Growatt PV Inverter Modbus RS485 RTU Protocol

V3.04

2013-02-28

Growatt New Energy CO.,LTD

No.	Version	Date	Notice	Signature
1	V1.00	2011-8-30	The first version	Paco
2	V1.10	2011-10-20	X	Lin
3	V2.01	2011-11-2	Update Modbus mostly protocol	Xin.Chen
…	…	…	…	…
19	V3.00	2012-8-15	add 3-113~115, 4-48~63, 4-450~575,	Jumi
20	V3.01	2012-11-22	Add many CEI registers	Jumi
21	V3.02	2013-01-26	Add some reserved registers	Jumi
22	V3.03	2013-01-30	Change 485 Time out limit	Jumi
23	V3.04	2013-02-28	Chang holding 80 and 150	Jumi

V2.01   2011-11-2:

    1, Update the four register map tables

    2, Add maximum data length define

    3,Change the parity type of RS232

V2.02 2011-11-4:

    1, Add the flash command

V2.03 2012-03-01

    1, Combine the read and write register map table

    2, Update the register map of 4.1 and 4.2 by blue marked;

V2.04 2012-03-05

    1， Add system time read and write cmd

V2.05 2012-03-06

    1, Add Grid V/F Outrange protect time read and write cmd

V2.06 2012-03-21

    1, Add Auto test start cmd;

    2, Move Manufacturer   info from 13 to 60.

V2.07 2012-04-19

    1, Add holding registers: 13~15, 40~45, 68~71, 73, 74;

V2.08 2012-04-28

    1, Shift the all reg address, start at 0x0000;

V2.09 2012-05-09

    1, Add 4-45 PF register, to read and adjust inverter output PF;

    2,Add3-90~99 registers, to set the PF limit line,(this function is resaved for internal);

V2.10 2012-05-10

    1, Add 4-180~429 registers, for the 50 records of the inverter error info;

V2.11 2012-05-29

    1, Add 3-1,100~107 registers, for the frequency – load limit rate and the PF check adjust values;

    2, Change the Input Pac registers's unit, from watt to power (W--VA) ;

V2.12 2012-06-14

    1, Change 3-3 register define;

    2, Change 3-90~99 registers, change the PF line   define;

    3, Add 3-135~138 grid spec network command password registers,

V2.13 2012-06-27

    1, chg 3-99 register, add 3-108~112

V2.14 2012-07-17

    1, add 3-74 euro inverter spec select cmd, 3-98 CEI freq. test cmd;

    2,add 3-80~89, 4-80~89 resaved registers,   for the outsourcing device updating;

V2.15 V2.16 2012-07-31

    1, add 4-48~63   pv energy , reactive power and energy registers;

V3.00 2012-08-15

    1, add 3-113~115 registers, for CEI021 model set;

    2, add 4-48~63 registers, for PV energy and reactive ac energy;

    3, add 4-450~575 registers, for history energy records;

V3.01 2012-11-22:

    1,add 3-75 232T485Enable;

    2,add 3-116~119, 6KwSystem, FrequencyDeratingEnable, QlockOutpower, RestartDelayTime

    3,add 4-47 DeratingMode;

    4,add others;

V3.02 2013-01-26:

    1,add power control registers in holding map;

    2,add debug resaved registers in input map;

    3,change 24 hours energy means;

    4, notice the minimum period of the CMD;

V3.03 2013-01-30:

    1,change 485 time out limit;

V3.04 2013-02-28:

    1,change holding 80 register to ODM factory Info;

    2,add holding 81 register for the point of over-frequency derate load;

    2,add holding 150 register to start Fan check;

1 Data format

Address	Function	Data	CRC check
8 bits	8 bits	N×8bits	16bits

Valid slave device addresses are in the range of 0 – 247 decimal.

The individual slave devices are assigned addresses in the range of 1 – 247.

