

Certificate of Conformity

No. ESY 120820 0011 Rev. 00

Holder of Certificate: **Renac Power Technology Co., Ltd.**
Block C-12, No. 20 Datong Road, Comprehensive Bonded Zone
Suzhou Hi-Tech District
215004 Suzhou
PEOPLE'S REPUBLIC OF CHINA

Product: **Converter**
(Hybrid Inverter)

Model(s): **N3-30K-E, N3-40K, N3-49.9K, N3-50K**


Parameters: See page 2

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.: 64290243068101

Date, 2024-07-11



(Billy Qiu)

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Parameters:

Model	N3-30K-E	N3-40K	N3-49.9K	N3-50K
PV terminal parameters				
Maximum PV voltage [V _{DC}]	1000			
Rated voltage [V _{DC}]	667			
MPPT voltage range [V _{DC}]	350-800			
MPPT voltage range (full load) [V _{DC}]	667-750			
Maximum input current [A _{DC}]	36/36/36			
Isc PV [A _{DC}]	40/40/40			
MPPT tracker number	3			
Maximum input power [W]	45000	60000	75000	75000
Battery input/output parameters				
Battery type	Lithium-ion battery			
Maximum voltage [V _{DC}]	750			
Battery rated voltage [V _{DC}]	512			
Battery voltage range [V _{DC}]	350-750			
Maximum charge power [W]	33000	44000	54890	55000
Maximum discharge power [W]	33000	44000	54890	55000
Maximum charge current [A _{DC}]	55/55			
Maximum discharge current [A _{DC}]	55/55			
Grid terminal input parameters				
Rated input voltage [V _{AC}]	3/N/PE, 230/400			
Rated input frequency [Hz]	50			
Maximum continuous input current [A _{AC}]	47.9	63.8	79.6	80.0
Maximum continuous input active power [W]	30000	40000	49900	50000
Maximum continuous input apparent power [VA]	33000	44000	54890	55000
Power factor range	0.9 under-excited to 0.9 over-excited			
Grid terminal output parameters				
Rated output voltage [V _{AC}]	3/N/PE, 230/400			
Rated output frequency [Hz]	50			
Rated output current [A _{AC}]	43.5	58.0	72.4	72.5
Maximum continuous output current [A _{AC}]	47.9	63.8	79.6	80.0
Rated output active power [W]	30000	40000	49900	50000
Maximum output active power P _{E_{max}} [W]	30000	40000	49900	50000
Maximum output apparent power S _{E_{max}} [VA]	33000	44000	54890	55000
Power factor range	0.9 under-excited to 0.9 over-excited			

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E.4 Unit certificate

Unit certificate		
Manufacturer	Renac Power Technology Co., Ltd.	
Power generation unit type	[Hybrid Inverter]: N3-30K-E, N3-40K, N3-49.9K, N3-50K. Remark: certified on representative model <u>N3-50K</u> of family design products, results of the measurement of <u>N3-50K</u> can be transferred to other models based on transferability rule of measurements in DIN VDE V 0124-100 (VDE V 0124-100):2020-06.	
Assessment values	max. active power $P_{E_{max}}$	<u>50000 W (N3-50K)</u>
	max. apparent power $S_{E_{max}}$	<u>55000 VA (N3-50K)</u>
	Rated voltage	<u>3/N/PE~, 230/400 V_{AC}</u>
	Rated current (AC) I_r	<u>72.5 A (N3-50K)</u>
	Initial short-circuit AC current I''_k	<u>80.0 A (N3-50K)</u>
Network connection rule	VDE-AR-N 4105:2018-11 “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):2020-06 “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	<u>64.290.24.30681.01</u> from <u>2024-06-25</u>	
The above designated power generation unit meets the requirements of VDE-AR-N 4105:2018-11.		

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

Extract of the test report for power generation units "Determination of electrical properties"	
System manufacturer:	Renac Power Technology Co., Ltd. Block C-12, No. 20 Datong Road, Comprehensive Bonded Zone, Suzhou Hi-Tech District, 215004 Suzhou, PEOPLE'S REPUBLIC OF CHINA
Manufacturer indications:	Type of system: Hybrid Inverter
	Max. active power $P_{E_{max}}$: 30000 W (N3-30K-E) 40000 W (N3-40K) 49900 W (N3-49.9K) 50000 W (N3-50K)
	Rated voltage: 3/N/PE~, 230/400 V _{AC}
Measurement period:	From 2024-03-30 to 2024-05-28

Rapid voltage change	
Model	N3-50K
Connection without provisions (regarding the primary energy carrier)	$K_i=0.542$
Most adverse case when switching between generator levels	$K_i=0.537$
Connection at nominal conditions (of the primary energy carrier)	$K_i=1.093$
Disconnection at rated power	$K_i=1.035$
Worst value of all switching operations	$K_{i_{max}}=1.093$

