

Certificate of Conformity

No. ESY 117304 0029 Rev. 00

Holder of Certificate: **Ningbo AUX Solar Technology Co., Ltd.**
No. 17 Fenglin Road, Cicheng Town
Jiangbei District
315031 Ningbo City, Zhejiang Province
PEOPLE'S REPUBLIC OF CHINA

Product: **Converter**
Hybrid solar inverter

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.: 5040923017102-00

Date, 2023-10-18



(Zhengdong Ma)



Product Service

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Model(s): ASG-12TL-ZH, ASG-10TL-ZH, ASG-8TL-ZH,
ASG-6TL-ZH, ASG-5TL-ZH

Parameters:
Please see pages 3 to 10.

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

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Model	ASG-12TL-ZH	ASG-10TL-ZH	ASG-8TL-ZH
PV input			
Max. input voltage	1000 Vd.c.		
MPPT voltage range	200, ..., 900 Vd.c		
Max. input current	26/26 Ad.c.		
Max. short circuit current	32/32 Ad.c.		
AC output			
Rated voltage	3/N/PE~ 230/400 V		
Rated frequency	50 Hz		
Rated output power	12 kW	10 kW	8 kW
Max. apparent output power	12 kVA	10 kVA	8 kVA
Max. output current	17.3 Aa.c.	14.4 Aa.c.	11.5 Aa.c.
Power factor	0.8leading, ..., 1, ..., 0.8lagging		

Model	ASG-6TL-ZH	ASG-5TL-ZH
PV input		
Max. input voltage	1000 Vd.c.	
MPPT voltage range	200, ..., 900 Vd.c	
Max. input current	16/16 Ad.c.	
Max. short circuit current	20/20 Ad.c.	
AC output		
Rated voltage	3/N/PE~ 230/400 V	
Rated frequency	50 Hz	
Rated output power	6 kW	5 kW
Max. apparent output power	6 kVA	5 kVA
Max. output current	8.7 Aa.c.	7.2 Aa.c.
Power factor	0.8leading, ..., 1, ..., 0.8lagging	

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E.4 Unit certificate

Unit certificate	No. 5040923017102-00	
Manufacturer	Ningbo AUX Solar Technology Co., Ltd. No. 17 Fenglin Road, Cicheng Town, Jiangbei District, Ningbo City, Zhejiang Province, China	
Power generation unit type	[Inverter]: ASG-12TL-ZH, ASG-10TL-ZH, ASG-8TL-ZH, ASG-6TL-ZH, ASG-5TL-ZH Remark: certified on representative model ASG-12TL-ZH of family design products, results of the measurement of ASG-12TL-ZH can be transferred to the other models based on transferability rule of measurements in DIN VDE V 0124-100 (VDE V 0124-100):2020.	
<input checked="" type="checkbox"/> Inverter	<input type="checkbox"/> Asynchronous generator	<input type="checkbox"/> Synchronous generator
<input type="checkbox"/> Stirling generator	<input type="checkbox"/> Fuel cell	<input type="checkbox"/> others
Assessment values	Max. active power $P_{E_{max}}$	11.99 kW (for model ASG-12TL-ZH)
	Max. apparent power $S_{E_{max}}$	12.11 kVA (for model ASG-12TL-ZH)
	Rated voltage	3/N/PE~, 230/400 V
Rated values	Rated current (AC) I_r	7.2 A (for model ASG-5TL-ZH) 8.7 A (for model ASG-6TL-ZH) 11.5 A (for model ASG-8TL-ZH) 14.4 A (for model ASG-10TL-ZH) 17.3 A (for model ASG-12TL-ZH)
Rated values	Initial short-circuit current I_k	7.2 A (for model ASG-5TL-ZH) 8.7 A (for model ASG-6TL-ZH) 11.5 A (for model ASG-8TL-ZH) 14.4 A (for model ASG-10TL-ZH) 17.3 A (for model ASG-12TL-ZH)
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. 5040923017102-00
Generation unit manufacturer:	Ningbo AUX Solar Technology Co., Ltd. No. 17 Fenglin Road, Cicheng Town, Jiangbei District, Ningbo City, Zhejiang Province, China	
Manufacturer indications:	Type of system	Inverter for PV system
	Max. active power $P_{E_{max}}$	5000 W (for model ASG-5TL-ZH) 6000 W (for model ASG-6TL-ZH) 8000 W (for model ASG-8TL-ZH) 10000 W (for model ASG-10TL-ZH) 12000 W (for model ASG-12TL-ZH)
	Rated voltage	3/N/PE~, 230/400 V
Period of measurement:	From 2023-08-23 to 2023-09-18	