0 is the broadcast address

It is 16bits (two bytes) unsigned integer for each holding and input register;

2 Command Format

Function 3 Read holding register

```
QUERY

Field Name                     Example
                               (Hex)

Slave Address                  11
Function                       03
Starting Address Hi            00
Starting Address Lo            6B
No. of Points Hi               00
No. of Points Lo               03
Error Check (LRC or CRC)       —
```

```
RESPONSE

Field Name                     Example
                               (Hex)

Slave Address                  11
Function                       03
Byte Count                     06
Data Hi (Register 40108)       02
Data Lo (Register 40108)       2B
Data Hi (Register 40109)       00
Data Lo (Register 40109)       00
Data Hi (Register 40110)       00
Data Lo (Register 40110)       64
Error Check (LRC or CRC)       —
```

Response Error:

    11 0x80|0x03 Errornum CRC   (Errornum as a byte)

Function 4 Read input   register

```
QUERY

                                Example
Field Name                      (Hex)

Slave Address                   11
Function                        04
Starting Address Hi             00
Starting Address Lo             08
No. of Points Hi                00
No. of Points Lo                01
Error Check (LRC or CRC)        —
```

```
RESPONSE

                                Example
Field Name                      (Hex)

Slave Address                   11
Function                        04
Byte Count                      02
Data Hi (Register 30009)        00
Data Lo (Register 30009)        0A
Error Check (LRC or CRC)        —
```

Response Error:

    11 0x80|0x04 Errornum CRC   (Errornum as a byte)

Function 6 Preset single register

```
QUERY

                                Example
Field Name                      (Hex)

Slave Address                   11
Function                        06
Register Address Hi             00
Register Address Lo             01
Preset Data Hi                  00
Preset Data Lo                  03
Error Check (LRC or CRC)        —
```

```
RESPONSE

                            Example
Field Name                  (Hex)

Slave Address               11
Function                    06
Register Address Hi         00
Register Address Lo         01
Preset Data Hi              00
Preset Data Lo              03
Error Check (LRC or CRC)    —
```

Response Error:

11 0x80|0x06 Errornum CRC   (Errornum as a byte)

Function 16 Preset multiple register

```
QUERY

                            Example
Field Name                  (Hex)

Slave Address               11
Function                    10
Starting Address Hi         00
Starting Address Lo         01
No. of Registers Hi         00
No. of Registers Lo         02
Byte Count                  04
Data Hi                     00
Data Lo                     0A
Data Hi                     01
Data Lo                     02
Error Check (LRC or CRC)    —
```

```
RESPONSE

                            Example
Field Name                  (Hex)

Slave Address               11
Function                    10
Starting Address Hi         00
Starting Address Lo         01
No. of Registers Hi         00
No. of Registers Lo         02
Error Check (LRC or CRC)    —
```

Response Error:

11 0x80|0x10 Errornum CRC   (Errornum as a byte)

3 Device Message Transmission Mode / Framing

RTU Mode

When controllers are setup to communicate on a Modbus network using RTU (Remote Terminal Unit) mode, each 8–bit byte in a message contains two 4–bit hexadecimal characters. Each message must be transmitted in a continuous stream.

The format for each byte in RTU mode is:

Coding System: 8–bit binary, hexadecimal 0–9, A–F

Two hexadecimal characters contained in each

8–bit field of the message

Bits per Byte:

1 start bit

8 data bits, least significant bit sent first

None parity

1 stop bit

Error Check Field: Cyclical Redundancy Check (CRC)

The baud rate of the transmission is:

Baud Rate: 9600 bps

Minimum CMD period (RS485 Time out): 850ms.

Wait for minimum 850ms to send a new CMD after last CMD. Suggestion is 1s;

Maximum Data Length Define:

Maximum read data length is 45 words in read command;

Maximum update data length is 45 words in preset command;

Read or update registers NO. should in the range of times of 45,

eg: 1~45 or 96~123 are OK,   but 40~60 is not OK;

Note:

Except the CEI0-21 and VDE-AR-N 4105 power management registers, you should refer the manufactory's suggestion when writing other registers;

4 Register map

It is 16bits (two bytes) unsigned integer for each holding and input register;

