

Certificate of Conformity

No. ESY 076644 0022 Rev. 00

Holder of Certificate: **EAST Group Co., Ltd.**
No.6 Northern Industry Road
Songshan Lake Sci. & Tech. Industry Park
523808 DongGuan City, Guangdong Province
PEOPLE'S REPUBLIC OF CHINA

Product: **Converter**
(Hybrid Inverter)

Model(s): **EAHI-3000-SL, EAHI-3600-SL,**
EAHI-5000-SL, EAHI-6000-SL

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.: 64290233072201

Date, 2023-07-12



(Billy Qiu)

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Parameters:

Model	EAHI-3000-SL	EAHI-3600-SL	EAHI-5000-SL	EAHI-6000-SL
PV input rating				
Rated input voltage	360 V d.c.			
Maximum input voltage	550 V d.c.			
MPPT voltage range	100 V d.c. – 540 V d.c.			
Full-load voltage range	250 V d.c. – 450 V d.c.			
Maximum input current	15 A d.c.	15 A d.c.*2		
Maximum short circuit current	20 A d.c.	20 A d.c.*2		
Maximum input power	4680 W	4680 W	6500 W	7800 W
Battery input / output rating				
Battery type	Lead-acid / Li-ion battery			
Rated voltage	48.0 V d.c. / 51.2 V d.c.			
Battery voltage range	42.0 V d.c. – 58.0 V d.c.			
Maximum charging current	66 A d.c.	75 A d.c.	100 A d.c.	100 A d.c.
Maximum charging power	3000 W	3600 W	5000 W	5000 W
Maximum discharging current	66 A d.c.	75 A d.c.	100 A d.c.	120 A d.c.
Maximum discharging power	3000 W	3600 W	5000 W	6000 W
Grid input rating				
Rated input voltage	230 V a.c.			
Rated output current	13.05 A a.c.	15.7 A a.c.	21.8 A a.c.	26.09 A a.c.
Maximum continuous input current	13.05 A a.c.	15.7 A a.c.	21.8 A a.c.	26.09 A a.c.
Maximum input power from grid to battery	3000 W	3600 W	5000 W	6000 W
Maximum input power from grid	3000 W	3600 W	5000 W	6000 W
Rated input frequency	50 Hz			
Grid output rating				
Rated output voltage	230 V a.c.			
Rated output current	13.05 A a.c.	15.7 A a.c.	21.8 A a.c.	26.09 A a.c.
Maximum continuous output current	13.05 A a.c.	15.7 A a.c.	21.8 A a.c.	26.09 A a.c.
Rated output power	3000 W	3600 W	5000 W	6000 W
Maximum output active power	3000 W	3600 W	5000 W	6000 W
Maximum output apparent power	3000 VA	3600 VA	5000 VA	6000 VA
P _{Emax}	2999 W	3622 W	5020 W	6025 W
S _{Emax}	3054 VA	3601 VA	5038 VA	6043 VA
Rated output frequency	50 Hz			
Power factor	0.8 under-excited to 0.8 over-excited			

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E.4 Unit certificate

Unit certificate		
Manufacturer	EAST Group Co., Ltd.	
Power generation unit type	[Hybrid Inverter]: EAHI-3000-SL, EAHI-3600-SL, EAHI-5000-SL, EAHI-6000-SL	
Assessment values	max. active power $P_{\text{E}_{\text{max}}}$	6025 W (EAHI-6000-SL)
	max. apparent power $S_{\text{E}_{\text{max}}}$	6043 VA (EAHI-6000-SL)
	Rated voltage	230 V a.c.
	Rated current (AC) I_r	26.09 A (EAHI-6000-SL)
	Initial short-circuit AC current I''_k	26.09 A (EAHI-6000-SL)
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	64.290.23.30722.01 from 2023-06-13	
The above designated power generation unit meets the requirements of VDE-AR-N 4105		
The model EAHI-6000-SL may be connected single-phase, a storage unit and a balancing device must be used to ensure that the requirements of maximum permissible unbalance $\leq 4.6\text{kVA}$ according to 5.5.2 of VDE-AR-N 4100 are met and a registration with the grid operators the finally installation.		

