Certificate of Conformity

Certificate Number: CN-PV-190097

On the basis of the tests undertaken, the samples of the below product have been found to comply with the requirements of the referenced specifications /standards at the time the tests were carried out. It does not imply that Intertek has performed any surveillance or control of the manufacture. The manufacturer shall ensure that the manufacturing process assures compliance of the production units with the examined products mentioned in this certificate.

Applicant Name & Address:	Shenzhen SOFAR SOLAR Co., Ltd. 401, Building 4, AnTongDa Industrial Park, District 68, XingDong Community, XinAn Street, BaoAn District, Shenzhen, China
Product Description:	Solar Grid-tied Inverter
Ratings & Principle Characteristics:	See Annex to Certificate of Conformity
Models/Type References:	SOFAR 10000TL-G2, SOFAR 12000TL-G2, SOFAR 15000TL-G2
Brand Name:	SOFAR SOLAR
Specification/Standard:	EN 50549-1: 2019, Requirements for generating plants to be connected in parallel with distribution networks Part 1: Connection to a LV distribution network - Generating plants up to and including Type B Compliant with COMMISSION REGULATION (EU) 2016/631 (NC RfG) Type approval for type B
Certificate Issuing Office Name & Address:	Intertek Testing Services Ltd. Shanghai 2/F (West Side), No. 707, Zhangyang Road, Free Trade Experimental Area, Shanghai, P. R. China
Test Report Number:	190411094GZU-001

Additional information in Appendix.

Signature

Name: Grady Ye
Position: Certifier
Date: 07 January 2020

APPENDIX: Certificate of Conformity

This is an Appendix to Certificate of Conformity Number: CN-PV-190097

Ratings & Principle Characteristics:

Model	SOFAR 10000TL-G2	SOFAR 12000TL-G2	SOFAR 15000TL-G2
Max.PV voltage	1000 d.c.V		
PV MPPT voltage range	160-960 d.c.V		
Max.input current	21 /11 d.c.A		
PV Isc	30/15 d.c.A		
Max.output power	10000W	12000W	15000W
Max.apparent power	11000VA	13200VA	16500VA
Nominal output voltage	3/N/PE, 230 /400 a.cV		
Max.output current	3×16.5 a.c.A	3×20.0 a.c.A	3×24.0 a.c.A
Nominal output Frequency	50 Hz		
Power factor range	0.8Leading – 0.8 lagging		
Inverter technology	Non-isolated		
Safety level	Class I		
Ingress Protection	IP 65		
Operation Ambient Temperature	-25℃ - +60℃		
Software Version	V1.30		

Certificate of Conformity

Certificate Number: CN-PV-200016

On the basis of the tests undertaken, the samples of the below product have been found to comply with the requirements of the referenced specifications /standards at the time the tests were carried out. It does not imply that Intertek has performed any surveillance or control of the manufacture. The manufacturer shall ensure that the manufacturing process assures compliance of the production units with the examined products mentioned in this certificate.

Applicant:	Shenzhen SOFAR SOLAR Co., Ltd. 401, Building 4, AnTongDa Industrial Park, District 68, XingDong Community, XinAn Street, BaoAn District, Shenzhen, China
Product:	Solar Grid-tied Inverter
Ratings & Principle Characteristics:	See Appendix to Certificate of Conformity
Models:	SOFAR 10000TL-G2, SOFAR 12000TL-G2, SOFAR 15000TL-G2
Brand Name:	SOFAR SOLAR
Tested according to:	DIN V VDE V 0126-1-1:2013.08
Certificate Issuing Office Name & Address:	Intertek Testing Services Ltd. Shanghai 2/F (West Side), No. 707, Zhangyang Road, Free Trade Experimental Area, Shanghai, P. R. China
Test Reports No:	190411093GZU-003

Additional information in Appendix.

Signature

Certification Manager: Grady Ye
Date: 16 March 2020

APPENDIX: Certificate of Conformity

This is an Appendix to Certificate of Conformity Number: CN-PV-200016

Ratings & Principle Characteristics:

Model	SOFAR 10000TL-G2	SOFAR 12000TL-G2	SOFAR 15000TL-G2
Max.PV voltage	1000 d.c.V		
PV MPPT voltage range	160-960 d.c.V		
Max.input current	21 /11 d.c.A		
PV Isc	30/15 d.c.A		
Max.output power	10000W	12000W	15000W
Max.apparent power	11000VA	13200VA	16500VA
Nominal output voltage	3/N/PE, 230 /400 a.cV		
Max.output current	3×16.5 a.c.A	3×20.0 a.c.A	3×24.0 a.c.A
Nominal output Frequency	50 Hz		
Power factor range	0.8Leading – 0.8 lagging		
Inverter technology	Non-isolated		
Safety level	Class I		
Ingress Protection	IP 65		
Operation Ambient Temperature	-25℃ - +60℃		
Software Version	V1.30		

Test Verification of Conformity

Verification Number: 201222124-VOC001

On the basis of the referenced test reports, sample tested of the below product have been found to comply with the standards harmonized with the directives listed on this verification at the time the tests were carried out. Other standards and Directives may be relevant to the product. This verification is part of the full test reports and should be read in conjunction with them. This verification replaces previous verification dated: 17 April 2020: 200331130GZU-V0C001

Once compliance with all product relevant CE mark directives are verified, including any relevant e.g. risk assessment and production control, the manufacturer may indicate compliance by signing a Declaration of Conformity themselves and applying the mark to products identical to the tested sample(s).

Applicant Name & Address:	Shenzhen SOFARSOLAR Co., Ltd. 401, Building 4, AnTongDa Industrial Park, District 68, XingDong Community, XinAn Street, BaoAn District, Shenzhen, China
Product Description:	Solar Grid-tied Inverter
Ratings & Principle Characteristics:	See Appendix: Test Verification of Conformity
Models/Type References:	SOFAR 10000TL-G2, SOFAR 12000TL-G2, SOFAR 15000TL-G2
Brand Name:	SOFAR SOLAR
Relevant Standards/Directives:	See Appendix: Test Verification of Conformity
Verification Issuing Office Name & Address:	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch Block E, No.7-2 Guang Dong Software Science Park, Caipin Road, Guangzhou Science City, GETDD, Guangzhou, China
Date of Tests:	31 Mar., 2020 – 06 Apr., 2020
Test Report Number(s):	190411091GZU-005, date 18 Jun.,2019 and Revision 1:07 April 2020 190411091GZU-006, date 18 Jun.,2019

Additional information in Appendix.

Tommy

Signature

Name: Tommy Zhong
Position: Technical Manager
Date: 29 December 2020

APPENDIX: Test Verification of Conformity

This is an Appendix to Test Verification of Conformity Number: 201222124GZU-VOC001

Ratings & Principle Characteristics:

Model	SOFAR 10000TL-G2	SOFAR 12000TL-G2	SOFAR 15000TL-G2
Max.PV voltage	1000 d.c.V		
PV MPPT voltage range	160-960 d.c.V		
Max.input current	21 /11 d.c.A		
PV Isc	30/15 d.c.A		
Max.output power	10000W	12000W	15000W
Max.apparent power	11000VA	13200VA	16500VA
Nominal output voltage	3/N/PE, 230 /400 a.cV		
Max.output current	3×16.5 a.c.A	3×20.0 a.c.A	3×24.0 a.c.A
Nominal output Frequency	50/60 Hz		
Power factor range	0.8Leading – 0.8 lagging		
Inverter technology	Non-isolated		
Safety level	Class I		
Ingress Protection	IP 65		
Operation Ambient Temperature	-25℃ - +60℃		
Software Version	V0.21		

Relevant Standards/Directives

IEC/EN 62109-1: 2010 Safety of power converters for use in photovoltaic power systems – Part 1: General requirements
IEC/EN 62109-2: 2011 Safety of power converters for use in photovoltaic power systems – Part 2: Particular requirements for inverters
Low Voltage Directive 2014/35/EU

Signature

Name: Tommy Zhong
Position: Technical Manager
Date: 29 December 2020

By the product certificate number **No: 2620/0076-C-CER**

Issued to

License holder **Shenzhen SOFAR SOLAR Co., Ltd.**
401, Building 4, AnTongDa Industrial Park, District 68,
XingDong Community, XinAn Street, BaoAn District.
Shenzhen City, Guangdong Province, P.R. China

Manufacturer **Dongguan SOFAR SOLAR Co., Ltd.**
1F – 6F, Building E, No.1 JinQi Road, Bihu Industrial Park.
Wulian Village, Fenggang Town, Dongguan, P.R. China.

Trademark SOFAR SOLAR

It is certified that the product *:*

Type of generator **PV Inverter**

Models		**SOFAR 15000TL-G2**	**SOFAR 12000TL-G2**	**SOFAR 10000TL-G2**
Technical Data	**Rated Power**	**15000 W**	**12000 W**	**10000 W**
	Nominal Voltage		**230 / 400 V**	
	Nominal Frequency		**50**	
	Firmware version		**V3.00**	
	Number of phases		**Three phase**	
	Isolation transformer		**NO**	

Is in compliance with

Regulation **Technical regulation 3.2.2 for PV power plants above 11 kW. Energinet.**
Category A2. Plants above 11 kW up to and including 50 kW.
Category B. Plants above 50 kW up to and including 1.5 MW.
Revision 4. Dated on 14th July 2016.

This certificate is based upon the test results of the Test Report nº 2220/0076-C.

The above-mentioned generating unit is certified according to the SGS internal process 4 based on the requirements of the UNE-EN ISO/IEC 17065.

This certificate is valid until: 22th of May 2023.
First issued on: 22th of May 2020.

Madrid, 22th May 2020

Daniel Arranz Muñiz
Certification Manager

Test Verification of Conformity

Verification Number: 200320093GZU-VOC001

On the basis of the referenced test report(s), sample(s) tested of the below product have been found to comply with the standards harmonized with the directives listed on this verification at the time the tests were carried out. Other standards and Directives may be relevant to the product. This verification is part of the full test report(s) and should be read in conjunction with it <them>. This verification supersedes all previous verfications with the noted Verificaton/Report number(s) dated before this verfication notice.

Once compliance with all product relevant CE mark directives are verified, including any relevant e.g. risk assessment and production control, the manufacturer may indicate compliance by signing a Declaration of Conformity themselves and applying the mark to products identical to the tested sample(s).

Applicant Name & Address:	Shenzhen SOFARSOLAR Co., Ltd. 401, Building 4, AnTongDa Industrial Park, District 68, XingDong Community, XinAn Street, BaoAn District, Shenzhen, China
Product Description:	Solar Grid-tied Inverter
Models/Type References:	SOFAR 10000TL-G2, SOFAR 12000TL-G2, SOFAR 15000TL-G2
Ratings & Principle Characteristics:	See Appendix
Brand Name(s):	SOFAR
Relevant Standards:	EN 61000-6-3:2007+A1: 2011 EN 61000-6-1:2007 EMC Directive 2014/30/EU
Verification Issuing Office Name & Address:	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch Block E, No.7-2 Guang Dong Software Science Park, Caipin Road, Guangzhou Science City, GETDD Guangzhou, China
Date of Tests:	11 June 2019-26 June 2019
Test Report Number(s):	190411096GZU-001 amendment 1

Additional information in Appendix.

Signature

Name: **Strong Yao**
Position: Manager
Date: 15 April 2020

APPENDIX: Test Verification of Conformity

This is an Appendix to Test Verification of Conformity Number: 200320093GZU-VOC001

Ratings & Principle Characteristics:

Model	SOFAR 10000TL-G2	SOFAR 12000TL-G2	SOFAR 15000TL-G2
Max.PV voltage	1000 d.c.V		
PV MPPT voltage range	160-960 d.c.V		
Max.input current	21 /11 d.c.A		
PV Isc	30/15 d.c.A		
Max.output power	10000W	12000W	15000W
Max.apparent power	11000VA	13200VA	16500VA
Nominal output voltage	3/N/PE, 230 /400 a.cV		
Max.output current	3×16.5 a.c.A	3×20.0 a.c.A	3×24.0 a.c.A
Nominal output Frequency	50 Hz		
Power factor range	0.8Leading – 0.8 lagging		
Inverter technology	Non-isolated		
Safety level	Class I		
Ingress Protection	IP 65		
Operation Ambient Temperature	-25℃ - +60℃		
Software Version	V0.21		

Signature

Name: **Strong Yao**
Position: Manager
Date: 15 April 2020

Certificate of Conformity
(Übereinstimmungsbescheinigung)

Certificate No. (Bescheinigungs-Nr): CN-PV-200059

On the basis of the tests undertaken, the sample<s> of the below product have been found to comply with the requirements of the referenced specification<s>/standard<s> at the time the tests were carried out. It does not imply that Intertek has performed any surveillance or control of the manufacture(s). The manufacturer(s) shall ensure that the manufacturing process assures compliance of the production units with the examined products mentioned in this certificate.
Anhand der durchgeführten Tests wurde festgestellt, dass die Probe (n) des nachstehenden Produkts zum Zeitpunkt der Durchführung der Tests den Anforderungen der angegebenen Spezifikation (n) / Norm (en) entsprachen. Dies bedeutet nicht, dass Intertek die Herstellung (en) überwacht oder kontrolliert hat. Der Hersteller stellt sicher, dass der Herstellungsprozess die Übereinstimmung der Produktionseinheiten mit den in dieser Bescheinigung genannten geprüften Produkten sicherstellt.

Applicant: **(Bescheinigungsinhaber)**	Shenzhen SOFAR SOLAR Co., Ltd. 401, Building 4, AnTongDa Industrial Park, District 68, XingDong Community, XinAn Street, BaoAn District, Shenzhen, China
Product: **(Produkt)**	Solar Grid-tied inverter (Umricher)
Model: **(Modell)**	SOFAR 10000TL-G2, SOFAR 12000TL-G2, SOFAR 15000TL-G2
Max. active power PEmax: **(max. Wirkleistung PEmax)**	10.071KW; 12.049KW;15.082KW
Max. apparent power SEmax: **(max. Scheinleistung SEmax)**	11.188KVA; 13.295KVA; 16.663KVA
Rated voltage: **(Bemessungsspannung)**	3W/N/PE 230Vac/400Vac
Rated current (AC) Ir: **(Bemessungsstrom (AC) Ir)**	16.5A; 20.0A; 24.0A
Initial short-circuit AC current Ik: **(Anfangs-Kurzschlusswechselstrom Ik)**	16.5A; 20.0A; 24.0A
Tested according to: **(Geprüft nach)**	**VDE-AR-N 4105:2018-11 „Erzeugungsanlagen am Niederspannungsnet** Technische Mindestanforderungen für Anschluss und Parallelbetrieb vo Erzeugungsanlagen am Niederspannungsnetz
Test Report No.: **(Prüfbericht-Nr.)**	**DIN VDE V 0124-100 (VDE V 0124-100):2020-06 „Netzintegration von Erzeugungsanlagen – Niederspannung“** Prüfanforderungen an Erzeugungseinheiten vorgesehen zum Anschluss Parallelbetrieb am Niederspannungsnetz
Certificate Issuing Office: **(Stelle des ausgestellten Zertifikats)**	Intertek Testing Services Ltd. Shanghai

The above designated power generation unit meets the requirements of VDE-AR-N 4105: 2018.
Die oben bezeichnete Erzeugungseinheit erfüllt die Anforderungen der VDE-AR-N 4105: 2018.

Signature (Unterschrift)
Certification Manager: Grady Ye
Date (Datum): 29 June 2020

APPENDIX (ANHANG)

Annex to Certificate No. (Anhang zur Bescheinigungsnummer): CN-PV-200059

Model (Modell)	SOFAR 10000TL-G2	SOFAR 12000TL-G2	SOFAR 15000TL-G2
Max. DC input voltage (Max. DC-Eingangsspannung)	1000 d.c.V		
Voltage range (Spannungsbereich)	160-960 d.c.V		
Max. PV Isc	30/15 d.c.A		
Nominal mains voltage (Netzspannung Batteriespannungsbereich)	3/N/PE, 230 /400 a.cV		
Max. output current (Max. Ausgangsstrom)	3×16.5 a.c.A	3×20.0 a.c.A	3×24.0 a.c.A
Nominal frequency (Nominale Netzfrequenz)	50Hz		
Power factor (Leistungsfaktor)	0.8 Leading to 0.8 Lagging		
Max. apparent power (Max. Scheinleistung)	11000VA	13200VA	16500VA
Ingress protection (Schutzart)	IP65		
Protection class (Schutzklasse)	Class I		
Operating temperature range (Betriebstemperaturbereich)	-25℃ - +60℃		
FW-Version	V1.30		

APPENDIX (ANHANG)

Annex to Certificate No. (Anhang zur Bescheinigungsnummer): CN-PV-200059

"Network interactions" for power generation units with an input current> 75 A

„Netzrückwirkungen" für Erzeugungseinheiten mit einem Eingangsstrom > 75 A

System manufacturer (Herstellerangaben):	System type (Anlagenart) (BHKW, PV-WR, …)	PV			
	Max. active power PEmax (maximale Wirkleistung PEmax)	SOFAR 10000TL-G2	SOFAR 12000TL-G2	SOFAR 15000TL-G2	
		10.071KW	12.049KW	15.082KW	
	Rated voltage (Bemessungsspannung)	3/N/PE, 230 /400 a.cV			
Measurement period (Messzeitraum)	From (vom) JJJJ-MM-TT to (bis) JJJJ-MM-TT	2020-Jan-09 to 2020 Jun 10			
Rapid voltage changes (Schnelle Spannungsänderungen)		ki = 0.340			
Connection without provisions (regarding the primary energy carrier) (Einschalten ohne Vorgabe (zum Primärenergieträger))		ki = 0.015			
Most adverse case when switching between generator levels (Ungünstigster Fall beim Umschalten der Generatorstufen)		ki = 0.015			
Connection at nominal conditions (of the primary energy carrier) (Einschalten bei Nennbedingungen (des Primärenergieträgers)		ki = 0.033			
Disconnection at rated power (Ausschalten bei Bemessungsleistung)		ki = 0.340			
Worst value of all switching operations (Schlechtester Wert aller Schaltvorgänge)		kimax = 0.340			
Flicker	Network impedance angle Ψ_k (Netzimpedanzwinkel Ψ_k)	30°	50°	70°	85°
	Initial flicker factor c_Ψ (Anlagenflickerbeiwert c_Ψ)	7.00	6.23	5.96	6.58

APPENDIX (ANHANG)

Annex to Certificate No. (Anhang zur Bescheinigungsnummer): CN-PV-200059

Model: SOFAR 10000TL-G2										
Active power (Wirkleistung) P/P_n [%]	10	20	30	40	50	60	70	80	90	100
Ordinal number (Ordnungszahl)	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]
2	0.2892	0.0573	0.0455	0.0518	0.0538	0.0476	0.0704	0.0483	0.0587	0.0725
3	0.0580	0.0718	0.2264	0.1912	0.1725	0.1346	0.1180	0.1139	0.1325	0.1760
4	0.2629	0.0435	0.0621	0.0545	0.0518	0.0483	0.0531	0.0483	0.0524	0.0628
5	0.1656	0.3188	0.3720	0.1691	0.1498	0.1836	0.2063	0.2070	0.1863	0.1525
6	0.0552	0.0324	0.0324	0.0324	0.0338	0.0338	0.0345	0.0290	0.0290	0.0338
7	0.7350	0.4872	0.4251	0.2188	0.1394	0.1063	0.1042	0.1132	0.1084	0.1090
8	0.1449	0.0352	0.0283	0.0331	0.0324	0.0324	0.0338	0.0304	0.0338	0.0345
9	0.1304	0.1532	0.0614	0.0628	0.0683	0.0580	0.0476	0.0435	0.0476	0.0890
10	0.1808	0.0345	0.0311	0.0317	0.0283	0.0262	0.0276	0.0276	0.0290	0.0311
11	0.5908	0.7329	0.5210	0.2008	0.1063	0.0842	0.0945	0.0959	0.0835	0.0856
12	0.0780	0.0283	0.0283	0.0304	0.0290	0.0311	0.0297	0.0255	0.0311	0.0324
13	0.3623	0.1222	0.4541	0.1925	0.1415	0.1366	0.1208	0.1028	0.0911	0.0732
14	0.1373	0.0497	0.0504	0.0518	0.0476	0.0538	0.0538	0.0573	0.0538	0.0656
15	0.1001	0.1304	0.1090	0.1104	0.0801	0.0669	0.0718	0.0780	0.0663	0.0711
16	0.0600	0.0304	0.0324	0.0269	0.0207	0.0242	0.0311	0.0345	0.0297	0.0283
17	0.3451	0.1863	0.4134	0.2077	0.1263	0.0849	0.1056	0.1201	0.1353	0.1373
18	0.0435	0.0262	0.0269	0.0248	0.0255	0.0242	0.0248	0.0221	0.0214	0.0262
19	0.1815	0.0462	0.3678	0.1546	0.1001	0.1063	0.1201	0.1270	0.1387	0.1456
20	0.0725	0.0269	0.0255	0.0242	0.0214	0.0214	0.0214	0.0255	0.0214	0.0248
21	0.0745	0.0932	0.0317	0.0897	0.1014	0.0732	0.0449	0.0559	0.0766	0.0890
22	0.0421	0.0207	0.0235	0.0166	0.0166	0.0173	0.0207	0.0193	0.0166	0.0186
23	0.1518	0.1325	0.3602	0.1629	0.0594	0.0614	0.0918	0.1070	0.1284	0.1339
24	0.0435	0.0207	0.0159	0.0166	0.0179	0.0159	0.0179	0.0173	0.0152	0.0173
25	0.1670	0.1774	0.3816	0.1477	0.0628	0.0442	0.0704	0.1021	0.1325	0.1491
26	0.0573	0.0200	0.0159	0.0173	0.0159	0.0131	0.0145	0.0138	0.0145	0.0152
27	0.1014	0.0870	0.0828	0.0345	0.0807	0.0849	0.0614	0.0518	0.0669	0.0870
28	0.0476	0.0214	0.0179	0.0186	0.0173	0.0179	0.0179	0.0193	0.0200	0.0207
29	0.2809	0.2671	0.3782	0.3485	0.3147	0.2974	0.2553	0.2974	0.2650	0.3195
30	0.0297	0.0193	0.0228	0.0193	0.0179	0.0193	0.0221	0.0186	0.0207	0.0214
31	0.1366	0.0973	0.2678	0.2415	0.1270	0.1001	0.0600	0.0483	0.0780	0.1014
32	0.0925	0.0145	0.0145	0.0152	0.0131	0.0124	0.0138	0.0131	0.0131	0.0138
33	0.0642	0.1332	0.0552	0.0462	0.0421	0.0600	0.0573	0.0490	0.0380	0.0428
34	0.0476	0.0193	0.0276	0.0228	0.0179	0.0186	0.0221	0.0193	0.0269	0.0193
35	0.1187	0.1339	0.1422	0.1760	0.1573	0.1504	0.0904	0.0235	0.0663	0.0973
36	0.0400	0.0152	0.0145	0.0138	0.0145	0.0117	0.0110	0.0104	0.0104	0.0124
37	0.0994	0.1863	0.1208	0.1656	0.1215	0.0897	0.0952	0.0725	0.0435	0.0649
38	0.0380	0.0166	0.0145	0.0131	0.0138	0.0124	0.0117	0.0131	0.0110	0.0138
39	0.0524	0.0794	0.0380	0.0373	0.0435	0.0497	0.0469	0.0476	0.0428	0.0283
40	0.0966	0.0138	0.0145	0.0110	0.0131	0.0110	0.0110	0.0110	0.0117	0.0131

