

# Certificate of Conformity

No. ESY 114387 0056 Rev. 00

**Holder of Certificate:** **Huawei Digital Power Technologies Co., Ltd.**  
Office 01, 39th Floor, Block A  
Antuoshan Headquarters Towers  
33 Antuoshan 6th Road, Futian District  
518043 Shenzhen  
PEOPLE'S REPUBLIC OF CHINA

**Product:** **Converter  
(Solar Inverter)**

**Model(s):** **SUN2000-12KTL-M5, SUN2000-15KTL-M5,  
SUN2000-17KTL-M5, SUN2000-20KTL-M5,  
SUN2000-25KTL-M5**


**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](http://www.tuvsud.com/ps-cert)

**Test report no.:** 64290223060201

**Date,** 2023-01-18



( Billy Qiu )

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**Parameters:**

Model	SUN2000-12KTL-M5	SUN2000-15KTL-M5	SUN2000-17KTL-M5	SUN2000-20KTL-M5	SUN2000-25KTL-M5
PV terminal parameters					
Maximum DC input voltage	1100 Vd.c.				
Rated input voltage	600 Vd.c.				
MPPT Range	200~1000 Vd.c.				
MPPT Range (full load)	370~800 Vd.c.	410~800 Vd.c.	440~800 Vd.c.	480~800 Vd.c.	530~800 Vd.c.
Maximum Input Current	2*30 Ad.c.				
Isc PV	2*40 Ad.c.				
Maximum Input Power	18000 W	22500 W	25500 W	30000 W	37500 W
Grid terminal parameters					
Rated AC voltage	230/400 Va.c., 3W+N+PE				
Rated AC output current	17.3 Aa.c.	21.7 Aa.c.	24.5 Aa.c.	28.9 Aa.c.	36.1 Aa.c.
Maximum AC output current	20.2 Aa.c.	25.2 Aa.c.	28.6 Aa.c.	33.6 Aa.c.	42.0 Aa.c.
Rated output active power	12000 W	15000 W	17000 W	20000 W	25000 W
Maximum output active power P <sub>Emax</sub>	13166 W	16467 W	18646W	21887 W	27400 W
Maximum continuous output apparent power S <sub>Emax</sub>	13198 VA	16492 VA	18658 VA	21902 VA	27405 VA
Rated AC frequency	50 Hz				
Power factor	0.8 leading to 0.8 lagging				

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E.4 Unit certificate		
<b>Manufacturer</b>	Huawei Digital Power Technologies Co., Ltd.	
<b>Power generation unit type</b>	[Inverter]: SUN2000-12KTL-M5, SUN2000-15KTL-M5, SUN2000-17KTL-M5, SUN2000-20KTL-M5, SUN2000-25KTL-M5  Remark: certified on representative model SUN2000-25KTL-M5 of family design products, results of the measurement of SUN2000-25KTL-M5 can be transferred to other models based on transferability rule of measurements in DIN VDE V 0124-100 (VDE V 0124-100):2020.	
<b>Assessment values</b>	max. active power $P_{E_{max}}$	27400 W (SUN2000-25KTL-M5)
	max. apparent power $S_{E_{max}}$	27405 VA (SUN2000-25KTL-M5)
	Rated voltage	230/400 Va.c., 3W+N+PE.
	Rated current (AC) $I_r$	36.1 A (SUN2000-25KTL-M5)
	Initial short-circuit AC current $I''_k$	42.0 A (SUN2000-25KTL-M5)
<b>Network connection rule</b>	<b>VDE-AR-N 4105 "Generators connected to the low-voltage distribution network"</b> Technical minimum requirements for connection and parallel operation of power generation systems connected to the low-voltage network	
<b>Test requirement</b>	<b>DIN VDE V 0124-100 (VDE V 0124-100) "Network integration of power generation systems – Low voltage"</b> Test requirements for power generation units intended for connection to and parallel operation on the low-voltage network	
<b>Test report</b>	64.290.22.30602.01 from 2022-01-13	
The above designated power generation unit meets the requirements of VDE-AR-N 4105.		

