0xff	-	-

Response by slave (BMS)

Slave address	Function Code	Byte Count	Data1 (Hi)	Data1 (Lo)	...	Data N (Hi)	Data (Lo)	CRC (Lo)	CRC (Hi)
0x01-0x10	0x03	2*(Num of register)	...	...	...	...	...	...	-

2.2 Write registers

Send by the master SMPS

Slave Address	Function Code	Address (Hi)	Address (Lo)	Num of register(Hi)	Num of Register(Lo)	Byte Count	
0x01-0x10	0x10	0x00	0x00-0xf f	0x00	0x00-0xff	2*(Num of register)	
Data1 (Hi)	Data1 (Lo)	.....		DataN (Hi)	DataN (Lo)	CRC (Lo)	CRC (Hi)
...	-	-

Response by salve (Write success)

Slave Address	Function Code	Address (Hi)	Address (Lo)	Num of register(Hi)	Num of register(Lo)	CRC (Lo)	CRC (Hi)
0x01-0x10	0x10	0x00	0x00-0xff	0x00	0x00-0xff	-	-

Response by salve (Write Error)

Slave address	Function Code	Error num	CRC (Lo)	CRC (Hi)
0x01-0x10	0x090	...	-	-

3.Register

ULONG: Unsigned long,4 bytes

LONG: Signed long, 4 bytes

USHORT: Unsigned int, 2 bytes

SHORT: signed int, 2bytes

Address	Content	Length	RW/Data type	Unit	Comment
0000	Voltage	2byte	R/USHORT	10mV	0~9000*10mV
0001	Current	2byte	R/SHORT	10mA	0~32767: Charge -32768~0:Discharge
0002-0017	Cell Voltage	32byte	R/USHORT	mV	Voltage of 16 Cells, 2 byte for each cell
0018	Temp of PCB	2byte	R/SHORT	℃	Temperature
0019	Temp Avg	2byte	R/SHORT	℃	Temperature
0020	Temp Max	2byte	R/SHORT	℃	Temperature
0021	Cap Remaining	2Byte	R/USHORT		

0022	Max charging Current	2Byte	R/USHOR T		
0023	SOH	2byte	R/USHOR T		0-100%
0024	SOC	2byte	R/USHOR T		0-100%
0025	Status	2byte	R/USHOR T		<p>0x0000:Heating off/Stand by 0x0001:Heating off/Charging 0x0002:Heating off/Discharging 0x0004:Heating off/Protect 0x0008:Heating off/Charging Lmt 0x8000:Heating on/Stand by 0x8001:Heating on/Charging 0x8002:Heating on/Discharging 0x8004:Heating on/Protect 0x8008:Heating on/Charging Lmt</p> <p>The high byte 0x00:Heated state -- off The high byte 0x80:Heated state -- on</p>
0026	Warning	2byte	R/USHOR T		<p>0x0001: Pack OV 0x0002: Cell OV 0x0004: Pack UV 0x0008: Cell UV 0x0010: Charge OC 0x0020: Discharge OC 0x0040: Abnormal ambient temperature 0x0080: MOS temperature high 0x0100: Charge OT 0x0200: Discharge OT 0x0400: Charge UT 0x0800: Discharge UT 0x1000: Low capacity 0x2000: Float Stopped 0x4000:</p>

0027	Protection	2byte	R/USHORT		0x0001: Pack OV 0x0002: Cell OV 0x0004: Pack UV 0x0008: Cell UV 0x0010: Charge OC 0x0020: Discharge OC 0x0040: Abnormal ambient temperature 0x0080: MOS temperature high 0x0100: Charge OT 0x0200: Discharge OT 0x0400: Charge UT 0x0800: Discharge UT 0x1000: Low capacity 0x2000: Discharge SC
0028	Error Code	2byte	R/USHORT		0x0001: Voltage error 0x0002: Temperature error 0x0004: Current detection Error 0x0010: Cell unbalance
0029	Cycle counts	4byte	RW/ULONG		1 ~ 65535
0030					
0031 0032	Full Capacity	4byte	RW/ULONG	mAS	=mAh*3600
0033 0034 0035	Temp	6Byte			Temperature for 6 sensor, 1byte/1Sensor
0036	Cell Num	2byte	RW/SHORT		Battery qty in series
0038	Cell Balance Status	2Byte			0001: Cell 1 balance open 0002: Cell 2 balance open 0004 0008 8000: Cell 16balance open
0040	Switch for HW	2Byte			0001: Charging MOS ON 0002:Discharging MOS ON 0004:Sleep On

