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DAkkS Deutsche Akkreditierungsstelle D-ZE-11321-01-00

TÜV SÜD Product Service

Certificate of Conformity

No. ESY 122411 0019 Rev. 00

Holder of Certificate:

Shenzhen Eternalplanet Energy Pingshan Ltd.
Room 220-3, Podium Building
Innovation Plaza
No. 2007, Pingshan Blvd, Liulian Community
Pingshan Subdistrict, Pingshan District
518118 Shenzhen, Guangdong
PEOPLE'S REPUBLIC OF CHINA

Product:

Energy Storage System (Battery Energy Storage System)

Model(s):

EP Cube HES-EU1-706W, EP Cube HES-EU1-706G, EP Cube HES-EU1-710W, EP Cube HES-EU1-710G, EP Cube HES-EU1-713W, EP Cube HES-EU1-713G, EP Cube HES-EU1-716W, EP Cube HES-EU1-716G, EP Cube HES-EU1-720W, EP Cube HES-EU1-720G

Parameters:

See page 2-3

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.: 64290223102601

Date, 2024-08-28

(Billy Qiu)

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Parameters:

Model:	EP Cube HES-EU1-706W	EP Cube HES-EU1-710W	EP Cube HES-EU1-713W	EP Cube HES-EU1-716W	EP Cube HES-EU1-720W
PV terminal parameters					
Maximum PV voltage [V_{DC}]	600				
Rated voltage [V_{DC}]	360				
MPPT voltage range [V_{DC}]	90-550				
MPPT voltage range (full load) [V_{DC}]	312.5-450.0				
Maximum input current [A_{DC}]	16/16				
Isc PV [A_{DC}]	20/20				
MPPT tracker number	2				
Maximum input power [W]	10000				
Battery input/output parameters					
Battery type	$LiFePO_4$				
Maximum voltage [V_{DC}]	87.6	131.4	175.2	219.0	262.8
Battery rated voltage [V_{DC}]	76.8	115.2	153.6	192.0	230.4
Battery voltage range [V_{DC}]	64.8-87.6	97.2-131.4	129.6-175.2	162.0-219.0	194.4-262.8
Maximum charging power [W]	3000	5000	6500	7600	7600
Maximum discharging power[W]	3000	5000	6500	7600	7600
Maximum charging current [A_{DC}]	55				
Maximum discharging current [A_{DC}]	55				
Grid terminal input parameters					
Rated input voltage [A_{DC}]	1P+N+PE, 230				
Rated input frequency [Hz]	50				
Maximum continuous input current [A_{AC}]	20.0				
Maximum continuous input active power [W]	4600				
Maximum continuous input apparent power [VA]	4600				
Power factor range	0.8 under-excited to 0.8 over-excited				
Grid terminal output parameters					
Rated output voltage [V_{AC}]	1P+N+PE, 230				
Rated output frequency [Hz]	50				
Rated output current [A_{AC}]	20.0				
Maximum continuous output current [A_{AC}]	20.0				
Rated output active power [W]	4600				
Maximum output active power P_{Emax} [W]	4600				
Maximum output apparent power S_{Emax} [VA]	4600				
Power factor range	0.8 under-excited to 0.8 over-excited				

