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

TÜV SÜD Product Service

Certificate of Conformity

No. ESY 096640 0031 Rev. 00

Holder of Certificate:	**AXITEC Energy GmbH & Co. KG** Otto-Lilienthal-Straße 5 71034 Böblingen GERMANY
Product:	**Converter** **Hybrid Inverter**
Model(s):	**AXIhycon 12H, AXIhycon 15H, AXIhycon 20H, AXIhycon 20H-YD**
Parameters:	See next pages.
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.: 7040924037143-00

Date, 2024-10-14

(Zhengdong Ma)

TÜV SÜD Product Service GmbH • Certification Body • Ridlerstraße 65 • 80339 Munich • Germany

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Model	AXIhycon 12H	AXIhycon 15H	AXIhycon 20H
PV input parameters:			
Max. input voltage	DC 1000 V		
Mppt voltage range	DC 200, …, 850 V		
Max. input current	DC 4*20 A		
Isc PV (absolute maximum)	DC 4*30 A		
Battery input parameters:			
Battery Type	Li-ion		
Battery Voltage range	DC 120, …, 800 V		
Max. Charge/discharge current	DC 50/50 A		
AC output parameters:			
Max. (Rated) apparent output Power	12000 VA	15000 VA	20000 VA
Nominal output voltage	3/N/PE AC 230/400 V		
Nominal Frequency	50 Hz		
Max. (Rated) output current	AC 17.3 A	AC 21.7 A	AC 28.9 A
Power factor range	-0.8, …, 1, …, +0.8		

Model	AXIhycon 20H-YD
PV input parameters:	
Max. input voltage	DC 1000 V
Mppt voltage range	DC 200, …, 850 V
Max. input current	DC 4*20 A
Isc PV (absolute maximum)	DC 4*30 A
Battery input parameters:	
Battery Type	Li-ion
Battery Voltage range	DC 120, …, 800 V
Max. Charge/discharge current	DC 50/50 A
AC output parameters:	
Max. (Rated) apparent output Power	20000 VA
Nominal output voltage	3/N/PE AC 230/400 V
Nominal Frequency	50 Hz
Max. (Rated) output current	AC 28.9 A
Power factor range	-0.8, …, 1, …, +0.8

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E.4 Unit certificate

Unit certificate	No. 7040924037143-00	
Manufacturer	AXITEC Energy GmbH & Co. KG Otto-Lilienthal-Straße 5, 71034 Böblingen, GERMANY	
Power generation unit type	[Hybrid Inverter]: AXIhycon 12H, AXIhycon 15H, AXIhycon 20H, AXIhycon 20H-YD Remark: certified on representative model AXIhycon 20H-YD of family design products, results of the measurement of AXIhycon 20H-YD can be transferred to the other models based on transferability rule of measurements in DIN VDE V 0124-100 (VDE V 0124-100):2020.	
☑ Inverter	☐ Asynchronous generator	☐ Synchronous generator
☐ Stirling generator	☐ Fuel cell	☐ others
Assessment values	Max. active power P_{Emax}	19.97 kW
	Max. apparent power S_{Emax}	20.18 kVA
	Rated voltage	3/N/PE AC 230/400 V
Rated values	Rated current (AC) I_r	28.9 Aa.c.
Rated values	Max. current (AC) I_{max}	30.4 Aa.c.
Rated values	Initial short-circuit current I_k"	50.0 Aa.c.
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. 7040924037143-00
Generation unit manufacturer:	AXITEC Energy GmbH & Co. KG Otto-Lilienthal-Straße 5, 71034 Böblingen, GERMANY	
Manufacturer indications:	Type of system	Inverter for PV and Battery System
	Max. active power P_{Emax}	12 kW (AXIhycon 12H) 15 kW (AXIhycon 15H) 20 kW (AXIhycon 20H, AXIhycon 20H-YD)
	Rated voltage	3/N/PE AC 230/400 V
Period of measurement:	From 2023-11-09 to 2024-01-11 and from 2024-07-31 to 2024-08-25, 2024-09-13	

Rapid voltage changes and flicker (DIN EN 61000-3-11)

