

## Declaration of Irish deviations according to EN50438

### Micro-generator details

MICRO-GENERATOR Type reference	GW3000 D-NS	GW3600 -NS	GW3600 D-NS	GW4200 -NS	GW4200 D-NS	GW5000 -NS	GW5000 D-NS
Maximum continuous rating	3000	3600	3600	4200	4200	5000	5000
Manufacturer	Jiangsu GoodWe Power Supply Technology Co.,Ltd						
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Reference standard No.	BS EN 50438:2013						
Date	2015-10-23						
Signature			On behalf of				

## Type testing result

### Over-/under-frequency tests

Parameter	Over-frequency		Under-frequency	
	Frequency	Disconnection time	Frequency	Disconnection time
Protection limit(FROM Table 4 or Annex A)	50.5Hz	0.5s	48Hz	0.5s
Actual setting(as applied to interface protection)	50.5Hz	0.06s	48Hz	0.06s
Trip value(test result)	50.53Hz	0.07s	47.97Hz	0.08s

### Over-/under-voltage tests(single stage protection)

Parameter	Over-voltage		Under-voltage	
	Voltage	Disconnection time	Voltage	Disconnection time
Protection limit(from Table 4 or Annex A)	253V	0.5s	207V	0.5s
Actual setting(as applied to interface protection)	253V	0.4s	207V	0.4s
Trip value(test result)	253.4V	0.47s	206.4V	0.43s

### LoM test

Output power level	Min(10%)	Medium(50%)	Max(100%)
Trip setting clearance time	2s	2s	2s
Trip value clearance time	0.13s	0.08s	0.16s

Indicative values are shown for minimum, medium and maximum power levels.

## Type testing of a micro-generator

### Operating Range

Test sequence	Voltage	Frequency	Output power	Primary power source
Test 1	207V	47.5Hz	5000W	DC source
Teat 2	253V	51.5Hz	5000W	DC source

### Active power at under-frequency

Test sequence	Output Power	Frequency	Primary power source
Test a)	5000W	50.00Hz	DC source
Test b)	5000W	49.55Hz	DC source
Test c)	/	/	/

### Power response to over-frequency

Test sequence at power level >80%	Out Power	Frequency	Primary Power source	Power gradient
Step a)	5000W	50.00Hz	DC source	40%Pm/Hz
Step b)	4800W	50.30 Hz	DC source	40%Pm/Hz
Step c)	4600W	50.40 Hz	DC source	40%Pm/Hz
Step d)	4500W	50.45Hz	DC source	40%Pm/Hz
Step e)	4600W	50.40 Hz	DC source	40%Pm/Hz
Step f)	4800W	50.30Hz	DC source	40%Pm/Hz
Step g)	5000W	50.00Hz	DC source	40%Pm/Hz

Test sequence at power level 40%-60%	Out Power	Frequency	Primary Power source	Power gradient
Step a)	2500W	50.00Hz	DC source	40%Pm/Hz
Step b)	2440W	50.30 Hz	DC source	40%Pm/Hz
Step c)	2350W	50.40 Hz	DC source	40%Pm/Hz
Step d)	2300W	50.45Hz	DC source	40%Pm/Hz
Step e)	2350W	50.40 Hz	DC source	40%Pm/Hz
Step f)	2450W	50.30Hz	DC source	40%Pm/Hz
Step g)	2500W	50.00Hz	DC source	40%Pm/Hz

## Reactive power

### Uncontrollable reactive power

Limit	Power factor		
	+0.95-0.95 at three voltage levels and four power levels		
	210 V	230 V	250 V
20% of nominal active power	0.988	0.982	0.974
50% of nominal active power	0.999	0.999	0.998
75% of nominal active power	0.999	0.999	0.999
100% of nominal active power	0.999	0.999	0.999

### Controllable reactive power

Test sequence start of generation	Output power(S)	Active power	Power factor	Set reactive power	Measured reactive power	Tolerance
10%	2389.4	444.4	0.19	-2400	-2347.7	-47.7
20%	2624.3	956.9	0.36	-2400	-2443.6	-43.6
30%	2830.8	1469.2	0.52	-2400	-2419.6	-19.6
40%	3105.3	1977.5	0.64	-2400	-2394.3	5.6
50%	3436.8	2482.5	0.72	-2400	-2376.7	23.3
60%	3808.3	2984.3	0.78	-2400	-2365.8	34.2
70%	4264.2	3480.4	0.82	-2400	-2463.8	-63.8
80%	4678.7	3975.6	0.85	-2400	-2466.6	-66.6
90%	---	---	---	---	---	---
100%	---	---	---	---	---	---

Test sequence start of generation	Output power(S)	Active power	Power factor	Set reactive power	Measured reactive power	Tolerance
10%	2499	450	0.18	2400	2458	58
20%	2611	964	0.37	2400	2427	27
30%	2822	1478	0.52	2400	2404	4
40%	3090	1986	0.64	2400	2367	-33
50%	3429	2492	0.73	2400	2355	-45
60%	3975	2991	0.79	2400	2335	-65
70%	4216	3532	0.84	2400	2302	-98