					0008:Sound ON
0041	Switch for Warn	2Byte			0x0001: Pack OV Enable 0x0002: Cell OV 0x0004: Pack UV 0x0008: Cell UV 0x0010: Charge OC 0x0020: Discharge OC 0x0040: Abnormal ambient temperature 0x0080: MOS temperature high 0x0100: Charge OT 0x0200: Discharge OT 0x0400: Charge UT 0x0800: Discharge UT 0x1000: PCB OT 0x2000: Low Cap
0042	Switch for Protect	2Byte			0x0001: Pack OV 0x0002: Cell OV 0x0004: Pack UV 0x0008: Cell UV 0x0010: Charge OC 0x0020: Discharge OC 0x0040: Abnormal ambient temperature 0x0080: MOS temperature high 0x0100: Charge OT 0x0200: Discharge OT 0x0400: Charge UT 0x0800: Discharge UT 0x1000: PCB OT 0x2000: Low Cap
0043	Log Duration Idle	2Byte		minute	Record interval when standby
0044	Log Duration Active	2Byte		minute	Record interval when charge and discharge
0045 0046	Date and Time	4Byte			Date and time (Definition see note 1)
0047	Charge OCP model	2Byte			Charge current limit 0: Unlimited current protection 1: Always limit current charging 2: Pr- charge protection 4: Current limit after over charge

					8:Pre-charge +current limit after charge over current
0048	Charge Limit Voltage			mV	Start voltage after charge current limit
0049	SOC stop Float	2Byte		%	Pause floating Soc
0050	SOC Recovery Float	2Byte		%	Recovery floating voltage
0051	Duration Float	2Byte		S	Floating time
0052	Duration Idle	2Byte		S	Pause floating time
0053	Voltage Stop Float	2Byte		0.1V	Pause floating voltage
0054	Voltage Recovery Float	2Byte		0.1V	Recovery floating voltage
0055	Floating Model	2Byte			0000: Continuous floating 0001: Detect voltage 0002: Timing float 0003: Detect SOC
0056	Balance Voltage	2Byte			Balance start voltage
0057	Balance ΔV	2Byte			Balance start voltage difference
0058	Warn Low Capacity	2Byte			Low capacity warning
0059	Delete data record	2Byte			0001: Delete data record
0061	Warn Cell UV	2byte	RW/USH ORT	mV	Cell under-voltage warning
0062	Protect Cell UV	2byte	RW/USH OR	mV	Cell under-voltage protection
0063	Release Cell UV	2byte	RW/USH ORT	mV	Cell under-voltage recovery
0064	Warn Pack UV	2byte	RW/USH ORT	10mV	Pack under-voltage warning

0065	Protect Pack UV	2byte	RW/USH ORT	10mV	Protect Pack under voltage
0066	Release Pack UV	2byte	RW/USH ORT	10mV	Release Pack under voltage
0067	Warn Cell OV	2byte	RW/USH ORT	mV	Cell over-voltage warning
0068	Protect Cell OV	2byte	RW/USH ORT	mV	Cell over-voltage protection
0069	Release Cell OV	2byte	RW/USH ORT	mV	Cell over-voltage recovery
0070	Warn Pack OV	2byte	RW/USH ORT	10mV	Pack over-voltage warning
0071	Protect Pack OV	2byte	RW/USH ORT	10mV	Pack over-voltage protection
0072	Release Pack OV	2byte	RW/USH ORT	10mV	Pack over-voltage recovery
0076	Times Charge OC	2byte	RW/USH ORT	times	Charge over current times
0077	Times Discharge OC	2byte	RW/USH ORT	times	Discharge over current times
0078	Release Charge OC	2Byte	RW/USH ORT	S	Charge over current recovery delay
0079	Release Discharge OC	2Byte	RW/USH ORT	S	discharge over current recovery delay
0080	Protect Charge OC1	2byte	RW/USH ORT	10mA	Charge over current 1
0081	Protect Discharge OC1	2byte	RW/USH ORT	10mA	Discharge over current 1
0082	Load Short	2byte	R/USHOR T	10mA	Short circuit
0083	Protection Charge OC2	2Byte	RW/USH ORT	10mA	Charge over current 2
0084	Protect Discharge OC2	2Byte	RW/USH ORT	10mA	Discharge over current 2
0085	Delay Charge OC1	2Byte	RW/USH ORT	S	Charge over current 1 delay
0086	Delay Charge OC2	2Byte	RW/USH ORT	S	Charge over current 2 delay
0087	Delay Discharge OC1	2Byte	RW/USH	S	Discharge over current 1 delay

