



**BUREAU  
VERITAS**

# Verklaring van geen bezwaar

**Aanvrager:** Omnik New Energy Co., Ltd.  
Xinghu Road No.218 bioBAY Park A4-314  
215123 Suzhou  
China

**Product:** Fotovoltaïsche Omvormers

**Model:** Omniksol-4k-TL2-TH  
Omniksol-5k-TL2-TH  
Omniksol-6k-TL2-TH

## Reglementair voorgeschreven gebruik:

Automatisch schakelstation met driefasige netwerkbewaking conform EN 50438:2013, NEN-EN 50438:2013, Annex A\*) voor fotovoltaïsche installaties met een driefasige parallelvoeding door middel van gelijkstroom-wisselstroommutator in het net van de openbare voorziening. Het automatische schakelstation vormt een integraal bestanddeel van de hoger vermelde gelijkstroom-wisselstroommutators met scheidingstransformator. Deze dient als vervangmiddel voor een te allen tijde voor de distributienetexploitant ("VNB") toegankelijk schakelstation met scheidingsfunctie.

## Controlebasis:

**EN 50438:2013, NEN-EN 50438:2013**

Eisen voor het aansluiten van microgeneratoren op het openbare laagspanningsnet

**DIN V VDE V 0126-1-1:2006-02 (Single fouttolerantie van de bescherming-interface systeem)**

Automatisch schakelstation tussen een netparallele zelfopwekinstallatie en het openbare laagspanningsnet

Een representatief testpatroon van het hoger vermelde product voldoet aan de op het moment van de uitreiking van dit attest geldende veiligheidstechnische eisen van de vermelde controlegrondbeginselen voor een reglementair voorgeschreven gebruik.

**Rapportnummer:** OMK-16FE1118FTSP

**Certificaatnummer:** U17-0001

**Datum:** 2017-01-11

**Certificatie-instelling**



Dieter Zitzmann



Certificatie-instelling Bureau Veritas Consumer Products Services Germany GmbH  
Geaccrediteerd volgens DIN EN ISO/IEC 17065

**Appendix E Type Verification Test Report**

Extract from test report according to EN 50438

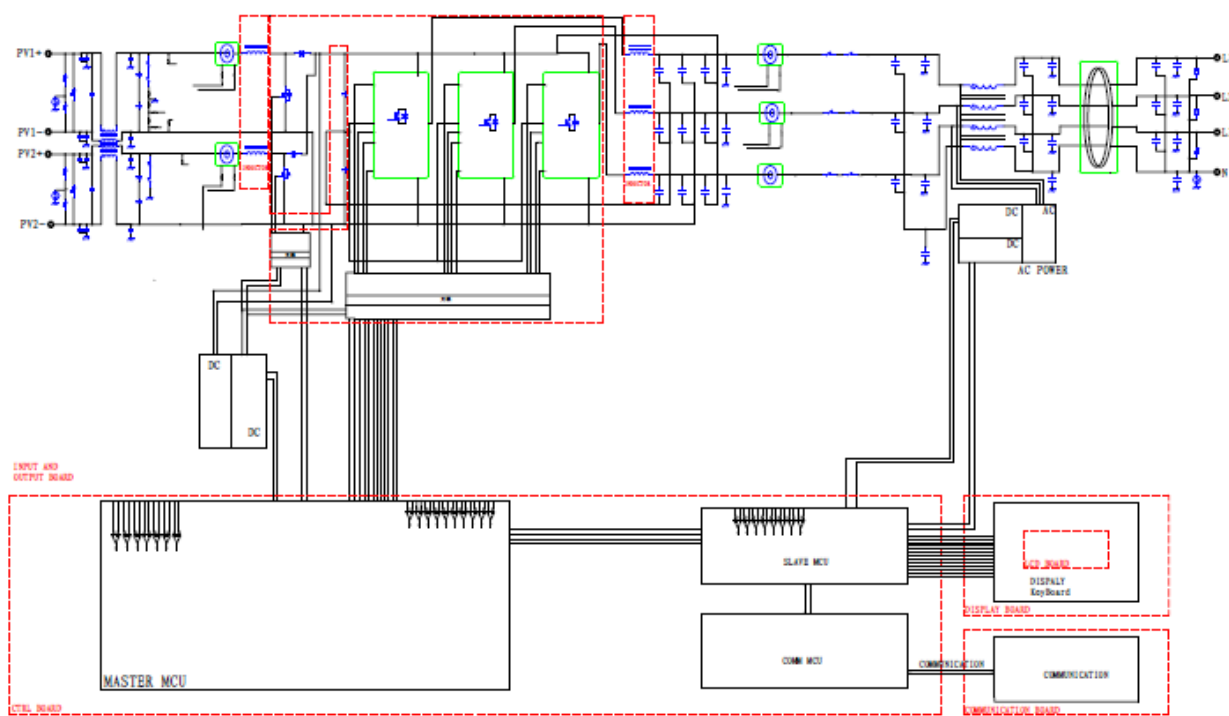
Nr. OMK-16FE1118FTSP

**Type Approval and declaration of compliance with the requirements of EN 50438.**

<b>Manufacturer / applicant:</b>	Omnik New Energy Co., Ltd. Xinghu Road No.218 bioBAY Park A4-314 215123 Suzhou China		
<b>Micro-generator Type</b>	Grid-tied photovoltaic inverter		
<b>Rated values</b>	Omniksol-4k-TL2-TH	Omniksol-5k-TL2-TH	Omniksol-6k-TL2-TH
<b>Maximum rated capacity</b>	4kW	5kW	6kW
<b>Rated voltage</b>	3/N/PE,230/240V,50Hz		
<b>Firmware version</b>	Master CPU: V5.04 Build0224 Slave CPU: V3.00 Build0114 Communication CPU: V3.00 Build0114		
<b>Measurement period:</b>	2016-2-29 to 2016-12-23		

**Description of the structure of the power generation unit (Figure 1):**

The power generation unit is equipped with a PV and line-side EMC filter. Output switch-off is performed with single-fault tolerance based on two series-connected relays in line and neutral. This enables a safe disconnection of the power generation unit from the network in case of error.