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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:	<u>Huawei Digital Power Technologies Co.,Ltd</u>  <u>Office 01, 39th Floor, Block A Antuoshan Headquarters Towers</u> <u>33 Antuoshan 6th Road, Futian District 518043 Shenzhen</u> <u>PEOPLE'S REPUBLIC OF CHINA</u>	
Manufacturer indications:	Type of system	<u>Solar Inverter for PV systems</u>
	Max. active power $P_{E_{max}}$	<u>13166 W (SUN2000-12KTL-M5)</u>
		<u>16467 W (SUN2000-15KTL-M5)</u>
		<u>18646 W (SUN2000-17KTL-M5)</u>
<u>21887 W (SUN2000-20KTL-M5)</u>		
	<u>27400 W (SUN2000-25KTL-M5)</u>	
	Rated voltage	<u>230/400 Va.c., 3W+N+PE.</u>
Measurement period:	<u>From 2022-08-01 to 2022-01-12</u>	

Rapid voltage changes	
Connection without provisions (regarding the primary energy carrier)	Ki=0.50
Most adverse case when switching between generator levels	Ki=0.50
Connection at nominal conditions (of the primary energy carrier)	Ki=1.00
Disconnection at rated power	Ki=1.00
Worst value of all switching operations	kimax=1.00

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Flicker – EN 61000-3-11(SUN2000-25KTL-M5)						
Simulated network voltage (V)	L1 (P-N)	230.0		Network impedance	L1	0.24Ω+j0.15Ω
	L2 (P-N)	230.0			L2	0.24Ω+j0.15Ω
	L3 (P-N)	230.0			L3	0.24Ω+j0.15Ω
	--	--			N	0.16Ω+j0.10Ω
EZE operating current (A)	L1	36.09		EZE operating power (kVA)	L1	8.33
	L2	36.09			L2	8.33
	L3	36.09			L3	8.33
Simulated network frequency (Hz)	50		Short circuit power Sk (VA)	907500		
Plt (Maximum measured Pst)	0.0203		EZE nominal power (Pn/W)	25000		
Pst	#1	#2	#3	#4	#5	#6
L1	0.0196	0.0188	0.0197	0.0195	0.0200	0.0202
L2	0.0178	0.0189	0.0182	0.0193	0.0190	0.0191
L3	0.0191	0.0203	0.0203	0.0204	0.0199	0.0197
Pst	#7	#8	#9	#10	#11	#12
L1	0.0200	0.0203	0.0208	0.0205	0.0209	0.0212
L2	0.0198	0.0199	0.0197	0.0203	0.0200	0.0204
L3	0.0204	0.0203	0.0205	0.0208	0.0207	0.0211

