
Alpha ESS Europe GmbH | Paul-Ehrlich-Straße 1a | 63225 Langen



Alpha ESS Europe GmbH
Paul-Ehrlich-Straße 1a
63225 Langen

+49 6103 459 1601
europe@alpha-ess.de

www.alpha-ess.de

Bestätigung über den Einsatz des Sinexcel Wechselrichters „PWS2-30P-EX“ im Alpha ESS Stromspeicher Storion H30

Sehr geehrte Damen und Herren,

Hiermit bestätigt die Alpha ESS Europe GmbH für das Speichersystem Storion H30, dass es sich bei dem im System verwendeten Wechselrichter um den Sinexcel Wechselrichter „PWG2-30P-EX“ handelt.

Die Zertifizierung des Wechselrichters wurde von Shenzhen Sinexcel Electric Co., Ltd unter dem Originalnamen „PWG2-30P-EX“ durchgeführt.

Mit freundlichen Grüßen


Michael Steininger-Yang

Country Manager DACH

**Smarten
Your
Energy**

Alpha ESS Europe GmbH
Paul-Ehrlich-Straße 1a
63225 Langen
Geschäftsführer Jun Wang

Telefon +49 6103 4591601
europe@alpha-ess.de
www.alpha-ess.de



Amtsgericht: Frankfurt a. M.
USt-Id DE300781685

Handelsregister
HRB 101992

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Certificate of Conformity

No. ESY 076777 0040 Rev. 00

Holder of Certificate: **Shenzhen Sinexcel Electric Co., Ltd**
Building 6, BaiWangXin
High-tech Industrial Park, Nanshan District
518055 Shenzhen City
PEOPLE'S REPUBLIC OF CHINA

Product: **Converter**
(Bi-directional Storage Inverter)

Model(s): **PWS2-29P-EX, PWS2-30P-EX**

Parameters: See below pages

Applicable standards: VDE-AR-N 4105:2018
DIN VDE V 0124-100 (VDE V 0124-100):2020

This Certificate of Conformity confirms the compliance with the above listed standards on a voluntary basis. It refers only to the sample submitted to TÜV SÜD Product Service GmbH and does not certify the quality or safety of the serial products. It was issued according to TÜV SÜD Product Service certification program Photovoltaics and Grid Integration. For details see: www.tuvsud.com/ps-cert

Test report no.: 64290213088101

Date, 2022-06-20



(Billy Qiu)

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Parameters:

DC Link input Voltage range	700~830 Vd.c.
DC Link input maximum continuous current	65 Ad.c.
DC Link input power	45 kW
Battery type	Lead-acid/Lithium battery
Battery rated voltage	600 Vd.c.
Battery operating input voltage range	150~750 Vd.c.
Battery input voltage range (full load)	350~750 Vd.c.
Max. Battery charging/discharge power	30 kW
Max. Battery charging/discharge current	90 Ad.c.
Rated grid input active power	30 kW (PWS2-30P-EX) 29.9 kW (PWS2-29P-EX)
Rated grid input apparent power	30 kVA (PWS2-30P-EX) 29.9 kVA (PWS2-29P-EX)
Maximum grid input apparent power	33 kVA (PWS2-30P-EX) 29.9 kVA (PWS2-29P-EX)
Rated grid input frequency	50 Hz
Rated grid input voltage	230/400 Va.c., 3/N/PE
Rated grid input current	43.3 Aa.c. (PWS2-30P-EX) 43.2 Aa.c. (PWS2-29P-EX)
Max. continuous grid input current	47.6 Aa.c. (PWS2-30P-EX) 43.2 Aa.c. (PWS2-29P-EX)
Rated grid output active power	30 kW (PWS2-30P-EX) 29.9 kW (PWS2-29P-EX)
Rated grid output apparent power	30 kVA (PWS2-30P-EX) 29.9 kVA (PWS2-29P-EX)
Maximum grid output apparent power	30 kVA (PWS2-30P-EX) 29.9 kVA (PWS2-29P-EX)
Rated grid output frequency	50 Hz
Rated grid output voltage	230/400Va.c., 3/N/PE
Rated grid output current	43.3 Aa.c. (PWS2-30P-EX) 43.2 Aa.c. (PWS2-29P-EX)
Max. grid continuous output current	47.6 Aa.c. (PWS2-30P-EX) 43.2 Aa.c. (PWS2-29P-EX)
Power factor	0.9 leading~0.9 lagging

