

SOFARSOLAR

ModBus-RTU Communication Protocol

2017-11-27

一.General Information

二. Instruction

2. Modbus Function Format

2.1 Broadcast data frames information (Address 0x88)

2.1.1. Time calibration automatically

Slave Address	0x88
Function Code	0x02
Register address Hi	0x50
Register address Lo	0x00
Register number Hi	0x00
Register number Lo	0x03
Data field (second)	
Data field (minute)	
Data field (hour)	
Data field (day)	
Data field (month)	
Data field (year)	
CRC check code Lo	
CRC check code Hi	

Address list of Time calibration automatically

Address	Define	Variable types	Length	Range	Default value	Remarks
0x5000	Time calibration automatically	BCD				

2.2 Packet Format (Function Code 0x03)

Query

Slave Address	Function Code	Starting Address	Number of Registers	CRC16
1 byte	1 byte	2 bytes	2 bytes	2 bytes
0xxx	0xxx	Hi Byte Lo Byte	Hi Byte Lo Byte	Lo Byte Hi Byte

Response

Slave Address	Function Code	Byte Count	Register-1 value	...	Register-N value	CRC16
1 byte	1 byte	1 byte	2 bytes	N-2	2 bytes	2 bytes
Byte	Byte	Byte	Hi Byte Lo Byte	...	Hi Byte Lo Byte	Lo Byte Hi Byte

request:

Slave Address	0x01
Function Code	0x03
Register address Hi	0x00
Register address Lo	0x00
Register number Hi	0x00
Register number Lo	0x01
CRC check code Lo	0x84
CRC check code Hi	0x0A

response:

Slave Address	0x01
Function Code	0x03
number of bytes	0x02
Register value Hi	0x00
Register value Lo	0x00
CRC check code Lo	0xB8
CRC check code Hi	0x44

2.2.2 Read storage inverter address list

Fault Message:

Byte0

bit	Error Message	ID code(detailed)
Bit0	GridOVP	ID01 Grid Over Voltage Protection
Bit1	GridUVP	ID02 Grid Under Voltage Protection
Bit2	GridOFP	ID03 Grid Over Frequency Protection
Bit3	GridUFP	ID04 Grid Under Frequency Protection
Bit4	BatOVP	ID05 Battery Over Voltage

		Protection
Bit5	reserved	reserved ID06
Bit6	reserved	reserved ID07
Bit7	reserved	reserved ID08

Byte1

bit	Error Message	ID code(detailed)
Bit0	HW_LLCCBus_OVP	LLCCBus Over Voltage Hardware Protection ID09
Bit1	HW_Boost_OVP	Bus Over Voltage Hardware Protection ID10
Bit2	HwBuckBoostOCP	BuckBoost over Current Hardware Protection ID11
Bit3	HwBatOCP	Battery over Current Hardware Protection ID12
Bit4	reserved	reserved ID13
Bit5	reserved	reserved ID14
Bit6	HwAcOCP	Output Current Hardware Protection
Bit7	reserved	reserved ID16

Byte2

bit	Error Message	ID code(detailed)
Bit0	HwADFaultIGrid	The Grid current sampling is error ID17
Bit1	HwADFaultDCI	The DCI sampling is error ID18
Bit2	HwADFaultVGrid	The Grid voltage sampling is error ID19
Bit3	reserved	Reserved ID20
Bit4	MChip_Fault	Main chip fault ID21
Bit5	HwAuxPowerFault	Hardware auxiliary power fault ID22
Bit6	reserved	Reserved ID23
Bit7	reserved	reserved ID24

Byte3

bit	Error Message	ID code(detailed)
Bit0	LLCCBusOVP	LLCCBus Over Current protection ID25
Bit1	SwBusOVP	Bus Over Voltage software protection ID26
Bit2	BatOCP	Battery Over Current protection ID27
Bit3	DciOCP	Dci Over Current Protection ID28
Bit4	SwOCPInstant	Output over current software protection ID29
Bit5	BuckOCP	Buck Over Current Protection ID30