APPENDIX (ANHANG)

Annex to Certificate No. (Anhang zur Bescheinigungsnummer): CN-PV-200059

Inter-harmonics (Zwischenharmonische)										
Active power (Wirkleistung) P/P_n [%]	10	20	30	40	50	60	70	80	90	100
Frequenz (Frequency) [kHz]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]
75	0.0768	0.0614	0.0868	0.0996	0.0942	0.1509	0.0708	0.0776	0.1756	0.0912
125	0.0671	0.0727	0.0630	0.0674	0.0547	0.0729	0.0545	0.0536	0.0834	0.0500
175	0.0819	0.0778	0.0642	0.0705	0.0652	0.0740	0.0577	0.0582	0.0769	0.0587
225	0.0814	0.0594	0.0594	0.0618	0.0565	0.0702	0.0607	0.0637	0.0771	0.0625
275	0.0728	0.0783	0.0732	0.0807	0.0835	0.0880	0.0815	0.0768	0.0892	0.0780
325	0.0786	0.0804	0.0744	0.0739	0.0798	0.0901	0.0829	0.0899	0.0963	0.0848
375	0.0646	0.0561	0.0611	0.0638	0.0625	0.0666	0.0646	0.0639	0.0712	0.0657
425	0.1204	0.0604	0.0814	0.0827	0.0937	0.0996	0.0968	0.0943	0.1002	0.0903
475	0.0956	0.0606	0.0579	0.0592	0.0663	0.0704	0.0655	0.0639	0.0672	0.0636
525	0.0659	0.0527	0.0556	0.0638	0.0636	0.0669	0.0676	0.0646	0.0702	0.0660
575	0.0672	0.0640	0.0603	0.0570	0.0647	0.0687	0.0659	0.0641	0.0628	0.0637
625	0.0822	0.0999	0.0840	0.0805	0.0794	0.0779	0.0699	0.0648	0.0653	0.0604
675	0.0707	0.0577	0.0537	0.0549	0.0556	0.0571	0.0612	0.0549	0.0680	0.0682
725	0.5111	0.5738	0.5798	0.5753	0.5848	0.6050	0.6249	0.6464	0.6777	0.7116
775	0.0681	0.0683	0.0615	0.0517	0.0551	0.0645	0.0697	0.0579	0.0656	0.0624
825	0.1135	0.1355	0.1508	0.1267	0.1074	0.1009	0.0848	0.0720	0.0599	0.0490
875	0.0632	0.0568	0.0502	0.0462	0.0445	0.0451	0.0429	0.0422	0.0481	0.0438
925	0.0748	0.0461	0.0467	0.0491	0.0505	0.0542	0.0531	0.0539	0.0578	0.0485
975	0.0416	0.0474	0.0425	0.0433	0.0439	0.0434	0.0427	0.0416	0.0484	0.0478
1025	0.0817	0.0562	0.0395	0.0440	0.0464	0.0482	0.0526	0.0532	0.0563	0.0499
1075	0.0446	0.0458	0.0374	0.0401	0.0332	0.0325	0.0351	0.0330	0.0374	0.0344
1125	0.0414	0.0373	0.0325	0.0311	0.0338	0.0334	0.0361	0.0351	0.0395	0.0375
1175	0.0424	0.0418	0.0378	0.0369	0.0385	0.0366	0.0374	0.0378	0.0393	0.0387
1225	0.0499	0.0335	0.0288	0.0263	0.0293	0.0273	0.0307	0.0313	0.0337	0.0333
1275	0.0385	0.0314	0.0272	0.0303	0.0272	0.0281	0.0276	0.0272	0.0323	0.0289
1325	0.0390	0.0481	0.0293	0.0286	0.0272	0.0296	0.0309	0.0337	0.0353	0.0313
1375	0.0392	0.0323	0.0289	0.0294	0.0297	0.0282	0.0254	0.0299	0.0328	0.0283
1425	0.0482	0.0499	0.0467	0.0492	0.0467	0.0459	0.0442	0.0481	0.0522	0.0582
1475	0.1031	0.1810	0.1351	0.1013	0.0909	0.1242	0.0877	0.1672	0.1110	0.0754
1525	0.0317	0.0463	0.0309	0.0282	0.0282	0.0273	0.0238	0.0279	0.0297	0.0275
1575	0.0317	0.0284	0.0254	0.0237	0.0232	0.0270	0.0221	0.0242	0.0244	0.0243
1625	0.0405	0.0316	0.0265	0.0283	0.0248	0.0241	0.0217	0.0233	0.0265	0.0245
1675	0.0275	0.0223	0.0225	0.0226	0.0230	0.0249	0.0199	0.0221	0.0243	0.0222
1725	0.0297	0.0286	0.0300	0.0294	0.0334	0.0298	0.0303	0.0282	0.0325	0.0320
1775	0.0314	0.0252	0.0271	0.0272	0.0272	0.0242	0.0215	0.0225	0.0233	0.0221
1825	0.0394	0.0257	0.0224	0.0277	0.0237	0.0236	0.0201	0.0196	0.0221	0.0217
1875	0.0292	0.0238	0.0227	0.0231	0.0227	0.0219	0.0197	0.0193	0.0213	0.0208
1925	0.0398	0.0218	0.0212	0.0249	0.0213	0.0225	0.0206	0.0201	0.0220	0.0215
1975	0.0279	0.0192	0.0190	0.0224	0.0205	0.0221	0.0188	0.0181	0.0215	0.0202

APPENDIX (ANHANG)

Annex to Certificate No. (Anhang zur Bescheinigungsnummer): CN-PV-200059

Higher frequencies (Höhere Frequenzen)										
Active power (Wirkleistung) P/P_n [%]	10	20	30	40	50	60	70	80	90	100
Frequenz (Frequency) [kHz]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]
2.1	0.1946	0.1914	0.2925	0.1848	0.1946	0.2163	0.2109	0.1822	0.1942	0.2162
2.3	0.1345	0.1121	0.2386	0.1142	0.0693	0.1028	0.1237	0.0973	0.0749	0.0875
2.5	0.1844	0.1233	0.2003	0.1600	0.0664	0.0698	0.0923	0.0997	0.0838	0.0748
2.7	0.1133	0.1362	0.1533	0.2310	0.0764	0.0480	0.0882	0.1355	0.0962	0.0717
2.9	0.1091	0.1299	0.1440	0.1333	0.1103	0.0853	0.0834	0.1301	0.1184	0.1014
3.1	0.1166	0.1115	0.1251	0.1092	0.1328	0.0620	0.0539	0.0815	0.0931	0.0952
3.3	0.1293	0.1261	0.1297	0.2069	0.1757	0.0683	0.0747	0.0925	0.1427	0.1380
3.5	0.1047	0.1062	0.0811	0.2206	0.1133	0.0911	0.0945	0.0801	0.1395	0.1329
3.7	0.1409	0.1584	0.1207	0.1867	0.1450	0.1426	0.1027	0.1142	0.1209	0.1482
3.9	0.1138	0.1732	0.1246	0.1528	0.2514	0.1821	0.1051	0.1376	0.1439	0.1891
4.1	0.0675	0.0875	0.1039	0.0973	0.1491	0.1018	0.0758	0.1013	0.0934	0.1161
4.3	0.0493	0.0465	0.0674	0.0634	0.0825	0.0598	0.0559	0.0610	0.0573	0.0601
4.5	0.0375	0.0374	0.0387	0.0406	0.0457	0.0456	0.0428	0.0451	0.0470	0.0499
4.7	0.0572	0.0591	0.0580	0.0571	0.0603	0.0613	0.0605	0.0605	0.0627	0.0614
4.9	0.0285	0.0272	0.0265	0.0267	0.0277	0.0294	0.0285	0.0278	0.0304	0.0288
5.1	0.0230	0.0227	0.0233	0.0244	0.0237	0.0250	0.0246	0.0245	0.0267	0.0255
5.3	0.0207	0.0196	0.0209	0.0209	0.0208	0.0215	0.0210	0.0209	0.0224	0.0220
5.5	0.0195	0.0178	0.0193	0.0192	0.0188	0.0198	0.0194	0.0194	0.0205	0.0196
5.7	0.0197	0.0190	0.0192	0.0198	0.0185	0.0197	0.0192	0.0190	0.0202	0.0191
5.9	0.0236	0.0187	0.0186	0.0173	0.0166	0.0176	0.0166	0.0170	0.0184	0.0170
6.1	0.0269	0.0242	0.0234	0.0225	0.0225	0.0235	0.0230	0.0231	0.0235	0.0224
6.3	0.0363	0.0245	0.0247	0.0253	0.0257	0.0260	0.0238	0.0234	0.0239	0.0241
6.5	0.0291	0.0202	0.0185	0.0186	0.0192	0.0191	0.0188	0.0182	0.0190	0.0186
6.7	0.0629	0.0563	0.0531	0.0566	0.0586	0.0592	0.0616	0.0616	0.0627	0.0626
6.9	0.0414	0.0212	0.0178	0.0172	0.0177	0.0177	0.0175	0.0171	0.0176	0.0169
7.1	0.0411	0.0308	0.0265	0.0259	0.0260	0.0262	0.0275	0.0274	0.0278	0.0270
7.3	0.0259	0.0182	0.0173	0.0174	0.0179	0.0180	0.0176	0.0173	0.0178	0.0169
7.5	0.0258	0.0206	0.0206	0.0202	0.0206	0.0194	0.0193	0.0194	0.0206	0.0203
7.7	0.0270	0.0139	0.0143	0.0142	0.0135	0.0137	0.0128	0.0125	0.0137	0.0129
7.9	0.0170	0.0127	0.0135	0.0136	0.0135	0.0133	0.0126	0.0127	0.0137	0.0126
8.1	0.0187	0.0174	0.0170	0.0174	0.0172	0.0175	0.0168	0.0172	0.0179	0.0175
8.3	0.0182	0.0156	0.0153	0.0157	0.0158	0.0158	0.0152	0.0152	0.0158	0.0152
8.5	0.0174	0.0161	0.0146	0.0153	0.0154	0.0157	0.0148	0.0149	0.0161	0.0150
8.7	0.0136	0.0124	0.0123	0.0129	0.0127	0.0132	0.0121	0.0123	0.0128	0.0126
8.9	0.0238	0.0225	0.0226	0.0224	0.0231	0.0239	0.0231	0.0233	0.0243	0.0240

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Model: SOFAR 12000TL-G2										
Active power (Wirkleistung) P/P_n [%]	10	20	30	40	50	60	70	80	90	100
Ordinal number (Ordnungszahl)	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]
2	0.2208	0.0472	0.0391	0.0449	0.0621	0.0598	0.0529	0.0558	0.0495	0.0644
3	0.0523	0.1938	0.1587	0.1438	0.1185	0.0937	0.0995	0.1231	0.1576	0.2116
4	0.1932	0.0454	0.0403	0.0408	0.0443	0.0414	0.0426	0.0443	0.0443	0.0535
5	0.1484	0.4612	0.1771	0.1202	0.1374	0.1599	0.1604	0.1323	0.0799	0.0449
6	0.0443	0.0270	0.0224	0.0276	0.0293	0.0265	0.0253	0.0224	0.0224	0.0282
7	0.5854	0.3933	0.2404	0.1484	0.0914	0.0863	0.0943	0.0845	0.1041	0.1742
8	0.1242	0.0259	0.0224	0.0224	0.0253	0.0230	0.0230	0.0219	0.0213	0.0259
9	0.1070	0.1432	0.0477	0.0535	0.0472	0.0391	0.0345	0.0489	0.0978	0.1639
10	0.1478	0.0247	0.0242	0.0224	0.0259	0.0230	0.0219	0.0230	0.0247	0.0253
11	0.4934	0.7798	0.2737	0.1179	0.0707	0.0759	0.0759	0.0656	0.0909	0.1449
12	0.0690	0.0242	0.0230	0.0236	0.0236	0.0219	0.0213	0.0230	0.0265	0.0270
13	0.3048	0.3692	0.2427	0.1254	0.1144	0.1001	0.0834	0.0650	0.0489	0.0529
14	0.1196	0.0380	0.0414	0.0397	0.0374	0.0380	0.0328	0.0380	0.0391	0.0437
15	0.0863	0.1530	0.0851	0.0771	0.0535	0.0460	0.0403	0.0385	0.0374	0.0460
16	0.0546	0.0242	0.0242	0.0155	0.0201	0.0201	0.0184	0.0219	0.0196	0.0201
17	0.2921	0.1374	0.2651	0.1271	0.0742	0.0851	0.1024	0.1087	0.1185	0.1340
18	0.0334	0.0219	0.0178	0.0196	0.0196	0.0196	0.0178	0.0178	0.0196	0.0196
19	0.1518	0.2961	0.2122	0.0966	0.0828	0.0983	0.1052	0.1144	0.1311	0.1443
20	0.0558	0.0293	0.0178	0.0161	0.0184	0.0190	0.0167	0.0190	0.0190	0.0196
21	0.0598	0.0857	0.0397	0.0834	0.0644	0.0380	0.0483	0.0673	0.0799	0.0857
22	0.0316	0.0167	0.0150	0.0121	0.0144	0.0150	0.0144	0.0121	0.0127	0.0144
23	0.1277	0.0552	0.2076	0.0983	0.0420	0.0748	0.0937	0.1058	0.1185	0.1369
24	0.0316	0.0161	0.0121	0.0127	0.0127	0.0121	0.0121	0.0121	0.0109	0.0127
25	0.1426	0.2064	0.2162	0.0851	0.0414	0.0552	0.0891	0.1150	0.1328	0.1420
26	0.0437	0.0132	0.0115	0.0132	0.0109	0.0115	0.0127	0.0121	0.0109	0.0121
27	0.0868	0.1001	0.0431	0.0506	0.0702	0.0500	0.0420	0.0633	0.0776	0.0817
28	0.0403	0.0167	0.0138	0.0144	0.0132	0.0132	0.0155	0.0150	0.0138	0.0144
29	0.2030	0.1547	0.3128	0.2363	0.2231	0.1967	0.2030	0.2076	0.2128	0.2283
30	0.0311	0.0155	0.0150	0.0144	0.0144	0.0127	0.0127	0.0121	0.0132	0.0138
31	0.1202	0.2283	0.2559	0.1351	0.0811	0.0472	0.0431	0.0713	0.0937	0.1058
32	0.0707	0.0138	0.0109	0.0121	0.0109	0.0098	0.0109	0.0109	0.0098	0.0104
33	0.0535	0.0776	0.0437	0.0339	0.0472	0.0454	0.0374	0.0288	0.0426	0.0598
34	0.0472	0.0173	0.0178	0.0201	0.0127	0.0104	0.0109	0.0109	0.0098	0.0109
35	0.0983	0.1185	0.1783	0.1167	0.1248	0.0759	0.0196	0.0661	0.0897	0.1006
36	0.0299	0.0121	0.0092	0.0104	0.0086	0.0081	0.0086	0.0081	0.0092	0.0098
37	0.0863	0.0426	0.1478	0.1012	0.0684	0.0788	0.0506	0.0397	0.0615	0.0805
38	0.0380	0.0127	0.0104	0.0109	0.0109	0.0086	0.0104	0.0104	0.0121	0.0121
39	0.0454	0.0753	0.0414	0.0322	0.0374	0.0385	0.0397	0.0305	0.0259	0.0408
40	0.0771	0.0121	0.0104	0.0115	0.0092	0.0086	0.0092	0.0092	0.0098	0.0098

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Annex to Certificate No. (Anhang zur Bescheinigungsnummer): CN-PV-200059

Inter-harmonics (Zwischenharmonische)										
Active power (Wirkleistung) P/P_n [%]	10	20	30	40	50	60	70	80	90	100
Frequenz (Frequency) [kHz]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]
75	0.0723	0.0374	0.0663	0.1259	0.1091	0.0990	0.1233	0.1230	0.1394	0.0436
125	0.0616	0.0489	0.0463	0.0585	0.0532	0.0535	0.0482	0.0483	0.0654	0.0345
175	0.0653	0.0516	0.0518	0.0623	0.0540	0.0499	0.0477	0.0463	0.0613	0.0413
225	0.0540	0.0461	0.0471	0.0535	0.0521	0.0529	0.0488	0.0482	0.0586	0.0465
275	0.0751	0.0583	0.0590	0.0751	0.0718	0.0712	0.0661	0.0613	0.0717	0.0542
325	0.0655	0.0552	0.0571	0.0644	0.0640	0.0648	0.0630	0.0633	0.0667	0.0536
375	0.0584	0.0465	0.0482	0.0551	0.0503	0.0472	0.0503	0.0528	0.0585	0.0509
425	0.1009	0.0642	0.0661	0.0700	0.0699	0.0721	0.0672	0.0646	0.0703	0.0655
475	0.0477	0.0496	0.0446	0.0554	0.0541	0.0517	0.0477	0.0460	0.0528	0.0523
525	0.0535	0.0460	0.0486	0.0524	0.0505	0.0502	0.0475	0.0490	0.0539	0.0519
575	0.0570	0.0525	0.0491	0.0520	0.0550	0.0494	0.0496	0.0484	0.0540	0.0467
625	0.0664	0.0777	0.0641	0.0610	0.0581	0.0495	0.0482	0.0420	0.0467	0.0453
675	0.0564	0.0487	0.0414	0.0425	0.0405	0.0372	0.0396	0.0421	0.0458	0.0485
725	0.3819	0.4473	0.4236	0.3961	0.4054	0.4283	0.4546	0.4711	0.4913	0.4900
775	0.0518	0.0564	0.0423	0.0448	0.0425	0.0389	0.0420	0.0402	0.0431	0.0440
825	0.0753	0.1162	0.1050	0.0774	0.0652	0.0529	0.0444	0.0383	0.0336	0.0308
875	0.0534	0.0382	0.0387	0.0398	0.0368	0.0346	0.0345	0.0336	0.0386	0.0335
925	0.0588	0.0388	0.0398	0.0402	0.0407	0.0371	0.0392	0.0374	0.0388	0.0337
975	0.0451	0.0307	0.0330	0.0356	0.0377	0.0329	0.0362	0.0340	0.0387	0.0377
1025	0.0682	0.0275	0.0305	0.0354	0.0371	0.0386	0.0392	0.0360	0.0409	0.0399
1075	0.0375	0.0254	0.0296	0.0283	0.0252	0.0254	0.0247	0.0266	0.0281	0.0278
1125	0.0353	0.0245	0.0246	0.0263	0.0249	0.0266	0.0257	0.0270	0.0277	0.0275
1175	0.0384	0.0311	0.0290	0.0308	0.0278	0.0265	0.0292	0.0296	0.0312	0.0278
1225	0.0375	0.0239	0.0226	0.0238	0.0217	0.0236	0.0238	0.0240	0.0272	0.0253
1275	0.0314	0.0233	0.0242	0.0223	0.0213	0.0213	0.0232	0.0241	0.0249	0.0242
1325	0.0356	0.0288	0.0225	0.0210	0.0228	0.0245	0.0260	0.0244	0.0271	0.0266
1375	0.0286	0.0266	0.0225	0.0236	0.0220	0.0223	0.0207	0.0224	0.0225	0.0218
1425	0.0322	0.0326	0.0349	0.0374	0.0382	0.0366	0.0438	0.0450	0.0390	0.0494
1475	0.1205	0.1185	0.1302	0.0561	0.0555	0.0441	0.0434	0.0499	0.0496	0.0405
1525	0.0283	0.0256	0.0233	0.0226	0.0205	0.0207	0.0195	0.0198	0.0245	0.0203
1575	0.0296	0.0196	0.0203	0.0180	0.0201	0.0178	0.0195	0.0205	0.0223	0.0201
1625	0.0248	0.0233	0.0211	0.0200	0.0182	0.0177	0.0184	0.0186	0.0210	0.0208
1675	0.0248	0.0176	0.0198	0.0180	0.0184	0.0156	0.0171	0.0176	0.0178	0.0182
1725	0.0224	0.0206	0.0211	0.0260	0.0224	0.0221	0.0226	0.0237	0.0247	0.0240
1775	0.0302	0.0170	0.0208	0.0206	0.0197	0.0173	0.0185	0.0191	0.0201	0.0179
1825	0.0279	0.0157	0.0180	0.0198	0.0183	0.0153	0.0153	0.0164	0.0191	0.0175
1875	0.0238	0.0168	0.0177	0.0222	0.0176	0.0162	0.0165	0.0184	0.0184	0.0161
1925	0.0346	0.0170	0.0181	0.0173	0.0167	0.0165	0.0158	0.0155	0.0178	0.0172
1975	0.0217	0.0166	0.0150	0.0176	0.0170	0.0138	0.0156	0.0156	0.0158	0.0150