**Figure 1 – Schematic structure of the power generation unit**

The above stated micro-generators are tested according to the requirements in the EN 50438. Any modification that affects the stated tests must be named by the manufacturer/supplier of the product to ensure that the product meets all requirements of the EN 50438.

**Appendix E Type Verification Test Report**

Extract from test report according to EN 50438

Nr. OMK-16FE1118FTSP

**Type testing of the interface protection**

Over-/under-voltage tests						
Omnisol-6k-TL2-TH						
Phase1						
Parameter	Protection limit		Actual setting		Trip value (test result)	
	Voltage [V]	Disconnection time [s]	Voltage [V]	Disconnection time [s]	Voltage [V]	Disconnection time [s]
Over-voltage stage 1	253,0	2,0	253,0	2,0	253,5	1,233
Under-voltage stage 1	184,0	2,0	184,0	2,0	184,9	1,235
Phase2						
Parameter	Protection limit		Actual setting		Trip value (test result)	
	Voltage [V]	Disconnection time [s]	Voltage [V]	Disconnection time [s]	Voltage [V]	Disconnection time [s]
Over-voltage stage 1	253,0	2,0	253,0	2,0	253,5	1,235
Under-voltage stage 1	184,0	2,0	184,0	2,0	184,9	1,240
Phase3						
Parameter	Protection limit		Actual setting		Trip value (test result)	
	Voltage [V]	Disconnection time [s]	Voltage [V]	Disconnection time [s]	Voltage [V]	Disconnection time [s]
Over-voltage stage 1	253,0	2,0	253,0	2,0	253,5	1,228
Under-voltage stage 1	184,0	2,0	184,0	2,0	184,9	1,230

**Appendix E Type Verification Test Report**

Extract from test report according to EN 50438

Nr. OMK-16FE1118FTSP

Over-/under-frequency tests						
Parameter	Protection limit		Actual setting		Trip value (test result)	
	Frequency [Hz]	Disconnection time [s]	Frequency [Hz]	Disconnection time [s]	Frequency [Hz]	Disconnection time [s]
Over-frequency	51,00	2,0	51,00	2,0	51,00	1,500
Under-frequency	48,00	2,0	48,00	2,0	48,00	1,530

LoM test						
Method used	EN 62116					
	33% of -5% Q Test 22	66% of -5% Q Test 12	100% of -5% P Test 5	33% of +5% Q Test 31	66% of +5% Q Test 21	100% of +5% P Test 10
Trip time. Phase 1 fuse removed [ms]	180	98	156	100	94	108
Trip time. Phase 2 fuse removed [ms]	65	59	104	91	97	68
Trip time. Phase 3 fuse removed [ms]	84	124	120	102	116	146

**Appendix E Type Verification Test Report**

Extract from test report according to EN 50438

Nr. OMK-16FE1118FTSP

**Type testing of a micro-generator**

**Operating range**

Test 1: U = 195,5 V; f = 47,5 Hz; P = 1,00 Sn; cosφ = 1

Test 2: U = 253,0 V; f = 51,5 Hz; P = 1,00 Sn; cosφ = 1

Test sequence	Voltage [V]	Frequency [Hz]	Output power [W]	Cos φ [1]
1	196,0	47,5	5773	0,9996
2	253,3	51,5	5804	0,9989

**Active power at under-frequency**

5-min mean value (each)	a) 50 ± 0,01 [Hz]	b) - 0,4 to - 0,5 [Hz]	c) - 2,4 to - 2,5 [Hz]
Frequency [Hz]:	50,00	49,50	47,55
Active power [kW]:	5789	5789	5790
ΔP/PM [%] per 1 Hz:			0

**Power response to over-frequency**

1-min mean value [Hz]:	a) 50,00	b) 50,25	c) 50,70	d) 51,15	e) 50,70	f) 50,25	g) 50,00
<b>1. Measurement a) to g): Active power output &gt; 80% P<sub>n</sub></b>							
Frequency [Hz]:	50,00	50,25	50,70	51,15	50,70	50,25	50,00
PM [kW]:	N/A	5880	4800	3720	4800	5880	N/A
PE60 [kW]:	6012,6	5933,5	4876,3	3793,8	4875,3	5898,4	6018,8
ΔPE60/PM [%]:	N/A	0,91	1,30	1,26	1,57	0,31	N/A
<b>2. Measurement a) to g): Active power output 40% and 60% after freezing &gt; 80% P<sub>n</sub></b>							
Frequency [Hz]:	50,00	50,25	50,70	51,15	50,70	50,25	50,00
PM [kW]:	N/A	2940	2400	1860	2400	2940	N/A
PE60 [kW]:	3002,3	2972,2	2477,3	1925,6	2399,6	2938,4	3004,1
ΔPE60/PM [%]:	N/A	1,09	2,63	2,21	-0,01	-0,05	N/A
Limit ΔP/P <sub>1min</sub> :	+ 10 % of P <sub>M</sub>						

