



Certificate G83/2

Engineering Recommendation

Manufacturer	SMA Solar Technology AG
Address	Sonnenallee 1, 34266 Niestetal (Germany)

Type Tested reference number	ZE_G83-2_STPxx000TL-20_en_13
Generating Unit technology	Three phase inverter
Test house details	SMA Solar Technology AG
Test period	From 2014-10-23 until 2014-11-03

Type reference	Max. apparent AC power (VA)	Rated AC power (W)	From FW Pack
STP 12000TL-20	12000	12000	2.52.00.R
STP 10000TL-20	10000	10000	2.52.00.R
STP 9000TL-20	9000	9000	2.52.00.R
STP 8000TL-20	8000	8000	2.52.00.R
STP 7000TL-20	7000	7000	2.52.00.R
STP 6000TL-20	6000	6000	2.52.00.R
STP 5000TL-20	5000	5000	2.52.00.R

The results of the G83/2 are summarized in this certificate. SMA declares that all units shipped to the UK, with at least the aforementioned FW version, are within the specifications and parameters set by the G83/2 Engineering Recommendation, Amendment 1 2018. These settings cannot be changed by an installer, user or by any person other than SMA. Note that all tests were carried out with the biggest inverter of the family under test. The results for the other inverters of the family are equivalent.

Do note that the aforementioned inverters complies with the new Amendment of the G83/2 with the same firmware version and country setting. The conformity was proven during Juni 2018.



Test Results

Power quality

Harmonics as per BS EN 61000-3-2								
Order	Frequency [Hz]	Thresholds [A]	P/Pn [%]				Max. NV / Limit [%]	
			50		100			
			MV [A]	NV [A]	MV [A]	NV [A]		
2	100	1,08	0,046	0,042	0,091	0,083	7,71%	✓
3	150	2,3	0,041	0,038	0,038	0,035	1,66%	✓
4	200	0,43	0,072	0,066	0,039	0,036	15,35%	✓
5	250	1,14	0,060	0,055	0,067	0,061	5,38%	✓
6	300	0,3	0,034	0,032	0,013	0,012	10,55%	✓
7	350	0,77	0,056	0,052	0,047	0,043	6,69%	✓
8	400	0,23	0,018	0,017	0,011	0,010	7,39%	✓
9	450	0,4	0,015	0,014	0,013	0,012	3,46%	✓
10	500	0,184	0,013	0,012	0,009	0,009	6,38%	✓
11	550	0,33	0,056	0,051	0,048	0,045	15,48%	✓
12	600	0,153	0,011	0,010	0,006	0,006	6,31%	✓
13	650	0,21	0,036	0,033	0,064	0,059	27,99%	✓
14	700	0,131	0,008	0,008	0,005	0,005	5,94%	✓
15	750	0,15	0,011	0,011	0,008	0,008	7,00%	✓
16	800	0,115	0,007	0,007	0,005	0,004	5,90%	✓
17	850	0,132	0,036	0,033	0,017	0,015	25,17%	✓
18	900	0,102	0,006	0,005	0,005	0,005	4,97%	✓
19	950	0,118	0,023	0,021	0,062	0,057	48,11%	✓
20	1000	0,092	0,005	0,004	0,004	0,004	4,84%	✓
21	1050	0,107	0,007	0,006	0,007	0,006	5,88%	✓
22	1100	0,084	0,004	0,004	0,003	0,003	4,93%	✓
23	1150	0,098	0,021	0,019	0,009	0,008	19,92%	✓
24	1200	0,077	0,004	0,003	0,004	0,003	4,44%	✓
25	1250	0,09	0,018	0,017	0,048	0,044	48,81%	✓
26	1300	0,071	0,004	0,004	0,003	0,003	5,20%	✓
27	1350	0,083	0,010	0,009	0,010	0,009	10,97%	✓
28	1400	0,066	0,003	0,003	0,003	0,003	4,56%	✓
29	1450	0,078	0,014	0,012	0,028	0,026	33,07%	✓
30	1500	0,061	0,003	0,002	0,004	0,003	5,34%	✓
31	1550	0,073	0,007	0,006	0,015	0,014	18,68%	✓
32	1600	0,058	0,002	0,002	0,003	0,002	4,11%	✓
33	1650	0,068	0,008	0,007	0,010	0,009	13,53%	✓
34	1700	0,054	0,002	0,002	0,002	0,002	3,50%	✓
35	1750	0,064	0,010	0,010	0,011	0,011	16,39%	✓
36	1800	0,051	0,002	0,002	0,002	0,002	3,21%	✓
37	1850	0,061	0,007	0,007	0,017	0,015	24,98%	✓
38	1900	0,048	0,002	0,001	0,002	0,001	3,05%	✓
39	1950	0,058	0,002	0,002	0,002	0,002	3,70%	✓
40	2000	0,046	0,002	0,001	0,001	0,001	3,18%	✓

