

Growatt PV Inverter Modbus RS485 RTU Protocol

V3.16

2018-04-10

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
24	V3.05	2014-12-30	add 3-180~191	
25	V3.06	2015-03-09	Add address to dis/enable N to GND detect	Jason
26	V3.07	2015-5-22	Add hold 165 and 166 for CEI delay time	
27	V3.08	2015-7-24	Add holding 194	
28	V3.09	2015-9-28	Add holding 195~200 for network	Zhenyuan.li
29	V3.10	2015-12-17	Add Input 70~89 for string monitor	May
30	V3.11	2016-04-01	Add holding 87~89 and input 115~119 for PID information	Hui.zhao
31	V3.12	2016-05-19	Add InputReg 120-127 to get PV3 Information	Jason
32	V3.13	2016-08-04	Add holding 167-170 for softstartflag,QPercentMax,DRMS and PowerVoltFuncEn Enable Add Inputreg128~129 for transfer fault code as &*8	Pan.xie
33	V3.14	2016-9-27	Add holding 171-175 for input parameters setting	Shuang.he
34	V3.15	2017-8-7	Add holding 131,132,149,176 for ruler 21 setting; 177for Growatt seting; 178&179 for reactivepower setting	May
35	V3.16	2018-4-10	Add holding 270~285 for ODM SN	Hui.zhao

			setting;	
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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, Add 3-90~99 registers, to set the PF limit line, (this function is reserved 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 reserved 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;

V3.05 2014-12-30:

- 1,add holding 180~182 register for the Internet IP;
- 2,add holding 184~191 register for the MTL-US 6K protect level 3;
- 3,add input 69 register for warning value of main CPU

V3.06 2015-03-09:

- 1, add holding 192 register to enable or disable N to GND detect
- 2, add holding 193 register to enable appointed Spec setting // 2015-03-19

V3.07 2015-05-22:

- 1, Add holding 165 register as delay time for Q(V) activation
- 2, Add holding 166 register as delay time for over-frequency load derating activation

V3.08 2015-07-24:

- 1,Add holding 194 register to enable or disable non-standard AC voltage range

V3.09 2015-09-28:

- 1,add holding 195~196 register for the server IP;
- 2,add holding 197 register for the send data Interval;
- 3,add holding 198~200 register for Datalogger Check Code;

V3.10 2015-12-17:

- 1, Add Input 70~89 for string monitor;

V3.11 2016-04-01:

- 1, Add holding 87~89 and input 115~119 for PID information;

V3.12 2016-5-19:

- Add InputReg 120-127, For getting PV3 voltage/current/power/E_Today/E_total information

V3.13 2016-8-9:

- 1, Add holding 167-169 for Australia Spe; 167: load softstart enable 168: Qmax for Q(V) curve 169: DRMS Enable 170: PowerVoltFuncEn
- 2, Add Inputreg128~129 for transfer faultcode as &*8

V3.14 2016-9-27:

Add holding 171-175 for input parameters setting. 171: INVWorkModeSetting 172: PV1VoltSet 173:PV2VoltSet 174:BT1CurrRefSet 175: BT2CurrRefSet

V3.15 2016-12-19:

Add holding 131 register for power restart slope setting

Add holding 132 register for load derating of over AC voltage start point setting

Add holding 149 register for over AC voltage load derating slope setting

Add holding 176 register for Delay time for power recovering when ac voltage getting normal

V3.16 2018-4-10:

Add holding 270~285 for ODM SN setting;

1 Data format	7
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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	
Field Name	Example (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	
Field Name	Example (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	
Field Name	Example (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	
Field Name	Example (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	
Field Name	Example (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	
Field Name	Example (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 underexcited, other is overexcited		10000	
06	Pmax H	Normal power (high)			0.1VA		
07	Pmax L	Normal power (low)			0.1VA		

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	Reset User	W	0x0001			

	Info	Information					
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	FreqDerateStart	Frequency derating start point	W		0.01HZ		
82	LoadSpeed	Load add speed	W		0.1%		
83	60HzLow	60Hz Fac low	W		0.01HZ		
84	60HzHingh	60Hz Fac hingh	W		0.01HZ		
85	Vac start by pf	Vac start adjust by pf	W		0.1V		
86	PF of vac limit	Max pf of adjust Vac	W			10000	
87	PID Working Model	PID Working Model	W	0:Automatic 1: Continual 2: Overnight			
88	PID On/Off Ctrl	PID On/Off Control	W	0:On 1:Off			
89	PID Volt Option	PID Output Voltage Option	W	300~1000	V		
90	PFLineP1_LP	PF limit line point 1 load percent	W	0-255	percent		255 means no this point
91	PFLineP1_P F	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_P F	PF limit line point 2power factor	W	0-20000			
94	PFLineP3_L P	PF limit line point 3 load percent	W	0-255	percen t		255 means no this point
95	PFLineP3_P F	PF limit line point 3 power factor	W	0-20000			
96	PFLineP4_L P	PF limit line point 4 load percent	W	0-255	percen t		255 means no this point
97	PFLineP4_P F	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 10: ReactivePowe rSet			
100	FLrate	Frequency – load limit rate	W	0-100	10time s		
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	LVFRTenabl	Low Voltage Fault	W	0 or 1			

