



JingFuYuan

Certificate G83/2

Engineering Recommendation

Manufacturer:	Shenzhen JingFuYuan Tech. Co., LTD.
Address:	12th Block, Nangang Second Industrial Park, SongBai Road, Xili Town, Nanshan District, Shenzhen
Postal code, place:	518055
Country:	China
Test house details:	Shenzhen JingFuYuan Tech. Co., LTD. R&D Department.
Type reference:	Gird-Connected PV Inverter
	SUNTWINS 3300TL/SUNTWINS 4000TL
Max. AC power:	3000W/3600W

The results of the G83/2 tests are summarized in this certificate. JingFuYuan declares that all devices (with G83 setting) that are shipped to the UK comply with the requirements defined in engineering recommendation G83/2. These settings cannot be changed by an installer, user or by any other person than JingFuYuan. The complete documentation are available at JingFuYuan on demand.

Test details

- Power quality
- Harmonic current emissions as per BS EN 61000-3-2 Class A
- Voltage fluctuations and flicker as per BS EN 61000-3-3 Class A
- DC injection / Power factor
- Under / Over frequency switch off
- Under / Over voltage switch off
- Loss of mains test
- Reconnection time measurement
- Frequency drift and step change stability test
- Short circuit current contribution

Shenzhen JingFuYuan Tech. Co., LTD.

05.11.2013

Jiang Yunzhong

Director of R&D Grid-connected Inverter Technology



Test results

SUNTWINS 3300TL						
Power Quality. Harmonics.						
SSEG rating per phase(rpp)			3.0	KW		
Harmonic	At 45-55% of rated output		100% of rated output		NV=MV*3.68/rpp	
	Measured Value (MV) in Amps	Normalized Value (NV) in Amps	Measured Value (MV) in Amps	Normalized Value (NV) in Amps	Limit in BS EN 61000-3-2 in Amps	Higher limit for odd harmonics 21 and above
2	0.048	0.059	0.046	0.056	1.080	
3	0.151	0.185	0.149	0.183	2.300	
4	0.009	0.011	0.009	0.011	0.430	
5	0.122	0.149	0.117	0.143	1.140	
6	0.008	0.009	0.007	0.009	0.300	
7	0.055	0.068	0.054	0.066	0.770	
8	0.006	0.008	0.005	0.007	0.230	
9	0.077	0.095	0.075	0.091	0.400	
10	0.004	0.005	0.004	0.004	0.184	
11	0.172	0.211	0.173	0.212	0.330	
12	0.010	0.012	0.011	0.013	0.153	
13	0.064	0.079	0.064	0.079	0.210	
14	0.007	0.008	0.007	0.009	0.131	
15	0.069	0.085	0.066	0.081	0.150	
16	0.008	0.010	0.009	0.011	0.115	
17	0.078	0.096	0.076	0.094	0.132	
18	0.005	0.006	0.005	0.006	0.102	
19	0.055	0.068	0.054	0.066	0.118	
20	0.015	0.018	0.015	0.018	0.092	
21	0.066	0.081	0.056	0.069	0.107	0.160
22	0.005	0.006	0.006	0.008	0.084	
23	0.053	0.066	0.057	0.070	0.098	0.147
24	0.007	0.008	0.008	0.010	0.077	
25	0.014	0.018	0.017	0.021	0.090	0.135
26	0.004	0.005	0.004	0.005	0.071	
27	0.014	0.017	0.016	0.019	0.083	0.124
28	0.005	0.006	0.005	0.006	0.066	
29	0.003	0.003	0.003	0.004	0.078	0.117
30	0.006	0.007	0.005	0.006	0.061	
31	0.010	0.012	0.011	0.014	0.073	0.109
32	0.003	0.004	0.005	0.006	0.058	
33	0.016	0.020	0.020	0.024	0.068	0.102
34	0.003	0.004	0.004	0.005	0.054	
35	0.005	0.006	0.006	0.007	0.064	0.096



36	0.003	0.004	0.003	0.004	0.051	
37	0.003	0.003	0.005	0.007	0.061	0.091
38	0.003	0.003	0.004	0.005	0.048	
39	0.003	0.004	0.003	0.004	0.058	0.087
40	0.002	0.002	0.003	0.004	0.046	

Note the higher limits for odd harmonics 21 and above are only allowable under certain conditions, if these higher limits are utilized please state the exemption used as detailed in part 6.2.3.4 of BS EN 61000-3-2 in the box below.

