GINLONG
No. 57 Jintong Road,
Binhai (Sea front) Industrial Park,
Xiangshan, Ningbo, Zhejiang, 315712, P.R.China
Tel: (+86) 574 6578 1806 Fax: (+86) 574 6578 1606

Power Generating Module Document Type B

Form B2-1 Power Generating Module Document for Type B Power Generating Modules Compliance Statement

This document shall be completed by the Generator

Note: For phased installations reference to PGM in this form should be read as reference to Generating Units. and the project phase noted.

Power Generating Module (PGM)	**Distribution Network Owner(DNO)**:
PGM Name: S6-GC80K,S6-GC100K, S6-GC110K,S6-GC125K	**DNO Name**: ABC electricitydistribution
Compliance Contact (name/tel/email)**:** Pan Ruyi/+86(0)574-6578 8615/ruyi.pan@ginlong.com	**Compliance Contact** (name/tel/email):

Key to Submission Stage

A – Application: Submission of the Standard Application Form.

E – Energisation: Documentation required prior to Energisation.

IS – Initial Submission: The programme of initial compliance document submission to be agreed between the **Generator** and the **DNO** as soon as possible after acceptance of a Connection Offer. The **Power Generating Module Document** shall be completed as agreed in accordance with paragraph 17.2.2 at least 28 days before the **Generator** wishes to synchronise its **Power Generating Module** for thefirst time.

IONS – Interim Operational Notification Submission: The **Generator** shall submit post energisation verification test documents to obtain an **Interim Operational Notification** from the **DNO**.

FONS – Final Operational Notification Submission: The **Generator** shall submit post monitoring verification test documents within 28 days of synchronising in accordance with paragraph 17.7.2 to obtain **Final Operational Notification** from the **DNO**.

GINLONG
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Key to evidence requested	**Key to Compliance**
S - Indicates that **DNO** would expect to see the results of a simulationstudy P - **Generating Unit** or **Power Generating Module** design data MI - **Manufacturers' Information**, generic data or test results asappropriate D - Copies of correspondence or other documents confirming that arequirement has been met T - Indicates that the **DNO** would expect to see results of, and/orwitness, tests or monitoring which demonstrates compliance TV - Indicates Type Test reports (if **Generator** pursues this complianceoption)	Y = Yes (Compliant), O = Outstanding (outstandingsubmission) UR= Unresolved issue N = No (Non-Compliant)

Note that second part of this form is split into two Parts, the Part 1 is applicable to **Synchronous Power** Generating Modules, Part 2 is applicable to Power Park Modules

Issue	Date of Issue	Compliance Declaration Signatory Name	Compliance Declaration Signature	Issue Notes
Issue#	2025/12/18	PanRuyi	I declare that the details provided in this issue of this **Power Generating Module Document** comply with the requirements of G99/NI	
1				
FinalIssue Prior to **FON**				

Details of Power Generating Module	
Connection Voltage	230/400V
RegisteredCapacity	80/100/110/125kW
Manufacturer / Reference	Ginlong technologies Co., Ltd.
Technology Type	Grid-connected PV Inverter

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17.2.1&17.2.3&17.7.1: Confirmation that a completed StandardApplication Form has been submitted tothe **DNO**		
Submission Stage	Evidence Requested (and / or)	Compliance **Y, O, UR, N,**
A, IS, IONS	P, MI, D	

17.2.1&17.2.3&17.7.1: Confirmation that a completed StandardApplication Form has been submitted tothe **DNO**		
Submission Stage	Evidence Requested (and / or)	Compliance **Y, O, UR, N,**
E	D	

9..4.2 Power Quality – Voltage fluctuations and Flicker:

For **Power Generating Modules** of **Registered Capacity** of less than 75 A per phase (ie 50 kW) these tests should be undertaken in accordance with Annex A.7.1.4.3. Results should be normalised to a standard source impedance, or if this results in figures above the limits set in BS EN 61000-3-11 to a suitable Maximum Impedance.

For **Power Generating Modules** of **Registered Capacity** of greater than 75 A per phase (ie 50 kW) the installation must be designed in accordance with EREC P28.

Submission Stage	Evidence Requested (and / or)	Compliance **Y, O, UR, N,**
IS	MI, D, TV	Y

	Starting			Stopping			Running	
	d max	d c	d(t)	d max	d c	d(t)	P st	P lt 2 hours
Measured Values at test impedance	0.51%	0.005%	0	0.576%	0.073%	0	0.102	0.082
Normalised to standard impedance	0.51%	0.005%	0	0.576%	0.073%	0	0.102	0.082
Normalised to required maximum impedance	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Limits set under BS EN 61000-3-11	4%	3.3%	3.3%	4%	3.3%	3.3%	1.0	0.65

Test Impedance	R	0.24 ^	Ω	Xl	0.15 ^	Ω
Standard Impedance	R	0.24 * 0.4 ^	Ω	Xl	0.15 * 0.25 ^	Ω
Maximum Impedance	R	N/A	Ω	Xl	N/A	Ω

* Applies to three phase and split single phase **Power Generating Modules.**

^ Applies to single phase **Power Generating Module** and **Power Generating Modules** using two phases on a three phase system

For voltage change and flicker measurements the following formula is to be used to convert the measured values to the normalised values where the **Power Factor** of the generation output is 0.98 or above.

Normalised value = Measured value x reference source resistance/measured source resistance at test point

Single phase units reference source resistance is 0.4 Ω

Two phase units in a three phase system reference source resistance is 0.4 Ω

Two phase units in a split phase system reference source resistance is 0.24 Ω

Three phase units reference source resistance is 0.24 Ω

Where the **Power Factor** of the output is under 0.98 then the Xl to R ratio of the test impedance should be close to that of the Standard Impedance.

The stopping test should be a trip from full load operation.

The duration of these tests need to comply with the particular requirements set out in the testing notes for the technology under test. Dates and location of the test need to be noted below

Test start date	18.Dec.2025	Test end date	18.Dec.2025
Test location	Ginlong Technologies Co.,Ltd.		

9.4.3 Power Quality – Harmonics:

For **Power Generating Modules** of **Registered Capacity** of less than 75 A per phase (ie 50 kW) the test requirements are specified in Annex A.7.1.5**.**These tests should be carried out as specified in BS EN 61000-3-12The results need to comply with the limits of Table2 of BS EN 61000-3-12 for single phase equipment and Table 3 of BS EN 610000-3-12 for three phase equipment.
Power Generating Modules with emissions close to the limits laid down in BS EN 61000-3-12 may require the installation of a transformer between 2 and 4 times the rating of the **Power Generating Module**in order to accept the connection to a **Distribution Network.**
For **Power Generating Modules** of **Registered Capacity** of greater than 75 A per phase (ie 50 kW) the installation must be designed in accordance with EREC G5.

