

Communication Protocol for Residential Single-phase Grid-Connected Inverters

V1.0.16

Ver. No.	Date	Change content and reason
V1.0.0	2015/12/9	First edition
V1.0.1	2016/6/28	Add related parameter setting according to the Australia new standard
V1.0.2	2016/7/11	Australia over-frequency derating frequency start derating point
V1.0.3	2016/7/25	Format finishing and revision
V1.0.4	2017/5/4	Add three holding register addresses: 5136: 10-min overvoltage protection switch 5137: power ramp rate switch 5138: under-frequency de-rating switch
V1.0.5	2017/6/5	1. Add the countries Korea and Luxemburg. 2. Add the setting parameters for Qu, Qp and Pu.
V1.0.6	2017/8/21	Add meter power display.
V1.0.7	2017/11/22	Add the settable parameters for Brazil Q(p): activated voltage and final voltage
V1.0.8	2017/12/22	Update the table of fault codes. Delete codes 047, 057, 058, 060, 205 and 307. Add codes as listed in the table.
V1.0.9	2018/05/05	Add the address (5144- 5145) for high-precision power generation display. Add the address (5143) and status codes for specific derating method. Add an appendix table to supplement for device status 5038.
V1.0.10	2018/07/25	Add country codes for Brazil 230 V and Brazil 240 V in the country information list.
V1.0.11	2018/09/14	Add note information on "Power limitation switch".
V1.0.12	2018/09/14	Fault recovery time: 0-900 Standby time: 10-255
V1.0.13	2018/10/08	Standby time: 10s (default) Fault recovery time: 30s (default)
V1.0.14	2018/10/11	Add default power factors (900) of cErgonEnergy and eEnergrex.
V1.0.15	2018/10/22	1. Change the data range of "Power limitation setting" (address: 5008) into: China 7k and below: 0~1100; others: 0~1000; China 7k and below: 1100 (default); others: 1000 (default). 2. Change the data range of "Reactive power percentage setting" (address: 5037) into: -600~0 and 0~600; Default: 0. 3. Change the data range of "Lower Power" (address: 5051) into: 0~ 500; Brazil: 200~1000; default: 500. 4. Change the data range of "Upper Power" (address: 5052) into: 500~1000; Brazil: 200~1000; default: 1000.

		<p>5. Change the data range of "Lower limit-PF (Ind)" (address: 5054) into: Australia, New Zealand, and Brazil: 950 (default); others: 900 (default).</p> <p>6. Change the data range of "Lower U Limit" (address: 5081) into: Netherlands, Belgium, Luxembourg: 900~920; Australia: 2070; others: 800~900 Default value: Netherlands, Belgium, Luxembourg: 900; others: 800; Australia: 2070.</p> <p>7. Change the data range of "Upper U Limit" (address: 5082) into: Netherlands, Belgium, Luxembourg: 1080~1100; Australia: 2440~2650; others: 1100~1200. Default value: Netherlands, Belgium, Luxembourg: 1100; others: 1150; Australia: 2650; New Zealand: 2550.</p> <p>8. Change the data range of "U1 Limit" (address: 5083) into: Netherlands, Belgium, Luxembourg: 920~1000; Australia: 2160~2300; others: 950~1000. Default value: Netherlands, Belgium, Luxembourg: 920; others: 950; Australia, New Zealand: 2200.</p> <p>9. Change the data range of "U2 Limit" (address: 5084) into: Netherlands, Belgium, Luxembourg: 1000~1080; Australia: 2350~2550; others: 1000~1050. Default value: Netherlands, Belgium, Luxembourg: 1080; others: 1050; Australia: 2500; New Zealand: 2440.</p> <p>10. Change the default value of "Hysteresis" (address: 5085) into: Netherlands, Belgium, Luxembourg: 0; others: 30.</p> <p>11. Change the data range of "Lower Q/Sn" (address: 5086) into: 0~600 Default value: Netherlands, Belgium, Luxembourg: 600; others: 300</p> <p>12. Change the data range of "Upper Q/Sn" (address: 5087) into: 0~600 Default value: Netherlands, Belgium, Luxembourg: 600; others: 300.</p> <p>13. Change the default value of "V2i(Italy)" (address: 5099) into: 900.</p> <p>14. Change the default value of "V1s(Italy)" (address: 5100) into: 1080.</p> <p>15. Change "Qmax(Italy)" (address: 5102) into Italian coefficient "k", data range into: 0~1000, default: 100.</p> <p>16. Change "Curve selection (Italy)" (address: 5105) into "Qmax", data range into 0~600, default: 328.</p> <p>17. Change the default value of "10 min overvoltage protection" (address: 5128) into: New Zealand: 2480; others: 2530; Australia: 2550 (Energex: 2570, SA Power Networks, WesternPower: 2580).</p>
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		<p>18. Change the data range of "Australia over-frequency de-rating frequency start de-rating point" (address: 5135) into: Australia: 5025~5200; Netherlands, Belgium, Luxembourg: 5020~5050; Default value: Australia: 5025; Italy: 5030; France Overseas 60Hz: 6050; Other: 5020.</p> <p>19. Delete "Remove arc alarm", "Remove arc bit alarm", "Single plate self-detection arc command", and "Enable arc detection function command".</p> <p>20. Change the default value of "Reactive power adjustment switch" (address: 5036) into 0x55.</p> <p>21. Delete parameters whose addresses are above 5138.</p> <p>22. Add Europe data ranges for parameters whose addresses are 5051, 5052, 5055, 5056, 5081, 5082, 5083, 5084, and 5135.</p> <p>23. Add energy meter-related power.</p>
V1.0.16	2019/6/10	<p>1. Add three pieces of country information to the "Appendix 2 Country Information": Mexico 220V, Mexico 230V, and Mexico 240V.</p>