Flicker (EN 61000-3-11) (ASG-12TL-ZH)					
Test condition	$d_{(t)} - 500ms$ [%]	d_c [%]	d_{max} [%]	P_{st}	P_{It}
Continuous operation	0/0/0	0.101/0.100/0.093	0.445/0.597/0.469	0.112/0.234/0.111	0.112/0.234/0.111
Start	0/0/0	0.082/0.092/0.090	0.460/0.432/0.426	-	-
Stop	0/0/0	0.325/0.360/0.270	0.375/0.409/0.320	-	-
Limit	3.3%	3.3%	4%	1.0	0.65

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Harmonics (IEC 61000-3-2 ($\leq 16A$))												
Power P/Pn[%]	0-5	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	0.079	0.033	0.035	0.039	0.041	0.045	0.051	0.059	0.067	0.075	0.051	1.080
3	0.098	0.089	0.086	0.080	0.079	0.083	0.081	0.094	0.099	0.106	0.119	2.300
4	0.026	0.008	0.008	0.008	0.009	0.010	0.011	0.013	0.015	0.016	0.011	0.430
5	0.087	0.081	0.060	0.062	0.063	0.065	0.067	0.065	0.067	0.073	0.081	1.140
6	0.027	0.006	0.006	0.007	0.007	0.008	0.009	0.009	0.010	0.010	0.009	0.300
7	0.094	0.052	0.043	0.040	0.046	0.051	0.054	0.057	0.057	0.060	0.054	0.770
8	0.026	0.006	0.006	0.006	0.007	0.009	0.009	0.010	0.010	0.010	0.009	0.230
9	0.076	0.041	0.051	0.042	0.042	0.049	0.056	0.062	0.065	0.071	0.056	0.400
10	0.029	0.007	0.006	0.007	0.007	0.008	0.010	0.011	0.011	0.011	0.010	0.184
11	0.051	0.035	0.044	0.058	0.046	0.047	0.052	0.062	0.069	0.075	0.058	0.330
12	0.027	0.006	0.007	0.007	0.009	0.007	0.008	0.010	0.011	0.011	0.009	0.153
13	0.085	0.028	0.038	0.060	0.065	0.055	0.053	0.061	0.068	0.081	0.065	0.210
14	0.033	0.006	0.009	0.008	0.009	0.009	0.007	0.010	0.012	0.014	0.009	0.131
15	0.091	0.022	0.041	0.057	0.078	0.069	0.061	0.063	0.070	0.084	0.078	0.150
16	0.034	0.007	0.010	0.008	0.009	0.009	0.009	0.009	0.012	0.015	0.010	0.115
17	0.079	0.018	0.043	0.053	0.080	0.087	0.077	0.067	0.073	0.082	0.087	0.132
