

Form C: Type Test Verification Report

All Micro-generators connected to the **DNO Distribution Network** shall be **Fully Type Tested**. This form is the **Manufacturer's** declaration of compliance with the requirements of EREC G98.

This form should be used when making a Type Test submission to the Energy Networks Association (ENA) Type Test Register.

If the **Micro-generator** is **Fully Type Tested** and already registered with the ENA Type Test Register, the **Installation Document** should include the **Manufacturer's** Reference Number (the system reference), and this form does not need to be submitted.

Manufacturer's reference number		X3-PRO-8K-G2 X3-PRO-10K-G2	
Micro-generator technology		Grid-connected PV Inverter	
Manufacturer name		SolaX Power Network Technology (Zhe jiang) Co., Ltd.	
Address		No. 288 Shizhu Road, Tonglu Economic Development Zone, Tonglu City, Zhejiang Province 310000, P.R. China	
Tel	+86(0571)-56260011	Fax	+86(0571)-56075753
E-mail	info@solaxpower.com	Web site	www.solaxpower.com
Registered Capacity , use separate sheet if more than one connection option.	Connection Option		
	8	kW three phase	
	10	kW three phase	
	NA	kW single phase, single, split or three phase system	
	NA	kW two phases in three phase system	
	NA	kW two phases split phase system	
Energy storage capacity for Electricity Storage devices		kWh	
Manufacturer Type Test declaration. - I certify that all products supplied by the company with the above Fully Type Tested reference number will be manufactured and tested to ensure that they perform as stated in this document, prior to shipment to site and that no site modifications are required to ensure that the product meets all the requirements of EREC G98.			
Signed		On behalf of	SolaX Power Network Technology (Zhe jiang) Co., Ltd.
Note that testing can be done by the Manufacturer of an individual component or by an external test house.			

Where parts of the testing are carried out by persons or organisations other than the **Manufacturer** then that person or organisation shall keep copies of all test records and results supplied to them to verify that the testing has been carried out by people with sufficient technical competency to carry out the tests.

Operating Range: This test should be carried out as specified in A.1.2.10.

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.

Test 1

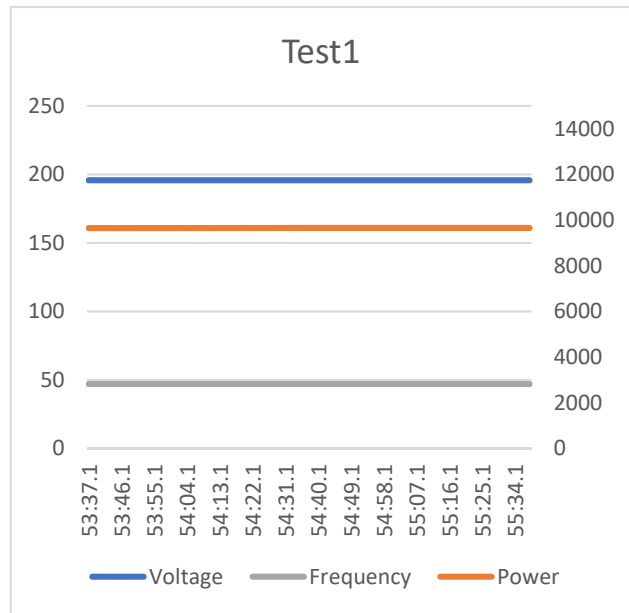
Voltage = 85% of nominal (195.5 V)

Frequency = 47.0 Hz

Power factor = 1

Period of test 20 seconds

Test results or chart to confirm operation



Test 2

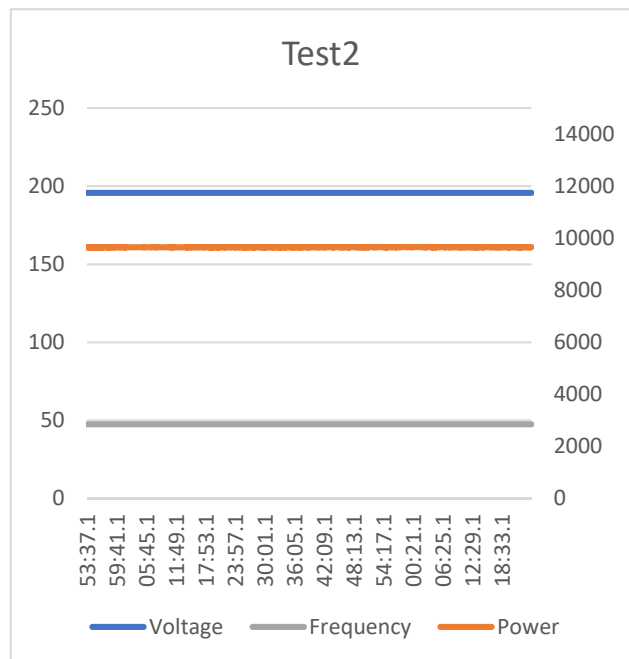
Voltage = 85% of nominal (195.5 V)