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Model:	EP Cube HES-EU1-706G	EP Cube HES-EU1-710G	EP Cube HES-EU1-713G	EP Cube HES-EU1-716G	EP Cube HES-EU1-720G
PV terminal parameters					
Maximum PV voltage [V_{DC}]	600				
Rated voltage [V_{DC}]	360				
MPPT voltage range [V_{DC}]	90-550				
MPPT voltage range (full load) [V_{DC}]	312.5-450.0				
Maximum input current [A_{DC}]	16/16				
Isc PV [A_{DC}]	20/20				
MPPT tracker number	2				
Maximum input power [W]	10000				
Battery input/output parameters					
Battery type	$LiFePO_4$				
Maximum voltage [V_{DC}]	87.6	131.4	175.2	219.0	262.8
Battery rated voltage [V_{DC}]	76.8	115.2	153.6	192.0	230.4
Battery voltage range [V_{DC}]	64.8-87.6	97.2-131.4	129.6-175.2	162.0-219.0	194.4-262.8
Maximum charging power [W]	3000	5000	6500	7600	7600
Maximum discharging power[W]	3000	5000	6500	7600	7600
Maximum charging current [A_{DC}]	55				
Maximum discharging current [A_{DC}]	55				
Grid terminal input parameters					
Rated input voltage [A_{DC}]	1P+N+PE, 230				
Rated input frequency [Hz]	50				
Maximum continuous input current [A_{AC}]	20.0				
Maximum continuous input active power [W]	4600				
Maximum continuous input apparent power [VA]	4600				
Power factor range	0.8 under-excited to 0.8 over-excited				
Grid terminal output parameters					
Rated output voltage [V_{AC}]	1P+N+PE, 230				
Rated output frequency [Hz]	50				
Rated output current [A_{AC}]	20.0				
Maximum continuous output current [A_{AC}]	20.0				
Rated output active power [W]	4600				
Maximum output active power P_{Emax} [W]	4600				
Maximum output apparent power S_{Emax} [VA]	4600				
Power factor range	0.8 under-excited to 0.8 over-excited				

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E.4 Unit certificate

Unit certificate		
Manufacturer	Eternalplanet Energy Co.,Ltd.	
Power generation unit type	[Battery Energy Storage System]: EP Cube HES-EU1-706W, EP Cube HES-EU1-706G, EP Cube HES-EU1-710W, EP Cube HES-EU1-710G, EP Cube HES-EU1-713W, EP Cube HES-EU1-713G, EP Cube HES-EU1-716W, EP Cube HES-EU1-716G, EP Cube HES-EU1-720W, EP Cube HES-EU1-720G Remark: certified on representative model EP Cube HES-EU1-720G of family design products, results of the measurement of EP Cube HES-EU1-720G 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_{Emax}	4600 W (EP Cube HES-EU1-720G)
	max. apparent power S_{Emax}	4600 VA (EP Cube HES-EU1-720G)
	Rated voltage	1/N/PE~, 230V_{AC}
	Rated current (AC) I_r	20.0 A (EP Cube HES-EU1-720G)
	Initial short-circuit AC current I''_k	20.0 A (EP Cube HES-EU1-720G)
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	64.290.22.31026.01 from 2024-08-02	
The above designated power generation unit meets the requirements of VDE-AR-N 4105:2018-11.		

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No. ESY 122411 0019 Rev. 00

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:	Eternalplanet Energy Co.,Ltd. 27th Floor, Building 3A, Longgang Intelligent Park, 518116, Shenzhen, PEOPLE'S REPUBLIC OF CHINA	
Manufacturer indications:	Type of system	Battery Energy Storage System
	Max. active power P_{Emax}	4600 W (EP Cube HES-EU1-706W) 4600 W (EP Cube HES-EU1-706G) 4600 W (EP Cube HES-EU1-710W) 4600 W (EP Cube HES-EU1-710G) 4600 W (EP Cube HES-EU1-713W) 4600 W (EP Cube HES-EU1-713G) 4600 W (EP Cube HES-EU1-716W) 4600 W (EP Cube HES-EU1-716G) 4600 W (EP Cube HES-EU1-720W) 4600 W (EP Cube HES-EU1-720G)
	Rated voltage	1/N/PE~, 230V_{AC}
Measurement period:	From 2024-06-12 to 2024-07-09	

Rapid voltage changes		
Model	EP Cube HES-EU1-720G	
Connection without provisions (regarding the primary energy carrier)		K_i=0.491
Most adverse case when switching between generator levels		K_i=0.490
Connection at nominal conditions (of the primary energy carrier)		K_i=0.940
Disconnection at rated power		K_i=0.970
Worst value of all switching operations		K_{imax}=0.970

Flicker (EP Cube HES-EU1-720G)					
Network impedance angle Ψ_k	30°	50°	70°	85°	32°
Coefficient of system flicker C_ψ (Maximum)					
L1	--	--	--	--	0.16