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Unit Certificate		
Manufacturer	Shenzhen Sinexcel Electric Co., Ltd.	
Power generation unit type	[converter]: <u>PWS2-30P-EX, PWS2-29P-EX</u> Remark: certified on representative model PWS2-30P-EX of family design products, results of the measurement of PWS2-30P-EX can be transferred to other models based on transferability rule of measurements in DIN VDE V 0124-100 (VDE V 0124-100):2020.	
Technical data	Max. active power $P_{E_{max}}$	30019.13 W (PWS2-30P-EX)
	Max. apparent power $S_{E_{max}}$	33077.23 VA (PWS2-30P-EX)
	Rated voltage	3/N/PE, 400/230 V
	Rated current (AC) I_r	43.3 A (PWS2-30P-EX)
	Initial short-circuit AC current	47.6 A (PWS2-30P-EX)
Network connection rule	VDE-AR-N 4105 “Generators connected to the low-voltage distribution network” Technical minimum requirements for connection and parallel operation of power generation systems connected to the low-voltage network	
Test requirement	DIN VDE V 0124-100 (VDE V 0124-100) “Network integration of power generation systems – Low voltage” Test requirements for power generation units intended for connection to and parallel operation on the low-voltage network	
Test report	64.290.21.30881.01 from 13.06.2022	
The above designated power generation unit meets the requirements of VDE-AR-N 4105		
This unit certificate includes extract report information of E.5 of VDE-AR-N 4105 for the power generation unit(s)		

Certificate of Conformity

No. ESY 076777 0040 Rev. 00

Certificate of NS protection	
Manufacturer	Shenzhen Sinexcel Electric Co., Ltd.
Type of NS protection	Integrated NS protection
Central NS protection	No
Integrated NS protection	Yes Assigned to power generation unit of type: PWS2-30P-EX, PWS2-29P-EX
Network connection rule	VDE-AR-N 4105 “Generators connected to the low-voltage distribution network” Technical minimum requirements for connection and parallel operation of power generation systems connected to the low-voltage network
Test requirement	DIN VDE V 0124-100 (VDE V 0124-100) “Network integration of power generation systems – Low voltage” Test requirements for power generation units intended for connection to and parallel operation on the low-voltage network
Test report	64.290.21.30881.01 from 13.06.2022
The network and system protection designated above meets the requirements of VDE-AR-N 4105.	
This certificate of NS protection includes extract report information of E.7 of VDE-AR-N 4105 for the NS protection.	

Certificate of Conformity

No. ESY 076777 0040 Rev. 00

E.5 Test report "Network interactions " for generating units with an input current > 75 A

Extract from test report for unit certificate "Determination of electrical properties"		No. 64.290.21.30881.01
Generation unit manufacturer:	Shenzhen Sinexcel Electric Co., Ltd.	
Manufacturer indications:	Type of system	Bi-directional Hybrid Energy Storage Inverter
	Max. active power $P_{E_{max}}$	30019.13 W (PWS2-30P-EX) 299920.96 W (PWS2-29P-EX)
	Rated voltage	3/N/PE~, 400/230 V
Period of measurement:	From 2021-12-10 to 2022-06-09	
Rapid voltage change (PWS2-30P-EX)		
Connection without provisions (regarding the primary energy carrier)	$k_i=0.53$	
Most adverse case when switching between generator levels Remark: Not applicable for PV system	$k_i=0.52$	
Connection at nominal conditions (of the primary energy carrier)	$k_i=1.03$	
Disconnection at rated power	$k_i=1.03$	
Worst case value of all switching operations	$k_{i_{max}}=1.03$	

