



**BUREAU  
VERITAS**

# Świadectwo zgodności

**Zgłaszający:** **SolaX power Co., Ltd.**  
No. 288 Shizhu Road, Tonglu Economic Development Zone,  
Dongxing District 311500, Tonglu City, Zhejiang Province,  
China

**Produkt:** **Siatka wiązanej fotowoltaicznych (PV) falownik**

**Model:** **X1-3.0-T-D, X1-3.0-T-N, X1-3.3-T-D, X1-3.3-T-N,  
X1-3.6-T-D, X1-3.6-T-N, X1-4.2-T-D, X1-4.2-T-N,  
X1-5.0-T-D, X1-5.0-T-N**

## Zastosowanie zgodnie z przepisami:

Automatyczne urządzenie wyłączające, monitorujące sieć jednofazową w systemach fotowoltaicznych z obwodem równoległym jednofazową poprzez przetwornicę w publicznej sieci zasilania. Automatyczne urządzenie wyłączające stanowi część wyżej wymienionej przetwornicy.

## Zastosowane przepisy i normy:

**EN 50438:2013, PN-EN 50438:2014**

Wymagania dla instalacji mikrogeneracyjnych przeznaczonych do równoległego przyłączenia do publicznych sieci dystrybucyjnych niskiego napięcia

**DIN V VDE V 0126-1-1:2006-02 (bezpieczeństwo funkcjonalne)**

Automatyczne urządzenie odłączające między generatorem a publiczną siecią niskiego napięcia

X1-4.2-T-D, X1-4.2-T-N, X1-5.0-T-D, X1-5.0-T-N jest zaprojektowane na >16 A na fazę, ale wszystkie podstawowe wymagania normy są spełnione.

W momencie wydania niniejszego certyfikatu pojęcie zabezpieczenia interfejsu wyżej wymienionego, reprezentatywnego produktu spełnia wymagania bezpieczeństwa obowiązujące dla określonego zastosowania zgodnie z przepisami.

**Numer raportu:** **SXP-16JY2479FTSP**

**Numer świadectwa:** **U17-0088**

**Data wydania:** **2017-03-14**



Institut certifikacji Bureau Veritas Consumer Products Services Germany GmbH  
Akredytowane zgodnie z normą DIN EN ISO/IEC 17065