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Harmonics-DIN EN 61000-3-12(>16 A and ≤75 A) (SUN2000-25KTL-M5)												
Phase L1												
Active power P/Pmax [%]	0	10	20	30	40	50	60	70	80	90	100	Limit value
Ordinal number	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]
2	0.56	0.13	0.31	0.43	0.55	0.65	0.71	0.78	0.98	1.07	1.18	8.0
3	0.07	0.05	0.05	0.05	0.06	0.06	0.07	0.08	0.10	0.12	0.16	-
4	0.08	0.07	0.07	0.09	0.11	0.13	0.14	0.15	0.16	0.13	0.20	4.0
5	0.08	0.08	0.08	0.11	0.13	0.14	0.15	0.21	0.25	0.28	0.39	10.7
6	0.05	0.02	0.03	0.04	0.04	0.05	0.05	0.05	0.06	0.05	0.07	2.67
7	0.05	0.12	0.06	0.07	0.08	0.07	0.05	0.06	0.06	0.06	0.06	7.2
8	0.05	0.05	0.04	0.05	0.06	0.08	0.10	0.12	0.12	0.13	0.17	2.0
9	0.04	0.02	0.02	0.03	0.04	0.05	0.05	0.05	0.05	0.06	0.06	-
10	0.07	0.04	0.03	0.03	0.05	0.08	0.10	0.13	0.13	0.15	0.19	1.6
11	0.09	0.12	0.19	0.17	0.23	0.27	0.29	0.33	0.33	0.28	0.24	3.1
12	0.03	0.02	0.02	0.02	0.02	0.03	0.03	0.04	0.05	0.05	0.06	1.33
13	0.05	0.15	0.14	0.11	0.15	0.20	0.25	0.28	0.25	0.27	0.28	2.0
14	0.04	0.04	0.02	0.02	0.04	0.05	0.09	0.12	0.14	0.16	0.18	-
15	0.03	0.02	0.02	0.02	0.02	0.04	0.05	0.05	0.06	0.06	0.07	-
16	0.04	0.03	0.02	0.02	0.03	0.05	0.07	0.10	0.12	0.13	0.14	-
17	0.05	0.16	0.10	0.09	0.13	0.21	0.29	0.39	0.35	0.39	0.36	-
18	0.02	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.04	0.04	0.05	-
19	0.06	0.05	0.05	0.06	0.08	0.15	0.23	0.31	0.30	0.35	0.35	-
20	0.03	0.03	0.02	0.02	0.02	0.03	0.04	0.05	0.08	0.09	0.11	-
21	0.02	0.01	0.01	0.01	0.02	0.02	0.03	0.03	0.04	0.04	0.05	-
22	0.03	0.02	0.02	0.02	0.02	0.03	0.04	0.05	0.06	0.09	0.10	-
23	0.10	0.11	0.06	0.04	0.03	0.06	0.08	0.11	0.12	0.15	0.17	-
24	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.03	-
25	0.11	0.05	0.04	0.04	0.03	0.05	0.05	0.07	0.07	0.08	0.10	-
26	0.03	0.03	0.02	0.01	0.02	0.02	0.02	0.03	0.03	0.05	0.08	-
27	0.02	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.02	0.02	0.03	-
28	0.03	0.01	0.02	0.01	0.01	0.02	0.03	0.04	0.04	0.04	0.10	-
29	0.13	0.09	0.04	0.04	0.03	0.03	0.05	0.07	0.06	0.08	0.09	-
30	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.03	-
31	0.13	0.06	0.06	0.05	0.05	0.02	0.03	0.05	0.06	0.09	0.11	-
32	0.02	0.02	0.01	0.01	0.02	0.01	0.02	0.03	0.03	0.03	0.07	-
33	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	-
34	0.03	0.01	0.02	0.01	0.02	0.01	0.02	0.03	0.04	0.05	0.06	-
35	0.12	0.09	0.06	0.05	0.05	0.04	0.05	0.06	0.07	0.10	0.12	-
36	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	-
37	0.11	0.06	0.05	0.05	0.05	0.05	0.05	0.06	0.07	0.11	0.15	-
38	0.02	0.02	0.02	0.01	0.02	0.01	0.02	0.02	0.03	0.04	0.07	-
39	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	-
40	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05	-
THC/I <sub>ref</sub>	0.68	0.40	0.46	0.53	0.68	0.83	0.95	1.11	1.26	1.37	1.52	13
PWHC/I <sub>ref</sub>	0.31	0.27	0.19	0.16	0.19	0.29	0.41	0.55	0.54	0.62	0.66	22
Phase L2												
Active power P/Pmax [%]	0	10	20	30	40	50	60	70	80	90	100	Limit value
Ordinal number	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]