SUNTWINS 4000TL						
Power Quality. Harmonics.						
SSEG rating per phase(rpp)			3.6	KW	NV=MV*3.68/rpp	
Harmonic	At 45-55% of rated output		100% of rated output			
	Measured Value (MV) in Amps	Normalized Value (NV) in Amps	Measured Value (MV) in Amps	Normalized Value (NV) in Amps	Limit in BS EN 61000-3-2 in Amps	Higher limit for odd harmonics 21 and above
2	0.095	0.098	0.108	0.110	1.080	
3	0.150	0.153	0.147	0.150	2.300	
4	0.009	0.010	0.010	0.010	0.430	
5	0.136	0.139	0.132	0.135	1.140	
6	0.011	0.011	0.012	0.012	0.300	
7	0.122	0.124	0.118	0.121	0.770	
8	0.002	0.002	0.002	0.002	0.230	
9	0.191	0.196	0.191	0.196	0.400	
10	0.006	0.007	0.008	0.008	0.184	
11	0.142	0.146	0.146	0.149	0.330	
12	0.009	0.010	0.010	0.010	0.153	
13	0.111	0.114	0.114	0.117	0.210	
14	0.007	0.007	0.009	0.009	0.131	
15	0.083	0.085	0.088	0.090	0.150	
16	0.003	0.003	0.004	0.004	0.115	
17	0.012	0.012	0.014	0.014	0.132	
18	0.015	0.015	0.016	0.016	0.102	
19	0.009	0.010	0.010	0.011	0.118	
20	0.010	0.010	0.010	0.011	0.092	
21	0.028	0.029	0.030	0.031	0.107	0.160
22	0.011	0.011	0.012	0.012	0.084	
23	0.064	0.065	0.067	0.069	0.098	0.147
24	0.003	0.003	0.003	0.003	0.077	
25	0.050	0.051	0.058	0.059	0.090	0.135
26	0.005	0.005	0.006	0.006	0.071	
27	0.024	0.025	0.027	0.028	0.083	0.124
28	0.005	0.005	0.006	0.006	0.066	



29	0.026	0.026	0.025	0.026	0.078	0.117
30	0.003	0.003	0.004	0.004	0.061	
31	0.009	0.010	0.010	0.010	0.073	0.109
32	0.003	0.003	0.003	0.003	0.058	
33	0.018	0.018	0.021	0.021	0.068	0.102
34	0.003	0.003	0.003	0.004	0.054	
35	0.005	0.005	0.007	0.007	0.064	0.096
36	0.003	0.003	0.003	0.004	0.051	
37	0.002	0.002	0.002	0.002	0.061	0.091
38	0.003	0.003	0.003	0.003	0.048	
39	0.002	0.002	0.003	0.003	0.058	0.087
40	0.002	0.002	0.002	0.002	0.046	

Note the higher limits for odd harmonics 21 and above are only allowable under certain conditions, if these higher limits are utilized please state the exemption used as detailed in part 6.2.3.4 of BS EN 61000-3-2 in the box below.

Power Quality. Voltage fluctuations and Flicker.								
	Starting			Stopping			Running	
	d_{max} [%]	d_c [%]	$d_{(t)}$ [%]	d_{max} [%]	d_c [%]	$d_{(t)}$ [%]	P_{st}	P_{It} 2 hours
Measured Values	0.42	1.51	0.48	0.42	1.51	0.48	0.173	0.093
Normalized to standard impedance and 3.68kW for multiple units	0.65	2.29	0.77	0.65	2.29	0.77	0.287	0.149
Limits set under BS EN 61000-3-2	4%	3.3%	3.3% 500ms	4%	3.3%	3.3% 500ms	1.0	0.65

SUNTWINS 3300TL			
Power Quality. DC injection.			
Test power level	10%	55%	100%
Test value	13.6mA	15.1mA	17.6mA
as % of rated AC current	0.104%	0.116%	0.149%
Limit	0.25%	0.25%	0.25%

SUNTWINS 4000TL			
Power Quality. DC injection.			
Test power level	10%	55%	100%
Test value	15.1mA	17.2mA	18.9mA
as % of rated AC current	0.096%	0.110%	0.121%
Limit	0.25%	0.25%	0.25%