**Appendix E Type Verification Test Report**

Extract from test report according to EN 50438

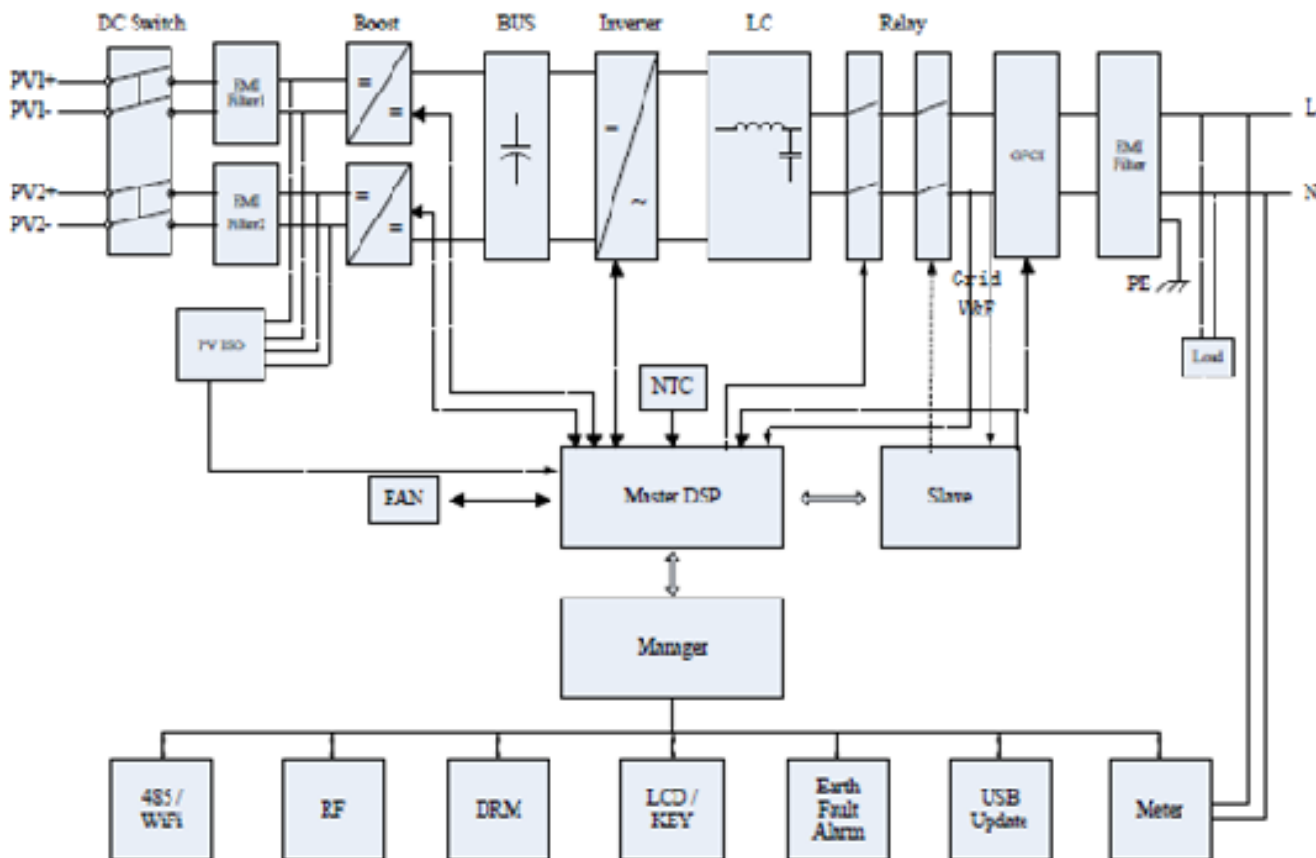
Nr. SXP-16JY2479FTSP

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

<b>Manufacturer / applicant:</b>	SolaX power Co., Ltd. No. 288 Shizhu Road, Tonglu Economic Development Zone, Dongxing District 311500, Tonglu City, Zhejiang Province, China				
<b>Micro-generator Type</b>	Grid-tied photovoltaic inverter				
<b>Rated values</b>	X1-3.0-T-D, X1-3.0-T-N	X1-3.3-T-D, X1-3.3-T-N	X1-3.6-T-D, X1-3.6-T-N	X1-4.2-T-D, X1-4.2-T-N	X1-5.0-T-D, X1-5.0-T-N
<b>Maximum rated capacity</b>	3000 VA	3300 VA	3680 VA	4200 VA	4600 VA
<b>Rated voltage</b>	220/230/240 Vac, 50/60Hz				
<b>Firmware version</b>	V 3.08				
<b>Measurement period:</b>	2016-12-31 to 2017-2-21				

**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.



**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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Nr. SXP-16JY2479FTSP

**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	3,0 / 600*	253,0	3,0 / 600*	253,7	1,346 / 471,2*
Over-voltage stage 2	264,5	0,2	264,5	0,2	266,0	0,182
Under-voltage stage 1	195,5	1,5	195,5	1,5	195,0	1,350

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.

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	52,01	0,428
Under-frequency	47,5	0,5	47,5	0,5	47,51	0,408

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]	150,5	172,0	202,5	202,0	173,5	157,0

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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Nr. SXP-16JY2479FTSP

**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	195,7	47,5	4061	0,998
2	253,2	51,5	4590	0,998

**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]:	4,521	4,529	4,518
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	4,370	2,300	0,230	2,300	4,370	N/A
PE60 [kW]:	4,604	4,395	2,360	0,262	2,345	4,395	4,600
ΔPE60/PM [%]:	N/A	+0,54	+1,30	+0,70	+0,98	+0,54	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	2,185	1,150	0,115	1,150	2,185	N/A
PE60 [kW]:	2,310	2,230	1,142	0,112	1,176	2,162	2,365
ΔPE60/PM [%]:	N/A	+1,96	+0,35	+0,13	-1,00	+1,00	N/A
Limit ΔP/P <sub>1min</sub> :	+ 10 % of P <sub>M</sub>						