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Flicker – EN 61000-3-11						
Simulated network voltage (V)	L1 (P-N)	231.6		Network impedance	L1	0.24Ω+j0.15Ω
	L2(P-N)	231.5			L2	0.24Ω+j0.15Ω
	L3(P-N)	231.2			L3	0.24Ω+j0.15Ω
	--	--			N	0.16Ω+j0.10Ω
EZE operating current (A)	L1	42.9		EZE operating power (kVA)	L1	9935.6
	L2	43.1			L2	9977.7
	L3	43.1			L3	9964.7
Simulated network frequency (Hz)	50		Short circuit power Sk (VA)	990000		
Plt (Maximum measured Pst)	L1	0.078		EZE nominal power (Pn/W)	30000	
	L2	0.176				
	L3	0.077				
Maximum flicker coefficient Cφk	L1	2.544		--	--	
	L2	5.808				
	L3	2.541				
Pst	#1	#2	#3	#4	#5	#6
L1	0.066	0.066	0.063	0.067	0.067	0.078
L2	0.176	0.173	0.176	0.170	0.171	0.174
L3	0.068	0.068	0.069	0.072	0.072	0.077
Pst	#7	#8	#9	#10	#11	#12
L1	0.075	0.072	0.077	0.077	0.073	0.070
L2	0.171	0.172	0.169	0.168	0.164	0.159
L3	0.076	0.075	0.075	0.074	0.075	0.074

