Manufacture Declaration for EN50438:2013 Ireland

Micro-generator Type reference		ZDNY-TL10000 ZDNY-TL12000 ZDNY-TL15000 ZDNY-TL17000 ZDNY-TL20000	
Maximum continuous rating		10000VA 12000VA 15000VA 17000VA 20000VA	
Manufacturer		Solax power Co., Ltd	
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Email		info@soalxpower.com	
Web site		www.solaxpower.com	
Reference standard No.		BS EN 50438:2013 A.13 IE-Ireland	
Signed	Guo Huawei	On behalf of	Solax power Co., Ltd
SSEG manufacturer/supplier declaration. I certify on behalf of the company named above as a manufacturer/supplier of Small Scale Embedded Generators, that all products manufactured/supplied by the company with the above SSEG Type reference number will be manufactured and tested to ensure that they perform as stated in this Type Verification Test Report, prior to shipment to site and that no site modifications are required to ensure that the product meets the Denmark requirements of EN50438:2013 A.13 IE-Ireland			

Under/over frequency

	Under frequency		Over frequency	
Parameter	Frequency	Time	Frequency	Time
Protection limit	48Hz	0.5s	50.5Hz	0.5s
Actual Setting	48Hz	0.5s	50.5Hz	0.5s
Trip value (test result)	47.97Hz	0.500s	50.52Hz	0.500s
ROCOF				
Trip value (limit)	0.4Hz/s		Trip Time (limit)	0.5s
Frequency	Time		Frequency	Time
49.6→49.2Hz within 1s	0.310s		50→50.4Hz within 1s	0.490s
Vector Shift				
Trip value (limit)	6°		Trip Time (limit)	0.5s
L1	6°		L1	0.249s
L2	6°		L2	0.247s
L3	6°		L3	0.242s

Under voltage

	Under Voltage	
Parameter	Voltage	Time
Protection limit	230V-10%	0.5s
Actual Setting	207.0V	0.5s
Trip value(test result)	207.0V	0.5s
L1	207.3 V	0.496s
L2	207.1 V	0.498s
L3	206.8 V	0.500s
ALL	206.6 V	0.495s

Over voltage

	Over Voltage	
Parameter	Voltage	Time
Protection limit	230V+10%	0.5s
Actual Setting	253.0V	0.5s
Trip value(test result)	253.0V	0.5s
L1	253.5V	0.500s

L2	254.2V	0.500s
L3	253.8V	0.500s
ALL	252.3V	0.500s

Loss of Mains test

Method used	inverters can be tested according to BS EN 62116		
Output power level (a	Min.	Medium	Max.
Trip setting clearance time	0.5s	0.5s	0.5s
Trip value clearance time	0.407s	0.407 s	0.369 s
(a Indicative values are shown for minimum, medium and maximum power levels			

Operating Range

Test sequence	Voltage	Frequency	Output power	Primary power source
Test 1	195.5V	47.5Hz	16149W	DC source
Test 2	253V	51.5Hz	15060W	DC source

Active power at under-frequency

Test sequence	Output Power	Frequency	Primary power source
Test a)	19410W	50.00Hz	DC source
Test b)	19467W	49.50Hz	DC source
Test c)	19374W	47.55Hz	DC source

Power response to over-frequency

Test sequence at power level>80%	Output Power(W)	Frequency(Hz)	Primary Power source	Power gradient
Step a)	19233W	50.000	DC source	40%Pm/Hz
Step b)	18943W	50.250	DC source	40%Pm/Hz
Step c)	15409W	50.700	DC source	40%Pm/Hz
Step d)	11923W	51.150	DC source	40%Pm/Hz
Step e)	15511W	50.700	DC source	40%Pm/Hz
Step f)	18899W	50.250	DC source	40%Pm/Hz
Step g)	19377W	49.999	DC source	40%Pm/Hz

Test sequence at power level40%-60%	Output Power(W)	Frequency(Hz)	Primary Power source	Power gradient
Step a)	9924W	50.000	DC source	40%Pm/Hz
Step b)	9602W	50.250	DC source	40%Pm/Hz
Step c)	7529W	50.699	DC source	40%Pm/Hz
Step d)	5466W	51.150	DC source	40%Pm/Hz
Step e)	7548W	50.700	DC source	40%Pm/Hz
Step f)	9609W	50.250	DC source	40%Pm/Hz
Step g)	19380W	49.999	DC source	40%Pm/Hz