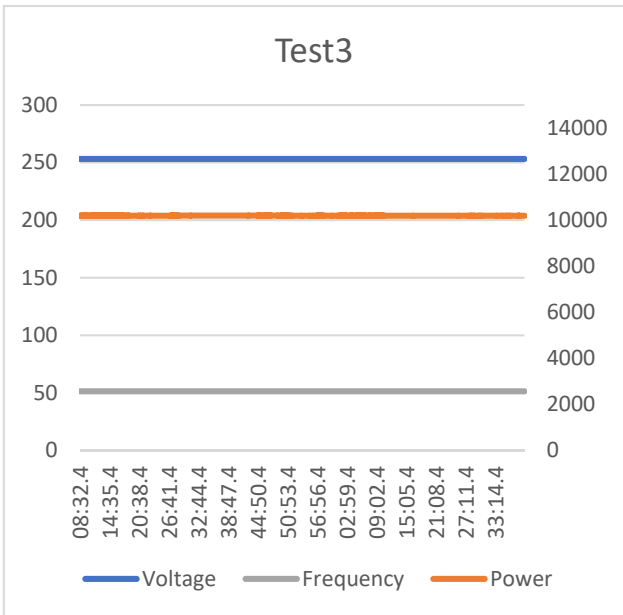
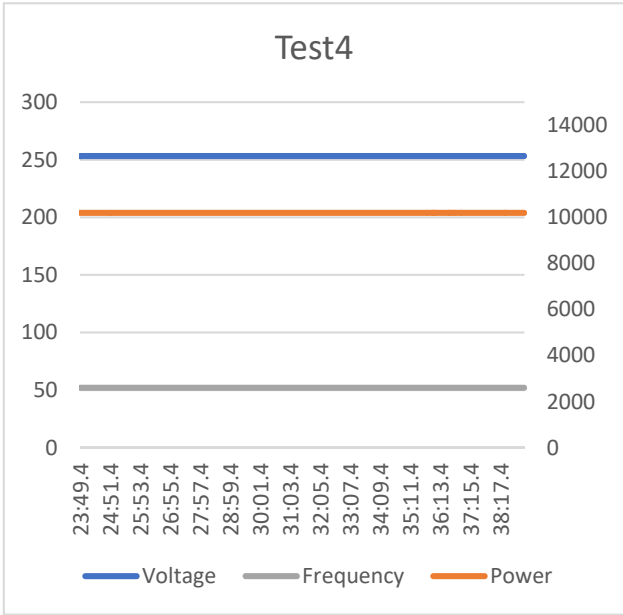
Frequency = 47.5 Hz

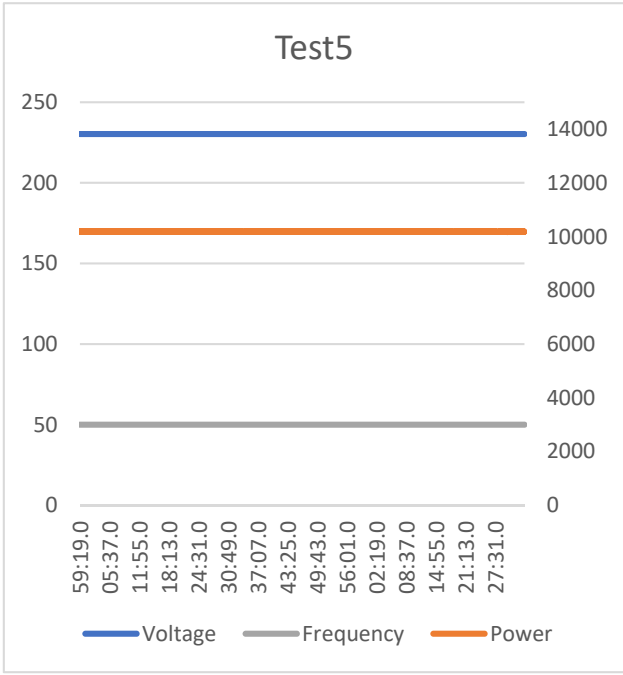
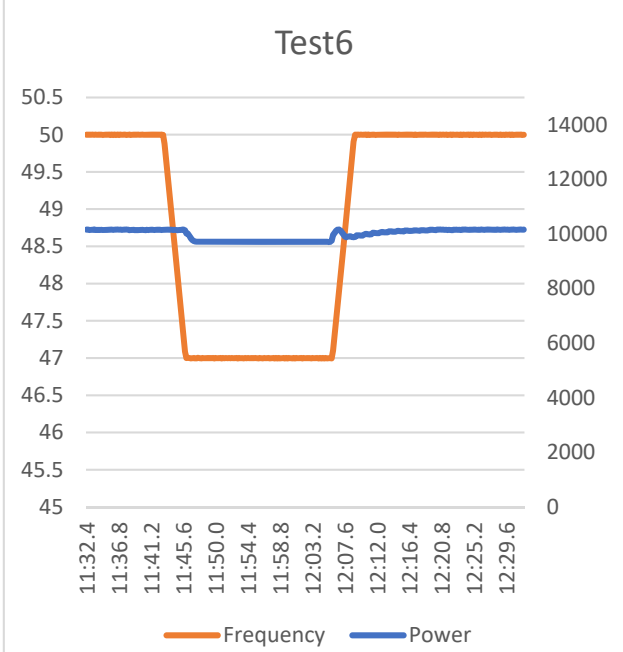
Power factor = 1

