



**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-M300 met Omnik-MG (M-Gate / Safety box)  
Omniksol-M600 met Omnik-MG (M-Gate / Safety box)

## Reglementair voorgeschreven gebruik:

Automatisch schakelstation met enkelfasige netwerkbewaking conform EN 50438 (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:** ZEM15DE0957FTSP-EN50438  
**Certificaatnummer:** U16-0179  
**Datum:** 2016-03-29



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

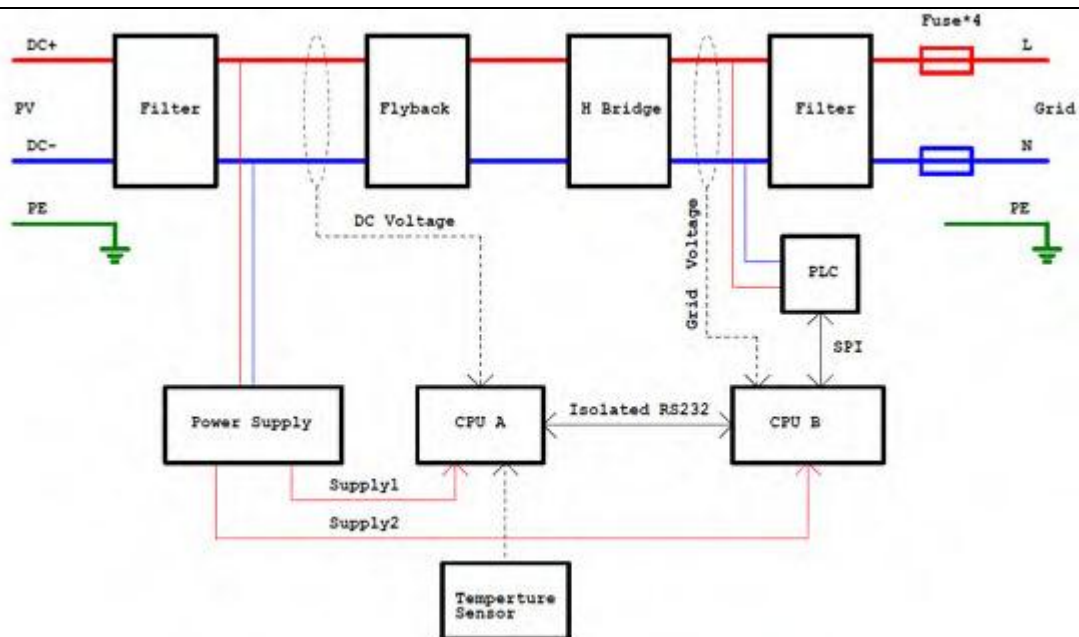
Nr. ZEM15DE0957FTSP

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 with external grid connection		
<b>Rated values:</b>	Omniksol-M300 (PV Micro-inverter)	Omniksol-M600 (PV Micro-inverter)	Omnik-MG(M-Gate) (Safety box)
<b>Maximum rated capacity:</b>	250 W	500W	3680W
<b>Rated voltage:</b>	230 Vac, 50Hz		230 Vac, 47,5Hz-51,5Hz
<b>Firmware version:</b>	Omniksol-M600:	140120141020	
	Omniksol-M300:	130120140505	
	Safety Box:	13022014070	
<b>Measurement period:</b>	2015-12-27 to 2016-01-26		
<b>Description of the structure of the power generation unit:</b>			
<p>The PV Micro-inverter converts DC voltage into AC voltage. The output is protected by Varistors to Earth. The units are providing EMC filtering at the input and output toward mains. The Micro-inverter does provide galvanic separation from input to output (transformer). The output is switched off redundant by the high power switching bridge and the external disconnection device.</p> <p>The unit provides two control MCUs. Two independent MCUs (Main MCU: U400 in Model Omniksol-M300 and U500 in Model Omniksol-M600; Slave MCU: U300 in Safety Box (M-Gate)) check the AC current, DC-injection and AC voltage in parallel with frequency. Main MCU controls the inverter bridge switch; each phase relay is controlled by slave MCU. There are two check points which one is safety Box self-checks the parameters above first, the other one is PV Micro-Inverter self-checks the parameters PV panel input voltage, input current, AC voltage with frequency before each start up.</p> <p>All CPUs monitor signals and analyze the data of the voltage and frequency along with resistors in serial which are connected directly to line/neutral respectively.</p> <p>The PV Micro-inverter is not provided with residual current monitoring device and it is intended to be installed conjunction with M-Gate and it has the internal integrate RCD, and also can monitoring the gird voltage, AC current and anti-islanding, located between the inverter and the mains in the end-use application.</p> <p>The M-Gate provides two relay in each phase. The relays are tested before every unit start-up. Main MCU controls the inverter bridge switch in the micro PV Inverter; relays are controlled by slave MCU in the safety Box.</p> <p>The maximum parallel combination of PV micro inverter (model: Omniksol-M300) per branch circuit connected to one M-Gate is 15 pieces and the max output power is 3,68 kVA.</p> <p>The maximum parallel combination of PV micro inverter (model: Omniksol-M600) per branch circuit connected to one M-Gate is 7 pieces and the max output power is 3,68 kVA.</p>			

