

Certificate of Conformity

No. ESY 091566 0090 Rev. 00

Holder of Certificate: **SINENG ELECTRIC CO.,LTD.**

No.6 Hehui Road, Huishan District
214174 Wuxi City
PEOPLE'S REPUBLIC OF CHINA

Product: **Converter**
Hybrid Inverter

Model(s): **SN5.0HT, SN6.0HT, SN8.0HT, SN10HT,
SN10HT-X, SN12HT, SN15HT**

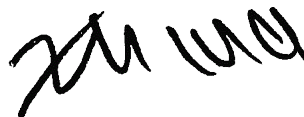
Parameters: Please see pages 2 to 21.

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.: 5040924001320-00

Date, 2024-05-13



(Zhengdong Ma)

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Model	SN5.0HT	SN6.0HT	SN8.0HT
PV Input Parameters:			
Max. Input Voltage	DC 1000 V		
Max. Input Current	DC 18/18 A		
Isc PV (Absolute Max.)	DC 25/25 A		
MPPT Voltage Range	DC 160, ..., 950 V		
AC Output Parameters:			
Nominal Output Power	5 kW	6 kW	8 kW
Rated Apparent Output Power	5 kVA	6 kVA	8 kVA
Max. Apparent Output Power	5.5 kVA	6.6 kVA	8.8 kVA
Nominal Voltage	3/N/PE AC 230/400 V		
Nominal Frequency	50 Hz		
Rated Output Current	AC 7.3 A	AC 8.7 A	AC 11.6 A
Max. Output Current	AC 8.0 A	AC 9.6 A	AC 12.8 A
Power Factor	0.8(leading), ..., 0.8(lagging)		
Battery			
Voltage Range	DC 160, ..., 600 V		
Rated (Max.) Charge/Discharge Current	DC 25/25 A		
Battery Type	Li-ion		

Model	SN10HT
PV Input Parameters:	
Max. Input Voltage	DC 1000 V
Max. Input Current	DC 18/18 A
Isc PV (Absolute Max.)	DC 25/25 A
MPPT Voltage Range	DC 160, ..., 950 V
AC Output Parameters:	
Nominal Output Power	10 kW
Rated Apparent Output Power	10 kVA
Max. Apparent Output Power	11 kVA
Nominal Voltage	3/N/PE AC 230/400 V
Nominal Frequency	50 Hz
Rated Output Current	AC 14.5 A
Max. Output Current	AC 16.0 A
Power Factor	0.8(leading), ..., 0.8(lagging)
Battery	
Voltage Range	DC 160, ..., 600 V
Rated (Max.) Charge/Discharge Current	DC 25/25 A
Battery Type	Li-ion

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Model	SN10HT-X	SN12HT	SN15HT
PV Input Parameters:			
Max. Input Voltage	DC 1000 V		
Max. Input Current	DC 32/18 A		
Isc PV (Absolute Max.)	DC 40/25 A		
MPPT Voltage Range	DC 160, ..., 950 V		
AC Output Parameters:			
Nominal Output Power	10 kW	12 kW	15 kW
Rated Apparent Output Power	10 kVA	12 kVA	15 kVA
Max. Apparent Output Power	11 kVA	13.2 kVA	16.5 kVA
Nominal Voltage	3/N/PE AC 230/400 V		
Nominal Frequency	50 Hz		
Rated Output Current	AC 14.5 A	AC 17.4 A	AC 21.8 A
Max. Output Current	AC 16.0 A	AC 19.2 A	AC 24 A
Power Factor	0.8(leading), ..., 0.8(lagging)		
Battery			
Voltage Range	DC 160, ..., 600 V		
Rated (Max.) Charge/Discharge Current	DC 30/30 A		
Battery Type	Li-ion		

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E.4 Unit certificate

Unit certificate	No. 5040924001320-00	
Manufacturer	SINENG ELECTRIC CO., Ltd. No.6 Hehui Road, Huishan District, 214174, Wuxi City, PEOPLE'S REPUBLIC OF CHINA	
Power generation unit type	[GRID-CONNECTED HYBRID INVERTER]: SN5.0HT, SN6.0HT, SN8.0HT, SN10HT, SN10HT-X, SN12HT, SN15HT Remark: certified on representative model SN15HT of family design products, results of the measurement of SN15HT can be transferred to the other models based on transferability rule of measurements in DIN VDE V 0124-100 (VDE V 0124-100):2020.	
☒ Inverter	☐ Asynchronous generator	☐ Synchronous generator
☐ Stirling generator	☐ Fuel cell	☐ others
Assessment values	Max. active power $P_{E_{max}}$	14970 W
	Max. apparent power $S_{E_{max}}$	16583 VA
	Rated voltage	3/N/PE AC 230/400 V
Rated values	Rated current (AC) I_r	21.8 Aa.c.
Rated values	Max. current (AC) I_{max}	24.0 Aa.c.
Rated values	Initial short-circuit current I_k ”	35.0 Aa.c.
Network connection rules	VDE-AR-N 4105:2018-11/Corrigendum 1:2020-10 Generators connected to the low-voltage distribution network - Technical requirements for the connection to and parallel operation with low-voltage distribution networks.	
Test requirement	DIN VDE V 0124-100 (VDE V 0124-100):2020-06 “Network integration of power generation system – Low voltage” Test requirements for power generation units intended for connection to and parallel operation on the low-voltage network.	
The above mentioned power generation unit meets the requirements of VDE-AR-N 4105.		