Period of test 90 minutes

Test results or chart to confirm operation



<p>Test 3</p> <p>Voltage = 110% of nominal (253 V).</p> <p>Frequency = 51.5 Hz</p> <p>Power factor = 1</p> <p>Period of test 90 minutes</p>	<p>Test results or chart to confirm operation</p> <div><p>Test3</p><p>The chart for Test 3 displays three data series over a 90-minute period. The left y-axis represents Voltage (0-300V) and Frequency (0-50 Hz), while the right y-axis represents Power (0-14000W). Voltage (blue line) remains constant at 253V. Frequency (grey line) remains constant at 51.5 Hz. Power (orange line) remains constant at 10000W. The x-axis shows time intervals from 08:32.4 to 33:14.4.</p><table><tr><th>Time</th><th>Voltage (V)</th><th>Frequency (Hz)</th><th>Power (W)</th></tr><tr><td>08:32.4</td><td>253</td><td>51.5</td><td>10000</td></tr><tr><td>14:35.4</td><td>253</td><td>51.5</td><td>10000</td></tr><tr><td>20:38.4</td><td>253</td><td>51.5</td><td>10000</td></tr><tr><td>26:41.4</td><td>253</td><td>51.5</td><td>10000</td></tr><tr><td>32:44.4</td><td>253</td><td>51.5</td><td>10000</td></tr><tr><td>38:47.4</td><td>253</td><td>51.5</td><td>10000</td></tr><tr><td>44:50.4</td><td>253</td><td>51.5</td><td>10000</td></tr><tr><td>50:53.4</td><td>253</td><td>51.5</td><td>10000</td></tr><tr><td>56:56.4</td><td>253</td><td>51.5</td><td>10000</td></tr><tr><td>02:59.4</td><td>253</td><td>51.5</td><td>10000</td></tr><tr><td>09:02.4</td><td>253</td><td>51.5</td><td>10000</td></tr><tr><td>15:05.4</td><td>253</td><td>51.5</td><td>10000</td></tr><tr><td>21:08.4</td><td>253</td><td>51.5</td><td>10000</td></tr><tr><td>27:11.4</td><td>253</td><td>51.5</td><td>10000</td></tr><tr><td>33:14.4</td><td>253</td><td>51.5</td><td>10000</td></tr></table></div>	Time	Voltage (V)	Frequency (Hz)	Power (W)	08:32.4	253	51.5	10000	14:35.4	253	51.5	10000	20:38.4	253	51.5	10000	26:41.4	253	51.5	10000	32:44.4	253	51.5	10000	38:47.4	253	51.5	10000	44:50.4	253	51.5	10000	50:53.4	253	51.5	10000	56:56.4	253	51.5	10000	02:59.4	253	51.5	10000	09:02.4	253	51.5	10000	15:05.4	253	51.5	10000	21:08.4	253	51.5	10000	27:11.4	253	51.5	10000	33:14.4	253	51.5	10000
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33:14.4	253	51.5	10000																																																														
<p>Test 4</p> <p>Voltage = 110% of nominal (253 V).</p> <p>Frequency = 52.0 Hz</p> <p>Power factor = 1</p> <p>Period of test 15 minutes</p>	<p>Test results or chart to confirm operation</p> <div><p>Test4</p><p>The chart for Test 4 displays three data series over a 15-minute period. The left y-axis represents Voltage (0-300V) and Frequency (0-50 Hz), while the right y-axis represents Power (0-14000W). Voltage (blue line) remains constant at 253V. Frequency (grey line) remains constant at 52.0 Hz. Power (orange line) remains constant at 10000W. The x-axis shows time intervals from 23:49.4 to 38:17.4.