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Nr. SXP-16JY2479FTSP

Reactive power			
Uncontrollable reactive power			
X1-3.0-T-D			
Test Voltage	211,6V	230V	248,4V
Output power			
25% PN	0,9871	0,9841	0,9829
50% PN	0,9958	0,9952	0,9953
75% PN	0,9980	0,9978	0,9974
100% PN	0,9983	0,9984	0,9982
Limit	>0,95	>0,95	>0,95
X1-3.3-T-D			
Test Voltage	211,6V	230V	248,4V
Output power			
25% PN	0,9890	0,9859	0,9869
50% PN	0,9963	0,9957	0,9960
75% PN	0,9977	0,9975	0,9976
100% PN	0,9982	0,9980	0,9983
Limit	>0,95	>0,95	>0,95
X1-3.6-T-D			
Test Voltage	211,6V	230V	248,4V
Output power			
25% PN	0,9906	0,9886	0,9883
50% PN	0,9968	0,9963	0,9963
75% PN	0,9979	0,9978	0,9979
100% PN	0,9983	0,9982	0,9985
Limit	>0,95	>0,95	>0,95
X1-4.2-T-D			
Test Voltage	211,6V	230V	248,4V
Output power			
25% PN	0,9915	0,9911	0,9915
50% PN	0,9968	0,9969	0,9972
75% PN	0,9982	0,9980	0,9983
100% PN	0,9985	0,9984	0,9987
Limit	>0,95	>0,95	>0,95
X1-5.0-T-D			
Test Voltage	211,6V	230V	248,4V
Output power			
25% PN	0,9925	0,9925	0,9917
50% PN	0,9971	0,9974	0,9975
75% PN	0,9979	0,9982	0,9984
100% PN	0,9976	0,9985	0,9987
Limit	>0,95	>0,95	>0,95

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Nr. SXP-16JY2479FTSP

Controllable reactive power				
X1-5.0-T-D				
Inductive (supply reactive power)				
Power-BIN	Active power [W]	Reactive power [Var]	Power factor (cos φ)	AC voltage [V]
0% - 10%	0,446	0,122	0,965	230,01
10% - 20%	0,916	0,123	0,991	230,66
20% - 30%	1,375	-0,679	0,896	230,22
30% - 40%	1,836	-0,901	0,898	230,21
40% - 50%	2,293	-1,110	0,900	230,18
50% - 60%	2,769	-1,344	0,900	230,12
60% - 70%	3,218	-1,560	0,900	230,26
70% - 80%	3,666	-1,769	0,901	230,34
80% - 90%	4,121	-1,994	0,900	230,44
90% - 100%	4,316	-2,100	0,899	230,61
Capacitive (supply reactive power)				
Power-BIN	Active power [W]	Reactive power [Var]	Power factor (cos φ)	AC voltage [V]
0% - 10%	0,453	0,127	0,963	230,29
10% - 20%	0,911	0,124	0,991	230,68
20% - 30%	1,374	0,675	0,897	230,53
30% - 40%	1,846	0,946	0,898	230,56
40% - 50%	2,305	1,128	0,898	230,99
50% - 60%	2,758	1,356	0,897	230,37
60% - 70%	3,219	1,577	0,898	230,77
70% - 80%	3,683	1,802	0,898	230,19
80% - 90%	4,120	2,020	0,898	230,55
90% - 100%	4,423	2,182	0,897	230,80
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%	0,455	0,123	0,963	230,02
10% - 20%	0,904	0,122	0,991	230,71
20% - 30%	1,375	0,128	0,996	230,08
30% - 40%	1,845	0,136	0,997	231,55
40% - 50%	2,309	0,145	0,998	231,94
50% - 60%	2,766	0,159	0,998	231,32
60% - 70%	3,222	0,164	0,999	231,52
70% - 80%	3,691	0,180	0,999	231,11
80% - 90%	4,148	0,193	0,999	230,53
90% - 100%	4,603	0,204	0,999	230,92

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Nr. SXP-16JY2479FTSP

Q adjustment				
X1-5.0-T-D	Reactive power set point Q [Var]	Measured reactive power Q [Var]	Measured cos $\varphi$	Deviation compared to setpoint $\Delta Q / PN$ [%]
- Qmin	-2,300	-2,322	0,698	0,21
0	0	-0,211	0,999	4,59
+ Qmax	2,300	2,356	0,879	1,21