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2	0.56	0.13	0.31	0.44	0.55	0.65	0.71	0.77	0.99	1.08	1.18	8.0
3	0.07	0.06	0.05	0.05	0.05	0.06	0.06	0.08	0.10	0.13	0.17	-
4	0.10	0.06	0.09	0.11	0.12	0.14	0.15	0.17	0.19	0.15	0.19	4.0
5	0.08	0.08	0.08	0.11	0.12	0.13	0.15	0.19	0.24	0.29	0.41	10.7
6	0.04	0.02	0.03	0.04	0.04	0.05	0.06	0.06	0.06	0.06	0.08	2.67
7	0.06	0.14	0.06	0.08	0.08	0.07	0.05	0.07	0.06	0.06	0.07	7.2
8	0.05	0.05	0.05	0.05	0.07	0.12	0.15	0.15	0.15	0.12	0.16	2.0
9	0.04	0.03	0.02	0.03	0.03	0.04	0.04	0.04	0.05	0.07	0.10	-
10	0.07	0.04	0.03	0.05	0.06	0.11	0.15	0.18	0.18	0.19	0.22	1.6
11	0.08	0.14	0.20	0.18	0.24	0.28	0.31	0.35	0.35	0.30	0.25	3.1
12	0.03	0.02	0.02	0.02	0.02	0.04	0.05	0.05	0.04	0.05	0.05	1.33
13	0.05	0.15	0.14	0.11	0.15	0.19	0.25	0.28	0.27	0.30	0.30	2.0
14	0.04	0.04	0.03	0.03	0.05	0.09	0.13	0.17	0.19	0.22	0.22	-
15	0.03	0.02	0.02	0.02	0.02	0.05	0.05	0.05	0.05	0.06	0.07	-
16	0.04	0.03	0.02	0.02	0.03	0.06	0.10	0.14	0.15	0.17	0.16	-
17	0.05	0.16	0.10	0.09	0.14	0.20	0.28	0.39	0.36	0.39	0.36	-
18	0.02	0.01	0.01	0.01	0.01	0.03	0.03	0.04	0.04	0.03	0.05	-
19	0.06	0.05	0.05	0.06	0.08	0.13	0.20	0.28	0.29	0.34	0.34	-
20	0.03	0.03	0.02	0.02	0.03	0.04	0.06	0.09	0.12	0.14	0.15	-
21	0.02	0.02	0.01	0.02	0.02	0.05	0.05	0.05	0.05	0.04	0.05	-
22	0.03	0.02	0.02	0.02	0.02	0.03	0.05	0.06	0.09	0.12	0.12	-
23	0.10	0.12	0.06	0.04	0.03	0.03	0.05	0.08	0.10	0.13	0.16	-
24	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.03	0.04	0.04	-
25	0.11	0.05	0.05	0.04	0.03	0.03	0.04	0.05	0.05	0.06	0.09	-
26	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.03	0.04	0.05	0.06	-
27	0.02	0.01	0.01	0.01	0.01	0.03	0.04	0.04	0.04	0.05	0.05	-
28	0.03	0.01	0.02	0.02	0.02	0.02	0.02	0.04	0.05	0.05	0.10	-
29	0.13	0.10	0.04	0.05	0.03	0.02	0.04	0.05	0.05	0.06	0.06	-
30	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.03	-
31	0.13	0.07	0.06	0.05	0.05	0.03	0.05	0.06	0.06	0.08	0.10	-
32	0.03	0.02	0.02	0.02	0.02	0.01	0.02	0.03	0.03	0.04	0.08	-
33	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.04	-
34	0.03	0.01	0.02	0.01	0.02	0.02	0.02	0.03	0.04	0.05	0.06	-
35	0.13	0.10	0.06	0.05	0.05	0.04	0.05	0.06	0.06	0.09	0.11	-
36	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.03	-
37	0.11	0.06	0.05	0.05	0.05	0.05	0.05	0.06	0.07	0.11	0.13	-
38	0.02	0.02	0.02	0.01	0.02	0.02	0.01	0.02	0.03	0.04	0.06	-
39	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	-
40	0.02	0.01	0.02	0.01	0.02	0.02	0.02	0.02	0.03	0.04	0.05	-
THC/I <sub>ref</sub>	0.68	0.42	0.47	0.55	0.68	0.84	0.97	1.13	1.30	1.41	1.54	13
PWHC/I <sub>ref</sub>	0.31	0.28	0.19	0.16	0.20	0.28	0.40	0.55	0.56	0.63	0.66	22

Phase L3

Active power P/P <sub>max</sub> [%]	0	10	20	30	40	50	60	70	80	90	100	Limit value
Ordinal number	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	[%]
2	0.56	0.08	0.28	0.40	0.53	0.62	0.68	0.74	0.94	1.06	1.14	8.0
3	0.07	0.05	0.05	0.05	0.06	0.07	0.07	0.06	0.09	0.12	0.16	-
4	0.10	0.06	0.08	0.10	0.11	0.13	0.15	0.15	0.17	0.12	0.20	4.0
5	0.07	0.09	0.08	0.11	0.12	0.13	0.14	0.21	0.25	0.28	0.40	10.7
6	0.05	0.02	0.03	0.03	0.03	0.05	0.05	0.05	0.06	0.05	0.08	2.67
7	0.07	0.12	0.06	0.07	0.07	0.06	0.05	0.06	0.06	0.07	0.06	7.2
8	0.05	0.05	0.04	0.05	0.06	0.09	0.11	0.12	0.11	0.09	0.15	2.0