</p><table><tr><th>Time</th><th>Voltage (V)</th><th>Frequency (Hz)</th><th>Power (W)</th></tr><tr><td>23:49.4</td><td>253</td><td>52.0</td><td>10000</td></tr><tr><td>24:51.4</td><td>253</td><td>52.0</td><td>10000</td></tr><tr><td>25:53.4</td><td>253</td><td>52.0</td><td>10000</td></tr><tr><td>26:55.4</td><td>253</td><td>52.0</td><td>10000</td></tr><tr><td>27:57.4</td><td>253</td><td>52.0</td><td>10000</td></tr><tr><td>28:59.4</td><td>253</td><td>52.0</td><td>10000</td></tr><tr><td>30:01.4</td><td>253</td><td>52.0</td><td>10000</td></tr><tr><td>31:03.4</td><td>253</td><td>52.0</td><td>10000</td></tr><tr><td>32:05.4</td><td>253</td><td>52.0</td><td>10000</td></tr><tr><td>33:07.4</td><td>253</td><td>52.0</td><td>10000</td></tr><tr><td>34:09.4</td><td>253</td><td>52.0</td><td>10000</td></tr><tr><td>35:11.4</td><td>253</td><td>52.0</td><td>10000</td></tr><tr><td>36:13.4</td><td>253</td><td>52.0</td><td>10000</td></tr><tr><td>37:15.4</td><td>253</td><td>52.0</td><td>10000</td></tr><tr><td>38:17.4</td><td>253</td><td>52.0</td><td>10000</td></tr></table></div>	Time	Voltage (V)	Frequency (Hz)	Power (W)	23:49.4	253	52.0	10000	24:51.4	253	52.0	10000	25:53.4	253	52.0	10000	26:55.4	253	52.0	10000	27:57.4	253	52.0	10000	28:59.4	253	52.0	10000	30:01.4	253	52.0	10000	31:03.4	253	52.0	10000	32:05.4	253	52.0	10000	33:07.4	253	52.0	10000	34:09.4	253	52.0	10000	35:11.4	253	52.0	10000	36:13.4	253	52.0	10000	37:15.4	253	52.0	10000	38:17.4	253	52.0	10000
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<p>Test 5</p> <p>Voltage = 100% of nominal (230 V).</p> <p>Frequency = 50.0 Hz</p> <p>Power factor = 1</p> <p>Period of test 90 minutes</p>	<p>Test results or chart to confirm operation</p>  <p>The chart for Test 5 shows three data series over a 90-minute period. The left y-axis represents Voltage (0-250 V) and Frequency (0-50 Hz), while the right y-axis represents Power (0-14000 W). Voltage (blue line) is constant at 230 V. Frequency (grey line) is constant at 50.0 Hz. Power (orange line) is constant at 10000 W.</p> <table><tr><th>Time</th><th>Voltage (V)</th><th>Frequency (Hz)</th><th>Power (W)</th></tr><tr><td>59:19.0</td><td>230</td><td>50.0</td><td>10000</td></tr><tr><td>05:37.0</td><td>230</td><td>50.0</td><td>10000</td></tr><tr><td>11:55.0</td><td>230</td><td>50.0</td><td>10000</td></tr><tr><td>18:13.0</td><td>230</td><td>50.0</td><td>10000</td></tr><tr><td>24:31.0</td><td>230</td><td>50.0</td><td>10000</td></tr><tr><td>30:49.0</td><td>230</td><td>50.0</td><td>10000</td></tr><tr><td>37:07.0</td><td>230</td><td>50.0</td><td>10000</td></tr><tr><td>43:25.0</td><td>230</td><td>50.0</td><td>10000</td></tr><tr><td>49:43.0</td><td>230</td><td>50.0</td><td>10000</td></tr><tr><td>56:01.0</td><td>230</td><td>50.0</td><td>10000</td></tr><tr><td>02:19.0</td><td>230</td><td>50.0</td><td>10000</td></tr><tr><td>08:37.0</td><td>230</td><td>50.0</td><td>10000</td></tr><tr><td>14:55.0</td><td>230</td><td>50.0</td><td>10000</td></tr><tr><td>21:13.0</td><td>230</td><td>50.0</td><td>10000</td></tr><tr><td>27:31.0</td><td>230</td><td>50.0</td><td>10000</td></tr></table>	Time	Voltage (V)	Frequency (Hz)	Power (W)	59:19.0	230	50.0	10000	05:37.0	230	50.0	10000	11:55.0	230	50.0	10000	18:13.0	230	50.0	10000	24:31.0	230	50.0	10000	30:49.0	230	50.0	10000	37:07.0	230	50.0	10000	43:25.0	230	50.0	10000	49:43.0	230	50.0	10000	56:01.0	230	50.0	10000	02:19.0	230	50.0	10000	08:37.0	230	50.0	10000	14:55.0	230	50.0	10000	21:13.0	230	50.0	10000	27:31.0	230	50.0	10000
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27:31.0	230	50.0	10000																																																														