18	0.037	0.007	0.008	0.010	0.009	0.011	0.011	0.010	0.010	0.013	0.014	0.102
19	0.100	0.021	0.032	0.053	0.068	0.091	0.085	0.077	0.072	0.085	0.091	0.118
20	0.031	0.010	0.008	0.011	0.009	0.010	0.010	0.011	0.010	0.012	0.017	0.092
21	0.078	0.023	0.028	0.042	0.051	0.075	0.085	0.086	0.081	0.086	0.085	0.107
22	0.024	0.008	0.009	0.010	0.010	0.010	0.011	0.012	0.011	0.012	0.015	0.084
23	0.072	0.018	0.016	0.036	0.040	0.058	0.080	0.083	0.084	0.089	0.080	0.098
24	0.020	0.006	0.007	0.007	0.009	0.010	0.011	0.011	0.012	0.013	0.011	0.077
25	0.062	0.017	0.017	0.029	0.039	0.042	0.061	0.077	0.080	0.079	0.061	0.090
26	0.016	0.006	0.006	0.007	0.009	0.008	0.009	0.010	0.011	0.012	0.012	0.071
27	0.048	0.018	0.010	0.013	0.025	0.024	0.032	0.052	0.062	0.060	0.047	0.083
28	0.014	0.004	0.005	0.005	0.007	0.007	0.008	0.010	0.010	0.010	0.009	0.066
29	0.048	0.014	0.008	0.013	0.014	0.021	0.015	0.031	0.033	0.034	0.040	0.078
30	0.014	0.004	0.004	0.005	0.005	0.006	0.007	0.008	0.010	0.010	0.008	0.061
31	0.040	0.014	0.006	0.008	0.013	0.016	0.017	0.019	0.026	0.035	0.037	0.073
32	0.012	0.004	0.003	0.004	0.005	0.005	0.006	0.008	0.009	0.009	0.007	0.058
33	0.038	0.014	0.006	0.008	0.011	0.014	0.015	0.017	0.027	0.030	0.036	0.068
34	0.011	0.003	0.003	0.003	0.004	0.005	0.005	0.008	0.008	0.009	0.006	0.054
35	0.034	0.011	0.005	0.006	0.007	0.009	0.011	0.013	0.015	0.019	0.032	0.064
36	0.011	0.003	0.003	0.003	0.003	0.004	0.004	0.006	0.007	0.009	0.004	0.051
37	0.027	0.010	0.004	0.005	0.005	0.007	0.010	0.012	0.016	0.017	0.028	0.061
38	0.010	0.003	0.002	0.002	0.003	0.003	0.004	0.005	0.006	0.008	0.004	0.048
39	0.027	0.011	0.003	0.005	0.005	0.006	0.007	0.009	0.012	0.014	0.025	0.058
40	0.010	0.003	0.002	0.002	0.003	0.003	0.003	0.004	0.005	0.008	0.003	0.046