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Harmonics (>16 A and ≤75 A) (EP Cube HES-EU1-720G)												
Active power P/Pn[%]	0	10	20	30	40	50	60	70	80	90	100	Limit value
Ordinal number	Ih/Iref [%]											[%]
2	0.168	0.148	0.129	0.125	0.138	0.144	0.154	0.153	0.143	0.128	0.125	8
3	0.718	0.560	1.471	1.951	2.186	2.312	2.369	2.397	2.399	2.392	2.391	21.6
4	0.071	0.055	0.058	0.078	0.095	0.100	0.105	0.106	0.101	0.096	0.100	4
5	0.935	0.824	0.601	0.550	0.982	1.303	1.541	1.705	1.816	1.849	1.902	10.7
6	0.078	0.074	0.090	0.098	0.121	0.129	0.122	0.126	0.121	0.109	0.112	2.67
7	0.697	0.527	0.295	0.246	0.091	0.373	0.590	0.766	0.892	0.895	0.961	7.2
8	0.072	0.085	0.081	0.086	0.100	0.110	0.111	0.107	0.102	0.085	0.081	2
9	0.233	0.485	0.357	0.105	0.144	0.249	0.393	0.509	0.596	0.525	0.567	3.8
10	0.092	0.118	0.115	0.114	0.112	0.109	0.114	0.116	0.113	0.079	0.075	1.6
11	0.078	0.249	0.528	0.255	0.151	0.251	0.363	0.450	0.520	0.373	0.402	3.1
12	0.081	0.098	0.092	0.103	0.114	0.105	0.111	0.113	0.106	0.060	0.057	1.33
13	0.095	0.404	0.343	0.358	0.141	0.146	0.237	0.313	0.388	0.234	0.260	2
14	0.088	0.108	0.115	0.120	0.123	0.112	0.115	0.112	0.115	0.052	0.050	-
15	0.127	0.238	0.217	0.412	0.215	0.113	0.188	0.250	0.312	0.150	0.171	-
16	0.098	0.112	0.119	0.122	0.123	0.111	0.108	0.104	0.107	0.041	0.042	-
17	0.153	0.179	0.298	0.363	0.295	0.133	0.138	0.195	0.243	0.095	0.109	-
18	0.101	0.123	0.121	0.138	0.134	0.124	0.121	0.120	0.122	0.039	0.039	-
19	0.174	0.159	0.342	0.271	0.356	0.197	0.123	0.164	0.223	0.074	0.084	-
20	0.152	0.214	0.244	0.267	0.283	0.284	0.289	0.294	0.299	0.075	0.075	-
21	0.171	0.150	0.237	0.196	0.347	0.246	0.137	0.137	0.184	0.052	0.058	-
22	0.097	0.124	0.138	0.148	0.158	0.155	0.148	0.145	0.140	0.031	0.031	-
23	0.166	0.150	0.140	0.240	0.331	0.297	0.157	0.119	0.152	0.038	0.043	-
24	0.102	0.109	0.112	0.121	0.130	0.139	0.126	0.121	0.118	0.023	0.023	-
25	0.143	0.191	0.160	0.268	0.252	0.311	0.185	0.114	0.128	0.028	0.031	-
26	0.091	0.110	0.112	0.115	0.126	0.149	0.117	0.108	0.108	0.019	0.018	-
27	0.151	0.219	0.139	0.259	0.211	0.343	0.239	0.129	0.116	0.023	0.025	-
28	0.087	0.104	0.105	0.105	0.115	0.146	0.121	0.102	0.103	0.015	0.015	-
29	0.155	0.173	0.122	0.171	0.200	0.294	0.271	0.155	0.117	0.019	0.021	-
30	0.085	0.103	0.107	0.111	0.127	0.117	0.154	0.113	0.122	0.015	0.014	-
31	0.171	0.190	0.190	0.119	0.245	0.256	0.326	0.216	0.146	0.018	0.019	-
32	0.080	0.102	0.098	0.106	0.124	0.100	0.160	0.123	0.131	0.014	0.013	-
33	0.178	0.127	0.156	0.122	0.240	0.186	0.303	0.229	0.163	0.015	0.015	-
34	0.079	0.098	0.098	0.111	0.114	0.092	0.147	0.150	0.161	0.015	0.013	-
35	0.183	0.125	0.159	0.114	0.212	0.145	0.274	0.263	0.182	0.014	0.014	-
36	0.073	0.095	0.095	0.103	0.098	0.091	0.116	0.133	0.127	0.013	0.012	-
37	0.167	0.115	0.193	0.097	0.167	0.146	0.221	0.238	0.158	0.012	0.012	-
38	0.075	0.083	0.087	0.092	0.083	0.082	0.104	0.119	0.106	0.012	0.012	-
39	0.150	0.145	0.181	0.099	0.126	0.193	0.212	0.262	0.171	0.011	0.011	-
40	0.061	0.072	0.074	0.082	0.082	0.086	0.098	0.109	0.099	0.010	0.010	-
THC/I_{ref}	1.570	1.534	1.986	2.320	2.647	2.893	3.115	3.266	3.380	3.244	3.307	23
PWHC/I_{ref}	3.508	3.745	4.263	4.552	5.193	5.007	5.159	4.655	4.204	1.024	1.122	23
Remark: Iref=20 A.												

