



**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-3k-TL2
Omniksol-4k-TL2
Omniksol-5k-TL2

Reglementair voorgeschreven gebruik:

Automatisch schakelstation met enkelfasige netwerkbewaking conform DIN V VDE V 0126-1-1:2006-02 (afwijkende grenswaarden voor Nederland op basis van EN 50438:2013, NEN-EN 50438:2013, Annex A*) voor fotovoltaïsche installaties met een enkelfasige parallelvoeding door middel van gelijkstroom-wisselstroommutator in het net van de openbare voorziening. Het automatische schakelstation vormt een integraal bestanddeel van de hoger vermelde transformatorloze gelijkstroom-wisselstroommutators. 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-17MA0334FTSP

Certificaatnummer: U17-0092

Datum: 2017-03-16



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-17MA0334FTSP

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

Manufacturer / applicant:	Omnik New Energy Co., Ltd. Xinghu Road No.218 bioBAY Park A4-314, 215123 Suzhou China		
Micro-generator Type	Grid-tied photovoltaic inverter		
Rated values	Omniksol-3k-TL2	Omniksol-4k-TL2	Omniksol-5k-TL2
Nominal rated capacity	3000 W	4000 W	4600 W
Maximum rated capacity	3300 VA	4400 VA	5000 VA
Rated voltage	220/230/240 Vac, 50/60Hz		
Firmware version	V1.0		
Measurement period:	2016-08-29 to 2016-09-08		

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. The power generation unit has no galvanic isolation between DC input and AC output. 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.

Omniksol-3k-TL2/Omniksol-4k-TL2/Omniksol-5k-TL2
block diagram

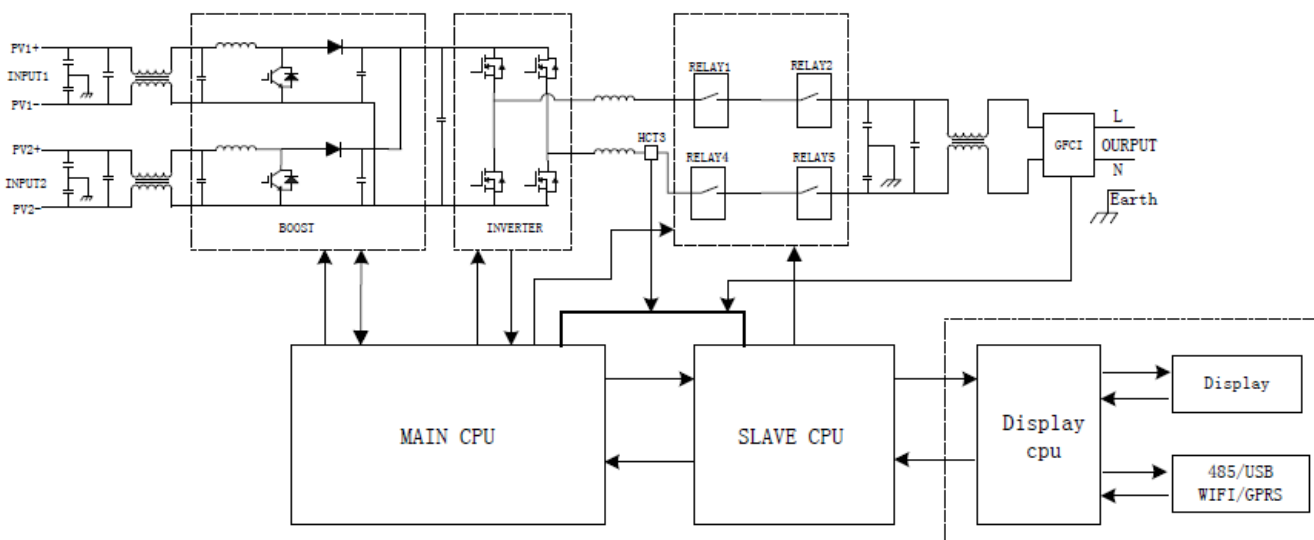


Figure 1 – Schematic structure of the power generation unit

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.