<p>Test 6 RoCoF withstand</p> <p>Confirm that the Micro-Generating Plant is capable of staying connected to the Distribution Network and operate at rates of change of frequency up to 1 Hzs⁻⁸ as measured over a period of 500 ms.</p>	<p>Test results or chart to confirm operation</p>  <p>The chart for Test 6 shows two data series over a period of approximately 15 minutes. The left y-axis represents Frequency (45-50.5 Hz) and Power (0-14000 W). Frequency (orange line) starts at 50 Hz, drops to 47 Hz between 11:45.6 and 12:03.2, and then returns to 50 Hz. Power (blue line) remains constant at 10000 W throughout the test.</p> <table><tr><th>Time</th><th>Frequency (Hz)</th><th>Power (W)</th></tr><tr><td>11:32.4</td><td>50.0</td><td>10000</td></tr><tr><td>11:36.8</td><td>50.0</td><td>10000</td></tr><tr><td>11:41.2</td><td>50.0</td><td>10000</td></tr><tr><td>11:45.6</td><td>50.0</td><td>10000</td></tr><tr><td>11:50.0</td><td>47.0</td><td>10000</td></tr><tr><td>11:54.4</td><td>47.0</td><td>10000</td></tr><tr><td>11:58.8</td><td>47.0</td><td>10000</td></tr><tr><td>12:03.2</td><td>47.0</td><td>10000</td></tr><tr><td>12:07.6</td><td>50.0</td><td>10000</td></tr><tr><td>12:12.0</td><td>50.0</td><td>10000</td></tr><tr><td>12:16.4</td><td>50.0</td><td>10000</td></tr><tr><td>12:20.8</td><td>50.0</td><td>10000</td></tr><tr><td>12:25.2</td><td>50.0</td><td>10000</td></tr><tr><td>12:29.6</td><td>50.0</td><td>10000</td></tr></table>	Time	Frequency (Hz)	Power (W)	11:32.4	50.0	10000	11:36.8	50.0	10000	11:41.2	50.0	10000	11:45.6	50.0	10000	11:50.0	47.0	10000	11:54.4	47.0	10000	11:58.8	47.0	10000	12:03.2	47.0	10000	12:07.6	50.0	10000	12:12.0	50.0	10000	12:16.4	50.0	10000	12:20.8	50.0	10000	12:25.2	50.0	10000	12:29.6	50.0	10000																			
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Power Quality – Harmonics: These tests should be carried out as specified in BS EN 61000-3-2. The chosen test should be undertaken with a fixed source of energy at two power levels a) between 45 and 55% and b) at 100% of Registered Capacity . The test requirements are specified in Annex A1 A.1.3.1 (Inverter connected) or Annex A2 A.2.3.1 (Synchronous).								
Micro-generator tested to BS EN 61000-3-2								
Micro-generator rating per phase (rpp)				3.3		kW		
For 3-phase Micro-generators , tick this box if harmonic measurements are identical for all three phases. If the harmonics are not identical for each phase, please replicate this section with the results for each phase.								
Harmonic	At 45-55% of Registered Capacity ¹			100% of Registered Capacity				
	Measured Value MV in Amps			Measured Value MV in Amps			Limit in BS EN 61000-3-2 in Amps	Higher limit for odd harmonics 21 and above
	L1	L2	L3	L1	L2	L3		
2	0.044	0.04	0.018	0.085	0.090	0.038	1.080	
3	0.161	0.059	0.153	0.139	0.063	0.170	2.300	
4	0.019	0.014	0.019	0.031	0.029	0.032	0.430	
5	0.022	0.052	0.052	0.070	0.086	0.083	1.140	
6	0.021	0.027	0.030	0.030	0.034	0.035	0.300	
7	0.026	0.056	0.044	0.047	0.053	0.036	0.770	
8	0.022	0.022	0.025	0.056	0.051	0.069	0.230	
9	0.042	0.037	0.034	0.083	0.060	0.062	0.400	
10	0.023	0.027	0.026	0.029	0.033	0.036	0.184	
11	0.070	0.060	0.081	0.123	0.119	0.149	0.330	
12	0.028	0.029	0.025	0.059	0.057	0.046	0.153	
13	0.035	0.058	0.047	0.088	0.122	0.081	0.210	
14	0.012	0.015	0.014	0.048	0.052	0.054	0.131	
15	0.025	0.011	0.021	0.050	0.051	0.053	0.150	