**Appendix E Type Verification Test Report**

Extract from test report according to EN 50438

Nr. OMK-16FE1118FTSP

Reactive power			
Uncontrollable reactive power			
Omniksol-6k-TL2-TH			
Test Voltage	211,6V	230V	248,4V
Output power			
25% PN	0,994	0,992	0,983
50% PN	0,998	0,997	0,997
75% PN	0,998	0,998	0,998
100% PN	0,999	0,999	0,999
Limit	>0,95	>0,95	>0,95
Omniksol-5k-TL2-TH			
Test Voltage	211,6V	230V	248,4V
Output power			
25% PN	0,992	0,994	0,985
50% PN	0,996	0,997	0,996
75% PN	0,997	0,997	0,998
100% PN	0,999	0,999	0,999
Limit	>0,95	>0,95	>0,95
Omniksol-4k-TL2-TH			
Test Voltage	211,6V	230V	248,4V
Output power			
25% PN	0,993	0,995	0,987
50% PN	0,995	0,996	0,996
75% PN	0,998	0,997	0,997
100% PN	0,999	0,999	0,999
Limit	>0,95	>0,95	>0,95

**Appendix E Type Verification Test Report**

Extract from test report according to EN 50438

Nr. OMK-16FE1118FTSP

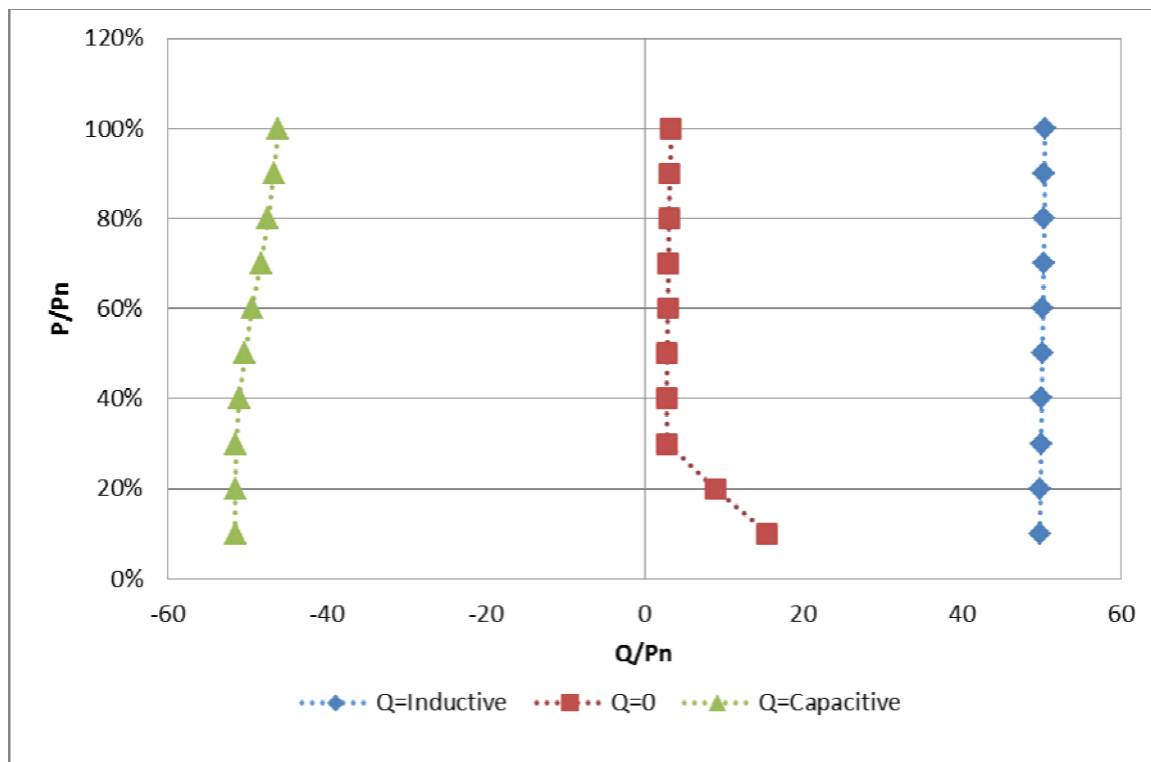
Controllable reactive power				
Inductive (supply reactive power)				
Power-BIN	Active power [kW]	Reactive power [kVar]	Power factor (cos φ)	AC voltage [V]
0% - 10%	0,624	-3,092	0,181	229,27
10% - 20%	1,232	-3,088	0,354	229,25
20% - 30%	1,837	-3,085	0,498	229,31
30% - 40%	2,440	-3,061	0,612	229,29
40% - 50%	3,039	-3,018	0,699	229,26
50% - 60%	3,636	-2,962	0,766	229,24
60% - 70%	4,231	-2,895	0,818	229,22
70% - 80%	4,823	-2,842	0,855	229,22
80% - 90%	5,412	-2,798	0,883	229,24
90% - 100%	5,854	-2,765	0,899	229,28
Capacitive (supply reactive power)				
Power-BIN	Active power [kW]	Reactive power [kVar]	Power factor (cos φ)	AC voltage [V]
0% - 10%	0,571	2,987	0,175	229,60
10% - 20%	1,212	2,991	0,366	229,47
20% - 30%	1,850	2,998	0,519	229,30
30% - 40%	2,639	3,003	0,629	229,17
40% - 50%	3,049	3,004	0,710	229,09
50% - 60%	3,646	3,010	0,769	229,07
60% - 70%	4,239	3,01	0,813	229,05
70% - 80%	4,830	3,021	0,846	229,05
80% - 90%	5,418	3,020	0,873	229,08
90% - 100%	5,959	3,026	0,891	229,51
Reactive power supply with set point Q=0				
Power-BIN	Active power [kW]	Reactive power [kVar]	Power factor (cos φ)	AC voltage [V]
0% - 10%	0,259	0,925	0,241	229,87
10% - 20%	0,856	0,534	0,818	229,93
20% - 30%	1,448	0,172	0,990	229,95
30% - 40%	2,038	0,168	0,996	229,92
40% - 50%	2,627	0,169	0,997	229,96
50% - 60%	3,215	0,174	0,998	229,98
60% - 70%	3,801	0,180	0,999	229,95
70% - 80%	4,385	0,185	0,999	229,93
80% - 90%	4,969	0,192	0,999	229,96
90% - 100%	5,5541	0,201	0,999	229,98