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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:	EAST Group Co., Ltd. No.6 Northern Industry Road, Songshan Lake Sci. & Tech. Industry Park, 523808 DongGuan City, Guangdong Province PEOPLE'S REPUBLIC OF CHINA	
Manufacturer indications:	Type of system	Hybrid Inverter
	Max. active power $P_{E_{max}}$	<u>2999 W (EAHI-3000-SL)</u>
		<u>3622 W (EAHI-3600-SL)</u>
		<u>5020 W (EAHI-5000-SL)</u>
		<u>6025 W (EAHI-6000-SL)</u>
	Rated voltage	<u>230 V a.c.</u>
Measurement period:	From 2023-04-25 to 2023-05-17	

Rapid voltage change		
Model	<u>EAHI-3000-SL</u>	
Connection without provisions (regarding the primary energy carrier)	$K_i=0.38$	
Most adverse case when switching between generator levels	$K_i=0.51$	
Connection at nominal conditions (of the primary energy carrier)	$K_i=0.21$	
Disconnection at rated power	$K_i=0.99$	
Worst value of all switching operations	$k_{imax}=0.99$	

Rapid voltage change		
Model	<u>EAHI-6000-SL</u>	
Connection without provisions (regarding the primary energy carrier)	$K_i=0.20$	
Most adverse case when switching between generator levels	$K_i=0.50$	
Connection at nominal conditions (of the primary energy carrier)	$K_i=0.21$	
Disconnection at rated power	$K_i=0.99$	
Worst value of all switching operations	$k_{imax}=0.99$	

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Flicker (≤ 16 A) (EAHI-3000-SL)					
Test items	$d_{(t)} - 500\text{ms}$ [%]	d_c [%]	$d_{\max}$ [%]	P_{st}	P_{lt}
Limit value	3.30	3.30	4.00	1.00	0.65
L1	0	0	0	0.036	0.023

Flicker (> 16 A and ≤ 75 A) (EAHI-6000-SL)					
Test items	$d_{(t)} - 500\text{ms}$ [%]	d_c [%]	$d_{\max}$ [%]	P_{st}	P_{lt}
Limit value	3.30	3.30	4.00	1.00	0.65
L1	0	0	0	0.042	0.039