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0088	Delay Discharge OC2	2Byte	RW/USH ORT	S	Discharge over current 2 delay
0089		2Byte	RW/USH ORT		
0090	Warn Charge UT	2Byte	RW/SHO RT	℃	Charge low temperature warning (-30 ~+30)
0091	Protect Charge UT	2Byte	RW/SHO RT	℃	Charge low temperature protection (-30 ~+30)
0092	Release Charge UT	2Byte	RW/SHO RT	℃	Charge low temperature recovery (-30~+35)
0093	Warn Charge OT	2Byte	RW/SHO RT	℃	Charge high temperature warning 10~80
0094	Protect Charge OT	2Byte	RW/SHO RT	℃	Charge high temperature protection 10~80
0095	Release Charge OT	2Byte	RW/SHO RT	℃	Charge high temperature recovery 10~80
0096	Warn Discharge UT	2Byte	RW/SHO RT	℃	Discharge low temperature warning -30 ~+30
0097	Protect Discharge UT	2Byte	RW/SHO RT	℃	Discharge low temperature protection -30 ~+30
0098	Release Discharge UT	2Byte	RW/SHO RT	℃	Discharge low temperature recovery -30~+35
0099	Warn Discharge OT	2Byte	RW/SHO RT	℃	Discharge high temperature warning 10~80
00100	Protect Discharge OT	2Byte	RW/SHO RT	℃	Discharge high temperature protection 10~80
00101	Release Discharge OT	2Byte	RW/SHO RT	℃	Discharge high temperature recovery 10~80
00102	Warn PCB OT	2Byte	RW/SHO RT		PCB high temperature warning 60-100
00103	Protect PCB OT	2Byte	RW/SHO RT		PCB high temperature protection 60-100
00104	Release PCB OT	2Byte	RW/SHO RT		PCB high temperature recovery 60-100
0105-0116	Model	24Byte	R		Model
0117-0119	FW Version	6Byte	R		BMS software (6Byte V03R04)
0120-0127	Serial No.	16Byte	RW		Series No
0128	Heating temperature start	2Byte	RW/SHO RT	℃	Range :-10~25℃
0129	Heating temperature close	2Byte	RW/SHO RT	℃	Range :-10~25℃

0130	Ambient low temperature warning	2Byte	RW/SHO RT	°C	Discharge low temperature warning -30 ~+30 default -20
0131	Ambient low temperature protection	2Byte	RW/SHO RT	°C	Discharge low temperature protection -30 ~+30 default -25
0132	Ambient low temperature recovery	2Byte	RW/SHO RT	°C	Discharge low temperature recovery -30~+35 default-20
0133	Ambient high temperature warning	2Byte	RW/SHO RT	°C	Discharge low temperature warning 20 ~+75 default60
0134	Ambient high temperature protection	2Byte	RW/SHO RT	°C	Discharge low temperature protection 20 ~+75 default70
0135	Ambient high temperature recovery	2Byte	RW/SHO RT	°C	放电低温恢复 20~+75 default60

Note 1 :Date and time definition :

Date & Time bits

Bit Index	Content	Comment
0~5	Second	
6~11	Minute	
12~16	Hour	
17~21	Day	
22~25	Month	
26~31	Year	

BMS Data record

0x200 0x201	Date and time	4Byte			Date and time (Definition see note 1)	Date and Time
0x202	Status	2Byte				Status
0x203	Warn	2Byte				Warn
0x204	Protect	2Byte				Protect
0x205	Error	2Byte				Error
0x206	Voltage	2byte	R/USHORT	10mV	0~9000*10mV	Voltage
0x207	Current	2byte	R/SHORT	10mA	0~32767: Charge -32768~0:Discharge	Current
0x208	SOC	2Byte				Soc
0x209 0x20A 0x20B ~	Temp	6Byte			Same as Register33-35	Temp1 Temp2 Temp3 Temp4 Temp5
0x20C 0x20D 0x20E 0x20F 0x210 0x211 0x212 0x213 0x214 0x215 0x216 0x217	Cell Voltage	32Byte				Cell Voltage

0x218						
0x219						
0x21A						
0x21B						
0x220	Date and time	4Byte			Date and time (Definition see note 1)	Date and Time

1. BMS data record start from MODBUS address 0*200
2. Every record takes up 32 Register(64Bytes),the last 8 Bytes retain for back up .
3. Data read record use MODBUS query instruction