FZSoNick

Sodium-Nickel Batteries

Title: **48TLxxx ModBus Protocol**
Revision: 7.1
Issue Date: 04/07/2017

Technical information

This documents describes the RS485 MODBUS communication protocol of the 48TL200 batteries.

UART Modes

The default communication is ASCII mode with 1 Start, 7 Bit, Even, 1 Stop (7-E-1) bits per Byte
The RTU mode is available on request (a firmware update is required), possible configurations are listed below.

	DATA BITS	PARITY	STOP BITS	BAUD
MODE RTU	8	EVEN	1	600 - 115200
MODE RTU	8	ODD	1	600 - 115200
MODE RTU	8	NONE	2	600 - 115200
MODE ASCII	7	EVEN	1	600 - 115200
MODE ASCII	7	ODD	1	600 - 115200
MODE ASCII	7	NONE	2	600 - 115200
***MODE ASCII**	**7**	**EVEN**	**1**	**115200**

* Default setting

The following standard MODBUS functions are implemented:

Function Name	Function Code
Read Input Register	0x04
Report Slave ID	0x11
Terminal Tunnel	0x41

Modbus addresses

Default battery address is 0x02.

0x00	BROADCAST MESSAGES	
0x01	RESERVED FOR BOOTLOADER	(115200,ASCII,**8**,N,1)
0x02	**DEFAULT ADDRESS**	**(115200,ASCII,7,E,1)**
0x03 - 0xF7	FREE	
0xF8 - 0xFF	RESERVED (MODBUS)	

Report Slave ID

Use this function to read the BMS serial number. The answer contains the following string:
"48TL200 " + <BMS SERIAL NUMBER>

Read Input Register

Use this function to read the input registers. Multiple registers can be read at the same time.

Please refer to MODBUS specification for details about message formatting.

ModBus register description

MODBUS REGISTER INDEX	REGISTER INDEX	DATA	UNIT	SCALE FACTOR	OFFSET	MIN DATA VAL	MAX DATA VAL	EXAMPLE: ON PDU	EXAMPLE: RESULT	UNIT	NOTES
999	1	BATT VOLTAGE	V	0.01	0	0	100	**5343**	**53.43**	V	
1000	2	BATT CURRENT	A	0,01	-10000	-400	100	**60000**	**500**	A	see section below
1001	3	BUS VOLTAGE	V	0.01	0	0	100	**5653**	**56.53**	V	
1003	5	Tbatt(AVE)	°C	0.1	-400	-40	500	**3050**	**265**	°C	
1004	6	LedStat	bitmap	1	0	0x0000	0xFFFF			bitmap	see LED bitmap
1005	7	Warning Flags (0-15)	bitmap	1	0	0x0000	0xFFFF			bitmap	see WARNINGS bitmap
1006	8	Warning Flags (16-31)	bitmap	1	0	0x0000	0xFFFF			bitmap	see WARNINGS bitmap
1007	9	Warning Flags (32-47)	bitmap	1	0	0x0000	0xFFFF			bitmap	see WARNINGS bitmap
1008	10	Warning Flags (48-63)	bitmap	1	0	0x0000	0xFFFF			bitmap	see WARNINGS bitmap
1009	11	Alarm Flags (0-15)	bitmap	1	0	0x0000	0xFFFF			bitmap	see ALARMS bitmap
1010	12	Alarm Flags (16-31)	bitmap	1	0	0x0000	0xFFFF			bitmap	see ALARMS bitmap
1011	13	Alarm Flags (32-47)	bitmap	1	0	0x0000	0xFFFF			bitmap	see ALARMS bitmap
1012	14	Alarm Flags (48-63)	bitmap	1	0	0x0000	0xFFFF			bitmap	see ALARMS bitmap
1013	15	IO Status	bitmap	1	0	0x0000	0xFFFF			bitmap	see IO bitmap
1014	16	Board_Temp	°C	0.1	-400	-40	150	**768**	**36.8**	°C	
1015	17	Tc_Center_Temp	°C	0.1	-400	-40	500	**3060**	**266**	°C	
1016	18	Tc_Lat1_Temp	°C	0.1	-400	-40	500	**3055**	**265.5**	°C	
1017	19	Tc_Lat2_Temp	°C	0.1	-400	-40	500	**3054**	**265.4**	°C	
1018	20	RiscC_pwm	per cent	0.1	0	0	100	**634**	**63.4**	per cent	
1019	21	RiscL_pwm	per cent	0.1	0	0	100	**634**	**63.4**	per cent	
1050	52	RTC_Counter_Lo	Seconds								
1051	53	RTC_Counter_Hi	seconds								
1053	55	Battery SOC percent	per cent	0,1	0	0	100	**569**	**56,9**	per cent	

Battery current on ModBus

Calculation executed by the BMS to publish current on ModBus. Modbus value is 16 bit with sign	
(I (mA) / Scale Factor) - Offset	Scale Factor = 10 Offset = -10000

Calculation executed by the user to convert Modbus values (Signed Int) into current (mA)	
(Modbus value + Offset)*Scale Factor	Scale Factor = 10 Offset = -10000

Battery current (mA)	Modbus contents (dec)	Modbus contents (hex signed int)
0	10000	2710
1000	10100	2774
8000	10800	2A30
40000	14000	36B0
-1000	9900	26AC
-50000	5000	1388
-99000	100	0064
-100000	0	0000
-120000	-2000	FFFFFFF830
-150000	-5000	FFFFFFEC78
-200000	-10000	FFFFFFD8F0
-220000	-12000	FFFFFFD120