Remark: The maximum values in the three phases are recorded in the table

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Harmonics (IEC 61000-3-12)													
Power P/Pn[3	10	20	30	40	50	60	70	80	90	100	IEC 61000-3-12 limit	
Ordinal numbe r	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	1 phase [%]	3 phase [%]
2	0.454	0.190	0.201	0.224	0.236	0.259	0.293	0.339	0.385	0.431	0.293	8%	8%
3	0.564	0.512	0.495	0.460	0.454	0.477	0.466	0.541	0.569	0.610	0.684	21.6%	Not stated
4	0.150	0.046	0.046	0.046	0.052	0.058	0.063	0.075	0.086	0.092	0.063	4%	4%
5	0.500	0.466	0.345	0.357	0.362	0.374	0.385	0.374	0.385	0.420	0.466	10.7%	10.7%
6	0.155	0.035	0.035	0.040	0.040	0.046	0.052	0.052	0.058	0.058	0.052	2.67%	2.67%
7	0.541	0.299	0.247	0.230	0.265	0.293	0.311	0.328	0.328	0.345	0.311	7.2%	7.2%
8	0.150	0.035	0.035	0.035	0.040	0.052	0.052	0.058	0.058	0.058	0.052	2%	2%
9	0.437	0.236	0.293	0.242	0.242	0.282	0.322	0.357	0.374	0.408	0.322	3.8%	Not stated
10	0.167	0.040	0.035	0.040	0.040	0.046	0.058	0.063	0.063	0.063	0.058	1.6%	1.6%
11	0.293	0.201	0.253	0.334	0.265	0.270	0.299	0.357	0.397	0.431	0.334	3.1%	3.1%
12	0.155	0.035	0.040	0.040	0.052	0.040	0.046	0.058	0.063	0.063	0.052	1.33%	1.33%
13	0.489	0.161	0.219	0.345	0.374	0.316	0.305	0.351	0.391	0.466	0.374	2%	2%
14	0.190	0.035	0.052	0.046	0.052	0.052	0.040	0.058	0.069	0.081	0.052	-	-
15	0.523	0.127	0.236	0.328	0.449	0.397	0.351	0.362	0.403	0.483	0.449	-	-
16	0.196	0.040	0.058	0.046	0.052	0.052	0.052	0.052	0.069	0.086	0.058	-	-
17	0.454	0.104	0.247	0.305	0.460	0.500	0.443	0.385	0.420	0.472	0.500	-	-
18	0.213	0.040	0.046	0.058	0.052	0.063	0.063	0.058	0.058	0.075	0.081	-	-
19	0.575	0.121	0.184	0.305	0.391	0.523	0.489	0.443	0.414	0.489	0.523	-	-
20	0.178	0.058	0.046	0.063	0.052	0.058	0.058	0.063	0.058	0.069	0.098	-	-
21	0.449	0.132	0.161	0.242	0.293	0.431	0.489	0.495	0.466	0.495	0.489	-	-
22	0.138	0.046	0.052	0.058	0.058	0.058	0.063	0.069	0.063	0.069	0.086	-	-
23	0.414	0.104	0.092	0.207	0.230	0.334	0.460	0.477	0.483	0.512	0.460	-	-
24	0.115	0.035	0.040	0.040	0.052	0.058	0.063	0.063	0.069	0.075	0.063	-	-
25	0.357	0.098	0.098	0.167	0.224	0.242	0.351	0.443	0.460	0.454	0.351	-	-
26	0.092	0.035	0.035	0.040	0.052	0.046	0.052	0.058	0.063	0.069	0.069	-	-
27	0.276	0.104	0.058	0.075	0.144	0.138	0.184	0.299	0.357	0.345	0.270	-	-
28	0.081	0.023	0.029	0.029	0.040	0.040	0.046	0.058	0.058	0.058	0.052	-	-
29	0.276	0.081	0.046	0.075	0.081	0.121	0.086	0.178	0.190	0.196	0.230	-	-
30	0.081	0.023	0.023	0.029	0.029	0.035	0.040	0.046	0.058	0.058	0.046	-	-
31	0.230	0.081	0.035	0.046	0.075	0.092	0.098	0.109	0.150	0.201	0.213	-	-
32	0.069	0.023	0.017	0.023	0.029	0.029	0.035	0.046	0.052	0.052	0.040	-	-
33	0.219	0.081	0.035	0.046	0.063	0.081	0.086	0.098	0.155	0.173	0.207	-	-
34	0.063	0.017	0.017	0.017	0.023	0.029	0.029	0.046	0.046	0.052	0.035	-	-
35	0.196	0.063	0.029	0.035	0.040	0.052	0.063	0.075	0.086	0.109	0.184	-	-
36	0.063	0.017	0.017	0.017	0.017	0.023	0.023	0.035	0.040	0.052	0.023	-	-
37	0.155	0.058	0.023	0.029	0.029	0.040	0.058	0.069	0.092	0.098	0.161	-	-
38	0.058	0.017	0.012	0.012	0.017	0.017	0.023	0.029	0.035	0.046	0.023	-	-
39	0.155	0.063	0.017	0.029	0.029	0.035	0.040	0.052	0.069	0.081	0.144	-	-
40	0.058	0.017	0.012	0.012	0.017	0.017	0.017	0.023	0.029	0.046	0.017	-	-
THC/Ir	1.774	0.893	0.896	1.034	1.193	1.327	1.400	1.482	1.573	1.689	1.400	23%	13%
PWHD	6.206	4.143	4.520	4.928	5.177	4.511	4.928	5.177	5.497	5.927	5.177	23%	22%