Phase	P_{st}	d(t) - 500ms [%]	dc [%]	dmax [%]
Limit	1.0	3.3%	3.3%	4%
L1	0.57	0.00	0.23	0.75
L2	0.57	0.00	0.20	0.70
L3	0.58	0.00	0.21	0.72

$P_{lt\ measured}$	0.41/0.41/0.41	**$P_{lt\ limit}$**	0.65
	d(t) - 500ms [%]	dc [%]	dmax [%]
START	0.00	0.01	0.08
STOP	0.00	0.03	0.40
LIMIT	3.3%	3.3%	4%

Supplementary information:

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Harmonics IEC 61000-3-12(>16 A and ≤75 A) (AXIhycon 20H-YD)													
L1													
Power P/Pn [%]	0-5	10	20	30	40	50	60	70	80	90	100	IEC 61000-3-12 limit	
Ordinal number	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	1 phase [%]	3 phase [%]
2	0.060	0.089	0.067	0.037	0.062	0.078	0.069	0.116	0.116	0.140	0.155	8%	8%
3	0.040	0.046	0.045	0.031	0.041	0.045	0.033	0.047	0.031	0.033	0.034	21.6%	Not stated
4	0.040	0.047	0.043	0.061	0.058	0.044	0.038	0.045	0.040	0.075	0.143	4%	4%
5	0.501	0.262	0.409	0.508	0.569	0.569	0.586	0.620	0.639	0.676	0.696	10.7%	10.7%
6	0.037	0.046	0.024	0.016	0.021	0.023	0.020	0.026	0.022	0.030	0.035	2.67%	2.67%
7	0.383	0.207	0.120	0.209	0.278	0.317	0.311	0.281	0.267	0.262	0.253	7.2%	7.2%
8	0.037	0.039	0.035	0.034	0.038	0.035	0.033	0.038	0.033	0.039	0.045	2%	2%
9	0.019	0.027	0.023	0.016	0.020	0.029	0.029	0.034	0.037	0.044	0.055	3.8%	Not stated
10	0.026	0.026	0.033	0.035	0.036	0.039	0.038	0.038	0.043	0.041	0.043	1.6%	1.6%
11	0.092	0.243	0.074	0.070	0.178	0.216	0.247	0.281	0.286	0.289	0.267	3.1%	3.1%
12	0.038	0.035	0.018	0.015	0.020	0.024	0.022	0.030	0.030	0.036	0.043	1.33%	1.33%
13	0.064	0.337	0.172	0.031	0.104	0.171	0.187	0.201	0.224	0.239	0.241	2%	2%
14	0.029	0.029	0.026	0.019	0.029	0.031	0.029	0.030	0.030	0.032	0.039	-	-
15	0.020	0.026	0.025	0.020	0.024	0.027	0.026	0.030	0.030	0.032	0.034	-	-
16	0.021	0.030	0.025	0.017	0.033	0.032	0.033	0.031	0.030	0.032	0.035	-	-
17	0.180	0.127	0.173	0.096	0.046	0.121	0.170	0.192	0.190	0.202	0.207	-	-
18	0.023	0.032	0.029	0.023	0.020	0.023	0.024	0.029	0.026	0.029	0.033	-	-
19	0.096	0.100	0.168	0.137	0.034	0.088	0.135	0.163	0.176	0.176	0.176	-	-
20	0.027	0.027	0.025	0.020	0.027	0.032	0.028	0.030	0.029	0.033	0.036	-	-