Qmin reactive power in accordance to standard characteristic curve $Q=f(V)$ ; X1-5.0-T-D						
P/Pn	Vac [V] Set point	P/Pn [%]	Vac [V] measured	Q [Var] measured	Q [Var] expected	$\Delta Q$ [%]
< 20%	1,07Vn	9,57	246,13	109,00	$\approx 0 (< \pm 2.5\% Pn)$	2,37
< 20%	1,09Vn	9,48	250,75	105,00	$\approx 0 (< \pm 2.5\% Pn)$	2,28
< 20%-30%	1,09Vn	27,70	250,64	-1054,00	-0,5 Qmin	2,09
40%	1,09Vn	38,35	250,69	-1167,00	-0,5 Qmin	0,37
50%	1,09Vn	49,04	250,71	-1168,00	-0,5 Qmin	0,39
60%	1,09Vn	58,93	250,72	-1160,00	-0,5 Qmin	0,22
70%	1,09Vn	68,76	250,76	-1177,00	-0,5 Qmin	0,59
80%	1,09Vn	78,39	250,80	-1184,00	-0,5 Qmin	0,74
90%	1,09Vn	88,15	250,74	-1176,00	-0,5 Qmin	0,57
100%	1,09Vn	94,26	250,60	-1171,00	-0,5 Qmin	0,46
100%	1,1Vn	83,50	252,94	-2307,00	-Qmin	1,12
100%-10%	1,1Vn	8,89	252,96	-2216,00	-Qmin	2,05
10% $\rightarrow$ $\leq 5\%$	1,1Vn	2,57	252,98	-104,00	$\approx 0 (< \pm 2.5\% Pn)$	0,07
Qmax reactive power in accordance to standard characteristic curve $Q=f(V)$ ; X1-5.0-T-D						
P/Pn	Vac [V] Set point	P/Pn [%]	Vac [V] measured	Q [Var] measured	Q [Var] expected	$\Delta Q$ [%]
< 20%	0,93Vn	9,33	213,89	114,20	$\approx 0 (< \pm 2.5\% Pn)$	2,48
< 20%	0,91Vn	9,26	209,27	114,16	$\approx 0 (< \pm 2.5\% Pn)$	2,48
< 20%-30%	0,91Vn	28,76	209,45	1196,00	-0,5 Qmin	1,00
40%	0,91Vn	38,61	209,38	1200,00	-0,5 Qmin	1,09
50%	0,91Vn	48,43	209,32	1194,00	-0,5 Qmin	0,96
60%	0,91Vn	58,48	209,37	1092,00	-0,5 Qmin	1,26
70%	0,91Vn	68,33	209,36	1067,00	-0,5 Qmin	1,80
80%	0,91Vn	77,50	209,43	1041,00	-0,5 Qmin	2,37
90%	0,91Vn	86,04	209,26	1063,00	-0,5 Qmin	1,89
100%	0,91Vn	91,41	209,28	1041,00	-0,5 Qmin	2,37
100%	0,90Vn	81,65	206,99	2225,00	-Qmin	1,63
100%-10%	0,90Vn	8,46	206,85	2339,00	-Qmin	0,85
10% $\rightarrow$ $\leq 5\%$	0,90Vn	2,43	206,89	112,00	$\approx 0 (< \pm 2.5\% Pn)$	2,43

**Appendix E Type Verification Test Report**

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Nr. SXP-16JY2479FTSP

Connection and starting to generate electrical power		
Test according EN 50438 with standard 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 (≥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]	85	79
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. For recorded gradient see diagram below.	
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]	79	76
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.	
	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	≥48,05 Hz within twice of setting observation time	≤51,15 Hz within twice of setting observation time
Reconnection time [s]	82	85
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. For recorded gradient see diagram below.	



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Nr. SXP-16JY2479FTSP

<b>f) In frequency range after frequency failure</b>	<b>≥48,05 Hz for twice of setting observation time</b>	<b>≤51,15 Hz for twice of setting observation time</b>
<b>Reconnection time [s]</b>	76	79
<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.	

Short-circuit current contribution					
Short-circuit current parameters X1-5.0-T-D					
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	7,7	0,93
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	4,2 ms	