Bit6	AcRmsOCP	Output over current protection ID31
Bit7	reserved	Reserved ID32

Byte4

bit	Error Message	
Bit0	reserved	Reserved ID33
Bit1	reserved	Reserved ID34
Bit2	reserved	Reserved ID35
Bit3	reserved	Reserved ID36
Bit4	reserved	Reserved ID37
Bit5	reserved	Reserved ID38
Bit6	reserved	Reserved ID39
Bit7	reserved	Reserved ID40

Byte5

bit		
Bit0	reserved	Reserved ID41
Bit1	reserved	Reserved ID42
Bit2	reserved	Reserved ID43
Bit3	reserved	Reserved ID44
Bit4	reserved	Reserved ID45
Bit5	reserved	Reserved ID46
Bit6	reserved	Reserved ID47
Bit7	reserved	Reserved ID48

Byte6

bit		
Bit0	ConsistentFault_VGrid	The grid voltage sampling value between the master and slave DSP is Vary widely ID49
Bit1	ConsistentFault_FGrid	The grid frequency sampling value between the master and slave DSP is Vary widely ID50
Bit2	ConsistentFault_DCI	The DCI sampling value between the master and slave DSP is Vary widely ID51
Bit3	BatCommunicationFlag	Battery communication fault ID52
Bit4	SpiCommLose	SPI communication fault ID53
Bit5	SciCommLose	SCI communication fault ID54
Bit6	RecoverRelayFail	The relay is fault ID55
Bit7	reserved	Reserved ID56

Byte7

bit		
Bit0	OverTempFault_BAT	The inverter temp is too high ID57
Bit1	OverTempFault_HeatSink	The boost temp is too high ID58
Bit2	OverTempFault_Env	The environment temp is too high

		ID59
Bit3	reserved	Reserved ID60
Bit4	reserved	Reserved ID61
Bit5	reserved	Reserved ID62
Bit6	reserved	Reserved ID63
Bit7	reserved	Reserved ID64

Byte8

bit		
Bit0	unrecoverHwAcOCP	The grid current is too high,and has cause unrecoverable fault ID65
Bit1	unrecoverBusOVP	The bus voltage is too high,and has cause unrecoverable fault ID66
Bit2	BitEPSunrecoverBatOcP	EPS Mode Battery Over current,and has cause unrecoverable fault ID67
Bit3	reserved	Reserved ID68
Bit4	reserved	Reserved ID69
Bit5	unrecoverOCPIstant	The Output current is too high,and has cause unrecoverable faultID70
Bit6	reserved	Reserved ID71
Bit7	reserved	Reserved ID72

Byte9

bit		
Bit0	reserved	ID73
Bit1	reserved	ID74
Bit2	unrecoverEEPROM_W	Write EEPROM unrecoverable fault ID 75
Bit3	unrecoverEEPROM_R	Read EEPROM unrecoverable fault ID 76
Bit4	unrecoverRelayFail	The relay is fault, and has cause unrecoverable fault ID 77
Bit5	reserved	Reserved 78
Bit6	reserved	Reserved 79
Bit7	reserved	Reserved 80

Inverter alert message Message:

byte0

bit		
Bit0	OverTempAlarmLoadShedding	The inverter has derated because of the temperature is too high ID81
Bit1	OverFreqAlarmLoadShedding	inverter has derated because of the grid frequency is too high ID82
Bit2	bitlongdistLoadShedding	inverter has derated by remote

		control ID83
Bit3	bitlongdistOFF	inverter has shut down by remote control ID84
Bit4	reserved	reserved
Bit5	reserved	reserved
Bit6	reserved	reserved
Bit7	batLowVoltageAlarm	Battery Low Voltage Alert ID85

Inverter alert message: byte1

bit		
Bit0	reserved	reserved
Bit1	reserved	reserved
Bit2	reserved	reserved
Bit3	reserved	reserved
Bit4	reserved	reserved
Bit5	reserved	reserved
Bit6	reserved	reserved
Bit7	reserved	reserved