	e	Ride Through enable					
108	V1S	CEI021 V1S Q(v)	W	V1S<V2S	0.1V		
109	V2S	CEI021 V2S Q(v)	W		0.1V		
110	V1L	CEI021 V1L Q(v)	W	V1L<V1S	0.1V		
111	V2L	CEI021 V2L Q(v)	W	V2L<V1L	0.1V		
112	U10min	Volt protection for 10 min	W		0.1V	1.1 Vn	
113	Qlockinpower	Q(v) lock in active power of CEI021	W	0-100	Percent		
114	LIGridV	Lock in grid volt of CEI021 PF line	W	nVn	0.1V		
115	LOGridV	Lock out grid 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	W		1ms		

		time 1					
131	wPowerRestartSlopeEE	Power restart slope	W	1-1000	0.1%		
132	wLoadDerateStartVolt	Load derate start ac voltage		1.05Vn~1.2Vn	0.1V		
135	SpecPasswordType	Unlock or set Specpassword	W	0:unlock ,auto lock in 5 minute; 1:change pw (should unlock first), 2: lock, &*7		2	
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
149	bHighACVDerateSlope	High ac voltage load derating slope	W	20	0-100		
150	StartFanCheck	Start Fan Check	W	1			
151	EnableNLine	Enable N Line of grid	W	1			
152	SimilarPVTracker	Similar PV strings for two trackers	W	1			

153	wCheckHardware	wCheckHardware	W	Bit0: GFCIBreak; Bit1:SPSDamage Bit8:EEPROMReadWarning Bit9:EEWriteWarning			
154	BalanceModel	BalanceModel	W	1-3			
155	BalancePhase	BalancePhase	W	1-3			
156	DCIshift2	DCI offset 2	W	Center is 30000			Reserved
157	DCIshift3	DCI offset 3	W	Center is 30000			Reserved
158	EnergyLimitEnable	Output Energy Limit Enable	R	1 is enable			Reserved
159	EnergyRemainH	Output Energy Limit value High	W	0.1kWh			Reserved
160	EnergyRemainL	Output Energy Limit value low	W	0.1kWh			Reserved
161	BLVersion1	Boot loader version1	R				Reserved
162	BLVersion2	Boot loader version2	R				Reserved
163	TrakerModel	2 Traker Model	W	0,1,2			Reserved
164	PMcheck	Growatt Resaved	W				Reserved
165	QVRPDelayTimeEE	QV Reactive Power delaytime	W	0-30	1S	3S	
166	OverFDeratDelayTimeEE	Overfrequency derating delaytime	W	0-20	50ms	0	
167	SoftstartFlag	Softstart enable for Australia spec	W	0: Disable 1: enable		1	
168	QPercentMax	Qmax for Q(V) curve	W	0-1000	0.1%		
169	DRMSEn	DRMS enable for Australia spec	W	0: Disable 1: enable		0	
170	PowerVoltageFunctEn	Enable PowerVoltageFunction for SAA Spec	W	0: Disable 1: enable		1	

171	INVWorkMode	INV work mode set	W	0:default 1:CV Mode 2:CC Mode 3:CP Mode		0	
172	PV1VoltSet	pv1 voltage set when CV Mode was chosed	W	StartPVPV-H ighPVPV			
173	PV2VoltSet	Pv2 voltage set when CV Mode was chosed	W	StartPVPV-H ighPVPV			
174	BT1CurrRefSet	BT1 current set when CC Mode was chosed	W	0-MaxBTCurr ent			
175	BT2CurrRefSet	BT2current set when CC Mode was chosed	W	0-MaxBTCurr ent			
176	WattACVRecoverDelayTime	Delay time for power recovering when ac voltage getting normal	W	3-90S			
177	DebugSettingFuction		W	Bit0: micro Grid function Bit1~15:reser ved		0	0:disable 1:Enable
178	OPReactivePowerSet_H		W		0.1Var		Active when
179	OPReactivePowerSet_L		W		0.1Var		PFModel =10
180	DHCP Disable	Disable LAN DHCP	W	1:Disable DHCP; 0:Enable DHCP;			
181	HostIP H	LAN Local IP part1&part2	W	part1*256+p art2			
182	HostIP L	LAN Local IP part3&part4	W	part3*256+p art4			
183	PV Voltage High Fault	PV Voltage High Fault	W	900V~10000 V	0.1V		
184	Vac low 3	Grid voltage low limit protect 3	W		0.1V		
185	Vac high 3	Grid voltage high limit protect 3	W		0.1V		
186	Vac low3	Grid voltage low	W	9	Cycle		