¹ See the note in A.2.3.1 if 45-55% of **Registered Capacity** is below the minimum stable operating level. If an alternative loading level is chosen, the level should be indicated on the test form and the reason for not testing at 45-55% of **Registered Capacity** should be stated. The additional comments box at the end of the harmonics test sheet can be used for this.

16	0.012	0.011	0.016	0.040	0.041	0.044	0.115	
17	0.027	0.029	0.040	0.038	0.042	0.047	0.132	
18	0.012	0.011	0.015	0.035	0.032	0.040	0.102	
19	0.021	0.03	0.022	0.038	0.050	0.045	0.118	
20	0.009	0.009	0.014	0.017	0.019	0.023	0.092	
21	0.015	0.014	0.012	0.023	0.028	0.025	0.107	0.160
22	0.008	0.008	0.008	0.016	0.015	0.023	0.084	
23	0.019	0.012	0.016	0.033	0.030	0.037	0.098	0.147
24	0.007	0.007	0.007	0.013	0.013	0.013	0.077	
25	0.014	0.022	0.019	0.013	0.018	0.019	0.090	0.135
26	0.006	0.007	0.007	0.013	0.014	0.011	0.071	
27	0.009	0.008	0.008	0.016	0.014	0.014	0.083	0.124
28	0.007	0.006	0.006	0.011	0.010	0.010	0.066	
29	0.015	0.013	0.019	0.016	0.016	0.017	0.078	0.117
30	0.006	0.006	0.007	0.010	0.013	0.013	0.061	
31	0.017	0.016	0.017	0.022	0.025	0.020	0.073	0.109
32	0.007	0.008	0.007	0.009	0.010	0.008	0.058	
33	0.011	0.009	0.012	0.011	0.012	0.009	0.068	0.102
34	0.007	0.008	0.008	0.009	0.009	0.009	0.054	
35	0.020	0.023	0.023	0.022	0.017	0.019	0.064	0.096
36	0.006	0.008	0.008	0.008	0.010	0.007	0.051	
37	0.039	0.039	0.040	0.016	0.018	0.019	0.061	0.091
38	0.005	0.007	0.007	0.008	0.008	0.009	0.048	
39	0.014	0.012	0.009	0.016	0.020	0.014	0.058	0.087
40	0.006	0.006	0.007	0.007	0.008	0.008	0.046	

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

Additional comments:

Power Quality – Voltage fluctuations and Flicker: These tests should be undertaken in accordance with EREC G98 Annex A1 A.1.3.3 (**Inverter** connected) or Annex A2 A.2.3.3 (Synchronous).

The standard test impedance is 0.4 Ω for a single phase **Micro-generating Plant** (and for a two phase unit in a three phase system) and 0.24 Ω for a three phase **Micro-generating Plant** (and for a two phase unit in a split phase system). Please ensure that both test and standard impedance are completed on this form. If the test impedance (or the measured impedance) is different to the standard impedance, it must be normalised to the standard impedance as follows (where the **Power Factor** of the generation output is 0.98 or above):

$d \text{ max normalised value} = (\text{Standard impedance} / \text{Measured impedance}) \times \text{Measured value}.$

Where the **Power Factor** of the output is under 0.98 then the X 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 needs to comply with the particular requirements set out in the testing notes for the technology under test.

The test date and location must be declared.

Test start date	12.06.2022			Test end date	12.06.2022			
Test location	No. 288 Shizhu Road, Tonglu Economic Development Zone, Tonglu City, Zhejiang Province 310000, P.R. China							
	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	0.53%	0.002%	0%	0.52%	0.005%	0%	0.028	0.022
Normalised to standard impedance	NA	NA	NA	NA	NA	NA	NA	NA
Normalised to required maximum impedance	NA	NA	NA	NA	NA	NA	NA	NA
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		Ω	X		Ω
Standard Impedance	R	0.24 * 0.4 ^	Ω	X	0.15 * 0.25 ^	Ω
Maximum Impedance	R		Ω	X		Ω

*Applies to three phase and split single phase **Micro-generators**. Delete as appropriate.

^ Applies to single phase **Micro-generators** and **Micro-generators** using two phases on a three phase system. Delete as appropriate.

Power quality – DC injection: This test should be carried out in accordance with A 1.3.4 as applicable.

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) / 230 V. The % **DC** injection should not be greater than 0.25%.