Remark: The maximum values in the three phases are recorded in the table

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E.6 Certificate of the network and system protection

Certificate of NS protection	No. 5040923017102-00		
Manufacturer	Ningbo AUX Solar Technology Co., Ltd. No. 17 Fenglin Road, Cicheng Town, Jiangbei District, Ningbo City, Zhejiang Province, China		
Type of NS protection			
Central NS protection	<input type="checkbox"/>		
Integrated NS protection	<input checked="" type="checkbox"/>	Assigned to power generation unit type	5000 W (for model ASG-5TL-ZH) 6000 W (for model ASG-6TL-ZH) 8000 W (for model ASG-8TL-ZH) 10000 W (for model ASG-12TL-ZH) 12000 W (for model ASG-12TL-ZH)
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. 5040923017102-00	
NS protection test report			
Type of NS system:	Integrated NS protection	Other Manufacturer indications	
Software version:	DSP: D2301, ARM: 2301		
Manufacturer:	Ningbo AUX Solar Technology Co., Ltd. No. 17 Fenglin Road, Cicheng Town, Jiangbei District, Ningbo City, Zhejiang Province, China		
Measuring period:	From 2023-08-23 to 2023-09-18		
	Inverter		
	directly coupled synchronous and asynchronous generators with Pn > 50 kW		
Protection function	Setting value	Tripping value	Break time NS protection *
Rise-in-voltage protection $U >>$	$1.25 \cdot U_n$	L1-N/L2-N/L3-N: 288 V, 288 V, 288 V, L1-N: 290 V, L2-N: 288 V, L3-N: 289 V,	L1-N/L2-N/L3-N: 115 ms, L1-N: 108 ms, L2-N: 103 ms, L3-N: 102 ms,
Rise-in-voltage protection $U >$	$1.10 \cdot U_n$	$1.0 \cdot U_n$	496 ms
Voltage drop protection $U <$	$0.8 \cdot U_n$	L1-N/L2-N/L3-N: 183 V, 184 V, 184 V, L1-N: 184 V, L2-N: 183 V, L3-N: 184 V,	L1-N/L2-N/L3-N: 3016 ms, L1-N: 3036 ms, L2-N: 3038 ms, L3-N: 3029 ms,
Voltage drop protection $U <<$	$0.45 \cdot U_n$	L1-N/L2-N/L3-N: 102 V, 102 V, 102 V, L1-N: 102 V, L2-N: 102 V, L3-N: 102 V,	L1-N/L2-N/L3-N: 316 ms, L1-N: 306 ms, L2-N: 319 ms, L3-N: 314 ms,
Frequency decrease protection $f <$	47.5 Hz	47.47 Hz	110 ms
Frequency increase protection $f >$	51.5 Hz	51.48 Hz	104 ms
*: 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: <ol style="list-style-type: none"> 496 s (L1-N) / 496 s (L2-N) / 497 s (L3-N) (from 600s@U_n to 112%U_n) Continuous operation (L1-N/L2-N/L3-N) (from 600s@U_n to 108%U_n) 301 s (L1-N) / 302 s (L2-N) / 303 s (L3-N) (from 600s@106%U_n to 114%U_n) 			

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<input checked="" type="checkbox"/> as integrated NS protection	
Assigned to power generation unit type	5000 W (for model ASG-5TL-ZH) 6000 W (for model ASG-6TL-ZH) 8000 W (for model ASG-8TL-ZH) 10000 W (for model ASG-12TL-ZH) 12000 W (for model ASG-12TL-ZH)
Integrated interface switch type	Series-connected relays for both the neutral conductor and the line conductor Relay type: HF161F-40W
Response time of interface switch for integrated NS protection	Release time: Max. 10 ms
Verification of the entire functional chain "integrated NS protection – interface switch" has resulted in successful disconnection.	<input checked="" type="checkbox"/>