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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. 5040924001320-00
Generation unit manufacturer:	SINENG ELECTRIC CO., Ltd. No.6 Hehui Road, Huishan District, 214174, Wuxi City, PEOPLE'S REPUBLIC OF CHINA	
Manufacturer indications:	Type of system	Inverter for PV and Battery System
	Max. active power $P_{E_{max}}$	5 kW (SN5.0HT) 6 kW (SN6.0HT) 8 kW (SN8.0HT) 10 kW (SN10HT, SN10HT-X) 12 kW (SN12HT) 15 kW (SN15HT)
	Rated voltage	3/N/PE AC 230/400 V
	Period of measurement:	From 2023-12-09 to 2024-05-06

Rapid voltage changes and flicker (DIN EN 61000-3-11)				
Phase	P_{st}	$d(t) - 500ms$ [%]	dc [%]	d_{max} [%]
Limit	1.0	3.3%	3.3%	4%
L1	0.056	0	0.039	0.524
	0.057	0	0.031	0.521
	0.057	0	0.038	0.039
	0.057	0	0.081	0.558
	0.058	0	0.049	0.108
	0.058	0	0.026	0.499
	0.058	0	0.041	0.536
	0.059	0	0.048	0.109
	0.073	0	0.046	0.521
	0.057	0	0.011	0.500
	0.057	0	0.022	0.474
	0.057	0	0.042	0.524
L2	0.020	0	0.013	0.516
	0.021	0	0.014	0.511
	0.022	0	0.002	0.510
	0.025	0	0.004	0.504
	0.024	0	0.004	0.502
	0.025	0	0.028	0.530
	0.027	0	0.003	0.501
	0.028	0	0.006	0.499
	0.061	0	0.002	0.497
	0.025	0	0.011	0.497
	0.024	0	0.013	0.501
	0.024	0	0.001	0.511
L3	0.100	0	0.004	0.076
	0.100	0	0.082	0.557
	0.100	0	0.061	0.562

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	0.101	0	0.048	0.552
	0.102	0	0.101	0.600
	0.101	0	0.055	0.590
	0.102	0	0.052	0.552
	0.102	0	0.073	0.575
	0.110	0	0.017	0.492
	0.102	0	0.079	0.554
	0.101	0	0.050	0.553
	0.101	0	0.057	0.559
P_{lt} measured	0.073/0.061/0.110		P_{lt} limit	0.65
	d(t) - 500ms [%]		dc [%]	dmax [%]
START	0.00		0.06	0.61
STOP	0.00		0.06	0.58
LIMIT	3.3%		3.3%	4%

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Harmonics IEC 61000-3-2(≤16 A) (SN5.0HT)												
L1												
Power P/Pn[%]	5	10	20	30	40	50	60	70	80	90	100	Limit
Ordinal number	A	A	A	A	A	A	A	A	A	A	A	A
2	0.012	0.013	0.013	0.013	0.013	0.013	0.012	0.012	0.012	0.011	0.013	1.080
3	0.008	0.009	0.009	0.009	0.010	0.010	0.010	0.010	0.009	0.009	0.010	2.300
4	0.011	0.013	0.013	0.014	0.014	0.015	0.015	0.015	0.014	0.014	0.014	0.430
5	0.040	0.036	0.037	0.042	0.047	0.051	0.054	0.057	0.060	0.062	0.063	1.140
6	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.008	0.008	0.008	0.300
7	0.013	0.015	0.020	0.025	0.029	0.031	0.035	0.040	0.043	0.045	0.047	0.770
8	0.007	0.007	0.008	0.008	0.008	0.008	0.008	0.008	0.009	0.009	0.008	0.230
9	0.007	0.007	0.008	0.007	0.007	0.008	0.007	0.008	0.008	0.008	0.008	0.400
10	0.007	0.007	0.007	0.007	0.008	0.008	0.008	0.008	0.008	0.009	0.008	0.184
11	0.022	0.031	0.023	0.010	0.010	0.018	0.027	0.036	0.043	0.046	0.052	0.330
12	0.007	0.008	0.007	0.007	0.008	0.008	0.008	0.008	0.008	0.009	0.008	0.153
13	0.011	0.024	0.029	0.022	0.013	0.008	0.009	0.016	0.022	0.029	0.033	0.210
14	0.009	0.009	0.008	0.008	0.009	0.009	0.010	0.009	0.009	0.010	0.011	0.131
15	0.008	0.009	0.008	0.007	0.010	0.010	0.009	0.009	0.009	0.009	0.010	0.150
16	0.008	0.008	0.008	0.008	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.115
17	0.013	0.009	0.028	0.037	0.034	0.026	0.016	0.011	0.012	0.016	0.023	0.132
18	0.008	0.008	0.008	0.007	0.009	0.009	0.009	0.009	0.009	0.009	0.010	0.102
19	0.009	0.008	0.016	0.027	0.031	0.027	0.019	0.012	0.009	0.010	0.013	0.118
20	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.009	0.009	0.010	0.009	0.092