4.1 Holding Reg

Register NO.	Variable Name	Description	Customer Write	Value	Unit	Initial value	Note
00	OnOff	The Inverter On/Off state and the auto start state, The low byte is the on/off(1/0), the high byte is the auto start state or not(1/0).	W	0x0000; 0x0001; 0x0100; 0x0101;		0x0101;	Auto start means the auto power AC when next power on inverter.
01	SPIenable	SPI(system protection interface) function enable	W	0or1,			Now only for CEI021
02	PF CMD memory state	Set the following 3,4,5,99 CMD will be memory or not(1/0), if not, these settings are the initial value.	W	0or1,		0	Means these settings will be acting or not when next power on
03	Active P Rate	Read Inverter max output active power percent	W	0-100	percent	100	
04	Reactive P Rate	Read Inverter max output reactive power percent	W	0-100	percent		
05	Power factor	Read Inverter output power factor's 10000 times	W	0-20000，0-10000 is underexcitec, other is overexcited		10000	
06	Pmax H	Normal power (high)			0.1VA		
07	Pmax L	Normal power			0.1VA		

		(low)					
08	Vnormal	Normal work PV voltage			0.1V		
09	Fw version H	Firmware version (high)			ASCII		
10	Fw version M	Firmware version (middle)					
11	Fw version L	Firmware version (low)					
12	Fw version2 H	Control Firmware version (high)			ASCII		
13	Fw version2 M	Control Firmware version (middle)					
14	Fw version2 L	Control Firmware version (low)					
15	LCD language	LCD language	W	0-4,5			
16	LCD Contrast	LCD Contrast	W				
17	Vpv start	Input start voltage	W		0.1V		
18	Time start	Start time	W		1S		
19	Vac low	Grid voltage low limit protect	W		0.1V		
20	Vac high	Grid voltage high limit protect	W		0.1V		
21	Fac low	Grid frequency low limit protect	W		0.01 Hz		
22	Fac high	Grid high frequency limit protect	W		0.01 Hz		
23	Serial NO. 5	Serial number 5			ASCII		
24	Serial No. 4	Serial number 4					
25	Serial No. 3	Serial number 3					
26	Serial No. 2	Serial number 2					
27	Serial No. 1	Serial number 1					
28	Moudle H	Inverter Moudle (high)		&*5			
29	Moudle L	Inverter Moudle (low)					
30	Com Address	Communicate address	W			1	
31	FlashStart	Update firmware	W	0x0001:own 0X0100:			

				TIC2000			
32	Reset User Info	Reset User Information	W	0x0001			
33	Reset to factory	Reset to factory	W	0x0001			
34	AutoTestStart	AutoTestStart	W	0x0001			
35	Vac low 2	Grid voltage low limit protect 2	W		0.1V		
36	Vac high 2	Grid voltage high limit protect 2	W		0.1V		
37	Fac low 2	Grid frequency low limit protect 2	W		0.01 Hz		
38	Fac high 2	Grid high frequency limit protect 2	W		0.01 Hz		
39	Vac low C	Grid low voltage limit connect to Grid	W		0.1V		
40	Vac high C	Grid high voltage limit connect to Grid	W		0.1V		
41	Fac low C	Grid low frequency limit connect to Grid	W		0.01 Hz		
42	Fac high C	Grid high frequency limit connect to Grid	W		0.01 Hz		
43	DTC	Device Type Code		&*6			
44	TP	Input tracker num and output phase num		Eg:0x0203 is two MPPT and 3ph output			
45	Sys Year	System time-year	W	Year offset is 0			
46	Sys Month	System time- Month	W				
47	Sys Day	System time- Day	W				
48	Sys Hour	System time- Hour	W				
49	Sys Min	System time- Min	W				
50	Sys Sec	System time- Second	W				
51	Vac low1 time	Grid voltage low limit protect time 1	W		Cycle		
52	Vac high1 time	Grid voltage high limit protect time 1	W		Cycle		