Test power level	20%	50%	75%	100%
Recorded DC value in Amps (L1/L2/L3)	0.0219/0.0162 /0.027	0.027/0.012 /0.017	0.024/0.011 /0.019	0.022/0.015 /0.023
as % of rated AC current (L1/L2/L3)	0.15%/0.19% /0.19%	0.18%/0.08% /0.19%	0.16%/0.08% /0.13%	0.016%/0.13% /0.16%
Limit	0.25%	0.25%	0.25%	0.25%

Power Quality – Power factor: This test shall be carried out in accordance with A.1.3.2 and A.2.3.2 at three voltage levels and at **Registered Capacity** and the measured **Power Factor** must be greater than 0.95 to pass. Voltage to be maintained within $\pm 1.5\%$ of the stated level during the test.

Voltage	216.2 V	230 V	253 V
Measured value (20%Pn)	0.976	0.989	0.989
Measured value (50%Pn)	0.999	0.998	0.999
Measured value (75%Pn)	0.999	0.999	0.999
Measured value (100%Pn)	0.999	0.999	0.999
Power Factor Limit	>0.95	>0.95	>0.95

Protection – Frequency tests: These tests should be carried out in accordance with Annex A1 A.1.2.3 (Inverter connected) or Annex A2 A.2.2.3 (Synchronous). For trip tests, frequency and time delay should be stated. For “no trip tests”, “no trip” can be stated.						
Function	Setting		Trip test		“No trip tests”	
	Frequency	Time delay	Frequency	Time delay	Frequency /time	Confirm no trip
U/F stage 1	47.5 Hz	20 s	47.49 Hz	20.2s	47.7Hz 30s	No trip
U/F stage 2	47 Hz	0.5 s	47.01 Hz	0.504s	47.2 Hz 19.5 s	No trip
					46.8 Hz 0.45 s	No trip
O/F stage 1	52 Hz	0.5 s	52.01 Hz	0.504s	51.8 Hz 120.0 s	No trip
					52.2 Hz 0.45 s	No trip
Note. For frequency trip tests the frequency required to trip is the setting ± 0.1 Hz. In order to measure the time delay a larger deviation than the minimum required to operate the protection can be used. The “No trip tests” need to be carried out at the setting ± 0.2 Hz and for the relevant times as shown in the table above to ensure that the protection will not trip in error.						
Protection – Voltage tests: These tests should be carried out in accordance with Annex A1 A.1.2.2 (Inverter connected) or Annex A2 A.2.2.2 (Synchronous). For trip tests, voltage and time delay should be stated. For “no trip tests”, “no trip” can be stated.						
Function	Setting		Trip test		“No trip tests”	
	Voltage	Time delay	Voltage	Time delay	Voltage /time	Confirm no trip
U/V	184 V	2.5 s	184.6V	2.58s	188 V 5.0 s	No trip
					180 V 2.45 s	No trip
O/V stage 1	262.2 V	1.0 s	263.7V	1.056s	258.2 V 5.0 s	No trip
O/V stage 2	273.7 V	0.5 s	275.2V	0.532s	269.7 V 0.95 s	No trip
					277.7 V 0.45 s	No trip
Note for Voltage tests the Voltage required to trip is the setting ± 3.45 V. 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 ± 4 V 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: For PV **Inverters** shall be tested in accordance with BS EN 62116. Other **Micro-generators** should be tested in accordance with A.2.2.4 at 10%, 55% and 100% of rated power.

For **Inverters** tested to BS EN 62116 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 0.5 s ²	0.234s	0.228s	0.310s	0.227s	0.239s	0.278s

Protection – Frequency change, Vector Shift Stability test: This test should be carried out in accordance with EREC G98 Annex A1 A.1.2.6 (**Inverter** connected) or Annex A2 A.2.2.6 (Synchronous). Confirmation is required that the **Micro-generating Plant** does not trip under positive / negative vector shift.

	Start Frequency	Change	Confirm no trip
Positive Vector Shift	49.0 Hz	+50 degrees	No trip
Negative Vector Shift	50.0 Hz	- 50 degrees	No trip

Protection – Frequency change, RoCoF Stability test: The requirement is specified in section 11.3, test procedure in Annex A.1.2.6 (**Inverter** connected) or Annex A2 A.2.2.6 (Synchronous). Confirmation is required that the **Micro-generating Plant** does not trip for the duration of the ramp up and ramp down test.

Ramp range	Test frequency ramp:	Test Duration	Confirm no trip
49.0 Hz to 51.0 Hz	+0.95 Hzs ⁻¹	2.1 s	No trip
51.0 Hz to 49.0 Hz	-0.95 Hzs ⁻¹	2.1 s	No trip

Limited Frequency Sensitive Mode – Overfrequency test: This test should be carried out in accordance with A.1.2.8. The test should be carried out using the specific threshold frequency of 50.4 Hz and **Droop** of 10%. The measurement tolerances are contained in A.1.2.8.