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21	0.019	0.023	0.025	0.024	0.025	0.026	0.028	0.031	0.030	0.031	0.033	-	-
22	0.016	0.026	0.026	0.030	0.024	0.033	0.035	0.036	0.035	0.035	0.039	-	-
23	0.108	0.076	0.070	0.137	0.068	0.054	0.106	0.148	0.168	0.195	0.193	-	-
24	0.025	0.034	0.027	0.029	0.029	0.029	0.030	0.033	0.032	0.033	0.036	-	-
25	0.092	0.127	0.022	0.140	0.099	0.035	0.076	0.132	0.148	0.161	0.169	-	-
26	0.015	0.030	0.018	0.028	0.022	0.029	0.032	0.035	0.036	0.042	0.051	-	-
27	0.014	0.021	0.024	0.027	0.028	0.027	0.030	0.033	0.033	0.039	0.045	-	-
28	0.016	0.029	0.022	0.030	0.025	0.029	0.034	0.040	0.038	0.048	0.062	-	-
29	0.099	0.071	0.073	0.090	0.105	0.041	0.061	0.101	0.134	0.150	0.162	-	-
30	0.018	0.024	0.027	0.020	0.025	0.021	0.022	0.026	0.028	0.032	0.036	-	-
31	0.062	0.057	0.099	0.064	0.109	0.050	0.035	0.079	0.111	0.137	0.147	-	-
32	0.021	0.022	0.020	0.020	0.022	0.023	0.029	0.032	0.035	0.037	0.048	-	-
33	0.014	0.019	0.021	0.020	0.027	0.026	0.026	0.029	0.030	0.031	0.033	-	-
34	0.019	0.027	0.027	0.019	0.032	0.024	0.028	0.034	0.036	0.042	0.049	-	-
35	0.070	0.041	0.073	0.025	0.088	0.061	0.028	0.052	0.082	0.106	0.129	-	-
36	0.015	0.019	0.018	0.010	0.022	0.017	0.017	0.023	0.025	0.029	0.033	-	-
37	0.042	0.044	0.065	0.032	0.084	0.067	0.025	0.042	0.071	0.094	0.109	-	-
38	0.019	0.023	0.020	0.015	0.026	0.023	0.024	0.029	0.033	0.042	0.052	-	-
39	0.013	0.019	0.016	0.018	0.021	0.024	0.024	0.026	0.029	0.030	0.033	-	-
40	0.019	0.024	0.017	0.015	0.027	0.022	0.018	0.030	0.033	0.041	0.052	-	-
THC/Iref	0.715	0.612	0.572	0.638	0.724	0.753	0.795	0.865	0.901	0.960	0.991	23%	13%
PWHD	1.422	1.303	1.495	1.449	1.404	1.120	1.344	1.790	2.059	2.332	2.504	23%	22%

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L2													
Power P/Pn [%]	0-5	10	20	30	40	50	60	70	80	90	100	IEC 61000-3-12 limit	
Ordinal number	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	1 phase [%]	3 phase [%]
2	0.057	0.084	0.074	0.056	0.086	0.120	0.120	0.171	0.181	0.187	0.174	8%	8%
3	0.046	0.052	0.049	0.038	0.048	0.055	0.043	0.053	0.050	0.056	0.056	21.6%	Not stated
4	0.043	0.051	0.045	0.051	0.054	0.051	0.047	0.046	0.042	0.077	0.152	4%	4%
5	0.521	0.278	0.393	0.499	0.561	0.557	0.574	0.610	0.632	0.661	0.677	10.7%	10.7%
6	0.038	0.050	0.040	0.035	0.037	0.040	0.036	0.041	0.040	0.050	0.067	2.67%	2.67%
7	0.394	0.219	0.128	0.228	0.299	0.336	0.324	0.296	0.285	0.282	0.265	7.2%	7.2%
8	0.054	0.048	0.047	0.051	0.058	0.047	0.045	0.050	0.044	0.049	0.057	2%	2%
9	0.036	0.039	0.035	0.035	0.036	0.038	0.038	0.044	0.050	0.060	0.073	3.8%	Not stated
10	0.036	0.043	0.041	0.039	0.041	0.044	0.044	0.046	0.046	0.045	0.044	1.6%	1.6%
11	0.100	0.243	0.080	0.075	0.183	0.218	0.250	0.285	0.287	0.291	0.265	3.1%	3.1%
12	0.040	0.041	0.038	0.036	0.037	0.038	0.037	0.042	0.043	0.054	0.069	1.33%	1.33%
13	0.067	0.346	0.177	0.036	0.109	0.177	0.199	0.217	0.242	0.255	0.256	2%	2%
14	0.039	0.043	0.039	0.037	0.040	0.041	0.040	0.042	0.041	0.042	0.049	-	-
15	0.035	0.038	0.036	0.035	0.036	0.037	0.036	0.037	0.038	0.041	0.045	-	-
16	0.038	0.038	0.038	0.037	0.039	0.039	0.039	0.039	0.040	0.039	0.040	-	-
17	0.183	0.125	0.177	0.096	0.054	0.122	0.166	0.190	0.184	0.196	0.206	-	-
18	0.038	0.042	0.040	0.038	0.039	0.041	0.040	0.044	0.045	0.044	0.056	-	-
19	0.102	0.102	0.172	0.138	0.042	0.097	0.147	0.173	0.184	0.184	0.190	-	-
20	0.038	0.043	0.042	0.041	0.041	0.045	0.043	0.044	0.044	0.041	0.043	-	-