1. Introduction

This communication protocol, adopting Modbus RTU protocol, applies to the communication between Sungrow PV grid-connected inverters and upper computer (PC) monitoring system. This protocol can read the real-time operating data and fault states of the inverters.

2. Communication Interface

(1) RS485

	Default setting
Address	Inverter: 1 – 247 settable PC: 1 – 247 settable
Broadcast	Yes
Baud rate	9600bit/s
Check bit	Null or settable
Data bit	8
Stop bit	1
Mode	RTU
Appliance interface	RS485-2W cable connection

3. Definition of Address

- Read-only register type supports the command code of 0x04
- Holding register type supports the command code of 0x03, 0x10 and 0x06
- command codes 0x10 and 0x06 support the broadcast address 0

3.1 Running information variable address definition (read-only register)

No.	Name	Address	Data type	Data range	Unit	Note
Device attributes						
1	Protocol No.	4950–4951	U32			
2	Protocol ver.	4952–4953	U32			
3	Reserved	4954–4971	U16*18			
4	Reserved	4972–4979	U16*8			
5	Reserved	4980–4989	U16*10			
6	SN	4990–4999	U16*10			Data type :UTF-8
Device type code						
7	Device type code	5000	U16			
8	Nominal output power	5001	U16		0.1kW	
9	Output type	5002	U16	0-two phase; 1-3P4L; 2-3P3L		If the output type (address: 5002) is 0, only voltage of address 5019 and current of address 5022 are valid; if the output type is 1, address 5019-5021 are “Phase x voltage”; if the output type is 2, address 5019-5021 are “x-x line voltage”
10	Daily power yields	5003	U16		0.1kWh	
11	Total power	5004–5005	U32		kWh	

	yields					
12	Total running time	5006–5007	U32		h	
13	Internal temperature	5008	S16		0.1°C	
14	Reserved	5009–5010	S16		0.1°C	
15	DC Voltage 1	5011	U16		0.1V	
16	DC current 1	5012	U16		0.1A	
17	DC Voltage 2	5013	U16		0.1V	
18	DC current 2	5014	U16		0.1A	
19	Total DC power	5017–5018	U32		W	
20	A-B line voltage/phase A voltage	5019	U16		0.1V	If the output type (address: 5002) is 1: upload phase voltage; If the output type is 2: upload line voltage
21	Reserved	5020–5021				
22	Phase A current	5022	U16		0.1A	
23	Reserved	5023–5030				
24	Total active power	5031–5032	U32		W	
25	Reserved	5033–5034				
26	Power factor	5035	S16		0.001	
27	Grid frequency	5036	U16		0.1Hz	
28	Reserved	5037				
29	Device state	5038	U16			
30	State Time: Year	5039	U16			Fault time
31	State Time: Month	5040	U16			Fault time
32	State Time: Day	5041	U16			Fault time
33	State Time: Hour	5042	U16			Fault time
34	State Time: Minute	5043	U16			Fault time
35	State Time: Second	5044	U16			Fault time