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9	0.04	0.03	0.02	0.02	0.03	0.04	0.04	0.05	0.05	0.05	0.08	-
10	0.06	0.04	0.03	0.04	0.05	0.08	0.12	0.15	0.16	0.19	0.22	1.6
11	0.09	0.15	0.21	0.18	0.24	0.29	0.32	0.35	0.34	0.29	0.24	3.1
12	0.03	0.02	0.02	0.02	0.02	0.04	0.05	0.06	0.07	0.07	0.07	1.33
13	0.05	0.15	0.12	0.10	0.14	0.17	0.23	0.26	0.25	0.29	0.27	2.0
14	0.04	0.04	0.03	0.03	0.04	0.06	0.10	0.13	0.15	0.19	0.18	-
15	0.03	0.02	0.02	0.01	0.02	0.03	0.04	0.05	0.05	0.05	0.05	-
16	0.04	0.03	0.02	0.02	0.03	0.05	0.07	0.11	0.14	0.15	0.15	-
17	0.05	0.16	0.11	0.10	0.15	0.24	0.34	0.44	0.40	0.42	0.38	-
18	0.02	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05	0.05	0.07	-
19	0.06	0.05	0.05	0.06	0.07	0.14	0.20	0.28	0.28	0.33	0.33	-
20	0.03	0.03	0.02	0.02	0.03	0.04	0.05	0.07	0.10	0.09	0.13	-
21	0.02	0.02	0.01	0.01	0.02	0.03	0.03	0.03	0.04	0.03	0.05	-
22	0.03	0.02	0.02	0.02	0.02	0.02	0.03	0.05	0.07	0.10	0.11	-
23	0.10	0.12	0.06	0.05	0.04	0.06	0.09	0.13	0.15	0.17	0.19	-
24	0.02	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.03	0.04	-
25	0.11	0.05	0.04	0.04	0.02	0.05	0.06	0.07	0.06	0.06	0.09	-
26	0.03	0.03	0.02	0.01	0.02	0.02	0.02	0.04	0.04	0.05	0.08	-
27	0.02	0.01	0.01	0.01	0.01	0.02	0.03	0.03	0.03	0.03	0.04	-
28	0.03	0.01	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.04	0.10	-
29	0.13	0.09	0.04	0.04	0.03	0.02	0.03	0.05	0.05	0.05	0.07	-
30	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.03	-
31	0.13	0.07	0.06	0.05	0.04	0.02	0.05	0.06	0.07	0.10	0.12	-
32	0.03	0.02	0.02	0.02	0.02	0.01	0.02	0.03	0.03	0.03	0.07	-
33	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.03	-
34	0.03	0.01	0.02	0.01	0.02	0.02	0.02	0.03	0.04	0.05	0.06	-
35	0.12	0.09	0.06	0.04	0.05	0.04	0.04	0.05	0.05	0.08	0.10	-
36	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	-
37	0.11	0.06	0.05	0.05	0.05	0.04	0.05	0.06	0.08	0.12	0.15	-
38	0.02	0.02	0.02	0.01	0.02	0.01	0.01	0.02	0.02	0.03	0.07	-
39	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	-
40	0.02	0.01	0.02	0.01	0.02	0.02	0.02	0.03	0.03	0.04	0.05	-
THC/I <sub>ref</sub>	0.68	0.41	0.45	0.52	0.66	0.81	0.95	1.10	1.25	1.38	1.49	13
PWHC/I <sub>ref</sub>	0.31	0.28	0.19	0.16	0.20	0.31	0.43	0.58	0.57	0.64	0.67	22

Note:

The test power is based on the maximum power and I<sub>ref</sub>=39.9A.



