

## Certificate UK-G59

The results of the G59 tests are summarized in this certificate.  
 Omnik New Energy Co., Ltd declares that the units installed in UK market and set for G59 operations are characterized by the following features:

- The internal specification and parameters are set to be compliant with: Engineering Recommendation G59, 2014.
- All units have internal parameters setting.
- These parameters cannot be changed by user, an installer or by any person other than the manufacturer.
- All units are tested before shipping according to: Engineering Recommendation G59, 2014.

<b>SSEG Type reference number</b>	PHOTO-VOLTAIC Inverter		
<b>SSEG Type</b>	Omniksol-4k-TL2,Omniksol-5k-TL2		
<b>System Supplier name</b>	Omnik New Energy Co.,Ltd.		
<b>Address</b>	CN-215213 Suzhou China Xinghu Road No. 218 Biobay Park A4-314		
<b>Tel</b>	+86 512 6956 8216	<b>Fax</b>	+86 512 6295 6682
<b>E:mail</b>	<a href="mailto:service@omnik-solar.com">service@omnik-solar.com</a>	<b>Web site</b>	<a href="http://www.omnik-solar.com">www.omnik-solar.com</a>

<b>Maximum rated capacity</b>	<b>Connection Option</b>	
	4	kW single phase (Omniksol-4k-TL2)
	5	kW single phase (Omniksol-5k-TL2)
	NA	kW three phase
	NA	kW two phases in three phase system
	NA	kW two phases split phase system
	NA	
	NA	

### 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 all the requirements of G59.

<b>Signed</b>	2014-10-17	<b>On behalf of</b>	Omnik New Energy Co.,Ltd
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Omniksol-4k&5k-TL2								
13.7.3.2 UNDER / OVER VOLTAGE TESTS								P
	Under Voltage				Over Voltage			
Parameter	Voltage	Time (sec)			Voltage	Time (sec)		
Output power level	207.1	10%	55%	100%	253.3	10%	55%	100%
G59/2 Limit: stage 1	-13%Un	2,5 s			+10%Un	1,0 s		
Actual setting								
Trip value	212V to 202V	2.50	2.52	2.52	248V to 258V	1.02	1.00	0.97
		2.50	2.51	2.52		1.03	1.02	1.01
		2.51	2.53	2.52		1.03	1.02	1.02
		2.50	2.50	2.50		1.01	1.01	1.02
		2.51	2.51	2.50		1.00	1.04	1.01
G59/2 Limit: stage 2	-20%Un	1.2 s			+15%Un	1.2 s		
Actual setting								
Trip value	230V to 183.8 V	1.23	1.21	1.221	230V to 264.5V	1.02	1.04	1.01
		1.22	1.22	0.123		1.03	1.02	1.02
		1.21	1.22	0.121		1.01	1.05	1.02
		1.22	1.22	0.121		1.00	1.04	1.04
		1.23	1.22	0.123		1.02	1.03	1.03

**Note:**  
 The Interface Protection should operate within the specified trip times of Table 10.5.7.1 when the voltage is at or within 1.5% of the trip setting of the inverter. For example, an inverter with a stated accuracy of  $\pm 1.5\%$  could be set with an overvoltage setting of +13.5% on the basis that the overvoltage protection should operate when the terminal voltage is in the range of 12-15% ( $13.5 \pm 1.5\%$ ). The test voltage should be applied in steps of  $\pm 0.5\%$  of setting for a duration that is longer than the trip time delay, for example 3s in the case of a delay setting of 2.5s. It will be necessary to carry out five tests for each trip setting. The longest trip time is to be recorded as the certificated trip time. The test voltage at which this trip occurred is to be recorded as the certificated trip voltage.  
 The measurement shall take place at nominal frequency, 10%, 55% and 100% power.