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Type testing of the interface protection

Over-/under-voltage tests

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	253,4	1,530
Under-voltage stage 1	184,0	2,0	184,0	2,0	184,6	1,540

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	50,98	1,530
Under-frequency	48,00	2,0	48,00	2,0	48,02	1,530

LoM test

Method used	EN 62116					
Balancing load on islanded network	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]	84,0	77,0	102,0	77,0	78,0	102,0
Indicate additional shut down time included in above results. (Integrated interface switch)				Type of switching equipment 1: Relay Type of switching equipment 2: Relay		

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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	196,9	47,5	4579,4	0,9991
2	253,0	51,5	4629,4	0,9994

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]:	4617	4616	4614
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
1. Measurement a) to g): Active power output > 80% P_n							
Frequency [Hz]:	50,00	50,25	50,70	51,15	50,70	50,25	50,00
PM [kW]:	N/A	3,98	3,25	2,52	3,25	3,98	N/A
PE60 [kW]:	4,06	3,99	3,23	2,52	3,24	3,92	4,05
ΔPE60/PM [%]:	N/A	0,22	0,43	0,00	0,22	1,30	N/A
2. Measurement a) to g): Active power output 40% and 60% after freezing > 80% P_n							
Frequency [Hz]:	50,00	50,25	50,70	51,15	50,70	50,25	50,00
PM [kW]:	N/A	2,36	1,93	1,49	1,93	2,46	N/A
PE60 [kW]:	2,41	2,37	1,98	1,56	1,97	2,37	2,40
ΔPE60/PM [%]:	N/A	0,22	1,09	1,52	0,87	-1,96	N/A
Limit ΔP/P _{1min} :	+ 10 % of P _M						

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Reactive power			
Uncontrollable reactive power			
Omniksol-5k-TL2			
Test Voltage	211,6V	230V	248,4V
Output power			
25% PN	0,9971	0,9966	0,9943
50% PN	0,9990	0,9990	0,9985
75% PN	0,9993	0,9993	0,9991
100% PN	0,9992	0,9992	0,9992
Limit	>0,95	>0,95	>0,95
Omniksol-4k-TL2			
Test Voltage	211,6V	230V	248,4V
Output power			
25% PN	0,9962	0,9953	0,9931
50% PN	0,9988	0,9987	0,9982
75% PN	0,9993	0,9993	0,9990
100% PN	0,9993	0,9992	0,9991
Limit	>0,95	>0,95	>0,95
Omniksol-3k-TL2			
Test Voltage	211,6V	230V	248,4V
Output power			
25% PN	0,9935	0,9915	0,9815
50% PN	0,9982	0,9980	0,9970
75% PN	0,9990	0,9990	0,9985
100% PN	0,9993	0,9993	0,9990
Limit	>0,95	>0,95	>0,95

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Controllable reactive power				
Inductive (supply reactive power)				
Power-BIN	Active power [W]	Reactive power [Var]	Power factor (cos φ)	AC voltage [V]
0% - 10%	448,6	163,9	0,939	229,26
10% - 20%	929,0	164,7	0,939	229,27
20% - 30%	1403,1	349,3	0,936	229,32
30% - 40%	1871,4	500,4	0,942	229,30
40% - 50%	2340,9	648,7	0,945	229,25
50% - 60%	2803,8	950,5	0,947	229,26
60% - 70%	3262,6	1159,2	0,945	229,20
70% - 80%	3715,5	1109,6	0,947	229,221
80% - 90%	4168,4	1290,1	0,945	229,22
90% - 100%	4611,6	1431,7	0,946	229,26
Capacitive (supply reactive power)				
Power-BIN	Active power [W]	Reactive power [Var]	Power factor (cos φ)	AC voltage [V]
0% - 10%	442,0	165,8	0,936	229,62
10% - 20%	920,2	163,0	0,937	229,46
20% - 30%	1396,1	345,8	0,937	229,31
30% - 40%	1867,1	512,7	0,940	229,20
40% - 50%	2337,8	831,9	0,942	229,08
50% - 60%	2798,0	818,9	0,944	229,08
60% - 70%	3257,1	1007,2	0,941	229,05
70% - 80%	3713,3	1152,5	0,943	229,05
80% - 90%	4163,5	1267,2	0,947	229,07
90% - 100%	4607,6	1469,0	0,943	229,50
Reactive power supply with set point Q=0				
Power-BIN	Active power [W]	Reactive power [Var]	Power factor (cos φ)	AC voltage [V]
0% - 10%	441,8	138,1	0,954	229,88
10% - 20%	429,9	129,8	0,957	229,95
20% - 30%	914,5	150,2	0,987	229,95
30% - 40%	1386,4	164,2	0,993	229,93
40% - 50%	1849,8	168,6	0,996	229,96
50% - 60%	2317,9	186,3	0,997	229,97
60% - 70%	2787,9	219,9	0,997	229,96
70% - 80%	3224,4	221,5	0,998	229,94
80% - 90%	4136,2	259,0	0,998	229,96
90% - 100%	4587,0	285,3	0,998	229,98

Q adjustment				
	Reactive power set point Q [Var]	Measured reactive power Q [Var]	Measured cos φ	Deviation compared to setpoint $\Delta Q / P_N$ [%]
- Qmin	-2,300	-2,294	0,9965	0,13
0	0	0,202	0,9985	4,39
+ Qmax	2,300	2397	0,9954	2,11

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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:	48,00
	Max. frequency for connection to grid:	50,15
	Observation time ($\geq 60s$)	60
Test		
Voltage conditions		
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]	79	79
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]	86	86
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.	
Frequency conditions		
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]	79,5	79,5
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.	