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Harmonics												
Phase L1												
Harm on. Nr.	P/P _{E_{max}}											Limit (%)
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	
0	0.10%	0.13%	0.13%	0.12%	0.12%	0.14%	0.16%	0.18%	0.19%	0.23%	0.26%	0.5% IR
1	3.42%	9.21%	19.20%	29.29%	39.38%	49.16%	59.26%	69.05%	79.17%	88.97%	99.07%	-
2	0.03%	0.10%	0.14%	0.20%	0.27%	0.30%	0.39%	0.46%	0.54%	0.60%	0.64%	8.0
3	0.00%	0.51%	0.47%	0.87%	1.06%	1.18%	1.27%	1.37%	1.47%	1.60%	1.73%	-
4	0.03%	0.05%	0.06%	0.08%	0.10%	0.13%	0.15%	0.18%	0.21%	0.24%	0.25%	4.0
5	0.22%	0.11%	0.25%	0.22%	0.52%	0.69%	0.81%	0.89%	0.97%	1.04%	1.13%	10.7
6	0.00%	0.04%	0.05%	0.07%	0.10%	0.12%	0.15%	0.17%	0.19%	0.22%	0.24%	2.67
7	0.21%	0.74%	0.52%	0.47%	0.67%	0.81%	0.89%	0.94%	0.96%	0.99%	1.01%	7.2
8	0.02%	0.04%	0.04%	0.05%	0.06%	0.07%	0.08%	0.10%	0.10%	0.11%	0.13%	2.0
9	0.01%	0.07%	0.23%	0.13%	0.14%	0.22%	0.26%	0.30%	0.32%	0.34%	0.36%	-
10	0.02%	0.03%	0.04%	0.04%	0.05%	0.06%	0.07%	0.08%	0.09%	0.10%	0.11%	1.6
11	0.17%	0.10%	0.09%	0.05%	0.06%	0.06%	0.10%	0.15%	0.19%	0.21%	0.24%	3.1
12	0.00%	0.02%	0.03%	0.04%	0.04%	0.05%	0.06%	0.07%	0.08%	0.09%	0.09%	1.33
13	0.15%	0.26%	0.25%	0.33%	0.32%	0.35%	0.39%	0.41%	0.42%	0.44%	0.46%	2.0
14	0.01%	0.02%	0.02%	0.03%	0.03%	0.04%	0.05%	0.05%	0.05%	0.06%	0.07%	-
15	0.00%	0.03%	0.04%	0.08%	0.07%	0.09%	0.12%	0.14%	0.13%	0.14%	0.15%	-
16	0.01%	0.03%	0.02%	0.03%	0.03%	0.04%	0.05%	0.05%	0.05%	0.06%	0.07%	-
17	0.09%	0.07%	0.04%	0.04%	0.05%	0.06%	0.05%	0.07%	0.09%	0.09%	0.11%	-
18	0.00%	0.02%	0.02%	0.02%	0.03%	0.03%	0.04%	0.04%	0.05%	0.05%	0.06%	-
19	0.07%	0.07%	0.10%	0.11%	0.14%	0.11%	0.16%	0.21%	0.23%	0.22%	0.21%	-