Uncontrollable reactive power

Phase L1	**Power factor**		
Limit	+ 0,95 - 0,95 at three voltage level sand four power levels		
	210V	230V	250V
20%of nominal active power	0.9974	0.9966	0.9959
50%of nominal active power	0.9996	0.9994	0.9993
75%of nominal active power	0.9997	0.9997	0.9996
100%of nominal active power	0.9998	0.9998	0.9998

Phase L2	**Power factor**		
Limit	+ 0,95 - 0,95 at three voltage level sand four power levels		
	210V	230V	250V
20%of nominal active power	0.9950	0.9937	0.9924
50%of nominal active power	0.9992	0.9989	0.9987
75%of nominal active power	0.9995	0.9994	0.9992
100%of nominal active power	0.9995	0.9997	0.9996

Phase L3	**Power factor**		
Limit	+ 0,95 - 0,95 at three voltage level sand four power levels		
	210V	230V	250V
20%of nominal active power	0.9949	0.9937	0.9923
50%of nominal active power	0.9992	0.9989	0.9987
75%of nominal active power	0.9995	0.9994	0.9992
100%of nominal active power	0.9995	0.9997	0.9996

Controllable reactive power

Test sequence start of generation	Output power[W]	Set reactive power[Var]	Measured reactive power[Var]	Tolerance[Var]
10%	1660	-49%Pn	9640	160
40%	7620	-49%Pn	9590	210
70%	13400	-49%Pn	9540	260
100%	16900	-49%Pn	9500	300

Test sequence start of generation	Output power[W]	Set reactive power[Var]	Measured reactive power[Var]	Tolerance[Var]
10%	1680	49%Pn	-9790	-10
40%	7590	49%Pn	-9850	50
70%	13300	49%Pn	-9910	110
100%	16000	49%Pn	-9940	140

Test sequence start of generation	Output power[W]	Set reactive power[Var]	Measured reactive power[Var]	Tolerance[Var]
10%	1910	0	369	-369
40%	7760	0	416	-416
70%	13500	0	-207	207
100%	19000	0	-473	473

Connection and starting to generate electrical power

Test sequence start of generation	connection	connection allowed	Primary power source	Power gradient after connection
Step a)	47.95Hz	No	DC source	
Step b)	48.05Hz	Yes	DC source	10%Pn/min
Step c)	50.55 Hz	No	DC source	
Step d)	50.10 Hz	Yes	DC source	10%Pn/min
Step e)	205V	No	DC source	
Step f)	208V	Yes	DC source	10%Pn/min
Step g)	256V	No	DC source	
Step h)	253V	Yes	DC source	10%Pn/min

Connection after trip of interface protection

Test sequence start of generation	connection	connection allowed	Primary power source	Power gradient after connection
Step a)	47.95Hz	No	DC source	
Step b)	48.05Hz	Yes	DC source	10%Pn/min

Step c)	50.55 Hz	No	DC source	
Step d)	50.10 Hz	Yes	DC source	10%Pn/min
Step e)	205V	No	DC source	
Step f)	208V	Yes	DC source	10%Pn/min
Step g)	256V	No	DC source	
Step h)	253V	Yes	DC source	10%Pn/min

Short-circuit current parameters					
For machines with electro-magnetic output			For Inverter output		
Parameter	Symbol	Value	Time after fault	Volts	Amps
Peak Short Circuit current	i_p		20ms	29.96 V	0.093 A
Initial Value of aperiodic current	A		100ms	NA	NA
Initial symmetrical short-circuit current*	I_k		250ms	NA	NA
Decaying (aperiodic) component of short circuit current*	i_{DC}		500ms	NA	NA
Reactance/Resistance Ratio of source*	$^X/_R$		Time to trip	7 ms	In seconds
For rotating machines and linear piston machines the test should produce a 0s – 2s plot of the short circuit current as seen at the **Generating Unit** terminals. * Values for these parameters should be provided where the short circuit duration is sufficiently long to enable interpolation of the plot					

Harmonic current emission

P/Pn[%]	100%			66%			33%			Limit	Result
Ordinal number	L1 [A]	L2 [A]	L3 [A]	L1 [A]	L2 [A]	L3 [A]	L1 [A]	L2 [A]	L3 [A]	[A]	PASS
2	0.058	0.027	0.068	0.044	0.014	0.054	0.028	0.009	0.036	1.08	
3	0.013	0.012	0.011	0.007	0.008	0.008	0.007	0.003	0.008	2.3	
4	0.018	0.020	0.018	0.017	0.018	0.016	0.013	0.014	0.014	0.43	
5	0.242	0.252	0.223	0.226	0.244	0.212	0.209	0.227	0.196	1.14	
6	0.005	0.005	0.002	0.002	0.003	0.003	0.002	0.003	0.004	0.3	
7	0.150	0.158	0.139	0.159	0.159	0.143	0.144	0.137	0.127	0.77	