36	State data 1	5045	U16			See Appendix 4
37	State data 2	5046	U16			See Appendix 5
38	Reserved	5047~5080				
39	Work state	5081~5082	U32			See Appendix 1
40	Power of energy meter	5083~5084	S32		W	Feed-in power is negative value; and taken-back power is positive value
41	Energy meter A-phase power	5085~5086	S32		w	
42	Energy meter B-phase power	5087~5088	S32		w	
43	Energy meter C-phase power	5089~5090	S32		w	
44	Load power	5091~5092	S32		w	
45	Daily feed-in energy	5093~5094	U32		0.1kwh	
46	Total feed-in energy	5095~5096	U32		0.1kwh	
47	Daily taken-back energy	5097~5098	U32		0.1kwh	
48	Total taken-back energy	5099~5100	U32		0.1kwh	
49	Daily direct energy consumption	5101~5102	U32		0.1kwh	
50	Total direct energy consumption	5103~5104	U32		0.1kwh	
51	Reserved	5105~5112				
52	Daily running time	5113	U16		1min	
53	Present country	5114	U16			See Appendix 2
54	Reserved	5115~5142				
55	Power limited method	5143	U16			See Appendix 5
56	Total power generation	5144~5145	U32		0.1kWh	

57	Reserved	5146~7012				
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3.2 Parameter setting address definition (holding register)

No.	Name	Address	Data type	Data range	Unit	Note
Setting data						
1	System clock: Year	5000	U16			Receive time synchronization setting of the monitoring system or GPS
2	System clock: Month	5001	U16			
3	System clock: Day	5002	U16			
4	System clock: Hour	5003	U16			
5	System clock: Minute	5004	U16			
6	System clock: Second	5005	U16			
7	Start/Stop	5006	U16	0xCF (Start)/0xCE (Stop)/Others (No operation)		
8	Power limitation switch	5007	U16	0xAA: Enable; 0x55: Disable (power limitation returns to 100.0%)		G2-series devices with version later than V25 (2017.11.23) do not support the setting.
9	Power limitation setting	5008	U16	Others: 0~1000 China 7k and below: 0~1100 China 7k and below: 1100 (default) Others: 1000 (default)	0.10%	
10	Reserved	5009~5018				
11	Power factor setting	5019	S16	(-1000~-800, 800~1000) Note: Power factors of grid companies cErgonEnergy and eEnergrex are 900 by	0.001	

				default		
12	Reserved	5020~5035				
13	Reactive power adjustment switch	5036	U16	0x55: OFF, power factor returns to 1; and reactive power percentage returns to 0 0xA1: power factor setting is valid, and reactive power percentage returns to 0 0xA2: reactive power percentage setting is valid, and power factor returns to 1 0xA3—Q(P) curve setting is enabled 0xA4—Q(U) curve setting is enabled Default: 0x55		
14	Reactive power percentage setting	5037	S16	[-600,0]; [0,600] Default: 0	0.10%	
15	Reserved	5038~5050				
16	Lower Power	5051	U16	0~ 500; Brazil and Europe: 200~1000 Default: 500	0.10%	Lower Power < Upper Power Q(P) curve Plow point
17	Upper Power	5052	U16	500~1000; Brazil and Europe: 200~1000 Default: 1000	0.10%	Q(P) curve upper point
18	Upper limit-PF (Cap)	5053	U16	900~1000 Default: 1000	0.001	Q(P) curve PF upper (CAP) point
19	Lower limit-PF (Ind)	5054	U16	900~1000; Australia, New Zealand, and Brazil: 950 (default) others: 900 (default)	0.001	Q(P) curve PF lower (IND) point

20	Lock-in	5055	U16	2200~2420 Europe: 2200,2640 Default: 2288	0.1V	The activated voltage for Q(P) cure. Remark: only for crystal G2 in Brazil
21	Lock-out	5056	U16	1980~2200 Europe: 1980~2400 Default: 2200	0.1V	The final voltage for Q(P) cure. Remark: only for crystal G2 in Brazil
22	Reserved	5057~5064	U16			
23	PowerA(Italy)	5065	U16	200~1000 Default: 200	0.10%	
24	PowerB(Italy)	5066	U16	200~1000 Default: 500	0.10%	
25	PowerC(Italy)	5067	U16	200~1000 Default: 1000	0.10%	
26	pf-max(Italy)	5068	U16	900~1000 Default: 950	0.10%	
27	Uin(Italy)	5069	U16	1000~1100 Default: 1050	0.10%	
28	Uout(Italy)	5070	U16	900~1000 Default: 1000	0.10%	
29	Reserved	5071~5080				
30	Lower U Limit	5081	U16	Netherlands, Belgium, Luxembourg: 900~920 Australia: 2070 others: 800~900 Europe: 800~1000 Default value: Netherlands, Belgium, Luxembourg: 900 others: 800 Australia: 2070	0.10%	
31	Upper U Limit	5082	U16	Netherlands, Belgium, Luxembourg:	0.10%	