Appendix E Type Verification Test Report

Extract from test report according to EN 50438

Nr. OMK-16FE1118FTSP

Diagram of inductive reactive power absorption



Q adjustment

	Reactive power set point Q [Var]	Measured reactive power Q [Var]	Measured cos φ	Deviation compared to setpoint ΔQ / PN [%]
- Qmin	-3,000	-3,031	0,852	0,52
0	0	0,213	0,999	3,55
+ Qmax	3,000	2,833	0,897	2,78



**Appendix E Type Verification Test Report**

Extract from test report according to EN 50438

Nr. OMK-16FE1118FTSP

Connection and starting to generate electrical power		
Test according to EN 50438 with setting	Min. voltage for connection to grid:	195,5
	Max. voltage for connection to grid:	253,0
	Min. frequency for connection to grid:	48,0
	Max. frequency for connection to grid:	50,15
	Observation time ( $\geq 60s$ )	60s
<b>Test</b>		
<b>Voltage conditions</b>		
a) Start up for voltage range	<84% $U_n$ for twice of observation time	>111% $U_n$ for twice of observation time
Connection:	No connection	No connection
Limit:	No connection allowed	
b) In voltage range at start-up	$\geq 84\% U_n$ within twice setting observation time	$\leq 111\% U_n$ within twice setting observation time
Reconnection time [s]	67	67
Limit:	Connected after setting observation time ( $\geq 60s$ )	
Gradient:	For adjustable micro generators the maximum occurring active power gradient after connection respectively start generating electrical power is less than the configured maximum active power per minute Max gradient: 10% $P_n$ /min. For recorded gradient see diagram below.	
c) In voltage range after voltage failure	$\geq 84\% U_n$ for twice of setting observation time	$\leq 111\% U_n$ for twice of setting observation time
Reconnection time [s]	68	67
Limit:	Reconnection after setting observation time ( $\geq 60s$ )	
Gradient:	For adjustable micro generators the maximum occurring active power gradient after connection respectively start generating electrical power is less than the configured maximum active power per minute Max gradient: 10% $P_n$ /min. For recorded gradient see diagram below.	
<b>Frequency conditions</b>		
d) Start up for frequency range	<47,95 Hz for twice of setting observation time	>50,15 Hz for twice of setting observation time
Connection:	No connection	No connection
Limit:	No connection allowed	
e) In frequency range at start-up	$\geq 47,95$ Hz within twice of setting observation time	$\leq 50,15$ Hz within twice of setting observation time
Reconnection time [s]	80	68
Limit:	Connected after setting delay time ( $\geq 60s$ )	
Gradient:	For adjustable micro generators the maximum occurring active power gradient after connection respectively start generating electrical power is less than the configured maximum active power per minute Max gradient: 10% $P_n$ /min. For recorded gradient see diagram below.	

**Appendix E Type Verification Test Report**

Extract from test report according to EN 50438

Nr. OMK-16FE1118FTSP

f) In frequency range after frequency failure	$\geq 47,95$ Hz for twice of setting observation time	$\leq 50,15$ Hz for twice of setting observation time
Reconnection time [s]	66	72
Limit:	Reconnection after setting observation time ( $\geq 60$ s)	
Gradient:	For adjustable micro generators the maximum occurring active power gradient after connection respectively start generating electrical power is less than the configured maximum active power per minute Max gradient: 10%Pn/min. For recorded gradient see diagram below.	

Short-circuit current contribution					
Short-circuit current parameters					
For a directly coupled micro-generator			For a Inverter micro-generator		
Parameter	Symbol	Value	Time after fault	Volts	Amps
Peak Short Circuit current	$I_p$	N/A	20ms	121	0,147
Initial Value of aperiodic current	A	N/A	100ms	N/A	N/A
Initial symmetrical short-circuit current*	$I_k$	N/A	250ms	N/A	N/A
Decaying (aperiodic) component of short circuit current*	$i_{DC}$	N/A	500ms	N/A	N/A
Reactance/Resistance Ratio of source*	X/R	N/A	Time to trip	12 ms	

**Appendix E Type Verification Test Report**

Extract from test report according to EN 50438

Nr. OMK-16FE1118FTSP

Power Quality. Harmonic current emission				
micro-generator		Omniksol-6k-TL2-TH		
Harmonic order n	Current Magnitude [A] at 100% rated output power	% of Fundamental	Phase	Harmonic current limit EN 61000-3-2, Class A [A]
1st	8,392	--	Phase 1	-
2nd	0,099	0,012	Phase 1	1,080
3rd	0,027	0,003	Phase 1	2,300
4th	0,021	0,002	Phase 1	0,430
5th	0,097	0,012	Phase 1	1,140
6th	0,026	0,003	Phase 1	0,300
7th	0,079	0,009	Phase 1	0,770
8th	0,019	0,002	Phase 1	0,230
9th	0,035	0,004	Phase 1	0,400
10th	0,017	0,002	Phase 1	0,184
11th	0,130	0,015	Phase 1	0,330
12th	0,016	0,002	Phase 1	0,153
13th	0,110	0,013	Phase 1	0,210
14th	0,025	0,003	Phase 1	0,131
15th	0,048	0,006	Phase 1	0,150
16th	0,030	0,004	Phase 1	0,115
17th	0,073	0,009	Phase 1	0,132
18th	0,063	0,007	Phase 1	0,102
19th	0,098	0,012	Phase 1	0,118
20th	0,071	0,008	Phase 1	0,092
21th	0,052	0,006	Phase 1	0,107
22th	0,042	0,005	Phase 1	0,084
23th	0,053	0,006	Phase 1	0,098
24th	0,022	0,003	Phase 1	0,077
25th	0,023	0,003	Phase 1	0,090
26th	0,014	0,002	Phase 1	0,071
27th	0,012	0,001	Phase 1	0,083
28th	0,010	0,001	Phase 1	0,066
29th	0,015	0,002	Phase 1	0,078
30th	0,008	0,001	Phase 1	0,061
31th	0,008	0,001	Phase 1	0,073
32th	0,007	0,001	Phase 1	0,058
33th	0,007	0,001	Phase 1	0,068
34th	0,006	0,001	Phase 1	0,054
35th	0,006	0,001	Phase 1	0,064
36th	0,005	0,001	Phase 1	0,051
37th	0,005	0,001	Phase 1	0,061
38th	0,005	0,001	Phase 1	0,048
39th	0,005	0,001	Phase 1	0,058
40th	0,004	0,001	Phase 1	0,046

