

CERTIFICATE OF CONFORMITY

Issued to: Huawei Technologies Co., Ltd.
Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian,
Longgang District, Shenzhen, Guangdong, 518129, China

For the product: Solar Inverter

Trade name:



Type/Model: SUN2000-30K-MC0, SUN2000-40K-MC0, SUN2000-50K-MC0

Ratings: See Annex

Manufactured by: Huawei Technologies Co., Ltd.
Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian,
Longgang District, Shenzhen, Guangdong, 518129, China

Requirements: Engineering Recommendation G99 Issue 1 – Amendment 10:2024 (G99/1-10:2024)
(Requirements for Type A Generating Module)

This Test Certificate is granted on account of an examination by DEKRA, the results of which are laid down in a confidential file no. 6219643.50 V1.1.

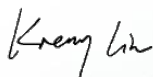
The examination has been carried out on one single specimen of the product. The Attestation does not include an assessment of the manufacturer's production. Conformity of his production with the specimen tested by DEKRA is not the responsibility of DEKRA.

This Test Certificate expires at the latest on 29 August 2030 or expires upon withdrawal of one of the above mentioned standards.

Shanghai, 29 August 2025

Number: 6219643.01COC V1.1

DEKRA Testing and Certification (Shanghai) Ltd.

A handwritten signature in black ink, appearing to read "Kreny Lin".

Kreny Lin
Certification Manager



© Integral publication of this certificate and adjoining reports is allowed

PCA-141

Document no. : 6219643.01COC V1.1

Ratings of the test product:

Operating temperature range: - 25°C to + 60°C

Protective class: I

Ingress protection rating: IP66

Power factor range (adjustable): 0.8 leading...0.8 lagging

Overvoltage category: III(Mains), II(DC)

Operating altitude: 4000 m

Inverter Topology: Non-Isolation

SUN2000-30K-MC0:

Input port:

Max. input voltage 1100 Vdc, MPP range 180 - 1000 Vdc

Max. input current 27 A / 27 A / 27 A / 27 A

Max. Isc 40 A / 40 A / 40 A / 40 A

Output port:

Nominal voltage 380 / 400 / 480 Vac; 3(N)~+PE, 50 / 60 Hz,

Rated Power 30 kW, Rated Apparent Power 30 kVA,

Max. Apparent Power 33 kVA, Max. Current 50.4 A, 380 Vac; 47.9 A, 400 Vac; 39.9 A, 480 Vac;

Rated Current 45.6 A, 380 Vac; 43.3 A, 400 Vac; 36.1 A, 480 Vac;

SUN2000-40K-MC0:

Input port:

Max. input voltage 1100 Vdc, MPP range 180 - 1000 Vdc

Max. input current 27 A / 27 A / 27 A / 27 A

Max. Isc 40 A / 40 A / 40 A / 40 A

Output port:

Nominal voltage 380 / 400 / 480 Vac; 3(N)~+PE, 50 / 60 Hz,

Rated Power 40 kW, Rated Apparent Power 40 kVA,

Max. Apparent Power 44 kVA, Max. Current 67.2 A, 380 Vac; 63.8 A, 400 Vac; 53.2 A, 480 Vac;

Rated Current 60.8 A, 380 Vac; 57.7 A, 400 Vac; 48.1 A, 480 Vac;

SUN2000-50K-MC0:

Input port:

Max. input voltage 1100 Vdc, MPP range 180 - 1000 Vdc

Max. input current 30 A / 33 A / 33 A / 30 A

Max. Isc 40 A / 44 A / 44 A / 40 A

Output port:

Nominal voltage 380 / 400 / 480 Vac; 3(N)~+PE, 50 / 60 Hz,

Rated Power 50 kW, Rated Apparent Power 50 kVA,

Max. Apparent Power 55 kVA, Max. Current 84.0 A, 380 Vac; 79.8 A, 400 Vac; 66.5 A, 480 Vac;

Rated Current 76.0 A, 380 Vac; 72.2 A, 400 Vac; 60.1 A, 480 Vac;

Document no. : 6219643.01COC V1.1

G99/1-10 A2-3 Compliance Verification Report –Tests for Type A Inverter Connected Power Generating Modules					
Extract form test report number:					6219643.50
Model: SUN2000-50K-MC0					P
Test 1:					
Measured Voltage (V)		Measured Frequency (Hz)	Measured Power (W)	Measured Power factor	Test Time (seconds)
L1	195.96	47.00	47578.51	1.000	21
L2	195.93				
L3	195.94				
Test 2:					
Measured Voltage (V)		Measured Frequency (Hz)	Measured Power (W)	Measured Power factor	Test Time (Minutes)
L1	195.93	47.50	41494.73	1.000	91
L2	195.89				
L3	195.89				
Test 3:					
Measured Voltage (V)		Measured Frequency (Hz)	Measured Power (W)	Measured Power factor	Test Time (Minutes)
L1	253.42	51.50	49970.50	1.000	91
L2	253.38				
L3	253.39				
Test 4:					
Measured Voltage (V)		Measured Frequency (Hz)	Measured Power (W)	Measured Power factor	Test Time (Minutes)
L1	253.35	51.99	49985.82	1.000	15
L2	253.32				
L3	253.33				
Test 5:					
Measured Voltage (V)		Measured Frequency (Hz)	Measured Power (W)	Measured Power factor	Test Time (Minutes)
L1	230.44	50.00	49965.64	1.000	91
L2	230.41				
L3	230.42				
Test 6:					
Measured Voltage (V)		Ramp range	Test frequency ramp	Test Duration	Confirm no trip
195.91		47.0 Hz to 52.0 Hz	+0.99 Hzs ⁻¹	5.0 s	No trip
253.37		52.0 Hz to 49.0 Hz	-1.01 Hzs ⁻¹	3.0 s	No trip

2 Power Quality – Harmonics:							P
For Power Generating Modules of Registered Capacity of less than 75 A per phase (ie 50 kW) the test requirements are specified in Annex A.7.1.5. These tests should be carried out as specified in BS EN 61000-3-12, and measurements for the 2 nd – 100 th harmonics should be provided. The results need to comply with the limits of Table 2 of BS EN 61000-3-12 for single phase equipment and Table 3 of BS EN 610000-3-12 for three phase equipment. For three phase Power Generating Modules , measurements for all phases should be provided.							
For Power Generating Modules of Registered Capacity of greater than 75 A per phase (ie 50 kW) the installation must be designed in accordance with EREC G5.							
The rating of the Power Generating Module (per phase) should be provided below, and the Total Harmonic Distortion (THD) and Partial Weighted Harmonic Distortion (PWhD) should be provided at the bottom of this section.							
Model: SUN2000-50K-MC0							
Power Generating Module tested to BS EN 61000-3-12							
Power Generating Module rating per phase (rpp)				16.67	kVA	Harmonic % = Measured Value (A) x 23/rating per phase (kVA)	
Single or three phase measurements (for single phase measurements, only complete L1 columns below)				three phase PV inverter			
Harmonic	At 45-55% of Registered Capacity						Limit in BS EN 61000-3-12 in %
	Measured Value (MV) in Amps			Measured Value (MV) in %			
	L1	L2	L3	L1	L2	L3	3 phase
2	0.096	0.066	0.048	0.083	0.057	0.041	8
3	0.027	0.023	0.013	0.024	0.020	0.011	-
4	0.019	0.021	0.012	0.017	0.018	0.010	4
5	0.058	0.057	0.065	0.050	0.049	0.056	10.7
6	0.029	0.031	0.015	0.025	0.027	0.013	2.67
7	0.063	0.066	0.067	0.055	0.057	0.058	7.2
8	0.010	0.009	0.016	0.009	0.008	0.014	2
9	0.013	0.008	0.008	0.011	0.007	0.007	-
10	0.011	0.010	0.007	0.010	0.008	0.006	1.6
11	0.127	0.119	0.128	0.110	0.103	0.110	3.1
12	0.011	0.010	0.006	0.010	0.009	0.005	1.33
13	0.304	0.302	0.295	0.262	0.261	0.254	2
14	0.006	0.010	0.008	0.005	0.009	0.007	1
15	0.015	0.009	0.009	0.013	0.008	0.008	1