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Nr. SXP-16JY2479FTSP

Power Quality. Harmonic current emission				
micro-generator		X1-3.0-T-D		
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	12,881	--	Phase 1	-
2nd	0,078	0,605	Phase 1	1,080
3rd	0,106	0,827	Phase 1	2,300
4th	0,005	0,037	Phase 1	0,430
5th	0,064	0,497	Phase 1	1,140
6th	0,002	0,014	Phase 1	0,300
7th	0,039	0,306	Phase 1	0,770
8th	0,002	0,012	Phase 1	0,230
9th	0,032	0,251	Phase 1	0,400
10th	0,001	0,009	Phase 1	0,184
11th	0,024	0,186	Phase 1	0,330
12th	0,003	0,021	Phase 1	0,153
13th	0,021	0,165	Phase 1	0,210
14th	0,002	0,012	Phase 1	0,131
15th	0,015	0,119	Phase 1	0,150
16th	0,002	0,012	Phase 1	0,115
17th	0,013	0,098	Phase 1	0,132
18th	0,005	0,040	Phase 1	0,102
19th	0,011	0,089	Phase 1	0,118
20th	0,002	0,012	Phase 1	0,092
21th	0,013	0,097	Phase 1	0,107
22th	0,004	0,029	Phase 1	0,084
23th	0,010	0,076	Phase 1	0,098
24th	0,004	0,035	Phase 1	0,077
25th	0,005	0,038	Phase 1	0,090
26th	0,006	0,046	Phase 1	0,071
27th	0,006	0,044	Phase 1	0,083
28th	0,005	0,037	Phase 1	0,066
29th	0,002	0,019	Phase 1	0,078
30th	0,002	0,017	Phase 1	0,061
31th	0,002	0,016	Phase 1	0,073
32th	0,002	0,017	Phase 1	0,058
33th	0,002	0,018	Phase 1	0,068
34th	0,002	0,012	Phase 1	0,054
35th	0,002	0,013	Phase 1	0,064
36th	0,002	0,015	Phase 1	0,051
37th	0,001	0,009	Phase 1	0,061
38th	0,001	0,008	Phase 1	0,048
39th	0,001	0,009	Phase 1	0,058
40th	0,001	0,008	Phase 1	0,046

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Nr. SXP-16JY2479FTSP

Power Quality. Harmonic current emission				
micro-generator		X1-3.3-T-D		
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	14,222	--	Phase 1	-
2nd	0,087	0,612	Phase 1	1,080
3rd	0,115	0,810	Phase 1	2,300
4th	0,005	0,038	Phase 1	0,430
5th	0,072	0,508	Phase 1	1,140
6th	0,002	0,014	Phase 1	0,300
7th	0,042	0,293	Phase 1	0,770
8th	0,001	0,007	Phase 1	0,230
9th	0,036	0,250	Phase 1	0,400
10th	0,002	0,012	Phase 1	0,184
11th	0,024	0,167	Phase 1	0,330
12th	0,002	0,017	Phase 1	0,153
13th	0,023	0,160	Phase 1	0,210
14th	0,001	0,010	Phase 1	0,131
15th	0,016	0,111	Phase 1	0,150
16th	0,001	0,010	Phase 1	0,115
17th	0,016	0,115	Phase 1	0,132
18th	0,006	0,043	Phase 1	0,102
19th	0,013	0,089	Phase 1	0,118
20th	0,002	0,013	Phase 1	0,092
21th	0,011	0,078	Phase 1	0,107
22th	0,004	0,026	Phase 1	0,084
23th	0,008	0,056	Phase 1	0,098
24th	0,004	0,026	Phase 1	0,077
25th	0,007	0,047	Phase 1	0,090
26th	0,007	0,049	Phase 1	0,071
27th	0,011	0,074	Phase 1	0,083
28th	0,006	0,039	Phase 1	0,066
29th	0,003	0,019	Phase 1	0,078
30th	0,003	0,020	Phase 1	0,061
31th	0,003	0,022	Phase 1	0,073
32th	0,003	0,022	Phase 1	0,058
33th	0,003	0,019	Phase 1	0,068
34th	0,002	0,015	Phase 1	0,054
35th	0,002	0,013	Phase 1	0,064
36th	0,002	0,017	Phase 1	0,051
37th	0,001	0,010	Phase 1	0,061
38th	0,001	0,009	Phase 1	0,048
39th	0,002	0,013	Phase 1	0,058
40th	0,001	0,008	Phase 1	0,046