**Appendix E Type Verification Test Report**

Extract from test report according to EN 50438

Nr. OMK-16FE1118FTSP

Power Quality. Harmonic current emission				
micro-generator		Omniksol-6k-TL2-TH		
Harmonic order n	Current Magnitude [A] at 100% rated output power	% of Fundamental	Phase	Harmonic current limit EN 61000-3-2, Class A [A]
1st	8,360	--	Phase 2	-
2nd	0,050	0,006	Phase 2	1,080
3rd	0,027	0,003	Phase 2	2,300
4th	0,017	0,002	Phase 2	0,430
5th	0,104	0,012	Phase 2	1,140
6th	0,033	0,004	Phase 2	0,300
7th	0,097	0,012	Phase 2	0,770
8th	0,023	0,003	Phase 2	0,230
9th	0,045	0,005	Phase 2	0,400
10th	0,026	0,003	Phase 2	0,184
11th	0,165	0,020	Phase 2	0,330
12th	0,029	0,004	Phase 2	0,153
13th	0,195	0,023	Phase 2	0,210
14th	0,039	0,005	Phase 2	0,131
15th	0,045	0,005	Phase 2	0,150
16th	0,041	0,005	Phase 2	0,115
17th	0,104	0,012	Phase 2	0,132
18th	0,069	0,008	Phase 2	0,102
19th	0,100	0,012	Phase 2	0,118
20th	0,085	0,010	Phase 2	0,092
21th	0,064	0,008	Phase 2	0,107
22th	0,055	0,007	Phase 2	0,084
23th	0,062	0,007	Phase 2	0,098
24th	0,035	0,004	Phase 2	0,077
25th	0,029	0,003	Phase 2	0,090
26th	0,023	0,003	Phase 2	0,071
27th	0,021	0,002	Phase 2	0,083
28th	0,018	0,002	Phase 2	0,066
29th	0,019	0,002	Phase 2	0,078
30th	0,015	0,002	Phase 2	0,061
31th	0,014	0,002	Phase 2	0,073
32th	0,012	0,001	Phase 2	0,058
33th	0,011	0,001	Phase 2	0,068
34th	0,012	0,001	Phase 2	0,054
35th	0,011	0,001	Phase 2	0,064
36th	0,010	0,001	Phase 2	0,051
37th	0,010	0,001	Phase 2	0,061
38th	0,010	0,001	Phase 2	0,048
39th	0,009	0,001	Phase 2	0,058
40th	0,009	0,001	Phase 2	0,046

**Appendix E Type Verification Test Report**

Extract from test report according to EN 50438

Nr. OMK-16FE1118FTSP

Power Quality. Harmonic current emission				
micro-generator		Omniksol-6k-TL2-TH		
Harmonic order n	Current Magnitude [A] at 100% rated output power	% of Fundamental	Phase	Harmonic current limit EN 61000-3-2, Class A [A]
1st	8,357	--	Phase 3	-
2nd	0,057	0,007	Phase 3	1,080
3rd	0,040	0,005	Phase 3	2,300
4th	0,011	0,001	Phase 3	0,430
5th	0,110	0,013	Phase 3	1,140
6th	0,013	0,002	Phase 3	0,300
7th	0,090	0,011	Phase 3	0,770
8th	0,018	0,002	Phase 3	0,230
9th	0,027	0,003	Phase 3	0,400
10th	0,021	0,003	Phase 3	0,184
11th	0,160	0,019	Phase 3	0,330
12th	0,030	0,004	Phase 3	0,153
13th	0,185	0,022	Phase 3	0,210
14th	0,032	0,004	Phase 3	0,131
15th	0,046	0,006	Phase 3	0,150
16th	0,035	0,004	Phase 3	0,115
17th	0,087	0,010	Phase 3	0,132
18th	0,061	0,007	Phase 3	0,102
19th	0,110	0,013	Phase 3	0,118
20th	0,078	0,009	Phase 3	0,092
21th	0,071	0,008	Phase 3	0,107
22th	0,058	0,007	Phase 3	0,084
23th	0,058	0,007	Phase 3	0,098
24th	0,033	0,004	Phase 3	0,077
25th	0,025	0,003	Phase 3	0,090
26th	0,022	0,003	Phase 3	0,071
27th	0,019	0,002	Phase 3	0,083
28th	0,016	0,002	Phase 3	0,066
29th	0,019	0,002	Phase 3	0,078
30th	0,014	0,002	Phase 3	0,061
31th	0,013	0,002	Phase 3	0,073
32th	0,012	0,001	Phase 3	0,058
33th	0,011	0,001	Phase 3	0,068
34th	0,011	0,001	Phase 3	0,054
35th	0,010	0,001	Phase 3	0,064
36th	0,010	0,001	Phase 3	0,051
37th	0,009	0,001	Phase 3	0,061
38th	0,009	0,001	Phase 3	0,048
39th	0,009	0,001	Phase 3	0,058
40th	0,008	0,001	Phase 3	0,046