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Harmonics (≤ 16 A) (EAHI-3000-SL)												
Active power P/Pn[%]	0	10	20	30	40	50	60	70	80	90	100	Limit value
Ordinal number	A	A	A	A	A	A	A	A	A	A	A	A
2	0.005	0.006	0.007	0.007	0.010	0.011	0.010	0.013	0.012	0.017	0.020	1.08
3	0.050	0.078	0.064	0.052	0.039	0.034	0.033	0.034	0.035	0.040	0.048	2.30
4	0.008	0.008	0.006	0.005	0.005	0.005	0.004	0.004	0.005	0.008	0.007	0.43
5	0.045	0.029	0.040	0.040	0.037	0.033	0.030	0.027	0.026	0.025	0.023	1.14
6	0.006	0.005	0.006	0.005	0.004	0.004	0.003	0.004	0.005	0.006	0.006	0.30
7	0.030	0.030	0.027	0.039	0.044	0.042	0.039	0.036	0.034	0.030	0.028	0.77
8	0.005	0.005	0.006	0.007	0.003	0.003	0.003	0.003	0.004	0.004	0.008	0.23
9	0.018	0.007	0.027	0.034	0.043	0.043	0.042	0.041	0.040	0.039	0.039	0.40
10	0.007	0.005	0.008	0.006	0.006	0.005	0.005	0.005	0.005	0.005	0.005	0.18
11	0.009	0.013	0.018	0.028	0.041	0.044	0.047	0.047	0.046	0.045	0.044	0.33
12	0.005	0.004	0.004	0.006	0.006	0.007	0.005	0.007	0.007	0.007	0.007	0.15
13	0.008	0.014	0.005	0.023	0.033	0.040	0.042	0.044	0.044	0.043	0.044	0.21
14	0.011	0.007	0.015	0.012	0.009	0.009	0.009	0.011	0.006	0.007	0.007	0.13
15	0.009	0.006	0.007	0.017	0.025	0.034	0.039	0.042	0.044	0.045	0.044	0.15
16	0.005	0.005	0.006	0.005	0.006	0.006	0.008	0.005	0.007	0.006	0.006	0.12
17	0.008	0.009	0.011	0.010	0.020	0.030	0.037	0.040	0.042	0.043	0.044	0.13
18	0.004	0.005	0.008	0.009	0.007	0.006	0.004	0.003	0.004	0.003	0.003	0.10
19	0.008	0.007	0.011	0.008	0.016	0.022	0.028	0.032	0.036	0.039	0.042	0.12
20	0.004	0.004	0.008	0.012	0.010	0.008	0.008	0.008	0.005	0.006	0.007	0.09
21	0.009	0.005	0.012	0.012	0.012	0.015	0.022	0.028	0.032	0.036	0.039	0.11
22	0.005	0.003	0.008	0.006	0.006	0.006	0.006	0.005	0.007	0.006	0.005	0.08
23	0.004	0.006	0.011	0.011	0.010	0.015	0.022	0.029	0.033	0.035	0.038	0.10
24	0.005	0.004	0.010	0.004	0.005	0.007	0.006	0.005	0.007	0.005	0.005	0.08
25	0.007	0.005	0.006	0.015	0.013	0.013	0.017	0.021	0.025	0.029	0.032	0.09
26	0.005	0.006	0.003	0.012	0.011	0.009	0.007	0.006	0.004	0.004	0.004	0.07
27	0.005	0.004	0.005	0.015	0.015	0.013	0.012	0.014	0.019	0.025	0.030	0.08
28	0.005	0.003	0.004	0.013	0.013	0.011	0.008	0.008	0.005	0.005	0.006	0.07
29	0.004	0.004	0.004	0.014	0.017	0.014	0.011	0.014	0.018	0.024	0.029	0.08
30	0.004	0.005	0.009	0.006	0.004	0.006	0.008	0.008	0.010	0.008	0.007	0.06
31	0.004	0.003	0.003	0.011	0.015	0.014	0.014	0.017	0.019	0.023	0.025	0.07
32	0.009	0.006	0.010	0.009	0.004	0.008	0.010	0.010	0.013	0.012	0.010	0.06
33	0.004	0.004	0.004	0.008	0.012	0.014	0.016	0.017	0.018	0.022	0.024	0.07
34	0.008	0.006	0.007	0.011	0.005	0.007	0.010	0.011	0.014	0.013	0.012	0.05
35	0.004	0.004	0.005	0.006	0.014	0.016	0.017	0.015	0.014	0.016	0.019	0.06
36	0.005	0.004	0.004	0.009	0.004	0.005	0.007	0.008	0.011	0.010	0.011	0.05
37	0.004	0.003	0.004	0.005	0.013	0.016	0.017	0.016	0.015	0.016	0.020	0.06
38	0.003	0.003	0.003	0.009	0.005	0.004	0.005	0.006	0.009	0.008	0.008	0.05
39	0.005	0.003	0.005	0.004	0.011	0.016	0.018	0.017	0.015	0.015	0.017	0.06
40	0.004	0.003	0.007	0.007	0.008	0.007	0.005	0.004	0.007	0.006	0.006	0.05
THD	0.648%	0.734%	0.741%	0.815%	0.890%	0.943%	0.992%	1.037%	1.075%	1.125%	1.185%	5%
Remark: Iref=13.05A												