	time	limit protect time 3						
187	Vac high3 time	Grid voltage high limit protect time 3	W	9	Cycle			
188	Fac low 3	Grid frequency low limit protect 3	W	5600-6000	0.01Hz			
189	Fac high 3	Grid frequency high limit protect 3	W	6000-6400	0.01Hz			
190	Fac low3 time	Grid frequency low limit protect time 3	W	119-17999	Cycle			
191	Fac high3 time	Grid frequency high limit protect time 3	W	9-599	Cycle			
192	ubNToGND DetectBit	Dis/enable N to GND detect function	W	1:enable 0:disable	Cycle	1		
193	uwEnableSp ecSet	Dis/enable appointed spec setting	W	1:enable 0:disable	Binary	0x0 000	Bit 0: Hungary	
194	NonStdVacE nable	Enable/Disable Nonstandard AC voltage range	w	0-1; 0:Disable; 1:Enable;		0	0:Disable Nonstan dard AC voltag e range; 1:Enable Nonstand ard AC voltag e range;	
195	ServerIP H	ServerIP part1&part2	W	part1*256+p art2		192 *25 6+1 68	192. 168	
196	ServerIP L	ServerIP part3&part4	W	part3*256+p art4		3*2 56+ 35	3.35	
197	TxDatInter val	TxDatInterval	W	1~600	0.1 mins	50	5mins	
198	ChkCode NO.1	Datalogger Check Code 1	R		ASCII			
199	ChkCode NO.2	Datalogger Check Code 2	R		ASCII			

200	ChkCode NO.3	Datalogger Check Code 3	R		ASCII		
...							
270	ODM Serial NO. 15	Serial number 15	W		ASCII		
271	ODM Serial No.14	Serial number 14	W		ASCII		
272	ODM Serial No. 13	Serial number 13	W		ASCII		
273	ODM Serial No. 12	Serial number 12	W		ASCII		
274	ODM Serial No. 11	Serial number 11	W		ASCII		
275	ODM Serial NO. 10	Serial number 10	W		ASCII		
276	ODM Serial No. 9	Serial number 9	W		ASCII		
277	ODM Serial No. 8	Serial number 8	W		ASCII		
278	ODM Serial No. 7	Serial number 7	W		ASCII		
279	ODM Serial No. 6	Serial number 6	W		ASCII		
280	ODM Serial NO. 5	Serial number 5	W		ASCII		
281	ODM Serial No. 4	Serial number 4	W		ASCII		
282	ODM Serial No. 3	Serial number 3	W		ASCII		
283	ODM Serial No. 2	Serial number 2	W		ASCII		
284	ODM Serial No. 1	Serial number 1	W		ASCII		
285	ODM Identifier	ODM Special Character 'OD'	R	ODM : 'OD' Other: 0x00	ASCII		
859	bISLShiftD eltaEE	Growatt Resaved	W				Reserved
860	bLowPointe r	Growatt Resaved	W				Reserved

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4.2 Input Reg

Reg iste r 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		0.01 Hz	
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)		0.1V A	
17	Pac1 L	Three/single phase grid output watt (low)		0.1V A	
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)		0.1V A	
21	Pac2 L	Three phase grid output power (low)		0.1V A	
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)		0.1V A	
25	Pac3 L	Three phase grid output power (low)		0.1V A	
26	Energy today H	Today generate energy (high)		0.1K WH	
27	Energy today L	Today generate energy today (low)		0.1K WH	
28	Energy total H	Total generate energy (high)		0.1K WH	
29	Energy total L	Total generate energy (low)		0.1K WH	
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		0.01 A	
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:*LoadSpee		“*”is Reserved

			d; 9:*OverBackB yTime;		
48	Epv1_today H	PV Energy today			
49	Epv1_today L	PV Energy today		0.1k Wh	
50	Epv1_total H	PV Energy total			
51	Epv1_total L	PV Energy total		0.1k Wh	
52	Epv2_today H	PV Energy today			
53	Epv2_today L	PV Energy today		0.1k Wh	
54	Epv2_total H	PV Energy total			
55	Epv2_total L	PV Energy total		0.1k Wh	
56	Epv_total H	PV Energy total			
57	Epv_total L	PV Energy total		0.1k Wh	
58	Rac H	AC Reactive power			
59	Rac L	AC Reactive power		0.1Va r	
60	E_rac_today H	AC Reactive energy			
61	E_rac_today L	AC Reactive energy		0.1kV arh	
62	E_rac_total H	AC Reactive energy			
63	E_rac_total L	AC Reactive energy		0.1kV arh	
64	WarningCode	Warning Code	&*8		
65	WarningValue1	Warning Value of slave CPU			
66	RealOPPercent	RealOPPercent		1%	
67	OPFullwatt H	Out put full load watt high			
68	OPFullwatt L	Out put full load watt low		0.1W	
69	WarningValue2	Warning Value of main CPU	PV1ShortCirc uit: 0x0001 PV2ShortCirc uit: 0x0002 BT1DriverFaul t: 0x0004 BT2DriverFaul t: 0x0008		
70	V_String1	PV String1 voltage		0.1V	