Document no. : 6219643.01COC V1.1

16	0.011	0.013	0.008	0.009	0.011	0.007	1
17	0.072	0.074	0.078	0.063	0.064	0.067	2
18	0.008	0.006	0.004	0.007	0.006	0.004	1
19	0.225	0.218	0.220	0.194	0.188	0.190	1.5
20	0.005	0.008	0.006	0.004	0.007	0.005	1
21	0.008	0.013	0.006	0.007	0.011	0.005	1
22	0.013	0.013	0.013	0.011	0.011	0.012	1
23	0.057	0.060	0.059	0.049	0.052	0.051	1.5
24	0.009	0.010	0.004	0.008	0.009	0.003	1
25	0.155	0.156	0.160	0.133	0.135	0.138	1.5
26	0.005	0.005	0.008	0.005	0.004	0.007	1
27	0.010	0.005	0.006	0.008	0.005	0.005	1
28	0.016	0.013	0.016	0.014	0.011	0.013	1
29	0.047	0.060	0.052	0.040	0.052	0.044	1
30	0.008	0.010	0.003	0.007	0.008	0.003	1
31	0.109	0.105	0.104	0.094	0.091	0.089	1
32	0.008	0.007	0.012	0.007	0.006	0.010	1
33	0.005	0.005	0.008	0.004	0.004	0.007	1
34	0.014	0.009	0.014	0.012	0.008	0.012	1
35	0.033	0.039	0.032	0.028	0.034	0.028	1
36	0.007	0.009	0.003	0.006	0.007	0.002	1
37	0.065	0.070	0.067	0.056	0.060	0.058	1
38	0.011	0.008	0.013	0.010	0.007	0.011	1
39	0.007	0.004	0.006	0.006	0.004	0.005	1
40	0.011	0.006	0.009	0.009	0.005	0.008	1
41	0.022	0.025	0.025	0.019	0.022	0.022	-
42	0.006	0.007	0.003	0.005	0.006	0.002	-
43	0.043	0.044	0.045	0.037	0.038	0.039	-
44	0.013	0.009	0.015	0.011	0.008	0.013	-
45	0.013	0.010	0.004	0.011	0.009	0.004	-
46	0.005	0.003	0.004	0.005	0.003	0.003	-
47	0.037	0.041	0.040	0.032	0.036	0.035	-
48	0.004	0.004	0.002	0.003	0.004	0.002	-
49	0.027	0.024	0.027	0.024	0.020	0.024	-
50	0.012	0.008	0.013	0.010	0.007	0.012	-
51	0.022	0.018	0.005	0.019	0.016	0.004	-
52	0.004	0.005	0.004	0.003	0.005	0.003	-
53	0.054	0.059	0.056	0.046	0.051	0.048	-

Document no. : 6219643.01COC V1.1

54	0.003	0.004	0.004	0.003	0.003	0.003	-
55	0.012	0.018	0.019	0.010	0.016	0.016	-
56	0.008	0.006	0.010	0.007	0.006	0.009	-
57	0.007	0.007	0.002	0.006	0.006	0.002	-
58	0.007	0.010	0.010	0.006	0.008	0.008	-
59	0.042	0.043	0.041	0.036	0.037	0.036	-
60	0.004	0.004	0.002	0.004	0.004	0.002	-
61	0.037	0.038	0.039	0.032	0.033	0.033	-
62	0.004	0.002	0.003	0.003	0.002	0.003	-
63	0.006	0.006	0.003	0.006	0.006	0.003	-
64	0.010	0.012	0.013	0.009	0.011	0.011	-
65	0.006	0.005	0.002	0.005	0.004	0.002	-
66	0.004	0.004	0.002	0.003	0.003	0.002	-
67	0.040	0.040	0.043	0.035	0.035	0.037	-
68	0.004	0.004	0.004	0.004	0.003	0.003	-
69	0.003	0.003	0.003	0.002	0.003	0.002	-
70	0.011	0.012	0.013	0.009	0.010	0.011	-
71	0.021	0.020	0.020	0.018	0.017	0.017	-
72	0.003	0.003	0.002	0.003	0.002	0.002	-
73	0.029	0.030	0.030	0.025	0.026	0.026	-
74	0.007	0.006	0.007	0.006	0.005	0.006	-
75	0.003	0.003	0.004	0.003	0.003	0.003	-
76	0.008	0.009	0.011	0.007	0.008	0.009	-
77	0.031	0.032	0.033	0.027	0.028	0.028	-
78	0.003	0.003	0.002	0.002	0.002	0.002	-
79	0.015	0.014	0.015	0.013	0.012	0.013	-
80	0.008	0.006	0.008	0.007	0.005	0.007	-
81	0.002	0.003	0.003	0.002	0.003	0.003	-
82	0.004	0.004	0.006	0.004	0.004	0.005	-
83	0.029	0.031	0.029	0.025	0.027	0.025	-
84	0.002	0.002	0.002	0.002	0.002	0.002	-
85	0.003	0.003	0.003	0.003	0.003	0.002	-
86	0.009	0.006	0.007	0.007	0.005	0.006	-
87	0.002	0.002	0.002	0.002	0.002	0.002	-
88	0.003	0.002	0.002	0.003	0.002	0.002	-
89	0.022	0.023	0.021	0.019	0.020	0.018	-
90	0.002	0.002	0.002	0.002	0.001	0.002	-
91	0.012	0.011	0.013	0.011	0.009	0.011	-

Document no. : 6219643.01COC V1.1

92	0.007	0.005	0.005	0.006	0.005	0.004	-
93	0.002	0.002	0.002	0.002	0.002	0.002	-
94	0.005	0.004	0.005	0.004	0.004	0.004	-
95	0.013	0.014	0.012	0.011	0.012	0.010	-
96	0.002	0.002	0.002	0.002	0.002	0.002	-
97	0.014	0.016	0.016	0.012	0.013	0.013	-
98	0.004	0.004	0.002	0.003	0.004	0.002	-
99	0.003	0.003	0.002	0.002	0.002	0.002	-
100	0.006	0.005	0.006	0.005	0.005	0.005	-
THD	-	-	-	1.381	1.364	1.351	13
PWHD	-	-	-	5.177	5.254	5.231	22