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21	0.008	0.008	0.007	0.007	0.008	0.008	0.009	0.009	0.009	0.010	0.009	0.107
22	0.007	0.007	0.008	0.007	0.008	0.008	0.008	0.009	0.009	0.009	0.009	0.084
23	0.011	0.009	0.012	0.011	0.025	0.029	0.027	0.022	0.016	0.010	0.010	0.098
24	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.008	0.007	0.077
25	0.009	0.007	0.011	0.009	0.015	0.021	0.022	0.021	0.018	0.014	0.010	0.090
26	0.008	0.008	0.007	0.007	0.008	0.008	0.008	0.008	0.008	0.009	0.008	0.071
27	0.008	0.008	0.007	0.007	0.008	0.008	0.008	0.008	0.009	0.009	0.009	0.083
28	0.008	0.008	0.007	0.007	0.009	0.009	0.009	0.009	0.009	0.010	0.010	0.066
29	0.013	0.015	0.007	0.014	0.010	0.013	0.020	0.025	0.024	0.018	0.014	0.078
30	0.008	0.008	0.008	0.007	0.008	0.009	0.009	0.009	0.009	0.010	0.010	0.061
31	0.011	0.011	0.008	0.010	0.013	0.012	0.015	0.022	0.023	0.022	0.017	0.073
32	0.008	0.009	0.008	0.007	0.008	0.008	0.008	0.009	0.009	0.010	0.009	0.058
33	0.009	0.009	0.008	0.007	0.009	0.009	0.009	0.008	0.008	0.009	0.009	0.068
34	0.009	0.009	0.008	0.008	0.009	0.009	0.009	0.010	0.010	0.011	0.012	0.054
35	0.012	0.012	0.010	0.007	0.014	0.016	0.015	0.018	0.021	0.020	0.016	0.064
36	0.008	0.008	0.008	0.007	0.009	0.009	0.009	0.009	0.010	0.010	0.010	0.051
37	0.009	0.010	0.009	0.007	0.010	0.013	0.010	0.010	0.010	0.010	0.009	0.061
38	0.008	0.008	0.007	0.007	0.009	0.009	0.010	0.010	0.010	0.011	0.010	0.048
39	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.009	0.008	0.058
40	0.007	0.007	0.008	0.010	0.013	0.014	0.013	0.013	0.013	0.013	0.013	0.046

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L2												
Power P/Pn[%]	5	10	20	30	40	50	60	70	80	90	100	Limit
Ordinal number	A	A	A	A	A	A	A	A	A	A	A	A
2	0.011	0.012	0.013	0.013	0.013	0.013	0.013	0.012	0.012	0.011	0.013	1.080
3	0.010	0.010	0.011	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	2.300
4	0.012	0.014	0.014	0.014	0.015	0.015	0.015	0.015	0.014	0.014	0.014	0.430
5	0.036	0.032	0.037	0.045	0.050	0.053	0.057	0.060	0.063	0.064	0.065	1.140
6	0.007	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.300
7	0.016	0.015	0.018	0.024	0.029	0.033	0.038	0.043	0.047	0.048	0.051	0.770
8	0.007	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.009	0.009	0.009	0.230
9	0.007	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.009	0.008	0.400
10	0.008	0.008	0.008	0.007	0.008	0.008	0.008	0.009	0.009	0.009	0.009	0.184
11	0.020	0.030	0.024	0.012	0.010	0.018	0.028	0.038	0.045	0.048	0.055	0.330
12	0.008	0.008	0.008	0.007	0.008	0.008	0.008	0.008	0.008	0.009	0.009	0.153
13	0.010	0.022	0.030	0.024	0.015	0.009	0.010	0.018	0.025	0.032	0.037	0.210
14	0.009	0.009	0.009	0.008	0.011	0.011	0.010	0.010	0.011	0.011	0.012	0.131
15	0.009	0.009	0.008	0.008	0.010	0.011	0.010	0.010	0.010	0.010	0.011	0.150
16	0.009	0.009	0.009	0.008	0.009	0.010	0.010	0.010	0.010	0.010	0.010	0.115
17	0.012	0.010	0.027	0.035	0.034	0.027	0.018	0.012	0.013	0.017	0.023	0.132
18	0.009	0.009	0.009	0.008	0.010	0.010	0.010	0.010	0.010	0.010	0.012	0.102
19	0.009	0.008	0.015	0.026	0.031	0.028	0.021	0.014	0.010	0.012	0.015	0.118
20	0.009	0.009	0.008	0.008	0.009	0.009	0.009	0.009	0.009	0.010	0.010	0.092

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21	0.008	0.008	0.008	0.008	0.009	0.009	0.009	0.009	0.009	0.010	0.010	0.107
22	0.008	0.008	0.008	0.008	0.008	0.009	0.009	0.009	0.010	0.010	0.009	0.084
23	0.010	0.008	0.011	0.011	0.023	0.029	0.027	0.023	0.017	0.011	0.011	0.098
24	0.007	0.007	0.007	0.007	0.007	0.007	0.008	0.008	0.008	0.008	0.008	0.077
25	0.008	0.007	0.011	0.008	0.014	0.020	0.023	0.023	0.019	0.015	0.011	0.090
26	0.009	0.009	0.008	0.008	0.008	0.008	0.009	0.009	0.009	0.010	0.010	0.071
27	0.009	0.009	0.008	0.007	0.009	0.009	0.009	0.009	0.009	0.010	0.010	0.083
28	0.008	0.009	0.008	0.008	0.009	0.010	0.010	0.010	0.010	0.011	0.011	0.066
29	0.012	0.015	0.008	0.013	0.011	0.012	0.019	0.024	0.024	0.019	0.015	0.078
30	0.009	0.009	0.008	0.008	0.009	0.009	0.009	0.010	0.010	0.011	0.011	0.061
31	0.011	0.011	0.009	0.010	0.014	0.013	0.016	0.023	0.024	0.023	0.018	0.073
32	0.009	0.009	0.008	0.008	0.009	0.009	0.010	0.010	0.010	0.011	0.012	0.058
33	0.009	0.009	0.009	0.008	0.010	0.010	0.009	0.009	0.009	0.009	0.010	0.068
34	0.009	0.009	0.009	0.008	0.010	0.010	0.011	0.011	0.012	0.012	0.013	0.054
35	0.012	0.012	0.010	0.008	0.014	0.016	0.015	0.018	0.021	0.020	0.016	0.064
36	0.008	0.008	0.008	0.008	0.009	0.009	0.010	0.010	0.010	0.011	0.010	0.051
37	0.009	0.009	0.009	0.007	0.010	0.012	0.011	0.010	0.010	0.011	0.010	0.061
38	0.008	0.008	0.008	0.009	0.012	0.013	0.013	0.013	0.013	0.013	0.013	0.048
39	0.007	0.007	0.007	0.007	0.007	0.008	0.007	0.008	0.008	0.009	0.008	0.058
40	0.008	0.008	0.008	0.012	0.015	0.015	0.015	0.015	0.014	0.014	0.014	0.046