Flicker (N3-50K)					
Network impedance angle ψ_k	30°	50°	70°	85°	32°
Initial flicker coefficient $c\psi$ at Max. active power $P_{E_{max}}$					
L1	--	--	--	--	12.243
L2	--	--	--	--	11.880
L3	--	--	--	--	10.857

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Harmonics (N3-50K)												
Active power P/Pn[%]	0	10	20	30	40	50	60	70	80	90	100	Limit value
Ordinal number	Ih/Iref [%]											[%]
2	0.000	0.370	0.913	0.804	0.726	0.712	0.692	0.730	0.764	0.848	0.987	8
3	0.000	0.431	0.436	0.283	0.335	0.394	0.320	0.294	0.253	0.230	0.200	-
4	0.000	0.331	0.890	1.038	0.978	0.900	0.925	0.892	0.825	0.746	0.743	4
5	0.002	0.539	1.603	1.902	2.109	2.240	2.356	2.426	2.506	2.573	2.602	10.7
6	0.000	0.245	0.202	0.545	0.615	0.577	0.628	0.638	0.585	0.483	0.426	2.67
7	0.001	0.197	0.419	0.725	0.985	1.217	1.366	1.452	1.525	1.614	1.723	7.2
8	0.000	0.079	0.193	0.373	0.406	0.404	0.347	0.315	0.273	0.232	0.180	2
9	0.000	0.118	0.128	0.063	0.066	0.066	0.077	0.088	0.116	0.146	0.151	-
10	0.000	0.081	0.144	0.086	0.118	0.143	0.227	0.243	0.236	0.221	0.185	1.6
11	0.000	0.281	0.244	0.142	0.128	0.244	0.396	0.479	0.574	0.672	0.735	3.1
12	0.000	0.122	0.362	0.178	0.080	0.138	0.305	0.371	0.392	0.387	0.393	1.33
13	0.000	0.143	0.125	0.135	0.143	0.189	0.276	0.364	0.396	0.432	0.481	2
14	0.000	0.157	0.137	0.090	0.065	0.084	0.116	0.133	0.122	0.114	0.100	-
15	0.000	0.057	0.135	0.085	0.050	0.076	0.098	0.108	0.114	0.130	0.115	-
16	0.000	0.083	0.147	0.046	0.054	0.034	0.101	0.120	0.110	0.107	0.087	-
17	0.000	0.056	0.159	0.176	0.129	0.083	0.119	0.148	0.214	0.279	0.325	-
18	0.000	0.154	0.151	0.189	0.175	0.039	0.112	0.173	0.188	0.195	0.202	-
19	0.000	0.039	0.113	0.052	0.067	0.090	0.121	0.156	0.186	0.230	0.277	-
20	0.000	0.027	0.036	0.076	0.087	0.069	0.042	0.056	0.059	0.062	0.089	-
21	0.000	0.074	0.054	0.069	0.032	0.050	0.061	0.055	0.074	0.066	0.057	-
22	0.000	0.044	0.030	0.039	0.070	0.062	0.031	0.039	0.045	0.051	0.063	-
23	0.001	0.044	0.059	0.084	0.053	0.074	0.100	0.119	0.106	0.123	0.150	-
24	0.000	0.112	0.043	0.069	0.113	0.067	0.028	0.067	0.092	0.119	0.117	-
25	0.001	0.082	0.107	0.085	0.070	0.077	0.118	0.146	0.167	0.195	0.243	-
26	0.000	0.084	0.023	0.023	0.050	0.058	0.039	0.033	0.038	0.051	0.063	-
27	0.000	0.030	0.039	0.058	0.039	0.065	0.085	0.060	0.040	0.044	0.064	-
28	0.000	0.103	0.058	0.052	0.048	0.058	0.041	0.032	0.033	0.036	0.052	-
29	0.001	0.079	0.133	0.135	0.136	0.128	0.171	0.188	0.172	0.171	0.192	-
30	0.000	0.067	0.047	0.061	0.045	0.063	0.041	0.025	0.059	0.058	0.082	-
31	0.001	0.055	0.070	0.075	0.081	0.062	0.081	0.099	0.109	0.169	0.287	-
32	0.000	0.028	0.023	0.027	0.030	0.027	0.030	0.033	0.032	0.034	0.070	-
33	0.000	0.032	0.016	0.020	0.024	0.018	0.038	0.036	0.044	0.066	0.102	-
34	0.000	0.016	0.015	0.022	0.027	0.020	0.024	0.030	0.041	0.049	0.039	-
35	0.001	0.055	0.045	0.041	0.057	0.063	0.081	0.109	0.131	0.193	0.276	-
36	0.000	0.047	0.026	0.032	0.040	0.037	0.033	0.022	0.018	0.025	0.056	-
37	0.001	0.024	0.015	0.028	0.019	0.035	0.023	0.020	0.023	0.052	0.089	-
38	0.000	0.013	0.018	0.018	0.028	0.022	0.019	0.016	0.018	0.019	0.025	-
39	0.000	0.017	0.020	0.017	0.023	0.017	0.032	0.025	0.016	0.019	0.023	-
40	0.000	0.028	0.012	0.017	0.019	0.018	0.016	0.015	0.016	0.016	0.022	-
THC/I _{ref}	0.003	1.047	2.249	2.573	2.785	2.951	3.149	3.274	3.368	3.479	3.620	13
PWHC/I _{ref}	0.013	1.714	1.880	1.841	1.769	1.565	1.950	2.292	2.513	3.035	3.858	22