Document no. : 6219643.01COC V1.1

Harmonic	At 100% of Registered Capacity						Limit in BS EN 61000-3-12 in %
	Measured Value (MV) in Amps			Measured Value (MV) in %			
	L1	L2	L3	L1	L2	L3	3 phase
2	0.136	0.070	0.080	0.117	0.060	0.069	8
3	0.048	0.079	0.037	0.042	0.068	0.032	-
4	0.034	0.019	0.028	0.029	0.016	0.024	4
5	0.073	0.081	0.101	0.063	0.070	0.087	10.7
6	0.020	0.032	0.023	0.017	0.027	0.019	2.67
7	0.042	0.055	0.047	0.036	0.047	0.040	7.2
8	0.033	0.018	0.026	0.028	0.015	0.023	2
9	0.015	0.029	0.020	0.013	0.025	0.017	-
10	0.020	0.010	0.019	0.017	0.009	0.016	1.6
11	0.197	0.175	0.215	0.170	0.151	0.185	3.1
12	0.008	0.006	0.008	0.007	0.005	0.007	1.33
13	0.231	0.230	0.220	0.199	0.198	0.190	2
14	0.027	0.018	0.026	0.023	0.016	0.023	1
15	0.031	0.020	0.013	0.027	0.017	0.012	1
16	0.009	0.007	0.010	0.008	0.006	0.009	1
17	0.115	0.103	0.118	0.099	0.089	0.102	2
18	0.009	0.007	0.007	0.008	0.006	0.006	1
19	0.139	0.138	0.134	0.119	0.119	0.115	1.5
20	0.020	0.010	0.019	0.017	0.009	0.016	1
21	0.012	0.011	0.006	0.011	0.010	0.005	1
22	0.005	0.005	0.007	0.004	0.005	0.006	1
23	0.069	0.072	0.079	0.060	0.062	0.068	1.5
24	0.007	0.011	0.010	0.006	0.009	0.009	1
25	0.102	0.109	0.105	0.088	0.094	0.090	1.5
26	0.016	0.008	0.012	0.014	0.007	0.010	1
27	0.009	0.005	0.008	0.008	0.004	0.007	1
28	0.005	0.008	0.008	0.004	0.007	0.007	1
29	0.056	0.065	0.063	0.048	0.056	0.054	1
30	0.005	0.006	0.009	0.005	0.006	0.008	1
31	0.085	0.083	0.078	0.073	0.071	0.068	1
32	0.012	0.006	0.011	0.010	0.005	0.010	1
33	0.010	0.014	0.008	0.009	0.012	0.007	1
34	0.005	0.010	0.009	0.004	0.009	0.008	1
35	0.062	0.059	0.057	0.053	0.051	0.049	1

Document no. : 6219643.01COC V1.1

36	0.007	0.006	0.011	0.006	0.005	0.010	1
37	0.071	0.079	0.064	0.061	0.068	0.056	1
38	0.009	0.004	0.008	0.008	0.003	0.007	1
39	0.011	0.011	0.005	0.010	0.010	0.004	1
40	0.006	0.012	0.008	0.005	0.010	0.007	1
41	0.061	0.064	0.066	0.053	0.055	0.057	-
42	0.007	0.008	0.012	0.006	0.007	0.010	-
43	0.070	0.070	0.071	0.060	0.060	0.062	-
44	0.007	0.004	0.008	0.006	0.003	0.007	-
45	0.013	0.008	0.007	0.011	0.007	0.006	-
46	0.008	0.014	0.008	0.007	0.012	0.007	-
47	0.065	0.071	0.073	0.056	0.062	0.063	-
48	0.007	0.006	0.011	0.006	0.005	0.010	-
49	0.065	0.062	0.066	0.056	0.053	0.057	-
50	0.006	0.004	0.006	0.005	0.003	0.006	-
51	0.011	0.007	0.005	0.009	0.006	0.005	-
52	0.011	0.015	0.006	0.010	0.013	0.005	-
53	0.076	0.070	0.059	0.065	0.061	0.051	-
54	0.006	0.009	0.013	0.005	0.008	0.011	-
55	0.059	0.047	0.029	0.051	0.040	0.025	-
56	0.006	0.006	0.008	0.006	0.005	0.007	-
57	0.020	0.011	0.010	0.017	0.010	0.009	-
58	0.017	0.018	0.006	0.014	0.016	0.005	-
59	0.077	0.085	0.087	0.066	0.074	0.075	-
60	0.006	0.009	0.013	0.005	0.008	0.011	-
61	0.036	0.027	0.032	0.031	0.023	0.027	-
62	0.009	0.008	0.011	0.008	0.006	0.009	-
63	0.017	0.008	0.010	0.015	0.007	0.009	-
64	0.019	0.017	0.005	0.016	0.015	0.004	-
65	0.078	0.073	0.060	0.068	0.063	0.052	-
66	0.006	0.009	0.012	0.005	0.008	0.010	-
67	0.031	0.009	0.032	0.027	0.008	0.028	-
68	0.013	0.011	0.013	0.011	0.009	0.011	-
69	0.010	0.005	0.009	0.008	0.004	0.008	-
70	0.019	0.016	0.006	0.017	0.014	0.005	-
71	0.053	0.050	0.044	0.046	0.044	0.038	-
72	0.005	0.008	0.008	0.005	0.007	0.007	-
73	0.028	0.021	0.042	0.025	0.018	0.036	-

Document no. : 6219643.01COC V1.1

74	0.016	0.013	0.014	0.014	0.011	0.012	-
75	0.006	0.006	0.007	0.005	0.005	0.006	-
76	0.016	0.012	0.006	0.014	0.010	0.006	-
77	0.039	0.031	0.025	0.033	0.027	0.022	-
78	0.005	0.006	0.006	0.005	0.005	0.005	-
79	0.023	0.026	0.037	0.020	0.022	0.032	-
80	0.016	0.015	0.014	0.013	0.013	0.012	-
81	0.007	0.007	0.008	0.006	0.006	0.007	-
82	0.013	0.010	0.007	0.011	0.009	0.006	-
83	0.027	0.017	0.020	0.023	0.014	0.017	-
84	0.005	0.005	0.004	0.004	0.005	0.004	-
85	0.020	0.019	0.028	0.017	0.017	0.024	-
86	0.016	0.016	0.014	0.014	0.014	0.012	-
87	0.008	0.008	0.009	0.007	0.007	0.008	-
88	0.010	0.010	0.008	0.009	0.009	0.007	-
89	0.021	0.013	0.021	0.018	0.011	0.018	-
90	0.005	0.005	0.004	0.004	0.004	0.003	-
91	0.013	0.013	0.019	0.011	0.011	0.016	-
92	0.014	0.016	0.012	0.012	0.014	0.011	-
93	0.008	0.009	0.008	0.007	0.008	0.007	-
94	0.007	0.011	0.008	0.006	0.010	0.007	-
95	0.020	0.016	0.023	0.017	0.014	0.020	-
96	0.005	0.004	0.004	0.004	0.004	0.004	-
97	0.008	0.007	0.011	0.007	0.006	0.009	-
98	0.013	0.015	0.011	0.011	0.013	0.009	-
99	0.007	0.011	0.010	0.006	0.010	0.008	-
100	0.006	0.012	0.008	0.005	0.010	0.007	-
THD	-	-	-	0.681	0.650	0.664	13
PWHD	-	-	-	2.994	2.904	2.884	22

THD = Total Harmonic Distortion

PWHD = Partial Weighted Harmonic Distortion

Document no. : 6219643.01COC V1.1

2 Power Quality – Harmonics:							P
For Power Generating Modules of Registered Capacity of less than 75 A per phase (ie 50 kW) the test requirements are specified in Annex A.7.1.5. These tests should be carried out as specified in BS EN 61000-3-12, and measurements for the 2nd – 100th harmonics should be provided. The results need to comply with the limits of Table 2 of BS EN 61000-3-12 for single phase equipment and Table 3 of BS EN 61000-3-12 for three phase equipment. For three phase Power Generating Modules, measurements for all phases should be provided. For Power Generating Modules of Registered Capacity of greater than 75 A per phase (ie 50 kW) the installation must be designed in accordance with EREC G5. The rating of the Power Generating Module (per phase) should be provided below, and the Total Harmonic Distortion (THD) and Partial Weighted Harmonic Distortion (PWhD) should be provided at the bottom of this section.							
Model: SUN2000-30K-MC0							
Power Generating Module tested to BS EN 61000-3-12							
Power Generating Module rating per phase (rpp)				10.00	kVA	Harmonic % = Measured Value (A) x 23/rating per phase (kVA)	
Single or three phase measurements (for single phase measurements, only complete L1 columns below)				three phase PV inverter			
Harmonic	At 45-55% of Registered Capacity						Limit in BS EN 61000-3-12 in %
	Measured Value (MV) in Amps			Measured Value (MV) in %			
	L1	L2	L3	L1	L2	L3	3 phase
2	0.092	0.049	0.052	0.079	0.042	0.045	8
3	0.024	0.011	0.018	0.021	0.009	0.016	-
4	0.025	0.019	0.013	0.021	0.016	0.012	4
5	0.047	0.046	0.047	0.041	0.039	0.040	10.7
6	0.021	0.019	0.014	0.018	0.017	0.012	2.67
7	0.060	0.073	0.070	0.051	0.063	0.060	7.2
8	0.012	0.008	0.008	0.010	0.007	0.006	2
9	0.018	0.013	0.009	0.016	0.011	0.007	-
10	0.015	0.007	0.011	0.013	0.006	0.009	1.6
11	0.074	0.074	0.068	0.064	0.064	0.058	3.1
12	0.009	0.007	0.007	0.008	0.006	0.006	1.33
13	0.295	0.299	0.288	0.255	0.258	0.248	2
14	0.012	0.004	0.011	0.010	0.003	0.010	1