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21	0.035	0.036	0.036	0.035	0.037	0.037	0.038	0.039	0.041	0.040	0.043	-	-
22	0.038	0.039	0.039	0.039	0.040	0.042	0.042	0.042	0.043	0.041	0.042	-	-
23	0.113	0.087	0.072	0.140	0.069	0.058	0.110	0.148	0.163	0.186	0.182	-	-
24	0.046	0.051	0.049	0.049	0.050	0.051	0.051	0.053	0.055	0.050	0.056	-	-
25	0.097	0.134	0.038	0.151	0.100	0.046	0.090	0.142	0.161	0.174	0.181	-	-
26	0.036	0.039	0.038	0.039	0.040	0.041	0.042	0.046	0.048	0.054	0.065	-	-
27	0.035	0.036	0.036	0.035	0.036	0.037	0.038	0.040	0.041	0.046	0.052	-	-
28	0.038	0.039	0.039	0.038	0.039	0.042	0.045	0.049	0.050	0.053	0.060	-	-
29	0.102	0.070	0.076	0.093	0.108	0.047	0.063	0.102	0.134	0.148	0.158	-	-
30	0.036	0.038	0.039	0.038	0.039	0.040	0.040	0.042	0.044	0.048	0.057	-	-
31	0.066	0.063	0.102	0.069	0.120	0.057	0.046	0.086	0.121	0.148	0.159	-	-
32	0.036	0.039	0.039	0.037	0.039	0.038	0.039	0.041	0.047	0.043	0.050	-	-
33	0.034	0.034	0.034	0.034	0.034	0.035	0.036	0.036	0.037	0.039	0.042	-	-
34	0.035	0.036	0.035	0.036	0.036	0.037	0.039	0.040	0.044	0.046	0.047	-	-
35	0.075	0.048	0.077	0.034	0.091	0.062	0.036	0.059	0.085	0.108	0.128	-	-
36	0.034	0.035	0.035	0.035	0.036	0.036	0.036	0.038	0.040	0.047	0.058	-	-
37	0.055	0.050	0.066	0.038	0.090	0.071	0.036	0.053	0.080	0.100	0.117	-	-
38	0.035	0.035	0.036	0.035	0.037	0.037	0.036	0.038	0.041	0.046	0.050	-	-
39	0.033	0.033	0.033	0.033	0.034	0.034	0.034	0.035	0.036	0.038	0.042	-	-
40	0.034	0.035	0.034	0.034	0.035	0.035	0.035	0.038	0.039	0.043	0.049	-	-
THC/Iref	0.756	0.648	0.590	0.661	0.749	0.778	0.819	0.893	0.933	0.982	1.007	23%	13%
PWHD	1.648	1.503	1.683	1.652	1.599	1.351	1.557	1.951	2.210	2.441	2.626	23%	22%

