Certificado de conformidade

Requerente: **Sungrow Power Supply Co., Ltd.**
No. 1699 Xiyou Rd., New & High Technology
Industrial Development Zone, Heifei, Anhui,
P. R. China

Produto: **Microgerador em paralelo com redes de distribuição pública de baixa tensão**

Modelo: **SG80KTL**
SG80KTL-20

Utilização de acordo com os regulamentos:

Dispositivo de desconexão automática com monitorização da rede trifásica para sistemas fotovoltaicos com um circuito paralelo trifásico através de um inversor na alimentação pela rede pública. O dispositivo de desconexão automática é parte integrante do inversor anteriormente mencionado.

Regras e normas aplicadas:

EN 50438:2013 / PN EN 50438:2015
Requisitos para as instalações de microprodução destinadas a serem ligadas em paralelo com as redes públicas de distribuição de baixa tensão

EN 50438:2013 / PN EN 50438:2015 com as definições de protecção de interface padrão para Portugal. As unidades são projetadas para uma corrente máxima >16 A por fase, mas todos os requisitos básicos da norma estão cumpridos.
Limites básicos:
sobretensão 264,5 V
subtensão 195,5 V
sobrefrequência 52,0 Hz
subfrequência 47,5 Hz

Aquando da emissão deste certificado, o conceito de protecção de interface de um produto representativo anteriormente mencionado corresponde a especificações de segurança válidas para a utilização especificada, de acordo com os regulamentos. Os testes e certificação foram realizados de acordo com a norma ISO / IEC sistema 5 – Guia 67:2004.

Número de relatório: **SGR-18OC1058FCSHP**
Número de certificado: **U18-0587**
Data de emissão: **2018-10-26** **Válido até:** **2023-10-25**

Órgão de certificação

Holger Schaffer
Órgão de certificação da Bureau Veritas Consumer Products Services Germany GmbH
Acreditado nos termos da norma DIN EN ISO/IEC 17065

DAkkS Deutsche Akkreditierungsstelle D-ZE-12024-01-00

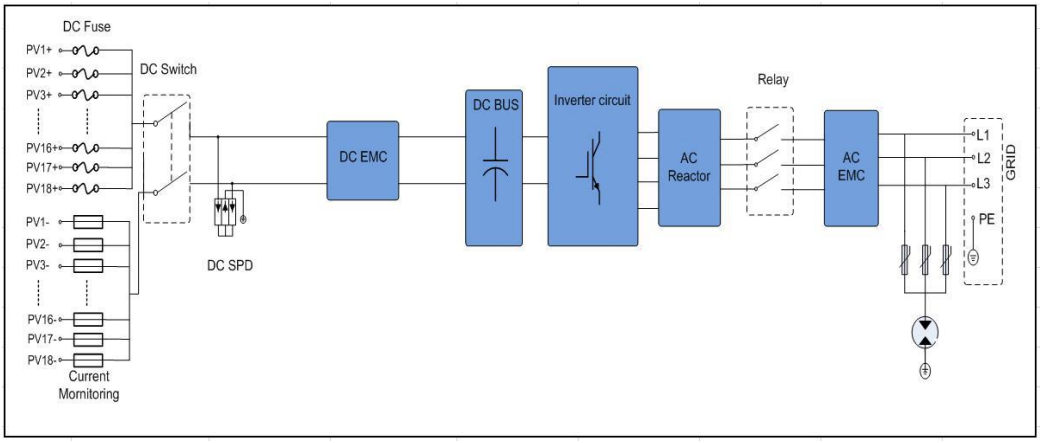
Appendix E Type Verification Test Report	
Extract from test report according to EN 50438	**Nr. SGR-18OC1058FCSHP**

Type Approval and declaration of compliance with the requirements of EN 50438.	
Manufacturer / applicant:	Sungrow Power Supply Co., Ltd. No. 1699 Xiyou Rd., New & High Technology Industrial Development Zone, Heifei, Anhui, P. R. China
Micro-generator Type	**Grid-tied photovoltaic inverter**
Rated values	SG80KTL SG80KTL-20
Maximum rated capacity	80 kW
Rated voltage	3/PE AC 400V
Firmware version	DSP_SG80KTL_V11_A LCD_SG80KTL_V03_A_M
Measurement period:	2018-07-26 to 2018-09-05

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.