Test sequence at Registered Capacity >80%	Measured Active Power Output	Frequency	Primary Power Source	Active Power Gradient
Step a) 50.00 Hz ±0.01 Hz	10035W	50.00 Hz		-
Step b) 50.45 Hz ±0.05 Hz	9929W	50.45 Hz		-
Step c) 50.70 Hz ±0.10 Hz	9429W	50.70 Hz		-
Step d) 51.15 Hz ±0.05 Hz	8529W	51.15 Hz		-

² If the device requires additional shut down time (beyond 0.5 s but less than 1 s) then this should be stated on this form.

Step e) 50.70 Hz ±0.10 Hz	9429W	50.70 Hz		-
Step f) 50.45 Hz ±0.05 Hz	9929W	50.45 Hz		-
Step g) 50.00 Hz ±0.01 Hz	10028W	50.00 Hz		
Test sequence at Registered Capacity 40% - 60%	Measured Active Power Output	Frequency	Primary Power Source	Active Power Gradient
Step a) 50.00 Hz ±0.01 Hz	5050W	50.00 Hz		-
Step b) 50.45 Hz ±0.05 Hz	4949W	50.45 Hz		-
Step c) 50.70 Hz ±0.10 Hz	4449W	50.70 Hz		-
Step d) 51.15 Hz ±0.05 Hz	3549W	51.15 Hz		-
Step e) 50.70 Hz ±0.10 Hz	4449W	50.70 Hz		-
Step f) 50.45 Hz ±0.05 Hz	4949W	50.45 Hz		-
Step g) 50.00 Hz ±0.01 Hz	5050W	50.00 Hz		
Power output with falling frequency test: This test should be carried out in accordance with A.1.2.7.				
Test sequence	Measured Active Power Output	Frequency	Primary power source	
Test a) 50 Hz ± 0.01 Hz	10193W	50 Hz		
Test b) Point between 49.5 Hz and 49.6 Hz	10189W	49.55 Hz		
Test c) Point between 47.5 Hz and 47.6 Hz	10194W	47.55 Hz		
NOTE: The operating point in Test (b) and (c) shall be maintained for at least 5 minutes				
Re-connection timer.				
Test should prove that the reconnection sequence starts after a minimum delay of 20 s for restoration of voltage and frequency to within the stage 1 settings of Table 2. Both the time delay setting and the measured delay should be provided in this form; both should be greater than 20 s to pass. Confirmation should be provided that the Micro-generating Plant does not reconnect at the voltage and frequency settings below; a statement of “no reconnection” can be made.				
Time delay setting	Measured delay	Checks on no reconnection when voltage or frequency is brought to just outside stage 1 limits of table 2.		
35s	48.4s	At 266.2 V	At 180.0 V	At 47.4 Hz
Confirmation that the Micro-generator does not re-connect.		No-Reconnection	No-Reconnection	No-Reconnection

Fault level contribution: These tests shall be carried out in accordance with EREC G98 Annex A1 A.1.3.5 (Inverter connected) and Annex A2 A.2.3.4 (Synchronous). Please complete each entry, even if the fault contribution is zero.					
For machines with electro-magnetic output			For Inverter output		
Parameter	Symbol	Value	Time after fault	Volts	Amps
Peak Short Circuit current	i_p	NA	20 ms	22.9V	20.5A
Initial Value of aperiodic current	A	NA	100 ms	20.5V	0.05A
Initial symmetrical short-circuit current*	I_k	NA	250 ms	NA	NA
Decaying (aperiodic) component of short circuit current*	i_{DC}	NA	500 ms	NA	NA
Reactance/Resistance Ratio of source*	X/R	NA	Time to trip	0.313s	In seconds
<p>For rotating machines and linear piston machines the test should produce a 0 s – 2 s plot of the short circuit current as seen at the Micro-generator terminals.</p> <p>* Values for these parameters should be provided where the short circuit duration is sufficiently long to enable interpolation of the plot</p>					
Logic Interface (input port)					
Confirm that an input port is provided and can be used to reduce the Active Power output to zero					Yes
Provide high level description of logic interface, e.g. details in 9.4.3 such as AC or DC signal (the additional comments box below can be used)					Yes
Self-Monitoring solid state switching: No specified test requirements. Refer to EREC G98 Annex A1 A.1.3.6 (Inverter connected).					NA
It has been verified that in the event of the solid state switching device failing to disconnect the Micro-generator , the voltage on the output side of the switching device is reduced to a value below 50 V within 0.5 s.					
Cyber security					
Confirm that the Manufacturer or Installer of the Micro-generator has provided a statement describing how the Micro-generator has been designed to comply with cyber security requirements, as detailed in 9.7.					NA
Additional comments					