APPENDIX (ANHANG)

Annex to Certificate No. (Anhang zur Bescheinigungsnummer): CN-PV-200059

Higher frequencies (Höhere Frequenzen)										
Active power (Wirkleistung) P/P_n [%]	10	20	30	40	50	60	70	80	90	100
Frequenz (Frequency) [kHz]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]
2.1	0.2086	0.1700	0.2344	0.1760	0.1352	0.1628	0.1503	0.1326	0.1462	0.1634
2.3	0.0937	0.1189	0.1403	0.1421	0.0556	0.0800	0.1000	0.0661	0.0612	0.0824
2.5	0.1462	0.0889	0.0886	0.1547	0.0606	0.0540	0.0781	0.0760	0.0606	0.0619
2.7	0.1336	0.0722	0.0540	0.1656	0.0910	0.0391	0.0865	0.1038	0.0633	0.0659
2.9	0.0931	0.1124	0.0681	0.1240	0.1017	0.0654	0.0708	0.1065	0.0821	0.0748
3.1	0.1062	0.1055	0.0817	0.1200	0.1128	0.0503	0.0444	0.0721	0.0797	0.0767
3.3	0.1181	0.0744	0.1322	0.1651	0.1416	0.0567	0.0555	0.1007	0.1230	0.1046
3.5	0.1117	0.0982	0.1015	0.1256	0.1140	0.0812	0.0799	0.0886	0.1279	0.0957
3.7	0.1184	0.1366	0.1059	0.1115	0.1543	0.1237	0.0906	0.0965	0.1175	0.1419
3.9	0.0797	0.0970	0.0774	0.1162	0.2365	0.1614	0.0987	0.1194	0.1581	0.1820
4.1	0.0511	0.0538	0.0587	0.0595	0.1211	0.0871	0.0667	0.0806	0.0928	0.0972
4.3	0.0333	0.0402	0.0492	0.0413	0.0660	0.0521	0.0484	0.0497	0.0494	0.0641
4.5	0.0284	0.0346	0.0366	0.0321	0.0393	0.0377	0.0361	0.0371	0.0391	0.0472
4.7	0.0426	0.0481	0.0494	0.0488	0.0508	0.0513	0.0514	0.0509	0.0515	0.0526
4.9	0.0191	0.0223	0.0217	0.0219	0.0235	0.0242	0.0240	0.0240	0.0241	0.0247
5.1	0.0175	0.0204	0.0189	0.0196	0.0205	0.0210	0.0206	0.0207	0.0211	0.0224
5.3	0.0153	0.0169	0.0168	0.0169	0.0180	0.0178	0.0181	0.0179	0.0180	0.0192
5.5	0.0143	0.0159	0.0152	0.0154	0.0163	0.0160	0.0165	0.0160	0.0165	0.0171
5.7	0.0141	0.0164	0.0158	0.0153	0.0164	0.0161	0.0164	0.0160	0.0159	0.0166
5.9	0.0129	0.0170	0.0156	0.0140	0.0145	0.0146	0.0146	0.0141	0.0146	0.0149
6.1	0.0179	0.0223	0.0194	0.0187	0.0197	0.0195	0.0195	0.0189	0.0185	0.0198
6.3	0.0173	0.0271	0.0212	0.0196	0.0206	0.0202	0.0203	0.0220	0.0220	0.0201
6.5	0.0139	0.0229	0.0158	0.0155	0.0162	0.0158	0.0158	0.0156	0.0157	0.0166
6.7	0.0386	0.0507	0.0457	0.0487	0.0506	0.0513	0.0533	0.0550	0.0534	0.0535
6.9	0.0120	0.0318	0.0159	0.0158	0.0151	0.0145	0.0144	0.0145	0.0144	0.0145
7.1	0.0212	0.0327	0.0224	0.0227	0.0228	0.0231	0.0229	0.0223	0.0212	0.0234
7.3	0.0135	0.0194	0.0145	0.0147	0.0150	0.0147	0.0146	0.0150	0.0148	0.0144
7.5	0.0153	0.0193	0.0169	0.0165	0.0163	0.0154	0.0157	0.0158	0.0160	0.0163
7.7	0.0104	0.0147	0.0121	0.0121	0.0120	0.0115	0.0110	0.0109	0.0110	0.0113
7.9	0.0105	0.0126	0.0106	0.0111	0.0115	0.0110	0.0110	0.0106	0.0104	0.0110
8.1	0.0139	0.0146	0.0139	0.0136	0.0144	0.0143	0.0142	0.0140	0.0144	0.0150
8.3	0.0133	0.0136	0.0130	0.0128	0.0130	0.0129	0.0127	0.0130	0.0128	0.0131
8.5	0.0133	0.0141	0.0128	0.0124	0.0129	0.0131	0.0128	0.0127	0.0123	0.0131
8.7	0.0105	0.0109	0.0115	0.0102	0.0104	0.0107	0.0103	0.0102	0.0100	0.0107
8.9	0.0174	0.0176	0.0173	0.0176	0.0173	0.0172	0.0173	0.0175	0.0177	0.0184

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Model: SOFAR 15000TL-G2										
Active power (Wirkleistung) P/P_n [%]	10	20	30	40	50	60	70	80	90	100
Ordinal number (Ordnungszahl)	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]
2	0.2421	0.0311	0.0351	0.0529	0.0391	0.0598	0.0368	0.0374	0.0403	0.0506
3	0.0477	0.3548	0.1570	0.1300	0.0851	0.1035	0.1282	0.1852	0.2432	0.3076
4	0.2197	0.0466	0.0420	0.0403	0.0351	0.0454	0.0408	0.0431	0.0414	0.0506
5	0.1386	0.5601	0.1277	0.1282	0.1714	0.1708	0.1294	0.0690	0.0414	0.1305
6	0.0495	0.0253	0.0236	0.0253	0.0236	0.0299	0.0282	0.0219	0.0247	0.0305
7	0.6021	0.5003	0.1811	0.1075	0.0909	0.0989	0.0926	0.1265	0.2358	0.3565
8	0.1288	0.0219	0.0236	0.0253	0.0236	0.0293	0.0265	0.0236	0.0247	0.0311
9	0.1110	0.1070	0.0569	0.0598	0.0426	0.0420	0.0673	0.1323	0.2070	0.2726
10	0.1466	0.0219	0.0259	0.0207	0.0219	0.0265	0.0259	0.0236	0.0242	0.0242
11	0.4980	0.7292	0.1662	0.0730	0.0782	0.0730	0.0656	0.1098	0.1829	0.2547
12	0.0679	0.0184	0.0253	0.0224	0.0190	0.0230	0.0265	0.0270	0.0276	0.0288
13	0.3076	0.6285	0.1616	0.1144	0.1041	0.0799	0.0592	0.0460	0.0782	0.1219
14	0.1167	0.0385	0.0529	0.0466	0.0420	0.0449	0.0615	0.0535	0.0656	0.0765
15	0.0909	0.1179	0.0932	0.0713	0.0546	0.0506	0.0598	0.0644	0.0742	0.0960
16	0.0535	0.0236	0.0201	0.0270	0.0276	0.0219	0.0259	0.0242	0.0242	0.0334
17	0.2944	0.1932	0.1742	0.0799	0.0868	0.1075	0.1133	0.1300	0.1553	0.1886
18	0.0380	0.0190	0.0213	0.0207	0.0207	0.0184	0.0219	0.0201	0.0207	0.0236
19	0.1489	0.2944	0.1277	0.0771	0.1035	0.1127	0.1208	0.1374	0.1599	0.1673
20	0.0696	0.0207	0.0178	0.0167	0.0173	0.0167	0.0184	0.0184	0.0201	0.0201
21	0.0627	0.0782	0.0794	0.0771	0.0397	0.0564	0.0673	0.0736	0.0799	0.0742
22	0.0368	0.0190	0.0132	0.0132	0.0150	0.0138	0.0132	0.0144	0.0127	0.0167
23	0.1242	0.2812	0.1369	0.0374	0.0782	0.0983	0.1075	0.1277	0.1547	0.1702
24	0.0403	0.0150	0.0167	0.0144	0.0167	0.0144	0.0150	0.0155	0.0161	0.0184
25	0.1403	0.2312	0.1231	0.0552	0.0633	0.1041	0.1254	0.1409	0.1530	0.1518
26	0.0541	0.0138	0.0144	0.0109	0.0121	0.0127	0.0115	0.0121	0.0121	0.0138
27	0.0817	0.0840	0.0305	0.0765	0.0541	0.0518	0.0719	0.0863	0.0817	0.0811
28	0.0426	0.0167	0.0184	0.0161	0.0150	0.0184	0.0196	0.0150	0.0167	0.0167
29	0.1719	0.2496	0.3703	0.3030	0.3007	0.3013	0.3088	0.3243	0.3485	0.3088
30	0.0253	0.0167	0.0167	0.0173	0.0161	0.0155	0.0190	0.0167	0.0178	0.0213
31	0.1133	0.0679	0.2036	0.0886	0.0518	0.0581	0.0891	0.1121	0.1196	0.1305
32	0.0805	0.0115	0.0115	0.0115	0.0104	0.0121	0.0115	0.0127	0.0104	0.0132
33	0.0523	0.0667	0.0403	0.0460	0.0489	0.0391	0.0397	0.0633	0.0725	0.0736
34	0.0518	0.0127	0.0144	0.0138	0.0109	0.0127	0.0190	0.0132	0.0115	0.0236
35	0.0989	0.0926	0.1478	0.1225	0.0776	0.0380	0.0828	0.1001	0.1035	0.0983
36	0.0368	0.0109	0.0104	0.0098	0.0086	0.0086	0.0086	0.0098	0.0092	0.0109
37	0.0828	0.1282	0.1403	0.0679	0.0817	0.0403	0.0558	0.0794	0.1006	0.1202
38	0.0334	0.0109	0.0098	0.0098	0.0086	0.0098	0.0104	0.0092	0.0098	0.0104
39	0.0437	0.0713	0.0328	0.0414	0.0420	0.0426	0.0288	0.0408	0.0552	0.0627
40	0.0857	0.0109	0.0092	0.0092	0.0081	0.0081	0.0098	0.0098	0.0109	0.0104

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Annex to Certificate No. (Anhang zur Bescheinigungsnummer): CN-PV-200059

Inter-harmonics (Zwischenharmonische)										
Active power (Wirkleistung) P/P_n [%]	10	20	30	40	50	60	70	80	90	100
Frequenz (Frequency) [kHz]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]
75	0.0332	0.0446	0.0767	0.0438	0.0991	0.0441	0.0388	0.0458	0.0787	0.0398
125	0.0647	0.0385	0.0440	0.0353	0.0509	0.0358	0.0331	0.0365	0.0445	0.0334
175	0.0591	0.0391	0.0494	0.0393	0.0484	0.0378	0.0395	0.0390	0.0439	0.0386
225	0.0434	0.0367	0.0380	0.0392	0.0487	0.0445	0.0400	0.0417	0.0461	0.0404
275	0.0606	0.0519	0.0602	0.0573	0.0641	0.0545	0.0503	0.0467	0.0492	0.0466
325	0.0479	0.0444	0.0507	0.0548	0.0656	0.0609	0.0538	0.0496	0.0477	0.0451
375	0.0447	0.0465	0.0466	0.0475	0.0514	0.0472	0.0479	0.0467	0.0491	0.0454
425	0.1032	0.0558	0.0646	0.0682	0.0737	0.0702	0.0632	0.0621	0.0621	0.0587
475	0.0650	0.0381	0.0440	0.0466	0.0481	0.0461	0.0434	0.0435	0.0431	0.0419
525	0.0399	0.0413	0.0480	0.0480	0.0483	0.0470	0.0443	0.0459	0.0456	0.0423
575	0.0351	0.0375	0.0375	0.0447	0.0452	0.0397	0.0398	0.0380	0.0371	0.0362
625	0.0633	0.0627	0.0605	0.0552	0.0501	0.0445	0.0458	0.0491	0.0616	0.0657
675	0.0365	0.0435	0.0369	0.0399	0.0397	0.0500	0.0472	0.0516	0.0612	0.0567
725	0.4177	0.4864	0.4778	0.5038	0.5356	0.5580	0.5878	0.6181	0.6410	0.5954
775	0.0340	0.0403	0.0423	0.0440	0.0416	0.0450	0.0460	0.0440	0.0573	0.0527
825	0.0743	0.1164	0.0893	0.0726	0.0544	0.0418	0.0298	0.0307	0.0430	0.0471
875	0.0359	0.0343	0.0294	0.0298	0.0307	0.0290	0.0297	0.0297	0.0285	0.0277
925	0.0520	0.0345	0.0388	0.0413	0.0412	0.0381	0.0358	0.0360	0.0358	0.0358
975	0.0280	0.0291	0.0281	0.0316	0.0307	0.0303	0.0313	0.0314	0.0294	0.0319
1025	0.0791	0.0272	0.0332	0.0387	0.0414	0.0396	0.0383	0.0412	0.0420	0.0451
1075	0.0251	0.0257	0.0271	0.0240	0.0264	0.0250	0.0245	0.0257	0.0271	0.0282
1125	0.0279	0.0234	0.0212	0.0245	0.0260	0.0260	0.0255	0.0263	0.0260	0.0263
1175	0.0324	0.0291	0.0277	0.0289	0.0298	0.0279	0.0295	0.0309	0.0298	0.0276
1225	0.0287	0.0209	0.0188	0.0216	0.0245	0.0244	0.0259	0.0256	0.0240	0.0231
1275	0.0227	0.0191	0.0185	0.0175	0.0198	0.0198	0.0208	0.0221	0.0239	0.0226
1325	0.0609	0.0225	0.0199	0.0212	0.0280	0.0273	0.0265	0.0275	0.0303	0.0273
1375	0.0259	0.0228	0.0225	0.0191	0.0227	0.0233	0.0200	0.0227	0.0297	0.0223
1425	0.0477	0.0425	0.0411	0.0392	0.0504	0.0438	0.0433	0.0470	0.0360	0.0451
1475	0.0383	0.0622	0.0617	0.0526	0.0519	0.0894	0.0584	0.0576	0.1346	0.0630
1525	0.0292	0.0225	0.0210	0.0175	0.0195	0.0220	0.0226	0.0216	0.0218	0.0219
1575	0.0198	0.0169	0.0174	0.0167	0.0167	0.0162	0.0206	0.0180	0.0235	0.0183
1625	0.0242	0.0196	0.0222	0.0173	0.0170	0.0203	0.0232	0.0219	0.0245	0.0217
1675	0.0196	0.0186	0.0166	0.0181	0.0175	0.0168	0.0192	0.0163	0.0159	0.0174
1725	0.0210	0.0235	0.0243	0.0221	0.0229	0.0239	0.0281	0.0261	0.0246	0.0240
1775	0.0181	0.0167	0.0182	0.0162	0.0157	0.0166	0.0176	0.0141	0.0162	0.0153
1825	0.0230	0.0162	0.0188	0.0154	0.0149	0.0145	0.0177	0.0170	0.0166	0.0168
1875	0.0141	0.0138	0.0164	0.0144	0.0130	0.0134	0.0144	0.0141	0.0150	0.0159
1925	0.0169	0.0144	0.0178	0.0166	0.0143	0.0145	0.0153	0.0179	0.0180	0.0180
1975	0.0153	0.0128	0.0186	0.0153	0.0123	0.0149	0.0140	0.0165	0.0150	0.0135

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Annex to Certificate No. (Anhang zur Bescheinigungsnummer): CN-PV-200059

Higher frequencies (Höhere Frequenzen)										
Active power (Wirkleistung) P/P_n [%]	10	20	30	40	50	60	70	80	90	100
Frequenz (Frequency) [kHz]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]
2.1	0.1547	0.1792	0.0832	0.1185	0.0941	0.0890	0.1120	0.1292	0.1358	0.1799
2.3	0.0853	0.1609	0.0573	0.0687	0.0768	0.0520	0.0681	0.0845	0.0894	0.0864
2.5	0.0515	0.1359	0.0762	0.0485	0.0720	0.0576	0.0545	0.0634	0.0780	0.0887
2.7	0.0673	0.1048	0.1136	0.0323	0.0867	0.0628	0.0524	0.0687	0.0803	0.0835
2.9	0.0882	0.0960	0.0835	0.0526	0.0714	0.0742	0.0573	0.0666	0.0770	0.0832
3.1	0.0756	0.0831	0.0761	0.0453	0.0496	0.0621	0.0638	0.0569	0.0617	0.0718
3.3	0.0630	0.0881	0.1126	0.0462	0.0451	0.0909	0.0800	0.0683	0.0701	0.0762
3.5	0.0737	0.0503	0.1141	0.0580	0.0493	0.0826	0.0733	0.0600	0.0591	0.0642
3.7	0.1043	0.0751	0.1278	0.0908	0.0770	0.0839	0.1022	0.1028	0.0977	0.0992
3.9	0.0751	0.0731	0.1246	0.1102	0.0771	0.0831	0.1145	0.1055	0.0890	0.0972
4.1	0.0420	0.0675	0.0751	0.0692	0.0603	0.0580	0.0734	0.0598	0.0546	0.0552
4.3	0.0323	0.0463	0.0506	0.0426	0.0411	0.0401	0.0483	0.0654	0.0706	0.0625
4.5	0.0263	0.0252	0.0313	0.0308	0.0286	0.0303	0.0370	0.0498	0.0559	0.0448
4.7	0.0375	0.0390	0.0395	0.0406	0.0399	0.0403	0.0413	0.0436	0.0445	0.0434
4.9	0.0171	0.0175	0.0177	0.0190	0.0194	0.0192	0.0196	0.0196	0.0208	0.0236
5.1	0.0153	0.0155	0.0162	0.0166	0.0172	0.0170	0.0172	0.0176	0.0181	0.0180
5.3	0.0133	0.0142	0.0141	0.0142	0.0147	0.0144	0.0150	0.0148	0.0150	0.0152
5.5	0.0124	0.0127	0.0127	0.0128	0.0134	0.0130	0.0131	0.0132	0.0133	0.0136
5.7	0.0127	0.0128	0.0134	0.0125	0.0130	0.0128	0.0128	0.0129	0.0132	0.0131
5.9	0.0128	0.0123	0.0115	0.0116	0.0120	0.0119	0.0115	0.0117	0.0126	0.0117
6.1	0.0174	0.0158	0.0157	0.0154	0.0162	0.0153	0.0157	0.0154	0.0152	0.0157
6.3	0.0191	0.0165	0.0172	0.0176	0.0163	0.0172	0.0152	0.0173	0.0184	0.0164
6.5	0.0153	0.0123	0.0130	0.0129	0.0127	0.0122	0.0125	0.0125	0.0130	0.0125
6.7	0.0368	0.0358	0.0379	0.0404	0.0393	0.0425	0.0431	0.0469	0.0504	0.0521
6.9	0.0185	0.0121	0.0117	0.0116	0.0117	0.0114	0.0111	0.0111	0.0114	0.0110
7.1	0.0229	0.0176	0.0173	0.0172	0.0178	0.0174	0.0190	0.0184	0.0184	0.0198
7.3	0.0132	0.0118	0.0120	0.0115	0.0121	0.0122	0.0114	0.0119	0.0121	0.0116
7.5	0.0113	0.0112	0.0104	0.0100	0.0105	0.0103	0.0103	0.0103	0.0105	0.0139
7.7	0.0101	0.0097	0.0088	0.0088	0.0089	0.0089	0.0086	0.0088	0.0089	0.0090
7.9	0.0093	0.0091	0.0086	0.0088	0.0092	0.0088	0.0085	0.0087	0.0091	0.0088
8.1	0.0111	0.0104	0.0100	0.0104	0.0107	0.0106	0.0102	0.0107	0.0110	0.0126
8.3	0.0106	0.0105	0.0102	0.0104	0.0107	0.0103	0.0103	0.0105	0.0106	0.0104
8.5	0.0101	0.0099	0.0106	0.0100	0.0105	0.0103	0.0102	0.0105	0.0107	0.0105
8.7	0.0086	0.0082	0.0088	0.0086	0.0086	0.0083	0.0085	0.0084	0.0089	0.0087
8.9	0.0143	0.0142	0.0144	0.0144	0.0144	0.0147	0.0145	0.0147	0.0153	0.0172

Test Verification of Conformity

Verification Number: 201222126GZU-VOC002

On the basis of the tests undertaken, the sample<s> of the below product have been found to comply with the requirements of the referenced specification<s>/standard<s> at the time the tests were carried out. This verification is part of the full test report<s> and should be read in conjunction with it <them>. This verification supersedes all previous verfications with the noted Verificaton/Report number(s) dated before this verfication notice.

Applicant Name & Address:	Shenzhen SOFARSOLAR Co., Ltd. 401, Building 4, AnTongDa Industrial Park, District 68, XingDong Community, XinAn Street, BaoAn District, Shenzhen, China
Product Description:	Solar Grid-tied Inverter
Models/Type References:	SOFAR 10000TL-G2, SOFAR 12000TL-G2, SOFAR 15000TL-G2
Ratings & Principle Characteristics:	See Appendix
Brand Name<s>:	SOFAR
Specification<s>/ Standard<s>	IEC 61000-6-1:2005 IEC 61000-6-3:2006+A1:2010
Verification Issuing Office Name & Address:	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch Room 02, & 101/E201/E301/E401/E501/E601/E701/E801 of Room 01 1-8/F., No. 7-2. Caipin Road, Science City, GETDD, Guangzhou, Guangdong, China
Date of Tests:	09 January 2021
Test Report Number<s>:	190411096GZU-001 amendment 2

Additional information in Appendix.