Document no. : 6219643.01COC V1.1

15	0.022	0.007	0.018	0.019	0.006	0.016	1
16	0.013	0.004	0.012	0.011	0.004	0.010	1
17	0.051	0.052	0.050	0.044	0.045	0.043	2
18	0.004	0.005	0.006	0.004	0.004	0.005	1
19	0.209	0.207	0.203	0.181	0.179	0.175	1.5
20	0.011	0.003	0.012	0.009	0.003	0.011	1
21	0.016	0.008	0.010	0.014	0.007	0.008	1
22	0.006	0.003	0.007	0.005	0.003	0.006	1
23	0.051	0.052	0.048	0.044	0.045	0.042	1.5
24	0.006	0.009	0.005	0.005	0.008	0.005	1
25	0.128	0.129	0.132	0.110	0.111	0.114	1.5
26	0.010	0.004	0.013	0.009	0.003	0.011	1
27	0.008	0.007	0.007	0.007	0.006	0.006	1
28	0.007	0.006	0.004	0.006	0.006	0.004	1
29	0.046	0.057	0.048	0.039	0.049	0.042	1
30	0.008	0.011	0.005	0.007	0.009	0.004	1
31	0.072	0.075	0.073	0.062	0.065	0.063	1
32	0.009	0.008	0.016	0.008	0.007	0.013	1
33	0.012	0.009	0.005	0.010	0.008	0.004	1
34	0.013	0.010	0.008	0.011	0.009	0.007	1
35	0.034	0.040	0.032	0.029	0.035	0.028	1
36	0.007	0.009	0.004	0.006	0.008	0.004	1
37	0.035	0.036	0.036	0.030	0.031	0.031	1
38	0.009	0.012	0.015	0.008	0.010	0.013	1
39	0.012	0.009	0.005	0.010	0.008	0.004	1
40	0.016	0.012	0.011	0.014	0.010	0.010	1
41	0.029	0.034	0.032	0.025	0.029	0.028	-
42	0.004	0.007	0.005	0.004	0.006	0.004	-
43	0.009	0.006	0.011	0.008	0.005	0.009	-
44	0.012	0.015	0.017	0.010	0.013	0.014	-
45	0.014	0.014	0.008	0.012	0.012	0.006	-
46	0.014	0.010	0.011	0.012	0.009	0.009	-
47	0.035	0.033	0.034	0.030	0.029	0.030	-
48	0.004	0.007	0.005	0.003	0.006	0.004	-
49	0.024	0.030	0.023	0.021	0.026	0.020	-
50	0.011	0.012	0.011	0.010	0.011	0.010	-
51	0.006	0.007	0.004	0.005	0.006	0.003	-
52	0.016	0.012	0.013	0.014	0.011	0.011	-

Document no. : 6219643.01COC V1.1

53	0.009	0.005	0.005	0.008	0.005	0.004	-
54	0.003	0.005	0.005	0.002	0.004	0.004	-
55	0.049	0.047	0.051	0.043	0.041	0.044	-
56	0.004	0.004	0.002	0.004	0.004	0.002	-
57	0.005	0.003	0.003	0.004	0.003	0.002	-
58	0.010	0.009	0.009	0.009	0.008	0.008	-
59	0.033	0.035	0.030	0.028	0.030	0.026	-
60	0.004	0.002	0.003	0.003	0.002	0.003	-
61	0.037	0.034	0.036	0.032	0.029	0.031	-
62	0.004	0.008	0.005	0.004	0.007	0.004	-
63	0.004	0.002	0.004	0.003	0.002	0.003	-
64	0.003	0.002	0.004	0.003	0.002	0.003	-
65	0.046	0.048	0.046	0.039	0.041	0.040	-
66	0.005	0.005	0.004	0.005	0.004	0.003	-
67	0.018	0.017	0.017	0.016	0.014	0.015	-
68	0.005	0.009	0.006	0.004	0.007	0.005	-
69	0.004	0.003	0.004	0.003	0.003	0.004	-
70	0.010	0.006	0.009	0.009	0.005	0.008	-
71	0.043	0.040	0.041	0.037	0.034	0.035	-
72	0.005	0.006	0.004	0.004	0.005	0.003	-
73	0.004	0.002	0.003	0.003	0.002	0.003	-
74	0.004	0.007	0.005	0.003	0.006	0.005	-
75	0.004	0.004	0.003	0.003	0.004	0.003	-
76	0.013	0.010	0.012	0.012	0.008	0.010	-
77	0.029	0.026	0.028	0.025	0.023	0.024	-
78	0.003	0.005	0.004	0.003	0.004	0.003	-
79	0.007	0.007	0.010	0.006	0.006	0.008	-
80	0.003	0.004	0.004	0.003	0.004	0.004	-
81	0.003	0.002	0.002	0.002	0.002	0.002	-
82	0.012	0.010	0.010	0.010	0.009	0.009	-
83	0.012	0.008	0.009	0.010	0.007	0.008	-
84	0.002	0.003	0.003	0.002	0.002	0.003	-
85	0.011	0.010	0.013	0.009	0.009	0.011	-
86	0.005	0.005	0.005	0.005	0.004	0.004	-
87	0.002	0.003	0.002	0.002	0.003	0.002	-
88	0.007	0.007	0.006	0.006	0.006	0.006	-
89	0.006	0.007	0.006	0.005	0.006	0.005	-
90	0.002	0.002	0.003	0.002	0.001	0.002	-

Document no. : 6219643.01COC V1.1

91	0.010	0.010	0.012	0.009	0.009	0.010	-
92	0.007	0.006	0.005	0.006	0.005	0.004	-
93	0.003	0.004	0.002	0.003	0.004	0.002	-
94	0.003	0.003	0.004	0.002	0.003	0.003	-
95	0.014	0.015	0.014	0.012	0.013	0.012	-
96	0.007	0.007	0.007	0.006	0.006	0.006	-
97	0.008	0.010	0.011	0.007	0.009	0.009	-
98	0.006	0.005	0.003	0.005	0.004	0.003	-
99	0.003	0.004	0.002	0.003	0.004	0.002	-
100	0.005	0.002	0.005	0.004	0.002	0.004	-
THD	-	-	-	2.071	2.058	2.001	13
PWHD	-	-	-	7.526	7.542	7.440	22