SG80KTL



SG80KTL-20

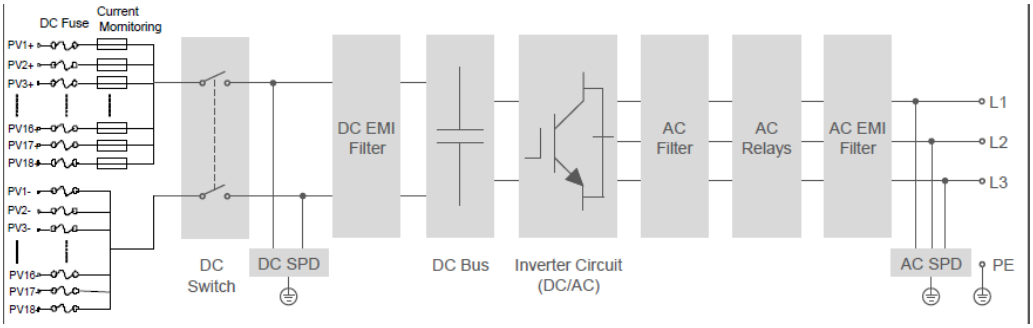


Figure 1 – Schematic structure of the power generation unit

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. SGR-18OC1058FCSHP**

Type testing of the interface protection

Over-/under-voltage tests

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	3 / 600*	253,0	3 / 600*	252,8	2,068 / 598,1*
Over-voltage stage 2	264,5	0,2	264,5	0,2	264,6	0,150
Under-voltage stage 1	195,5	1,5	195,5	1,5	195,8	1,375

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	3 / 600*	253,0	3 / 600*	252,8	2,084 / 599,1*
Over-voltage stage 2	264,5	0,2	264,5	0,2	264,6	0,136
Under-voltage stage 1	195,5	1,5	195,5	1,5	195,8	1,377

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	3 / 600*	253,0	3 / 600*	252,8	2,076 / 599,1*
Over-voltage stage 2	264,5	0,2	264,5	0,2	264,6	0,145
Under-voltage stage 1	195,5	1,5	195,5	1,5	195,8	1,359

Note.
Minimum operation time according to default interface protection:
Over-voltage stage 1 -
Over-voltage stage 2 0,1s
Under-voltage 1,2s

* The over-voltage-stage 1 is a 10-min-mean-value according to EN 50160. The disconnection after detection of an overvoltage at the 10-min-mean-value takes place within 200ms.

Appendix E Type Verification Test Report

Extract from test report according to EN 50438 **Nr. SGR-18OC1058FCSHP**

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	52,0	0,5	52,0	0,5	52,00	0,363
Under-frequency	47,5	0,5	47,5	0,5	47,50	0,391

Note.
Minimum operation time according to default interface protection:
Over-frequency 0,5 s
Under-frequency 0,5 s

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]	138,5	170,0	287,5	140,5	141,0	303,5
Trip time. Phase 2 fuse removed [ms]	138,5	170,0	287,5	140,5	141,0	303,5
Trip time. Phase 3 fuse removed [ms]	138,5	170,0	287,5	140,5	141,0	303,5

Appendix E Type Verification Test Report	
Extract from test report according to EN 50438	**Nr. SGR-18OC1058FCSHP**

Type testing of a micro-generator

Operating range

Model: SG80KTL

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	198,7	47,5	69,375	0,9918
2	248,7	51,1	80,129	0,9926

Active power at under-frequency

Model: SG80KTL

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	49,5	47,5
Active power [kW]:	80,424	80,433	80,101
ΔP/PM [%] per 1 Hz:			0,05

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% Pn							
Frequency [Hz]:	50,00	50,25	50,70	51,15	50,70	50,25	50,00
PM [kW]:	N/A	78,4	64,0	49,6	64,0	78,4	N/A
PE60 [kW]:	80,07	77,46	63,30	49,32	63,31	77,40	80,08
ΔPE60/PM [%]:	N/A	1,18	0,88	0,35	0,86	1,25	N/A
2. Measurement a) to g): Active power output 40% and 60% after freezing > 80% Pn							
Frequency [Hz]:	50,00	50,25	50,70	51,15	50,70	50,25	50,00
PM [kW]:	N/A	39,2	32,0	24,8	32,0	39,2	N/A
PE60 [kW]:	39,87	37,96	31,95	24,66	31,76	37,97	39,94
ΔPE60/PM [%]:	N/A	3,10	0,13	0,35	0,60	3,08	N/A
Limit ΔP/P1min:	+ 10 % of P_M						