**Appendix E Type Verification Test Report**

Extract from test report according to EN 50438

Nr. OMK-16FE1118FTSP

Power Quality. Harmonic current emission				
micro-generator		Omniksol-5k-TL2-TH		
Harmonic order n	Current Magnitude [A] at 100% rated output power	% of Fundamental	Phase	Harmonic current limit EN 61000-3-2, Class A [A]
1st	7,017	--	Phase 1	-
2nd	0,103	0,015	Phase 1	1,080
3rd	0,029	0,004	Phase 1	2,300
4th	0,021	0,003	Phase 1	0,430
5th	0,097	0,014	Phase 1	1,140
6th	0,030	0,004	Phase 1	0,300
7th	0,075	0,011	Phase 1	0,770
8th	0,020	0,003	Phase 1	0,230
9th	0,040	0,006	Phase 1	0,400
10th	0,019	0,003	Phase 1	0,184
11th	0,118	0,017	Phase 1	0,330
12th	0,017	0,002	Phase 1	0,153
13th	0,189	0,027	Phase 1	0,210
14th	0,026	0,004	Phase 1	0,131
15th	0,050	0,007	Phase 1	0,150
16th	0,031	0,004	Phase 1	0,115
17th	0,106	0,015	Phase 1	0,132
18th	0,045	0,006	Phase 1	0,102
19th	0,112	0,016	Phase 1	0,118
20th	0,041	0,006	Phase 1	0,092
21th	0,030	0,004	Phase 1	0,107
22th	0,023	0,003	Phase 1	0,084
23th	0,036	0,005	Phase 1	0,098
24th	0,015	0,002	Phase 1	0,077
25th	0,022	0,003	Phase 1	0,090
26th	0,011	0,002	Phase 1	0,071
27th	0,009	0,001	Phase 1	0,083
28th	0,008	0,001	Phase 1	0,066
29th	0,012	0,002	Phase 1	0,078
30th	0,007	0,001	Phase 1	0,061
31th	0,007	0,001	Phase 1	0,073
32th	0,006	0,001	Phase 1	0,058
33th	0,006	0,001	Phase 1	0,068
34th	0,005	0,001	Phase 1	0,054
35th	0,006	0,001	Phase 1	0,064
36th	0,005	0,001	Phase 1	0,051
37th	0,005	0,001	Phase 1	0,061
38th	0,004	0,001	Phase 1	0,048
39th	0,004	0,001	Phase 1	0,058
40th	0,004	0,001	Phase 1	0,046

**Appendix E Type Verification Test Report**

Extract from test report according to EN 50438

Nr. OMK-16FE1118FTSP

Power Quality. Harmonic current emission				
micro-generator		Omniksol-5k-TL2-TH		
Harmonic order n	Current Magnitude [A] at 100% rated output power	% of Fundamental	Phase	Harmonic current limit EN 61000-3-2, Class A [A]
1st	7,015	--	Phase 2	-
2nd	0,054	0,008	Phase 2	1,080
3rd	0,026	0,004	Phase 2	2,300
4th	0,016	0,002	Phase 2	0,430
5th	0,107	0,015	Phase 2	1,140
6th	0,038	0,005	Phase 2	0,300
7th	0,092	0,013	Phase 2	0,770
8th	0,025	0,004	Phase 2	0,230
9th	0,050	0,007	Phase 2	0,400
10th	0,030	0,004	Phase 2	0,184
11th	0,155	0,022	Phase 2	0,330
12th	0,033	0,005	Phase 2	0,153
13th	0,178	0,025	Phase 2	0,210
14th	0,041	0,006	Phase 2	0,131
15th	0,058	0,008	Phase 2	0,150
16th	0,049	0,007	Phase 2	0,115
17th	0,134	0,019	Phase 2	0,132
18th	0,062	0,009	Phase 2	0,102
19th	0,113	0,016	Phase 2	0,118
20th	0,058	0,008	Phase 2	0,092
21th	0,045	0,006	Phase 2	0,107
22th	0,036	0,005	Phase 2	0,084
23th	0,048	0,007	Phase 2	0,098
24th	0,026	0,004	Phase 2	0,077
25th	0,026	0,004	Phase 2	0,090
26th	0,020	0,003	Phase 2	0,071
27th	0,018	0,003	Phase 2	0,083
28th	0,017	0,002	Phase 2	0,066
29th	0,017	0,002	Phase 2	0,078
30th	0,014	0,002	Phase 2	0,061
31th	0,014	0,002	Phase 2	0,073
32th	0,012	0,002	Phase 2	0,058
33th	0,012	0,002	Phase 2	0,068
34th	0,011	0,002	Phase 2	0,054
35th	0,011	0,002	Phase 2	0,064
36th	0,010	0,001	Phase 2	0,051
37th	0,010	0,001	Phase 2	0,061
38th	0,009	0,001	Phase 2	0,048
39th	0,009	0,001	Phase 2	0,058
40th	0,009	0,001	Phase 2	0,046