20	0.00%	0.02%	0.02%	0.02%	0.02%	0.03%	0.03%	0.03%	0.04%	0.04%	0.05%	-
21	0.00%	0.02%	0.02%	0.02%	0.04%	0.03%	0.03%	0.06%	0.09%	0.10%	0.10%	-
22	0.01%	0.02%	0.02%	0.02%	0.02%	0.03%	0.03%	0.03%	0.04%	0.04%	0.04%	-
23	0.03%	0.03%	0.02%	0.02%	0.03%	0.03%	0.03%	0.04%	0.07%	0.10%	0.12%	-
24	0.00%	0.02%	0.02%	0.02%	0.02%	0.02%	0.03%	0.03%	0.03%	0.05%	0.04%	-
25	0.01%	0.03%	0.03%	0.03%	0.02%	0.05%	0.03%	0.04%	0.07%	0.09%	0.11%	-
26	0.01%	0.01%	0.03%	0.02%	0.02%	0.02%	0.02%	0.03%	0.04%	0.04%	0.03%	-
27	0.00%	0.02%	0.03%	0.02%	0.02%	0.03%	0.03%	0.03%	0.03%	0.05%	0.07%	-
28	0.01%	0.02%	0.03%	0.02%	0.02%	0.02%	0.02%	0.03%	0.03%	0.03%	0.03%	-
29	0.01%	0.02%	0.03%	0.02%	0.02%	0.03%	0.04%	0.04%	0.04%	0.05%	0.07%	-
30	0.00%	0.02%	0.02%	0.03%	0.02%	0.02%	0.03%	0.02%	0.03%	0.03%	0.03%	-
31	0.02%	0.03%	0.03%	0.04%	0.03%	0.04%	0.03%	0.02%	0.03%	0.03%	0.03%	-
32	0.01%	0.01%	0.01%	0.03%	0.02%	0.02%	0.02%	0.02%	0.03%	0.02%	0.02%	-
33	0.00%	0.02%	0.02%	0.02%	0.03%	0.02%	0.02%	0.02%	0.04%	0.03%	0.03%	-
34	0.01%	0.01%	0.01%	0.02%	0.03%	0.03%	0.02%	0.02%	0.03%	0.02%	0.02%	-
35	0.02%	0.01%	0.01%	0.02%	0.03%	0.03%	0.04%	0.04%	0.03%	0.03%	0.04%	-
36	0.00%	0.01%	0.01%	0.01%	0.03%	0.03%	0.04%	0.04%	0.02%	0.02%	0.02%	-
37	0.02%	0.02%	0.02%	0.03%	0.04%	0.03%	0.03%	0.04%	0.03%	0.02%	0.02%	-
38	0.01%	0.01%	0.01%	0.02%	0.03%	0.02%	0.03%	0.03%	0.03%	0.02%	0.02%	-
39	0.01%	0.01%	0.01%	0.03%	0.02%	0.02%	0.02%	0.02%	0.03%	0.02%	0.03%	-
40	0.01%	0.01%	0.01%	0.02%	0.01%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	-
THD	0.40%	0.97%	0.85%	1.12%	1.45%	1.70%	1.89%	2.06%	2.20%	2.37%	2.53%	13
PWH D	0.13%	0.14%	0.15%	0.18%	0.21%	0.21%	0.26%	0.31%	0.35%	0.37%	0.39%	22