Reactive power

Uncontrollable reactive power

Model: SG80KTL

Test Voltage / Output power	211,6V	230V	248,4V
25% PN	0,9853	0,9792	0,9726
50% PN	0,9962	0,9943	0,9924
75% PN	0,9982	0,9976	0,9969
100% PN	0,9988	0,9987	0,9983
Limit	**>0,95**	**>0,95**	**>0,95**

Appendix E Type Verification Test Report

Extract from test report according to EN 50438 **Nr. SGR-18OC1058FCSHP**

Controllable reactive power				
Inductive (supply reactive power)				
Model: SG80KTL				
Power-BIN	**Active power [kW]**	**Reactive power [kVar]**	**Power factor (cos φ)**	**AC voltage [V]**
0% - 10%	3,826	-4,505	0,6464	230,48
10% - 20%	11,776	-7,279	0,8505	230,48
20% - 30%	20,091	-10,254	0,8907	230,65
30% - 40%	28,295	-14,339	0,8920	230,54
40% - 50%	36,259	-18,335	0,8924	230,70
50% - 60%	44,025	-22,232	0,8926	230,64
60% - 70%	51,975	-26,021	0,8942	230,62
70% - 80%	59,924	-29,824	0,8952	230,69
80% - 90%	67,939	-33,665	0,8960	230,67
90% - 100%	71,988	-35,611	0,8963	230,70
Capacitive (supply reactive power)				
Power-BIN	**Active power [kW]**	**Reactive power [kVar]**	**Power factor (cos φ)**	**AC voltage [V]**
0% - 10%	3,836	4,345	0,6609	230,57
10% - 20%	11,785	7,239	0,8519	230,55
20% - 30%	20,120	10,274	0,8906	230,65
30% - 40%	28,358	14,392	0,8917	230,67
40% - 50%	36,310	18,393	0,8921	230,76
50% - 60%	43,902	22,219	0,8922	230,76
60% - 70%	51,813	26,030	0,8936	230,75
70% - 80%	59,766	29,879	0,8944	230,84
80% - 90%	67,844	33,808	0,8950	230,86
90% - 100%	72,115	35,885	0,8953	230,89
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%	3,837	3,740	0,7140	230,56
10% - 20%	11,729	3,751	0,9516	230,46
20% - 30%	19,854	2,817	0,9901	230,64
30% - 40%	27,969	3,735	0,9912	230,56
40% - 50%	35,984	4,009	0,9934	230,64
50% - 60%	43,764	4,151	0,9954	230,67
60% - 70%	51,951	4,179	0,9967	230,69
70% - 80%	59,882	2,920	0,9975	230,73
80% - 90%	67,873	4,196	0,9981	230,75
90% - 100%	75,730	4,160	0,9985	230,78

Q adjustment				
	Reactive power set point Q [kVar]	**Measured reactive power Q [kVar]**	**Measured cos φ**	**Deviation compared to setpoint ΔQ / PN [%]**
- Qmin	-38,744	-39,028	0,8737	0,355
0	0	3,109	0,9987	3,886
+ Qmax	38,744	39,055	0,8749	0,389