**Appendix E Type Verification Test Report**

Extract from test report according to EN 50438

Nr. OMK-16FE1118FTSP

Power Quality. Harmonic current emission				
micro-generator		Omniksol-5k-TL2-TH		
Harmonic order n	Current Magnitude [A] at 100% rated output power	% of Fundamental	Phase	Harmonic current limit EN 61000-3-2, Class A [A]
1st	7,007	--	Phase 3	-
2nd	0,062	0,009	Phase 3	1,080
3rd	0,041	0,006	Phase 3	2,300
4th	0,013	0,002	Phase 3	0,430
5th	0,107	0,015	Phase 3	1,140
6th	0,017	0,002	Phase 3	0,300
7th	0,086	0,012	Phase 3	0,770
8th	0,021	0,003	Phase 3	0,230
9th	0,031	0,004	Phase 3	0,400
10th	0,025	0,004	Phase 3	0,184
11th	0,144	0,021	Phase 3	0,330
12th	0,033	0,005	Phase 3	0,153
13th	0,161	0,023	Phase 3	0,210
14th	0,037	0,005	Phase 3	0,131
15th	0,051	0,007	Phase 3	0,150
16th	0,047	0,007	Phase 3	0,115
17th	0,107	0,015	Phase 3	0,132
18th	0,061	0,009	Phase 3	0,102
19th	0,112	0,016	Phase 3	0,118
20th	0,054	0,008	Phase 3	0,092
21th	0,047	0,007	Phase 3	0,107
22th	0,037	0,005	Phase 3	0,084
23th	0,045	0,006	Phase 3	0,098
24th	0,026	0,004	Phase 3	0,077
25th	0,024	0,003	Phase 3	0,090
26th	0,020	0,003	Phase 3	0,071
27th	0,017	0,002	Phase 3	0,083
28th	0,017	0,002	Phase 3	0,066
29th	0,018	0,003	Phase 3	0,078
30th	0,014	0,002	Phase 3	0,061
31th	0,013	0,002	Phase 3	0,073
32th	0,013	0,002	Phase 3	0,058
33th	0,012	0,002	Phase 3	0,068
34th	0,011	0,002	Phase 3	0,054
35th	0,011	0,002	Phase 3	0,064
36th	0,011	0,001	Phase 3	0,051
37th	0,010	0,001	Phase 3	0,061
38th	0,010	0,001	Phase 3	0,048
39th	0,009	0,001	Phase 3	0,058
40th	0,009	0,001	Phase 3	0,046



**Appendix E Type Verification Test Report**

Extract from test report according to EN 50438

Nr. OMK-16FE1118FTSP

Power Quality. Harmonic current emission				
micro-generator		Omniksol-4k-TL2-TH		
Harmonic order n	Current Magnitude [A] at 100% rated output power	% of Fundamental	Phase	Harmonic current limit EN 61000-3-2, Class A [A]
1st	5,906	--	Phase 1	-
2nd	0,127	2,151	Phase 1	1,080
3rd	0,039	0,668	Phase 1	2,300
4th	0,055	0,935	Phase 1	0,430
5th	0,145	2,448	Phase 1	1,140
6th	0,015	0,260	Phase 1	0,300
7th	0,138	2,328	Phase 1	0,770
8th	0,028	0,474	Phase 1	0,230
9th	0,022	0,372	Phase 1	0,400
10th	0,027	0,462	Phase 1	0,184
11th	0,052	0,886	Phase 1	0,330
12th	0,007	0,112	Phase 1	0,153
13th	0,061	1,034	Phase 1	0,210
14th	0,022	0,370	Phase 1	0,131
15th	0,013	0,215	Phase 1	0,150
16th	0,021	0,363	Phase 1	0,115
17th	0,018	0,306	Phase 1	0,132
18th	0,012	0,208	Phase 1	0,102
19th	0,027	0,461	Phase 1	0,118
20th	0,009	0,156	Phase 1	0,092
21th	0,010	0,162	Phase 1	0,107
22th	0,009	0,145	Phase 1	0,084
23th	0,012	0,209	Phase 1	0,098
24th	0,007	0,126	Phase 1	0,077
25th	0,017	0,280	Phase 1	0,090
26th	0,007	0,117	Phase 1	0,071
27th	0,006	0,093	Phase 1	0,083
28th	0,005	0,091	Phase 1	0,066
29th	0,009	0,155	Phase 1	0,078
30th	0,005	0,082	Phase 1	0,061
31th	0,008	0,142	Phase 1	0,073
32th	0,005	0,086	Phase 1	0,058
33th	0,004	0,060	Phase 1	0,068
34th	0,004	0,066	Phase 1	0,054
35th	0,006	0,105	Phase 1	0,064
36th	0,003	0,052	Phase 1	0,051
37th	0,006	0,097	Phase 1	0,061
38th	0,003	0,053	Phase 1	0,048
39th	0,003	0,045	Phase 1	0,058
40th	0,003	0,044	Phase 1	0,046