**Appendix E Type Verification Test Report**

Extract from test report according to EN 50438

Nr. SXP-16JY2479FTSP

Power Quality. Harmonic current emission				
micro-generator		X1-3.6-T-D		
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	15,367	--	Phase 1	-
2nd	0,092	0,601	Phase 1	1,080
3rd	0,125	0,814	Phase 1	2,300
4th	0,006	0,040	Phase 1	0,430
5th	0,080	0,520	Phase 1	1,140
6th	0,002	0,014	Phase 1	0,300
7th	0,044	0,289	Phase 1	0,770
8th	0,001	0,007	Phase 1	0,230
9th	0,036	0,237	Phase 1	0,400
10th	0,001	0,008	Phase 1	0,184
11th	0,027	0,173	Phase 1	0,330
12th	0,004	0,024	Phase 1	0,153
13th	0,023	0,148	Phase 1	0,210
14th	0,002	0,011	Phase 1	0,131
15th	0,016	0,103	Phase 1	0,150
16th	0,002	0,011	Phase 1	0,115
17th	0,020	0,127	Phase 1	0,132
18th	0,006	0,036	Phase 1	0,102
19th	0,016	0,102	Phase 1	0,118
20th	0,002	0,012	Phase 1	0,092
21th	0,010	0,064	Phase 1	0,107
22th	0,004	0,024	Phase 1	0,084
23th	0,008	0,049	Phase 1	0,098
24th	0,004	0,024	Phase 1	0,077
25th	0,006	0,039	Phase 1	0,090
26th	0,007	0,045	Phase 1	0,071
27th	0,014	0,092	Phase 1	0,083
28th	0,005	0,033	Phase 1	0,066
29th	0,004	0,024	Phase 1	0,078
30th	0,004	0,024	Phase 1	0,061
31th	0,004	0,028	Phase 1	0,073
32th	0,004	0,024	Phase 1	0,058
33th	0,003	0,022	Phase 1	0,068
34th	0,002	0,015	Phase 1	0,054
35th	0,002	0,015	Phase 1	0,064
36th	0,002	0,014	Phase 1	0,051
37th	0,002	0,015	Phase 1	0,061
38th	0,002	0,010	Phase 1	0,048
39th	0,002	0,015	Phase 1	0,058
40th	0,001	0,008	Phase 1	0,046

**Appendix E Type Verification Test Report**

Extract from test report according to EN 50438

Nr. SXP-16JY2479FTSP

Power Quality. Harmonic current emission					
micro-generator		X1-4.2-T-D			
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	17,876	--	Phase 1	-	-
2nd	0,108	0,601	Phase 1	8	8
3rd	0,149	0,835	Phase 1	21,6	N/A
4th	0,005	0,031	Phase 1	4	4
5th	0,096	0,537	Phase 1	10,7	10,7
6th	0,002	0,013	Phase 1	2,67	2,67
7th	0,054	0,301	Phase 1	7,2	7,2
8th	0,002	0,013	Phase 1	2	2
9th	0,040	0,222	Phase 1	3,8	N/A
10th	0,002	0,009	Phase 1	1,6	1,6
11th	0,030	0,166	Phase 1	3,1	3,1
12th	0,002	0,012	Phase 1	1,33	1,33
13th	0,028	0,155	Phase 1	2	2
14th	0,001	0,007	Phase 1	N/A	N/A
15th	0,018	0,101	Phase 1	N/A	N/A
16th	0,002	0,014	Phase 1	N/A	N/A
17th	0,022	0,126	Phase 1	N/A	N/A
18th	0,004	0,024	Phase 1	N/A	N/A
19th	0,022	0,124	Phase 1	N/A	N/A
20th	0,002	0,012	Phase 1	N/A	N/A
21th	0,014	0,076	Phase 1	N/A	N/A
22th	0,004	0,024	Phase 1	N/A	N/A
23th	0,011	0,062	Phase 1	N/A	N/A
24th	0,004	0,020	Phase 1	N/A	N/A
25th	0,010	0,054	Phase 1	N/A	N/A
26th	0,006	0,035	Phase 1	N/A	N/A
27th	0,015	0,085	Phase 1	N/A	N/A
28th	0,007	0,040	Phase 1	N/A	N/A
29th	0,008	0,045	Phase 1	N/A	N/A
30th	0,004	0,024	Phase 1	N/A	N/A
31th	0,006	0,036	Phase 1	N/A	N/A
32th	0,005	0,026	Phase 1	N/A	N/A
33th	0,006	0,032	Phase 1	N/A	N/A
34th	0,004	0,021	Phase 1	N/A	N/A
35th	0,005	0,029	Phase 1	N/A	N/A
36th	0,003	0,015	Phase 1	N/A	N/A
37th	0,004	0,023	Phase 1	N/A	N/A
38th	0,003	0,015	Phase 1	N/A	N/A
39th	0,003	0,030	Phase 1	N/A	N/A
40th	0,001	0,009	Phase 1	N/A	N/A
THD <sub>40</sub>	-	1,28	Phase 1	13	13
PWHD	-	2,10	Phase 1	22	22