SUNTWINS 3300TL				
Power Quality. Power factor.				
	216.5V	230V	252.5V	Test at three voltage levels and at full output.
Test value	0.9934	0.9984	0.9971	
Limit	>0.95	>0.95	>0.95	

SUNTWINS 4000TL				
Power Quality. Power factor.				
	216.5V	230V	252.5V	Test at three voltage levels and at full output.
Test value	0.9942	0.9992	0.9981	
Limit	>0.95	>0.95	>0.95	

Protection. Frequency tests						
Function	Setting		Trip test		“No trip tests”	
	Frequency	Time delay	Frequency	Time delay	Frequency/Time	Confirm no trip
Under frequency stage 1	47.5Hz	20s	47.45Hz	20.032s	47.70Hz/25s	No Trip
Under frequency stage 2	47Hz	0.5s	46.95Hz	0.530s	47.20Hz/19.98s	No Trip
					46.80Hz/0.48s	No Trip
Over frequency stage 1	51.5Hz	90s	51.55Hz	90.120s	51.30Hz/95s	No Trip
Over frequency stage 2	52Hz	0.5s	52.05Hz	0.564s	51.80Hz/89.98s	No Trip
					52.20Hz/0.48s	No Trip

Protection. Voltage tests						
Function	Setting		Test value		“No trip tests”	
	Voltage	Time delay	Voltage	Time delay	Voltage/Time	Confirm no trip
Under voltage stage 1	200.1V	2.5s	199.2V	2.562s	204.1V/3.5s	No Trip
Under voltage stage 2	184V	0.5s	183.6V	0.544s	188V/2.48s	No Trip
					180V/0.48s	No Trip
Over voltage stage 1	262.2V	1.0s	262.8V	1.040s	258.2V/2.0s	No Trip
Over voltage stage 2	273.7V	0.5s	274.3V	0.528s	269.7V/0.98s	No Trip
					277.7V/0.48s	No Trip

Note for Voltage tests the Voltage required to trip is the setting $\pm 3.45V$. The time delay can be measured at a larger deviation than the minimum required to operate the protection. The No trip tests need to be carried out at the setting $\pm 4V$ and for the relevant times as shown in the table above to ensure that the protection will not trip in error.

Protection. Loss of Mains test.						
To be carried out at three output power levels with a tolerance of plus or minus 5% in Test Power levels.						
Test Power	10%	55%	100%	10%	55%	100%
Balancing load on islanded network	95% of SSEG output	95% of SSEG output	95% of SSEG output	105% of SSEG output	105% of SSEG output	105% of SSEG output
Trip time. Limit is 0.5 seconds	0.22s	0.19s	0.21s	0.25s	0.26s	0.22s

Protection. Frequency change, Stability test.				
	Start Frequency	Change	End Frequency	Confirm no trip
Positive Vector Shift	49.5Hz	+9degrees		No trip
Negative Vector Shift	50.5Hz	-9degrees		No trip
Positive Frequency Drift	49.5Hz	+0.19Hz/sec	51.5Hz	No trip
Negative Frequency Drift	50.5Hz	-0.19Hz/sec	47.5Hz	No trip

Protection Re-connection timer.					
Test should prove that the reconnection sequence starts after a minimum delay of 20 seconds for restoration of voltage and frequency to within the stage 1 settings of table 1.					
Time delay setting	Measured delay	Checks on no reconnection when voltage or frequency is brought to just outside stage 1 limits of table 1.			
30s	34s	At 266.2V	At 196.1V	At 47.4Hz	At 51.6Hz
Confirmation that the SSEG does not re-connect.		No re-connect	No re-connect	No re-connect	No re-connect



Fault level contribution.					
SUNTWINS 3300TL			SUNTWINS 4000TL		
For an inverter SSEG			For an inverter SSEG		
Time After Fault	Volts	Amps	Time After Fault	Volts	Amps
20ms	29.79V	0.36A	20ms	29.93V	0.43A
100ms	29.80V	0.32A	100ms	29.82V	0.38A
250ms	29.79V	0.28A	250ms	29.80V	0.36A
500ms	29.78V	0.26A	500ms	29.81V	0.33A
Time to trip	0.063	In seconds	Time to trip	0.060	In seconds

Output current limitation of SUNTWINS 4000TL			
Grid voltage	200.5Vac	230Vac	261.5Vac
G83/2 Limit	16.0A	16.0A	16.0A
Limitation setting	16.0A	16.0A	16.0A
Actual value	15.9A	15.7A	13.8A

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