				<p>1080~1100 Australia: 2440~2650 others: 1100~1200 Europe: 1000~1200 Default value: Netherlands, Belgium, Luxembourg: 1100 others: 1150 Australia: 2650 New Zealand: 2550</p>		
32	U1 Limit	5083	U16	<p>Netherlands, Belgium, Luxembourg: 920~1000 Australia: 2160~2300 others: 950~1000 Europe: 800~1000 Default value: Netherlands, Belgium, Luxembourg: 920 others: 950 Australia, New Zealand: 2200</p>	0.10%	
33	U2 Limit	5084	U16	<p>Netherlands, Belgium, Luxembourg: 1000~1080 Australia: 2350~2550 others: 1000~1050 Europe: 1000~1200 Default value: Netherlands, Belgium, Luxembourg: 1080 others: 1050 Australia: 2500 New Zealand: 2440</p>	0.10%	
34	Hysteresis	5085	U16	<p>0~50 Default value: Netherlands, Belgium, Luxembourg: 0 others: 30</p>	0.10%	
35	Lower Q/Sn	5086	U16	<p>0~600 Default value: Netherlands, Belgium, Luxembourg: 600</p>	0.10%	

				others: 300		
36	Upper Q/Sn	5087	U16	0~600 Default value: Netherlands, Belgium, Luxembourg: 600 others: 300	0.10%	
37	Reserved	5088~5097				
38	V1i(Italy)	5098	U16	900~1100 Default: 920	0.10%	
39	V2i(Italy)	5099	U16	900~1100 Default: 900	0.10%	
40	V1s(Italy)	5100	U16	900~1100 Default: 1080	0.10%	
41	V2s(Italy)	5101	U16	900~1100 Default: 1100	0.10%	
42	k	5102	U16	0~1000 Default: 100	0.10%	
43	Pin(Italy)	5103	U16	200~1000 Default: 200	0.10%	
44	Pout(Italy)	5104	U16	10~200 Default: 50	0.10%	
45	Qmax	5105	U16	[0,600] Default: 328		
46	Reserved	5106~5115				
47	Lower U Limit(Austria)	5116	U16	800~1000 Default: 990	0.10%	
48	Upper U Limit(Austria)	5117	U16	1070~1200 Default: 1080	0.10%	
49	U1 Limit(Austria)	5118	U16	1000~1040 Default: 1020	0.10%	
50	U2 Limit(Austria)	5119	U16	1040~1070 Default: 1050	0.10%	
51	Hysteresis(Aust ria)	5120	U16	0~50 Default: 0	0.10%	

52	Lower Q/QmaxInd	5121	U16	0~1200 Default: 1000	0.10%	
53	Upper Q/Qmax Cap	5122	U16	0~1200 Default: 1000	0.10%	
54	Qmax/Sn	5123	U16	0~500 Default: 312	0.10%	
55	Reserved	5124~5127				
56	10 min overvoltage protection	5128	U16	244V~258V Default value: New Zealand: 2480 others: 2530 Australia: 2550 (Energex: 2570, SA Power Networks, WesternPower: 2580)	0.1	
57	Reserved	5129~5132				
58	Fault slow start slope	5133	U16	(5% ~100%) Default: 16.67%	0.01%	
59	Frequency when the over-frequency de-rating decreases to 0W	5134	U16	51Hz~52Hz Default: 52.0Hz	0.01	
60	Australia over-frequency de-rating frequency start de-rating point	5135	U16	Australia: 5025~5200; Netherlands, Belgium, Luxembourg: 5020~5050; Europe: 5020~5200 Default value: Australia: 5025; Italy: 5030; France Overseas 60Hz: 6050; Other: 5020	0.01	
61	10-min overvoltage protection switch	5136	U16	0x55: enable (default) 0xAA: disable		
62	Power ramp rate switch	5137	U16	0x55: enable (default) 0xAA: disable		