Document no. : 6219643.01COC V1.1

Harmonic	At 100% of Registered Capacity						Limit in BS EN 61000-3-12 in %
	Measured Value (MV) in Amps			Measured Value (MV) in %			
	L1	L2	L3	L1	L2	L3	3 phase
2	0.110	0.060	0.062	0.095	0.052	0.053	8
3	0.029	0.028	0.009	0.025	0.025	0.008	-
4	0.021	0.022	0.009	0.018	0.019	0.008	4
5	0.059	0.057	0.071	0.051	0.050	0.061	10.7
6	0.031	0.031	0.018	0.027	0.027	0.015	2.67
7	0.059	0.065	0.065	0.051	0.056	0.056	7.2
8	0.017	0.007	0.012	0.015	0.006	0.010	2
9	0.017	0.013	0.013	0.015	0.011	0.012	-
10	0.008	0.006	0.005	0.007	0.005	0.004	1.6
11	0.154	0.134	0.156	0.133	0.115	0.135	3.1
12	0.011	0.006	0.010	0.009	0.005	0.009	1.33
13	0.314	0.309	0.299	0.270	0.267	0.258	2
14	0.012	0.008	0.013	0.010	0.007	0.011	1
15	0.023	0.012	0.013	0.020	0.010	0.012	1
16	0.009	0.004	0.007	0.008	0.003	0.006	1
17	0.088	0.081	0.092	0.076	0.070	0.079	2
18	0.009	0.003	0.008	0.008	0.002	0.007	1
19	0.228	0.218	0.219	0.197	0.188	0.189	1.5
20	0.010	0.008	0.010	0.009	0.007	0.008	1
21	0.014	0.015	0.008	0.012	0.013	0.007	1
22	0.006	0.003	0.005	0.005	0.002	0.004	1
23	0.064	0.063	0.065	0.055	0.054	0.056	1.5
24	0.011	0.006	0.005	0.009	0.006	0.004	1
25	0.160	0.159	0.161	0.138	0.137	0.139	1.5
26	0.012	0.007	0.007	0.011	0.006	0.006	1
27	0.008	0.005	0.005	0.007	0.005	0.004	1
28	0.006	0.002	0.005	0.005	0.002	0.005	1
29	0.052	0.064	0.057	0.045	0.055	0.049	1
30	0.009	0.004	0.005	0.008	0.004	0.004	1
31	0.120	0.110	0.109	0.103	0.095	0.094	1
32	0.011	0.006	0.009	0.010	0.005	0.008	1
33	0.003	0.011	0.011	0.003	0.010	0.009	1
34	0.007	0.003	0.005	0.006	0.003	0.005	1
35	0.039	0.046	0.041	0.034	0.040	0.035	1

Document no. : 6219643.01COC V1.1

36	0.007	0.004	0.004	0.006	0.004	0.003	1
37	0.075	0.078	0.074	0.065	0.067	0.064	1
38	0.011	0.007	0.009	0.010	0.006	0.008	1
39	0.003	0.006	0.007	0.003	0.005	0.006	1
40	0.009	0.005	0.005	0.008	0.005	0.004	1
41	0.022	0.027	0.030	0.019	0.023	0.025	-
42	0.005	0.003	0.003	0.005	0.003	0.003	-
43	0.051	0.052	0.053	0.044	0.045	0.046	-
44	0.009	0.007	0.011	0.008	0.006	0.010	-
45	0.006	0.005	0.003	0.006	0.004	0.003	-
46	0.008	0.005	0.003	0.007	0.005	0.003	-
47	0.025	0.025	0.030	0.022	0.021	0.026	-
48	0.002	0.003	0.003	0.002	0.002	0.002	-
49	0.035	0.036	0.036	0.030	0.031	0.031	-
50	0.005	0.008	0.010	0.005	0.007	0.009	-
51	0.016	0.017	0.003	0.013	0.015	0.003	-
52	0.008	0.005	0.004	0.007	0.004	0.003	-
53	0.039	0.050	0.051	0.034	0.043	0.044	-
54	0.003	0.001	0.003	0.003	0.001	0.003	-
55	0.017	0.012	0.005	0.015	0.011	0.004	-
56	0.008	0.013	0.007	0.007	0.011	0.006	-
57	0.007	0.006	0.004	0.006	0.005	0.004	-
58	0.007	0.003	0.005	0.006	0.003	0.004	-
59	0.055	0.054	0.057	0.048	0.047	0.050	-
60	0.003	0.002	0.004	0.003	0.002	0.004	-
61	0.020	0.019	0.022	0.018	0.017	0.019	-
62	0.014	0.013	0.008	0.012	0.011	0.006	-
63	0.007	0.007	0.004	0.006	0.006	0.003	-
64	0.007	0.006	0.005	0.006	0.005	0.004	-
65	0.021	0.027	0.020	0.018	0.024	0.017	-
66	0.002	0.003	0.004	0.002	0.003	0.004	-
67	0.039	0.036	0.041	0.034	0.031	0.036	-
68	0.014	0.010	0.009	0.012	0.008	0.008	-
69	0.003	0.001	0.002	0.002	0.001	0.002	-
70	0.006	0.006	0.003	0.005	0.006	0.003	-
71	0.003	0.001	0.003	0.003	0.001	0.003	-
72	0.002	0.003	0.004	0.002	0.003	0.004	-
73	0.037	0.035	0.037	0.032	0.030	0.032	-

Document no. : 6219643.01COC V1.1

74	0.010	0.007	0.009	0.009	0.006	0.008	-
75	0.005	0.004	0.007	0.004	0.004	0.006	-
76	0.004	0.005	0.002	0.004	0.004	0.002	-
77	0.019	0.019	0.023	0.017	0.016	0.019	-
78	0.003	0.002	0.005	0.003	0.002	0.004	-
79	0.029	0.024	0.027	0.025	0.021	0.023	-
80	0.006	0.005	0.008	0.005	0.004	0.006	-
81	0.002	0.003	0.004	0.002	0.002	0.003	-
82	0.002	0.003	0.002	0.002	0.003	0.002	-
83	0.024	0.027	0.029	0.021	0.023	0.025	-
84	0.004	0.003	0.006	0.003	0.002	0.005	-
85	0.013	0.011	0.013	0.011	0.009	0.011	-
86	0.002	0.005	0.005	0.002	0.004	0.004	-
87	0.002	0.003	0.004	0.002	0.002	0.004	-
88	0.001	0.002	0.002	0.001	0.002	0.002	-
89	0.024	0.027	0.026	0.021	0.023	0.022	-
90	0.003	0.003	0.005	0.003	0.003	0.005	-
91	0.003	0.001	0.003	0.002	0.001	0.003	-
92	0.004	0.005	0.002	0.003	0.004	0.002	-
93	0.002	0.002	0.004	0.002	0.002	0.003	-
94	0.002	0.003	0.002	0.001	0.003	0.002	-
95	0.019	0.022	0.021	0.017	0.019	0.018	-
96	0.002	0.004	0.005	0.002	0.003	0.004	-
97	0.009	0.008	0.008	0.008	0.007	0.007	-
98	0.006	0.006	0.003	0.005	0.005	0.003	-
99	0.002	0.002	0.003	0.001	0.002	0.002	-
100	0.002	0.003	0.002	0.002	0.003	0.002	-
THD	-	-	-	1.214	1.164	1.171	13
PWHD	-	-	-	4.482	4.437	4.480	22

THD = Total Harmonic Distortion

PWHD = Partial Weighted Harmonic Distortion

3. Power Quality – Voltage fluctuations and Flicker:	P
For Power Generating Modules of Registered Capacity of less than 75 A per phase (ie 50 kW) these tests should be undertaken in accordance with Annex A.7.1.4.3. Results should be normalised to a standard source impedance, or if this results in figures above the limits set in BS EN 61000-3-11 to a suitable Maximum Impedance. For Power Generating Modules of Registered Capacity of greater than 75 A per phase (ie 50 kW) the installation must be designed in accordance with EREC P28. The standard test impedance is 0.4 Ω for a single phase Power Generating Module (and for a two phase unit in a three phase system) and 0.24 Ω for a three phase Power Generating Module (and for a two phase unit in a split phase system). Please ensure that both test and standard impedance are completed on this form. If the test impedance (or the measured impedance) is different to the standard impedance, it must be normalised to the standard impedance as follows (where the Power Factor of the generation output is 0.98 or above): d max normalised value = (Standard impedance / Measured impedance) x Measured value. Where the Power Factor of the output is under 0.98 then the X to R ratio of the test impedance should be close to that of the standard impedance. The stopping test should be a trip from full load operation. The duration of these tests needs to comply with the particular requirements set out in the testing notes for the technology under test. The test date and location must be declared.	