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L3												
Power P/Pn[%]	5	10	20	30	40	50	60	70	80	90	100	Limit
Ordinal number	A	A	A	A	A	A	A	A	A	A	A	A
2	0.012	0.014	0.014	0.013	0.014	0.014	0.013	0.013	0.012	0.011	0.013	1.080
3	0.009	0.009	0.010	0.010	0.011	0.011	0.012	0.011	0.011	0.011	0.011	2.300
4	0.012	0.013	0.014	0.014	0.015	0.015	0.016	0.015	0.015	0.015	0.015	0.430
5	0.038	0.033	0.034	0.042	0.048	0.052	0.056	0.059	0.062	0.064	0.065	1.140
6	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.300
7	0.014	0.014	0.020	0.027	0.032	0.035	0.039	0.043	0.047	0.048	0.050	0.770
8	0.007	0.008	0.008	0.008	0.008	0.008	0.009	0.008	0.009	0.009	0.009	0.230
9	0.007	0.007	0.008	0.007	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.400
10	0.008	0.008	0.008	0.008	0.009	0.008	0.008	0.009	0.009	0.009	0.009	0.184
11	0.020	0.028	0.021	0.011	0.009	0.016	0.025	0.035	0.042	0.046	0.052	0.330
12	0.008	0.008	0.008	0.007	0.008	0.008	0.008	0.009	0.009	0.009	0.009	0.153
13	0.010	0.024	0.032	0.024	0.014	0.009	0.012	0.019	0.026	0.033	0.036	0.210
14	0.010	0.010	0.009	0.008	0.011	0.011	0.010	0.010	0.011	0.011	0.012	0.131
15	0.009	0.009	0.009	0.008	0.011	0.011	0.010	0.010	0.010	0.010	0.011	0.150
16	0.009	0.009	0.009	0.008	0.009	0.010	0.010	0.010	0.010	0.010	0.010	0.115
17	0.012	0.010	0.027	0.034	0.031	0.026	0.017	0.012	0.012	0.016	0.022	0.132
18	0.009	0.009	0.009	0.008	0.011	0.011	0.010	0.010	0.011	0.011	0.012	0.102
19	0.009	0.009	0.015	0.028	0.033	0.029	0.022	0.013	0.010	0.012	0.016	0.118
20	0.009	0.009	0.008	0.008	0.009	0.009	0.009	0.009	0.009	0.010	0.010	0.092

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21	0.008	0.008	0.008	0.008	0.009	0.009	0.010	0.009	0.010	0.011	0.010	0.107
22	0.008	0.008	0.008	0.008	0.009	0.009	0.009	0.009	0.009	0.010	0.009	0.084
23	0.010	0.009	0.011	0.011	0.023	0.027	0.025	0.021	0.016	0.010	0.010	0.098
24	0.007	0.007	0.007	0.007	0.008	0.008	0.008	0.008	0.008	0.009	0.008	0.077
25	0.009	0.008	0.011	0.009	0.015	0.022	0.024	0.023	0.019	0.016	0.011	0.090
26	0.009	0.009	0.008	0.007	0.008	0.008	0.009	0.009	0.009	0.009	0.009	0.071
27	0.009	0.009	0.008	0.008	0.009	0.009	0.009	0.009	0.009	0.010	0.010	0.083
28	0.009	0.009	0.008	0.008	0.009	0.010	0.010	0.010	0.010	0.010	0.011	0.066
29	0.012	0.014	0.008	0.013	0.010	0.012	0.019	0.023	0.022	0.018	0.015	0.078
30	0.009	0.009	0.009	0.008	0.010	0.010	0.010	0.010	0.010	0.011	0.011	0.061
31	0.011	0.012	0.009	0.011	0.015	0.014	0.017	0.024	0.025	0.024	0.018	0.073
32	0.009	0.009	0.008	0.008	0.009	0.009	0.009	0.010	0.010	0.011	0.011	0.058
33	0.010	0.010	0.009	0.008	0.010	0.010	0.009	0.010	0.009	0.009	0.010	0.068
34	0.010	0.010	0.009	0.008	0.010	0.010	0.010	0.010	0.011	0.011	0.012	0.054
35	0.011	0.012	0.010	0.008	0.014	0.016	0.015	0.018	0.021	0.020	0.016	0.064
36	0.008	0.008	0.008	0.008	0.009	0.009	0.010	0.010	0.010	0.010	0.010	0.051
37	0.009	0.010	0.009	0.008	0.010	0.013	0.011	0.011	0.011	0.012	0.010	0.061
38	0.008	0.008	0.008	0.008	0.010	0.010	0.011	0.011	0.011	0.012	0.011	0.048
39	0.008	0.008	0.007	0.007	0.007	0.008	0.008	0.008	0.008	0.010	0.009	0.058
40	0.008	0.008	0.008	0.011	0.012	0.012	0.012	0.011	0.011	0.011	0.011	0.046