63	Under-frequency derating switch	5138	U16	0x55: disable (default) 0xAA: enable		
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Note:

Communication address = protocol address-1. If data of address 5000 is to be inquired, the corresponding sending address data is 4999 (0x1387);

U16: 16-bit unsigned integer, big-endian;

U32: 32-bit unsigned integer; little-endian for double-word data. Big-endian for byte data;

S16: 16-bit signed integer, big-endian;

S32: 32-bit signed integer; little-endian for double-word data. Big-endian for byte data

Power factor: + means leading; - means lagging, 1000 means power factor 1.000, 950 means power factor 0.95.

Appendix

Appendix 1 State Data

BIT	State	State code	Note
BIT 0	Run	1: Run	
BIT 1	Stop (normal stop)	1: Stop	
BIT 2	Initial standby	1: Initial standby	
BIT 3	Key stop	1: Key stop	
BIT 4	Standby	1: Standby	
BIT 5	Emergency stop	1: Emergency stop	
BIT 6	Startup	1: Startup	
BIT 7	Stopping	1: Stopping	
BIT 8	Reserved		
BIT 9	Fault stop	1: Fault stop	
BIT 10	Alarm run	1: Alarm run	
BIT 11	Derating run	1: Derating run	Active derating due to device internal temperature and grid condition
BIT 12	Limited run	1: Limited run	Dispatch limitation, dispatch value is lower than 100%
BIT 13	Communication fault		Communication fault between measurement board and DSP
BIT 14	Reserved		
BIT 15	Reserved		
BIT 16	Sleeping	1: Sleeping	
BIT 17	Total signal bit of the	1: Run	Include all run states:

	running state		bit0: Run bit7: Stopping bit8: Inverter temp. alarm bit10: Alarm run bit11: Derating run bit12: Limited run
BIT18	Total stop bit		Include all non-fault stop states: BIT 1: Stop Bit 3: Key stop Bit 5: Emergency stop BIT 9: Fault stop
BIT 19~ BIT 31	Reserved		

Appendix 2 Country Information

Code	Country	Country (English)	Note
0	GB	Great Britain	
1	DE	Germany	
2	FR	France	
3	IT	Italy	
4	ES	Spain	
5	AT	Austria	
6	AU	Australia	
7	CZ	Czech	
8	BE	Belgium	
9	DK	Denmark	
10	GR_L	Greece Land	
11	GR_IS	Greece Island	
12	NL	Netherlands	
13	PT	Portugal	
14	CHN	China	
15	SE	Sweden	
16	Other 50Hz		
17	RO	Romania	
18	TH	Thailand	
19	TK	Turkey	
20	AU-WEST	Australia (west)	
21	Reserved		
25	Vorarlberg (Austria)	Vorarlberg	District
26-59	Reserved		

60	CA	Canada	
61	US	America	
62	Other 60Hz		
63	KR	Korea	
66	BR	Brazil	
70	JP 50Hz		
71	JP 60Hz		
72	LUX	Luxemburg	
99	NZ	New Zealand	
The followings are grid company code			
100	AusGrid	Australia	Grid company
101	Ergon Energy	Australia	Grid company
102	SA Power Networks	Australia	Grid company
103	Powercor	Australia	Grid company
104	Western Power	Australia	Grid company
105	Energex	Australia	Grid company
166	Brazil 230V	Brazil	Grid company
167	Brazil 240V	Brazil	Grid company
170	Mexico 220V	MX-220V	Grid company
171	Mexico 230V	MX-230V	Grid company
172	Mexico 240V	MX-240V	Grid company

Appendix 3 History record type

Name	Data type	Data range	Unit	Note
SN	U16	0-100		
Year	U16			
Month	U16			
Day	U16			
Hour	U16			
Minute	U16			
Second	U16			
Unified fault code for string inverters	U16			

Appendix 4 Device Fault Code (Note: For corrective measures, refer to the corresponding user manual.)

Code	Description	Note
002	Grid voltage exceeds the set protection value. Protection time and point varies as per country difference.	
003	Grid voltage exceeds the set protection value within a certain period of time.	