Signature

Name: **Strong Yao**
Position: Manager
Date: 21 January 2021

APPENDIX: Test Verification of Conformity

This is an Appendix to Test Verification of Conformity Number: 201222126GZU-VOC002

Ratings & Principle Characteristics:

Model	SOFAR 10000TL-G2	SOFAR 12000TL-G2	SOFAR 15000TL-G2
Max.PV voltage	1000 d.c.V		
PV MPPT voltage range	160-960 d.c.V		
Max.input current	21 /11 d.c.A		
PV Isc	30/15 d.c.A		
Max.output power	10000W	12000W	15000W
Max.apparent power	11000VA	13200VA	16500VA
Nominal output voltage	3/N/PE, 230 /400 a.cV		
Max.output current	3×16.5 a.c.A	3×20.0 a.c.A	3×24.0 a.c.A
Nominal output Frequency	50 Hz/60Hz		
Power factor range	0.8Leading – 0.8 lagging		
Inverter technology	Non-isolated		
Safety level	Class I		
Ingress Protection	IP 65		
Operation Ambient Temperature	-25℃ - +60℃		
Software Version	V0.21		

Signature

Name: **Strong Yao**
Position: Manager
Date: 21 January 2021

Test Verification of Conformity

Verification Number: 201222126GZU-VOC001

On the basis of the referenced test report(s), sample(s) tested of the below product have been found to comply with the standards harmonized with the directives listed on this verification at the time the tests were carried out. Other standards and Directives may be relevant to the product. This verification is part of the full test report(s) and should be read in conjunction with it <them>. This verification supersedes all previous verfications with the noted Verificaton/Report number(s) dated before this verfication notice.

Once compliance with all product relevant CE mark directives are verified, including any relevant e.g. risk assessment and production control, the manufacturer may indicate compliance by signing a Declaration of Conformity themselves and applying the mark to products identical to the tested sample(s).

Applicant Name & Address:	Shenzhen SOFARSOLAR Co., Ltd. 401, Building 4, AnTongDa Industrial Park, District 68, XingDong Community, XinAn Street, BaoAn District, Shenzhen, China
Product Description:	Solar Grid-tied Inverter
Models/Type References:	SOFAR 10000TL-G2, SOFAR 12000TL-G2, SOFAR 15000TL-G2
Ratings & Principle Characteristics:	See Appendix
Brand Name:	SOFAR
Relevant Standards/Directives:	EN 61000-6-3:2007+A1: 2011 EN 61000-6-1:2007 EMC Directive 2014/30/EU
Verification Issuing Office Name & Address:	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch Room 02, & 101/E201/E301/E401/E501/E601/E701/E801 of Room 01 1-8/F., No. 7-2. Caipin Road, Science City, GETDD, Guangzhou, Guangdong, China
Date of Tests:	09 January 2021
Test Report Number(s):	190411096GZU-001 amendment 2

Additional information in Appendix.

Signature

Name: **Strong Yao**
Position: Manager
Date: 21 January 2021

APPENDIX: Test Verification of Conformity

This is an Appendix to Test Verification of Conformity Number: 201222126GZU-VOC001

Ratings & Principle Characteristics:

Model	SOFAR 10000TL-G2	SOFAR 12000TL-G2	SOFAR 15000TL-G2
Max.PV voltage	1000 d.c.V		
PV MPPT voltage range	160-960 d.c.V		
Max.input current	21 /11 d.c.A		
PV Isc	30/15 d.c.A		
Max.output power	10000W	12000W	15000W
Max.apparent power	11000VA	13200VA	16500VA
Nominal output voltage	3/N/PE, 230 /400 a.cV		
Max.output current	3×16.5 a.c.A	3×20.0 a.c.A	3×24.0 a.c.A
Nominal output Frequency	50 Hz/60Hz		
Power factor range	0.8Leading – 0.8 lagging		
Inverter technology	Non-isolated		
Safety level	Class I		
Ingress Protection	IP 65		
Operation Ambient Temperature	-25℃ - +60℃		
Software Version	V0.21		

Signature

Name: Strong Yao
Position: Manager
Date: 21 January 2021

Test Verification of Conformity

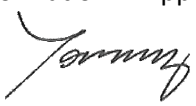
Verification Number: 200331130GZU-VOC001

On the basis of the referenced test reports, sample tested of the below product have been found to comply with the standards harmonized with the directives listed on this verification at the time the tests were carried out. Other standards and Directives may be relevant to the product. This verification is part of the full test reports and should be read in conjunction with them. This verification replaces previous verification dated: 30 Jul 2019: 190411091GZU-001

Once compliance with all product relevant CE mark directives are verified, including any relevant e.g. risk assessment and production control, the manufacturer may indicate compliance by signing a Declaration of Conformity themselves and applying the mark to products identical to the tested sample(s).

Applicant Name & Address:	Shenzhen SOFAR SOLAR Co., Ltd. 401, Building 4, AnTongDa Industrial Park, District 68, XingDong Community, XinAn Street, BaoAn District, Shenzhen, China
Product Description:	Solar Grid-tied Inverter
Ratings & Principle Characteristics:	See Appendix: Test Verification of Conformity
Models/Type References:	SOFAR 10000TL-G2, SOFAR 12000TL-G2, SOFAR 15000TL-G2
Brand Name:	SOFAR SOLAR
Relevant Standards/Directives:	See Appendix: Test Verification of Conformity
Verification Issuing Office Name & Address:	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch Block E, No.7-2 Guang Dong Software Science Park, Caipin Road, Guangzhou Science City, GETDD, Guangzhou, China
Date of Tests:	31 Mar., 2020 – 06 Apr., 2020
Test Report Number(s):	190411091GZU-005, date 18 Jun.,2019 and Revision 1:07 April 2020 190411091GZU-006, date 18 Jun.,2019

Additional information in Appendix.



Signature

Name: Tommy Zhong
Position: Technical Manager
Date: 17 April 2020

APPENDIX: Test Verification of Conformity

This is an Appendix to Test Verification of Conformity Number: 200331130GZU-VOC001

Ratings & Principle Characteristics:

Model	SOFAR 10000TL-G2	SOFAR 12000TL-G2	SOFAR 15000TL-G2
Max.PV voltage	1000 d.c.V		
PV MPPT voltage range	160-960 d.c.V		
Max.input current	21 /11 d.c.A		
PV Isc	30/15 d.c.A		
Max.output power	10000W	12000W	15000W
Max.apparent power	11000VA	13200VA	16500VA
Nominal output voltage	3/N/PE, 230 /400 a.cV		
Max.output current	3×16.5 a.c.A	3×20.0 a.c.A	3×24.0 a.c.A
Nominal output Frequency	50 Hz		
Power factor range	0.8Leading – 0.8 lagging		
Inverter technology	Non-isolated		
Safety level	Class I		
Ingress Protection	IP 65		
Operation Ambient Temperature	-25℃ - +60℃		
Software Version	V0.21		

Relevant Standards/Directives

IEC/EN 62109-1: 2010 Safety of power converters for use in photovoltaic power systems – Part 1: General requirements
IEC/EN 62109-2: 2011 Safety of power converters for use in photovoltaic power systems – Part 2: Particular requirements for inverters
Low Voltage Directive 2014/35/EU

Signature

Name: Tommy Zhong
Position: Technical Manager
Date: 17 April 2020

Certificate of The Network and System Protection
Zertifikat für den Netz- und Anlagenschutz

Certificate No. (Bescheinigungs-Nr): CN-PV-200064

On the basis of the tests undertaken, the sample<s> of the below product have been found to comply with the requirements of the referenced specification<s>/standard<s> at the time the tests were carried out. It does not imply that Intertek has performed any surveillance or control of the manufacture(s). The manufacturer(s) shall ensure that the manufacturing process assures compliance of the production units with the examined products mentioned in this certificate.
Anhand der durchgeführten Tests wurde festgestellt, dass die Probe (n) des nachstehenden Produkts zum Zeitpunkt der Durchführung der Tests den Anforderungen der angegebenen Spezifikation (n) / Norm (en) entsprachen. Dies bedeutet nicht, dass Intertek die Herstellung (en) überwacht oder kontrolliert hat. Der Hersteller stellt sicher, dass der Herstellungsprozess die Übereinstimmung der Produktionseinheiten mit den in dieser Bescheinigung genannten geprüften Produkten sicherstellt.

Applicant: **(Bescheinigungsinhaber)**	**Shenzhen SOFAR SOLAR Co., Ltd.** **401, Building 4, AnTongDa Industrial Park, District 68, XingDong Community, XinAn Street, BaoAn District, Shenzhen, China**
Type of NS protection: **(Typ NA-Schutz)**	**Integrierter NA-Schutz**
Assigned to power generation unit of type: **(Zugeordnet zu Erzeugungseinheit Typ)**	**SOFAR 10000TL-G2, SOFAR 12000TL-G2, SOFAR 15000TL-G2**
Firmware version: **(Firmwareversion)**	**V1.30**
Brandname: **(Markenname)**	**SOFAR SOLAR**
Network connection rule: **(Netzanschlussregel)**	**VDE-AR-N 4105:2018-11 „Erzeugungsanlagen am Niederspannungsnetz“** Technische Mindestanforderungen für Anschluss und Parallelbetrieb von Erzeugungsanlagen am Niederspannungsnetz **DIN VDE V 0124-100 (VDE V 0124-100):2020-06 „Netzintegration von Erzeugungsanlagen – Niederspannung“** Prüfanforderungen an Erzeugungseinheiten vorgesehen zum Anschluss und Parallelbetrieb am Niederspannungsnetz
Test Report No.: **(Prüfbericht-Nr.)**	190411085GZU-001
Certificate Issuing Office: **(Stelle des ausgestellten Zertifikats)**	Intertek Testing Services Ltd. Shanghai

The network and system protection designated above meets the requirements of VDE-AR-N 4105: 2018.
Der oben bezeichnete Netz- und Anlagenschutz erfüllt die Anforderungen der VDE-AR-N 4105: 2018.

Signature: (Unterschrift)

Certification Manager: Grady Ye
Date (Datum): 29 June 2020

APPENDIX (ANHANG)

Annex to Certificate No. (Anhang zur Bescheinigungsnummer): CN-PV-200064

Requirements for the NS protection (Anforderungen an den NA-Schutz)						
Extract of the test report for NS protection (Auszug aus dem Prüfbericht für den NA-Schutz)						
NS protection as integrated NS protection (NA-Schutz als integrierter)						
Manufacturer: (Hergesteller)	**Shenzhen SOFAR SOLAR Co., Ltd.** 401, Building 4, AnTongDa Industrial Park, District 68, XingDong Community, XinAn Street, BaoAn District, Shenzhen, China					
Type of NS Protection: (Typ NA-Schutz)	**Integrierter NA-Schutz**					
Software Version:	**V1.30**					
Measurement Period: (Messzeitraum)	2020-01-09 bis 2020-06-10					
	Stirling generators, fuel cells (Stirlinggeneratoren, Brennstoffzellen)			Inverter(s) (Umrichter)		
	Synchronous and asynchronous generators with *P*n ≤ 50 kW coupled directly or via inverters (direkt oder über Umrichter gekoppelte Synchron- und Asynchrongeneratoren mit Pn ≤ 50 kW)			Directly coupled synchronous and asynchronous generators with *P*n > 50 kW (direkt gekoppelte Synchron- und Asynchrongeneratoren mit Pn > 50 kW)		
Protective function (Schutzfunktion)	Set value (Einstell wert)	Tripping value (Auslösewert)	Tripping time NS protection * (Auslösezeit NA-Schutz*)	Set value (Einstellwert)	Tripping value (Auslösewert)	Tripping time NS protection * (Auslösezeit NA-Schutz*)
Rise-in-voltage protection (Spannungssteigerungsschutz) *U* >>	--	--	--	1,25 * *U*n	1.252* *U*n	98.0ms
Rise-in-voltage protection (Spannungssteigerungsschutz) *U* >	--	--	--	1,10 * *U*n	1.10* *U*n	468s
Voltage drop protection (Spannungsrückgangsschutz) *U* <	--	--	--	0,8 * *U*n	0.798* *U*n	3.04s
Voltage drop protection (Spannungsrückgangsschutz) *U* <<	--			0,45* *U*n	0.446* *U*n	337.8ms
Frequency decrease protection (Frequenzrückgangsschutz) *f* <	--	--	--	47,5 Hz	47.48Hz	94.0ms
Frequency increase protection (Frequenzsteigerungsschutz) *f* >	--	--	--	51,5 Hz	51.52Hz	95.2ms

APPENDIX (ANHANG)

Annex to Certificate No. (Anhang zur Bescheinigungsnummer): CN-PV-200064

* 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. * Die Auslösezeit umfasst den Zeitraum von der Grenzwertverletzung *U/f* bis zum Auslösesignal an den Kuppelschalter. Bei der Planung der Erzeugungsanlage ist die Eigenzeit des Kuppelschalters zum höchsten oben ermittelten Zeitwert zu addieren. Die Abschaltzeit (Summe der Auslösezeit NA-Schutz zzgl. Eigenzeit des Kuppelschalters) darf 200 ms nicht überschreiten.	
☒ For integrated NS protection（Bei integriertem NA-Schutz)	
Assigned to power generation unit of type zugeordnet zu Erzeugungseinheit Typ	**SOFAR 10000TL-G2, SOFAR 12000TL-G2, SOFAR 15000TL-G2**
Type integrated interface switch Typ integrierter Kuppelschalter	**HF161F-W/12- HT**
Response time of interface switch for integrated NS protection Eigenzeit des Kuppelschalters bei integriertem NA-Schutz	**20ms**
Verification of the entire functional chain “integrated NS protection – interface switch” has resulted in successful disconnection. Die Überprüfung der Gesamtwirkungskette „integrierter NA-Schutz – Kuppelschalter“ führte zu einer erfolgreichen Abschaltung.	

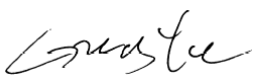
Certificate of Conformity
(Übereinstimmungsbescheinigung)

Certificate No. (Bescheinigungs-Nr): CN-PV-200060

On the basis of the tests undertaken, the sample<s> of the below product have been found to comply with the requirements of the referenced specification<s>/standard<s> at the time the tests were carried out. It does not imply that Intertek has performed any surveillance or control of the manufacture(s). The manufacturer(s) shall ensure that the manufacturing process assures compliance of the production units with the examined products mentioned in this certificate.
Anhand der durchgeführten Tests wurde festgestellt, dass die Probe (n) des nachstehenden Produkts zum Zeitpunkt der Durchführung der Tests den Anforderungen der angegebenen Spezifikation (n) / Norm (en) entsprachen. Dies bedeutet nicht, dass Intertek die Herstellung (en) überwacht oder kontrolliert hat. Der Hersteller stellt sicher, dass der Herstellungsprozess die Übereinstimmung der Produktionseinheiten mit den in dieser Bescheinigung genannten geprüften Produkten sicherstellt.

Applicant: **(Bescheinigungsinhaber)**	Shenzhen SOFAR SOLAR Co., Ltd. 401, Building 4, AnTongDa Industrial Park, District 68, XingDong Community, XinAn Street, BaoAn District, Shenzhen, China
Product: **(Produkt)**	Solar Grid-tied inverter (Umricher)
Model: **(Modell)**	SOFAR 50000TL, SOFAR 60000TL, SOFAR 70000TL-HV
Max. active power PEmax: **(max. Wirkleistung PEmax)**	50.313KW; 60.521KW; 70.637KW;
Max. apparent power SEmax: **(max. Scheinleistung SEmax)**	55.972KVA; 67.159KVA; 79.826KVA;
Rated voltage: **(Bemessungsspannung)**	3W/N/PE 230Vac/400Vac or 3/PE, 480Vac
Rated current (AC) Ir: **(Bemessungsstrom (AC) Ir)**	80.0A; 90.0A; 90.0A;
Initial short-circuit AC current Ik: **(Anfangs-Kurzschlusswechselstrom Ik)**	80.0A; 90.0A; 90.0A;
Tested according to: **(Geprüft nach)**	**VDE-AR-N 4105:2018-11 „Erzeugungsanlagen am Niederspannungsnet** Technische Mindestanforderungen für Anschluss und Parallelbetrieb vo Erzeugungsanlagen am Niederspannungsnetz
Test Report No.: **(Prüfbericht-Nr.)**	**DIN VDE V 0124-100 (VDE V 0124-100):2020-06 „Netzintegration von Erzeugungsanlagen – Niederspannung“** Prüfanforderungen an Erzeugungseinheiten vorgesehen zum Anschluss Parallelbetrieb am Niederspannungsnetz
Certificate Issuing Office: **(Stelle des ausgestellten Zertifikats)**	Intertek Testing Services Ltd. Shanghai

The above designated power generation unit meets the requirements of VDE-AR-N 4105: 2018.
Die oben bezeichnete Erzeugungseinheit erfüllt die Anforderungen der VDE-AR-N 4105: 2018.



Signature (Unterschrift)
Certification Manager: Grady Ye
Date (Datum): 29 June 2020

APPENDIX (ANHANG)

Annex to Certificate No. (Anhang zur Bescheinigungsnummer): CN-PV-200060

Model (Modell)	SOFAR 50000TL	SOFAR 60000TL	SOFAR 70000TL-HV
Max. DC input voltage (Max. DC-Eingangsspannung)	1000Vdc		
Voltage range (Spannungsbereich)	250-950Vdc		
Max. PV Isc	48A/36A/36A	48A/48A/48A	
Nominal mains voltage (Netzspannung Batteriespannungsbereich)	3W/N/PE 230Vac/400Vac		3/PE, 480Vac
Max. output current (Max. Ausgangsstrom)	80A	90A	
Nominal frequency (Nominale Netzfrequenz)	50Hz		
Power factor (Leistungsfaktor)	0.8 Leading to 0.8 Lagging		
Max. apparent power (Max. Scheinleistung)	50000VA	60000VA	75000VA
Ingress protection (Schutzart)	IP65		
Protection class (Schutzklasse)	Class I		
Operating temperature range (Betriebstemperaturbereich)	-25℃ - +60℃		
FW-Version	V2.00		

APPENDIX (ANHANG)

Annex to Certificate No. (Anhang zur Bescheinigungsnummer): CN-PV-200060

"Network interactions" for power generation units with an input current> 75 A

„Netzrückwirkungen" für Erzeugungseinheiten mit einem Eingangsstrom > 75 A

System manufacturer (Herstellerangaben):	System type (Anlagenart) (BHKW, PV-WR, …)	PV			
	Max. active power PEmax (maximale Wirkleistung PEmax)	SOFAR 50000TL	SOFAR 60000TL	SOFAR 70000TL-HV	
		50.313KW	60.521KW	70.637KW	
	Rated voltage (Bemessungsspannung)	3W/N/PE 230Vac/400Vac or 3/PE, 480Vac			
Measurement period (Messzeitraum)	From (vom) JJJJ-MM-TT to (bis) JJJJ-MM-TT	2020-Jan-09 to 2020 Jun 10			
Rapid voltage changes (Schnelle Spannungsänderungen)		ki = 0.969			
Connection without provisions (regarding the primary energy carrier) (Einschalten ohne Vorgabe (zum Primärenergieträger))		ki = 0.969			
Most adverse case when switching between generator levels (Ungünstigster Fall beim Umschalten der Generatorstufen)		ki = 0.969			
Connection at nominal conditions (of the primary energy carrier) (Einschalten bei Nennbedingungen (des Primärenergieträgers)		ki = 0.969			
Disconnection at rated power (Ausschalten bei Bemessungsleistung)		ki = 0.969			
Worst value of all switching operations (Schlechtester Wert aller Schaltvorgänge)		kimax = 0.969			
Flicker	Network impedance angle Ψ_k (Netzimpedanzwinkel Ψ_k)	30°	50°	70°	85°
	Initial flicker factor c_Ψ (Anlagenflickerbeiwert c_Ψ)	1.88	1.77	1.88	1.88

APPENDIX (ANHANG)