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L3													
Power P/Pn [%]	0-5	10	20	30	40	50	60	70	80	90	100	IEC 61000-3-12 limit	
Ordinal number	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	1 phase [%]	3 phase [%]
2	0.078	0.091	0.094	0.082	0.107	0.133	0.141	0.192	0.199	0.208	0.201	8%	8%
3	0.059	0.057	0.048	0.036	0.041	0.044	0.038	0.056	0.041	0.046	0.048	21.6%	Not stated
4	0.044	0.060	0.057	0.071	0.068	0.061	0.057	0.058	0.052	0.084	0.147	4%	4%
5	0.496	0.257	0.396	0.504	0.564	0.558	0.577	0.615	0.632	0.671	0.681	10.7%	10.7%
6	0.046	0.049	0.039	0.035	0.037	0.038	0.035	0.042	0.036	0.040	0.044	2.67%	2.67%
7	0.400	0.211	0.121	0.220	0.287	0.328	0.314	0.289	0.276	0.272	0.258	7.2%	7.2%
8	0.044	0.051	0.044	0.044	0.048	0.040	0.041	0.047	0.045	0.044	0.057	2%	2%
9	0.042	0.040	0.036	0.035	0.035	0.037	0.038	0.047	0.051	0.068	0.078	3.8%	Not stated
10	0.042	0.039	0.037	0.036	0.037	0.044	0.044	0.045	0.046	0.047	0.052	1.6%	1.6%
11	0.092	0.252	0.088	0.073	0.186	0.219	0.262	0.292	0.291	0.293	0.269	3.1%	3.1%
12	0.041	0.041	0.037	0.035	0.037	0.038	0.037	0.042	0.041	0.042	0.054	1.33%	1.33%
13	0.070	0.343	0.176	0.036	0.103	0.170	0.191	0.210	0.238	0.250	0.248	2%	2%
14	0.037	0.041	0.037	0.037	0.038	0.038	0.038	0.040	0.040	0.039	0.042	-	-
15	0.035	0.036	0.035	0.035	0.035	0.036	0.036	0.039	0.038	0.040	0.046	-	-
16	0.039	0.040	0.040	0.037	0.040	0.039	0.042	0.042	0.042	0.039	0.040	-	-
17	0.179	0.125	0.179	0.101	0.050	0.124	0.171	0.191	0.191	0.209	0.216	-	-
18	0.038	0.041	0.040	0.038	0.038	0.042	0.040	0.042	0.042	0.039	0.044	-	-
19	0.100	0.105	0.167	0.138	0.044	0.094	0.139	0.168	0.184	0.183	0.189	-	-
20	0.043	0.047	0.044	0.044	0.045	0.046	0.043	0.045	0.045	0.040	0.040	-	-

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21	0.043	0.038	0.037	0.036	0.037	0.037	0.038	0.040	0.040	0.038	0.039	-	-
22	0.038	0.042	0.040	0.043	0.040	0.042	0.045	0.045	0.047	0.042	0.045	-	-
23	0.116	0.092	0.072	0.148	0.079	0.061	0.109	0.152	0.170	0.195	0.186	-	-
24	0.057	0.065	0.064	0.065	0.065	0.064	0.065	0.066	0.067	0.049	0.048	-	-
25	0.098	0.130	0.040	0.144	0.102	0.046	0.084	0.134	0.149	0.164	0.173	-	-
26	0.039	0.043	0.041	0.042	0.044	0.044	0.045	0.048	0.048	0.048	0.055	-	-
27	0.035	0.036	0.037	0.036	0.037	0.037	0.038	0.041	0.041	0.042	0.046	-	-
28	0.039	0.040	0.042	0.043	0.043	0.042	0.045	0.052	0.050	0.050	0.056	-	-
29	0.102	0.070	0.085	0.094	0.114	0.050	0.059	0.100	0.133	0.150	0.161	-	-
30	0.036	0.038	0.038	0.037	0.039	0.038	0.040	0.041	0.041	0.041	0.046	-	-
31	0.067	0.063	0.099	0.064	0.115	0.058	0.044	0.084	0.116	0.140	0.151	-	-
32	0.036	0.038	0.037	0.036	0.037	0.037	0.038	0.039	0.043	0.041	0.046	-	-
33	0.034	0.034	0.035	0.034	0.035	0.035	0.035	0.037	0.037	0.037	0.039	-	-
34	0.035	0.037	0.037	0.035	0.037	0.038	0.038	0.041	0.045	0.047	0.050	-	-
35	0.078	0.049	0.078	0.035	0.095	0.069	0.036	0.056	0.084	0.106	0.130	-	-
36	0.034	0.035	0.035	0.034	0.036	0.036	0.035	0.035	0.036	0.038	0.041	-	-
37	0.054	0.048	0.063	0.038	0.085	0.068	0.036	0.050	0.076	0.095	0.112	-	-
38	0.034	0.034	0.035	0.034	0.034	0.035	0.035	0.036	0.036	0.041	0.047	-	-
39	0.033	0.034	0.034	0.033	0.033	0.034	0.034	0.035	0.036	0.036	0.038	-	-
40	0.034	0.035	0.034	0.036	0.035	0.036	0.035	0.037	0.039	0.043	0.051	-	-
THC/Iref	0.746	0.643	0.596	0.668	0.752	0.777	0.822	0.899	0.934	0.987	1.004	23%	13%
PWHD	1.666	1.526	1.701	1.676	1.626	1.375	1.546	1.937	2.194	2.409	2.570	23%	22%