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Harmonics (>16 A and ≤75 A) (EAHI-6000-SL)												
Active power P/Pn[%]	0	10	20	30	40	50	60	70	80	90	100	Limit value
Ordinal number	I _h /I _{ref} [%]											[%]
2	0.005	0.008	0.009	0.010	0.010	0.011	0.012	0.013	0.013	0.013	0.014	8
3	0.084	0.093	0.074	0.070	0.100	0.111	0.140	0.184	0.235	0.293	0.485	21.6
4	0.009	0.005	0.006	0.006	0.007	0.011	0.009	0.009	0.010	0.010	0.011	4
5	0.076	0.054	0.069	0.059	0.074	0.074	0.066	0.060	0.057	0.068	0.100	10.7
6	0.006	0.007	0.006	0.006	0.006	0.008	0.006	0.006	0.006	0.005	0.005	2.67
7	0.044	0.044	0.070	0.067	0.073	0.063	0.058	0.058	0.053	0.061	0.083	7.2
8	0.006	0.008	0.006	0.006	0.006	0.007	0.006	0.006	0.005	0.007	0.006	2
9	0.025	0.055	0.058	0.068	0.079	0.078	0.076	0.077	0.082	0.081	0.058	3.8
10	0.004	0.009	0.006	0.005	0.006	0.006	0.006	0.007	0.006	0.006	0.007	1.6
11	0.017	0.036	0.048	0.066	0.079	0.080	0.077	0.070	0.067	0.063	0.067	3.1
12	0.007	0.009	0.009	0.008	0.008	0.008	0.008	0.009	0.010	0.008	0.008	1.33
13	0.014	0.009	0.036	0.053	0.068	0.072	0.075	0.080	0.078	0.076	0.067	2
14	0.004	0.014	0.007	0.005	0.006	0.004	0.004	0.006	0.006	0.005	0.005	-
15	0.012	0.007	0.029	0.044	0.061	0.065	0.068	0.068	0.069	0.074	0.060	-
16	0.005	0.006	0.010	0.010	0.008	0.008	0.008	0.007	0.007	0.008	0.007	-
17	0.010	0.005	0.024	0.036	0.049	0.059	0.063	0.063	0.069	0.064	0.072	-
18	0.003	0.011	0.008	0.006	0.006	0.006	0.006	0.009	0.007	0.006	0.006	-
19	0.011	0.013	0.016	0.025	0.039	0.050	0.053	0.060	0.057	0.055	0.062	-
20	0.004	0.015	0.009	0.006	0.007	0.008	0.004	0.005	0.004	0.004	0.004	-
21	0.009	0.019	0.009	0.018	0.031	0.041	0.049	0.054	0.052	0.059	0.052	-
22	0.002	0.010	0.009	0.009	0.009	0.008	0.010	0.009	0.009	0.007	0.009	-
23	0.007	0.011	0.009	0.018	0.024	0.036	0.047	0.047	0.052	0.054	0.053	-
24	0.002	0.006	0.010	0.011	0.009	0.007	0.010	0.009	0.010	0.008	0.009	-
25	0.007	0.011	0.013	0.015	0.015	0.028	0.036	0.042	0.048	0.049	0.051	-
26	0.004	0.011	0.010	0.007	0.004	0.004	0.005	0.006	0.006	0.007	0.007	-
27	0.005	0.011	0.014	0.010	0.011	0.022	0.030	0.038	0.040	0.043	0.045	-
28	0.004	0.010	0.011	0.006	0.004	0.003	0.005	0.006	0.006	0.008	0.010	-
29	0.005	0.008	0.015	0.011	0.011	0.017	0.027	0.034	0.037	0.042	0.044	-
30	0.001	0.008	0.007	0.010	0.008	0.008	0.007	0.006	0.007	0.006	0.009	-
31	0.006	0.004	0.014	0.014	0.012	0.013	0.021	0.028	0.034	0.037	0.040	-
32	0.003	0.009	0.006	0.011	0.011	0.011	0.010	0.011	0.010	0.010	0.011	-
33	0.007	0.004	0.013	0.015	0.015	0.012	0.018	0.025	0.030	0.034	0.037	-
34	0.003	0.009	0.006	0.012	0.011	0.011	0.011	0.010	0.009	0.008	0.009	-
35	0.006	0.004	0.013	0.014	0.013	0.008	0.014	0.021	0.027	0.031	0.035	-
36	0.002	0.007	0.006	0.009	0.009	0.010	0.009	0.008	0.008	0.008	0.008	-
37	0.005	0.005	0.011	0.014	0.015	0.011	0.013	0.018	0.024	0.029	0.033	-
38	0.002	0.005	0.006	0.008	0.008	0.007	0.006	0.006	0.006	0.006	0.006	-
39	0.005	0.005	0.009	0.014	0.016	0.012	0.010	0.016	0.021	0.026	0.031	-
40	0.001	0.003	0.009	0.007	0.006	0.006	0.006	0.006	0.006	0.006	0.007	-
THC/I _{ref}	0.497	0.551	0.626	0.686	0.855	0.907	0.986	1.106	1.254	1.444	2.088	23
PWHC/I _{ref}	0.545	0.904	1.195	1.506	1.841	2.179	2.528	2.809	3.041	3.210	3.325	23
Remark: I _{ref} =26.09A												