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Harm on. Nr.	Phase L2											Limit (%)
	P/P _{E_{max}}											
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	
0	0.11%	0.14%	0.13%	0.15%	0.15%	0.17%	0.21%	0.21%	0.25%	0.29%	0.33%	0.5% IR
1	3.38%	10.31%	20.38%	30.49%	40.60%	50.38%	60.49%	70.27%	80.38%	90.18%	100.26%	-
2	0.03%	0.11%	0.13%	0.18%	0.25%	0.31%	0.39%	0.46%	0.51%	0.59%	0.64%	8.0
3	0.01%	0.57%	0.52%	0.81%	0.95%	1.04%	1.11%	1.19%	1.29%	1.39%	1.51%	-
4	0.03%	0.06%	0.06%	0.08%	0.10%	0.13%	0.15%	0.18%	0.21%	0.23%	0.26%	4.0
5	0.22%	0.11%	0.19%	0.24%	0.52%	0.68%	0.79%	0.87%	0.94%	1.00%	1.09%	10.7
6	0.00%	0.04%	0.05%	0.08%	0.10%	0.12%	0.15%	0.17%	0.20%	0.22%	0.24%	2.67
7	0.20%	0.76%	0.49%	0.48%	0.67%	0.80%	0.88%	0.92%	0.95%	0.98%	1.00%	7.2
8	0.03%	0.04%	0.05%	0.05%	0.06%	0.08%	0.09%	0.10%	0.11%	0.12%	0.13%	2.0
9	0.00%	0.10%	0.21%	0.13%	0.16%	0.23%	0.27%	0.30%	0.33%	0.35%	0.37%	-
10	0.02%	0.03%	0.04%	0.04%	0.06%	0.06%	0.07%	0.08%	0.10%	0.10%	0.11%	1.6
11	0.17%	0.12%	0.12%	0.05%	0.06%	0.05%	0.10%	0.14%	0.18%	0.20%	0.24%	3.1
12	0.00%	0.03%	0.03%	0.04%	0.04%	0.05%	0.06%	0.07%	0.08%	0.09%	0.10%	1.33
13	0.14%	0.28%	0.26%	0.33%	0.32%	0.35%	0.39%	0.40%	0.41%	0.43%	0.45%	2.0
14	0.01%	0.02%	0.03%	0.03%	0.03%	0.04%	0.04%	0.05%	0.05%	0.06%	0.07%	-
15	0.00%	0.02%	0.05%	0.08%	0.08%	0.11%	0.13%	0.14%	0.14%	0.15%	0.16%	-
16	0.01%	0.02%	0.02%	0.03%	0.03%	0.04%	0.05%	0.05%	0.05%	0.06%	0.06%	-
17	0.09%	0.08%	0.06%	0.04%	0.06%	0.05%	0.04%	0.06%	0.07%	0.08%	0.10%	-
18	0.00%	0.02%	0.02%	0.02%	0.03%	0.03%	0.04%	0.04%	0.04%	0.05%	0.06%	-
19	0.07%	0.08%	0.10%	0.12%	0.14%	0.13%	0.17%	0.21%	0.23%	0.23%	0.21%	-
20	0.00%	0.02%	0.02%	0.02%	0.02%	0.03%	0.03%	0.03%	0.04%	0.04%	0.05%	-
21	0.00%	0.02%	0.02%	0.02%	0.05%	0.03%	0.04%	0.07%	0.10%	0.11%	0.10%	-
22	0.00%	0.02%	0.02%	0.02%	0.02%	0.03%	0.03%	0.03%	0.04%	0.04%	0.04%	-
23	0.03%	0.03%	0.02%	0.02%	0.03%	0.03%	0.03%	0.04%	0.07%	0.10%	0.11%	-
24	0.00%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.03%	0.03%	0.04%	0.04%	-
25	0.01%	0.02%	0.02%	0.03%	0.03%	0.05%	0.04%	0.04%	0.07%	0.10%	0.12%	-
26	0.01%	0.01%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.03%	0.03%	0.03%	-
27	0.00%	0.02%	0.03%	0.02%	0.02%	0.03%	0.03%	0.03%	0.03%	0.05%	0.07%	-
28	0.01%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.03%	0.03%	0.03%	0.03%	-
29	0.01%	0.02%	0.02%	0.02%	0.02%	0.03%	0.04%	0.03%	0.04%	0.05%	0.08%	-
30	0.00%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.03%	-
31	0.02%	0.03%	0.02%	0.03%	0.02%	0.03%	0.03%	0.02%	0.03%	0.02%	0.04%	-
32	0.01%	0.01%	0.01%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.03%	-
33	0.00%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.03%	0.03%	0.03%	0.03%	-
34	0.00%	0.01%	0.01%	0.01%	0.02%	0.03%	0.02%	0.02%	0.02%	0.02%	0.02%	-
35	0.02%	0.01%	0.01%	0.01%	0.02%	0.03%	0.03%	0.04%	0.03%	0.03%	0.04%	-
36	0.00%	0.01%	0.01%	0.01%	0.02%	0.03%	0.03%	0.03%	0.02%	0.02%	0.02%	-
37	0.02%	0.02%	0.03%	0.03%	0.03%	0.02%	0.02%	0.03%	0.02%	0.02%	0.02%	-
38	0.00%	0.01%	0.01%	0.02%	0.02%	0.02%	0.02%	0.02%	0.03%	0.02%	0.02%	-
39	0.00%	0.01%	0.01%	0.03%	0.02%	0.02%	0.02%	0.02%	0.03%	0.02%	0.03%	-
40	0.00%	0.01%	0.01%	0.02%	0.01%	0.01%	0.01%	0.01%	0.02%	0.02%	0.02%	-
THD	0.39%	1.03%	0.85%	1.08%	1.37%	1.60%	1.77%	1.92%	2.06%	2.21%	2.37%	13
PWH D	0.13%	0.15%	0.16%	0.18%	0.21%	0.23%	0.26%	0.31%	0.35%	0.37%	0.39%	22

