



Certificate G83/2

Engineering Recommendation

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

Type Tested reference number	ZE_G83-2_SB240-10_en_10
Generating Unit technology	Single phase inverter
Test house details	SMA Solar Technology AG
Test period	From 2014-04-15 until 2014-04-24

Type reference	Max. apparent AC power (VA)	Rated AC power (W)	From FW Version
SB 240-10 + Multigate -10	230	230	01.03/01.01

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. These settings cannot be changed by an installer, user or by any person other than SMA. Note that all tests were carried out in the biggest inverter of the family under test. The results for the other inverters of the family are equivalent.

Up to 12 SB240-10 can be connected in serie into a Multigate-10.



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	0,001	0,017	0,002	0,037	3,39%	✓
3	150	2,3	0,005	0,073	0,013	0,203	8,83%	✓
4	200	0,43	0,000	0,008	0,001	0,011	2,66%	✓
5	250	1,14	0,017	0,274	0,027	0,434	38,05%	✓
6	300	0,3	0,000	0,006	0,001	0,013	4,23%	✓
7	350	0,77	0,001	0,023	0,008	0,131	17,05%	✓
8	400	0,23	0,000	0,005	0,001	0,009	4,08%	✓
9	450	0,4	0,009	0,151	0,018	0,283	70,81%	✓
10	500	0,184	0,000	0,004	0,000	0,006	3,06%	✓
11	550	0,33	0,002	0,032	0,009	0,148	45,00%	✓
12	600	0,153	0,000	0,004	0,000	0,008	5,13%	✓
13	650	0,21	0,005	0,077	0,011	0,182	86,68%	✓
14	700	0,131	0,000	0,005	0,000	0,008	5,95%	✓
15	750	0,15	0,003	0,042	0,008	0,124	82,83%	✓
16	800	0,115	0,000	0,003	0,000	0,006	5,60%	✓
17	850	0,132	0,002	0,036	0,006	0,092	69,17%	✓
18	900	0,102	0,000	0,003	0,000	0,006	5,99%	✓
19	950	0,118	0,003	0,043	0,006	0,088	74,71%	✓
20	1000	0,092	0,000	0,005	0,001	0,008	8,85%	✓
21	1050	0,107	0,003	0,042	0,005	0,077	72,08%	✓
22	1100	0,084	0,000	0,003	0,000	0,008	9,25%	✓
23	1150	0,098	0,001	0,019	0,002	0,034	35,23%	✓
24	1200	0,077	0,000	0,003	0,000	0,006	8,20%	✓
25	1250	0,09	0,001	0,020	0,001	0,020	22,37%	✓
26	1300	0,071	0,000	0,004	0,000	0,007	9,54%	✓
27	1350	0,083	0,001	0,020	0,001	0,014	24,52%	✓
28	1400	0,066	0,000	0,003	0,000	0,006	9,50%	✓
29	1450	0,078	0,002	0,025	0,000	0,007	32,11%	✓
30	1500	0,061	0,000	0,004	0,000	0,005	8,10%	✓
31	1550	0,073	0,001	0,018	0,001	0,013	24,92%	✓
32	1600	0,058	0,000	0,004	0,000	0,006	9,80%	✓
33	1650	0,068	0,001	0,019	0,001	0,022	31,98%	✓
34	1700	0,054	0,000	0,005	0,000	0,006	11,43%	✓
35	1750	0,064	0,002	0,026	0,002	0,035	53,90%	✓
36	1800	0,051	0,000	0,004	0,000	0,005	9,63%	✓
37	1850	0,061	0,001	0,017	0,001	0,020	33,08%	✓
38	1900	0,048	0,000	0,005	0,000	0,005	10,29%	✓
39	1950	0,058	0,001	0,011	0,001	0,023	40,08%	✓
40	2000	0,046	0,000	0,005	0,000	0,005	11,58%	✓

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

ZE_G83-2_SB240-10_en_10



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	Plf (2hours)
Limit	4,0%	3,3%	500	4,0%	3,3%	500	1	0,65
MV	0,0%	0,0%	0	0,0%	0,0%	0	0,13	0,13
NV	0,0%	0,0%	0	0,0%	0,0%	0	0,17	0,18
Verification	✓	✓	✓	✓	✓	✓	✓	✓

DC injection			
	P/Pn [%]		
	10	55	100
Limit	0,25% In	0,25% In	0,25% In
MV	0,001 A	0,001 A	0,001 A
%Inom	0,07%	0,08%	0,10%
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	2,52 s	✓
Undervoltage stage 2	184 V	0,5 s	184 V	0,5 s	183,6 V	0,52 s	✓
Overtvoltage stage 1	262,2 V	1 s	262,2 V	1 s	262,9 V	1,03 s	✓
Overtvoltage stage 2	273,7 V	0,5 s	270 V*	0,5 s	270,8 V	0,53 s	✓
Underfrequency stage 1	47,5 Hz	20 s	47,5 Hz	20 s	47,47 Hz	20,45 s	✓
Underfrequency stage 2	47 Hz	0,5 s	47 Hz	0,5 s	46,97 Hz	0,97 s	✓
Overfrequency stage 1	51,5 Hz	90 s	51,5 Hz	90 s	51,52 Hz	90,44 s	✓
Overfrequency stage 2	52 Hz	0,5 s	52 Hz	0,5 s	52,02 Hz	0,95 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	266 V*	0,98 s	✓
O/V 3	270 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	20,15 s	✓

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

* The maximum allowed setting for the overvoltage stage 2 is 270 V



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)*	1	1	1	1	1	1
Measured Value (s)	0,292	0,262	0,553	0,267	0,251	0,308
Verification	✓	✓	✓	✓	✓	✓

* Including a shut down time

Frequency change - Stability test				
	Start frequency	Change	End frequency	Verification
Positive vector shift	49,5 Hz	+9 degrees	N/A	✓
Negative vector shift	50,5 Hz	-9 degrees	N/A	✓
Positive frequency drift	49,5 Hz	+0,19 Hz/s	51,5 Hz	✓
Negative frequency drift	50,5 Hz	-0,19 Hz/s	47,5 Hz	✓

Fault level contribution		
Time after fault	Voltage (V)	Current (A)
< 50 ms	231,1	1,002
100 ms	13,44	0,0015
250 ms	10,3	0,0014
500 ms	12,55	0,0026
Time to Trip	0,0124	in seconds

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