004	Grid voltage is lower than the set protection value. Protection time and point varies as per country difference.	
005	Inverter detects that the grid voltage is low.	
006	AC output current exceeds the inverter allowable limit.	
007	Inverter detects an AC transient overcurrent.	
008	Grid frequency exceeds the inverter allowable limit.	
009	Grid frequency is lower than the inverter allowable limit.	
010	Islanding	
011	AC current DC injection exceeds the inverter protection range.	
012	Inverter detects that the leakage current exceeds the protection range.	
014	Average grid voltage exceeds allowable range for 10 minutes.	
015	Grid voltage exceeds the inverter allowable range.	
016	Bus voltage and power are high.	
028	PV1 reverse connection.	
029	PV2 reverse connection.	
100	AC output current exceeds the inverter allowable limit.	
101	Grid frequency exceeds the inverter allowable limit.	
102	Grid frequency is lower than the inverter allowable limit.	
106	Inverter is not grounded.	
019	Bus transient voltage exceeds the set value.	
020	Bus voltage is high.	
021	Inverter detects a PV input overcurrent.	
022	Inverter detects a PV2 input overcurrent.	
036	Heatsink is over-temperature.	
037	Inverter internal is over-temperature.	
039	Inverter insulation resistance to the ground is low.	
038	Relay fault	
041	Leakage current self-detection abnormal	
043	Inner under-temperature fault.	
044	Open-loop inverter self-test fault.	
045	PV1 boost circuit fault.	
046	PV1 boost circuit fault.	
048	AC current sampling channel abnormal	
053	Auxiliary DSP grid voltage exceeds the set protection value. Protection time and point varies as per country difference.	
054	Auxiliary DSP grid frequency exceeds the set protection value. Protection time and point varies as per country difference.	
056	Inverter auxiliary DSP detects that the leakage current exceeds the set protection range.	
059	Master/auxiliary DSP communication abnormal	
061	Alarm for no inverter type setting.	
070	Fan abnormal. Stop the inverter and disconnect inverter AC & DC cables. Check if the	

	fan air ducts are blocked. Replace the fan if necessary.	
084	Warning for reverse cable connection of the Sungrow Meter.	
085	Mismatched software version.	
087	Arc self-detection abnormal alarm.	
088	Arc abnormal alarm.	
089	Arc detection OFF alarm	
092	Lightning protection failure alarm of the grid-connected box	
093	Switch tripping alarm of the grid-connected box	
200	Bus voltage is high.	
202	PV overcurrent	
201	Bus voltage is low.	
203	The PV input voltage exceeds the bus voltage.	
306	Input and output power mismatching fault.	
315	PV1 current sampling fault.	
316	PV2 current sampling fault.	
320	Leakage current sensor fault.	
409	Both the ambient temperature sensor and the radiator temperature sensor fail.	
501	External memory reading/writing warning.	
503	Ambient temperature sensor open circuit warning.	
504	Ambient temperature sensor short circuit warning.	
505	Radiator temperature sensor open circuit warning.	
506	Radiator temperature sensor short circuit warning.	
514	Abnormal communication warning of the Sungrow Meter.	

4. Power limited method

Method	Status code	Explanation	Connected to grid or not
No limited	0	The inverter is grid-connected running normally without power limitation.	√
External command for limitation	1	The inverter receives an active power scheduling command, and the limited power ratio is less than 100% (110% for China).	
Over-temperature derating	2	Active derating due to high temperature.	√
Error recovery limitation	3	When an over- / under-frequency or over- / under-voltage error recovers, the output power will be limited according to the power ramp rate.	
Grid over-voltage power limited	4	Active derating due to high AC voltage.	
Grid under-voltage power limited	5	The output power is limited because the AC voltage is lower than rated voltage.	

Reserved	6		
Over-frequency power limited	7	Active derating due to high grid frequency.	√
High altitude limitation	8	Active derating due to higher altitude.	
PF setting	9	The PF is manually set to a value less than 1.	√
Inverter port power limited	10	In the case of a communication failure or reverse connection of the meter, the power limited will be performed at the inverter port instead of the grid-connected point.	√
Grid-connected port power limited	11	The export ratio is set to less than 100%.	√
DRM output power limited	12	Set the DRM mode to limit the power output.	√
Under-frequency power limited	13	The output power is limited because the grid frequency is lower than the frequency point required in the standard.	√
PV high-voltage power limited	14	Active derating due to high DC voltage.	√