53	Vac low2 time	Grid voltage low limit protect time 2	W		Cycle		
54	Vac high2 time	Grid voltage high limit protect time 2	W		Cycle		
55	Fac low1 time	Grid frequency low limit protect time 1	W		Cycle		
56	Fac high1 time	Grid frequency high limit protect time 1	W		Cycle		
57	Fac low2 time	Grid frequency low limit protect time 2	W		Cycle		
58	Fac high2 time	Grid frequency high limit protect time 2	W		Cycle		
59	Manufacturer Info 8	Manufacturer information (high)			ASCII		
60	Manufacturer Info 7	Manufacturer information (middle)					
61	Manufacturer Info 6	Manufacturer information (low)					
62	Manufacturer Info 5	Manufacturer information (high)					
63	Manufacturer Info 4	Manufacturer information (middle)					
64	Manufacturer Info3	Manufacturer information (low)					
65	Manufacturer Info 2	Manufacturer information (low)					
66	Manufacturer Info 1	Manufacturer information (high)			ASCII		
67	FW Build No. 4	Control FW Build No. 2			ASCII		
68	FW Build No. 3	Control FW Build No. 1					
69	FW Build No. 2	COM FW Build No. 2					
70	FW Build No. 1	COM FW Build No. 1			ASCII		

71							
72	Sys Weekly	Sys Weekly	W	0-6			
73	ModbusVersion	Modbus Version		Eg：207 is V2.07	Int(16bits)		
74	ModelSelected	Model Selected or not	W	0: need to select; 1: have selected			
75	232T485Enable	232T485Enable	W	0: Disable; 1: Enable			
76	Decrease Power H	Decrease output watt	W				
77	Decrease Power L	Decrease output watt	W		0.1W		
78	Increase Power H	Increase output watt	W				
79	Increase Power L	Increase output watt	W		0.1W		
80	Factory	The ODM Info code					
81	FLLPoint	Frequency load limit point	2		0.01HZ		
82							
83							
…..							
90	PFLineP1_LP	PF limit line point 1 load percent	W	0-255	percent		255 means no this point
91	PFLineP1_PF	PF limit line point 1 power factor	W	0-20000			
92	PFLineP2_LP	PF limit line point 2 load percent	W	0-255	percent		255 means no this point
93	PFLineP2_PF	PF limit line point 2power factor	W	0-20000			
94	PFLineP3_LP	PF limit line point 3 load percent	W	0-255	percent		255 means no this point
95	PFLineP3_PF	PF limit line point 3 power factor	W	0-20000			
96	PFLineP4_L	PF limit line point 4	W	0-255	percent		255

	P	load percent				means no this point
97	PFLineP4_PF	PF limit line point 4 power factor	W	0-20000		
98	LCMDTest	Local command test	W	1 to test		
99	PFModel	Set PF function Model	W	0: PF=1 1: PF by set 2: default PF line 3: User PF line 4：UnderExcited (Inda) Reactive Power 5：OverExcited(Capa) Reactive Power 6：Q(v)model		
100	FLrate	Frequency – load limit rate	W	0-100	10times	
101	PFAdj1	PF adjust value 1		4096 is 1		Reserved
102	PFAdj2	PF adjust value 2		4096 is 1		Reserved
103	PFAdj3	PF adjust value 3		4096 is 1		Reserved
104	PFAdj4	PF adjust value 4		4096 is 1		Reserved
105	PFAdj5	PF adjust value 5		4096 is 1		Reserved
106	PFAdj6	PF adjust value 6		4096 is 1		Reserved
107	LVFRTenable	Low Voltage Fault Ride Through enable	W	0 or 1		
108	V1S	CEI021 V1S Q(v)	W		0.1V	
109	V2S	CEI021 V2S Q(v)	W		0.1V	
110	V1L	CEI021 V1L Q(v)	W		0.1V	
111	V2L	CEI021 V2L Q(v)	W		0.1V	
112	U10min	Volt protection for 10 min	W		0.1V	1.1Vn
113	Qlockinpow	Q(v) lock in active	W	0-100	Percent	