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

TÜV SÜD Product Service

Certificate of Conformity

No. ESY 096640 0031 Rev. 00

E.6 Certificate of the network and system protection

Certificate of NS protection	No. 7040924037143-00		
Manufacturer	AXITEC Energy GmbH & Co. KG Otto-Lilienthal-Straße 5, 71034 Böblingen, GERMANY		
Type of NS protection			
Central NS protection	☐		
Integrated NS protection	☑	Assigned to power generation unit type	AXIhycon 12H, AXIhycon 15H, AXIhycon 20H, AXIhycon 20H-YD
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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TÜV SÜD Product Service

Certificate of Conformity

No. ESY 096640 0031 Rev. 00

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

Extract from test report for NS protection "Determination of electrical properties"		No. 7040924037143-00
NS protection test report		
Type of NS system:	Integrated NS protection	**Other Manufacturer indications**
Software version:	A1	
Manufacturer:	AXITEC Energy GmbH & Co. KG Otto-Lilienthal-Straße 5, 71034 Böblingen, GERMANY	
Measuring period:	From 2023-11-09 to 2024-01-11 and from 2024-07-31 to 2024-08-25, 2024-09-13	

	Inverter(s) (AXIhycon 20H-YD)		
Protection function	**Setting value**	**Tripping value**	**Break time NS protection** *
Rise-in-voltage protection *U* >>	1.25 * U_n	L1-N/L2-N/L3-N: 287.60 V / 287.44 V / 287.51 V L1-N: 286.82 V L2-N: 287.01 V L3-N: 286.79 V	L1-N/L2-N/L3-N: 125 ms L1-N: 124 ms L2-N: 128 ms L3-N: 127 ms
Rise-in-voltage protection *U* >	1.10 * U_n	1,10 * Un	ms**
Voltage drop protection *U* <	0.8 * U_n	L1-N/L2-N/L3-N: 183.68 V / 183.69 V / 183.59 V L1-N: 183.86 V L2-N: 183.30 V L3-N: 182.82 V	L1-N/L2-N/L3-N: 3031 ms L1-N: 3026 ms L2-N: 3016 ms L3-N: 3019 ms
Voltage drop protection *U* <<	0.45 * U_n	L1-N/L2-N/L3-N: 103.84 V / 103.83 V / 103.82 V L1-N: 103.18 V L2-N: 103.44 V L3-N: 103.77 V	L1-N/L2-N/L3-N: 328 ms L1-N: 327 ms L2-N: 325 ms L3-N: 325 ms
Frequency decrease protection *f* <	47.5 Hz	47.50 Hz	132 ms
Frequency increase protection *f* >	51.5 Hz	51.50 Hz	135 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:

1. 494.6 s (L1-N) / 493.8 s (L2-N) / 471.2 s (L3-N) (from 600s@Un to 112%Un)
2. Continuous operation (L1-N/L2-N/L3-N) (from 600s@Un to 108%Un)
3. 298.5 s (L1-N) / 302.5 s (L2-N) / 263.8 s (L3-N) (from 600s@106%Un to 114%Un)

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No. ESY 096640 0031 Rev. 00

☑ as integrated NS protection	
Assigned to power generation unit type	Hybrid Inverter: AXIhycon 12H, AXIhycon 15H, AXIhycon 20H, AXIhycon 20H-YD
Integrated interface switch type	Series-connected relays for both the neutral conductor and the line conductor; Power relay type: HF161F-40W/12-HTF(967)(A38)
Response time of interface switch for integrated NS protection	The response time of the interface switch: Operate time: Max. 10 ms Release time: Max. 20 ms
Verification of the entire functional chain “integrated NS protection – interface switch” has resulted in successful disconnection.	☑

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