The following table lists the meaning of used bits in bitmapped registers:

BIT INDEX	ALARM BITMAP registers 11-14	WARNING BITMAP register 7-10	LED BITMAP register 6	IO BITMAP register 15
0	Tam		GREEN_0	MAIN_SWITCH_CLOSED
1		TaM1	GREEN_1	ALARM_OUT_ACTIVE
2	TaM2		AMBER_0	INTERNAL_FAN_ACTIVE
3	Tbm		AMBER_1	VOLT_MEASUREMENT_ALLOWED
4		TbM1	BLUE_0	AUX_RELAY
5	TbM2		BLUE_1	REMOTE_STATE
6		VBm1	RED_0	RISC_ON
7	VBm2		RED_1	
8		VBM1		
9	VBM2			
10		IDM1		
11	IDM2			
12		ISOB		
13	MSWE			
14	FUSE			
15	HTRE			
16	TCPE			
17	STRE			
18	CM E			
19	HWFL			
20	HWEM			
21	ThM			
22	vsm1			
23	vsm2			
24		vsM1		
25	vsM2			
26		iCM1		
27	iCM2			
28		iDM1		
29	iCM2			
30		MID1		
31	MID2			
32		BLPW		
33	CCBF			
34	AhFL			
35		Ah_W		
36	TbCM			
37	BRNF			
38		MPMM		
39		TCMM		
40		TCdi		
41		WMTO		
42	HTFS			
43	DATA			
44-63	NOT USED	NOT USED		

LEDs status is encoded in two bits as explained below:

GREEN_1	GREEN_0	LED STATUS
BLUE_1	BLUE_0	
AMBER_1	AMBER_0	
RED_1	RED_0	
0	0	OFF
0	1	ON
1	0	BLINK SLOW
1	1	BLINK FAST

Setting a new MODBUS address

The MODBUS address can be changed using the "SMCMonitor200.exe" program connected via USB to the battery. Save the new address in a .xml file like the following and then load the file into the battery using the UTILITY-->UPGRADE function of the program. Please be sure to copy the text exactly as it appears here below, apart from the updated value. The value is expressed in hexadecimal notation, free addresses are in the range 0x03 - 0xF7.

```
<?xml version="1.0"?>
<NewParameter>
  <ConfigurationData>
    <Name Value="MODBUS ID" />
    <Version Value="1.0" />
    <Date Value="13-02-2012 08:26:16" />
  </ConfigurationData>
  <MCU>
    <NewParameters>
      <Parameter Name="MODBUS ID" Value="02" />
    </NewParameters>
  </MCU>
</NewParameter>
```

Terminal Tunnel

Terminal Tunnel is a way to access a setpoint register using ModBus.

Charge Current setpoint modification

Battery charging current upper limit can be modified by user if needed.
the max charge currents defined by register 050 as a current per string in mA.

Register Number	050
Default value	8000
Min value	1000
Max Value	8000

The Battery total charge current is defined by the number of active strings present in the battery

Battery type	Max number of active strings	Default charge current set point per string (mA)	Default tot charge current (A)
48TL120	3	8000	24
48TL160	4	8000	32
48TL200	5	8000	40

Sintax to send the ascii command (Note : Data bit on COM port = 7)

:	Colon start code
ADDRESS	ModBus address
TUNNEL CODE	0x41
COMMAND CODE	ASCII CODE for command (W for write , R for read)
DATA1….DATAn	DATA
ENTER	0x0D
CRC	CRC calculated as 2 complement of 8 bit data sum from ADDRESS to ENTER

Example

The following example explains the sequence to write 2000 mA as charge current per string
Register to write is 50. Total char sent is 29

STRING TO SEND : W050=2000<ENTER>

1) PC->BATTERY :0241573035303D323030300DC5<CR><LF>
   CRC is C5 calculated as --> {NOT[((02+41+57+30+35+30+3D+32+30+30+30+0D) AND 0xFF)]}+1

2) BATTERY->PC :0241573035303D323030300DC5<CR><LF>

The following example explains the sequence to read the charge current .
Register to read is 50

STRING TO SEND : R050<ENTER>

1) PC->BATTERY :0241523035300DC9<CR><LF>
2) BATTERY->PC :0241523035300DC9<CR><LF>
3) PC->BATTERY :0241BD<CR><LF> Get Data
4) BATTERY->PC :0241303530203D20323030300DDC<CR><LF> 050 = 2000

Sintax to send rtu command (Note : Data bit on COM port = 8)

ADDRESS	ModBus address
0x41	TUNNEL CODE
COMMAND CODE	HEX ASCII CODE for command (W for write , R for read)
DATA1….DATAn	DATA
ENTER	0x0D
CRC	CRC 16 bit compliant to MODBUS standard (http://www.tahapaksu.com/crc/)

Example

The following example explains the sequence to write 2000 mA as charge current per string
Register to write is 50. Total char sent is 14

STRING TO SEND : W050=2000<ENTER>

1) PC->BATTERY 02 41 57 30 35 30 3D 32 30 30 30 0D 3E A9
2) BATTERY->PC 02 41 57 30 35 30 3D 32 30 30 30 0D 3E A9

The following example explains the sequence to read the charge current .
Register to read is 50

STRING TO SEND : R050<ENTER>

1) PC->BATTERY 02 41 52 30 35 30 3D 44 C2
2) BATTERY->PC 02 41 52 30 35 30 3D 44 C2
3) PC->BATTERY 02 41 C0 E0 Get Data
4) BATTERY->PC 02 41 30 35 30 20 3D 20 32 30 30 30 0D 49 0E 050 = 2000