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E.6 Certificate of the network and system protection

Certificate of NS protection		
Manufacturer	EAST Group Co., Ltd.	
Type of NS protection	Integrated NS protection	
Central NS protection	☐	
Integrated NS protection	☒	Assigned to power generation unit of type: EAHI-3000-SL, EAHI-3600-SL, EAHI-5000-SL, EAHI-6000-SL
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	64.290.23.30722.01 from 2023-06-13	
The network and system protection designated above meets the requirements of VDE-AR-N 4105.		

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

Extract from test report for NS protection			
"Determination of electrical properties"			
NS protection test report			
Type of NS system:	Integrated NS protection	Other Manufacturer indications	
Software version:	V1002		
Manufacturer:	EAST Group Co., Ltd.		
Measuring period:	From 2023-04-25 to 2023-05-17		
	Inverter		
Protection function	Setting value	Tripping value	Tripping time NS protection*
Rise-in-voltage protection $U >>$	$1.25 \cdot U_n$	L1-N: 288.69V; L1-N: 288.66V; L1-N: 288.66V;	L1-N: 146.00ms; L1-N: 134.00ms; L1-N: 133.00ms;
Rise-in-voltage protection $U >$	$1.10 \cdot U_n$	$1.10 \cdot U_n$	ms**
Voltage drop protection $U <$	$0.8 \cdot U_n$	L1-N: 183.62V; L1-N: 183.65V; L1-N: 183.24V;	L1-N: 3.06s; L1-N: 3.04s; L1-N: 3.05s;
Voltage drop protection $U <<$	$0.45 \cdot U_n$	L1-N: 101.20V; L1-N: 101.30V; L1-N: 101.60V;	L1-N: 330.00ms; L1-N: 335.00ms; L1-N: 340.00ms;
Frequency decrease protection $f <$	47.5 Hz	47.49Hz	110.00ms
Frequency increase protection $f >$	51.5 Hz	51.49Hz	122.00ms
*: 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: <u>452.00s</u> (L1-N&L2-N&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) <u>250.00s</u> (L1-N&L2-N&L3-N from 600s@106%U_n to 114%U_n)			
☒ as integrated NS protection			
Assigned to power generation unit type		EAHI-3000-SL, EAHI-3600-SL, EAHI-5000-SL, EAHI-6000-SL	

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Integrated interface switch type	Series-connected relays for all phase conductors each 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.	☒