71	Curr_String1	PV String1 current	-15A~15A	0.1A	
72	V_String2	PV String2 voltage		0.1V	
73	Curr_String2	PV String2 current	-15A~15A	0.1A	
74	V_String3	PV String3 voltage		0.1V	
75	Curr_String3	PV String3 current	-15A~15A	0.1A	
76	V_String4	PV String4 voltage		0.1V	
77	Curr_String4	PV String4 current	-15A~15A	0.1A	
78	V_String5	PV String5 voltage		0.1V	
79	Curr_String5	PV String5 current	-15A~15A	0.1A	
80	V_String6	PV String6voltage		0.1V	
81	Curr_String6	PV String6 current	-15A~15A	0.1A	
82	V_String7	PV String7 voltage		0.1V	
83	Curr_String7	PV String7 current	-15A~15A	0.1A	
84	V_String8	PV String8 voltage		0.1V	
85	Curr_String8	PV String8 current	-15A~15A	0.1A	
86	StrFault	0~16:	1~8:String Reverse 9~16:String Short		
87	StrWarning	0~16	1~8:Fuse Open 9~16: String Unusual		
88	StrBreak	Bit0~7: String1~8 disconnect Bit8~15: Reserved			
89	PIDFaultCode	0~16	4.PID Iso Low 5.BUS Fault 6Over Voltage 7.PVA reverse 8.PVB reverse		
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 record 3 - day hour	Grid Fault record 3 - day 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	PID PVA+ Voltage	PID PVAPE Volt	0V~1000V	0.1V	
116	PID PVA+ Current	PID PVAPE Curr	-10mA~10mA	0.1A	
117	PID Status	Bit0~7:PID Working Status 1:Wait Status 2:Normal Status	1~3		

		3:Fault Status Bit8~15:Reverse			
118	PID PVB+ Voltage	PID PVBPE Volt	0V~1000V	0.1V	
119	PID PVB+ Current	PID PVBPE Curr	-10mA~10mA	0.1A	
120	PV3 Voltage	PV3 input voltage			
121	PV3 Current	PV3 input current			
122	PV3Watt H	PV3 input watt (high)			
123	PV3Watt L	PV3 input watt (low)			
124	Epv3_today H	PV3 Energy today			
125	Epv3_today L	PV3 Energy today			
126	Epv3_total H	PV3 Energy total			
127	Epv3_total L	PV3 Energy total			
128	Faultcode H	Inverter fault code high	&*8		
129	Faultcode L	Inverter fault code low			
...					
...					
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	Inverter Error record..... -41 9	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 Bit:

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;

&*8: Inverter fault code and warning code

Fault code		Warning code	
0x00000001	\	0x0001	Fan warning
0x00000002	Communication error	0x0002	String communication abnormal
0x00000004	\	0x0004	StrPID config Warning
0x00000008	StrReverse or StrShort fault	0x0008	Fail to read EEPROM
0x00000010	Model Init fault	0x0010	DSP and COM firmware unmatched
0x00000020	Grid Volt Sample different	0x0020	Fail to write EEPROM
0x00000040	ISO Sample different	0x0040	SPD abnormal
0x00000080	GFCI Sample different	0x0080	GND and N connect abnormal
0x00000100	\	0x0100	PV1 or PV2 circuit short
0x00000200	\	0x0200	PV1 or PV2 boost driver broken
0x00000400	\	0x0400	\
0x00000800	\	0x0800	\
0x00001000	AFCI Fault	0x1000	\
0x00002000	\	0x2000	\
0x00004000	AFCI Module fault	0x4000	\
0x00008000	\	0x8000	\
0x00010000	\		
0x00020000	Relay check fault		
0x00040000	\		
0x00080000	\		
0x00100000	\		
0x00200000	Communication error		
0x00400000	Bus Voltage error		
0x00800000	AutoTest fail		
0x01000000	No Utility		
0x02000000	PV Isolation Low		
0x04000000	Residual I High		
0x08000000	Output High DCI		
0x10000000	PV Voltage high		
0x20000000	AC V Outrange		
0x40000000	AC F Outrange		
0x80000000	TemperatureHigh		

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

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