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Harmonics IEC 61000-3-12(>16 A and ≤75 A) (SN15HT)													
L1													
Power P/Pn [%]	0-5	10	20	30	40	50	60	70	80	90	100	IEC 61000-3-12 limit	
Ordinal number	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	1 phase [%]	3 phase [%]
2	0.202	0.244	0.281	0.322	0.29	0.359	0.34	0.35	0.354	0.396	0.304	8%	8%
3	0.074	0.078	0.078	0.083	0.087	0.106	0.101	0.106	0.115	0.101	0.11	21.6%	Not stated
4	0.037	0.064	0.06	0.064	0.064	0.064	0.064	0.055	0.055	0.06	0.055	4%	4%
5	0.216	0.327	0.46	0.515	0.584	0.607	0.621	0.639	0.649	0.667	0.704	10.7%	10.7%
6	0.051	0.051	0.041	0.037	0.041	0.037	0.041	0.041	0.037	0.041	0.037	2.67%	2.67%
7	0.11	0.156	0.322	0.414	0.478	0.534	0.58	0.58	0.58	0.575	0.575	7.2%	7.2%
8	0.041	0.041	0.037	0.037	0.041	0.037	0.037	0.032	0.032	0.032	0.032	2%	2%
9	0.06	0.06	0.055	0.064	0.055	0.06	0.055	0.051	0.046	0.064	0.078	3.8%	Not stated
10	0.028	0.032	0.028	0.023	0.028	0.028	0.032	0.032	0.032	0.037	0.037	1.6%	1.6%
11	0.368	0.313	0.101	0.225	0.35	0.428	0.492	0.501	0.534	0.589	0.626	3.1%	3.1%
12	0.037	0.032	0.028	0.023	0.023	0.023	0.028	0.028	0.032	0.028	0.032	1.33%	1.33%
13	0.239	0.281	0.147	0.083	0.212	0.308	0.373	0.4	0.428	0.465	0.515	2%	2%
14	0.028	0.028	0.028	0.028	0.028	0.032	0.028	0.032	0.028	0.028	0.028	-	-
15	0.041	0.051	0.046	0.046	0.041	0.051	0.046	0.037	0.046	0.046	0.046	-	-
16	0.032	0.028	0.028	0.032	0.023	0.023	0.028	0.028	0.028	0.032	0.032	-	-
17	0.133	0.216	0.207	0.129	0.074	0.166	0.253	0.285	0.322	0.35	0.359	-	-
18	0.028	0.023	0.023	0.023	0.023	0.018	0.018	0.028	0.023	0.023	0.023	-	-
19	0.106	0.129	0.216	0.152	0.037	0.133	0.193	0.225	0.253	0.281	0.285	-	-
20	0.028	0.023	0.023	0.028	0.023	0.028	0.023	0.028	0.032	0.028	0.032	-	-

Certificate of Conformity

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21	0.041	0.046	0.051	0.046	0.046	0.051	0.037	0.041	0.046	0.041	0.037	-	-
22	0.023	0.023	0.023	0.023	0.023	0.023	0.018	0.023	0.023	0.023	0.023	-	-
23	0.078	0.12	0.184	0.152	0.064	0.083	0.143	0.17	0.202	0.235	0.248	-	-
24	0.023	0.023	0.023	0.023	0.018	0.018	0.018	0.023	0.023	0.023	0.023	-	-
25	0.06	0.106	0.129	0.138	0.097	0.051	0.12	0.152	0.175	0.202	0.216	-	-
26	0.037	0.023	0.023	0.023	0.028	0.023	0.023	0.032	0.032	0.032	0.032	-	-
27	0.041	0.028	0.032	0.041	0.041	0.032	0.032	0.037	0.041	0.037	0.041	-	-
28	0.023	0.023	0.208	0.032	0.028	0.028	0.023	0.028	0.028	0.023	0.023	-	-
29	0.078	0.087	0.055	0.12	0.12	0.055	0.097	0.133	0.161	0.184	0.198	-	-
30	0.028	0.023	0.018	0.023	0.018	0.023	0.023	0.023	0.023	0.023	0.023	-	-
31	0.06	0.064	0.055	0.106	0.161	0.087	0.083	0.129	0.161	0.184	0.184	-	-
32	0.041	0.041	0.041	0.041	0.041	0.041	0.037	0.046	0.051	0.046	0.046	-	-
33	0.064	0.051	0.046	0.051	0.037	0.055	0.051	0.051	0.055	0.055	0.055	-	-
34	0.037	0.037	0.037	0.037	0.023	0.032	0.06	0.051	0.046	0.046	0.046	-	-
35	0.078	0.041	0.092	0.106	0.156	0.106	0.083	0.115	0.147	0.193	0.207	-	-
36	0.028	0.023	0.018	0.018	0.023	0.028	0.028	0.028	0.023	0.028	0.037	-	-
37	0.069	0.032	0.074	0.069	0.092	0.069	0.046	0.092	0.225	0.225	0.212	-	-
38	0.028	0.023	0.023	0.018	0.018	0.028	0.055	0.046	0.055	0.051	0.046	-	-
39	0.046	0.037	0.023	0.023	0.018	0.023	0.037	0.051	0.046	0.055	0.055	-	-
40	0.032	0.028	0.023	0.023	0.018	0.018	0.018	0.023	0.041	0.055	0.064	-	-
THC/lre f	0.626	0.715	0.815	0.872	0.974	1.088	1.194	1.251	1.328	1.414	1.453	23%	13%
PWHD	1.449	1.641	2.269	1.890	1.798	1.561	2.020	2.470	3.110	3.453	3.544	23%	22%