Communication board inner message: byte0

bit		
Bit0	reserved	Reserved ID91
Bit1	reserved	Reserved ID92
Bit2	reserved	Reserved ID93
Bit3	Software version is not consistent	Software version is not consistent ID94
Bit4	CommEEPROMFault	The communication board EEPROM is fault ID95
Bit5	RTCFault	RTC clock chip is fault ID96
Bit6	InValidCountry	The country is invalid ID97
Bit7	SDfault	The SD card is fault ID98

Communication board inner message: byte1

bit		
Bit0	reserved	reserved
Bit1	reserved	reserved
Bit2	reserved	reserved
Bit3	reserved	reserved
Bit4	reserved	reserved
Bit5	reserved	reserved
Bit6	reserved	reserved
Bit7	reserved	reserved

Battery fault message list: byte0

bit		
Bit0	BatOCD	Discharge over current protection ID100
Bit1	BatSCD	Discharge short-circuit

		protection ID101
Bit2	BatOV	Battery over voltage protection ID102
Bit3	BatUV	Battery under voltage protection ID103
Bit4	BatOTD	Discharge over temperature protection ID104
Bit5	BatOTC	Charge over temperature protection ID105
Bit6	BatUTD	Discharge under temperature protection ID106
Bit7	BatUTC	Charge under temperature protection ID107

Battery fault message list: byte1 - byte9

bit		
Bit0	reserved	reserved
Bit1	reserved	reserved
Bit2	reserved	reserved
Bit3	reserved	reserved
Bit4	reserved	reserved
Bit5	reserved	reserved
Bit6	reserved	reserved
Bit7	reserved	reserved

Country code list:

00	Germany VDE4105	01	CEI0-21 Internal
02	Australia	03	Spain RD1699
04	Turkey	05	Denmark
06	Greece Continent	07	Netherland
08	Belgium	09	UK-G59
10	China	11	France
12	Poland	13	Germany BDEW
14	Germany VDE0126	15	Italy CEI0-16
16	UK G83	17	Greece island
18	EU EN50438	19	EU EN61727
20	Korea	21	Sweden
22	Europe General	23	CEI0-21 External
24	Cyprus	25	India
26	Philippines	27	NewZealand
28	Reserve	29	Reserve

Running state:

- 0: WaitState waiting state
- 1: CheckState charging check state
- 2: NormalState charging state
- 3: CheckDischargeState discharging check state
- 4: DischargeState discharging state
- 5: EPSState EPS state
- 6: FaultState fault state
- 7: PermanentState permanent fault state

Storage inverter data address list

Address	Define	Variable types	Length	Range	Default value	
0x0200	Running state					
0x0201	Fault message list 1	Uint	16			High-Byte:byte1,Low-Byte:byte0
0x0202	Fault message list 2	Uint	16			High-Byte:byte3,Low-Byte:byte2
0x0203	Fault message list 3	Uint	16			High-Byte:byte5,Low-Byte:byte4
0x0204	Fault message list 4	Uint	16			High-Byte:byte7,Low-Byte:byte6
0x0205	Fault message list 5	Uint	16			High-Byte:byte9,Low-Byte:byte8
Address	Define	Variable types	Length	Range	Default value	unit
0x0206	Grid A Voltage	Uint	16	0-1000V		0.1V
0x0207	Grid A Current	int	16	-20-20A		0.01A
0x0208	Grid B Voltage	Uint	16	0-1000V		0.1V
0x0209	Grid B Current	int	16	-20-20A		0.01A
0x020A	Grid C Voltage	Uint	16	0-1000V		0.1V
0x020B	Grid C Current	int	16	-20-20A		0.01A
0x020C	Grid Frequency	Uint	16	0-1000V		0.01Hz
0x020D	Charge/Discharge power	int	16	-10-10 KW		0.01KW
0x020E	Battery Voltage	Uint	16	0-100V		0.1V
0x020F	Battery Charge/Discharge current	int	16	-100-100 A		0.01A
0x0210	The residual capacity of battery	Uint	16	0-100		1%
0x0211	Battery					