	er	power of CEI021				
114	LIGridV	Lock in gird volt of CEI021 PF line	W	nVn	0.1V	
115	LOGridV	Lock out gird volt of CEI021 PF line	W	nVn	0.1V	
116	6KwSystem	Above 6KwSystem for CEI021	W	0 or 1		
117	FrequencyDeratingEnable	Frequency Derating Enable	W	0 or 1		1
118	QlockOutpower	Q(v) lock Out active power of CEI021	W	0-100	Percent	
119	RestartDelayTime	Restart Delay Time after fault back;	W		s	
120	ReactiveRate	Reactive Rate in LVFRT	W	0-100		2
121	LVFRT_LV1	LVFRT low fault value 1	W		0.1V	
122	LVFRT_LT1	LVFRT low fault time 1	W		1ms	
123	LVFRT_LV2	LVFRT low fault value 2	W		0.1V	
124	LVFRT_LT2	LVFRT low fault time 2	W		1ms	
125	LVFRT_LV3	LVFRT low fault value 3	W		0.1V	
126	LVFRT_LT3	LVFRT low fault time 3	W		1ms	
127	LVFRT_LV4	LVFRT low fault value 4	W		0.1V	
128	LVFRT_LT4	LVFRT low fault time 4	W		1ms	
129	LVFRT_HV1	LVFRT high fault value 1	W		0.1V	
130	LVFRT_HT1	LVFRT high fault time 1	W		1ms	
134						
135	SpecPasswordType	Unlock or set Specpassword	W	0:unlock ,auto lock in 5 minute; 1:change pw (should		2

				unlock first)，2：lock, &*7			
136	SpecPassword3	SpecPassword3	W	For the spec setting change	ASCII	XX	
137	SpecPassword2	SpecPassword2	W	..	ASCII	XX	
138	SpecPassword1	SpecPassword1	W	..	ASCII	XX	
139	GTsetModel						Reserved
140	GFCI_old	GFCI Module type		0 or 1, 1 is old			Reserved
141	DCIshift	DCI offset		Center is 30000			Reserved
142	DCIAdj	DCI adjust		Center is 2000			Reserved
143	Fast MPPT enable	About Fast mppt		0,1,2		0	Reserved
144	IslandDisable	IslandDisable	W	0,1		0	Reserved
145	IniEEPROM	IniEEPROM	W	0xFF			Reserved
146	Balance 1	Phaseflag|ErrorCode	W				Reserved
147	Balance 2	Power H	W				Reserved
148	Balance 3	Power L	W				Reserved
150	StartFanCheck	Start Fan Check	W	1			

4.2 Input Reg

(Some of input Registers can be wrote by Manufacturer, write address offset is 0x1000, start at 0x1000. can not be wrote by customer.)

Register NO.	Variable Name	Description	Value	Unit	Note
00	Inverter Status	Inverter run state	0:waiting, 1:normal, 3:fault		

01	Ppv H	Input power (high)		0.1W	
02	Ppv L	Input power (low)		0.1W	
03	Vpv1	PV1 voltage		0.1V	
04	PV1Curr	PV1 input current		0.1A	
05	PV1Watt H	PV1 input watt (high)		0.1W	
06	PV1Watt L	PV1 input watt (low)		0.1W	
07	Vpv2	PV2 voltage		0.1V	
08	PV2Curr	PV2 input current		0.1A	
09	PV2Watt H	PV2 input watt (high)		0.1W	
10	PV2Watt L	PV2 input watt (low)		0.1W	
11	Pac H	Output power (high)		0.1W	
12	Pac L	Output power (low)		0.1W	
13	Fac	Grid frequency		0.01Hz	
14	Vac1	Three/single phase grid voltage		0.1V	
15	Iac1	Three/single phase grid output current		0.1A	
16	Pac1 H	Three/single phase grid output watt (high)		0.1VA	
17	Pac1 L	Three/single phase grid output watt (low)		0.1VA	
18	Vac2	Three phase grid voltage		0.1V	
19	Iac2	Three phase grid output current		0.1A	
20	Pac2 H	Three phase grid output power (high)		0.1VA	
21	Pac2 L	Three phase grid output power (low)		0.1VA	
22	Vac3	Three phase grid voltage		0.1V	
23	Iac3	Three phase grid output current		0.1A	
24	Pac3 H	Three phase grid output power (high)		0.1VA	
25	Pac3 L	Three phase grid output power (low)		0.1VA	
26	Energy today H	Today generate energy (high)		0.1KWH	
27	Energy today L	Today generate energy today (low)		0.1KWH	
28	Energy total H	Total generate energy (high)		0.1KWH	
29	Energy total L	Total generate energy (low)		0.1KWH	
30	Time total H	Work time total (high)		0.5S	