Annex to Certificate No. (Anhang zur Bescheinigungsnummer): CN-PV-200060

Model: SOFAR 50000TL										
Active power (Wirkleistung) P/P_n [%]	10	20	30	40	50	60	70	80	90	100
Ordinal number (Ordnungszahl)	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]
2	0.0240	0.0250	0.0246	0.0259	0.0299	0.0288	0.0483	0.1159	0.2014	0.2697
3	0.0974	0.0970	0.0890	0.0834	0.0757	0.0837	0.0899	0.0822	0.0651	0.0607
4	0.0258	0.0167	0.0127	0.0163	0.0166	0.0134	0.0291	0.0665	0.0901	0.0669
5	0.3332	0.0851	0.1490	0.1855	0.1785	0.1790	0.1593	0.1417	0.1469	0.1818
6	0.0324	0.0171	0.0132	0.0206	0.0167	0.0181	0.0186	0.0214	0.0215	0.0247
7	0.3246	0.0874	0.0994	0.1295	0.1450	0.1338	0.1279	0.1288	0.1306	0.1337
8	0.0294	0.0146	0.0097	0.0145	0.0116	0.0127	0.0182	0.0261	0.0261	0.0222
9	0.0328	0.0479	0.0521	0.0481	0.0550	0.0706	0.0803	0.0841	0.0852	0.0800
10	0.0301	0.0146	0.0109	0.0164	0.0120	0.0121	0.0154	0.0203	0.0182	0.0196
11	0.2237	0.0401	0.0472	0.0502	0.0233	0.0342	0.0324	0.0349	0.0385	0.0520
12	0.0250	0.0154	0.0094	0.0203	0.0148	0.0157	0.0177	0.0211	0.0219	0.0240
13	0.2719	0.0516	0.0317	0.0443	0.0433	0.0410	0.0419	0.0461	0.0514	0.0543
14	0.0302	0.0137	0.0077	0.0117	0.0110	0.0102	0.0092	0.0131	0.0161	0.0229
15	0.0343	0.0479	0.0255	0.0161	0.0204	0.0370	0.0392	0.0339	0.0299	0.0326
16	0.0310	0.0114	0.0073	0.0124	0.0095	0.0088	0.0084	0.0126	0.0145	0.0185
17	0.0927	0.0575	0.0181	0.0230	0.0530	0.0683	0.0643	0.0680	0.0743	0.0832
18	0.0229	0.0134	0.0083	0.0143	0.0130	0.0113	0.0127	0.0160	0.0163	0.0199
19	0.1190	0.0288	0.0288	0.0160	0.0539	0.0703	0.0650	0.0637	0.0732	0.0869
20	0.0246	0.0092	0.0066	0.0086	0.0061	0.0058	0.0070	0.0106	0.0146	0.0185
21	0.0286	0.0131	0.0095	0.0134	0.0099	0.0211	0.0237	0.0233	0.0239	0.0262
22	0.0241	0.0073	0.0061	0.0087	0.0065	0.0076	0.0080	0.0087	0.0088	0.0126
23	0.1771	0.0703	0.0343	0.0177	0.0538	0.0680	0.0771	0.0790	0.0786	0.0829
24	0.0132	0.0086	0.0083	0.0097	0.0103	0.0073	0.0070	0.0087	0.0097	0.0131
25	0.0786	0.0739	0.0248	0.0230	0.0505	0.0582	0.0618	0.0716	0.0724	0.0720
26	0.0168	0.0068	0.0054	0.0065	0.0050	0.0054	0.0059	0.0072	0.0095	0.0141
27	0.0135	0.0182	0.0091	0.0077	0.0109	0.0101	0.0131	0.0150	0.0163	0.0199
28	0.0183	0.0051	0.0044	0.0066	0.0059	0.0047	0.0057	0.0070	0.0072	0.0083
29	0.1014	0.0527	0.0108	0.0154	0.0421	0.0480	0.0488	0.0550	0.0632	0.0648
30	0.0170	0.0081	0.0046	0.0080	0.0077	0.0048	0.0047	0.0065	0.0068	0.0079
31	0.0847	0.0647	0.0074	0.0161	0.0423	0.0499	0.0578	0.0634	0.0761	0.0834
32	0.0157	0.0052	0.0048	0.0059	0.0050	0.0040	0.0046	0.0059	0.0076	0.0108
33	0.0181	0.0196	0.0080	0.0079	0.0047	0.0072	0.0052	0.0058	0.0081	0.0109
34	0.0197	0.0057	0.0046	0.0051	0.0046	0.0036	0.0037	0.0059	0.0063	0.0084
35	0.0154	0.0269	0.0372	0.0210	0.0302	0.0396	0.0505	0.0589	0.0668	0.0757
36	0.0149	0.0051	0.0073	0.0066	0.0059	0.0036	0.0034	0.0054	0.0059	0.0062
37	0.0418	0.0461	0.0366	0.0288	0.0290	0.0303	0.0366	0.0421	0.0476	0.0519
38	0.0160	0.0041	0.0033	0.0054	0.0036	0.0032	0.0036	0.0048	0.0063	0.0080
39	0.0148	0.0177	0.0148	0.0128	0.0037	0.0048	0.0036	0.0043	0.0058	0.0077
40	0.0211	0.0043	0.0037	0.0055	0.0040	0.0033	0.0034	0.0052	0.0066	0.0079

APPENDIX (ANHANG)

Annex to Certificate No. (Anhang zur Bescheinigungsnummer): CN-PV-200060

Inter-harmonics (Zwischenharmonische)										
Active power (Wirkleistung) P/P_n [%]	10	20	30	40	50	60	70	80	90	100
Frequenz (Frequency) [kHz]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]
75	0.0297	0.0210	0.0321	0.0222	0.0223	0.0235	0.0258	0.0340	0.0369	0.0372
125	0.0282	0.0202	0.0334	0.0234	0.0192	0.0198	0.0246	0.0304	0.0292	0.0288
175	0.0285	0.0232	0.0426	0.0258	0.0222	0.0199	0.0284	0.0327	0.0352	0.0368
225	0.0307	0.0368	0.0522	0.0459	0.0418	0.0489	0.0613	0.0766	0.0853	0.0858
275	0.0178	0.0209	0.0299	0.0236	0.0233	0.0236	0.0249	0.0281	0.0324	0.0374
325	0.0195	0.0205	0.0282	0.0217	0.0207	0.0228	0.0232	0.0266	0.0318	0.0350
375	0.0269	0.0220	0.0389	0.0249	0.0196	0.0203	0.0256	0.0406	0.0499	0.0502
425	0.0241	0.0188	0.0372	0.0235	0.0189	0.0204	0.0268	0.0389	0.0446	0.0438
475	0.0263	0.0237	0.0375	0.0282	0.0295	0.0347	0.0410	0.0564	0.0648	0.0670
525	0.0186	0.0156	0.0305	0.0218	0.0165	0.0171	0.0235	0.0384	0.0437	0.0415
575	0.0160	0.0143	0.0178	0.0158	0.0156	0.0161	0.0197	0.0225	0.0259	0.0292
625	0.0204	0.0187	0.0221	0.0199	0.0216	0.0232	0.0253	0.0277	0.0318	0.0347
675	0.0235	0.0183	0.0299	0.0232	0.0172	0.0196	0.0247	0.0347	0.0429	0.0437
725	0.0168	0.0124	0.0239	0.0148	0.0124	0.0128	0.0189	0.0265	0.0329	0.0332
775	0.0186	0.0145	0.0221	0.0131	0.0108	0.0121	0.0136	0.0212	0.0277	0.0288
825	0.0153	0.0128	0.0187	0.0133	0.0105	0.0112	0.0160	0.0245	0.0277	0.0260
875	0.0126	0.0112	0.0141	0.0112	0.0111	0.0117	0.0138	0.0167	0.0200	0.0233
925	0.0172	0.0163	0.0166	0.0172	0.0160	0.0187	0.0213	0.0211	0.0243	0.0268
975	0.0125	0.0121	0.0175	0.0124	0.0092	0.0097	0.0124	0.0204	0.0268	0.0280
1025	0.0134	0.0117	0.0157	0.0123	0.0107	0.0120	0.0162	0.0211	0.0240	0.0246
1075	0.0114	0.0098	0.0154	0.0104	0.0077	0.0097	0.0106	0.0151	0.0190	0.0219
1125	0.0129	0.0082	0.0117	0.0102	0.0078	0.0086	0.0128	0.0179	0.0198	0.0197
1175	0.0096	0.0078	0.0092	0.0081	0.0081	0.0084	0.0098	0.0110	0.0129	0.0149
1225	0.0168	0.0140	0.0163	0.0176	0.0195	0.0244	0.0250	0.0308	0.0346	0.0411
1275	0.0119	0.0092	0.0141	0.0103	0.0080	0.0085	0.0100	0.0159	0.0198	0.0228
1325	0.0163	0.0155	0.0180	0.0169	0.0190	0.0221	0.0266	0.0320	0.0378	0.0410
1375	0.0089	0.0101	0.0136	0.0093	0.0064	0.0084	0.0090	0.0121	0.0158	0.0178
1425	0.0113	0.0066	0.0106	0.0098	0.0075	0.0082	0.0113	0.0149	0.0163	0.0154
1475	0.0082	0.0068	0.0078	0.0070	0.0065	0.0065	0.0082	0.0088	0.0097	0.0107
1525	0.0102	0.0087	0.0096	0.0094	0.0100	0.0111	0.0112	0.0135	0.0143	0.0155
1575	0.0099	0.0098	0.0116	0.0078	0.0067	0.0075	0.0084	0.0120	0.0157	0.0179
1625	0.0123	0.0086	0.0115	0.0095	0.0078	0.0084	0.0113	0.0133	0.0147	0.0138
1675	0.0119	0.0100	0.0118	0.0064	0.0054	0.0066	0.0083	0.0094	0.0124	0.0147
1725	0.0115	0.0066	0.0087	0.0082	0.0057	0.0064	0.0090	0.0116	0.0127	0.0113
1775	0.0107	0.0067	0.0067	0.0062	0.0057	0.0054	0.0070	0.0077	0.0082	0.0093
1825	0.0064	0.0061	0.0067	0.0060	0.0059	0.0058	0.0068	0.0078	0.0084	0.0094
1875	0.0080	0.0085	0.0114	0.0064	0.0049	0.0058	0.0066	0.0092	0.0125	0.0154
1925	0.0094	0.0057	0.0084	0.0069	0.0056	0.0055	0.0080	0.0104	0.0114	0.0110
1975	0.0085	0.0083	0.0134	0.0052	0.0051	0.0062	0.0067	0.0087	0.0113	0.0137

APPENDIX (ANHANG)

Annex to Certificate No. (Anhang zur Bescheinigungsnummer): CN-PV-200060

Higher frequencies (Höhere Frequenzen)										
Active power (Wirkleistung) P/P_n [%]	10	20	30	40	50	60	70	80	90	100
Frequenz (Frequency) [kHz]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]
2.1	0.0054	0.0048	0.0074	0.0066	0.0047	0.0043	0.0059	0.0067	0.0077	0.0084
2.3	0.0124	0.0114	0.0135	0.0118	0.0122	0.0142	0.0152	0.0164	0.0168	0.0180
2.5	0.0043	0.0046	0.0050	0.0049	0.0059	0.0065	0.0071	0.0080	0.0095	0.0091
2.7	0.0062	0.0041	0.0050	0.0035	0.0028	0.0028	0.0045	0.0054	0.0066	0.0081
2.9	0.0053	0.0042	0.0047	0.0030	0.0026	0.0025	0.0031	0.0034	0.0044	0.0071
3.1	0.0054	0.0042	0.0044	0.0032	0.0027	0.0027	0.0033	0.0036	0.0037	0.0034
3.3	0.0084	0.0053	0.0074	0.0047	0.0045	0.0040	0.0046	0.0048	0.0045	0.0044
3.5	0.0073	0.0058	0.0078	0.0053	0.0046	0.0042	0.0055	0.0057	0.0054	0.0053
3.7	0.0070	0.0057	0.0076	0.0065	0.0067	0.0069	0.0075	0.0077	0.0079	0.0075
3.9	0.0061	0.0065	0.0074	0.0073	0.0073	0.0091	0.0103	0.0100	0.0095	0.0100
4.1	0.0051	0.0055	0.0057	0.0058	0.0069	0.0078	0.0083	0.0092	0.0092	0.0098
4.3	0.0041	0.0045	0.0044	0.0046	0.0049	0.0049	0.0053	0.0055	0.0059	0.0059
4.5	0.0030	0.0030	0.0031	0.0032	0.0031	0.0034	0.0036	0.0037	0.0037	0.0036
4.7	0.0025	0.0027	0.0026	0.0027	0.0027	0.0029	0.0029	0.0030	0.0030	0.0028
4.9	0.0022	0.0025	0.0022	0.0023	0.0023	0.0024	0.0027	0.0028	0.0026	0.0026
5.1	0.0021	0.0023	0.0023	0.0023	0.0022	0.0023	0.0024	0.0026	0.0024	0.0024
5.3	0.0021	0.0022	0.0021	0.0021	0.0021	0.0021	0.0025	0.0024	0.0023	0.0024
5.5	0.0019	0.0022	0.0021	0.0020	0.0020	0.0022	0.0024	0.0022	0.0023	0.0024
5.7	0.0020	0.0021	0.0020	0.0020	0.0019	0.0019	0.0023	0.0023	0.0023	0.0023
5.9	0.0018	0.0022	0.0020	0.0019	0.0019	0.0019	0.0023	0.0024	0.0024	0.0023
6.1	0.0019	0.0021	0.0019	0.0019	0.0019	0.0019	0.0023	0.0023	0.0023	0.0022
6.3	0.0019	0.0021	0.0019	0.0017	0.0018	0.0018	0.0022	0.0022	0.0022	0.0022
6.5	0.0018	0.0021	0.0018	0.0017	0.0018	0.0018	0.0023	0.0023	0.0023	0.0022
6.7	0.0018	0.0020	0.0018	0.0017	0.0018	0.0018	0.0023	0.0022	0.0023	0.0022
6.9	0.0019	0.0020	0.0018	0.0017	0.0018	0.0018	0.0024	0.0023	0.0023	0.0023
7.1	0.0019	0.0021	0.0022	0.0018	0.0020	0.0020	0.0023	0.0023	0.0022	0.0022
7.3	0.0017	0.0022	0.0018	0.0018	0.0020	0.0018	0.0023	0.0023	0.0023	0.0022
7.5	0.0018	0.0022	0.0019	0.0019	0.0019	0.0017	0.0025	0.0024	0.0023	0.0022
7.7	0.0022	0.0025	0.0021	0.0025	0.0027	0.0026	0.0029	0.0027	0.0025	0.0024
7.9	0.0018	0.0021	0.0019	0.0018	0.0019	0.0019	0.0023	0.0023	0.0023	0.0021
8.1	0.0018	0.0022	0.0019	0.0018	0.0020	0.0020	0.0024	0.0023	0.0023	0.0022
8.3	0.0018	0.0022	0.0019	0.0019	0.0017	0.0019	0.0024	0.0024	0.0023	0.0022
8.5	0.0017	0.0023	0.0018	0.0017	0.0018	0.0018	0.0025	0.0025	0.0025	0.0022
8.7	0.0017	0.0022	0.0018	0.0018	0.0018	0.0018	0.0025	0.0024	0.0023	0.0022
8.9	0.0017	0.0022	0.0019	0.0016	0.0018	0.0019	0.0025	0.0024	0.0023	0.0022

APPENDIX (ANHANG)

Annex to Certificate No. (Anhang zur Bescheinigungsnummer): CN-PV-200060

Model: SOFAR 60000TL										
Active power (Wirkleistung) P/P_n [%]	10	20	30	40	50	60	70	80	90	100
Ordinal number (Ordnungszahl)	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]
2	0.0164	0.0225	0.0221	0.0260	0.0237	0.0368	0.1105	0.1994	0.2370	0.2147
3	0.0787	0.0710	0.0719	0.0651	0.0685	0.0747	0.0659	0.0505	0.0632	0.1048
4	0.0195	0.0110	0.0125	0.0120	0.0102	0.0246	0.0636	0.0754	0.0281	0.0727
5	0.2950	0.0936	0.1421	0.1536	0.1514	0.1363	0.1198	0.1322	0.1794	0.2202
6	0.0227	0.0077	0.0161	0.0159	0.0160	0.0167	0.0206	0.0195	0.0215	0.0248
7	0.2982	0.0838	0.0956	0.1176	0.1143	0.1080	0.1101	0.1102	0.1084	0.1079
8	0.0236	0.0110	0.0113	0.0110	0.0100	0.0163	0.0230	0.0213	0.0198	0.0268
9	0.0308	0.0473	0.0406	0.0428	0.0572	0.0669	0.0701	0.0701	0.0639	0.0641
10	0.0324	0.0077	0.0137	0.0113	0.0106	0.0133	0.0175	0.0153	0.0177	0.0179
11	0.1188	0.0182	0.0477	0.0254	0.0262	0.0241	0.0269	0.0366	0.0509	0.0599
12	0.0222	0.0078	0.0144	0.0140	0.0138	0.0148	0.0201	0.0189	0.0233	0.0218
13	0.1604	0.0298	0.0337	0.0362	0.0314	0.0327	0.0368	0.0388	0.0417	0.0549
14	0.0192	0.0086	0.0078	0.0087	0.0083	0.0085	0.0132	0.0161	0.0192	0.0168
15	0.0241	0.0178	0.0167	0.0124	0.0284	0.0321	0.0278	0.0255	0.0296	0.0337
16	0.0202	0.0078	0.0094	0.0087	0.0080	0.0074	0.0117	0.0130	0.0154	0.0163
17	0.1749	0.0253	0.0138	0.0251	0.0522	0.0519	0.0563	0.0647	0.0750	0.0811
18	0.0153	0.0092	0.0086	0.0122	0.0100	0.0102	0.0153	0.0143	0.0167	0.0181
19	0.1115	0.0507	0.0153	0.0305	0.0551	0.0520	0.0534	0.0666	0.0800	0.0915
20	0.0136	0.0064	0.0061	0.0060	0.0053	0.0056	0.0105	0.0136	0.0164	0.0147
21	0.0125	0.0174	0.0064	0.0070	0.0156	0.0199	0.0206	0.0210	0.0235	0.0250
22	0.0144	0.0068	0.0061	0.0049	0.0071	0.0071	0.0087	0.0086	0.0120	0.0116
23	0.1472	0.0362	0.0078	0.0291	0.0513	0.0628	0.0646	0.0664	0.0752	0.0889
24	0.0152	0.0066	0.0074	0.0091	0.0071	0.0057	0.0083	0.0089	0.0137	0.0143
25	0.1135	0.0154	0.0060	0.0321	0.0457	0.0504	0.0604	0.0598	0.0635	0.0739
26	0.0120	0.0057	0.0054	0.0047	0.0048	0.0046	0.0062	0.0095	0.0122	0.0116
27	0.0117	0.0079	0.0136	0.0107	0.0082	0.0109	0.0129	0.0148	0.0183	0.0224
28	0.0181	0.0055	0.0059	0.0047	0.0052	0.0051	0.0063	0.0066	0.0086	0.0092
29	0.0194	0.0650	0.0054	0.0345	0.0373	0.0401	0.0474	0.0542	0.0543	0.0573
30	0.0155	0.0067	0.0062	0.0055	0.0052	0.0039	0.0054	0.0059	0.0076	0.0084
31	0.0549	0.0485	0.0109	0.0373	0.0375	0.0471	0.0544	0.0676	0.0726	0.0747
32	0.0136	0.0055	0.0052	0.0047	0.0034	0.0038	0.0055	0.0069	0.0097	0.0095
33	0.0087	0.0080	0.0129	0.0075	0.0069	0.0045	0.0054	0.0076	0.0107	0.0130
34	0.0156	0.0047	0.0045	0.0037	0.0037	0.0031	0.0049	0.0057	0.0078	0.0077
35	0.0641	0.0158	0.0191	0.0302	0.0297	0.0416	0.0499	0.0596	0.0675	0.0735
36	0.0060	0.0066	0.0049	0.0051	0.0037	0.0032	0.0046	0.0049	0.0066	0.0077
37	0.0210	0.0400	0.0143	0.0304	0.0225	0.0299	0.0363	0.0415	0.0468	0.0535
38	0.0105	0.0038	0.0041	0.0038	0.0031	0.0032	0.0043	0.0061	0.0084	0.0083
39	0.0122	0.0049	0.0166	0.0045	0.0057	0.0032	0.0041	0.0057	0.0089	0.0108
40	0.0156	0.0030	0.0038	0.0037	0.0029	0.0036	0.0051	0.0061	0.0080	0.0078

APPENDIX (ANHANG)

Annex to Certificate No. (Anhang zur Bescheinigungsnummer): CN-PV-200060

Inter-harmonics (Zwischenharmonische)										
Active power (Wirkleistung) P/P_n [%]	10	20	30	40	50	60	70	80	90	100
Frequenz (Frequency) [kHz]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]
75	0.0191	0.0173	0.0233	0.0175	0.0188	0.0234	0.0332	0.0311	0.0329	0.0329
125	0.0199	0.0207	0.0246	0.0145	0.0159	0.0212	0.0292	0.0259	0.0239	0.0262
175	0.0186	0.0200	0.0245	0.0174	0.0168	0.0215	0.0319	0.0326	0.0307	0.0367
225	0.0283	0.0341	0.0452	0.0403	0.0414	0.0501	0.0634	0.0714	0.0695	0.0686
275	0.0155	0.0188	0.0200	0.0186	0.0192	0.0224	0.0277	0.0287	0.0302	0.0371
325	0.0141	0.0191	0.0190	0.0182	0.0198	0.0209	0.0248	0.0278	0.0310	0.0328
375	0.0182	0.0230	0.0281	0.0179	0.0178	0.0245	0.0417	0.0438	0.0407	0.0403
425	0.0179	0.0209	0.0248	0.0172	0.0185	0.0258	0.0376	0.0381	0.0347	0.0392
475	0.0233	0.0258	0.0307	0.0316	0.0337	0.0364	0.0506	0.0563	0.0510	0.0483
525	0.0169	0.0181	0.0229	0.0145	0.0156	0.0243	0.0362	0.0370	0.0337	0.0357
575	0.0141	0.0136	0.0128	0.0122	0.0139	0.0210	0.0194	0.0229	0.0257	0.0291
625	0.0163	0.0165	0.0156	0.0178	0.0196	0.0225	0.0246	0.0265	0.0298	0.0341
675	0.0165	0.0183	0.0223	0.0180	0.0196	0.0244	0.0346	0.0401	0.0371	0.0365
725	0.0135	0.0125	0.0159	0.0106	0.0115	0.0171	0.0253	0.0276	0.0274	0.0292
775	0.0123	0.0119	0.0148	0.0094	0.0109	0.0127	0.0205	0.0241	0.0237	0.0264
825	0.0107	0.0112	0.0142	0.0091	0.0097	0.0154	0.0220	0.0218	0.0225	0.0242
875	0.0094	0.0089	0.0091	0.0089	0.0095	0.0120	0.0135	0.0163	0.0178	0.0216
925	0.0136	0.0138	0.0128	0.0135	0.0161	0.0196	0.0226	0.0254	0.0259	0.0270
975	0.0103	0.0089	0.0136	0.0091	0.0093	0.0125	0.0210	0.0238	0.0228	0.0238
1025	0.0105	0.0102	0.0118	0.0090	0.0101	0.0149	0.0194	0.0203	0.0201	0.0239
1075	0.0088	0.0099	0.0112	0.0069	0.0080	0.0106	0.0148	0.0178	0.0178	0.0201
1125	0.0081	0.0075	0.0103	0.0064	0.0073	0.0121	0.0160	0.0173	0.0177	0.0213
1175	0.0069	0.0072	0.0072	0.0069	0.0071	0.0094	0.0107	0.0122	0.0140	0.0151
1225	0.0134	0.0122	0.0133	0.0156	0.0181	0.0217	0.0296	0.0349	0.0403	0.0463
1275	0.0075	0.0082	0.0106	0.0071	0.0077	0.0096	0.0153	0.0188	0.0204	0.0205
1325	0.0126	0.0134	0.0140	0.0143	0.0168	0.0242	0.0280	0.0338	0.0418	0.0467
1375	0.0075	0.0081	0.0090	0.0065	0.0069	0.0082	0.0115	0.0149	0.0167	0.0164
1425	0.0060	0.0072	0.0091	0.0063	0.0068	0.0106	0.0133	0.0130	0.0149	0.0162
1475	0.0058	0.0057	0.0059	0.0055	0.0058	0.0071	0.0079	0.0085	0.0096	0.0106
1525	0.0079	0.0067	0.0074	0.0080	0.0084	0.0100	0.0119	0.0137	0.0139	0.0153
1575	0.0070	0.0050	0.0079	0.0049	0.0056	0.0069	0.0122	0.0145	0.0153	0.0162
1625	0.0068	0.0068	0.0086	0.0063	0.0070	0.0102	0.0119	0.0122	0.0134	0.0139
1675	0.0083	0.0049	0.0067	0.0047	0.0058	0.0066	0.0096	0.0126	0.0124	0.0128
1725	0.0055	0.0045	0.0077	0.0048	0.0051	0.0084	0.0103	0.0100	0.0110	0.0121
1775	0.0060	0.0047	0.0051	0.0050	0.0049	0.0063	0.0066	0.0074	0.0085	0.0089
1825	0.0046	0.0046	0.0052	0.0052	0.0054	0.0059	0.0065	0.0077	0.0088	0.0093
1875	0.0061	0.0050	0.0074	0.0043	0.0052	0.0056	0.0093	0.0122	0.0143	0.0146
1925	0.0052	0.0046	0.0070	0.0048	0.0053	0.0074	0.0095	0.0095	0.0107	0.0113
1975	0.0055	0.0053	0.0059	0.0042	0.0054	0.0062	0.0083	0.0107	0.0124	0.0128