Omniksol-4k&5k-TL2				
13.7.3.3 UNDER / OVER FREQUENCY TESTS				P
	Under frequency		Over frequency	
	<b>Load condition:</b>			
	1) Full rating for an inverter of up to 5kW rating 2) No less than 10% of the rating for larger inverters up to 50KW.			
Parameter	Frequency	Time	Frequency	Time
Output power level	47.60		51.41	
G59/2 Limit: stage 1	>=47,6 Hz	>20 s	<=51.4 Hz	>90 s
Actual setting				
Trip value	48.1Hz to 47.1Hz	20	50.91Hz to 51.91Hz	90.2
		20		90.04
		20		90.1
		20		90.05
		20		90.2
G59/2 Limit: stage 2	>=47,0 Hz	1.2s	<=52,0 Hz	1.2s
Actual setting				
Trip value	48Hz to 47Hz	1.22	51.01Hz to 52.01Hz	1.24
		1.20		1.21
		1.21		1.20
		1.20		1.21
		1.20		1.21

**Note:**  
Operation of the under/over frequency protection will be demonstrated for an increase or decrease of frequency within  $\pm 0.5\%$  of the trip settings, e.g. for an Over Frequency setting of 50.5 Hz the permissible operating range is  $50.5 \pm 0.2525$  Hz. The test frequency should be applied in steps of  $\pm 0.5\%$  of setting for a duration that is longer than the trip time delay, for example 1 second in the case of a delay setting of 0.5 second.

<b>Omniksol-4k-TL2</b>			
<b>C3.4 LOSS OF MAINS TEST</b>			<b>p</b>
<b>Test conditions:</b>	Frequency: 50+/-0,2Hz $U_N=230\pm 3V_{ac}$ RLC consumes inverter real power within +/- 5% Quality > 0,5		
Output power level:	10%	55%	100%
<b>G83/1 Limit:</b>	<b>5s</b>		
Actual setting (sec):			
Trip value (sec):	0.211	0.234	0.183
	0.254	0.245	0.203
	0.207	0.238	0.189
	0.221	0.202	0.186
	0.197	0.194	0.175
Parameter	<b>L=0.996kVA</b>	<b>L=3.58kVA</b>	<b>L=8.28kVA</b>
	<b>R=0.357kW</b>	<b>R=1.811kW</b>	<b>R=3.702kW</b>
	<b>C=1.08kvar</b>	<b>C=5.25kvar</b>	<b>C=8.26kvar</b>
Udc	360.8V	359.5V	361.2V
Idc	1.17A	5.61A	11.15A
Uac	230.0V	230.2V	231.3V
Pac	0.404kW	2.006kW	4.012kW
<b>Note:</b> Inverter connected to a network combining a resonant circuit with a Q factor = 2 (at 55% output power and the values of L and C are fixed for 10% and 100% tests) and a variable load; the value of the load is to match the inverter output to within +/-5%. A switch is placed between inverter/load and distribution system.			

Omniksol-5k-TL2			
C3.4 LOSS OF MAINS TEST			p
Test conditions:	Frequency: 50+/-0,2Hz $U_N=230\pm 3V_{ac}$ RLC consumes inverter real power within +/- 5% Quality > 0,5		
Output power level:	10%	55%	100%
G83/1 Limit:	5s		
Actual setting (sec):			
Trip value (sec):	0.168	0.236	0.163
	0.238	0.257	0.232
	0.2	0.226	0.175
	0.172	0.212	0.172
	0.219	0.181	0.160
Parameter	L=1.2455kVA	L=6.4779kVA	L=9.52kVA
	R=0.4455kW	R=2.2623kW	R=4.257kW
	C=1.3498kvar	C=6.56kvar	C=9.5kvar
Udc	362.7V	359.4V	361.4V
Idc	1.47A	7.01A	12.82A
Uac	230.1V	230.6V	231.3V
Pac	0.5241kW	2.49914kW	4.618kW
<b>Note:</b> Inverter connected to a network combining a resonant circuit with a Q factor = 2 (at 55% output power and the values of L and C are fixed for 10% and 100% tests) and a variable load; the value of the load is to match the inverter output to within +/-5%. A switch is placed between inverter/load and distribution system.			