Appendix E Type Verification Test Report

Extract from test report according to EN 50438 **Nr. SGR-18OC1058FCSHP**

Qmin reactive power in accordance to standard characteristic curve Q=f(V)						
P/Pn	Vac [V] Set point	P/Pn [%]	Vac [V] measured	Q [Var] measured	Q [Var] expected	ΔQ [%]
< 20%	1,07Vn	9,55	247,28	-1,819	≈0(<±2.5%Pn)	2,27
< 20%	1,09Vn	9,63	250,69	-1,863	≈0(<±2.5%Pn)	2,33
< 20%-30%	1,09Vn	29,68	250,61	-20,235	-0,5 Qmin	1,07
40%	1,09Vn	40,03	250,83	-20,176	-0,5 Qmin	1,00
50%	1,09Vn	49,91	250,67	-20,351	-0,5 Qmin	1,22
60%	1,09Vn	59,90	250,77	-20,260	-0,5 Qmin	1,11
70%	1,09Vn	69,93	250,78	-20,249	-0,5 Qmin	1,09
80%	1,09Vn	79,88	250,75	-20,286	-0,5 Qmin	1,14
90%	1,09Vn	89,78	250,82	-20,253	-0,5 Qmin	1,10
100%	1,09Vn	98,19	250,79	-20,311	-0,5 Qmin	1,17
100%	1,1Vn	89,08	253,26	-40,317	-Qmin	1,97
100%-10%	1,1Vn	9,51	253,94	-40,036	-Qmin	1,62
10%→ ≤5%	1,1Vn	1,33	254,18	-1,866	≈0(<±2.5%Pn)	2,33
Qmax reactive power in accordance to standard characteristic curve Q=f(V)						
P/Pn	Vac [V] Set point	P/Pn [%]	Vac [V] measured	Q [Var] measured	Q [Var] expected	ΔQ [%]
< 20%	0,93Vn	10,15	214,05	1,433	≈0(<±2,5%Pn)	1,79
< 20%	0,91Vn	10,17	209,55	1,375	≈0(<±2,5%Pn)	1,72
< 20%-30%	0,91Vn	30,03	209,62	20,077	0,5 Qmax	0,88
40%	0,91Vn	40,15	209,71	20,143	0,5 Qmax	0,96
50%	0,91Vn	50,11	209,70	20,194	0,5 Qmax	1,02
60%	0,91Vn	60,11	209,66	20,301	0,5 Qmax	1,13
70%	0,91Vn	70,00	209,73	20,175	0,5 Qmax	1,00
80%	0,91Vn	80,11	209,68	20,227	0,5 Qmax	1,06
90%	0,91Vn	88,13	209,72	20,245	0,5 Qmax	1,10
100%	0,91Vn	87,98	209,84	20,279	0,5 Qmax	1,12
100%	0,90Vn	86,99	207,11	40,112	Qmax	1,71
100%-10%	0,90Vn	9,61	206,87	40,009	Qmax	1,58
10%→ ≤5%	0,90Vn	1,67	206,76	1,542	≈0(<±2,5%Pn)	1,93

Appendix E Type Verification Test Report	
Extract from test report according to EN 50438	**Nr. SGR-18OC1058FCSHP**

Connection and starting to generate electrical power		
Test according EN 50438 with standard setting	**Min. voltage for connection to grid:**	193,2V
	Max. voltage for connection to grid:	255,3V
	Min. frequency for connection to grid:	47,45Hz
	Max. frequency for connection to grid:	50,15Hz
	Observation time (≥60s)	60

Connection and starting to generate electrical power		
	Voltage conditions	
a) Start up for voltage range	**<84% Un for twice of observation time**	**>111% Un for twice of observation time**
Connection:	No connection	No connection
Limit:	No connection allowed	
b) In voltage range at start-up	**≥84% Un within twice setting observation time**	**≤111% Un within twice setting observation time**
Reconnection time [s]	124,0	124,0
Limit:	Connected after setting observation time (≥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%Pn/min.	
c) In voltage range after voltage failure	**≥84% Un for twice of setting observation time**	**≤111% Un for twice of setting observation time**
Reconnection time [s]	124,0	124,0
Limit:	Reconnection after setting observation time (≥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%Pn/min.	
	Frequency conditions	
d) Start up for frequency range	**<47,45 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	**≥47,45 Hz within twice of setting observation time**	**≤51,15 Hz within twice of setting observation time**
Reconnection time [s]	122,5	133,0
Limit:	Connected after setting delay time(≥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%Pn/min.	
f) In frequency range after frequency failure	**≥47,45 Hz for twice of setting observation time**	**≤51,15 Hz for twice of setting observation time**
Reconnection time [s]	123,0	123,0
Limit:	Reconnection after setting observation time (≥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%Pn/min. For recorded gradient see diagram below.	

Appendix E Type Verification Test Report

Extract from test report according to EN 50438 **Nr. SGR-18OC1058FCSHP**

Short-circuit current contribution

Short-circuit current parameters

Model: SG80KTL Phase 1

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	48,79V	119,3A
Initial Value of aperiodic current	A	N/A	100ms	29,61V	89,70A
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**	64,0ms	In seconds

Model: SG80KTL Phase 2

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	59,76V	118,7A
Initial Value of aperiodic current	A	N/A	100ms	31,43V	73,71A
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**	54,4ms	In seconds

Model: SG80KTL Phase 3

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	63,79V	118,7A
Initial Value of aperiodic current	A	N/A	100ms	30,18V	88,80A
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**	64,4ms	In seconds