31	Time total L	Work time total (low)		0.5S	
32	Temperature	Inverter temperature		0.1C	
33	ISO fault Value	ISO Fault value		0.1V	
34	GFCI fault Value	GFCI fault Value		1mA	
35	DCI fault Value	DCI fault Value		0.01A	
36	Vpv fault Value	PV voltage fault value		0.1V	
37	Vac fault Value	AC voltage fault value		0.1V	
38	Fac fault Value	AC frequency fault value		0.01 Hz	
39	Temperature fault Value	Temperature fault value		0.1C	
40	Fault code	Inverter fault bit	&*1		
41	IPM Temperature	The inside IPM in inverter Temperature		0.1C	
42	P Bus Voltage	P Bus inside Voltage		0.1V	
43	N Bus Voltage	N Bus inside Voltage		0.1V	
44	Check Step	Product check step			Reserved
45	IPF	Inverter output PF now	0-20000		
46	ResetCHK	Reset check data	1 to reset		Reserved
47	DeratingMode	DeratingMode	0:no deratring; 1:PV; 2:; 3:Vac; 4:Fac; 5:Tboost; 6:Tinv; 7:Control; 8:*LoadSpeed; 9:*OverBackByTime;		"*"is Reserved
48	Epv1_today H	PV Energy today			
49	Epv1_today L	PV Energy today		0.1kWh	
50	Epv1_total H	PV Energy total			
51	Epv1_total L	PV Energy total		0.1kWh	
52	Epv2_today H	PV Energy today			
53	Epv2_today L	PV Energy today		0.1kWh	
54	Epv2_total H	PV Energy total			
55	Epv2_total L	PV Energy total		0.1kWh	
56	Epv_total H	PV Energy total			
57	Epv_total L	PV Energy total		0.1kWh	
58	Rac H	AC Reactive power			

59	Rac L	AC Reactive power		0.1Var	
60	E_rac_today H	AC Reactive energy			
61	E_rac_today L	AC Reactive energy		0.1kVarh	
62	E_rac_total H	AC Reactive energy			
63	E_rac_ total L	AC Reactive energy		0.1kVarh	
64	WarningCode	Warning Code			
65	WarningValue	Warning Value			
80-89	GTresaved	Resaved		Resaved as word	
90	Grid Fault record 1 - code	Grid Fault record 1 - code			
91	Grid Fault record 1 - year|month	Grid Fault record 1 - year|month	Year offset is 2000		
92	Grid Fault record 1 - day|hour	Grid Fault record 1 - day|hour			
93	Grid Fault record 1 - min|sec	Grid Fault record 1 - min|sec			
94	Grid Fault record 1-value	Grid Fault record 1-value	&*2		
95	Grid Fault record 2 - code	Grid Fault record 2 - code			
96	Grid Fault record 2 - year|month	Grid Fault record 2 - year|month	Year offset is 2000		
97	Grid Fault record 2 - day|hour	Grid Fault record 2 - day|hour			
98	Grid Fault record 2 - min|sec	Grid Fault record 2 - min|sec			
99	Grid Fault record 2-value	Grid Fault record 2-value			
100	Grid Fault record 3 - code	Grid Fault record 3 - code			
101	Grid Fault record 3 - year|month	Grid Fault record 3 - year|month	Year offset is 2000		
102	Grid Fault	Grid Fault record 3 - day|			

	record 3 - day| hour	hour			
103	Grid Fault record 3 - min| sec	Grid Fault record 3 - min| sec			
104	Grid Fault record 3-value	Grid Fault record 3-value			
105	Grid Fault record 4 - code	Grid Fault record 4 - code			
106	Grid Fault record 4 - year| month	Grid Fault record 4 - year| month	Year offset is 2000		
107	Grid Fault record 4 - day| hour	Grid Fault record 4 - day| hour			
108	Grid Fault record 4 - min| sec	Grid Fault record 4 - min| sec			
109	Grid Fault record 4-value	Grid Fault record 4-value			
110	Grid Fault record 5 - code	Grid Fault record 5 - code			
111	Grid Fault record 5 - year| month	Grid Fault record 5 - year| month	Year offset is 2000		
112	Grid Fault record 5 - day| hour	Grid Fault record 5 - day| hour			
113	Grid Fault record 5 - min| sec	Grid Fault record 5 - min| sec			
114	Grid Fault record 5-value	Grid Fault record 5-value			
115					
116					
...					
...					
...					
133					
134					
135	bTestProcess<< 8 | bAutoTestStep	Auto test process or auto test step	&*3		