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E.6 Certificate of the network and system protection

Certificate of NS protection		
Manufacturer	Eternalplanet Energy Co.,Ltd.	
Type of NS protection	Integrated NS protection	
Central NS protection	☐	
Integrated NS protection	☒	Assigned to power generation unit of type: EP Cube HES-EU1-706W, EP Cube HES-EU1-706G, EP Cube HES-EU1-710W, EP Cube HES-EU1-710G, EP Cube HES-EU1-713W, EP Cube HES-EU1-713G, EP Cube HES-EU1-716W, EP Cube HES-EU1-716G, EP Cube HES-EU1-720W, EP Cube HES-EU1-720G.
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	64.290.22.31062.01 from 2024-08-02	
The network and system protection designated above meets the requirements of VDE-AR-N 4105:2018-11.		

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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:	V1.5.0	
Manufacturer:	Eternalplanet Energy Co.,Ltd. 27th Floor, Building 3A, Longgang Intelligent Park, 518116, Shenzhen, PEOPLE'S REPUBLIC OF CHINA	
Measuring period:	From 2024-06-12 to 2024-07-09	

	Inverter		
Protection function	**Setting value**	**Tripping value**	**Tripping time NS protection***
Rise-in-voltage protection *U* >>	1.25 * U_n	L1-N: 287.7V	L1-N: 156.00ms
Rise-in-voltage protection *U* >	1.10 * U_n	1.10 * U_n	ms**
Voltage drop protection *U* <	0.8 * U_n	L1-N: 183.03V	L1-N: 3070.00ms
Voltage drop protection *U* <<	0.45 * U_n	L1-N: 103.30V	L1-N: 355.00ms
Frequency decrease protection *f* <	47.5 Hz	47.51Hz	151.20ms
Frequency increase protection *f* >	51.5 Hz	51.52Hz	148.00ms

*: 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:

511.46s (L1-N from 600s@U_n to 112%U_n)

Continuous operation (L1-N from 600s@U_n to 108%U_n)

309.32s (L1-N from 600s@106%U_n to 114%U_n)

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☑ **as integrated NS protection**	
Assigned to power generation unit type	EP Cube HES-EU1-706W, EP Cube HES-EU1-706G, EP Cube HES-EU1-710W, EP Cube HES-EU1-710G, EP Cube HES-EU1-713W, EP Cube HES-EU1-713G, EP Cube HES-EU1-716W, EP Cube HES-EU1-716G, EP Cube HES-EU1-720W, EP Cube HES-EU1-720G.
Integrated interface switch type	Series-connected relays for all phase conductors each Relay type: CHIB-40/12H2DABP
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.	☑