Certificate of Conformity

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L2													
Power P/Pn [%]	0-5	10	20	30	40	50	60	70	80	90	100	IEC 61000-3-12 limit	
Ordinal number	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	1 phase [%]	3 phase [%]
2	0.262	0.276	0.281	0.299	0.262	0.299	0.271	0.299	0.248	0.29	0.248	8%	8%
3	0.083	0.087	0.101	0.115	0.11	0.11	0.12	0.101	0.097	0.087	0.083	21.6%	Not stated
4	0.078	0.083	0.083	0.069	0.078	0.069	0.069	0.064	0.069	0.074	0.06	4%	4%
5	0.23	0.308	0.446	0.501	0.575	0.598	0.621	0.635	0.644	0.662	0.695	10.7%	10.7%
6	0.041	0.041	0.037	0.032	0.032	0.037	0.037	0.037	0.037	0.037	0.041	2.67%	2.67%
7	0.12	0.17	0.308	0.391	0.474	0.529	0.58	0.584	0.584	0.575	0.58	7.2%	7.2%
8	0.032	0.041	0.046	0.037	0.046	0.041	0.037	0.032	0.037	0.037	0.037	2%	2%
9	0.06	0.06	0.06	0.06	0.06	0.055	0.064	0.064	0.064	0.083	0.078	3.8%	Not stated
10	0.037	0.032	0.028	0.032	0.032	0.037	0.037	0.032	0.037	0.037	0.037	1.6%	1.6%
11	0.368	0.313	0.092	0.225	0.336	0.409	0.478	0.478	0.52	0.57	0.644	3.1%	3.1%
12	0.032	0.032	0.028	0.028	0.028	0.028	0.028	0.028	0.032	0.037	0.037	1.33%	1.33%
13	0.253	0.285	0.152	0.078	0.207	0.299	0.386	0.409	0.437	0.469	0.524	2%	2%
14	0.032	0.032	0.028	0.032	0.028	0.028	0.028	0.028	0.028	0.028	0.028	-	-
15	0.041	0.046	0.041	0.046	0.041	0.037	0.046	0.046	0.046	0.041	0.041	-	-
16	0.028	0.028	0.032	0.032	0.028	0.032	0.032	0.032	0.032	0.032	0.032	-	-
17	0.133	0.216	0.202	0.124	0.06	0.156	0.239	0.271	0.313	0.34	0.35	-	-
18	0.018	0.032	0.018	0.018	0.023	0.023	0.023	0.023	0.023	0.028	0.023	-	-
19	0.115	0.138	0.207	0.152	0.032	0.11	0.193	0.23	0.262	0.285	0.294	-	-
20	0.037	0.023	0.023	0.018	0.023	0.023	0.018	0.023	0.028	0.023	0.028	-	-

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21	0.046	0.041	0.041	0.046	0.051	0.046	0.041	0.046	0.037	0.041	0.046	-	-
22	0.018	0.028	0.023	0.023	0.028	0.028	0.023	0.028	0.028	0.028	0.028	-	-
23	0.097	0.129	0.179	0.152	0.064	0.074	0.133	0.161	0.193	0.221	0.235	-	-
24	0.018	0.018	0.023	0.023	0.018	0.018	0.028	0.018	0.023	0.023	0.023	-	-
25	0.06	0.115	0.129	0.138	0.097	0.041	0.115	0.147	0.179	0.207	0.221	-	-
26	0.037	0.028	0.023	0.023	0.028	0.023	0.023	0.023	0.032	0.028	0.028	-	-
27	0.032	0.032	0.032	0.037	0.037	0.032	0.037	0.037	0.041	0.037	0.037	-	-
28	0.028	0.018	0.023	0.028	0.032	0.023	0.023	0.028	0.037	0.032	0.032	-	-
29	0.083	0.092	0.06	0.12	0.115	0.055	0.092	0.124	0.147	0.175	0.189	-	-
30	0.023	0.023	0.018	0.023	0.023	0.028	0.028	0.028	0.028	0.023	0.023	-	-
31	0.064	0.069	0.055	0.106	0.161	0.087	0.078	0.129	0.161	0.179	0.184	-	-
32	0.041	0.041	0.037	0.041	0.037	0.037	0.037	0.041	0.046	0.046	0.037	-	-
33	0.051	0.041	0.051	0.041	0.037	0.055	0.055	0.051	0.06	0.064	0.055	-	-
34	0.037	0.037	0.032	0.028	0.023	0.032	0.051	0.046	0.046	0.046	0.051	-	-
35	0.083	0.051	0.097	0.106	0.152	0.097	0.078	0.106	0.143	0.184	0.189	-	-
36	0.023	0.023	0.018	0.018	0.028	0.028	0.028	0.028	0.032	0.032	0.037	-	-
37	0.069	0.032	0.078	0.064	0.087	0.064	0.046	0.092	0.23	0.225	0.212	-	-
38	0.028	0.018	0.023	0.018	0.018	0.028	0.051	0.046	0.051	0.041	0.037	-	-
39	0.046	0.028	0.023	0.023	0.023	0.023	0.041	0.051	0.041	0.064	0.064	-	-
40	0.032	0.028	0.023	0.018	0.018	0.018	0.023	0.028	0.023	0.041	0.06	-	-
THC/lre f	0.667	0.730	0.775	0.845	0.955	1.046	1.172	1.226	1.298	1.374	1.459	23%	13%
PWHD	1.485	1.691	1.961	1.856	1.766	1.450	1.954	2.399	3.080	3.390	3.479	23%	22%