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Harm on. Nr.	Phase L3											Limit (%)
	P/P _{E_{max}}											
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	
0	0.13%	0.14%	0.17%	0.17%	0.18%	0.21%	0.26%	0.32%	0.36%	0.41%	0.49%	0.5% IR
1	3.37%	10.35%	20.28%	30.37%	40.40%	50.16%	60.21%	69.99%	80.07%	89.85%	99.93%	-
2	0.04%	0.11%	0.12%	0.17%	0.23%	0.29%	0.35%	0.41%	0.48%	0.54%	0.60%	8.0
3	0.01%	0.70%	0.58%	0.85%	0.98%	1.08%	1.16%	1.27%	1.37%	1.50%	1.61%	-
4	0.03%	0.06%	0.06%	0.07%	0.10%	0.13%	0.16%	0.18%	0.20%	0.23%	0.26%	4.0
5	0.22%	0.09%	0.23%	0.23%	0.54%	0.70%	0.82%	0.89%	0.99%	1.06%	1.16%	10.7
6	0.00%	0.04%	0.05%	0.07%	0.10%	0.12%	0.15%	0.17%	0.19%	0.21%	0.23%	2.67
7	0.21%	0.80%	0.50%	0.47%	0.69%	0.83%	0.91%	0.95%	0.97%	1.00%	1.02%	7.2
8	0.03%	0.04%	0.04%	0.05%	0.06%	0.07%	0.08%	0.09%	0.11%	0.12%	0.12%	2.0
9	0.00%	0.10%	0.24%	0.12%	0.14%	0.24%	0.28%	0.33%	0.35%	0.36%	0.38%	-
10	0.02%	0.03%	0.04%	0.04%	0.05%	0.06%	0.07%	0.08%	0.09%	0.09%	0.11%	1.6
11	0.17%	0.11%	0.12%	0.06%	0.07%	0.06%	0.12%	0.16%	0.21%	0.23%	0.26%	3.1
12	0.00%	0.02%	0.03%	0.03%	0.04%	0.05%	0.06%	0.07%	0.08%	0.08%	0.09%	1.33
13	0.15%	0.29%	0.26%	0.34%	0.32%	0.34%	0.40%	0.42%	0.43%	0.47%	0.48%	2.0
14	0.01%	0.02%	0.02%	0.03%	0.03%	0.04%	0.05%	0.05%	0.05%	0.06%	0.07%	-
15	0.00%	0.03%	0.05%	0.09%	0.09%	0.09%	0.11%	0.15%	0.14%	0.16%	0.18%	-
16	0.01%	0.02%	0.02%	0.03%	0.03%	0.04%	0.04%	0.05%	0.05%	0.06%	0.06%	-
17	0.10%	0.07%	0.04%	0.03%	0.05%	0.05%	0.04%	0.07%	0.09%	0.09%	0.12%	-
18	0.00%	0.02%	0.02%	0.02%	0.03%	0.03%	0.03%	0.04%	0.04%	0.05%	0.05%	-
19	0.07%	0.08%	0.11%	0.13%	0.14%	0.14%	0.17%	0.20%	0.23%	0.23%	0.21%	-
20	0.01%	0.02%	0.02%	0.02%	0.02%	0.03%	0.03%	0.03%	0.04%	0.04%	0.05%	-
21	0.00%	0.02%	0.02%	0.03%	0.05%	0.03%	0.04%	0.07%	0.09%	0.11%	0.10%	-
22	0.00%	0.02%	0.02%	0.02%	0.02%	0.03%	0.03%	0.03%	0.03%	0.04%	0.04%	-
23	0.03%	0.03%	0.02%	0.02%	0.03%	0.03%	0.03%	0.05%	0.07%	0.09%	0.11%	-
24	0.00%	0.02%	0.02%	0.02%	0.02%	0.02%	0.03%	0.03%	0.03%	0.04%	0.04%	-
25	0.01%	0.02%	0.02%	0.02%	0.04%	0.05%	0.04%	0.05%	0.08%	0.09%	0.12%	-
26	0.01%	0.01%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.03%	0.04%	0.03%	-
27	0.00%	0.02%	0.03%	0.02%	0.02%	0.04%	0.03%	0.03%	0.04%	0.06%	0.07%	-
28	0.01%	0.01%	0.02%	0.02%	0.02%	0.02%	0.02%	0.03%	0.03%	0.03%	0.03%	-
29	0.01%	0.02%	0.02%	0.02%	0.02%	0.04%	0.04%	0.04%	0.05%	0.06%	0.07%	-
30	0.00%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.03%	0.02%	0.03%	-
31	0.02%	0.04%	0.02%	0.04%	0.03%	0.03%	0.03%	0.02%	0.03%	0.02%	0.04%	-
32	0.01%	0.01%	0.01%	0.03%	0.02%	0.02%	0.02%	0.02%	0.03%	0.02%	0.02%	-
33	0.00%	0.02%	0.02%	0.02%	0.02%	0.02%	0.03%	0.02%	0.03%	0.03%	0.03%	-
34	0.00%	0.01%	0.01%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	-
35	0.02%	0.01%	0.01%	0.02%	0.02%	0.03%	0.03%	0.04%	0.04%	0.04%	0.04%	-
36	0.01%	0.01%	0.01%	0.01%	0.02%	0.02%	0.03%	0.03%	0.02%	0.02%	0.02%	-
37	0.02%	0.03%	0.02%	0.02%	0.03%	0.02%	0.03%	0.04%	0.02%	0.02%	0.02%	-
38	0.01%	0.01%	0.02%	0.02%	0.03%	0.02%	0.03%	0.03%	0.02%	0.02%	0.02%	-
39	0.00%	0.01%	0.01%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.03%	-
40	0.01%	0.01%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	-
THD	0.41%	1.13%	0.91%	1.10%	1.41%	1.64%	1.83%	1.99%	2.15%	2.31%	2.47%	13
PWH D	0.13%	0.15%	0.16%	0.20%	0.22%	0.22%	0.26%	0.31%	0.35%	0.38%	0.40%	22