# Certificate of Conformity

No. ESY 114387 0056 Rev. 00

## E.6 Certificate of the network and system protection

Certificate of NS protection	
<b>Manufacturer</b>	Huawei Digital Power Technologies Co.,Ltd
<b>Type of NS protection</b>	Integrated NS protection
<b>Central NS protection</b>	<input type="checkbox"/>
<b>Integrated NS protection</b>	<input checked="" type="checkbox"/> Assigned to power generation unit of type: <u>SUN2000-12KTL-M5, SUN2000-15KTL-M5,</u> <u>SUN2000-17KTL-M5, SUN2000-20KTL-M5,</u> <u>SUN2000-25KTL-M5</u>
<b>Network connection rule</b>	<b>VDE-AR-N 4105 “Generators connected to the low-voltage distribution network”</b> Technical minimum requirements for connection and parallel operation of power generation systems connected to the low-voltage network
<b>Test requirement</b>	<b>DIN VDE V 0124-100 (VDE V 0124-100) “Network integration of power generation systems – Low voltage”</b> Test requirements for power generation units intended for connection to and parallel operation on the low-voltage network
<b>Test report</b>	64.290.22.30602.01 from 2022-01-13
The network and system protection designated above meets the requirements of VDE-AR-N 4105.	

# Certificate of Conformity

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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"			
NS protection test report			
Type of NS system:	Integrated NS protection	Other Manufacturer indications	
Software version:	V200R022		
Manufacturer:	Huawei Digital Power Technologies Co.,Ltd.  Office 01, 39th Floor, Block A Antuoshan Headquarters Towers 33 Antuoshan 6th Road, Futian District 518043 Shenzhen PEOPLE'S REPUBLIC OF CHINA		
Measuring period:	From 2022-08-01 to 2022-12-05		
	<b>Inverter</b>		
Protection function	Setting value	Tripping value	Tripping time NS protection*
Rise-in-voltage protection $U >>$	$1.25 * U_n$	L1-N/L2-N/L3-N: 287.9V/287.9V/287.7V; L1-N: 289.0 V; L2-N: 288.9 V; L3-N: 288.9 V;	L1-N/L2-N/L3-N: 118.9 ms; L1-N: 133.4 ms; L2-N: 131.4 ms; L3-N: 131.8 ms;
Rise-in-voltage protection $U >$	$1.10 * U_n$	$1.12 * U_n$	ms**
Voltage drop protection $U <$	$0.8 * U_n$	L1-N/L2-N/L3-N: 183.4V/183.4V/183.3V; L1-N: 182.4 V; L2-N: 182.3 V; L3-N: 182.3 V;	L1-N/L2-N/L3-N: 3080.0 ms; L1-N: 3080.0 ms; L2-N: 3080.0 ms; L3-N: 3070.0 ms;
Voltage drop protection $U <<$	$0.45 * U_n$	L1-N/L2-N/L3-N: 102.6V/102.6V/102.6V; L1-N: 101.0 V; L2-N: 101.0 V; L3-N: 101.3 V;	L1-N/L2-N/L3-N: 320.4 ms; L1-N: 330.1 ms; L2-N: 331.1 ms; L3-N: 327.0 ms;
Frequency decrease protection $f <$	47.5 Hz	47.5 Hz	109.7 ms
Frequency increase protection $f >$	51.5 Hz	51.5 Hz	115.5 ms

# Certificate of Conformity

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<p>*: The tripping time includes the period from the limit value violation <math>U/f</math> 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:                  487.0s (L1-N, L2-N, L3-N from 600s@<math>U_n</math> to 112%<math>U_n</math>)                  Continuous operation (L1-N, L2-N, L3-N from 600s@<math>U_n</math> to 108%<math>U_n</math>)                  300.0s (L1-N, L2-N, L3-N from 600s@106%<math>U_n</math> to 114%<math>U_n</math>)</p>	
<p><input checked="" type="checkbox"/> as integrated NS protection</p>	
Assigned to power generation unit type	<p>SUN2000-12KTL-M5,                  SUN2000-15KTL-M5,                  SUN2000-17KTL-M5,                  SUN2000-20KTL-M5,                  SUN2000-25KTL-M5</p>
Integrated interface switch type	<p>Series-connected relays for all phase conductors each</p> <p>Relay type: HF161F</p>
Response time of interface switch for integrated NS protection	<p>Release time: Max. 10 ms (HF161F)</p>
Verification of the entire functional chain "integrated NS protection – interface switch" has resulted in successful disconnection.	<p><input checked="" type="checkbox"/></p>