Remark:
1. Iref=72.5A
2. The harmonic values are maximum values from all phases.

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Inter-harmonics (N3-50K)											
Active power P/Pn[%]	0	10	20	30	40	50	60	70	80	90	100
Frequency [Hz]	lh/lref [%]										
75	0.000	0.041	0.047	0.054	0.058	0.061	0.062	0.066	0.066	0.071	0.072
125	0.000	0.042	0.058	0.066	0.069	0.073	0.081	0.079	0.081	0.090	0.092
175	0.000	0.034	0.042	0.049	0.050	0.053	0.057	0.057	0.058	0.062	0.064
225	0.000	0.033	0.041	0.049	0.050	0.053	0.055	0.056	0.058	0.061	0.064
275	0.000	0.044	0.059	0.065	0.070	0.074	0.076	0.076	0.078	0.081	0.083
325	0.000	0.031	0.037	0.043	0.043	0.046	0.048	0.050	0.053	0.059	0.060
375	0.000	0.028	0.033	0.036	0.038	0.041	0.043	0.044	0.045	0.050	0.052
425	0.000	0.040	0.054	0.057	0.061	0.063	0.067	0.069	0.073	0.080	0.083
475	0.000	0.024	0.027	0.030	0.030	0.033	0.035	0.037	0.038	0.041	0.045
525	0.000	0.027	0.032	0.034	0.035	0.037	0.038	0.039	0.042	0.044	0.047
575	0.000	0.029	0.035	0.037	0.038	0.039	0.042	0.043	0.044	0.049	0.054
625	0.000	0.021	0.024	0.026	0.026	0.028	0.030	0.032	0.034	0.037	0.040
675	0.000	0.022	0.026	0.027	0.028	0.029	0.032	0.033	0.036	0.040	0.043
725	0.000	0.029	0.035	0.036	0.037	0.039	0.041	0.043	0.045	0.049	0.053
775	0.000	0.020	0.021	0.024	0.024	0.027	0.028	0.030	0.033	0.036	0.040
825	0.000	0.021	0.024	0.026	0.028	0.029	0.031	0.031	0.033	0.038	0.040
875	0.000	0.024	0.028	0.030	0.034	0.035	0.038	0.039	0.042	0.047	0.050
925	0.000	0.018	0.020	0.022	0.024	0.026	0.028	0.030	0.032	0.036	0.040
975	0.000	0.021	0.023	0.025	0.025	0.027	0.029	0.031	0.034	0.038	0.041
1025	0.000	0.030	0.034	0.034	0.036	0.037	0.042	0.044	0.049	0.056	0.061
1075	0.000	0.018	0.019	0.021	0.022	0.024	0.026	0.027	0.029	0.032	0.037
1125	0.000	0.020	0.023	0.023	0.025	0.027	0.029	0.031	0.033	0.036	0.040
1175	0.000	0.023	0.025	0.026	0.029	0.030	0.033	0.035	0.038	0.042	0.046
1225	0.000	0.017	0.019	0.020	0.023	0.024	0.026	0.028	0.030	0.033	0.036
1275	0.000	0.020	0.021	0.022	0.022	0.023	0.025	0.027	0.029	0.031	0.034
1325	0.000	0.023	0.027	0.028	0.031	0.033	0.038	0.039	0.042	0.046	0.052
1375	0.000	0.016	0.017	0.018	0.019	0.022	0.024	0.026	0.027	0.030	0.032
1425	0.000	0.018	0.020	0.020	0.021	0.023	0.026	0.029	0.031	0.033	0.035
1475	0.000	0.021	0.024	0.024	0.024	0.026	0.026	0.027	0.031	0.035	0.037
1525	0.000	0.015	0.016	0.017	0.018	0.020	0.022	0.023	0.025	0.029	0.031
1575	0.000	0.016	0.017	0.017	0.018	0.020	0.021	0.021	0.023	0.026	0.030
1625	0.000	0.019	0.020	0.020	0.022	0.023	0.027	0.030	0.033	0.036	0.040
1675	0.000	0.014	0.014	0.014	0.015	0.016	0.017	0.018	0.022	0.024	0.025
1725	0.000	0.017	0.017	0.017	0.018	0.019	0.018	0.019	0.020	0.024	0.027
1775	0.000	0.017	0.018	0.018	0.019	0.020	0.020	0.020	0.020	0.022	0.027
1825	0.000	0.012	0.013	0.013	0.016	0.017	0.017	0.018	0.018	0.019	0.022
1875	0.000	0.014	0.015	0.015	0.015	0.016	0.016	0.016	0.017	0.017	0.018
1925	0.000	0.016	0.017	0.018	0.023	0.024	0.024	0.025	0.026	0.025	0.027
1975	0.000	0.014	0.014	0.014	0.015	0.015	0.016	0.016	0.016	0.017	0.017