APPENDIX (ANHANG)

Annex to Certificate No. (Anhang zur Bescheinigungsnummer): CN-PV-200060

Higher frequencies (Höhere Frequenzen)										
Active power (Wirkleistung) P/P_n [%]	10	20	30	40	50	60	70	80	90	100
Frequenz (Frequency) [kHz]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]
2.1	0.0061	0.0042	0.0057	0.0042	0.0030	0.0044	0.0064	0.0076	0.0072	0.0104
2.3	0.0094	0.0108	0.0100	0.0100	0.0120	0.0131	0.0142	0.0151	0.0149	0.0165
2.5	0.0039	0.0041	0.0042	0.0048	0.0055	0.0057	0.0080	0.0084	0.0085	0.0090
2.7	0.0046	0.0033	0.0030	0.0025	0.0026	0.0041	0.0057	0.0070	0.0075	0.0085
2.9	0.0036	0.0031	0.0027	0.0023	0.0023	0.0028	0.0033	0.0053	0.0066	0.0084
3.1	0.0039	0.0032	0.0034	0.0026	0.0026	0.0031	0.0031	0.0029	0.0032	0.0045
3.3	0.0052	0.0052	0.0043	0.0039	0.0038	0.0042	0.0039	0.0036	0.0035	0.0033
3.5	0.0053	0.0047	0.0045	0.0041	0.0038	0.0049	0.0045	0.0044	0.0042	0.0040
3.7	0.0054	0.0050	0.0063	0.0057	0.0059	0.0060	0.0068	0.0066	0.0061	0.0056
3.9	0.0049	0.0050	0.0062	0.0064	0.0067	0.0080	0.0080	0.0080	0.0079	0.0095
4.1	0.0043	0.0041	0.0051	0.0052	0.0064	0.0071	0.0086	0.0086	0.0095	0.0114
4.3	0.0036	0.0034	0.0037	0.0039	0.0045	0.0043	0.0049	0.0047	0.0048	0.0062
4.5	0.0023	0.0022	0.0026	0.0026	0.0030	0.0030	0.0030	0.0029	0.0031	0.0036
4.7	0.0020	0.0019	0.0022	0.0022	0.0025	0.0025	0.0024	0.0022	0.0024	0.0029
4.9	0.0017	0.0017	0.0019	0.0019	0.0022	0.0022	0.0022	0.0022	0.0022	0.0025
5.1	0.0015	0.0015	0.0018	0.0019	0.0021	0.0022	0.0019	0.0020	0.0021	0.0024
5.3	0.0014	0.0014	0.0016	0.0017	0.0018	0.0022	0.0019	0.0019	0.0020	0.0027
5.5	0.0013	0.0013	0.0016	0.0016	0.0019	0.0020	0.0018	0.0018	0.0019	0.0025
5.7	0.0013	0.0013	0.0016	0.0015	0.0020	0.0020	0.0016	0.0016	0.0017	0.0022
5.9	0.0012	0.0012	0.0015	0.0015	0.0018	0.0021	0.0018	0.0017	0.0018	0.0020
6.1	0.0013	0.0012	0.0014	0.0015	0.0019	0.0020	0.0018	0.0017	0.0017	0.0020
6.3	0.0012	0.0011	0.0014	0.0014	0.0018	0.0020	0.0018	0.0017	0.0017	0.0021
6.5	0.0012	0.0011	0.0015	0.0013	0.0018	0.0019	0.0017	0.0017	0.0018	0.0019
6.7	0.0012	0.0011	0.0015	0.0014	0.0017	0.0019	0.0017	0.0017	0.0017	0.0021
6.9	0.0014	0.0011	0.0015	0.0014	0.0018	0.0019	0.0017	0.0016	0.0017	0.0021
7.1	0.0013	0.0014	0.0015	0.0015	0.0018	0.0019	0.0017	0.0017	0.0017	0.0021
7.3	0.0013	0.0011	0.0015	0.0014	0.0018	0.0021	0.0017	0.0017	0.0017	0.0021
7.5	0.0014	0.0012	0.0015	0.0014	0.0018	0.0020	0.0017	0.0017	0.0018	0.0022
7.7	0.0017	0.0016	0.0020	0.0020	0.0022	0.0025	0.0021	0.0020	0.0021	0.0024
7.9	0.0014	0.0012	0.0014	0.0014	0.0020	0.0022	0.0017	0.0017	0.0017	0.0020
8.1	0.0014	0.0012	0.0015	0.0014	0.0019	0.0021	0.0017	0.0017	0.0016	0.0021
8.3	0.0014	0.0012	0.0015	0.0014	0.0019	0.0021	0.0017	0.0017	0.0016	0.0021
8.5	0.0013	0.0010	0.0015	0.0013	0.0018	0.0023	0.0017	0.0016	0.0016	0.0020
8.7	0.0013	0.0011	0.0014	0.0014	0.0019	0.0023	0.0017	0.0016	0.0016	0.0021
8.9	0.0014	0.0011	0.0014	0.0013	0.0020	0.0022	0.0016	0.0015	0.0016	0.0019

APPENDIX (ANHANG)

Annex to Certificate No. (Anhang zur Bescheinigungsnummer): CN-PV-200060

Model: SOFAR 70000TL-HV										
Active power (Wirkleistung) P/P_n [%]	10	20	30	40	50	60	70	80	90	100
Ordinal number (Ordnungszahl)	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]
2	0.0306	0.0532	0.0253	0.0324	0.0366	0.0380	0.0455	0.0620	0.0998	0.1668
3	0.0783	0.0494	0.0661	0.0753	0.0734	0.0715	0.0800	0.0973	0.1070	0.1089
4	0.0273	0.0242	0.0116	0.0120	0.0186	0.0164	0.0131	0.0191	0.0472	0.0774
5	0.2805	0.1406	0.1466	0.1836	0.1955	0.2025	0.2048	0.1911	0.1779	0.1617
6	0.0294	0.0144	0.0144	0.0145	0.0217	0.0186	0.0226	0.0217	0.0203	0.0228
7	0.2493	0.1005	0.1028	0.1239	0.1404	0.1453	0.1446	0.1396	0.1438	0.1512
8	0.0229	0.0358	0.0115	0.0121	0.0171	0.0141	0.0142	0.0202	0.0285	0.0327
9	0.0287	0.0542	0.0483	0.0580	0.0580	0.0589	0.0757	0.0857	0.0947	0.1056
10	0.0250	0.0296	0.0125	0.0109	0.0201	0.0148	0.0133	0.0150	0.0201	0.0254
11	0.2039	0.0444	0.0616	0.0698	0.0520	0.0326	0.0421	0.0376	0.0357	0.0363
12	0.0199	0.0134	0.0106	0.0119	0.0227	0.0178	0.0192	0.0217	0.0261	0.0309
13	0.2261	0.0608	0.0480	0.0516	0.0550	0.0481	0.0541	0.0506	0.0566	0.0554
14	0.0172	0.0191	0.0083	0.0097	0.0146	0.0126	0.0115	0.0102	0.0129	0.0155
15	0.0227	0.0254	0.0236	0.0220	0.0164	0.0212	0.0353	0.0396	0.0350	0.0333
16	0.0272	0.0208	0.0085	0.0070	0.0148	0.0123	0.0103	0.0089	0.0112	0.0140
17	0.1111	0.0273	0.0159	0.0302	0.0302	0.0478	0.0566	0.0607	0.0686	0.0781
18	0.0152	0.0099	0.0078	0.0095	0.0170	0.0145	0.0142	0.0132	0.0167	0.0202
19	0.1753	0.0518	0.0267	0.0115	0.0265	0.0563	0.0649	0.0596	0.0664	0.0818
20	0.0253	0.0152	0.0072	0.0055	0.0107	0.0085	0.0080	0.0074	0.0100	0.0131
21	0.0275	0.0114	0.0072	0.0180	0.0099	0.0107	0.0189	0.0223	0.0245	0.0236
22	0.0319	0.0118	0.0085	0.0053	0.0101	0.0084	0.0070	0.0076	0.0083	0.0110
23	0.0712	0.0737	0.0134	0.0147	0.0128	0.0432	0.0665	0.0708	0.0686	0.0729
24	0.0153	0.0115	0.0065	0.0066	0.0121	0.0113	0.0093	0.0065	0.0080	0.0121
25	0.0880	0.0835	0.0186	0.0235	0.0138	0.0438	0.0566	0.0634	0.0660	0.0635
26	0.0249	0.0087	0.0069	0.0052	0.0078	0.0071	0.0058	0.0056	0.0068	0.0091
27	0.0119	0.0145	0.0228	0.0050	0.0115	0.0125	0.0084	0.0131	0.0147	0.0168
28	0.0220	0.0083	0.0062	0.0044	0.0077	0.0068	0.0063	0.0066	0.0074	0.0082
29	0.0833	0.0548	0.0228	0.0241	0.0267	0.0328	0.0426	0.0474	0.0557	0.0583
30	0.0104	0.0090	0.0070	0.0076	0.0078	0.0096	0.0061	0.0046	0.0057	0.0077
31	0.0336	0.0248	0.0229	0.0246	0.0364	0.0363	0.0497	0.0603	0.0718	0.0836
32	0.0163	0.0064	0.0051	0.0051	0.0063	0.0050	0.0043	0.0044	0.0058	0.0079
33	0.0082	0.0074	0.0142	0.0045	0.0103	0.0040	0.0085	0.0058	0.0062	0.0067
34	0.0129	0.0052	0.0046	0.0039	0.0064	0.0056	0.0047	0.0044	0.0052	0.0067
35	0.0729	0.0438	0.0288	0.0277	0.0292	0.0275	0.0394	0.0551	0.0653	0.0736
36	0.0062	0.0071	0.0042	0.0062	0.0070	0.0072	0.0050	0.0040	0.0051	0.0067
37	0.0380	0.0545	0.0161	0.0167	0.0364	0.0235	0.0311	0.0424	0.0516	0.0563
38	0.0099	0.0056	0.0038	0.0036	0.0053	0.0043	0.0038	0.0036	0.0044	0.0055
39	0.0178	0.0150	0.0197	0.0122	0.0068	0.0075	0.0078	0.0051	0.0058	0.0056
40	0.0156	0.0050	0.0046	0.0037	0.0070	0.0050	0.0042	0.0042	0.0045	0.0061

APPENDIX (ANHANG)

Annex to Certificate No. (Anhang zur Bescheinigungsnummer): CN-PV-200060

Inter-harmonics (Zwischenharmonische)										
Active power (Wirkleistung) P/P_n [%]	10	20	30	40	50	60	70	80	90	100
Frequenz (Frequency) [kHz]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]
75	0.0234	0.0155	0.0275	0.0396	0.0294	0.0251	0.0245	0.0274	0.0309	0.0356
125	0.0248	0.0178	0.0273	0.0425	0.0278	0.0187	0.0201	0.0235	0.0252	0.0276
175	0.0205	0.0168	0.0317	0.0432	0.0298	0.0229	0.0219	0.0270	0.0279	0.0312
225	0.0328	0.0387	0.0532	0.0737	0.0562	0.0553	0.0639	0.0775	0.0865	0.0819
275	0.0215	0.0202	0.0258	0.0299	0.0258	0.0240	0.0235	0.0283	0.0315	0.0383
325	0.0196	0.0179	0.0256	0.0293	0.0255	0.0233	0.0222	0.0265	0.0286	0.0315
375	0.0279	0.0199	0.0288	0.0487	0.0327	0.0227	0.0230	0.0265	0.0355	0.0452
425	0.0201	0.0184	0.0307	0.0431	0.0311	0.0223	0.0239	0.0285	0.0361	0.0428
475	0.0250	0.0206	0.0324	0.0460	0.0307	0.0383	0.0411	0.0487	0.0574	0.0602
525	0.0193	0.0165	0.0261	0.0408	0.0273	0.0183	0.0205	0.0232	0.0311	0.0423
575	0.0164	0.0144	0.0166	0.0195	0.0172	0.0171	0.0177	0.0219	0.0251	0.0284
625	0.0187	0.0174	0.0198	0.0256	0.0239	0.0246	0.0250	0.0269	0.0300	0.0333
675	0.0189	0.0174	0.0246	0.0372	0.0251	0.0191	0.0215	0.0268	0.0355	0.0374
725	0.0158	0.0113	0.0205	0.0288	0.0207	0.0150	0.0163	0.0184	0.0258	0.0336
775	0.0154	0.0116	0.0177	0.0279	0.0170	0.0127	0.0151	0.0165	0.0183	0.0246
825	0.0129	0.0107	0.0171	0.0253	0.0186	0.0125	0.0141	0.0160	0.0212	0.0271
875	0.0120	0.0097	0.0121	0.0144	0.0141	0.0133	0.0133	0.0152	0.0167	0.0198
925	0.0142	0.0129	0.0184	0.0192	0.0157	0.0176	0.0187	0.0244	0.0287	0.0290
975	0.0118	0.0120	0.0135	0.0243	0.0155	0.0102	0.0107	0.0131	0.0197	0.0250
1025	0.0121	0.0091	0.0120	0.0186	0.0143	0.0097	0.0110	0.0129	0.0176	0.0233
1075	0.0097	0.0099	0.0130	0.0195	0.0140	0.0091	0.0100	0.0123	0.0143	0.0185
1125	0.0102	0.0087	0.0109	0.0171	0.0133	0.0089	0.0103	0.0110	0.0145	0.0198
1175	0.0097	0.0073	0.0091	0.0097	0.0089	0.0087	0.0088	0.0115	0.0124	0.0142
1225	0.0124	0.0113	0.0165	0.0163	0.0182	0.0192	0.0220	0.0274	0.0314	0.0372
1275	0.0085	0.0102	0.0086	0.0197	0.0123	0.0085	0.0091	0.0104	0.0147	0.0185
1325	0.0133	0.0126	0.0173	0.0206	0.0199	0.0208	0.0245	0.0291	0.0313	0.0368
1375	0.0107	0.0097	0.0090	0.0163	0.0100	0.0086	0.0093	0.0108	0.0131	0.0152
1425	0.0092	0.0082	0.0093	0.0129	0.0113	0.0086	0.0097	0.0103	0.0134	0.0166
1475	0.0103	0.0065	0.0063	0.0078	0.0073	0.0067	0.0069	0.0082	0.0089	0.0101
1525	0.0081	0.0059	0.0070	0.0078	0.0076	0.0073	0.0077	0.0087	0.0095	0.0109
1575	0.0085	0.0093	0.0079	0.0164	0.0100	0.0073	0.0081	0.0089	0.0120	0.0154
1625	0.0096	0.0076	0.0106	0.0131	0.0112	0.0104	0.0122	0.0131	0.0139	0.0175
1675	0.0102	0.0082	0.0080	0.0150	0.0084	0.0059	0.0070	0.0085	0.0100	0.0128
1725	0.0085	0.0059	0.0081	0.0104	0.0084	0.0061	0.0071	0.0077	0.0100	0.0129
1775	0.0083	0.0047	0.0054	0.0070	0.0063	0.0059	0.0060	0.0070	0.0082	0.0092
1825	0.0070	0.0054	0.0070	0.0074	0.0069	0.0071	0.0073	0.0083	0.0092	0.0102
1875	0.0088	0.0071	0.0073	0.0139	0.0080	0.0058	0.0058	0.0070	0.0097	0.0122
1925	0.0081	0.0046	0.0070	0.0092	0.0075	0.0061	0.0066	0.0070	0.0090	0.0116
1975	0.0116	0.0060	0.0060	0.0135	0.0066	0.0056	0.0062	0.0072	0.0098	0.0116

APPENDIX (ANHANG)

Annex to Certificate No. (Anhang zur Bescheinigungsnummer): CN-PV-200060

Higher frequencies (Höhere Frequenzen)										
Active power (Wirkleistung) P/P_n [%]	10	20	30	40	50	60	70	80	90	100
Frequenz (Frequency) [kHz]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]	I [%]
2.1	0.0060	0.0057	0.0052	0.0079	0.0068	0.0055	0.0050	0.0053	0.0069	0.0072
2.3	0.0136	0.0141	0.0161	0.0166	0.0163	0.0169	0.0179	0.0180	0.0196	0.0201
2.5	0.0051	0.0047	0.0048	0.0059	0.0061	0.0068	0.0067	0.0070	0.0086	0.0092
2.7	0.0049	0.0034	0.0033	0.0046	0.0035	0.0035	0.0039	0.0052	0.0064	0.0070
2.9	0.0053	0.0040	0.0028	0.0041	0.0032	0.0027	0.0027	0.0032	0.0037	0.0058
3.1	0.0044	0.0037	0.0028	0.0041	0.0031	0.0029	0.0028	0.0030	0.0034	0.0035
3.3	0.0063	0.0052	0.0056	0.0068	0.0058	0.0054	0.0050	0.0050	0.0052	0.0050
3.5	0.0090	0.0061	0.0057	0.0075	0.0060	0.0051	0.0048	0.0051	0.0055	0.0053
3.7	0.0074	0.0066	0.0075	0.0085	0.0077	0.0075	0.0072	0.0072	0.0076	0.0075
3.9	0.0067	0.0054	0.0073	0.0086	0.0083	0.0086	0.0087	0.0090	0.0093	0.0098
4.1	0.0072	0.0050	0.0058	0.0067	0.0070	0.0071	0.0077	0.0084	0.0092	0.0105
4.3	0.0043	0.0043	0.0050	0.0050	0.0050	0.0052	0.0054	0.0054	0.0056	0.0058
4.5	0.0028	0.0026	0.0033	0.0032	0.0034	0.0033	0.0033	0.0033	0.0033	0.0032
4.7	0.0024	0.0023	0.0025	0.0027	0.0028	0.0028	0.0027	0.0028	0.0026	0.0027
4.9	0.0020	0.0018	0.0025	0.0024	0.0023	0.0024	0.0023	0.0025	0.0025	0.0026
5.1	0.0018	0.0018	0.0024	0.0022	0.0022	0.0022	0.0023	0.0023	0.0024	0.0024
5.3	0.0018	0.0019	0.0021	0.0021	0.0021	0.0022	0.0021	0.0022	0.0021	0.0023
5.5	0.0017	0.0017	0.0020	0.0019	0.0020	0.0021	0.0021	0.0021	0.0021	0.0022
5.7	0.0016	0.0016	0.0019	0.0019	0.0019	0.0019	0.0019	0.0020	0.0020	0.0021
5.9	0.0017	0.0015	0.0020	0.0020	0.0019	0.0019	0.0019	0.0021	0.0020	0.0020
6.1	0.0016	0.0014	0.0019	0.0019	0.0018	0.0019	0.0019	0.0020	0.0020	0.0019
6.3	0.0016	0.0015	0.0019	0.0019	0.0019	0.0019	0.0018	0.0019	0.0020	0.0019
6.5	0.0016	0.0015	0.0019	0.0018	0.0019	0.0019	0.0018	0.0020	0.0020	0.0020
6.7	0.0016	0.0015	0.0018	0.0018	0.0018	0.0019	0.0019	0.0020	0.0019	0.0019
6.9	0.0015	0.0014	0.0018	0.0018	0.0018	0.0018	0.0018	0.0019	0.0019	0.0019
7.1	0.0017	0.0015	0.0019	0.0018	0.0022	0.0020	0.0019	0.0020	0.0020	0.0021
7.3	0.0017	0.0015	0.0019	0.0018	0.0018	0.0019	0.0018	0.0019	0.0020	0.0020
7.5	0.0015	0.0014	0.0019	0.0018	0.0018	0.0019	0.0018	0.0020	0.0019	0.0020
7.7	0.0020	0.0019	0.0023	0.0022	0.0021	0.0023	0.0023	0.0025	0.0025	0.0025
7.9	0.0017	0.0015	0.0019	0.0018	0.0019	0.0019	0.0019	0.0020	0.0019	0.0019
8.1	0.0016	0.0014	0.0019	0.0019	0.0019	0.0019	0.0019	0.0021	0.0020	0.0020
8.3	0.0016	0.0014	0.0018	0.0017	0.0018	0.0018	0.0019	0.0019	0.0021	0.0020
8.5	0.0016	0.0014	0.0017	0.0016	0.0016	0.0017	0.0017	0.0018	0.0019	0.0019
8.7	0.0016	0.0014	0.0017	0.0017	0.0017	0.0017	0.0017	0.0019	0.0019	0.0019
8.9	0.0016	0.0014	0.0018	0.0016	0.0016	0.0018	0.0017	0.0019	0.0019	0.0018

Test Verification of Conformity

Verification Number: 200108177GZU -VOC001

On the basis of the referenced test report(s), sample(s) tested of the below product have been found to comply with the standards harmonized with the directives listed on this verification at the time the tests were carried out. Other standards and Directives may be relevant to the product. This verification is part of the full test report(s) and should be read in conjunction with it <them>.