Document no. : 6219643.01COC V1.1

Test start date		2025-04-14			Test end date			2025-04-14	
Test location		No.99, Hongye Road, Suzhou Industrial Park, Suzhou, Jiangsu, P.R. China							
Model: SUN2000-50K-MC0									
		Starting			Stopping			Running	
		d(max) [%]	d(c) [%]	d(t) [%]	d(max) [%]	d(c) [%]	d(t) [%]	Pst [%]	Plt 2 hours [%]
Measured Values at test impedance	L1	0.331	0.011	0.000	0.000	0.000	0.000	0.015	0.021
	L2	0.227	0.012	0.000	0.000	0.000	0.000	0.014	0.014
	L3	0.318	0.013	0.000	0.000	0.000	0.000	0.015	0.015
Normalised to standard impedance	L1	0.331	0.011	0.000	0.000	0.000	0.000	0.015	0.021
	L2	0.227	0.012	0.000	0.000	0.000	0.000	0.014	0.014
	L3	0.318	0.013	0.000	0.000	0.000	0.000	0.015	0.015
Normalised to required maximum impedance	L1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	L2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	L3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Limits set under BS EN 61000-3-11		4	3.3	3.3	4	3.3	3.3	1.0	0.65
Test Impedance		R	0.24	Ω	XI		0.15		Ω
Standard Impedance		R	0.24 * 0.4 ^	Ω	XI		0.15 * 0.25 ^		Ω
Maximum Impedance		R	N/A #	Ω	XI		N/A #		Ω
* Applies to three phase and split single phase Power Generating Modules .									
^ Applies to single phase Power Generating Module and Power Generating Modules using two phases on a three phase system									

Document no. : 6219643.01COC V1.1

Test start date		2025-07-09			Test end date			2025-07-09	
Test location		No.99, Hongye Road, Suzhou Industrial Park, Suzhou, Jiangsu, P.R. China							
Model: SUN2000-30K-MC0									
		Starting			Stopping			Running	
		d(max) [%]	d(c) [%]	d(t) [%]	d(max) [%]	d(c) [%]	d(t) [%]	Pst [%]	Plt 2 hours [%]
Measured Values at test impedance	L1	0.288	0.014	0.000	0.000	0.000	0.000	0.015	0.021
	L2	0.207	0.011	0.000	0.000	0.000	0.000	0.014	0.014
	L3	0.251	0.001	0.000	0.000	0.000	0.000	0.015	0.015
Normalised to standard impedance	L1	0.288	0.014	0.000	0.000	0.000	0.000	0.015	0.021
	L2	0.207	0.011	0.000	0.000	0.000	0.000	0.014	0.014
	L3	0.251	0.001	0.000	0.000	0.000	0.000	0.015	0.015
Normalised to required maximum impedance	L1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	L2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	L3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Limits set under BS EN 61000-3-11		4	3.3	3.3	4	3.3	3.3	1.0	0.65
Test Impedance		R	0.24	Ω	XI		0.15		Ω
Standard Impedance		R	0.24 * 0.4 ^	Ω	XI		0.15 * 0.25 ^		Ω
Maximum Impedance		R	N/A #	Ω	XI		N/A #		Ω
* Applies to three phase and split single phase Power Generating Modules .									
^ Applies to single phase Power Generating Module and Power Generating Modules using two phases on a three phase system									

4. Power quality – DC injection:									P
The tests should be carried out on a single Generating Unit . Tests are to be carried out at three defined power levels ±5%. At 230 V a 50 kW three phase Inverter has a current output of 217 A so DC limit is 543 mA. These tests should be undertaken in accordance with Annex A.7.1.4.4.									
The % DC injection (“as % of rated AC current” below) is calculated as follows: % DC injection = Recorded DC value in Amps / Base current where the base current is the Registered Capacity (W) / Vphase. The % DC injection should not be greater than 0.25%.									
Model: SUN2000-50K-MC0									
Three-phase									
Test power level	10%			55%			100%		
	L1	L2	L3	L1	L2	L3	L1	L2	L3
Recorded DC injection value in Amps	0.090	0.100	0.070	0.090	0.110	0.070	0.090	0.110	0.090
as % of rated AC current	0.12%	0.14%	0.10%	0.12%	0.15%	0.10%	0.12%	0.15%	0.12%
Limit	0.25%			0.25%			0.25%		
Model: SUN2000-30K-MC0									
Three-phase									
Test power level	10%			55%			100%		
	L1	L2	L3	L1	L2	L3	L1	L2	L3
Recorded DC injection value in Amps	0.060	0.050	0.040	0.060	0.060	0.050	0.060	0.060	0.050
as % of rated AC current	0.14%	0.12%	0.09%	0.14%	0.14%	0.12%	0.14%	0.14%	0.12%
Limit	0.25%			0.25%			0.25%		

Document no. : 6219643.01COC V1.1

5. Power Factor:			P
The tests should be carried out on a single Power Generating Module. Tests are to be carried out at three voltage levels and at Registered Capacity and the measured Power Factor must be greater than 0.95 to pass. Voltage to be maintained within $\pm 1.5\%$ of the stated level during the test. These tests should be undertaken in accordance with Annex A.7.1.4.2 Note that the value of voltage stated in brackets assumes a LV connection. This should be adjusted for HV as required.			
Model: SUN2000-50K-MC0			
Voltage	0.94 p.u. (216.65 V)	1.00 p.u. (230.43 V)	1.10 p.u. (253.40 V)
Measured value	1.000	1.000	1.000
Power Factor Limit	> 0.95	> 0.95	> 0.95
Model: SUN2000-30K-MC0			
Voltage	0.94 p.u. (216.48 V)	1.00 p.u. (230.27 V)	1.10 p.u. (253.26 V)
Measured value	1.000	1.000	1.000
Power Factor Limit	> 0.95	> 0.95	> 0.95

6. Protection – Frequency tests:						P
These tests should be carried out in accordance with the Annex A.7.1.2.3. For trip tests, frequency and time delay should be stated. For “no trip tests”, “no trip” can be stated.						
Model: SUN2000-50K-MC0						
Function	Setting		Trip test		“No trip tests”	
	Frequency	Time delay	Frequency	Time delay	Frequency /time	Confirm no trip
U/F stage 1	47.5 Hz	20 s	47.49 Hz	20.032 s	47.7 Hz 30 s	No trip
U/F stage 2	47.0 Hz	0.5 s	47.00 Hz	528.33 ms	47.2 Hz 19.5 s	No trip
					46.8 Hz 0.45 s	No trip
O/F	52.0Hz	0.5 s	52.01 Hz	525.54 ms	51.8 Hz 120 s	No trip
					52.2 Hz 0.45 s	No trip
Note: For frequency trip tests the frequency required to trip is the setting ± 0.1 Hz. In order to measure the time delay a larger deviation than the minimum required to operate the projection can be used. The “No trip tests” need to be carried out at the setting ± 0.2 Hz and for the relevant times as shown in the table above to ensure that the protection will not trip in error.						

