

Certificate of Conformity

No. ESY 119458 0005 Rev. 00

Holder of Certificate: **ESY Sunhome Co.,Ltd**
101, Building 6, No.5-2, Inner Ring Road, Shanxia Community
Pinghu Street, Longgang District
518000 Shenzhen
PEOPLE'S REPUBLIC OF CHINA

Product: **Converter**
(Hybrid Inverter)

Model(s): **ESYSUNHOME HM6**


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.: 64290223170701

Date, 2023-04-28



(Billy Qiu)

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Parameters:

Model	ESYSUNHOME HM6
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	15/15 A d.c.
Maximum short circuit current	20/20 A d.c.
Maximum input power	8000 W
Battery input / output rating	
Battery type	Li-ion
Rated voltage	51.2 V d.c.
Battery voltage range	40.8 V d.c. - 57.6 V d.c.
Maximum charging current	100 A d.c.
Maximum charging power	5000 W
Maximum discharging current	120 A d.c.
Maximum discharging power	6000 W
Grid output rating	
Rated output voltage	230 V a.c.
Rated output current	26.09 A a.c.
Max. continuous output current	26.09 A a.c.
Rated output power	6000 W
Maximum Output Active Power	6000 W
Maximum Output Apparent Power	6000 VA
$P_{E_{max}}$	6025 W
$S_{E_{max}}$	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	ESY Sunhome Co.,Ltd	
Power generation unit type	[Hybrid Inverter]: ESYSUNHOME HM6	
Assessment values	max. active power $P_{E_{max}}$	6025 W (ESYSUNHOME HM6)
	max. apparent power $S_{E_{max}}$	6043 VA (ESYSUNHOME HM6)
	Rated voltage	230 V a.c.
	Rated current (AC) I_r	26.09 A (ESYSUNHOME HM6)
	Initial short-circuit AC current I''_k	26.09 A (ESYSUNHOME HM6)
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	64.290.22.31707.01 from 2023-04-21	
The above designated power generation unit meets the requirements of VDE-AR-N 4105		
The model <u>ESYSUNHOME HM6</u> 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 operator in the final 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:	ESY Sunhome Co.,Ltd 101, building 6, No.5-2, inner ring road, Shanxia community, Pinghu street, Longgang District, Shenzhen, China	
Manufacturer indications:	Type of system	Hybrid Inverter systems
	Max. active power $P_{E_{max}}$	6025W (ESYSUNHOME HM6)
	Rated voltage	230 V a.c.
Measurement period:	From 2023-01-20 to 2023-04-20	

Rapid voltage change	
Model	ESYSUNHOME HM6
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	$k_{i_{max}}=0.99$

Flicker (>16 A and ≤75 A) (ESYSUNHOME HM6)					
Test items	$d_{(t) - 500ms}$ [%]	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 and ≤75 A) (ESYSUNHOME HM6)												
Active power P/Pn[%]	0	10	20	30	40	50	60	70	80	90	100	Limit value
Ordinal number	Ih/Iref [%]											[%]
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	ESY Sunhome Co.,Ltd
Type of NS protection	Integrated NS protection
Central NS protection	<input type="checkbox"/>
Integrated NS protection	<input checked="" type="checkbox"/> Assigned to power generation unit of type: <u>ESYSUNHOME HM6</u>
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	64.290.22.31707.01 from <u>2023-04-21</u>
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:	ESY Sunhome Co.,Ltd		
Measuring period:	From 2023-01-20 to 2023-04-20		
	Inverter		
Protection function	Setting value	Tripping value	Tripping time NS protection*
Rise-in-voltage protection $U \gg$	$1.25 * U_n$	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 $U >$	$1.10 * U_n$	$1.10 * U_n$	ms**
Voltage drop protection $U <$	$0.8 * U_n$	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 $U \ll$	$0.45 * U_n$	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
<p>*: The tripping time includes the period from the limit value violation U/f until the tripping signal to the interface switch.</p> <p>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.</p> <p>The disconnection time (sum of tripping time of the NS protection plus response time of the interface switch) shall not exceed 200 ms.</p> <p>** : Verification disconnection time of moving 10-min-average value.</p> <p>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)</p>			
<input checked="" type="checkbox"/> as integrated NS protection			
Assigned to power generation unit type		ESYSUNHOME HM6	

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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.	<input checked="" type="checkbox"/>