Appendix E Type Verification Test Report

Extract from test report according to EN 50438 **Nr. SGR-18OC1058FCSHP**

Power Quality. Harmonic current emission					
micro-generator		Model: SG80KTL			
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	115,72	99,96	Phase 1	-	-
2nd	0,07	0,06	Phase 1	8	8
3rd	0,27	0,24	Phase 1	21,6	N/A
4th	0,05	0,04	Phase 1	4	4
5th	2,40	2,08	Phase 1	10,7	10,7
6th	0,04	0,03	Phase 1	2,67	2,67
7th	1,67	1,44	Phase 1	7,2	7,2
8th	0,07	0,06	Phase 1	2	2
9th	0,10	0,08	Phase 1	3,8	N/A
10th	0,04	0,04	Phase 1	1,6	1,6
11th	0,91	0,79	Phase 1	3,1	3,1
12th	0,03	0,03	Phase 1	1,33	1,33
13th	0,74	0,64	Phase 1	2	2
14th	0,04	0,03	Phase 1	N/A	N/A
15th	0,05	0,05	Phase 1	N/A	N/A
16th	0,01	0,01	Phase 1	N/A	N/A
17th	0,38	0,33	Phase 1	N/A	N/A
18th	0,03	0,03	Phase 1	N/A	N/A
19th	0,32	0,28	Phase 1	N/A	N/A
20th	0,02	0,02	Phase 1	N/A	N/A
21th	0,04	0,04	Phase 1	N/A	N/A
22th	0,02	0,02	Phase 1	N/A	N/A
23th	0,17	0,15	Phase 1	N/A	N/A
24th	0,00	0,00	Phase 1	N/A	N/A
25th	0,15	0,13	Phase 1	N/A	N/A
26th	0,03	0,02	Phase 1	N/A	N/A
27th	0,01	0,01	Phase 1	N/A	N/A
28th	0,02	0,02	Phase 1	N/A	N/A
29th	0,10	0,08	Phase 1	N/A	N/A
30th	0,01	0,01	Phase 1	N/A	N/A
31th	0,09	0,08	Phase 1	N/A	N/A
32th	0,01	0,01	Phase 1	N/A	N/A
33th	0,01	0,01	Phase 1	N/A	N/A
34th	0,01	0,01	Phase 1	N/A	N/A
35th	0,10	0,08	Phase 1	N/A	N/A
36th	0,01	0,01	Phase 1	N/A	N/A
37th	0,09	0,07	Phase 1	N/A	N/A
38th	0,01	0,01	Phase 1	N/A	N/A
39th	0,01	0,01	Phase 1	N/A	N/A
40th	0,01	0,01	Phase 1	N/A	N/A
THD_{40}	-	2,784	Phase 1	13	13
PWHD	-		Phase 1	22	22

Appendix E Type Verification Test Report

Extract from test report according to EN 50438 **Nr. SGR-18OC1058FCSHP**

Power Quality. Harmonic current emission

micro-generator		Model: SG80KTL			
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	115,75	99,96	Phase 2	-	-
2nd	0,12	0,10	Phase 2	8	8
3rd	0,15	0,13	Phase 2	21,6	N/A
4th	0,07	0,06	Phase 2	4	4
5th	2,29	1,98	Phase 2	10,7	10,7
6th	0,08	0,07	Phase 2	2,67	2,67
7th	1,63	1,41	Phase 2	7,2	7,2
8th	0,07	0,06	Phase 2	2	2
9th	0,02	0,02	Phase 2	3,8	N/A
10th	0,05	0,04	Phase 2	1,6	1,6
11th	0,86	0,74	Phase 2	3,1	3,1
12th	0,03	0,03	Phase 2	1,33	1,33
13th	0,72	0,62	Phase 2	2	2
14th	0,04	0,04	Phase 2	N/A	N/A
15th	0,03	0,03	Phase 2	N/A	N/A
16th	0,04	0,03	Phase 2	N/A	N/A
17th	0,42	0,36	Phase 2	N/A	N/A
18th	0,02	0,02	Phase 2	N/A	N/A
19th	0,32	0,28	Phase 2	N/A	N/A
20th	0,04	0,04	Phase 2	N/A	N/A
21th	0,02	0,02	Phase 2	N/A	N/A
22th	0,05	0,05	Phase 2	N/A	N/A
23th	0,19	0,16	Phase 2	N/A	N/A
24th	0,03	0,03	Phase 2	N/A	N/A
25th	0,12	0,10	Phase 2	N/A	N/A
26th	0,03	0,02	Phase 2	N/A	N/A
27th	0,01	0,01	Phase 2	N/A	N/A
28th	0,02	0,02	Phase 2	N/A	N/A
29th	0,11	0,09	Phase 2	N/A	N/A
30th	0,00	0,00	Phase 2	N/A	N/A
31th	0,10	0,08	Phase 2	N/A	N/A
32th	0,00	0,00	Phase 2	N/A	N/A
33th	0,02	0,02	Phase 2	N/A	N/A
34th	0,01	0,01	Phase 2	N/A	N/A
35th	0,11	0,10	Phase 2	N/A	N/A
36th	0,01	0,01	Phase 2	N/A	N/A
37th	0,09	0,08	Phase 2	N/A	N/A
38th	0,01	0,01	Phase 2	N/A	N/A
39th	0,01	0,01	Phase 2	N/A	N/A
40th	0,02	0,02	Phase 2	N/A	N/A
THD_{40}	-	2,681	Phase 2	13	13
PWHD	-		Phase 2	22	22