80%	4596	3987	0.87	2400	2286	-114
90%	4833.2	4271.6	0.88	2400	2261.3	-138.7
100%	4828.2	4267.8	0.88	2400	2257.7	-142.3

Test sequence start of generation	Output power(S)	Active power	Power factor	Set reactive power	Measured reactive power	Tolerance
10%	505	459	0.909	0	210.5	210.5
20%	1013.2	994.6	0.981	0	193.4	193.4
30%	1521.7	1513.3	0.995	0	159.3	159.3
40%	2066	2061	0.998	0	142	142
50%	2525	2523	0.999	0	116	116
60%	3022	3020	0.999	0	100	100
70%	3522	3520	0.999	0	128	128
80%	4017	4015	0.999	0	112	112
90%	4504	4503	0.999	0	-114	-114
100%	4998	4996	0.999	0	-127	-127

### Connection and starting to generate electrical power

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

Step c)	50.55 Hz	No	DC source	/
Step d)	50.45 Hz	Yes	DC source	10%Pn/min
Step e)	205V	No	DC source	/
Step f)	208V	Yes	DC source	10%Pn/min
Step g)	257V	No	DC source	/
Step h)	253V	Yes	DC source	10%Pn/min

NOTE 1 It is sufficient to evaluate the power gradient after connection only at one test out of b),d),f),h).

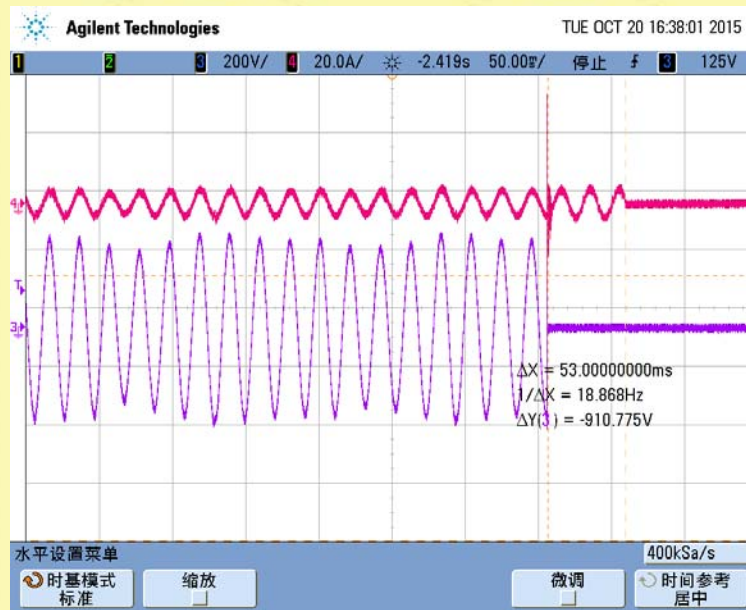
Test sequence start of generation	connection	Connection allowed	Primary power source	Powergradient after connection
Step a)	47.95Hz	No	DC source	/
Step b)	48.05Hz	Yes	DC source	10%Pn/min
Step c)	50.55 Hz	No	DC source	/
Step d)	50.45 Hz	Yes	DC source	10%Pn/min
Step e)	205V	No	DC source	/
Step f)	208V	Yes	DC source	10%Pn/min
Step g)	257V	No	DC source	/
Step h)	253V	Yes	DC source	10%Pn/min

NOTE 2 It is sufficient to evaluate the power gradient after connection only at one test out of b),d),f),h).

## Short-circuit current contribution

### Short-circuit current at micro-generator terminals

### Short-circuit applied to micro-generator at normal running condition



0-2.0 s plot

### Short-circuit current parameters

Parameter	Symbol	Time after fault	Volts	Amps
Peak short-circuit current	/	20ms	230V	300mA
Initial value of aperiodic component	/	100ms	10.1V	250mA
Initial symmetrical short-circuit current	/	250ms	11.5V	420mA
Decaying (aperiodic) component of short-circuit current	/	500ms	12.5V	350mA
Reactance/Resistance ratio of source	/	Time to	trip	0.053ms

### Power quality

#### Harmonic current emission

Maximum permissible harmonic current as per EN 61000-3-2, Class A



	Odd harmonics							Even harmonics			
Harmonic Order n	3	5	7	9	11	13	15≤n≤39	2	4	6	8≤n≤40
Limit	2.30	1.14	0.77	0.4	0.33	0.21	0.15(15/n)	1.08	0.43	0.3	0.23(8/n)
Test value	0.12 6	0.02 3	0.02 4	0.0 3	0.06	0.02 4	0.018	0.14	0.01 5	0.0 24	0.017

#### 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	0.39	0.18	0.8%	0.19%	0.26%

#### Comments

GW3000D-NS, GW3600-NS, GW3600D-NS, GW4200-NS, GW4200D-NS, GW5000-NS, is similar to GW5000D-NS in circuit and construction except for output rating of current and power. The test result can refer to GW5000D-NS.