8	0.004	0.005	0.003	0.003	0.003	0.002	0.003	0.003	0.004	0.23	
9	0.004	0.004	0.006	0.005	0.008	0.013	0.006	0.007	0.013	0.4	
10	0.003	0.004	0.003	0.002	0.003	0.003	0.004	0.004	0.005	0.18	
11	0.095	0.098	0.087	0.090	0.096	0.083	0.071	0.078	0.070	0.33	
12	0.003	0.004	0.003	0.002	0.003	0.003	0.002	0.003	0.004	0.15	
13	0.078	0.076	0.078	0.069	0.063	0.069	0.057	0.050	0.056	0.21	
14	0.003	0.003	0.003	0.003	0.003	0.004	0.004	0.004	0.005	0.13	
15	0.004	0.010	0.008	0.005	0.023	0.028	0.005	0.026	0.029	0.15	
16	0.003	0.004	0.004	0.002	0.003	0.003	0.003	0.004	0.004	0.12	
17	0.055	0.051	0.052	0.048	0.047	0.045	0.032	0.034	0.032	0.13	
18	0.003	0.005	0.008	0.002	0.005	0.008	0.002	0.005	0.006	0.10	
19	0.032	0.036	0.039	0.037	0.036	0.039	0.026	0.024	0.028	0.12	
20	0.003	0.005	0.007	0.003	0.004	0.006	0.004	0.004	0.006	0.09	
21	0.019	0.026	0.043	0.017	0.025	0.041	0.017	0.025	0.041	0.11	
22	0.003	0.006	0.007	0.003	0.005	0.006	0.003	0.004	0.005	0.08	
23	0.033	0.026	0.029	0.026	0.024	0.022	0.017	0.018	0.018	0.10	
24	0.004	0.015	0.021	0.004	0.012	0.018	0.004	0.013	0.020	0.08	
25	0.024	0.027	0.029	0.021	0.020	0.021	0.014	0.012	0.016	0.09	
26	0.003	0.005	0.007	0.003	0.006	0.009	0.003	0.004	0.006	0.07	
27	0.008	0.011	0.019	0.005	0.008	0.013	0.006	0.005	0.011	0.08	
28	0.002	0.004	0.005	0.003	0.005	0.006	0.003	0.004	0.005	0.07	
29	0.022	0.017	0.019	0.017	0.018	0.017	0.012	0.012	0.013	0.08	
30	0.002	0.005	0.007	0.002	0.006	0.008	0.003	0.005	0.006	0.06	
31	0.017	0.018	0.021	0.013	0.013	0.015	0.009	0.009	0.011	0.07	
32	0.002	0.002	0.003	0.003	0.003	0.003	0.003	0.003	0.004	0.06	

33	0.003	0.005	0.010	0.004	0.006	0.009	0.005	0.004	0.008	0.07	
34	0.002	0.002	0.003	0.002	0.002	0.003	0.003	0.003	0.003	0.05	
35	0.018	0.016	0.018	0.013	0.013	0.012	0.010	0.010	0.010	0.06	
36	0.002	0.003	0.003	0.002	0.003	0.003	0.003	0.004	0.004	0.05	
37	0.009	0.013	0.014	0.009	0.010	0.011	0.008	0.008	0.009	0.06	
38	0.002	0.002	0.002	0.003	0.003	0.003	0.003	0.004	0.004	0.05	
39	0.004	0.004	0.006	0.004	0.005	0.008	0.005	0.004	0.007	0.06	
40	0.002	0.002	0.003	0.003	0.003	0.003	0.003	0.004	0.004	0.05	
THD	1.220	1.245	1.157	1.730	1.797	1.643	3.060	3.189	2.911	5	

Voltage fluctuations and flicker					
	Maximum permissible flicker and voltage fluctuation as per EN 61000-3-3				
Value	P_{st}	P_{lt}	d(t) – 500ms	d_c	d_{max}
Limit	1,0	0,65	3,3%	3,3%	4%
Test value L1	0.21	0.17	----	1.29%	1.31%
Test value L2	0.17	0.17	----	1.21%	1.21%
Test value L3	0.17	0.17	----	1.31%	1.21%

Additional comments