**Appendix E Type Verification Test Report**

Extract from test report according to EN 50438

Nr. SXP-16JY2479FTSP

Power Quality. Harmonic current emission					
micro-generator		X1-5.0-T-D			
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	19,764	--	Phase 1	-	-
2nd	0,119	0,603	Phase 1	8	8
3rd	0,169	0,855	Phase 1	21,6	N/A
4th	0,005	0,027	Phase 1	4	4
5th	0,110	0,558	Phase 1	10,7	10,7
6th	0,004	0,021	Phase 1	2,67	2,67
7th	0,061	0,308	Phase 1	7,2	7,2
8th	0,002	0,012	Phase 1	2	2
9th	0,044	0,225	Phase 1	3,8	N/A
10th	0,002	0,010	Phase 1	1,6	1,6
11th	0,033	0,166	Phase 1	3,1	3,1
12th	0,002	0,012	Phase 1	1,33	1,33
13th	0,030	0,153	Phase 1	2	2
14th	0,001	0,006	Phase 1	N/A	N/A
15th	0,023	0,117	Phase 1	N/A	N/A
16th	0,002	0,012	Phase 1	N/A	N/A
17th	0,027	0,134	Phase 1	N/A	N/A
18th	0,005	0,027	Phase 1	N/A	N/A
19th	0,025	0,126	Phase 1	N/A	N/A
20th	0,003	0,014	Phase 1	N/A	N/A
21th	0,017	0,088	Phase 1	N/A	N/A
22th	0,005	0,027	Phase 1	N/A	N/A
23th	0,017	0,086	Phase 1	N/A	N/A
24th	0,003	0,016	Phase 1	N/A	N/A
25th	0,017	0,084	Phase 1	N/A	N/A
26th	0,006	0,031	Phase 1	N/A	N/A
27th	0,020	0,099	Phase 1	N/A	N/A
28th	0,008	0,039	Phase 1	N/A	N/A
29th	0,011	0,057	Phase 1	N/A	N/A
30th	0,007	0,035	Phase 1	N/A	N/A
31th	0,005	0,027	Phase 1	N/A	N/A
32th	0,006	0,028	Phase 1	N/A	N/A
33th	0,012	0,058	Phase 1	N/A	N/A
34th	0,006	0,028	Phase 1	N/A	N/A
35th	0,006	0,030	Phase 1	N/A	N/A
36th	0,004	0,018	Phase 1	N/A	N/A
37th	0,007	0,033	Phase 1	N/A	N/A
38th	0,003	0,017	Phase 1	N/A	N/A
39th	0,007	0,034	Phase 1	N/A	N/A
40th	0,002	0,012	Phase 1	N/A	N/A
THD <sub>40</sub>	-	1,29	Phase 1	13	13
PWHD	-	3,10	Phase 1	22	22

**Appendix E Type Verification Test Report**

Extract from test report according to EN 50438

Nr. SXP-16JY2479FTSP

Voltage fluctuation and Flicker.					
X1-5.0-T-D	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	0,09	0,09	0,00%	0,53%	0,57%

DC-Injection.				
X1-3.0-T-D				
Protection limit	Tested at four power levels, limit 0,5% of IAC <sub>nom</sub> (65mA)			
Output power	~20%	~50%	75%	~100%
Max. test value (phase L1) [mA]	-9,9	-15,6	15,5	13,2
X1-3.3-T-D				
Protection limit	Tested at four power levels, limit 0,5% of IAC <sub>nom</sub> (72mA)			
Output power	~20%	~50%	75%	~100%
Max. test value (phase L1) [mA]	8,6	14,6	19,4	16,5
X1-3.6-T-D				
Protection limit	Tested at four power levels, limit 0,5% of IAC <sub>nom</sub> (80mA)			
Output power	~20%	~50%	75%	~100%
Max. test value (phase L1) [mA]	-17,2	18,4	14,3	18,8
X1-4.2-T-D				
Protection limit	Tested at four power levels, limit 0,5% of IAC <sub>nom</sub> (91mA)			
Output power	~20%	~50%	75%	~100%
Max. test value (phase L1) [mA]	10,9	15,0	15,9	31,3
X1-5.0-T-D				
Protection limit	Tested at four power levels, limit 0,5% of IAC <sub>nom</sub> (100mA)			
Output power	~20%	~50%	75%	~100%
Max. test value (phase L1) [mA]	14,3	19,1	17,9	14,9