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Power Generating Module tested to BS EN 61000-3-12								
Submission Stage			Evidence Requested (and / or)				Compliance **Y, O, UR, N,**	
IS			MI, D, TV				Y	
Power Generating Module rating per phase (rpp)				41.67		kVA	Harmonic % = Measured Value (A) x 23/rating per phase (kVA)	
Harmonic	At 45-55% of **Registered Capacity**						Limit in BS EN 61000-3-12	
	Measured value (MV) in Amps			Measured value (MV) in %				
	L1	L2	L3	L1	L2	L3	1 phase	3 phase
2	0.533	0.533	0.522	0.294	0.294	0.288	8%	8%
3	0.222	0.331	0.428	0.123	0.183	0.236	21.6%	Not stated
4	0.188	0.156	0.154	0.104	0.086	0.085	4%	4%
5	1.169	1.214	1.083	0.645	0.670	0.598	10.7%	10.7%
6	0.090	0.110	0.081	0.050	0.061	0.045	2.67%	2.67%
7	1.006	0.936	1.016	0.555	0.517	0.561	7.2%	7.2%
8	0.112	0.112	0.087	0.062	0.062	0.048	2%	2%
9	0.074	0.083	0.074	0.041	0.046	0.041	3.8%	Not stated
10	0.147	0.111	0.136	0.081	0.061	0.075	1.6%	1.6%
11	0.162	0.167	0.129	0.089	0.092	0.071	3.1%	3.1%
12	0.087	0.086	0.087	0.048	0.047	0.048	1.33%	1.33%
13	0.783	0.706	0.778	0.432	0.390	0.429	2%	2%
THD[1]	--	--	--	1.024	1.010	1.011	23%	13%
PWHD[2]	--	--	--	0.618	0.613	0.621	23%	22%
Harmonic	At 100% of **Registered Capacity**						Limit in BS EN 61000-3-12	

[1] THD = Total Harmonic Distortion

[2]PWHD = Partial Weighted Harmonic Distortion

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	Measured value (MV) in Amps			Measured value (MV) in %				
	L1	L2	L3	L1	L2	L3	1 phase	3 phase
2	0.749	0.655	0.633	0.413	0.362	0.349	8%	8%
3	0.426	0.323	0.621	0.235	0.178	0.343	21.6%	Not stated
4	0.267	0.295	0.194	0.147	0.163	0.107	4%	4%
5	2.375	2.389	2.264	1.311	1.319	1.250	10.7%	10.7%
6	0.125	0.154	0.116	0.069	0.085	0.064	2.67%	2.67%
7	1.462	1.409	1.526	0.807	0.778	0.842	7.2%	7.2%
8	0.109	0.104	0.104	0.060	0.057	0.057	2%	2%
9	0.104	0.117	0.095	0.057	0.065	0.052	3.8%	Not stated
10	0.193	0.163	0.182	0.107	0.090	0.100	1.6%	1.6%
11	0.497	0.464	0.477	0.274	0.256	0.263	3.1%	3.1%
12	0.116	0.130	0.121	0.064	0.072	0.067	1.33%	1.33%
13	1.053	0.942	1.029	0.581	0.520	0.568	2%	2%
THD[3]	--	--	--	1.749	1.702	1.714	23%	13%
PWHD[4]	--	--	--	0.837	0.829	0.833	23%	22%

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12.5 Reactive Power capability
Confirm compliance with Section 12.5 by carrying out simulation study in accordance with B.4.2 and by submissionof a report

Submission Stage		Evidence Requested (and / or)				Compliance **Y, O, UR, N,**
IS		S, MI, TV				Y
Test Conditions		Measurements				Limitation
P/Pn	Q	U [V]	P [kW]	Q [kVA]	S [kVA]	Q/Pn
20%	Max. un	230.3	24.83	-41.76	48.58	<-33%
50%		230.7	62.62	-42.18	75.50	
100%		231.1	117.84	-41.95	125.08	
20%	Max. ov	230.4	24.69	41.43	48.23	>33%
50%		230.9	61.93	41.52	74.56	
100%		231.2	117.53	42.02	124.82	
Note(s):						

12.2.5 Limited Frequency Sensitive Mode – Over frequency test: The test is using the specific threshold frequency of 50.2 Hz and Droop of 4%.

Confirm the compliance with 12.2.5 by carrying out simulation study in accordance with B.4.5 and by submissionof a report.	**Yes**

Submission Stage	Evidence Requested (and / or)	Compliance **Y, O, UR, N,**
IS	S, MI, TV	Y

Alternatively, simulation results should be noted below:

Test sequence at **Registered Capacity**>80%	Measured **Active Power** Output	Frequency	T_{rise}≤10s	Primary Power Source	**Active Power** Gradient
Step a) 50.00Hz ±0.01Hz	124837W	50.00Hz	0.1	125138W	-
Step b) 50.25Hz ±0.05Hz	121683W	50.25Hz	0.1		-

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Step c) 50.70Hz ±0.10Hz	93356W	50.70Hz	0.1		-
Step d) 51.15Hz ±0.05Hz	65297W	51.15Hz	0.1		-
Step e) 50.70Hz ±0.10Hz	93186W	50.70Hz	0.1		-
Step f) 50.25Hz ±0.05Hz	121584W	50.25Hz	0.1		-
Step g) 50.00Hz ±0.01Hz	124745W	50.00Hz	0.1		750kW/min
Test sequence at **Registered Capacity** 40% - 60%	Measured **Active Power** Output	Frequency		Primary Power Source	**Active Power** Gradient
Step a) 50.00Hz ±0.01Hz	62377W	50.00Hz	0.1	62635W	-
Step b) 50.25Hz ±0.05Hz	59184W	50.25Hz	0.1		-
Step c) 50.70Hz ±0.10Hz	31046W	50.70Hz	0.1		-
Step d) 51.15Hz ±0.05Hz	2860W	51.15Hz	0.1		-
Step e) 50.70Hz ±0.10Hz	30968W	50.70Hz	0.1		-
Step f) 50.25Hz ±0.05Hz	59091W	50.25Hz	0.1		–
Step g) 50.00Hz ±0.01Hz	62285W	50.00Hz	0.1		750kW/min

12.2 Frequency response: Confirm that the plant and apparatus isable of continue to operate during frequency ranges specified in 12.2

Tests should be carried with the **Power Generating Module** operating at **Registered Capacity** and connected to a suitable test supply or grid simulation set. The power supplied by the primary source shall be kept stable within ± 5 % of the apparent power value set for the entire duration of each test sequence.

Frequency, voltage and **Active Power** measurements at the output terminals of the **Power Generating Module** shall be recorded every second. The tests will verify that the **Power Generating Module** can operate within the required ranges

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for the specified period of time.

The **Interface Protection** shall be disabled during the tests.