Once compliance with all product relevant CE mark directives are verified, including any relevant e.g. risk assessment and production control, the manufacturer may indicate compliance by signing a Declaration of Conformity themselves and applying the mark to products identical to the tested sample(s).

Applicant Name & Address:	Shenzhen SOFAR SOLAR Co., Ltd. 401, Building 4, AnTongDa Industrial Park, District 68, XingDong Community, XinAn Street, BaoAn District, Shenzhen, China.
Product Description:	Three phase Solar Grid-tied Inverter
Models/Type References:	SOFAR 50000TL, SOFAR 60000TL, SOFAR 70000TL-HV
Ratings & Principle Characteristics:	See Appendix
Brand Name:	SOFAR SOLAR
Relevant Standards/Directives:	EN 61000-6-1:2007 EN 61000-6-3:2007+A1: 2011 EMC Directive 2014/30/EU
Verification Issuing Office Name & Address:	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch Block E, No.7-2 Guang Dong Software Science Park, Caipin Road, Guangzhou Science City, GETDD Guangzhou, China
Date of Tests:	15 March 2020-18 March 2020
Test Report Number(s):	200108177GZU-001

Additional information in Appendix.

Signature

Name: Strong Yao
Position: Manager
Date: 20 April 2020

APPENDIX: Test Verification of Conformity

This is an Appendix to Test Verification of Conformity Number: 200108177GZU -VOC001

Ratings & Principle Characteristics:

Model Number	SOFAR 50000TL	SOFAR 60000TL	SOFAR 70000TL-HV
Full load MPP DC voltage range	530-800Vd.c.		660-800Vd.c.
Max. input voltage	250-1000Vd.c.		
Max. input current	40Ad.c./30Ad.c./ 30Ad.c.	40Ad.c./40Ad.c./ 40Ad.c.	
Rated grid voltage	3P/N/PE 230/400Vac		3P/PE 480Vac
Rated grid frequency	50Hz		
Rated output power	50KW	60KW	70KW
Rated output current	80Aa.c Max.	90Aa.c Max.	
Power factor	0.8 leading..0.8 lagging		

Signature

Name: Strong Yao
Position: Manager
Date: 20 April 2020

Zertifikat *Certificate*

TÜVRheinland®

Zertifikat Nr. *Certificate No.*
R 50412097

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0001

Ihr Zeichen *Client Reference*	**Unser Zeichen** *Our Reference*	**Ausstellungsdatum**	*Date of Issue*
H.W.	02-QJL-50160856 001	02.07.2018	*(day/mo/yr)*

Genehmigungsinhaber *License Holder*
Shenzhen SOFAR SOLAR Co., Ltd.
5/F,Building 4,Antongda Industrial Park,No.1 Liuxian Avenue,Xin'an Street Bao'an District,Shenzhen City
Guangdong Province 518101
P. R. China

Fertigungsstätte *Manufacturing Plant*
Shenzhen SOFAR SOLAR Co., Ltd.
5/F,Building 4,Antongda Industrial Park,No.1 Liuxian Avenue,Xin'an Street Bao'an District,Shenzhen City
Guangdong Province 518101
P. R. China

Prüfzeichen *Test Mark*

TÜVRheinland® ZERTIFIZIERT
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www.tuv.com
ID 1419059828

Geprüft nach *Tested acc. to*
IEC 62109-1:2010
IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation)
Certified Product ***(Product Identification)***

Lizenzentgelte - Einheit
License Fee - Unit

PV-Wechselrichter (Grid-connected PV Inverter)

Type Designation	: SOFAR 50000TL	SOFAR 60000TL	9
Vmax PV[Vd.c.]	: 1000	1000	
Isc PV[Ad.c.]	: 48/36/36	48/48/48	
MPP Voltage Range[Vd.c.]	: 250-960		
Max.Input Current[Ad.c.]	: 40/30/30	40/40/40	
Overvoltage Category(OVC)	: II for PV		
Rated Output Voltage[Va.c.]	: 3/N/PE 400		
Rated Output Frequency[Hz]	: 50/60		
Rated Output Power[W]	: 50000	60000	
Max. Output Current[Aa.c.]	: 80	90	
Power Factor	: [-0.80, 0.80]		
Overvoltage Category(OVC)	: III for AC Mains		

continued on page 0002

9

ANLAGE (Appendix): 1.0

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich betrachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.
This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.

TÜV Rheinland LGA Products GmbH Zertifizierungsstelle TÜV Rheinland®

Zertifizierungsstelle

Zeichun Li

TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg
Tel.: +49 221 806-1371 e-mail: cert-validity@de.tuv.com
Fax: +49 221 806-3935 http://www.tuv.com/safety

Zertifikat *Certificate*

TÜVRheinland®

Zertifikat Nr. *Certificate No.*
R 50412097

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0002

Ihr Zeichen *Client Reference*	**Unser Zeichen** *Our Reference*	**Ausstellungsdatum**	*Date of Issue*
H.W.	02-QJL-50160856 001	02.07.2018	*(day/mo/yr)*

Genehmigungsinhaber *License Holder*
Shenzhen SOFAR SOLAR Co., Ltd.
5/F,Building 4,Antongda Industrial Park,No.1 Liuxian Avenue,Xin'an Street Bao'an District,Shenzhen City Guangdong Province 518101
P. R. China

Fertigungsstätte *Manufacturing Plant*
Shenzhen SOFAR SOLAR Co., Ltd.
5/F,Building 4,Antongda Industrial Park,No.1 Liuxian Avenue,Xin'an Street Bao'an District,Shenzhen City Guangdong Province 518101
P. R. China

Prüfzeichen *Test Mark*

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Sicherheit
Regelmäßige Produktions-überwachung
www.tuv.com
ID 1419059828

Geprüft nach *Tested acc. to*
IEC 62109-1:2010
IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation)
Certified Product (Product Identification)

Lizenzentgelte - Einheit
License Fee - Unit

PV-Wechselrichter (Grid-connected PV Inverter)

as page 0001 continuation 1

Type Designation	: SOFAR 70000TL-HV
Vmax PV[Vd.c.]	: 1000
Isc PV[Ad.c.]	: 48/48/48
MPP Voltage Range[Vd.c.]	: 250-960
Max.Input Current[Ad.c.]	: 40/40/40
Overvoltage Category(OVC)	: II for PV
Rated Output Voltage[Va.c.]	: 3/PE 480
Rated Output Frequency[Hz]	: 50/60
Rated Output Power[W]	: 70000
Max. Output Current[Aa.c.]	: 90
Power Factor	: [-0.80, 0.80]
Overvoltage Category(OVC)	: III for AC Mains

continued on page 0003

ANLAGE (Appendix): 1.0

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich betrachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.
This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.

Zertifizierungsstelle

TÜV Rheinland LGA Products GmbH — TÜV Rheinland® — Zertifizierungsstelle

Weichun Li

TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg
Tel.: +49 221 806-1371 e-mail: cert-validity@de.tuv.com
Fax: +49 221 806-3935 http://www.tuv.com/safety

Zertifikat *Certificate*

TÜVRheinland®

Zertifikat Nr. *Certificate No.*
R 50412097

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0003

Ihr Zeichen *Client Reference*	**Unser Zeichen** *Our Reference*	**Ausstellungsdatum**	*Date of Issue*
H.W.	02-QJL-50160856 001	02.07.2018	*(day/mo/yr)*

Genehmigungsinhaber *License Holder*
Shenzhen SOFAR SOLAR Co., Ltd.
5/F,Building 4,Antongda Industrial
Park,No.1 Liuxian Avenue,Xin'an
Street Bao'an District,Shenzhen City
Guangdong Province 518101
P. R. China

Fertigungsstätte *Manufacturing Plant*
Shenzhen SOFAR SOLAR Co., Ltd.
5/F,Building 4,Antongda Industrial
Park,No.1 Liuxian Avenue,Xin'an
Street Bao'an District,Shenzhen City
Guangdong Province 518101
P. R. China

Prüfzeichen *Test Mark*

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Sicherheit
Regelmäßige Produktions-überwachung
www.tuv.com
ID 1419059828

Geprüft nach *Tested acc. to*
IEC 62109-1:2010
IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation)
Certified Product (Product Identification)

Lizenzentgelte - Einheit
License Fee - Unit

PV-Wechselrichter (Grid-connected PV Inverter)

as page 0002 continuation

Protective Class	: Class I
Ingress Protection (IP)	: IP65
Pollution Degree (PD)	: PD2 (inside), PD3(outside)
Operating Temperature [°C]	: -25 to 60 (> 45 derating)
Altitude [m]	: 2000
Type of Inverter	: Isolation

Remark(s):
The installation has to be carried out according to the attached installation instruction.
Any additional requirements in countries where the product is going to be marketed have to be considered additionally.

ANLAGE (Appendix): 1.0

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich betrachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.
This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.

Zertifizierungsstelle

TÜVRheinland LGA Products GmbH
TÜV Rheinland®
Zertifizierstelle

Weichun Li

TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg
Tel.: +49 221 806-1371 e-mail: cert-validity@de.tuv.com
Fax: +49 221 806-3935 http://www.tuv.com/safety

TÜV Rheinland (China) Ltd.
Member of TÜV Rheinland Group

TÜVRheinland®
Precisely Right.

Shenzhen SOFAR SOLAR Co., Ltd.
Mr. Eric Yi Deputy General Manager
-
5/F,Building 4,Antongda Industrial Park,No.1 Liuxian Avenue,Xin'an Street Bao'an District,Shenzhen City
Guangdong Province 518101
P. R. China

Date : 05.07.2018
Our ref. : QJL 02
Your ref.: H.W.

Ref : R TÜV-Mark Approval

Type of Equipment : Grid-connected PV Inverter
Model Designation : See Certificate
Certificate No. : R 50412097 0001
Report No. : 50160856 001

Dear Mr. Eric Yi,

The above specified equipment has been tested and found to be in accordance with the relevant requirements.

Please find enclosed your certificate as specified above.

If cancellation of the certificate is submitted by 15 November in a given year, no fee will be charged for the following year.

The certificate is issued with the reservation that the license holder applies all information required in § 6 of the ProdSG related to name and address of the manufacturer or his authorized representative / importer, including their respective contact addresses on the product prior to marketing of the product in the European Economic Area.

With kind regards,

Certification Body

Weichun Li

cc: Shenzhen SOFAR SOLAR Co., Ltd.

Enclosure

TÜV Rheinland (China) Ltd.
莱茵检测认证服务（中国）有限公司
Unit 707, AVIC Bldg., No. 10B, Central Road, East 3rd Ring Road, Chaoyang District, Beijing, 100022, P.R.China
北京市朝阳区东三环中路乙10号艾维克大厦707室
邮编：100022
Tel: (8610)6566 6660
Fax: (8610)6566 6667
e-mail: info@bj.chn.tuv.com
Internet: http://www.chn.tuv.com

C E R T I F I C A T E

TÜVRheinland®

of Conformity
Low Voltage Directive 2014/35/EU

Registration No.: AN 50412160 0001

Report No.: 50160856 001

Holder:

Shenzhen SOFAR SOLAR Co., Ltd.
5/F,Building 4,Antongda Industrial Park,No.1 Liuxian Avenue,Xin'an Street Bao'an District,Shenzhen City
Guangdong Province 518101
P. R. China

Product:

PV-Inverter
(Grid-connected PV Inverter)

Identification:

Type Designation : SOFAR 50000TL SOFAR 60000TL
SOFAR 70000TL-HV

Test Sample No. : Engineering sample
Remark : Issued in conjuction with TÜV Rheinland license R 50412097 0001-0003.

This certificate of conformity is based on an evaluation of a sample of the above mentioned product. Technical Report and documentation are at the Licence Holder's disposal. This is to certify that the tested sample is in conformity with Annex I of Council Directive 2014/35/EU, referred to as the Low Voltage Directive. This certificate does not imply assessment of the series-production of the product and does not permit the use of a TÜV Rheinland mark of conformity. The holder of the certificate is authorized to use this certificate in connection with the EC declaration of conformity according to Annex IV of the Directive.

Certification Body

TÜV Rheinland LGA Products GmbH Zertifizierstelle TÜV Rheinland®

Date 03.07.2018

Weichun Li

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

CE The CE marking may be used if all relevant and effective EC Directives are complied with. CE

TÜV Rheinland (China) Ltd.
Member of TÜV Rheinland Group

TÜVRheinland®
Precisely Right.

Shenzhen SOFAR SOLAR Co., Ltd.
Hui Wang, Certification Testing Engineer
-
5/F,Building 4,Antongda Industrial Park,No.1 Liuxian Avenue,Xin'an Street Bao'an District,Shenzhen City
Guangdong Province 518101

Date : 05.07.2018
Our ref. : QJL 01
Your ref.: H.W.

Ref : AN Certificate of Conf. Low Voltage D.

Type of Equipment : Grid-connected PV Inverter
Model Designation : See Certificate
Certificate No. : AN 50412160 0001
Report No. : 50160856 001

Dear Hui Wang,

We herewith confirm that a sample of the above mentioned technical equipment has been tested and was found to be in accordance with the relevant requirements.

Enclosed please find your Certificate of Conformity.

We appreciate your kind support and would like to offer our assistance and continuous services in the future.

With kind regards,

Certification Body

Weichun Li

Enclosure

TÜV Rheinland (China) Ltd.
莱茵检测认证服务（中国）有限公司
Unit 707, AVIC Bldg., No. 10B, Central Road, East 3rd Ring Road, Chaoyang District, Beijing, 100022, P.R.China
北京市朝阳区东三环中路乙10号
艾维克大厦707室
邮编：100022
Tel: (8610)6566 6660
Fax: (8610)6566 6667
e-mail: info@bj.chn.tuv.com
Internet: http://www.chn.tuv.com

Product certificate number **No: 2619/0400-CER/E1**

License holder **Shenzhen SOFAR SOLAR Co., Ltd.**
401, Building 4, AnTongDa Industrial Park, District 68,
XingDong Community, XinAn Street, BaoAn District.
Shenzhen City, Guangdong Province, P.R. China

Manufacturer **Dongguan SOFAR SOLAR Co., Ltd.**
1F – 6F, Building E, No.1 JinQi Road, Bihu Industrial Park.
Wulian Village, Fenggang Town, Dongguan, P.R. China.

Trademark SOFAR SOLAR

Type of generator **PV Inverter**

Models		**SOFAR 50000TL**	**SOFAR 60000TL**	**SOFAR 70000TL-HV**
Technical Data	**Nominal Power**	**50 kW**	**60 kW**	**70 kW**
	Nominal Voltage	**230 / 400 V**	**230 / 400 V**	**480 V**
	Nominal Frequency		**50**	
	Firmware version		**V1.80**	
	Number of phases		**Three-phase**	
	Isolation transformer		**NO**	

Regulations **EN 50549-1: 2019**
Requirements for generating plants to be connected in parallel with distribution networks –
Part 1: Connection to a LV Distribution Network - Generating Plants up to and including type B.

This certificate just covers PV inverters models certified below above-mentioned references to be installed in PV generating of type plants A and B to be connected to a LV distribution network.

This certificate is based upon the test results of the Test Report nº 2219/0400.

The above-mentioned generating unit is certified according to the SGS internal process 4 based on the requirements of the UNE-EN ISO/IEC 17065.
This certificate cancels and supersedes certificate number 2619/0400.
This certificate is valid until: 20th of December 2022.
First issued on: 20th of December 2019.

Madrid, 7th January 2020

Daniel Arranz Muñiz
Certification Manager

VERIFICATION OF COMPLIANCE

No.:	LVD GZES2005017719PV
Applicant:	Shenzhen SOFAR SOLAR Co., Ltd. 401, Building 4, AnTongDa Industrial Park, District 68, XingDong Community, XinAn Street, BaoAn District, Shenzhen City, Guangdong Province, P.R. China
Manufacturer:	Shenzhen SOFAR SOLAR Co., Ltd. 401, Building 4, AnTongDa Industrial Park, District 68, XingDong Community, XinAn Street, BaoAn District, Shenzhen City, Guangdong Province, P.R. China
Product Description:	Three phase Solar Grid-tied Inverter
Model No.:	SOFAR 50000TL, SOFAR 60000TL, SOFAR 70000TL-HV
Trade Mark:	SOFAR SOLAR
Rating:	Refer to page 2
Protection against Electric Shock:	Class I
Degree of Protection:	IP65
Additional Information:	N/A

Sufficient samples of the product have been tested and found to be in conformity with

Test Standard:	EN 62109-1: 2010 EN 62109-2: 2011

as shown in the

Test Report Number(s):	GZES200501771901, GZES200501771902

This Verification of Compliance has been granted to the applicant based on the results of tests, performed by Laboratory of SGS-CSTC Standards Technical Services Co., Ltd. on sample of the above-mentioned product in accordance with the provisions of the relevant harmonized standards under the Low Voltage Directive 2014/35/EU. The CE marking as shown below can be affixed, under the responsibility of the manufacturer, after completion of an EC Declaration of Conformity and compliance with all relevant EC Directives. The affixing of the CE marking presumes in addition that the conditions in annexes III and IV of the Directive are fulfilled.

CE

David Guo
Senior Technical Manager
SGS-CSTC

2020-05-28

No.: LVD GZES2005017719PV

Other information added:
Rati

Model Number	SOFAR 50000TL	SOFAR 60000TL	SOFAR 70000TL-HV
Full load MPP DC voltage range	530-800 Vd.c.		660-800Vd.c.
Max. input voltage	250-1000Vd.c.		
Max. input current	40Ad.c./30Ad.c./ 30Ad.c.	40Ad.c./40Ad.c./ 40Ad.c.	
Rated grid voltage	3P/N/PE 230/400Vac		3P/PE 480Vac
Rated grid frequency	50Hz		
Rated output power	50KW	60KW	70KW
Rated output current	80Aa.c Max.	90Aa.c Max.	
Power factor	0.8 leading to 0.8 lagging		

SGS-CSTC STANDARDS TECHNICAL SERVICES CO.,LTD. GUANGZHOU BRANCH E&E LAB 广州分公司 电子电气实验室

David Guo
Senior Technical Manager
SGS-CSTC

2020-05-28

ENAC
CERTIFICACIÓN
Nº 87/C-PR244

SGS

Product certificate number **No: 2618/0234-10-CER**

Manufacturer **Shenzhen SOFAR SOLAR Co., Ltd.**
5/F,Building 4, Antongda Industrial Park, No. 1 Liuxian Avenue, Xin'an Street, Bao'an District, Shenzhen City, Guangdong Province, P.R. China

Trademark SOFAR SOLAR

Models **SOFAR 50000 TL, SOFAR 60000TL, SOFAR 70000TL-HV**

Type of generating unit **Utility Interactive Inverter**

Technical Data

Nominal Power [kW]	**50**	**60**	**70**
Nominal Voltage [V]	**400**	**400**	**480**
Nominal Frequency [Hz]		**50**	
Firmware version		**V2.00**	
Number of phases		**Three phase**	
Isolation transformer		**NO**	

Standard **G59 Issue 3:2013,** Recommendation for the connection of generating plant to the distribution systems of licensed distribution network operators.

Loss of Mains conditions have been evaluated with positive result through the reference standard IEC 62116:2014. However, testing conditions required by the clause 13.7 of the standard under the scope of this certificate are not considered.

The above-mentioned generating unit is certified according the SGS internal procedure PE.T-ECPE-20 based on the requirements of the UNE-EN ISO/IEC 17065.

This certificate is valid until: 3rd of December of 2021

Madrid, 3rd of December 2018

Daniel Arranz Muñiz
Certification Manager

ENAC
CERTIFICACIÓN
Nº 87/C-PR244

SGS

Product certificate number **No: 2618/0234-8-CER**

Manufacturer	**Shenzhen SOFAR SOLAR Co., Ltd.** 5/F,Building 4, Antongda Industrial Park, No. 1 Liuxian Avenue, Xin'an Street, Bao'an District, Shenzhen City, Guangdong Province, P.R. China			
Trademark	SOFAR SOLAR			
Type of generating unit	**Utility Interactive Inverter**			
Models	**SOFAR 50000 TL, SOFAR 60000TL, SOFAR 70000TL-HV**			
Technical Data	**Nominal Power [kW]**	**50**	**60**	**70**
	Nominal Voltage [V]	**400**	**400**	**480**
	Nominal Frequency [Hz]		**50**	
	Firmware version		**V2.00**	
	Number of phases		**Three phase**	
	Isolation transformer		**NO**	
Standard	**EN 50438: 2013** Requirements for micro-generating plants to be connected in parallel with public low-voltage distribution networks.			

The above-mentioned generating unit is certified according to the SGS internal procedure PE. T-ECPE-31 based on the requirements of the UNE-EN ISO/IEC 17065.

This certificate is valid until: 28th November 2021

Madrid, 28th November 2018

Daniel Arranz Muñiz
Certification Manager

VERIFICATION OF COMPLIANCE

No.:	GZES2103013323PV
Applicant:	Shenzhen SOFARSOLAR Co., Ltd. 401, Building 4, AnTongDa Industrial Park, District 68, XingDong Community, XinAn Street, BaoAn District, Shenzhen, Guangdong, China
Manufacturer:	Shenzhen SOFARSOLAR Co., Ltd. 401, Building 4, AnTongDa Industrial Park, District 68, XingDong Community, XinAn Street, BaoAn District, Shenzhen, Guangdong, China
Product Name:	Solar Grid-tied Inverter
Product Description:	Inverter used in PV system
Model No.:	SOFAR 50000TL; SOFAR 60000TL; SOFAR 70000TL-HV
Trade Mark:	
Rating:	Refer to page 2
Intended Use:	PV System
Protection against Electric Shock:	Class I
Additional Information (if any):	Software Version: V2.20

Sufficient samples of the product have been tested and found to be in conformity with

Test Standard:	ENA Engineering Recommendation G99 Issue 1 Amendment 3 May 2018
as shown in the	
Test Report Number(s):	GZES210301332301

This Verification of Compliance has been granted to the applicant based on the results of tests, performed by Laboratory of SGS-CSTC Standards Technical Services Co., Ltd. on sample of the above-mentioned product in accordance with the provisions of the relevant specific standards.