7. Protection – Voltage tests:						P
These tests should be carried out in accordance with Annex A.7.1.2.2. For trip tests, voltage and time delay should be stated. For “no trip tests”, “no trip” can be stated. Note that the value of voltage stated below assumes a LV connection This should be adjusted for HV taking account of the VT ratio as required.						
Model: SUN2000-50K-MC0						
L1-N						
Function	Setting		Trip test		“No trip tests”	
	Voltage	Time delay	Voltage	Time delay	Voltage /time	Confirm no trip
U/V	0.8 pu (184 V)	2.5 s	183.47 V	2.52 s	188 V 5.0 s	No trip
					180 V 2.45 s	No trip
O/V stage 1	1.14 pu (262.2 V)	1.0 s	262.26 V	1.03 s	258.2 V 5.0 s	No trip
O/V stage 2	1.19 pu (273.7 V)	0.5 s	273.77 V	524 ms	269.7 V 0.95 s	No trip
					277.7 V 0.45 s	No trip
Note: for Voltage tests the Voltage required to trip is the setting ± 3.45 V. The time delay can be measured at a larger deviation than the minimum required to operate the protection. The No trip tests need to be carried out at the setting ± 4 V and for the relevant times as shown in the table above to ensure that the protection will not trip in error.						

Model: SUN2000-50K-MC0						
L2-N						
Function	Setting		Trip test		“No trip tests”	
	Voltage	Time delay	Voltage	Time delay	Voltage /time	Confirm no trip
U/V	0.8 pu (184 V)	2.5 s	183.52 V	2.53 s	188 V 5.0 s	No trip
					180 V 2.45 s	No trip
O/V stage	1.14 pu (262.2 V)	1.0 s	262.74 V	1.03 s	258.2 V 5.0 s	No trip
O/V stage 2	1.19 pu (273.7 V)	0.5 s	274.24 V	515 ms	269.7 V 0.95 s	No trip
					277.7 V 0.45 s	No trip
Note: for Voltage tests the Voltage required to trip is the setting ± 3.45 V. The time delay can be measured at a larger deviation than the minimum required to operate the protection. The No trip tests need to be carried out at the setting ± 4 V and for the relevant times as shown in the table above to ensure that the protection will not trip in error.						

Document no. : 6219643.01COC V1.1

Model: SUN2000-50K-MC0						
L3-N						
Function	Setting		Trip test		"No trip tests"	
	Voltage	Time delay	Voltage	Time delay	Voltage /time	Confirm no trip
U/V	0.8 pu (184 V)	2.5 s	182.94 V	2.53 s	188 V 5.0 s	No trip
					180 V 2.45 s	No trip
O/V stage 1	1.14 pu (262.2 V)	1.0 s	261.73 V	1.03 s	258.2 V 5.0 s	No trip
O/V stage 2	1.19 pu (273.7 V)	0.5 s	273.25 V	530 ms	269.7 V 0.95 s	No trip
					277.7 V 0.45 s	No trip
Note: for Voltage tests the Voltage required to trip is the setting ± 3.45 V. The time delay can be measured at a larger deviation than the minimum required to operate the protection. The No trip tests need to be carried out at the setting ± 4 V and for the relevant times as shown in the table above to ensure that the protection will not trip in error.						

Model: SUN2000-50K-MC0						
L1-L2-L3-N						
Function	Setting		Trip test		"No trip tests"	
	Voltage	Time delay	Voltage	Time delay	Voltage /time	Confirm no trip
U/V	0.8 pu (184 V)	2.5 s	184.01 V	2.53 s	188 V 5.0 s	No trip
					180 V 2.45 s	No trip
O/V stage 1	1.14 pu (262.2 V)	1.0 s	261.73 V	1.03 s	258.2 V 5.0 s	No trip
O/V stage 2	1.19 pu (273.7 V)	0.5 s	273.23 V	531 ms	269.7 V 0.95 s	No trip
					277.7 V 0.45 s	No trip
Note: for Voltage tests the Voltage required to trip is the setting ± 3.45 V. The time delay can be measured at a larger deviation than the minimum required to operate the protection. The No trip tests need to be carried out at the setting ± 4 V and for the relevant times as shown in the table above to ensure that the protection will not trip in error.						

Document no. : 6219643.01COC V1.1

Model: SUN2000-50K-MC0						
L1-L2 Phase						
Function	Setting		Trip test		"No trip tests"	
	Voltage	Time delay	Voltage (V)	Time delay (s)	Voltage / time	Confirm no trip
U/V	0.8 p.u.	2.5 s	319.09	2.53	324.0 V / 5.0 s	No trip
					316.0 V / 2.45 s	No trip
O/V stage 1	1.14 p.u.	1.0 s	454.58	1.03	452.0 V / 5.0 s	No trip
O/V stage 2	1.19 p.u.	0.5 s	476.84	0.523	472.0 V / 0.95 s	No trip
					480.0 V / 0.45 s	No trip
L2-L3 Phase						
Function	Setting		Trip test		"No trip tests"	
	Voltage	Time delay	Voltage (V)	Time delay (s)	Voltage /time	Confirm no trip
U/V	0.8 pu	2.5 s	319.05	2.55	324.0 V / 5.0 s	No trip
					316.0 V / 2.45 s	No trip
O/V stage 1	1.14 pu	1.0 s	453.55	1.05	452.0 V / 5.0 s	No trip
O/V stage 2	1.19 pu	0.5 s	476.85	0.536	472.0 V / 0.95 s	No trip
					480.0 V / 0.45 s	No trip
L3-L1 Phase						
Function	Setting		Trip test		"No trip tests"	
	Voltage	Time delay	Voltage (V)	Time delay (s)	Voltage/time	Confirm no trip
U/V	0.8 pu	2.5 s	319.88	2.52	324.0 V / 5.0 s	No trip
					316.0 V / 2.45 s	No trip
O/V stage 1	1.14 pu	1.0 s	452.92	1.03	452.0 V / 5.0 s	No trip
O/V stage 2	1.19 pu	0.5 s	477.61	0.520	472.0 V / 0.95 s	No trip
					480.0 V / 0.45 s	No trip
Note: For Voltage tests the Voltage required to trip is the setting ± 3.45 V. The time delay can be measured at a larger deviation than the minimum required to operate the protection. The No trip tests need to be carried out at the setting ± 4 V and for the relevant times as shown in the table above to ensure that the protection will not trip in error.						

Document no. : 6219643.01COC V1.1

8. Protection – Loss of Mains test:						P
These tests should be carried out in accordance with BS EN 62116. Annex A.7.1.2.4. For test condition A, EUT output = 100 % P _n , test condition B, EUT output = 50 % to 66 % P _n , and test condition C, EUT output = 25 % to 33 % P _n .						
Model: SUN2000-50K-MC0						
The following subset of tests should be recorded in the following table.						
Test Power and imbalance	33% -5% Q	66% -5% Q	100% -5% P	33% +5% Q	66% +5% Q	100% +5% P
Trip time. Limit is 0.5 s	220 ms	210 ms	260 ms	190 ms	200 ms	230 ms

8. Loss of Mains Protection, Vector Shift Stability test:				P
This test should be carried out in accordance with Annex A.7.1.2.6. Confirmation is required that the Power Generating Module does not trip under positive / negative vector shift.				
Model: SUN2000-50K-MC0				
	Start Frequency		Change	Confirm no trip
Positive Vector Shift	49.5 Hz		+50 degrees	No trip
Negative Vector Shift	50.5 Hz		- 50 degrees	No trip

8. Loss of Mains Protection, RoCoF Stability test:				P
This test should be carried out in accordance with Annex A.7.1.2.6. Confirmation is required that the Power Generating Module does not trip for the duration of the ramp up and ramp down test.				
Model: SUN2000-50K-MC0				
Ramp range	Test frequency ramp:		Test Duration	Confirm no trip
49.0 Hz to 51.0 Hz	+0.95 Hzs ⁻¹		2.1 s	No trip
51.0 Hz to 49.0 Hz	-0.95 Hzs ⁻¹		2.1 s	No trip