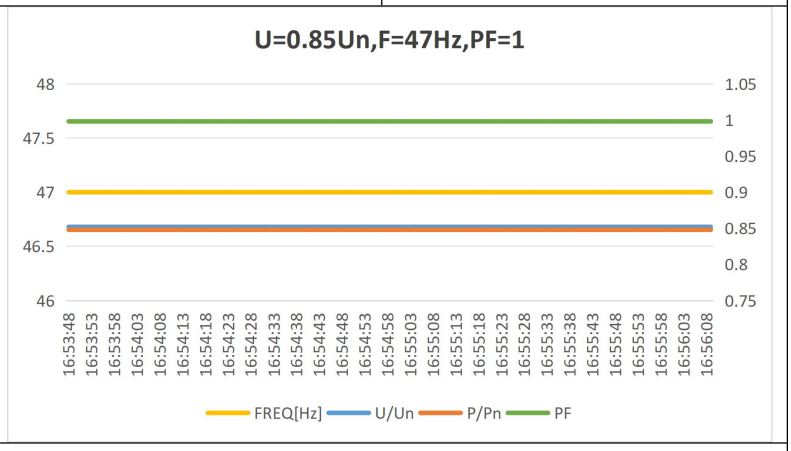
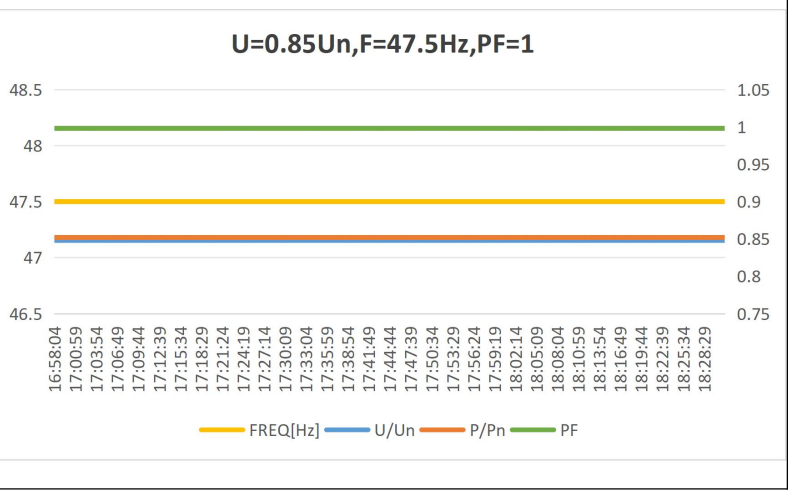
In case of a PV **Power Park Module** the PV primary source may be replaced by a DC source.

In case of a full converter **Power Park Module** (e.g wind) the primary source and the prime mover **Inverter**/rectifier may be replaced by a DC source.

Pass or failure of the test should be indicated in the fields below (right hand side), for example with the statement "Pass", "No disconnection occurs", etc. Graphical evidence is preferred.

Note that the value of voltage stated in brackets assumes a **LV** connection. This should be adjusted for **HV** as required.

Submission Stage	Evidence Requested (and / or)	Compliance **Y, O, UR, N,**
IS	MI, TV	Y

Test 1 Voltage = 85% of nominal (195.5 V), Frequency = 47 Hz, Power Factor = 1, Period of test 20 s	
Test 2 Voltage = 85% of nominal (195.5 V), Frequency = 47.5 Hz, Power Factor = 1, Period of test 90 minutes	

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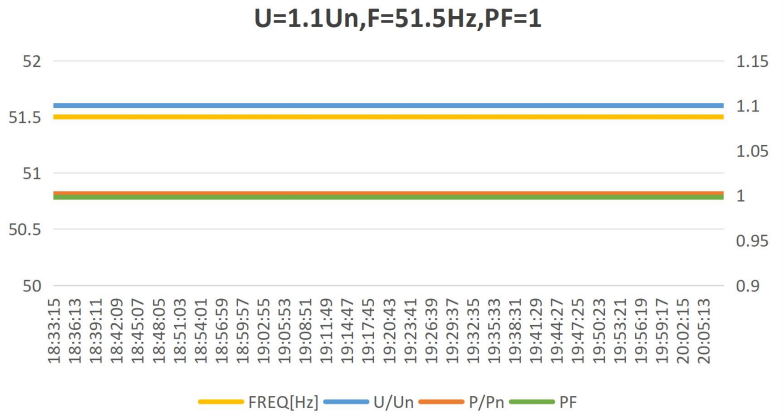
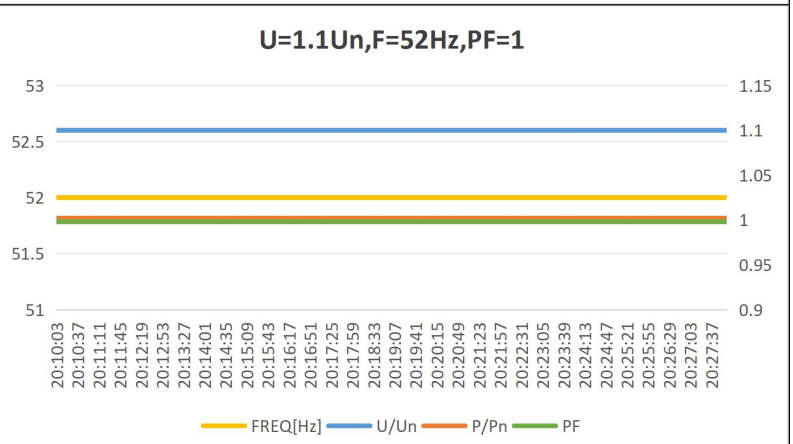
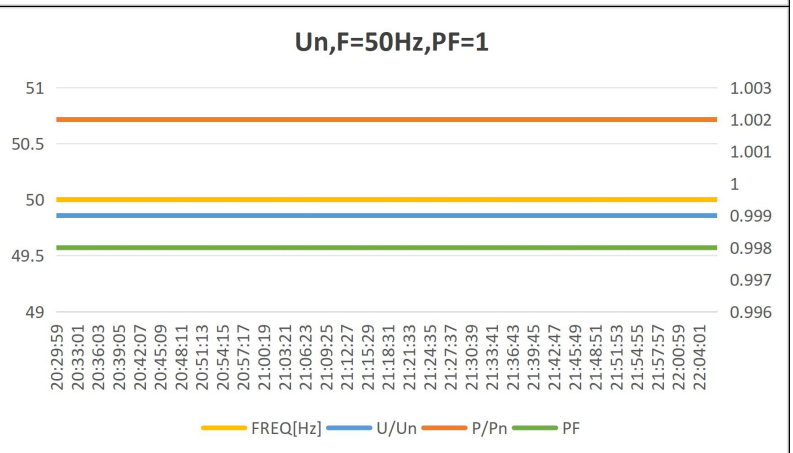
Test 3 Voltage = 110% of nominal (253 V)., Frequency = 51.5 Hz, Power Factor = 1, Period of test 90 minutes	
Test 4 Voltage = 110% of nominal (253 V), Frequency = 52.0 Hz, Power Factor = 1, Period of test 15 minutes	
Test 5 Voltage = 100% of nominal (230 V), Frequency = 50.0 Hz, Power Factor = 1, Period of test = 90 minutes	