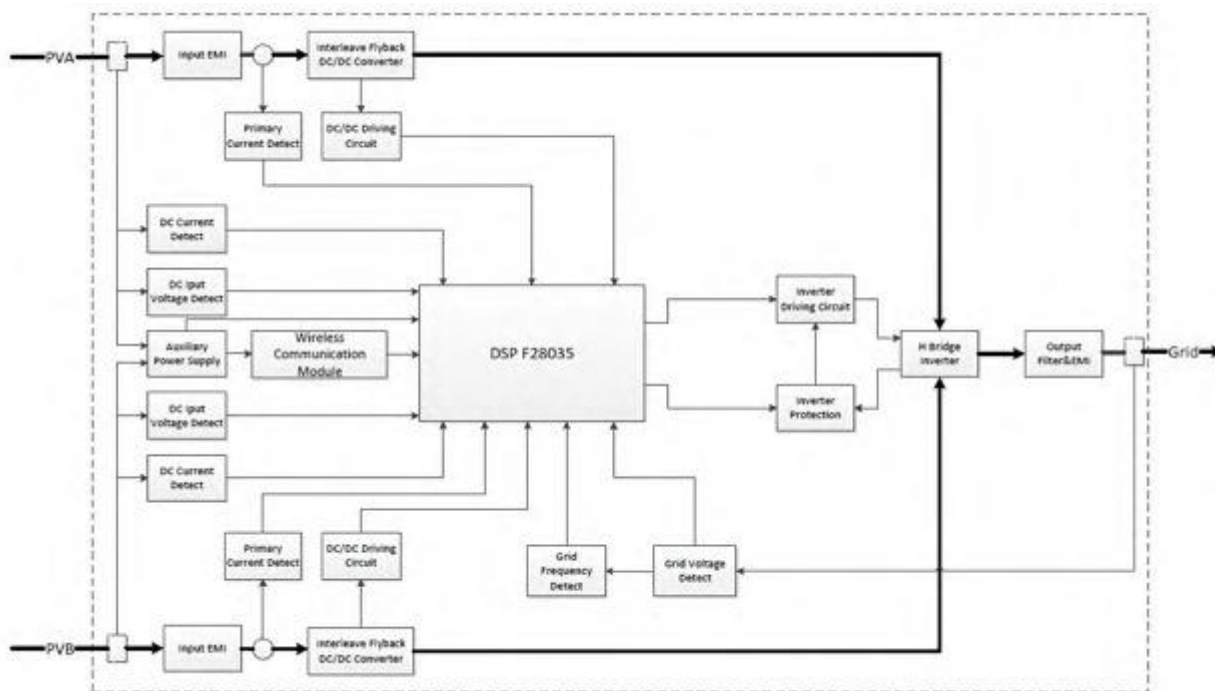
Appendix E Type Verification Test Report