**Appendix E Type Verification Test Report**

Extract from test report according to EN 50438

Nr. OMK-16FE1118FTSP

Power Quality. Harmonic current emission				
micro-generator		Omniksol-4k-TL2-TH		
Harmonic order n	Current Magnitude [A] at 100% rated output power	% of Fundamental	Phase	Harmonic current limit EN 61000-3-2, Class A [A]
1st	5,960	--	Phase 2	-
2nd	0,123	2,072	Phase 2	1,080
3rd	0,023	0,382	Phase 2	2,300
4th	0,051	0,860	Phase 2	0,430
5th	0,147	2,468	Phase 2	1,140
6th	0,024	0,394	Phase 2	0,300
7th	0,135	2,265	Phase 2	0,770
8th	0,012	0,208	Phase 2	0,230
9th	0,027	0,450	Phase 2	0,400
10th	0,027	0,451	Phase 2	0,184
11th	0,069	1,150	Phase 2	0,330
12th	0,012	0,196	Phase 2	0,153
13th	0,060	1,012	Phase 2	0,210
14th	0,022	0,377	Phase 2	0,131
15th	0,017	0,290	Phase 2	0,150
16th	0,022	0,375	Phase 2	0,115
17th	0,022	0,370	Phase 2	0,132
18th	0,015	0,246	Phase 2	0,102
19th	0,028	0,468	Phase 2	0,118
20th	0,016	0,275	Phase 2	0,092
21th	0,014	0,240	Phase 2	0,107
22th	0,015	0,248	Phase 2	0,084
23th	0,018	0,307	Phase 2	0,098
24th	0,011	0,190	Phase 2	0,077
25th	0,017	0,290	Phase 2	0,090
26th	0,011	0,184	Phase 2	0,071
27th	0,010	0,169	Phase 2	0,083
28th	0,009	0,146	Phase 2	0,066
29th	0,014	0,227	Phase 2	0,078
30th	0,008	0,138	Phase 2	0,061
31th	0,010	0,163	Phase 2	0,073
32th	0,008	0,128	Phase 2	0,058
33th	0,007	0,116	Phase 2	0,068
34th	0,006	0,098	Phase 2	0,054
35th	0,008	0,141	Phase 2	0,064
36th	0,006	0,093	Phase 2	0,051
37th	0,007	0,113	Phase 2	0,061
38th	0,005	0,087	Phase 2	0,048
39th	0,005	0,085	Phase 2	0,058
40th	0,005	0,082	Phase 2	0,046

**Appendix E Type Verification Test Report**

Extract from test report according to EN 50438

Nr. OMK-16FE1118FTSP

Power Quality. Harmonic current emission				
micro-generator		Omniksol-4k-TL2-TH		
Harmonic order n	Current Magnitude [A] at 100% rated output power	% of Fundamental	Phase	Harmonic current limit EN 61000-3-2, Class A [A]
1st	5,796	--	Phase 3	-
2nd	0,049	0,853	Phase 3	1,080
3rd	0,046	0,785	Phase 3	2,300
4th	0,046	0,801	Phase 3	0,430
5th	0,168	2,903	Phase 3	1,140
6th	0,020	0,350	Phase 3	0,300
7th	0,114	1,970	Phase 3	0,770
8th	0,025	0,428	Phase 3	0,230
9th	0,017	0,294	Phase 3	0,400
10th	0,018	0,306	Phase 3	0,184
11th	0,077	1,321	Phase 3	0,330
12th	0,013	0,222	Phase 3	0,153
13th	0,050	0,859	Phase 3	0,210
14th	0,024	0,416	Phase 3	0,131
15th	0,017	0,286	Phase 3	0,150
16th	0,016	0,277	Phase 3	0,115
17th	0,027	0,462	Phase 3	0,132
18th	0,015	0,267	Phase 3	0,102
19th	0,023	0,391	Phase 3	0,118
20th	0,018	0,305	Phase 3	0,092
21th	0,014	0,244	Phase 3	0,107
22th	0,015	0,252	Phase 3	0,084
23th	0,018	0,307	Phase 3	0,098
24th	0,012	0,211	Phase 3	0,077
25th	0,015	0,254	Phase 3	0,090
26th	0,011	0,185	Phase 3	0,071
27th	0,010	0,171	Phase 3	0,083
28th	0,010	0,166	Phase 3	0,066
29th	0,013	0,230	Phase 3	0,078
30th	0,008	0,144	Phase 3	0,061
31th	0,009	0,159	Phase 3	0,073
32th	0,007	0,125	Phase 3	0,058
33th	0,007	0,119	Phase 3	0,068
34th	0,007	0,113	Phase 3	0,054
35th	0,009	0,149	Phase 3	0,064
36th	0,006	0,099	Phase 3	0,051
37th	0,007	0,116	Phase 3	0,061
38th	0,005	0,089	Phase 3	0,048
39th	0,005	0,085	Phase 3	0,058
40th	0,005	0,084	Phase 3	0,046

**Appendix E Type Verification Test Report**

Extract from test report according to EN 50438

Nr. OMK-16FE1118FTSP

Voltage fluctuation and Flicker.					
	Maximum permissible flicker and voltage fluctuation as per EN 61000-3-3				
Value	Pst	Plt 2 hours	d(t) <sub>500ms</sub>	dc	dmax
Limit	1,0	0,65	3,3%	3,3%	4%
Test value Phase 1	0,07	0,07	0,00%	0,23%	0,28%
Test value Phase 2	0,08	0,08	0,00%	0,29%	0,37%
Test value Phase 3	0,08	0,08	0,00%	0,29%	0,37%

DC-Injection.				
Protection limit	Tested at four power levels, limit 0,5% of IAC <sub>nom</sub> (43mA)			
Output power	~20%	~50%	75%	~100%
Omnisol-6k-TL2-TH				
Max. test value (phase L1) [mA]	6,8	6,9	37,3	36,5
Max. test value (phase L2) [mA]	10,6	7,4	41,8	27,7
Max. test value (phase L3) [mA]	6,9	8,2	41,1	36,8

DC-Injection.				
Protection limit	Tested at four power levels, limit 0,5% of IAC <sub>nom</sub> (36mA)			
Output power	~20%	~50%	75%	~100%
Omnisol-5k-TL2-TH				
Max. test value (phase L1) [mA]	11,0	7,7	34,8	28,2
Max. test value (phase L2) [mA]	16,8	10,1	31,1	31,5
Max. test value (phase L3) [mA]	8,7	8,4	33,3	33,4

DC-Injection.				
Protection limit	Tested at four power levels, limit 0,5% of IAC <sub>nom</sub> (29mA)			
Output power	~20%	~50%	75%	~100%
Omnisol-4k-TL2-TH				
Max. test value (phase L1) [mA]	18,5	6,9	10,9	9,3
Max. test value (phase L2) [mA]	23,6	12,5	21,7	18,1
Max. test value (phase L3) [mA]	16,2	6,7	13,3	13,2