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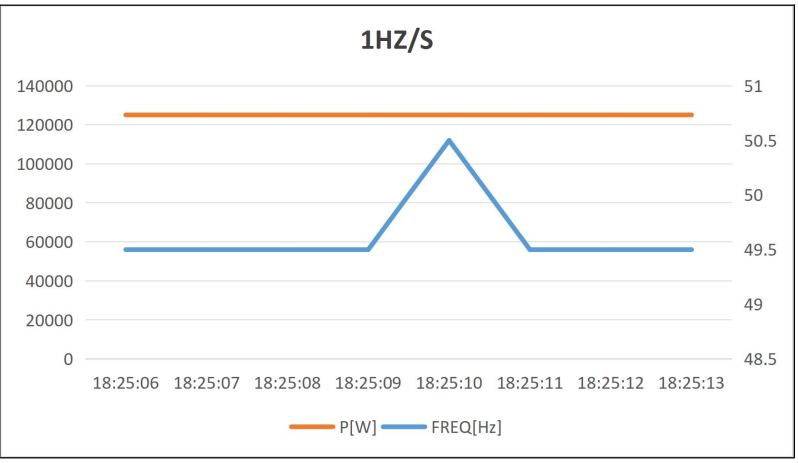
Test 6 RoCoF withstand Confirm that the Power Generating Module is capable of staying connected to the Distribution Network and operate at rates of change of frequency up to 1 Hzs-1 as measured over a period of 500 ms. Note that this is not expected to be demonstrated on site.	

12.1.3 Reduction of active power on setpoint (for Type B, Type C, Type D)

Note:The Active Power reduction will be either between 1.0 p.u. of Registered Capacity Active Power and zero, or between 1.0 pu of Registered Capacity Active Power and Minimum Stable Operating Level. In the latter case the Generator will agree with the DNO how zero output can be achieved, including the option ofusing the logic interface as described in paragraph 11.1.3.1.

11.1.3.1 By default the DNO logic interface will take the form of a simple binary output that can be operated by a simple switch or contactor. When the switch is closed the Power Generating Module can operate normally. When the switch is opened the Power Generating Module will reduce its Active Power to zero within 5 s. The signal from the Power Generating Module that is being switched can be either AC (maximum value 240 V) or DC (maximum value 110 V). If the DNO wishes to make use of the facility to cease Active Power output the DNO will agree with the Generator how the communication path is to be achieved

Submission Stage				Evidence Requested (and / or)				Compliance **Y, O, UR, N,**			
IS				MI, TV				Y			
1-min mean value, P/Pn [%]	100	90	80	70	60	50	40	30	20	10	0
Psetpoint [kW]:	125	112.5	100	87.5	75	62.5	50	37.5	25	12.5	0
Pmeasured[kW]:	124.86	112.27	99.23	87.26	74.58	62.27	49.38	37.17	24.54	12.21	0.53
ΔP/PEmax [%]:	-0.11	-0.18	-0.62	-0.19	-0.34	-0.18	-0.50	-0.26	-0.37	-0.23	0.42
Limit reduce time [s]	5s										

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12.3&12.6 TABLE: Fault Ride Through and Fast Fault Current Injection

Note: The product could inject reactive current in both pos. and neg. sequence during the fault, the magnitude of additional reactive current is configurable by K(2-6) value follow the ΔU-ΔIq curve in figure 1. The max. reactive current do not exceed the rated max. current of the product. In balanced faults, the reactive current magnitude in pos. sequence could be kept above the heavy black line in figure 2.

The calculation formula is as follows:

△U1=（U1- U1-1min）/Uc，△Iq1=k1*△U1, K1=2

△U2=（U2- U2-1min）/Uc，△Iq2=k2*△U2, K2=2

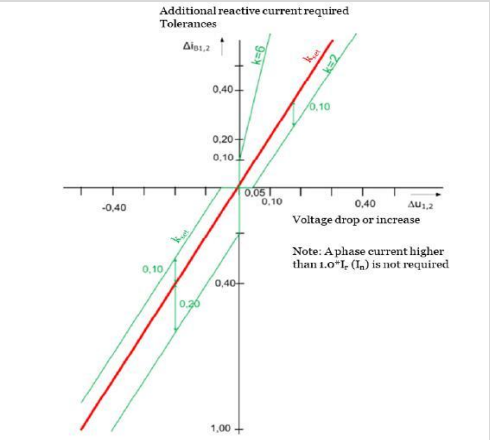

Figure 1

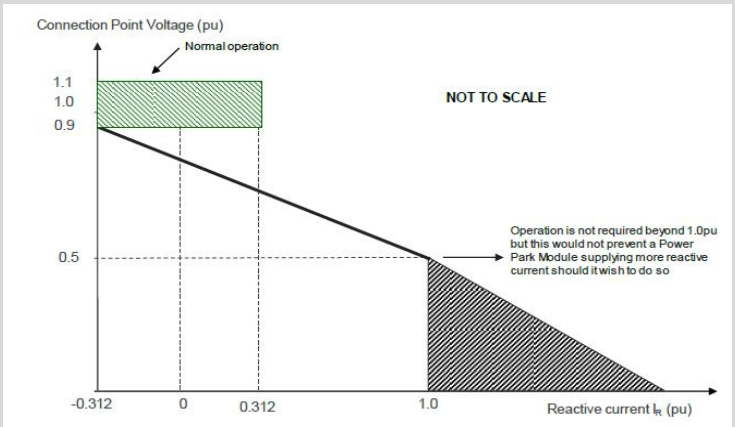

Figure 2

Submission Stage	Evidence Requested (and / or)	Compliance **Y, O, UR, N,**
IS	MI, TV, S	Y

Fault condition				During votage dips				After the fault	
Power P/Pn [%]	Voltage depth U/Un [p.u.]	Fault type	Fault duration [ms]	Fault Current Injection Ir[A]	Fault Current Injection ≥500ms[ms]	Qrise ≤100ms [ms]	Qsettling ≤300ms [ms]	Reactive power within0.5s Q/Pn [%]	Active power within1s P/Pn [%]