Remark: Iref=43.3 Aa.c. Harmonics of PGU test according to IEC 61000-3-12

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E.7 Requirement for the test report for the NS protection

Extract from test report for NS protection "Determination of electrical properties"		No. 64.290.21.30881.01	
NS protection test report			
Type of NS system:	Integrated NS protection	Other Manufacturer indications	
Firmware version & Software version:	v1.0 & v1.0		
Manufacturer:	Shenzhen Sinexcel Electric Co., Ltd. Building 6, BaiWangXin High-tech Industrial Park, Nanshan District, 518055 Shen-zhen City, PEOPLE'S REPUBLIC OF CHINA		
Measuring period:	From 2021-12-10 to 2022-06-09		
Inverter			
Protection function	Setting value	Tripping value	Break time NS protection
Rise-in-voltage protection $U >>$	$1.25 U_n$	L1-N/L2-N/L3-N: 288.3 V/288.5 V/288.4 V; L1-N: 288.5 V; L2-N: 289.1 V; L3-N: 289.3 V; L1-L2: 497.6 V; L2-L3: 496.9 V; L3-L1: 497.3 V;	L1-N/L2-N/L3-N: 123.0 ms; L1-N: 138.0 ms; L2-N: 130.0 ms; L3-N: 126.0 ms; L1-L2: 130.1 ms; L2-L3: 136.5 ms; L3-L1: 133.9 ms;
Rise-in-voltage protection $U >$	$1.10 \cdot U_n$	1.00Un – 1.12Un 230 V – 257.6 V	L1-N: 485.0 s; L2-N: 486.0 s; L3-N: 494.0 s;
		1.00Un – 1.08Un 230 V – 248.4 V	L1-N: No disconnection; L2-N: No disconnection; L3-N: No disconnection;
		1.06Un - 1.14Un 243.8 V - 262.2 V	L1-N: 304.0 s; L2-N: 289.0 s; L3-N: 303.0 s;
Voltage drop protection $U <$	$0.8 U_n$	L1-N/L2-N/L3-N: 183.3 V/183.2 V/183.2 V; L1-N: 182.9 V; L2-N: 183.2 V; L3-N: 183.2 V; L1-L2: 317.3 V; L2-L3: 317.3 V; L3-L1: 317.3 V;	L1-N/L2-N/L3-N: 3040 ms; L1-N: 3030ms; L2-N: 3060ms; L3-N: 3050ms; L1-L2: 3030ms; L2-L3: 3020ms; L3-L1: 3030ms;

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Voltage drop protection $U <<$	$0.45 U_n$	L1-N/L2-N/L3-N: 103.1 V/103.2 V/103.2 V; L1-N: 102.1 V; L2-N: 102.2 V; L3-N: 102.1 V; L1-L2: 180.7 V; L2-L3: 178.9 V; L3-L1: 180.3 V;	L1-N/L2-N/L3-N: 318.0 ms; L1-N: 310.0 ms; L2-N: 328.0 ms; L3-N: 338.0 ms; L1-L2: 336.8 ms; L2-L3: 325.7 ms; L3-L1: 322.4 ms;
Frequency decrease protection $f <$	47.5 Hz	47.50 Hz	144.8 ms
Frequency increase protection $f >$	51.5 Hz	51.50 Hz	136.2 ms
*: The above tripping time includes the entire function chain "integrated NS protection – interface switch"			
<input checked="" type="checkbox"/> as integrated NS protection			
Assigned to power generation unit type	Type 2		
Integrated interface switch type	Series-connected relays for both the neutral conductor and the line conductor Relay type: CHS01-V-124HA2(60G)		
Response time of interface switch for integrated NS protection	Max. 15 ms		
Verification of the entire functional chain "integrated NS protection – interface switch" has resulted in successful disconnection.	<input checked="" type="checkbox"/> Yes		
Note: Integrated NS protection – Interface switch function is enabled for model PWS2-30P-EX and PWS2-29P-EX by default. At grid connection point with the maximum apparent power higher than 30kVA, central NS protection device shall be installed.			