136	wAutoTestResult	Auto test result	&*4		
137	cTestStepStop	Auto test stop step	&*4		
138	0	0		0	
139	Value Limit	Safety voltage/frequency limit value		0.1V	
140	Time Limit	Safety time limit value		1ms	
141	Real value	Real voltage/frequency value		0.1V	
142	Test value	Auto testing voltage/frequency value		0.1V	
143	Test treat value	Auto test voltage/frequency treat value		0.1V	
144	Test treat time	Auto test treat time		1ms	
145					
146					
…					
…					
….					
178					
179					
180	Inverter Error record 1 - code	Inverter Error record 1 - code			
181	Inverter Error record 1 - year| month	Inverter Error record 1 - year| month	Year offset is 2000		
182	Inverter Error record 1 - day| hour	Inverter Error record 1 - day| hour			
183	Inverter Error record 1 - min| sec	Inverter Error record 1 - min| sec			
184	Inverter Error record 1-value	Inverter Error record 1-value			
185	Inverter Error record 2 - code	Inverter Error record 2 - code			
186	Inverter Error record 2 - year| month	Inverter Error record 2 - year| month	Year offset is 2000		
187	Inverter Error record 2 - day| hour	Inverter Error record 2 - day| hour			

188	Inverter Error record 2 - min| sec	Inverter Error record 2 - min| sec			
189	Inverter Error record 2-value	Inverter Error record 2-value			
190	Inverter Error record 2 - code	Inverter Error record 2 - code			
191-419	Inverter Error record……	Inverter Error record……			
420	Inverter Error record49 - code	Inverter Error record 49-code			
421	Inverter Error record49 - year| month	Inverter Error record49 - year| month	Year offset is 2000		
422	Inverter Error record49 - day| hour	Inverter Error record49 - day| hour			
423	Inverter Error record49 - min| sec	Inverter Error record49 - min| sec			
424	Inverter Error record49-value	Inverter Error record49-value			
425	Inverter Error record50 - code	Inverter Error record 50-code			
426	Inverter Error record50 - year| month	Inverter Error record50 - year| month	Year offset is 2000		
427	Inverter Error record50 - day| hour	Inverter Error record50 - day| hour			
428	Inverter Error record50 - min| sec	Inverter Error record50 - min| sec			
429	Inverter Error record50-value	Inverter Error record50-value			
430					
…					
450	E_hour0 H	Energy hourly of this day			
451	E_hour0 L	Energy hourly of this day			
452	E_hour1 H	Energy hourly of this day			
453	E_hour1 L	Energy hourly of this day			
454	E_hour	…			
…	E_hour	…			

496	E_hour23 H	Energy hourly of this day			
497	E_hour23 L	Energy hourly of this day			
498	E_ day0 H	Energy of latest day			
499	E_day0 L	Energy of latest day			
500	E_ day1 H	Energy of latest 1st day			
501	E_ day1 L	Energy of latest 1st day			
502	E_ day	...			
...	E_ day	...			
510	E_ day 6 H	Energy of latest 6 th day			
511	E_ day 6L	Energy of latest 6 th day			
512	E_ month0 H	Energy of latest month			
513	E_ month0 L	Energy of latest month			
514	E_ month1 H	Energy of latest 1st month			
515	E_ month1 L	Energy of latest 1st month			
516	E_ month	...			
...	E_ month	...			
534	E_ month11 H	Energy of latest 11 th month			
535	E_ month11L	Energy of latest 11 th month			
536	E_ year0 H	Energy of latest year			
537	E_ year 0 L	Energy of latest year			
538	E_ year 1 H	Energy of latest 1st year			
539	E_ year 1 L	Energy of latest 1st year			
540	E_ year	...			
...	E_ year	...			
574	E_ year 19 H	Energy of latest 11 th year			
575	E_ year19 L	Energy of latest 11 th year			
....					
630	Debug Resaved	Debug Resaved			Resaved
631	Debug Resaved	Debug Resaved			Resaved
....	Debug Resaved	Debug Resaved			Resaved
674	Debug Resaved	Debug Resaved			Resaved
675	Fault info. 0	The fault code info. 0			Resaved
676	Fault info. 1	The fault code info. 1			Resaved
.....	Fault info. x	The fault code info. x			Resaved
706	Fault info. 31	The fault code info. 31			Resaved
....					
720	Alarm info. 0	The Alarm code info. 0			Resaved
721	Alarm info. 1	The Alarm code info. 1			Resaved
.....	Alarm info. x	The Alarm code info. x			Resaved
751	Alarm info. 31	The Alarm code info. 31			Resaved