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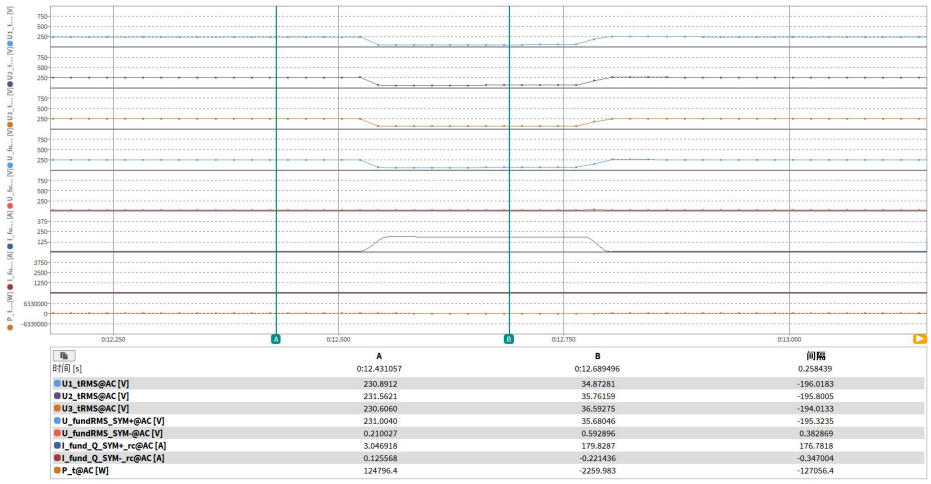
100%	0.15	3-phase	≥250	179.83	258	28.36	76.25	1.27	99.31
		2-phase		180.15	258	27.93	80.34	1.31	99.26
100%	0.85	3-phase	≥2900	51.88	2932	29.31	93.41	1.52	99.46
		2-phase		43.16	2932	29.09	87.23	1.54	99.23
100%	0.9	3-phase	≥180000	33.29	180000	--	--	1.46	99.08
		2-phase		0	180000	--	--	1.67	99.17

Test waveform diagram：

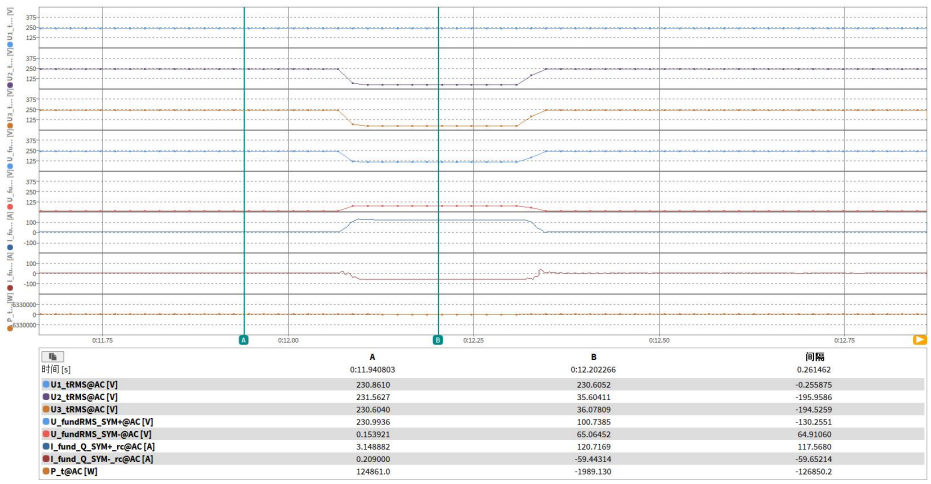
Voltage depth=0.15Un

3-phase



时间 [s]	A 0:12.431057	B 0:12.689496	间隔 0.258439
U1_tRMS@AC [V]	230.8912	34.87281	-196.0183
U2_tRMS@AC [V]	231.5621	35.76159	-195.8005
U3_tRMS@AC [V]	230.6060	36.59275	-194.0133
U_fundRMS_SYM+@AC [V]	231.0040	35.68046	-195.3235
U_fundRMS_SYM-@AC [V]	0.210027	0.592896	0.382869
I_fund_Q_SYM+_rc@AC [A]	3.046918	179.8287	176.7818
I_fund_Q_SYM-_rc@AC [A]	0.125568	-0.221436	-0.347004
P_t@AC [W]	124796.4	-2259.983	-127056.4

2-phase



时间 [s]	A 0:11.940803	B 0:12.202266	间隔 0.261462
U1_tRMS@AC [V]	230.8610	230.6052	-0.255875
U2_tRMS@AC [V]	231.5627	35.60411	-195.9586
U3_tRMS@AC [V]	230.6040	36.07809	-194.5259
U_fundRMS_SYM+@AC [V]	230.9936	100.7385	-130.2551
U_fundRMS_SYM-@AC [V]	0.153921	65.06452	64.91060
I_fund_Q_SYM+_rc@AC [A]	3.148882	120.7169	117.5680
I_fund_Q_SYM-_rc@AC [A]	0.209000	-59.44314	-59.65214
P_t@AC [W]	124861.0	-1989.130	-126850.2

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No. 57 Jintong Road,
Binhai (Sea front) Industrial Park,
Xiangshan, Ningbo, Zhejiang, 315712, P.R.China
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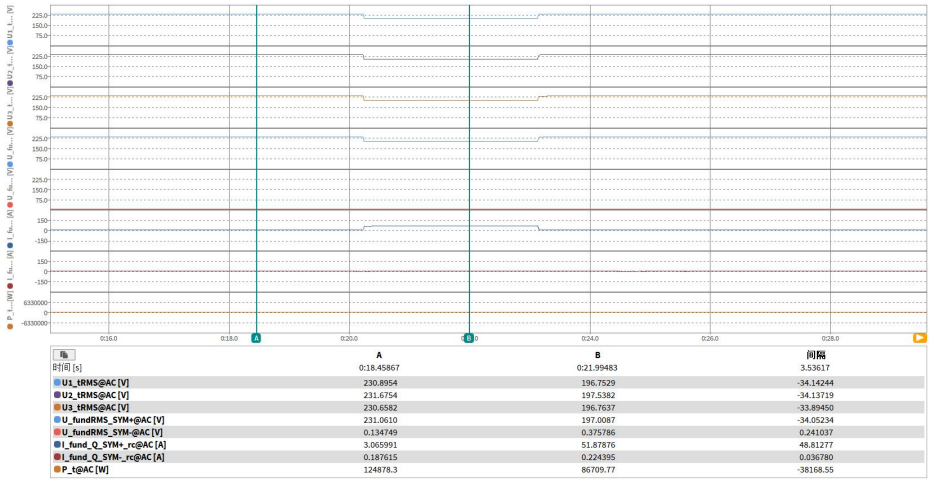
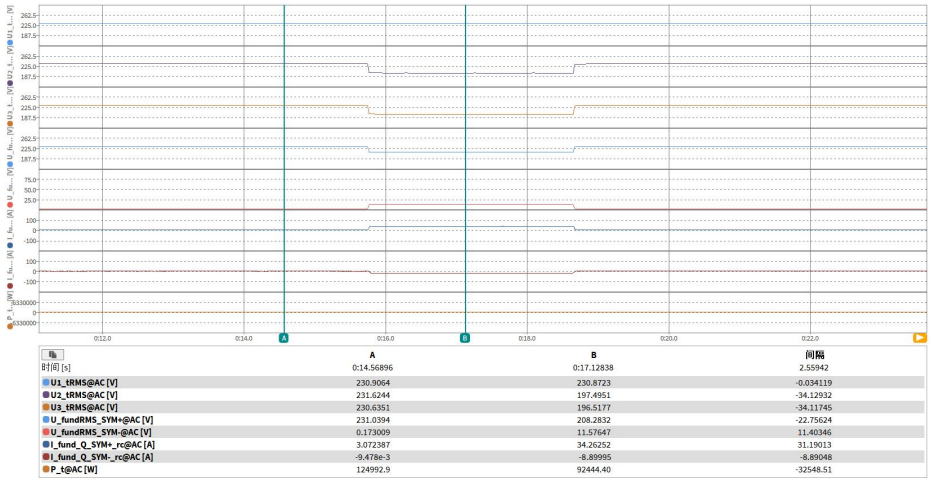
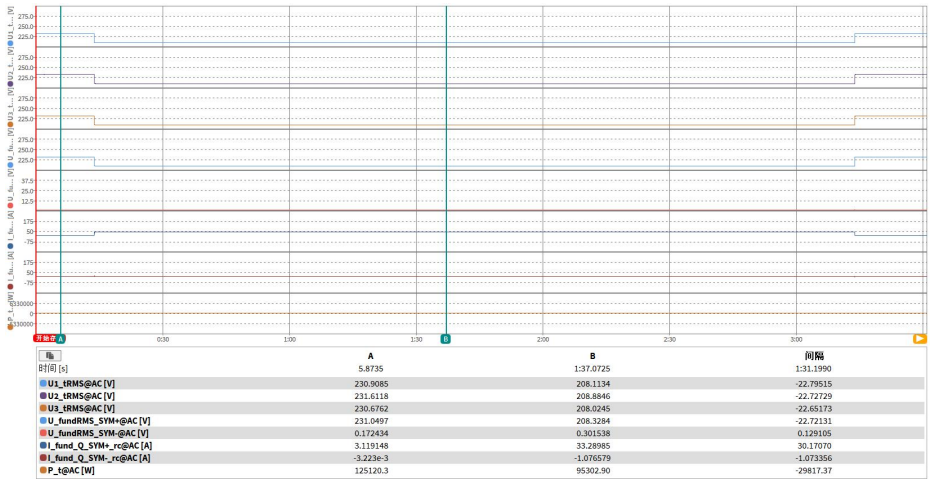
Voltage depth=0.85Un	3-phase	
	2-phase	
Voltage depth=0.9Un	3-phase	