	temperature					
0x0212	Feed in/out power	int	16	-10-10 KW		0.01KW
0x0213	The power of the load	Uint	16	0-10 KW		0.01KW
0x0214	Input/Output power	Int	16	-10-10KW		0.01KW
0x0215	The power of generation	Uint	16	0-10 KW		0.01KW
0x0216	EPS output voltage	Uint	16			0.1V
0x0217	EPS output power	Uint	16			0.01KW
0x0218	Generation of one day	Uint	16	0-65536		0.01KWh
0x0219	The power sell to grid of today	Uint	16	0-65536		0.01KWh
0x021A	The power buy from grid of today	Uint	16	0-65536		0.01KWh
0x021B	Today consumption of the load	Uint	16	0-65536		0.01KWh
0x021C	Total generation High-Byte	Uint	16	0-65536		1KWh
0x021D	Total generation Low-Byte	Uint	16	0-65536		1KWh
0x021E	Total power sell to grid,High-Byte	Uint	16	0-65536		1KWh
0x021F	Total power sell to grid,Low-Byte	Uint	16	0-65536		1KWh
0x0220	Total energy buy from grid,High-Byte	Uint	16	0-65536		1KWh
0x0221	Total energy buy from grid,Low-Byte	Uint	16	0-65536		1KWh
0x0222	Total consumption of the load,High-Byte	Uint	16	0-65536		1KWh
0x0223	Total	Uint	16	0-65536		1KWh

	consumption of the load,Low-Byte					
0x0224	reserved					
0x0225	reserved					
0x0226	reserved					
0x0227	reserved					
0x0228	reserved					
0x0229	reserved					
0x022A	The countdown time	Uint	16			
0x022B	Inverter alert message	Uint	16			
0x022C	Battery cycle times	Uint	16	0-65536		
0x022D	INV bus voltage	int	16			0.01A
0x022E	LLC bus voltage	Uint	16			
0x022F	Buck current	Uint	16			
0X0230	Grid R Voltage	Uint	16			0.1V
0X0231	Grid R Current	Uint	16			0.01A
0X0232	Grid S Voltage	Uint	16			0.1V
0X0233	Grid S Current	Uint	16			0.01A
0X0234	Grid T Voltage	Uint	16			0.1V
0X0235	Grid T Current	Uint	16			0.01A
0X0236	Generation current	Uint	16	0-100		
0X0237	Battery power	int	16			reserved
0X0238	Inner temperature	int	16	-127-127		1°C
0X0239	Heat sink temperature	int	16	-127-127		1°C
0X023A	Country	Uint	16			
0X023B	Current dc component	int	16			1mA
0X023C	Voltage dc component	int	16			0.1V
0X023D	Battery fault message 1	Uint	16			High-Byte:byte1,Low-Byte:byte0
0X023E	Battery fault message 2	Uint	16			High-Byte:byte3,Low-Byte:byte2
0X023F	Battery fault message 3	Uint	16			High-Byte:byte5,Low-Byte:byte4
0X0240	Battery fault message 4	Uint	16			High-Byte:byte7,Low-Byte:byte6

0x0241	Battery fault message 5	Uint	16			High-Byte:byte9,Low-Byte:byte8
0x0242	Communication board inner message	Uint	16			High-Byte:byte1,Low-Byte:byte0
0x0243	Today generation time	Uint	16			1min
0x0244	Total generation time High-Byte	Uint	16			1hour
0x0245	Total generation time,Low-Byte	Uint	16			1hour

2.3 Read command2 (function code0x04)

2.3.1Read the data format

Request:

Slave Address	Function Code	Starting Address	Number of Registers	CRC16
1byte	1byte	2bytes	2bytes	2bytes
Byte	Byte	Hi Byte Lo Byte	Hi Byte Lo Byte	Hi Byte Hi Byte

Request:

Slave Address	Function Code	Byte Count	Register-1 value	...	Register-N value	CRC16
1byte	1byte	1byte	2bytes	N-2	2bytes	2bytes
Byte	Byte	Byte	Hi Byte Lo Byte	...	Hi Byte Lo Byte	Lo Byte Hi Byte

Example request:

Address of device	0x01
Function code	0x04
address of register (Hi)	0x10
address of register (Lo)	0x00
number of register (Hi)	0x00
number of register (Lo)	0x01
CRC check code (Lo)	0x35
CRC check code (Hi)	0x0A

response:

Address of device	0x01
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Function code	0x04
The amount of bytes	0x02
value of register (Hi)	0x00
value of register (Lo)	0x00
CRC Check code Lo	0xB9
CRC Check code Hi	0x30

2.3.2 Read inverter setting parameters address list

Battery parameter register							
Address	Define	Variable types	Length	Range	Default value	Remarks:	
0x10B0	Battery type	Uint	16			V1.00: 0x0000—DA RFON 0x0001—PYL ON 0x0003—SOL TARO 0x0080—TEL E 0x0100—DEF AULT V1.20: 0x0000—DA RFON 0x0001—PYL ON 0x0002—SOL TARO 0x0003—ALP HA.ESS 0x0004—GE NERAL 0x0100—DEF AULT	
0x10B1	Battery capacity	Uint	16	0-999 Ah		Unit: 1Ah	
0x10B2	Energy management model	Uint	16			reserved	
0x10B3	Max charge voltage	Uint	16	50.0-5 8.0V		Unit: 0.1V	
0x10B4	Max charge current	Uint	16	0-65.0 0A		Unit: 0.01A	
0x10B5	Over voltage protection	Uint	16	50.0-5 8.5V		Unit: 0.1V	

	point						
0x10B6	Min discharge voltage	Uint	16	42.0-52.0V		Unit: 0.1V	
0x10B7	Max discharge current	Uint	16	0-70.00A		Unit: 0.01A	
0x10B8	Under voltage protection point	Uint	16	42.0-52.0V		Unit: 0.1V	
0x10B9	Discharge depth	Uint	16	0-100%		Unit: 1%	
0x10B4	Periods of discharge time	Uint	16	0-24h		reserved	
0x10BB	Empty battery voltage	Uint	16	42.50-47.00V		Unit: 0.01V	
0x10BC	Full battery voltage	Uint	16	47.01-55.00V		Unit: 0.01V	

2.3.3 Read inverter information address list

Inverter information						
Address	define	Variable types	Length	Range	Default value	
0x2000	Production code					
0x2001~0x2007	S/N number					
0x2008~0x2009	Software version					
0x200A~0x200B	Hardware version					
0x200C~0x200F	reserved					

S/N definition list:

ID	Value	
1	'S'	sofar
2-3	"A1" or "M1" or "C1"	A1 (1.1-6kW, M1 Micro-inverter, C1 10-20kW, D1 30-40kW, E1

		storage inverter)
4	E/U	E (Europe, Australian, China) , U(America)
5-6	"S0" or " S1" or" S2" or" "S3" or" S4" or" S5" or" S6"	
7-8		
9	YEAR (2000-2035)	00 (0) 01 (1) 02 (2) 03 (3) 04 (4) 05 (5) 06(6) 07 (7) 08 (8) 09 (9) 10 (A) 11 (B) 12 (C) 13 (D) 14 (E) 15 (F) 16 (G) 17 (H) 18 (I) 19 (J) 20 (K) 21 (L) 22 (M) 23 (N) 24 (O) 25 (P) 2 (Q) 27 (R) 28 (S) 29 (T) 30 (U) 31 (V) 32 (W) 33 (X) 34 年 (Y) 35years (Z)
10	MONTH	1month(1)2month(2)3month (3) 4month (4) 5 月 month5) 6month (6) 7month (7) 8month (8) 9month (9) 10month (A) 11month (B) 12month (C)
11	DAY	1th (1) 2th (2) 3th (3) 4th (4) 5th (5) 6th (6) 7th (7) 8th (8) 9th (9) 10th (A) 11th (B) 12th (C) 13th (D) 14th (E) 15th (F) 16th (G) 17th (H) 18th (I) 19th (J) 20th (K) 21th (L) 22th (M) 23th (N) 24th (O) 25th (P) 26th (Q) 27th (R) 28th (S) 29th (T) 30th (U) 31th (V)
12-14	xxx	001 (The numbers of that day)