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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]	85,5	85,5
Limit:	Reconnection after setting observation time (≥ 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	235	20,5
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	30,8 ms	

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Power Quality. Harmonic current emission				
micro-generator		Omniksol-3k-TL2		
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	13,104		Phase 1	-
2nd	0,021	0,157	Phase 1	1,080
3rd	0,024	0,180	Phase 1	2,300
4th	0,017	0,129	Phase 1	0,430
5th	0,073	0,553	Phase 1	1,140
6th	0,011	0,087	Phase 1	0,300
7th	0,023	0,173	Phase 1	0,770
8th	0,008	0,064	Phase 1	0,230
9th	0,008	0,062	Phase 1	0,400
10th	0,007	0,053	Phase 1	0,184
11th	0,018	0,136	Phase 1	0,330
12th	0,010	0,077	Phase 1	0,153
13th	0,010	0,076	Phase 1	0,210
14th	0,013	0,098	Phase 1	0,131
15th	0,018	0,137	Phase 1	0,150
16th	0,010	0,073	Phase 1	0,115
17th	0,008	0,064	Phase 1	0,132
18th	0,011	0,084	Phase 1	0,102
19th	0,013	0,096	Phase 1	0,118
20th	0,005	0,036	Phase 1	0,092
21th	0,005	0,040	Phase 1	0,107
22th	0,007	0,056	Phase 1	0,084
23th	0,011	0,083	Phase 1	0,098
24th	0,006	0,049	Phase 1	0,077
25th	0,006	0,048	Phase 1	0,090
26th	0,006	0,042	Phase 1	0,071
27th	0,006	0,043	Phase 1	0,083
28th	0,006	0,045	Phase 1	0,066
29th	0,005	0,035	Phase 1	0,078
30th	0,004	0,030	Phase 1	0,061
31th	0,006	0,044	Phase 1	0,073
32th	0,004	0,028	Phase 1	0,058
33th	0,003	0,027	Phase 1	0,068
34th	0,003	0,026	Phase 1	0,054
35th	0,005	0,042	Phase 1	0,064
36th	0,003	0,024	Phase 1	0,051
37th	0,004	0,032	Phase 1	0,061
38th	0,004	0,029	Phase 1	0,048
39th	0,004	0,030	Phase 1	0,058
40th	0,003	0,027	Phase 1	0,046

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Power Quality. Harmonic current emission					
micro-generator		Omniksol-4k-TL2			
Harmonic order n	Current Magnitude [A] at 100% rated output power	% of Fundamental	Phase	Harmonic current limit EN61000-3-12 [%]	
				1 phase	3 phase
1st	17,308		Phase 1	-	-
2nd	0,020	0,152	Phase 1	8	8
3rd	0,059	0,446	Phase 1	21,6	N/A
4th	0,010	0,077	Phase 1	4	4
5th	0,125	0,943	Phase 1	10,7	10,7
6th	0,018	0,136	Phase 1	2,67	2,67
7th	0,039	0,294	Phase 1	7,2	7,2
8th	0,015	0,114	Phase 1	2	2
9th	0,008	0,060	Phase 1	3,8	N/A
10th	0,012	0,093	Phase 1	1,6	1,6
11th	0,016	0,122	Phase 1	3,1	3,1
12th	0,016	0,122	Phase 1	1,33	1,33
13th	0,022	0,163	Phase 1	2	2
14th	0,011	0,085	Phase 1	N/A	N/A
15th	0,009	0,068	Phase 1	N/A	N/A
16th	0,005	0,036	Phase 1	N/A	N/A
17th	0,018	0,134	Phase 1	N/A	N/A
18th	0,011	0,079	Phase 1	N/A	N/A
19th	0,011	0,086	Phase 1	N/A	N/A
20th	0,009	0,067	Phase 1	N/A	N/A
21th	0,011	0,079	Phase 1	N/A	N/A
22th	0,005	0,037	Phase 1	N/A	N/A
23th	0,012	0,086	Phase 1	N/A	N/A
24th	0,011	0,084	Phase 1	N/A	N/A
25th	0,009	0,068	Phase 1	N/A	N/A
26th	0,010	0,077	Phase 1	N/A	N/A
27th	0,008	0,057	Phase 1	N/A	N/A
28th	0,004	0,027	Phase 1	N/A	N/A
29th	0,013	0,097	Phase 1	N/A	N/A
30th	0,006	0,042	Phase 1	N/A	N/A
31th	0,008	0,064	Phase 1	N/A	N/A
32th	0,006	0,043	Phase 1	N/A	N/A
33th	0,011	0,083	Phase 1	N/A	N/A
34th	0,004	0,032	Phase 1	N/A	N/A
35th	0,008	0,064	Phase 1	N/A	N/A
36th	0,004	0,033	Phase 1	N/A	N/A
37th	0,011	0,079	Phase 1	N/A	N/A
38th	0,005	0,038	Phase 1	N/A	N/A
39th	0,009	0,071	Phase 1	N/A	N/A
40th	0,004	0,033	Phase 1	N/A	N/A