3-phase

时间 [s]	A 0:18.45867	B 0:21.99483	间隔 3.53617
U1_tRMS@AC [V]	230.8954	196.7529	-34.14244
U2_tRMS@AC [V]	231.6754	197.5382	-34.13719
U3_tRMS@AC [V]	230.6582	196.7637	-33.89450
U_fundRMS_SYM+@AC [V]	231.0610	197.0087	-34.05234
U_fundRMS_SYM-@AC [V]	0.134749	0.375786	0.241037
I_fund_Q_SYM+_rc@AC [A]	3.065991	51.87876	48.81277
I_fund_Q_SYM-_rc@AC [A]	0.187615	0.224395	0.036780
P_t@AC [W]	124878.3	86709.77	-38168.55

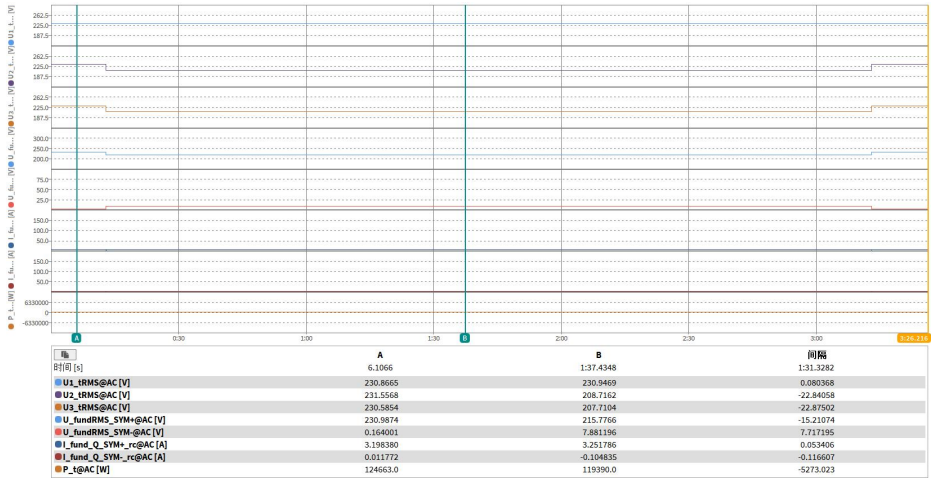
2-phase

时间 [s]	A 0:14.56896	B 0:17.12838	间隔 2.55942
U1_tRMS@AC [V]	230.9064	230.8723	-0.034119
U2_tRMS@AC [V]	231.6244	197.4951	-34.12932
U3_tRMS@AC [V]	230.6351	196.5177	-34.11745
U_fundRMS_SYM+@AC [V]	231.0394	208.2832	-22.75624
U_fundRMS_SYM-@AC [V]	0.173009	11.57647	11.40346
I_fund_Q_SYM+_rc@AC [A]	3.072387	34.26252	31.19013
I_fund_Q_SYM-_rc@AC [A]	-9.478e-3	-8.89995	-8.89048
P_t@AC [W]	124992.9	92444.40	-32548.51

3-phase

时间 [s]	A 5.8735	B 1:37.0725	间隔 1:31.1990
U1_tRMS@AC [V]	230.9085	208.1134	-22.79515
U2_tRMS@AC [V]	231.6118	208.8846	-22.72729
U3_tRMS@AC [V]	230.6762	208.0245	-22.65173
U_fundRMS_SYM+@AC [V]	231.0497	208.3284	-22.72131
U_fundRMS_SYM-@AC [V]	0.172434	0.301538	0.129105
I_fund_Q_SYM+_rc@AC [A]	3.119148	33.28985	30.17070
I_fund_Q_SYM-_rc@AC [A]	-3.223e-3	-1.076579	-1.073356
P_t@AC [W]	125120.3	95302.90	-29817.37

GINLONG
No. 57 Jintong Road,
Binhai (Sea front) Industrial Park,
Xiangshan, Ningbo, Zhejiang, 315712, P.R.China
Tel: (+86) 574 6578 1806 Fax: (+86) 574 6578 1606

	2-phase	

10 (Form B2-2) Interface Protection

- Over and under voltage protection
- Over and Under Frequencyprotection
- Loss of mains protectionOther protection:
- Details of any special protection, egPole Slipping or islanding

As an alternative to demonstrating protection compliance with Section 10 using **Manufacturers' Information** or type test reports, site tests can be undertaken at the time of commissioningthe **Power Generating Module**

Submission Stage	Evidence Requested (and / or)	Compliance **Y, O, UR, N,**
IS, IONS	MI, TV, T	Y

10.1.1 TABLE: Over and under voltage protection (for Type A)

Condition	Setting [U/Un]	Measurement				Limitation
		Trip value [V]				
		L1-N	L2-N	L3-N	L123	
U>	1.10 (253V)	253.87	254.06	253.76	253.90	± 1% of Un
U<	0.85 （195.5V）	195.74	195.93	195.68	195.78	
U<<	0.6 （138.0V）	138.72	138.81	138.68	138.74	
Condition	Setting [ms]	Measurement				Limitation
		Time delay[ms]				
		L1-N	L2-N	L3-N	L123	