Remark:

- Rsc=33, Iref=72.5A.
- The harmonic values are maximum values from all phases.

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Higher frequencies (N3-50K)											
Active power P/Pn[%]	0	10	20	30	40	50	60	70	80	90	100
Frequency [kHz]	Ih/Iref [%]										
2.1	0.001	0.040	0.053	0.054	0.061	0.050	0.051	0.054	0.057	0.064	0.092
2.3	0.001	0.049	0.041	0.049	0.055	0.045	0.057	0.052	0.047	0.052	0.054
2.5	0.001	0.036	0.038	0.045	0.048	0.044	0.048	0.047	0.052	0.058	0.052
2.7	0.001	0.032	0.031	0.033	0.041	0.042	0.036	0.037	0.035	0.042	0.037
2.9	0.002	0.045	0.045	0.043	0.060	0.059	0.041	0.038	0.041	0.038	0.032
3.1	0.002	0.069	0.069	0.074	0.083	0.082	0.075	0.071	0.068	0.066	0.065
3.3	0.012	0.242	0.244	0.236	0.230	0.231	0.242	0.243	0.235	0.228	0.227
3.5	0.001	0.034	0.039	0.040	0.062	0.050	0.038	0.038	0.048	0.058	0.064
3.7	0.001	0.033	0.031	0.034	0.039	0.037	0.039	0.038	0.037	0.040	0.040
3.9	0.001	0.028	0.029	0.030	0.036	0.039	0.035	0.037	0.043	0.043	0.036
4.1	0.001	0.025	0.027	0.030	0.033	0.035	0.035	0.039	0.038	0.042	0.041
4.3	0.001	0.022	0.025	0.025	0.029	0.029	0.031	0.033	0.036	0.041	0.040
4.5	0.001	0.020	0.021	0.022	0.025	0.027	0.028	0.030	0.033	0.038	0.037
4.7	0.001	0.017	0.017	0.018	0.021	0.024	0.026	0.027	0.031	0.037	0.035
4.9	0.001	0.014	0.014	0.014	0.016	0.019	0.020	0.022	0.025	0.030	0.032
5.1	0.001	0.010	0.011	0.011	0.013	0.014	0.016	0.017	0.019	0.022	0.024
5.3	0.001	0.008	0.008	0.009	0.010	0.011	0.012	0.013	0.014	0.017	0.018
5.5	0.000	0.006	0.007	0.007	0.008	0.008	0.009	0.010	0.011	0.013	0.013
5.7	0.000	0.005	0.005	0.005	0.006	0.007	0.007	0.008	0.008	0.010	0.010
5.9	0.000	0.004	0.005	0.005	0.006	0.006	0.007	0.007	0.008	0.009	0.008
6.1	0.000	0.004	0.004	0.004	0.004	0.005	0.005	0.005	0.006	0.007	0.007
6.3	0.001	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.009	0.009	0.009
6.5	0.001	0.004	0.004	0.004	0.004	0.004	0.005	0.005	0.005	0.005	0.006
6.7	0.000	0.003	0.003	0.003	0.003	0.003	0.003	0.004	0.004	0.004	0.004
6.9	0.000	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.004	0.004
7.1	0.000	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
7.3	0.000	0.002	0.002	0.002	0.003	0.003	0.003	0.003	0.003	0.003	0.003
7.5	0.001	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
7.7	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.003	0.003	0.003	0.003
7.9	0.001	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006
8.1	0.001	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
8.3	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
8.5	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002
8.7	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
8.9	0.000	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.003	0.003	0.003

Remark:

- Rsc=33, Iref=72.5A.
- The harmonic values are maximum values from all phases.