

## **CERTIFICATE G59/3**

**Product Model:** Growatt SPH3000/ Growatt SPH3600/ Growatt SPH4000/

Growatt SPH4600/ Growatt SPH5000/ Growatt SPH6000/

Nominal AC Power: 3000W/3680W/4000W/4600W/4999W/6000W/ MAX. AC Power: 3000W/3680W/4000W/4600W/4999W/6000W/

Manufacturer: Growatt New Energy Technology Co., Ltd.

Address: 1st East & 3rd Floor, Jiayu Industrial Zone, Xibianling, Shangwu Village, Shiyan, Baoan

District, Shenzhen, P.R. China

Test Lab: Growatt R&D Test Lab

## SSEG manufacturer/supplier declaration:

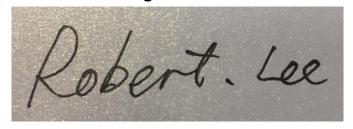
I certify on behalf of the company named above as a supplier of a Generating unit, that all products supplied by the company with the above Type Test reference number will be manufactured and tested to ensure that they perform as stated in this document, prior to shipment to site and that no site modifications are required to ensure that the product meets all the requirements of G59/3.

## **Test Details:**

- Under / Over voltage switch off
- Under / Over frequency switch off
- Loss of mains test
- Power quality: Harmonic current emissions as per BS EN 61000-3-2
- Power quality: Power factor
- Power quality: Voltage fluctuations and flicker as per BS EN 61000-3-3
- Power quality: DC injection

Growatt New Energy Technology CO., LTD

## The General Engineer





	TEST I: UNDER/OVER VOLTAGE TEST							
Function	Setting		Trip test		"No trip tests"			
	Voltage	Time delay	Voltage	Time delay	Voltage /time	Confirm no trip		
U/V stage 1	200.1V	2.5s	199.4V	2.57s	204.1V	No Trip		
					3.5s			
U/V stage 2	184V	0.5s	182.5V	0.57s	188V	No Trip		
					2.48s			
					180V	No Trip		
					0.48s			
O/V stage 1	262.2V	1.0s	262.4V	1.08s	258.2V	No Trip		
					2.0s			
O/V stage 2	273.7V	0.5s	274.5V	0.58s	269.7V	No Trip		
					0.98s			
					277.7V	No Trip		
					0.48s			

Note for Voltage tests the Voltage required to trip is the setting  $\pm 3.45$ 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  $\pm 4$ V and for the relevant times as shown in the table above to ensure that the protection will not trip in error.

TEST II: UNDER/OVER FREQUENCY TEST							
Function	Setting		Trip test		"No trip tests"		
	Frequency	Time delay	Frequency	Time delay	Frequency /time	Confirm no trip	
U/F stage 1	47.5Hz	20s	47.48Hz	20.06s	47.7Hz	No Trip	
					25s		
U/F stage 2	47Hz	0.5s	46.98Hz	0.55s	47.2Hz	No Trip	
					19.98s		
					46.8Hz 0.48s	No Trip	
O/F stage 1	51.5Hz	90s	51.52Hz	91.2s	51.3Hz	No Trip	
					95s		
O/F stage 2	52Hz	0.5s	52.00Hz	0.59s	51.8Hz	No Trip	
					89.98s		
					52.2Hz	No Trip	
					0.48s		



TEST III: LOSS OF MAINS PROTECTION							
Parameter 10% of power 55% of power 100% of power Note							
G59/3 Limit	0.5s	0.5s	0.5s				
Trip setting,sec	-	-	-				
Trip value,sec	0.271S	0.2685	0.217\$				

TEST IV: POWER QUALITY TEST-HARMONICS								
Parameter	2nd	3rd	5th	7th	9th	11th	13th	15th39th
G59/3 Limit(A)	1.08	2.3	1.14	0.77	0.4	0.33	0.21	0.15x(15/n)
Test value	0.086	0.266	0.0338	0.0264	0.0435	0.0158	0.0297	<li><li><li><li>61000-3-2</li></li></li></li>

TEST V: POWER QUALITY TEST-POWER FACTOR							
Parameter	212V	230V	250V	Note			
G59/3 Limit	0.95lag-0.95lead	0.95lag-0.95lead	0.95lag-0.95lead				
Measured	0.995	0.995	0.994	@full load			

TEST VI: POWER QUALITY TEST- VOLTAGE FLICKER							
Parameter	Starting	Stopping	Note				
G59/3 Limit	4%	4%	P <sub>st</sub> =1.0	Pit = 0.65			
Test Value	<1.08%	<1.08	0.27	0.17			



TEST VII: POWER QUALITY TEST- DC INJECTION						
Test level	10% power	55% power	100% power	Note		
Recorded value	30.2mA	25mA	56mA			
as % of rated AC current	0.12%	0.09%	0.21%			
Limit	0.25%	0.25%	0.25%			

		TEST VIII:	RECONNECTION T	IMES				
Time delay	Measured	red Checks on no reconnection when voltage or frequency is brought to just						
setting	delay	outside stage 1 limits of table 1						
65S	69.4S	At 266.2V	At 266.2V At 196.1V At 47.4Hz At 51.6Hz					
Confirmation that the Generating Unit does not re-connect		No reconnection	No reconnection	No reconnection	No reconnection			