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U>	500	521	520	522	521	500-600
U<	3000	3064	3066	3066	3065	3000-3100
U<<	2000	2059	2057	2059	2058	2000-2100

Condition		Measurement	limitation
U/Un	time [s]		
0.867 (199.5V)	5	No trip	No trip
0.617 (142 V)	2.5	No trip	No trip
0.583 (134 V)	1.98	No trip	No trip
1.083 (249V)	5	No trip	No trip
1.117 (257 V)	0.45	No trip	No trip

Note(s):

10.1.2 TABLE: Over and under voltage protection (for Type B)

Condition	Setting [U/Un]	Measurement				Limitation
		Trip value [V]				
		L1-L2	L2-L3	L3-L1	L1L2L3	
U>	1.10 (440V)	440.4	440.2	440.3	440.3	± 1% of Un
U<	0.85 (340V)	340.3	340.5	340.4	340.4	
U<<	0.60 (240V)	240.1	240.1	240.3	240.2	
Condition	Setting [ms]	Measurement				Limitation
		Time delay				
		L1-L2	L2-L3	L3-L1	L1L2L3	
U>	500	536	535	537	536	500-600
U<	3000	3062	3061	3063	3062	3000-3100
U<<	2000	2033	2035	2035	2034	2000-2100

Condition		Measurement	limitation
U/Un	time [s]		

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No. 57 Jintong Road,
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0.867(347 V)	5	No trip	No trip
0.617(247 V)	2.5	No trip	No trip
0.583(233 V)	1.98	No trip	No trip
1.083(433 V)	5	No trip	No trip
1.117(447 V)	0.45	No trip	No trip

Note(s):

10.2 TABLE: Over and Under Frequency protection

Condition	Setting [Hz]	Measurement Trip value [Hz]	Limitation
F>	52.0	52.01Hz	± 0.1% of fn
F<	48.0	47.99Hz	

Condition	Setting [ms]	Measurement Time delay	Limitation [ms]
F>	1000	1073	1000-1100
F<	500	528	500-600

Condition		Measurement	limitation
F [Hz]	t [s]		
48.2	25	No trip	No trip
47.8	0.45	No trip	No trip
51.8	120	No trip	No trip
52.2	0.98	No trip	No trip

Note(s):

10.3 TABLE: Loss of mains protection Other protection

Protection – Loss of Mains test: These tests should be carried out in accordance with BS EN 62116. Annex A.7.1.2.4.

The following sub set of tests should be recorded in the following table.

Test Power and imbalance	33% -5% Q Test 22	66% -5% Q Test 12	100% -5% P Test 5	33% +5% Q Test 31	66% +5% Q Test 21	100% +5% P Test 10
Trip time. Limit is 0.5s	0.117s	0.268s	0.400s	0.135s	0.290s	0.445s

Vector Shift Stability test. This test should be carried out in accordance with Annex A.7.1.2.6.

	Start Frequency	Change	Confirm no trip

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Binhai (Sea front) Industrial Park,
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Positive Vector Shift	49.5Hz	+50 degrees	Yes
Negative Vector Shift	50.5Hz	- 50 degrees	Yes

RoCoF Stability test: This test should be carried out in accordance with Annex A.7.1.2.6.

Ramp range	Test frequency ramp:	Test Duration	Confirm no trip
49.0Hz to 51.0Hz	+0.95Hzs^{-1}	2.1s	Yes
51.0Hz to 49.0Hz	-0.95Hzs^{-1}	2.1s	Yes

12.8&17.4,&17.5: SCADA commissioning and controllabilitytests; including completion of the controllability test sheet in Annex B.10

Submission Stage	Evidence Requested (and / or)	Compliance **Y, O, UR, N,**
IONS	T	

12.2 Frequency Response Test
Confirm the **Power Park Module** meetsthe requirements of 12.2 by testing in accordance with B.6.2

Submission Stage	Evidence Requested (and / or)	Compliance **Y, O, UR, N,**
IONS	T, MI, TV	Y

Step response test

Test sequence at Registered Capacity >65%	Measured Active Power Output (W)	Frequency (Hz)	Calculate droop (%)	Primary Power Source	Target value/Pn (%)
Step a) 50.00 Hz ±0.01 Hz	123442	50.00	-	PV simulator	-
Step b) 52.00 Hz ±0.01Hz	82807	52.00	9.84		67.08
Step c) 50.00 Hz ±0.01 Hz	122585	50.00	-		-

GINLONG
No. 57 Jintong Road,
Binhai (Sea front) Industrial Park,
Xiangshan, Ningbo, Zhejiang, 315712, P.R.China
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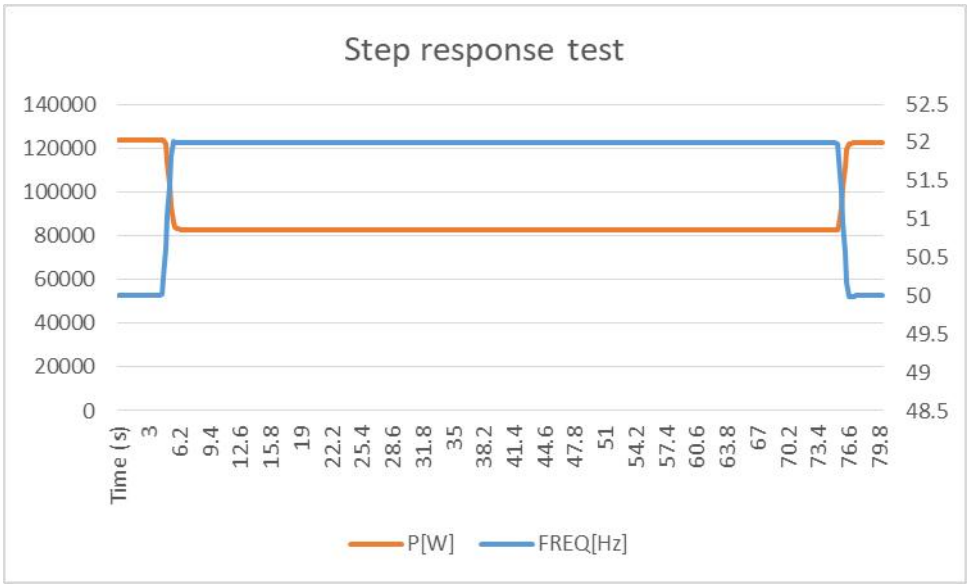
Response curve



Ramp response test

Test sequence at Registered Capacity >80%	Measured Active Power Output (W)	Frequency (Hz)	Calculate droop (%)	Primary Power Source	Target value/Pn (%)
Step a) 50.00 Hz ±0.01 Hz	123449	50.00	-	PV simulator	-
Step b) 50.60 Hz ±0.01Hz	117133	50.60	9.42		94.88
Step c) 50.00 Hz ±0.01 Hz	122676	50.00	-		-