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Power Quality. Harmonic current emission					
micro-generator		Omniksol-5k-TL2			
Harmonic order n	Current Magnitude [A] at 100% rated output power	% of Fundamental	Phase	Harmonic current limit EN61000-3-12 [%]	
				1 phase	3 phase
1st	19,905		Phase 1	-	-
2nd	0,027	0,137	Phase 1	8	8
3rd	0,100	0,500	Phase 1	21,6	N/A
4th	0,007	0,033	Phase 1	4	4
5th	0,160	0,803	Phase 1	10,7	10,7
6th	0,013	0,067	Phase 1	2,67	2,67
7th	0,045	0,226	Phase 1	7,2	7,2
8th	0,007	0,037	Phase 1	2	2
9th	0,019	0,096	Phase 1	3,8	N/A
10th	0,012	0,063	Phase 1	1,6	1,6
11th	0,027	0,134	Phase 1	3,1	3,1
12th	0,018	0,090	Phase 1	1,33	1,33
13th	0,016	0,079	Phase 1	2	2
14th	0,014	0,070	Phase 1	N/A	N/A
15th	0,015	0,077	Phase 1	N/A	N/A
16th	0,008	0,038	Phase 1	N/A	N/A
17th	0,020	0,099	Phase 1	N/A	N/A
18th	0,010	0,049	Phase 1	N/A	N/A
19th	0,008	0,041	Phase 1	N/A	N/A
20th	0,007	0,033	Phase 1	N/A	N/A
21th	0,016	0,080	Phase 1	N/A	N/A
22th	0,009	0,046	Phase 1	N/A	N/A
23th	0,015	0,074	Phase 1	N/A	N/A
24th	0,004	0,021	Phase 1	N/A	N/A
25th	0,010	0,050	Phase 1	N/A	N/A
26th	0,011	0,056	Phase 1	N/A	N/A
27th	0,010	0,050	Phase 1	N/A	N/A
28th	0,009	0,045	Phase 1	N/A	N/A
29th	0,014	0,070	Phase 1	N/A	N/A
30th	0,004	0,020	Phase 1	N/A	N/A
31th	0,010	0,052	Phase 1	N/A	N/A
32th	0,005	0,025	Phase 1	N/A	N/A
33th	0,012	0,059	Phase 1	N/A	N/A
34th	0,007	0,033	Phase 1	N/A	N/A
35th	0,009	0,046	Phase 1	N/A	N/A
36th	0,004	0,021	Phase 1	N/A	N/A
37th	0,012	0,061	Phase 1	N/A	N/A
38th	0,004	0,021	Phase 1	N/A	N/A
39th	0,009	0,044	Phase 1	N/A	N/A
40th	0,005	0,025	Phase 1	N/A	N/A

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Voltage fluctuation and Flicker.					
	Maximum permissible flicker and voltage fluctuation as per EN 61000-3-3/-3-11				
Value	Pst	Plt 2 hours	d(t) _{500ms}	dc	dmax
Limit	1,0	0,65	3,3%	3,3%	4%
Test value	0,19	0,17	0,00%	0,83%	0,97

DC-Injection.				
Protection limit Omniksol-3k-TL2	Tested at four power levels, limit 0,5% of IAC _{nom} (65mA)			
Output power	~20%	~50%	75%	~100%
Max. test value (phase L1) [mA]	25,9	55,8	60,1	60,6
Protection limit Omniksol-4k-TL2	Tested at four power levels, limit 0,5% of IAC _{nom} (87mA)			
Output power	~20%	~50%	75%	~100%
Max. test value (phase L1) [mA]	63,8	77,4	82,5	79,3
Protection limit Omniksol-5k-TL2	Tested at four power levels, limit 0,5% of IAC _{nom} (100mA)			
Output power	~20%	~50%	75%	~100%
Max. test value (phase L1) [mA]	36,5	83,4	69,0	16,3