Extract from test report according to EN 50438

Nr. ZEM15DE0957FTSP



Schematic structure of the power generation unit Omnisol-M300

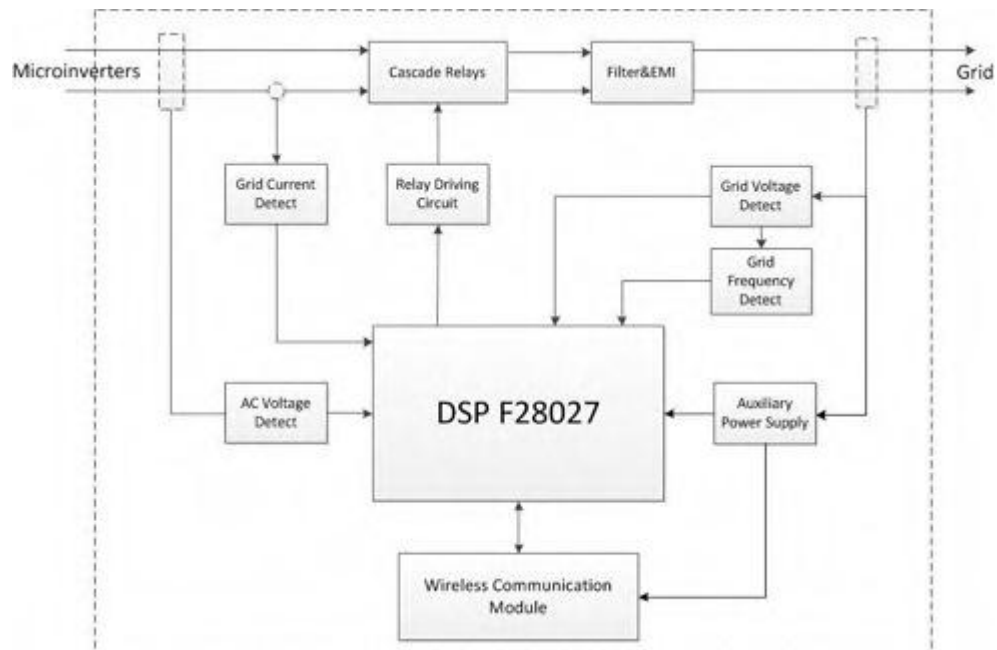


Schematic structure of the power generation unit Omnisol-M600

Appendix E Type Verification Test Report

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Nr. ZEM15DE0957FTSP



Schematic structure of the power generation unit Omnik-MG(M-Gate)

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. ZEM15DE0957FTSP

**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	2	253	2	253,3	1,634
Under-voltage stage 1	184	2	184	2	183,2	1,630
Note.						

**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	51,0	2,0	51,0	2,0	51,0	1,635
Under-frequency	48,0	2,0	48,0	2,0	48,0	1,634
Note.						

**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	784ms	552ms	600ms	592ms	572ms	556ms
Indicate additional shut down time included in above results. (Integrated interface switch)				Type of switching equipment 1: Panasonic Relay ALF2PF12 with 20ms Type of switching equipment 2: Panasonic Relay ALF2PF12 with 20ms		

**Appendix E Type Verification Test Report**

Extract from test report according to EN 50438

Nr. ZEM15DE0957FTSP

**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				
Omniksol-M600				
Test sequence	Voltage [V]	Frequency [Hz]	Output power [W]	Cos φ [1]
1	195,9	47,5	500,5	0,996
2	253,4	51,5	504,0	0,994
Omniksol-M300				
Test sequence	Voltage [V]	Frequency [Hz]	Output power [W]	Cos φ [1]
1	195,5	47,5	249	0,998
2	253,4	51,5	250	0,995

Active power at under-frequency			
Omniksol-M600			
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]:	501,0	500,5	500,5
ΔP/PM [%] per 1 Hz:			0
Omniksol-M300			
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]:	250	250	250
ΔP/PM [%] per 1 Hz:			0

**Appendix E Type Verification Test Report**

Extract from test report according to EN 50438

Nr. ZEM15DE0957FTSP

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	50,15	50,70	50,25	50,00
PM [kW]:	N/A	500,4	410,2	319,1	409,7	500,8	N/A
PE60 [kW]:	505,6	504,0	412,4	319,6	412,8	503,9	505,3
ΔPE60/PM [%]:	N/A	+0,72	+0,44	+0,10	+0,62	+0,62	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	50,15	50,70	50,25	50,00
PM [kW]:	N/A	247,4	202,5	157,3	202,3	248,0	N/A
PE60 [kW]:	251,3	250,7	203,8	156,8	204,0	250,2	251,5
ΔPE60/PM [%]:	N/A	+1,32	+0,52	-0,20	+0,68	+0,88	N/A
Limit ΔP/P1min:	+ 10 % of P <sub>M</sub>						

Reactive power				
Uncontrollable reactive power				
Omniksol-M600				
Test Voltage	211,6V	230V	248,4V	
Output power				
25% PN	0,9775	0,9725	0,9657	
50% PN	0,9913	0,9895	0,9872	
75% PN	0,9939	0,9926	0,9923	
100% PN	0,9959	0,9952	0,9940	
Limit	>0,95	>0,95	>0,95	
Omniksol-M300				
Test Voltage	211,6V	230V	248,4V	
Output power				
25% PN	0,9753	0,9648	0,9566	
50% PN	0,9919	0,9897	0,9856	
75% PN	0,9954	0,9941	0,9927	
100% PN	0,9970	0,9968	0,9959	
Limit	>0,95	>0,95	>0,95	