Omniksol-4k&5k-TL2			
<b>C3.5 RECONNECTION TIMES</b>			<b>p</b>
<b>Reconnection Time</b>	<b>Under/Over voltage</b>	<b>Under/over frequency</b>	<b>Loss of mains</b>
Minimum value	180 seconds		
Actual settings (sec)			
Recorded value (sec)	198	200	200

Omniksol-4k-TL2								
<b>13.7.6.1 Harmonic Current Emissions</b>								<b>p</b>
Harmonics	3rd	5th	7th	9th	11th	13th	THD	PWHD
Limit	21,6	10,7	7,2	3,8	3,1	2,0	13	22
Test Value	0.517	1.055	0.166	0.088	0.177	0.068	1.243	0.0519
<p>Note: Maximum permissible harmonics current as per EN61000-3-12. Measurement taken at rated load</p>								

Omniksol-5k-TL2								
<b>13.7.6.1 Harmonic Current Emissions</b>								<b>p</b>
Harmonics	3rd	5th	7th	9th	11th	13th	THD	PWHD
Limit	21,6	10,7	7,2	3,8	3,1	2,0	13	22
Test Value	0.199	1.120	0.112	0.131	0.084	0.078	1.172	0.0628
<p>Note: Maximum permissible harmonics current as per EN61000-3-12. Measurement taken at rated load</p>								

Omniksol-4k-TL2			
<b>13.7.6.2 Power factor</b>			<b>P</b>
G 59 Limit	0.95 lag-0.95 lead		
Output Voltage:	212V (U <sub>N</sub> -8%)	230V	248V (U <sub>N</sub> +12.7%)
Test Value	0.9983	0.9990	0.9989
<p>Note: The power factor test shall be such that the inverter supplies full load to the DNO system.</p>			

Omniksol-5k-TL2			
<b>13.7.6.2 Power factor</b>			<b>P</b>
G 59 Limit	0.95 lag-0.95 lead		
Output Voltage:	212V ( $U_N-8\%$ )	230V	248V ( $U_N+12.7\%$ )
Test Value	0.9984	0.9989	0.9989
<p>Note:</p> <p>The power factor test shall be such that the inverter supplies full load to the DNO system.</p>			

Omniksol-4k-TL2					
<b>13.7.6.3 Voltage Flicker (maybe covered by EMC Report)</b>					<b>p</b>
$U_N=230V$					
Output power: 100%					
Running					
Limit (at $Z_{ref}$ )	Pst = 1.0	Plt = 0.65	d(t)%= 3.3	$d_c\%=3.3$	$d_{max}\%$
Test value (at $Z_{ref}$ )	0.319	0.139	0.0	0.47	0.53
<p>Note:</p> <p>Maximum permissible voltage fluctuation (expressed as a percentage of nominal voltage at 100% power) and flicker. As per BS EN 61000-3-3</p>					

Omniksol-5k-TL2					
<b>13.7.6.3 Voltage Flicker (maybe covered by EMC Report)</b>					<b>p</b>
$U_N=230V$					
Output power: 100%					
Running					
Limit (at $Z_{ref}$ )	Pst = 1.0	Plt = 0.65	d(t)%= 3.3	$d_c\%=3.3$	$d_{max}\%$
Test value (at $Z_{ref}$ )	0.319	0.139	0.0	0.47	0.53
<p>Note:</p> <p>Maximum permissible voltage fluctuation (expressed as a percentage of nominal voltage at 100% power) and flicker. As per BS EN 61000-3-3</p>					

Omniksol-4k-TL2			
<b>13.7.6.4 DC injection</b>			<b>P</b>
G 59 Limit	20 mA		
Output power:	10%	55%	100%
Test Value	15mA	10mA	5mA
<p>Note: The level of dc injection may be measured during tests C3.2, C3.3, C3.4 and C4.2.</p>			

Omniksol-5k-TL2			
<b>13.7.6.4 DC injection</b>			<b>P</b>
G 59 Limit	20 mA		
Output power:	10%	55%	100%
Test Value	11mA	7mA	5mA
<p>Note: The level of dc injection may be measured during tests C3.2, C3.3, C3.4 and C4.2.</p>			

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