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Binhai (Sea front) Industrial Park,
Xiangshan, Ningbo, Zhejiang, 315712, P.R.China
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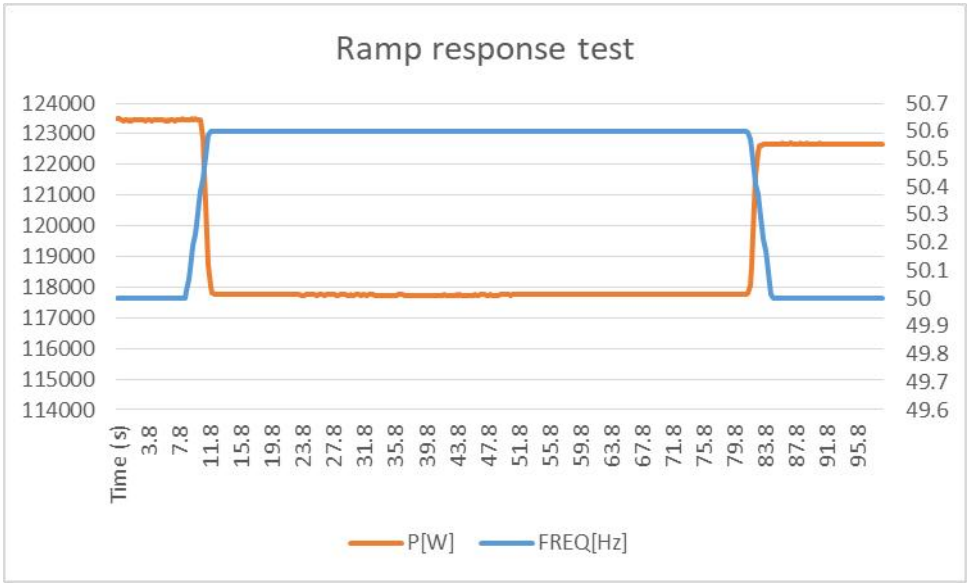
Response curve:



10.3.4 Automatic reconnection

Confirm by testing that the reconnection sequence starts after a minimum delay of60 s for restoration of voltage and frequency in accordance with paragraph 10.3.4

Submission Stage	Evidence Requested (and / or)	Compliance **Y, O, UR, N,**
IONS	T, MI, TV	Y

Time delay setting	Measured delay	Checks on no reconnection when voltage or frequency is brought to just outside stage 1 limits of Table 10.1.			
70s	71s	At 257.0V	At 191.5V	At 47.9Hz	At 52.1Hz
Confirmation that the **Power Generating Module** does not re-connect.		Yes	Yes	Yes	Yes

B.3: Installation and Commissioning Form B3completed with signed acceptance from the **DNO** representative 10

Submission Stage	Evidence Requested (and / or)	Compliance **Y, O, UR, N,**
IONS	D	

GINLONG
No. 57 Jintong Road,
Binhai (Sea front) Industrial Park,
Xiangshan, Ningbo, Zhejiang, 315712, P.R.China
Tel: (+86) 574 6578 1806 Fax: (+86) 574 6578 1606

17.8: Successful completion of 12-monthmonitoring period17.8		
Submission Stage	Evidence Requested (and / or)	Compliance **Y, O, UR, N,**
FONS	D	

Form A2-3: Compliance Verification Report for Inverter Connected Power Generating Modules

1. Power quality – DC injection: The tests should be carried out on a single **Generating Unit**. Tests are to be carried out at three defined power levels ±5%. At 230 V a 125 kW three phase **Inverter** has a current output of 541.2 A so DC limit is 1353 mA. These tests should be undertaken in accordance with Annex A.7.1.4.4.

The % DC injection ("as % of rated AC current" below) is calculated as follows:

% DC injection = Recorded DC value in Amps / Base current

where the base current is the **Registered Capacity** (W) / Vphase. The % DC injection should not be greater than 0.25%.

Test power level	10%	55%	100%
Recorded DC value in Amps	0.0327A	0.0385A	0.0462A
as % of rated AC current	0.006%	0.007%	0.009%
Limit	0.25%	0.25%	0.25%

2. Power Factor: The tests should be carried out on a single **Power Generating Module**. Tests are to be carried out at three voltage levels and at **Registered Capacity**. Voltage to be maintained within ±1.5% of the stated level during the test. These tests should be undertaken in accordance with Annex A.7.1.4.2.

Voltage	0.94 pu (216.2V)	1 pu (230V)	1.1 pu (253V)
Measured value	0.9986	0.9991	0.9989
Power Factor Limit –leading	>0.95	>0.95	>0.95

GINLONG
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Xiangshan, Ningbo, Zhejiang, 315712, P.R.China
Tel: (+86) 574 6578 1806 Fax: (+86) 574 6578 1606

Power Factor Limit –lagging	>0.98	>0.98	>0.98

3. Fault level contribution: These tests shall be carried out in accordance with EREC G99/NI Annex A.7.1.5.		
For **Inverter** output		
Time after fault	Volts	Amps
20ms	55.5V	225.3A
100ms	55.4V	44.3A
250ms	55.2V	0A
500ms	55.2V	0A
Time to trip	0.124S	In seconds

4. Self-Monitoring solid state switching: No specified test requirements. Refer to Annex A.7.1.6.	
It has been verified that in the event of the solid state switching device failing to disconnect the **Power Park Module**, the voltage on the output side of the switching device is reduced to a value below 50 volts within 0.5 s.	N/A (Solid state switch means electronic switch, Solis inverter uses mechanical dual relay protection with relay checks, which drops the voltage below 50V in 0.5s)

5. Wiring functional tests: If required by para 15.2.1.	
Confirm that the relevant test schedule is attached (tests to be undertaken at time of commissioning)	N/A (Not applicable. Refer to 15.2.1, inverter is using special connector for wiring)

6. Logic interface (input port)	
Confirm that an input port is provided and can be used to shut down the module	Yes. (Logic interface is marked as "DRM" on inverter. Please see inverter manual part 4.3.9 for detail.)
Provide high level description of logic interface, e.g. details in 11.1.3.1 such as AC or DC signal (the additional comments box below can be used)	Yes. (Logic interface marked "DRM" on inverter which can be operated by a simple switch or contactor. When the switch is closed the inverter can operated normally. When the switch is opened, the inverter will reduce it's output power to zero within 5s. The signal from the inverter that is being switched is DC about 10 V.)

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7. Cyber security	
Confirm that the **Power Generating Module** has been designed to comply with cyber security requirements, as detailed in 9.1.7.	Yes(The inverter can work with S2-WL-ST data logger to meet the requirements of ETSI EN 303 645)
Additional comments.	
The test result is based on S6-GC125K. All the series of inverters electrical character are the same. So the test result can cover all other models.	