**Appendix E Type Verification Test Report**

Extract from test report according to EN 50438

Nr. ZEM15DE0957FTSP

Connection and starting to generate electrical power		
	Voltage conditions	
<b>a) Start up for voltage range</b>	<b>&lt;84% Un for twice of observation time</b>	<b>&gt;111% Un for twice of observation time</b>
<b>Connection:</b>	No connection	No connection
<b>Limit:</b>	No connection allowed	
<b>b) In voltage range at start-up</b>	<b>≥84% Un within twice setting observation time</b>	<b>≤111% Un within twice setting observation time</b>
<b>Reconnection time [s]</b>	64	65
<b>Limit:</b>	Connected after setting observation time (≥60s)	
<b>Gradient:</b>	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.	
<b>c) In voltage range after voltage failure</b>	<b>≥84% Un for twice of setting observation time</b>	<b>≤111% Un for twice of setting observation time</b>
<b>Reconnection time [s]</b>	63	66
<b>Limit:</b>	Reconnection after setting observation time (≥60s)	
<b>Gradient:</b>	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.	
	Frequency conditions	
<b>d) Start up for frequency range</b>	<b>&lt;47,95 Hz for twice of setting observation time</b>	<b>&gt;50,15 Hz for twice of setting observation time</b>
<b>Connection:</b>	No connection	No connection
<b>Limit:</b>	No connection allowed	
<b>e) In frequency range at start-up</b>	<b>≥47,95 Hz within twice of setting observation time</b>	<b>≤51,15 Hz within twice of setting observation time</b>
<b>Reconnection time [s]</b>	65	66
<b>Limit:</b>	Connected after setting delay time(≥60s)	
<b>Gradient:</b>	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.	
<b>f) In frequency range after frequency failure</b>	<b>≥47,95 Hz for twice of setting observation time</b>	<b>≤51,15 Hz for twice of setting observation time</b>
<b>Reconnection time [s]</b>	64	65
<b>Limit:</b>	Reconnection after setting observation time (≥60s)	
<b>Gradient:</b>	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.	



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Extract from test report according to EN 50438

Nr. ZEM15DE0957FTSP

Short-circuit current contribution					
Short-circuit current parameters					
Omniksol-M600					
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	29,42	1,22
Initial Value of aperiodic current	A	N/A	100ms	29,32	0,674
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	0,12	In seconds
Omniksol-M300					
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	30,07	0,595
Initial Value of aperiodic current	A	N/A	100ms	29,84	0,574
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	0,07	In seconds

**Appendix E Type Verification Test Report**

Extract from test report according to EN 50438

Nr. ZEM15DE0957FTSP

Power Quality. Harmonic current emission								
micro-generator				Omniksol-M600				
Maximum permissible harmonic current as per EN 61000-3-2 Class A								
Harmonics	2 <sup>nd</sup>	3 <sup>rd</sup>	5 <sup>th</sup>	7 <sup>th</sup>	9 <sup>th</sup>	11 <sup>th</sup>	13 <sup>th</sup>	15 th ≤ n ≤ 39 th
Limit [A]	1,08	2,3	1,14	0,77	0,4	0,33	0,21	0,15 * (15/n)
Test value [A]	0,014	0,011	0,026	0,007	0,008	0,007	0,003	0,003*
	THD				PWHD			
Limit [%] single-phase	23				23			
Test value [%]	0,66				0,93			
micro-generator				Omniksol-M300				
Maximum permissible harmonic current as per EN 61000-3-2 Class A								
Harmonics	2 <sup>nd</sup>	3 <sup>rd</sup>	5 <sup>th</sup>	7 <sup>th</sup>	9 <sup>th</sup>	11 <sup>th</sup>	13 <sup>th</sup>	15 th ≤ n ≤ 39 th
Limit [A]	1,08	2,3	1,14	0,77	0,4	0,33	0,21	0,15 * (15/n)
Test value [A]	0,014	0,011	0,026	0,007	0,008	0,007	0,003	0,003*
	THD				PWHD			
Limit [%] single-phase	23				23			
Test value [%]	0,66				0,93			
<b>Note:</b>								
The tests should be based on the limits of the EN 61000-3-2 for less than 16A.								
*is the 15th value.								

**Appendix E Type Verification Test Report**

Extract from test report according to EN 50438

Nr. ZEM15DE0957FTSP

Voltage fluctuation and Flicker.					
<b>Omniksol-M600</b>					
	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	0,17	0,07	0,0%	0,0%	0,19%
<b>Omniksol-M300</b>					
	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	0,06	0,03	0,0%	0,0%	0,0%

DC-Injection.				
<b>Omniksol-M600</b>				
Protection limit	Tested at four power levels limit 0,5% of IAC <sub>nom</sub>			
Output power	~20%	~50%	75%	~100%
Max. test value (phase L1) [mA]	-2	-4	-6	-6
<b>Omniksol-M300</b>				
Protection limit	Tested at four power levels limit 0,5% of IAC <sub>nom</sub>			
Output power	~20%	~50%	75%	~100%
Max. test value (phase L1) [mA]	-2	-1	-1	-1