MV - Measured Value NV - Normalized Value $NV = MV * 3,68 / \text{power per phase}$

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Test Results

Power quality

Voltage fluctuations and flicker as per BS EN 61000-3-3								
	Starting			Stopping			Running	
	dmax	dc	d(t) in ms	dmax	dc	d(t) in ms	Pst	Plt (2hours)
Limit	4,0%	3,3%	500	4,0%	3,3%	500	1	0,65
MV	2,1%	1,7%	0	2,6%	2,2%	0	0,11	0,11
NV	1,9%	1,6%	0	2,4%	2,0%	0	0,10	0,10
Verification	✓	✓	✓	✓	✓	✓	✓	✓

DC injection			
	P/Pn [%]		
	10	55	100
Limit	0,25% In	0,25% In	0,25% In
MV	0,006 A	0,009 A	0,008 A
%Inom	0,04%	0,05%	0,05%
Verification	✓	✓	✓

Power factor			
	Voltage [V]		
	218,2	230	253
Limit	0,95	0,95	0,95
MV	1,00	1,00	1,00
Verification	✓	✓	✓

MV - Measured value

NV - Normalized value

Protection - Grid monitoring and reconnection time

Trip Tests	G83/2		Setting		Measures Values		Verification
	Magnitude	Time	Magnitude	Time	Magnitude	Time	
Undervoltage stage 1	200,1 V	2,5 s	200,1 V	2,5 s	199,7 V	2,54 s	✓
Undervoltage stage 2	184 V	0,5 s	184 V	0,5 s	183,7 V	0,6 s	✓
Overvoltage stage 1	262,2 V	1 s	262,2 V	1 s	263 V	1,06 s	✓
Overvoltage stage 2	273,7 V	0,5 s	273,7 V	0,5 s	274,5 V	0,56 s	✓
Underfrequency stage 1	47,5 Hz	20 s	47,5 Hz	20 s	47,5 Hz	20,1 s	✓
Underfrequency stage 2	47 Hz	0,5 s	47 Hz	0,5 s	47 Hz	0,61 s	✓
Overfrequency stage 1	51,5 Hz	90 s	51,5 Hz	90 s	51,55 Hz	90,07 s	✓
Overfrequency stage 2	52 Hz	0,5 s	52 Hz	0,5 s	52,05 Hz	0,6 s	✓

No trip test	G83/2		Verification
	Magnitude	Time	
U/V 1	204,1 V	3,5 s	✓
U/V 2	188 V	2,48 s	✓
U/V 3	180 V	0,48 s	✓
O/V 1	258,2 V	2 s	✓
O/V 2	269,7 V	0,98 s	✓
O/V 3	277,7 V	0,48 s	✓

No trip test	G83/2		Verification
	Magnitude	Time	
U/F 1	47,7 Hz	25 s	✓
U/F 2	47,2 Hz	19,98 s	✓
U/F 3	46,8 Hz	0,48 s	✓
O/F 1	51,3 Hz	95 s	✓
O/F 2	51,8 Hz	89,98 s	✓
O/F 3	52,2 Hz	0,48 s	✓

Reconnection time			
Limit	Setting	MV	Verification
20 s	20 s	28,9 s	✓

No reconnection			
At 266,2 V	At 196,1 V	At 47,4 Hz	At 51,8 Hz
✓	✓	✓	✓

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Test Results

Protection

Loss of mains test according to the BS EN 62116						
	29 % -5%Q (Test 22)	58 % -5%Q (Test 12)	100 % -5%P (Test 5)	29 % +5%Q (Test 31)	58 % +5%Q (Test 21)	100 % +5%P (Test 10)
Test power and imbalance						
Trip time limit (s)	0,5	0,5	0,5	0,5	0,5	0,5
Measured Value L1 (s)	0,081	0,068	0,101	0,108	0,102	0,051
Measured Value L1L2L3 (s)*	0,059	0,063	0,066	0,112	0,095	0,053
Verification	✓	✓	✓	✓	✓	✓

* Only applicable to three phase inverters

Frequency change - Stability test				
	Start frequency	Change	End frequency	Verification
Positive vector shift	49,5 Hz	+50 degrees	N/A	✓
Negative vector shift	50,5 Hz	-50 degrees	N/A	✓
Positive frequency drift	49 Hz	+0,95 Hz/s	51 Hz	✓
Negative frequency drift	51 Hz	-0,95 Hz/s	49 Hz	✓

Fault level contribution		
Time after fault	Voltage (V)	Current (A)
< 50 ms	229,9	15,91
100 ms	11,51	0,04
250 ms	11,56	0,04
500 ms	11,64	0,04
Time to Trip	0,53	in seconds

Self monitoring - solid state switching
Not applicable as electro-mechanical relays are used