9. Limited Frequency Sensitive Mode – Over frequency test: The test should be carried out using the specific threshold frequency of 50.4 Hz and Droop of 10%. This test should be carried out in accordance with Annex A.7.1.3.					P
Active Power response to rising frequency/time plots are attached if frequency injection tests are undertaken in accordance with Annex A.7.2.4.					
Alternatively, simulation results should be noted below:					
Model: SUN2000-50K-MC0					
Test sequence at Registered Capacity >80%	Measured Active Power Output (W)	Frequency (Hz)	Calculate droop (%)	Primary Power Source	Active Power Gradient
Step a) 50.00 Hz ±0.01 Hz	50453.86	50.00	--	Photovoltaic array simulator	10%
Step b) 50.45 Hz ±0.05 Hz	49875.98	50.45	8.57		
Step c) 50.70 Hz ±0.10 Hz	47367.74	50.70	9.70		
Step d) 51.15 Hz ±0.05 Hz	42920.73	51.15	9.95		
Step e) 50.70 Hz ±0.10 Hz	47420.89	50.70	9.88		
Step f) 50.45 Hz ±0.05 Hz	49910.56	50.45	9.10		
Step g) 50.00 Hz ±0.01 Hz	50515.10	50.00	--		
Test sequence at Registered Capacity 40% - 60%	Measured Active Power Output (W)	Frequency (Hz)	Calculate droop (%)	Primary Power Source	Active Power Gradient
Step a) 50.00 Hz ±0.01 Hz	25000.00	50.00	--	Photovoltaic array simulator	10%
Step b) 50.45 Hz ±0.05 Hz	24430.00	50.45	8.66		
Step c) 50.70 Hz ±0.10 Hz	21900.00	50.70	9.66		
Step d) 51.15 Hz ±0.05 Hz	17400.00	51.15	9.86		
Step e) 50.70 Hz ±0.10 Hz	21900.00	50.70	9.65		
Step f) 50.45 Hz ±0.05 Hz	24430.00	50.45	8.68		
Step g) 50.00 Hz ±0.01 Hz	25000.00	50.00	--		
The frequency at each step should be maintained for at least one minute and the Active Power reduction in the form of a gradient determined and assessed for compliance with paragraph 11.2.3. The Droop should be determined from the measurements between 50.4 Hz and 51.15 Hz. The allowed tolerance for the frequency measurement shall be ± 0.05 Hz. The allowed tolerance for Active Power output measurement shall be ±10% of the required change in Active Power. The resulting overall tolerance range for a nominal 10% Droop is +2.8% and – 1.5%, ie a Droop less than 12.8% and greater than 8.5%.					

Document no. : 6219643.01COC V1.1

9-2. Power output with falling frequency test (For PV Inverter):				P
Tests should prove that the Power Generating Module does not reduce output power as the frequency falls. These tests should be carried out in accordance with 11.2.3.1, 12.2.3.1, 13.2.3.1.				
Model: SUN2000-50K-MC0				
Test sequence	Measured Active Power Output (W)	Acceptable Active Power	Frequency (Hz)	Primary power source
50.5 Hz for 5 minutes	50455.77	100% Registered Capacity	50.50	Photovoltaic array simulator
50.0 Hz for 5 minutes	50048.16	100% Registered Capacity	50.00	Photovoltaic array simulator
49.5 Hz for 5 minutes	50026.09	100% Registered Capacity	49.50	Photovoltaic array simulator
49.0 Hz for 5 minutes	50015.73	99% Registered Capacity	49.00	Photovoltaic array simulator
48.0 Hz for 5 minutes	50003.77	97% Registered Capacity	48.00	Photovoltaic array simulator
47.6 Hz for 5 minutes	49998.57	96.2% Registered Capacity	47.60	Photovoltaic array simulator
47.1 Hz for 20 s	49998.47	95% Registered Capacity	47.10	Photovoltaic array simulator

Document no. : 6219643.01COC V1.1

10. Protection – Re-connection timer.					P
Model: SUN2000-50K-MC0					
Test should prove that the reconnection sequence starts after a minimum delay of 20 s for restoration of voltage and frequency to within the stage 1 settings of Table 10.1.					
Time delay setting	Measured delay	Checks on no reconnection when voltage or frequency is brought to just outside stage 1 limits of Table 10.1.			
60 s	69.30 s	At 1.16 pu (266.2 V)	At 0.78 pu (180.0 V)	At 47.4 Hz	At 52.1 Hz
Confirmation that the Micro-generator does not re-connect.		No reconnection	No reconnection	No reconnection	No reconnection
Recover to normal operation range after confirmation of no connection		Yes	Yes	Yes	Yes
Confirmation that the Power Generating Module shall reconnect		Reconnection after 69.30 s	Reconnection after 65.58 s	Reconnection after 68.00 s	Reconnection after 70.28 s

11. Fault level contribution: These tests shall be carried out in accordance with EREC G99 Annex A.7.1.5.			P
For Inverter output			
Time after fault	Volts	Amps	
20ms	412.11 / 158.58 / 155.55	0.02 / 0.02 / 0.01	
100ms	227.14 / 320.28 / 228.22	0.02 / 0.02 / 0.01	
250ms	35.60 / 27.60 / 35.82	0.02 / 0.02 / 0.01	
500ms	19.99 / 28.56 / 21.15	0.02 / 0.02 / 0.01	
Time to trip	0.073 s	In seconds	

12. Self-Monitoring solid state switching: No specified test requirements. Refer to Annex A.7.1.6.

It has been verified that in the event of the solid state switching device failing to disconnect the **Power Park Module**, the voltage on the output side of the switching device is reduced to a value below 50 volts within 0.5 s.

N/A

13. Wiring functional tests: If required by para 15.2.1.

Confirm that the relevant test schedule is attached (tests to be undertaken at time of commissioning)

N/A

14. Logic interface (input port).

Confirm that an input port is provided and can be used to shut down the module.

Yes

Logic interface marked 'COM' on inverter which can be operated by a switch. When the switch is open the inverter can operate normally. When the switch is closed, the inverter will reduce its output voltage to below 30V within 30s.

Provide high level description of logic interface, e.g. details in 11.1.3.1 such as AC or DC signal (the additional comments box below can be used)

Yes

15. Cyber security

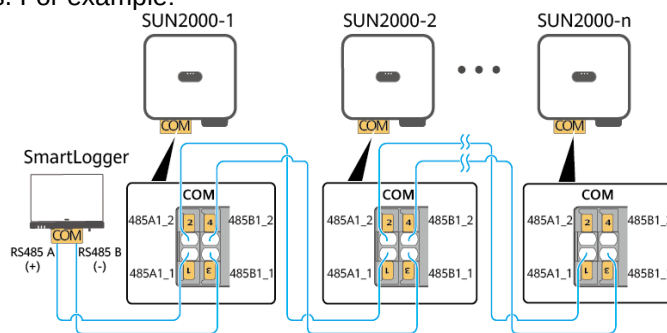
Confirm that the Power Generating Module has been designed to comply with cyber security requirements, as detailed in 9.1.7.

Yes
Manufacturer's
declaration
provided

Additional comments.

Logic Interface:

The inverters can connect to the Smart Logger over RS485 or to a PC through the Smart Logger to implement communication. You can use the Fusion Solar app, Smart Logger, or the network management software (such as the Fusion Solar) on the PC to query information about inverters, such as energy yield, alarms, and running status. For example:



1. Interface protection has been tested and evaluated on basis of rated grid voltage 3/N/PE~, 230/400 V, 50Hz according to the grid code on page 1.
2. Interface protection settings is limited to the authorized installer, password and seal provided to protect these from unpermitted interference. Inverters with multi-voltage and/or frequency ratings are available in difference versions based on output voltages and frequencies, the ratings on which the testing has been based was identified on pater tag and control panel.
3. Unauthorised access to factory safety parameters setting and software should be prohibited. A reset to the factory safety parameters requires retesting and verification in conjunction with the end-use system.
4. Protection integrated in inverter cannot be used as an alternative central interface protection device at connection point.

-End-