Appendix E Type Verification Test Report

Extract from test report according to EN 50438 **Nr. SGR-18OC1058FCSHP**

Power Quality. Harmonic current emission

micro-generator		Model: SG80KTL			
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	115,76	99,97	Phase 3	-	-
2nd	0,11	0,10	Phase 3	8	8
3rd	0,18	0,15	Phase 3	21,6	N/A
4th	0,02	0,02	Phase 3	4	4
5th	2,24	1,93	Phase 3	10,7	10,7
6th	0,03	0,03	Phase 3	2,67	2,67
7th	1,60	1,38	Phase 3	7,2	7,2
8th	0,04	0,04	Phase 3	2	2
9th	0,08	0,07	Phase 3	3,8	N/A
10th	0,01	0,01	Phase 3	1,6	1,6
11th	0,91	0,79	Phase 3	3,1	3,1
12th	0,04	0,04	Phase 3	1,33	1,33
13th	0,69	0,60	Phase 3	2	2
14th	0,05	0,04	Phase 3	N/A	N/A
15th	0,07	0,06	Phase 3	N/A	N/A
16th	0,03	0,02	Phase 3	N/A	N/A
17th	0,42	0,36	Phase 3	N/A	N/A
18th	0,00	0,00	Phase 3	N/A	N/A
19th	0,35	0,30	Phase 3	N/A	N/A
20th	0,02	0,02	Phase 3	N/A	N/A
21th	0,02	0,02	Phase 3	N/A	N/A
22th	0,02	0,02	Phase 3	N/A	N/A
23th	0,20	0,17	Phase 3	N/A	N/A
24th	0,01	0,01	Phase 3	N/A	N/A
25th	0,14	0,12	Phase 3	N/A	N/A
26th	0,03	0,03	Phase 3	N/A	N/A
27th	0,03	0,02	Phase 3	N/A	N/A
28th	0,02	0,02	Phase 3	N/A	N/A
29th	0,12	0,10	Phase 3	N/A	N/A
30th	0,00	0,00	Phase 3	N/A	N/A
31th	0,09	0,08	Phase 3	N/A	N/A
32th	0,02	0,01	Phase 3	N/A	N/A
33th	0,03	0,02	Phase 3	N/A	N/A
34th	0,01	0,01	Phase 3	N/A	N/A
35th	0,10	0,09	Phase 3	N/A	N/A
36th	0,00	0,00	Phase 3	N/A	N/A
37th	0,08	0,07	Phase 3	N/A	N/A
38th	0,01	0,01	Phase 3	N/A	N/A
39th	0,00	0,00	Phase 3	N/A	N/A
40th	0,01	0,01	Phase 3	N/A	N/A
THD_{40}	-	2,642	Phase 3	13	13
PWHD	-		Phase 3	22	22

Appendix E Type Verification Test Report

Extract from test report according to EN 50438 **Nr. SGR-18OC1058FCSHP**

Voltage fluctuation and Flicker.					
	Maximum permissible flicker and voltage fluctuation as per EN 61000-3-11				
Value	**Pst**	**Plt 2 hours**	**d(t) $_{500ms}$**	**dc**	**dmax**
Limit	1,0	0,65	3,3%	3,3%	4%
Test value – Phase 1	0,71	0,54	0,00%	0,35%	0,65%
Test value – Phase 2	0,29	0,18	0,00%	0,38%	0,53%
Test value – Phase 3	0,33	0,26	0,00%	0,38%	0,64%

DC-Injection.				
Protection limit	Tested at four power levels, limit 0,5% of IAC_{nom} (57,97mA)			
Output power	**~20%**	**~50%**	**75%**	**~100%**
Max. test value (phase L1) [mA]	38	56	50	89
Max. test value (phase L2) [mA]	28	82	73	109
Max. test value (phase L3) [mA]	20	121	74	84