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L3													
Power P/Pn [%]	0-5	10	20	30	40	50	60	70	80	90	100	IEC 61000-3-12 limit	
Ordinal number	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	1 phase [%]	3 phase [%]
2	0.239	0.267	0.299	0.34	0.285	0.322	0.313	0.294	0.29	0.304	0.212	8%	8%
3	0.074	0.087	0.097	0.097	0.106	0.129	0.129	0.129	0.138	0.129	0.133	21.6%	Not stated
4	0.074	0.074	0.064	0.06	0.064	0.064	0.06	0.055	0.051	0.055	0.041	4%	4%
5	0.225	0.308	0.451	0.515	0.58	0.603	0.635	0.649	0.658	0.69	0.722	10.7%	10.7%
6	0.032	0.032	0.037	0.032	0.032	0.041	0.032	0.037	0.032	0.032	0.037	2.67%	2.67%
7	0.129	0.166	0.317	0.4	0.474	0.52	0.575	0.57	0.575	0.566	0.57	7.2%	7.2%
8	0.032	0.032	0.037	0.032	0.037	0.032	0.032	0.028	0.032	0.037	0.032	2%	2%
9	0.055	0.055	0.051	0.051	0.055	0.06	0.06	0.055	0.064	0.069	0.083	3.8%	Not stated
10	0.037	0.028	0.037	0.032	0.028	0.037	0.037	0.028	0.037	0.032	0.032	1.6%	1.6%
11	0.363	0.322	0.087	0.212	0.34	0.423	0.483	0.501	0.538	0.584	0.639	3.1%	3.1%
12	0.032	0.032	0.023	0.023	0.023	0.028	0.023	0.028	0.028	0.032	0.032	1.33%	1.33%
13	0.244	0.29	0.138	0.083	0.207	0.294	0.363	0.391	0.423	0.451	0.501	2%	2%
14	0.032	0.037	0.032	0.028	0.028	0.028	0.023	0.023	0.032	0.032	0.028	-	-
15	0.037	0.037	0.037	0.037	0.037	0.041	0.037	0.037	0.041	0.051	0.051	-	-
16	0.028	0.032	0.028	0.032	0.028	0.032	0.032	0.028	0.032	0.032	0.028	-	-
17	0.133	0.202	0.212	0.124	0.06	0.166	0.253	0.29	0.331	0.359	0.363	-	-
18	0.023	0.018	0.023	0.018	0.018	0.023	0.018	0.018	0.018	0.023	0.023	-	-
19	0.12	0.124	0.207	0.138	0.032	0.115	0.184	0.221	0.248	0.276	0.271	-	-
20	0.028	0.028	0.028	0.023	0.023	0.023	0.023	0.028	0.028	0.023	0.023	-	-

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21	0.041	0.041	0.037	0.032	0.037	0.037	0.041	0.037	0.041	0.041	0.037	-	-
22	0.018	0.028	0.032	0.028	0.028	0.032	0.028	0.028	0.037	0.028	0.028	-	-
23	0.092	0.12	0.179	0.147	0.069	0.069	0.143	0.175	0.207	0.235	0.248	-	-
24	0.018	0.018	0.018	0.018	0.018	0.014	0.018	0.018	0.023	0.018	0.023	-	-
25	0.06	0.12	0.129	0.138	0.092	0.051	0.115	0.147	0.175	0.193	0.202	-	-
26	0.032	0.018	0.028	0.032	0.028	0.023	0.028	0.028	0.032	0.028	0.028	-	-
27	0.041	0.028	0.032	0.032	0.032	0.028	0.032	0.032	0.037	0.037	0.041	-	-
28	0.023	0.023	0.028	0.037	0.032	0.028	0.028	0.037	0.041	0.032	0.028	-	-
29	0.074	0.092	0.055	0.11	0.12	0.064	0.087	0.124	0.161	0.189	0.202	-	-
30	0.028	0.023	0.018	0.023	0.018	0.018	0.018	0.023	0.028	0.023	0.023	-	-
31	0.06	0.064	0.06	0.11	0.161	0.087	0.083	0.12	0.152	0.175	0.175	-	-
32	0.046	0.041	0.041	0.037	0.037	0.032	0.032	0.041	0.046	0.046	0.037	-	-
33	0.055	0.051	0.06	0.046	0.046	0.046	0.051	0.055	0.051	0.051	0.051	-	-
34	0.037	0.032	0.037	0.041	0.032	0.037	0.055	0.051	0.06	0.046	0.051	-	-
35	0.074	0.051	0.092	0.101	0.152	0.097	0.078	0.11	0.138	0.189	0.198	-	-
36	0.023	0.023	0.018	0.023	0.023	0.028	0.028	0.032	0.037	0.028	0.037	-	-
37	0.074	0.032	0.083	0.069	0.092	0.064	0.041	0.087	0.221	0.216	0.207	-	-
38	0.032	0.028	0.023	0.023	0.018	0.032	0.055	0.046	0.037	0.046	0.041	-	-
39	0.046	0.032	0.032	0.028	0.028	0.028	0.037	0.046	0.046	0.064	0.051	-	-
40	0.037	0.028	0.028	0.028	0.023	0.018	0.023	0.037	0.037	0.041	0.069	-	-
THC/lre f	0.649	0.722	0.786	0.863	0.964	1.060	1.183	1.233	1.317	1.391	1.439	23%	13%
PWHD	1.472	1.634	2.004	1.829	1.782	1.478	1.970	2.432	3.087	3.408	3.468	23%	22%