5. Device status

Status	Status code	Explanation	Connected to grid or not
Running	0x0	After being energized, the inverter tracks the PV strings' maximum power point (MPP) and feeds the AC power to grid. This mode is the normal mode.	√
Turn off	0x8000	The inverter is turned off.	×
Key-stop	0x1300	The inverter will stop running by manual "OFF" via the LCD menu or with the communication setting. Set to "ON" if you want to restart the inverter.	×
Emergency stop	0x1500	The external device triggers the dry contact signal of the inverter, and the inverter response to perform an emergency shutdown.	×
Standby	0x1400	If the DC input power is insufficient, the inverter will enter the standby status.	×
Initial standby	0x1200	The inverter is powered on for the first time and is in the status of standby.	×
Startup	0x1600	The inverter is initializing and synchronizing with the grid.	×
Warning	0x9100	The inverter has detected an warning information.	√
Derating	0x8100	Due to temperature, altitude or other environmental factors or with an active power scheduling command from monitoring device, and the active power setting	√

		value is less than 100%, the inverter will run with power derating.	
Error stop	0x5500	The inverter stops running due to an error.	×
Communication error	0x2500	Communication failure between the inverter's LCD and internal DSP, and the LCD cannot obtain the DSP running status.	To be decided

6. Examples

Take ComTest for example.

6.1 Acquire one piece of running information

Supposed that the inverter address is 1, it needs to acquire data from address 5000 of 3x address type.

The PC sends (HEX):

01 04 13 87 00 01 85 67

The inverter replies (HEX):

01 04 02 00 22 39 29

Note: The type code of inverter SG4KTL is 0x0022.

6.2 Acquire multiple running information

Supposed that the inverter address is 1, it needs to acquire 10 data from address starting from 5000 of 3x address type

The PC sends (HEX):

01 04 13 87 00 0A C4 A0

The inverter replies (HEX):

01 04 14 00 22 00 28 00 00 00 00 00 05 00 00 00 26 00 00 00 00 00 AF F8

Note: The type code of inverter SG4KTL is 0x0022. The nominal output power is 4.0 kW, two-phase. Daily power generation is 0. The total power generation is 5 kWh. The total running time is 38h. The internal temperature is 0°C. The internal transformer temperature is 0°C.

6.3 Acquire SN

Supposed that the inverter address is 1, it needs to acquire 10 data from address starting from 4990 of 3x address type

The PC sends (HEX):

01 04 13 7D 00 0A E4 91

The inverter replies (HEX):

01 04 14 31 32 31 32 31 32 30 30 31 00 00 00 00 00 00 00 00 00 00 9B 56

Note:

1. SN data type is UTF-8;
2. Serial number is: 121212001

6.4 Read one setting datum

Supposed that the inverter address is 1, it needs to read data from address 5000 of 4x address type.

The PC sends (HEX):

01 03 13 87 00 01 30 A7

The inverter replies (HEX):

01 03 02 07 D8 BA 2E

Note: the data read out is year 2008.

6.5 Read multiple setting data

Supposed that the inverter address is 1, it needs to read 10 data from address starting from 5000 of 4x address type.

The PC sends (HEX):

01 03 13 87 00 0A 71 60

The inverter replies (HEX):

01 03 14 07 DA 00 0A 00 1E 00 09 00 28 00 25 00 CE 00 AA 01 F4 00 00 80 53

Note: The data are October, 30, 2010, 09:40:37; Stop; power limitation on, power limitation value is 50 %.

6.6 Set one datum

Supposed that the inverter address is 1, it needs to set data from address 5000 of 4x address type.

The PC sends (HEX):

01 10 13 87 00 01 02 07 DA 19 4D

The inverter replies (HEX):

01 10 13 87 00 01 B5 64

Or

The PC sends (HEX):

01 06 13 87 07 DA BE CC

The inverter replies (HEX):

01 06 13 87 07 DA BE CC

Note: The setting data is year 2010

6.7 Set multiple data

Supposed that the inverter address is 1, it needs to set 10 data to address starting from 5000 of 4x address type.

The PC sends (HEX):

01 10 13 87 00 0A 14 07 D9 00 0A 00 1E 00 09 00 10 00 00 00 CE 00 AA 01 F4 00 00 3E 65

The inverter replies (HEX):

01 10 13 87 00 0A F4 A3

Note: The data are October, 30, 2009, 09:16:00, stop, power limitation on, power limitation value is 50 %.