&*1:　Inverter fault code:

Fault type value	Means(The message showed on the inverter when the inverter has fault)
1~23	"　　　Error: 99+x ",
24	"Auto Test Failed",
25	"No AC Connection",
26	"PV Isolation Low",
27	" Residual I High",
28	" Output High DCI",
29	" PV Voltage High",
30	" AC V Outrange　",
31	" AC F Outrange　",
32	"　　Module Hot　　"

&*2:　The value is 0.1V when the fault is the voltage, is 0.01Hz when the fault is the frequency;

&*3:

High byte value	Means	low byte value	Means
0	Auto test stop	0	No test
1	Auto test starting	1	Testing grid volt high pro
2	Auto testing	2	Testing grid volt low pro
		3	Testing grid frequency high pro
		4	Testing grid frequency low pro

&*4: The variable "wAutoTestResult" and "cTestStepStop": wAutoTestResult is the step test time counter, when it reach cTestStepStop, this step test will stop and fail.

&*5: Inverter Model: A , could be show: "T0 Q0 PF U1 M5 S1" or "00F151"

$Tx=(A\&0XF00000)>>20$

$Qx=(A\&0X0F0000)>>16$

$Px=(A\&0x00F000)>>12$

$Ux=(A\&0x000F00)>>8$

$Mx=(A\&0x0000F0)>>4$

$Sx=(A\&0x00000F)$

&*6: DTC(Device type code)

Code No.	Device type	Note
001xx	Inverter	1 tracker and 1phase Grid connect PV inverter TL

002xx	Inverter	2 tracker and 1phase Grid connect PV inverter TL
003xx	Inverter	1 tracker and 1phase Grid connect PV inverter HF
004xx	Inverter	2 tracker and 1phase Grid connect PV inverter HF
005xx	Inverter	1 tracker and 1phase Grid connect PV inverter LF
006xx	Inverter	2 tracker and 1phase Grid connect PV inverter LF
007xx	Inverter	1 tracker and 3phase Grid connect PV inverter TL
008xx	Inverter	2 tracker and 3phase Grid connect PV inverter TL
009xx	Inverter	1 tracker and 3phase Grid connect PV inverter LF
010xx	Inverter	2 tracker and 3phase Grid connect PV inverter LF
……		
10001	Data logger	RF-ShineVersion
10002	Data logger	Web-ShinePano
10003	Data logger	Web-ShineWebBox
10004	Data logger	WL-WIFI Module
……		
11001	Confluence box	Confluence box 1
……		

&*7: Grid network power control command password:

Inverter is in lock state after power on; change the power control by network command should unlock

inverter first; default pw is XXXXXX;

Unlock: send 0 to 3-135, then send password to 3-136~138; inverter will auto lock in 5min after

unlocked;

Change PW: unlock first, then send 1 to 3-135, then send new password to 3-136~138;

Lock: send 0 or 2 to 3-135;

5 Set address

Refer to the Inverter user manual.   Always is :

Knock the pv inverter to let the lcd display to the "COM Addr: xxx", then double knock, if displays "Move", you should another double knock, until it displays a address number, then you can give a single knock to change the address, this address will be remembered when the lcd backlight off.

6 Notice

1) It can drive mostly 32 pv inverters for one rs485 comport.

2) There are only read input and hold registers commands even the newest version.

3) App user could only care the input register.

4) App user could not care the holding registers.

5) Except the CEI0-21 and VDE-AR-N 4105 power management registers, you should refer the manufactory's suggestion when writing the other registers;