Certificate of Conformity

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E.6 Certificate of the network and system protection

Certificate of NS protection	No. 5040924001320-00		
Manufacturer	SINENG ELECTRIC CO., Ltd. No.6 Hehui Road, Huishan District, 214174, Wuxi City, PEOPLE'S REPUBLIC OF CHINA		
Type of NS protection			
Central NS protection	☐		
Integrated NS protection	☒	Assigned to power generation unit type	SN5.0HT, SN6.0HT, SN8.0HT, SN10HT, SN10HT-X, SN12HT, SN15HT
Network connection rules	VDE-AR-N 4105:2018-11/Corrigendum 1:2020-10 Generators connected to the low-voltage distribution network - Technical requirements for the connection to and parallel operation with low-voltage distribution networks.		
Test requirement	DIN VDE V 0124-100 (VDE V 0124-100):2020-06 “Network integration of power generation system – Low voltage” Test requirements for power generation units intended for connection to and parallel operation on the low-voltage network.		
The network and system protection mentioned above meets the requirements of VDE-AR-N 4105.			

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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. 5040924001320-00	
NS protection test report			
Type of NS system:	Integrated NS protection	Other Manufacturer indications	
Software version:	V1.0		
Manufacturer:	SINENG ELECTRIC CO., Ltd. No.6 Hehui Road, Huishan District, 214174, Wuxi City, PEOPLE'S REPUBLIC OF CHINA		
Measuring period:	From 2023-12-09 to 2024-05-06		
	Inverter(s)		
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: 287.18 V / 287.29 V / 287.28 V L1-N: 287.24 V L2-N: 287.09 V L3-N: 287.33 V L1- L2: 497.57 V L2- L3: 497.61 V L3- L1: 497.73 V	L1-N/L2-N/L3-N: 71 ms L1-N: 49 ms L2-N: 58 ms L3-N: 54 ms L1- L2: 86 ms L2- L3: 81 ms L3- L1: 79 ms
Rise-in-voltage protection $U >$	$1.10 * U_n$	1,10 * Un	ms**
Voltage drop protection $U <$	$0.8 * U_n$	L1-N/L2-N/L3-N: 183.43 V / 183.44 V / 183.51 V L1-N: 183.42 V L2-N: 182.93 V L3-N: 182.91 V L1- L2: 318.11 V L2- L3: 317.43 V L3- L1: 317.79 V	L1-N/L2-N/L3-N: 3065 ms L1-N: 3064 ms L2-N: 3058 ms L3-N: 3064 ms L1- L2: 3022 ms L2- L3: 3041 ms L3- L1: 3016 ms
Voltage drop protection $U <<$	$0.45 * U_n$	L1-N/L2-N/L3-N: 103.25 V / 103.22 V / 103.60 V L1-N: 104.58 V L2-N: 104.61 V L3-N: 104.18 V L1- L2: 183.21 V L2- L3: 183.10 V L3- L1: 183.15 V	L1-N/L2-N/L3-N: 345 ms L1-N: 343 ms L2-N: 350 ms L3-N: 348 ms L1- L2: 352 ms L2- L3: 336 ms L3- L1: 334 ms
Frequency decrease protection $f <$	47.5 Hz	47.50 Hz	39 ms
Frequency increase protection $f >$	51.5 Hz	51.50 Hz	85 ms

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*: The tripping time includes the period from the limit value violation U/f until the tripping signal to the interface switch. When planning the power generation system, the response time of the interface switch shall be added to the maximum time value obtained as indicated above. The disconnection time (sum of tripping time of the NS protection plus response time of the interface switch) shall not exceed 200 ms. ** : Verification disconnection time of moving 10-min-average value. Disconnecting time as below: 1. 473 s (L1-N) / 476 s (L2-N) / 478 s (L3-N) (from 600s@Un to 112%Un) 2. Continuous operation (L1-N/L2-N/L3-N) (from 600s@Un to 108%Un) 3. 295 s (L1-N) / 296 s (L2-N) / 333 s (L3-N) (from 600s@106%Un to 114%Un)	
☒ as integrated NS protection	
Assigned to power generation unit type	Hybrid Inverter: SN5.0HT, SN6.0HT, SN8.0HT, SN10HT, SN10HT-X, SN12HT, SN15HT
Integrated interface switch type	Series-connected relays for both the neutral conductor and the line conductor; Power relay type: SN15HT, SN12HT: HF161F-W/12- HT(A27) SN5.0HT, SN6.0HT, SN8.0HT, SN10HT, SN10HT-X: HF161F-W/12-HT(704)
Response time of interface switch for integrated NS protection	The response time of the interface switch: Release time: Max. 20 ms
Verification of the entire functional chain "integrated NS protection – interface switch" has resulted in successful disconnection.	☒