David Guo
Senior Technical Manager
SGS-CSTC

2021-03-24

No.: GZES2103013323PV

Other information added :
Ratings

Model Number	SOFAR 50000TL	SOFAR 60000TL	SOFAR 70000TL-HV
DC Input			
Max. DC voltage	1000V		
Max. input voltage	250-950V		
Full load MPP DC voltage range	530-800V	530-800V	660-800V
Max. input current	40A/30A/30A	40A/40A/40A	40A/40A/40A
AC Output			
Rated output power	50000W	60000W	70000W
Max. output power	50000VA	60000VA	75000VA
Rated grid voltage	3P/N/PE, 230/400V	3P/N/PE, 230/400V	3P/PE, 480V
Rated output current	72.5A	87.0A	84.2A
Max. output current	80A	90A	90A
Nominal output freqency	50Hz		
Output power factor	>0.99 (adjustable +/-0.8)		
Operating temperature range	-25ºC~60ºC		
Ingress protection	IP65		
Protective class	Class I		

David Guo
Senior Technical Manager
SGS-CSTC

2021-03-24

ATTESTATION OF CONFORMITY

Issued to:	Shenzhen SOFAR SOLAR Co., Ltd. 401, Building 4, AnTongDa Industrial Park, District 68, XingDong Community, XinAn Street, BaoAn District, Shenzhen, China.
For the product:	Grid-connected PV Inverter
Trade name:	SOFAR SOLAR
Type/Model:	SOFAR 50000TL, SOFAR 60000TL, SOFAR 70000TL-HV
Ratings:	See Annex
Manufactured by:	Shenzhen SOFAR SOLAR Co., Ltd. 401, Building 4, AnTongDa Industrial Park, District 68, XingDong Community, XinAn Street, BaoAn District, Shenzhen, China.
Requirements:	IEC 60255-27:2013

This Attestation is granted on account of an examination by DEKRA, the results of which are laid down in test report no. 6041106.52

The examination has been carried out on one single specimen of the product, submitted by the manufacturer.
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.

Shanghai, 1 March 2019 Number: 6041106.03AOC

DEKRA Testing and Certification (Shanghai) Ltd.

Kreny Lin
Certification Manager

DEKRA Testing and Certification (Shanghai) Ltd.
3F #250 Jiangchangsan Road Building 16 Headquarter Economy Park Shibei Hi-Tech Park, Zhabei District Shanghai 200436 China
T +86 21 6056 7666 F +86 21 6056 7555 www.dekra-certification.com

Ratings of the test product:

SOFAR 50000TL:
PV input: Max.1000 Vdc, MPPT voltage range: 250-950 Vdc, max 40/30/30 A, Isc PV: 48/36/36 A
Output: 400 Vac, 3/N/PE, 50/60 Hz, nominal 50000 W, max 50000 VA, max 3x80 A

SOFAR 60000TL:
PV input: Max.1000 Vdc, MPPT voltage range: 250-950 Vdc, max 40/40/40 A, Isc PV: 48/48/48 A
Output: 400 Vac, 3/N/PE, 50/60 Hz, nominal 60000 W, max 60000 VA, max 3x90 A

SOFAR 70000TL-HV:
PV input: Max.1000 Vdc, MPPT voltage range: 250-950 Vdc, max 40/40/40 A, Isc PV: 48/48/48 A
Output: 480 Vac, 3/PE, 50/60 Hz, nominal 70000 W, max 75000 VA, max 3x90 A

Shenzhen BALUN Technology Co., Ltd.
Room 104, 204, 205, Building 1, No. 6, Industrial South Road, Songshan Lake District, Dongguan, Guangdong, China

VERIFICATION OF CONFORMITY

Certificate No.:	BL-DG2030080D05
Applicant:	Shenzhen SOFAR SOLAR Co., Ltd.
Address:	401, Building 4, AnTongDa Industrial Park, District 68, XingDong Community, XinAn Street, BaoAn District, Shenzhen, China.
Manufacture:	Shenzhen SOFAR SOLAR Co., Ltd.
Address:	401, Building 4, AnTongDa Industrial Park, District 68, XingDong Community, XinAn Street, BaoAn District, Shenzhen, China.
Product:	Solar Grid-tied Inverter
Brand name:	SOFAR SOLAR
Model name:	SOFAR 50000TL, SOFAR 60000TL, SOFAR 70000TL-HV

The submitted sample of the above product has been tested according with below Standard(s) used for showing compliance with the essential requirements in the **EMC directive (2014/30/EU)** :

Applied Standards:	**Report No.:**
EN 61000-6-2: 2005; EN 61000-6-4: 2007/A1: 2011; EN 61000-3-11: 2000; EN 61000-3-12: 2011;	BL-DG2030080-401

CE

CERTIFICATION • CONSULTING • SOLUTION • SERVICE
BALUN

Hao Qi

Hao Qi
Date of Issue: May. 21, 2020

Prototypenbescheinigung / *Prototype Confirmation*

Hersteller / Antragsteller *Manufacturer / Applicant*:	**Shenzhen SOFAR SOLAR Co., Ltd.** 401, Building 4, AnTongDa Industrial Park, District 68, XingDong Community, XinAn Street, BaoAn District, Shenzhen P.R. China
Produkttyp / *Product type*:	**Netzgebundener Photovoltaikwechselrichter / *Grid-tied photovoltaic (PV) inverter***
Modelle / *Models*:	**SOFAR 50000TL, SOFAR 60000TL, SOFAR 70000TL-HV**
Beschreibung / *Description*:	Leistungselektronischer Umrichter zur Einspeisung von DC-Strom aus Photovoltaik-Modulen ins öffentliche Stromnetz. / *The power generation units (PGU) enable the injection of direct current generated by means of photovoltaic panels into the public AC grid using power electronics.*
Standards / *Standards*:	**VDE-AR-N 4110:2018-11** – Technische Regeln für den Anschluss von Kundenanlagen an das Mittelspannungsnetz und deren Betrieb (TAR Mittelspannung) / *Technical requirements for the connection and operation of customer installations to the medium voltage network (TAR medium voltage)* **FGW TR8 / *TG8* Rev. 9 (2019-02-01)** – Zertifizierung der elektrischen Eigenschaften von Erzeugungseinheiten und -anlagen, Speicher sowie für deren Komponenten am Stromnetz / *Certification of the Electrical Characteristics of Power Generating Units, Systems and Storage Systems as well as their Components on the Grid*

Diese Prototypenbescheinigung bestätigt, dass es sich bei der genannten Erzeugungseinheit (EZE) nach VDE-AR-N 4110 sowie gemäß FGW TR 8 um einen Prototyp handelt: Die EZE weist wesentliche technische Weiterentwicklungen oder Neuerungen auf (siehe Anhang 1 und Anhang 3). /
This prototype certificate confirms that the above-mentioned PGU is a prototype according to VDE-AR-N 4110 and FGW TG 8: The PGU is characterized by major technical developments or innovations (see Annex 1 and Annex 3).

Weiterhin bestätigt diese Prototypenbescheinigung, dass die genannten EZE in der Lage ist sind, die Anforderungen an die elektrischen Eigenschaften der EZE nach VDE-AR-N 4110 zu erfüllen (siehe Anhang 2). Es wird davon ausgegangen, dass die Anforderungen in Anhang A und Anhang B der FGW TR8 im Rahmen einer Zertifizierung erfüllt werden. /
This prototype certificate also confirms the general ability of the PGUs to fulfil the requirements of the VDE-AR-N 4110, based on manufacturer data of the electrical properties of the PGU (see Annex 2). It is expected that in the scope of a certification the requirements of Annex A and Annex B of the FGW TG8 will be fulfilled.

Projektnummer / *Project number*:	**19TH0183**	**Zertifizierungsprogramm / *Certification scheme*:**	**NSOP-0032-DEU-ZE-V01**
Zertifikatsnummer / *Certificate number*:	**19-0540**	**Ausstellungsdatum / *Date of issue*:**	**2019-09-23**

Zertifizierungsstelle / *Certification body*

Holger Schaffer

Zertifizierungsstelle der Bureau Veritas Consumer Products Services Germany GmbH
Akkreditiert nach DIN EN ISO/IEC 17065

DAkkS Deutsche Akkreditierungsstelle D-ZE-12024-01-00

Anhang 1 / *Annex 1*

Diese Bescheinigung bestätigt, dass es sich bei der genannten Erzeugungseinheit (EZE) nach FGW TR 8 um einen Prototypen handelt. Dazu wird im Folgenden die EZE beschrieben und die wesentlichen technischen Weiterentwicklungen oder Neuerungen dargestellt:

FGW TR 8 (Revision 9)

Anforderungen	**Kommentar / Bewertung**
2.11 Betriebsmittelprototypen	
2.11.1 Prototypenregelung	
Ein Prototyp ist das erste Betriebsmittel eines Typs, welches wesentliche technische Weiterentwicklung oder Neuerung aufweist, sowie alle weiteren Betriebsmittel dieses Typs, die innerhalb von zwei Jahren nach Inbetriebsetzung des ersten Betriebsmittels dieses Typs in Betrieb gesetzt werden.	Berücksichtigt (Anhang 3).
Die Regelung und Fristen von Betriebsmittelprototypen in einer EZA können der NAR entnommen werden.	Berücksichtigt. gemäß VDE-AR-N 4110: 2018-11 gilt: für Erzeugungsanlagen mit Erzeugungseinheiten gleichen Prototyps müssen das Anlagenzertifikat und die Konformitäts-erklärung binnen eines Jahres, nachdem für den ersten Prototypen ein Einheiten-zertifikat vorliegt, nachgereicht werden.
2.11.2 Prototypenbestätigung	
Voraussetzung für das Ausstellen einer Prototypenbestätigung durch eine Zertifizierungsstelle ist eine Herstellererklärung zu folgenden Punkten:	
• Erklärung der teilweisen oder vollständigen Konformität zu einer oder mehreren NAR	Berücksichtigt (siehe Anhang 2, Anhang 3, Anhang 5 und Anhang 6).
• Erklärung, dass es sich um eine wesentliche technische Weiterentwicklung bzw. Neuerung handelt	Berücksichtigt (siehe Anhang 2 und Anhang 3).
• Aufzeigen von Unterschieden zu ggf. vorhandenen und bereits zertifizierten Betriebsmitteln	Berücksichtigt.
• Weitere technische Daten entsprechend den Anforderungen der jeweiligen NAR	Berücksichtigt (siehe Anhang 5 und Anhang 6).
Wesentliche technische Weiterentwicklungen und Neuerungen liegen in der Regel vor, wenn Komponenten oder Softwareversionen so geändert werden, dass sich das elektrische Verhalten der Betriebsmittel am Netz signifikant ändert oder dass ein äquivalentes elektrisches Verhalten durch eine andere technische Weiterentwicklung und Neuerung erreicht wird.	
Auf Basis der vorgelegten Herstellererklärungen zum Prototyp bewertet die Zertifizierungsstelle ob es sich um eine technische Weiterentwicklung handelt und bescheinigt dies in Form einer Prototypenbestätigung.	Berücksichtigt (siehe Anhang 2 und Anhang 3).
Die Zertifizierungsstelle muss in der Prototypenbestätigung nachvollziehbar ausweisen, dass der Prototyp grundsätzlich in der Lage wäre, die Anforderungen der jeweiligen NAR an die elektrischen Eigenschaften und Funktionen der Betriebsmittel zu erfüllen. Die Vorgaben der NAR an den Prüfumfang für die Prototypenbestätigung sind zu berücksichtigen (sofern vorhanden).	Berücksichtigt (siehe Anhang 2, Anhang 3, Anhang 5 und Anhang 6).

Anhang 2 / *Annex 2*

Diese Bescheinigung bestätigt, dass die genannte Erzeugungseinheit (EZE) in der Lage ist, die Anforderungen an die elektrischen Eigenschaften der Erzeugungseinheit nach VDE-AR-N 4110 zu erfüllen. Dazu wird im Folgenden die Übereinstimmung der elektrischen Eigenschaften der EZE mit den Anforderungen nach VDE-AR-N 4110 nachgewiesen:

Art der Betriebsmittel:	EZE		Komponenten		
	PV	Speicher	EZA-Regler	Kompensations-einrichtungen	Schutz-einrichtungen
	☒	☐	☐	☐	☐
Anmerkung	Die folgenden Punkte 1), 2) und 4) sind anzuwenden		Die folgenden Punkte 1), 2), 3) und 4) sind anzuwenden		

VDE-AR-N 4110		
BV-Nr.	**Anforderungen**	**Kommentar / Bewertung**
12 Prototypenregelung		
1)	Ein Prototyp ist die erste Erzeugungseinheit eines Typs, der wesentliche technische Weiterentwicklungen oder Neuerungen aufweist, und alle weiteren Erzeugungseinheiten dieses Typs, die innerhalb von zwei Jahren nach der Inbetriebsetzung der ersten Erzeugungseinheit dieses Typs in Betrieb gesetzt werden. ANMERKUNG 1 Diese Definition entspricht der Begriffsdefinition nach SDLWindV [1]. Es besteht kein Zusammenhang zum Begriff „Pilotwindenergieanlage“ im EEG [6]. Wesentliche technische Weiterentwicklungen und Neuerungen liegen in der Regel vor, wenn Komponenten oder Softwareversionen so geändert werden, dass sich das elektrische Verhalten der Erzeugungseinheit am Netz signifikant ändert und eine Einheitenzertifizierung dieses neuen Typs erforderlich wird.	Berücksichtigt (siehe Anhang 3).
2)	Für einen Prototypen einer Erzeugungseinheit gelten die Anforderungen dieser VDE-Anwendungsregel. Innerhalb von zwei Jahren nach der Inbetriebsetzung der ersten Prototypen-Erzeugungseinheit in Deutschland ist für diese Prototypen anstelle des Einheitenzertifikats eine Prototypenbestätigung ausreichend, in der die Zertifizierungsstelle das Vorhandensein einer wesentlichen technischen Weiterentwicklung oder Neuerung auf Basis einer Herstellererklärung bestätigt. Weiterhin ist durch die Zertifizierungsstelle zu prüfen und in der Prototypenbestätigung nachvollziehbar auszuweisen, ob der Prototyp grundsätzlich in der Lage ist. die Anforderungen dieser VDE-Anwendungsregel an die elektrischen Eigenschaften der Erzeugungseinheit zu erfüllen. Dies erfolgt auf Basis eines vom Hersteller der Erzeugungseinheit erstellten Datenblattes der elektrischen Eigenschaften. Für Prototypen die vor dem 27.04.2019 in Betrieb gesetzt werden, beginnt die oben genannte Frist am 27.04.2019.	Berücksichtigt.
3)	Für Komponenten innerhalb der Erzeugungsanlage, für die ein Komponentenzertifikat erforderlich ist, kann die Prototypenregelung entsprechend angewendet werden.	Entfällt.

Anhang 2 / *Annex 2*

BV-Nr.	Anforderungen	Kommentar / Bewertung
4)	Damit die geforderte Plausibilitätsprüfung durch die Zertifizierungsstelle erfolgen kann, muss das Datenblatt der Erzeugungseinheit mindestens folgende Angaben enthalten: - elektrische Daten (Nenn- und Bemessungsgrößen) - schematisches Übersichtsbild der Erzeugungseinheit mit allen wesentlichen Komponenten - Betriebsbereiche der Erzeugungseinheit: • Grenzen im quasistationären Betrieb • Blindleistungsstellbereich • FRT-Grenzkurve(U/t-Diagramm) - Schutzfunktionen mit Einstellbereichen: • Entkupplungsschutz • Eigenschutz - Wirkleistungsregelung: • Leistungs-Frequenz-Verhalten • Wirkleistungsgradient - Blindleistungsregelung - Dynamische Blindstromeinspeisung: • Grundsätzliche Funktionsweise - Erklärung des Herstellers, dass die Erzeugungseinheit so konstruiert wurde, dass die Anforderungen dieser Anwendungsregel an die Erzeugungseinheit erfüllt werden können. Spätestens nach Ablauf der oben genannten Frist ist ein Einheitenzertifikat erforderlich ANMERKUNG 2 Sofern das Einheitenzertifikat vor Ablauf der Frist von zwei Jahren nach der Inbetriebsetzung der ersten Erzeugungseinheit dieses Typs vorliegt. kann es sich dennoch um einen Prototypen handeln.	Berücksichtigt. Daten vom Hersteller stehen zur Verfügung (siehe Anhang 4, Anhang 5 und Anhang 6). Ergebnisse der Plausibilitäts-prüfung siehe folgende Tabelle.
Plausibilitätsprüfung		
a)	Elektrische Daten (Nenn- und Bemessungsgrößen)	Erfüllt (siehe Anhang 4)
b)	Schematisches Übersichtsbild der Erzeugungseinheit mit allen wesentlichen Komponenten;	Erfüllt (siehe Anhang 6)
c)	Betriebsbereiche der Erzeugungseinheit: • Grenzen im quasistationären Betrieb • Blindleistungsstellbereich • FRT-Grenzkurve(U/t-Diagramm)	Erfüllt (siehe Anhang 5)
d)	Schutzfunktionen mit Einstellbereichen: • Entkupplungsschutz • Eigenschutz	Erfüllt (siehe Anhang 5)
e)	Wirkleistungsregelung: • Leistungs-Frequenz-Verhalten • Wirkleistungsgradient	Erfüllt (siehe Anhang 5)
f)	Blindleistungsregelung;	Erfüllt (siehe Anhang 5)
g)	Dynamische Blindstromeinspeisung: • Grundsätzliche Funktionsweise	Erfüllt (siehe Anhang 5)

Anhang 2 / *Annex 2*		
BV-Nr.	**Anforderungen**	**Kommentar / Bewertung**
h)	Erklärung des Herstellers, dass die Erzeugungseinheit so konstruiert wurde, dass die Anforderungen dieser Anwendungsregel an die Erzeugungseinheit erfüllt werden können.	Erfüllt (siehe Anhang 3)

Anhang 3 / *Annex 3*

Herstellererklärung zum Prototyp / *Manufacturer's declaration for prototype*:

SOFAR SOLAR Shenzhen SOFAR SOLAR Co., Ltd.

Manufacturer declaration

From the beginning, Shenzhen SOFAR SOLAR Co., Ltd. has been working hard to achieve more innovative requirements in our inverters and components:

- Integrated with 20 strings, intelligent monitoring and fast trouble-shooting.
- Full aluminium cabinet and IP65 design, which makes inverter can work in harsh environment, like high temperature, humility and saline-alkali.
- RS485 communication port on inverter, also supports WIFI, GPRS or Ethernet port for monitoring.
- Integrated with 4 digital inputs, used for power control in hardware response level.
- Programmable relay output, used for connecting external audible and visual alarm device.
- Fuse-free design.
- Patent PV anti-reverse connection, protect inverter from damaging by wrong installation.
- MPPT scan function, maximizing plant profit.
- Fast and precise output short circuit detecting, protect inverter damaging from short circuit.
- Complete leakage current detecting and recover mechanism
- Advanced digitization .control technology, suitable for different country grid and limit the current harmonic wave to minimum.

We has developed and implemented a new firmware (FW version 2.00) to meet the VDE-AR-N 4110:2018-11 requirements. We hereby declare that the Sofar three phase commercial inverters listed below are prototypes according to VDE-AR-N 4110:2018:

- SOFAR 50000TL
- SOFAR 50000TL
- SOFAR 70000TL-HV

The PGUs SOFAR 50000TL, SOFAR 60000TL and SOFAR 70000TL-HV have been designed to conform the requirements according to VDE-AR-N 4110:2018-11. We hereby confirm that the requirement of the VDE-AR-N 4110:2018-11 will be fulfilled.

Shenzhen SOFAR SOLAR Co., Ltd.

Shenzhen	23 September 2019	Technical manage
place	date	(stamp, signature)

Anhang 4 / *Annex 4*

Datenblatt / *Datasheet*:

9 Technical data

Outlines of this chapter

This topic lists the technical specifications for all EVVO 50000TL3P~EVVO 70000TL3P-HV inverters.

9.1 Input parameter (DC)

Parameter	EVVO 50000TL3P	EVVO 60000TL3P	EVVO 70000TL3P-HV
Max. input voltage	1000V		
Start-up input voltage	350V (+/-1v)		
Number of independent MPPT	3		
Number of DC inputs	4/3/3	4/4/4	
Input range with Full power operation with 2 MPPT parallel	530V-800V	530V-800V	660V-800V
Max DC power for single MPPT	22000(530V-800V) 16000(530V-800V) 16000(530V-800V)	22000(530V-800V) 22000(530V-800V) 22000(530V-800V)	26000(660V-800V) 26000(660V-800V) 26000(660V-800V)
Operating input volt range	250V-960V		
Max. input MPPT current	40A/30A/30A	40A/40A/40A	
Input short circuit current for each MPPT	48A/36A/36A	48A/48A/48A	
Overvoltage category of input	II		

Anhang 4 / *Annex 4*

9.2 Output parameter (AC)

Parameter	EVVO 50000TL3P	EVVO 60000TL3P	EVVO 70000TL3P-HV
Rated power	50000W	60000W	70000W
Max. AC power	50000VA	60000VA	75000VA
Rated AC voltage	3/N/PE,230/400Vac		3/N/PE,277/480Vac或 3/PE,480Vac
Grid voltage range	310-480Vac(adjustable)		422-528Vac
Grid frequency range	44~55Hz/54~66Hz(adjustable, must meet local grid requirements)		
Active power adjustable range	0~100%		
Max. output current	80A	90A	
THDI	<3%		
Power factor	1 (adjustable +/-0.8)		
Overvoltage category of output	III(II-S2version)		

9.3 Efficiency, Safety and Protection

Parameter	EVVO 50000TL3P	EVVO 60000TL3P	EVVO 70000TL3P-HV
Max efficiency	98.5%	98.6%	
Weighted eff. (EU/CEC)	98.3%	98.4%	
Self-consumption at night	<1W		
Feed in start power	45W		
MPPT efficiency	>99.9%		
DC reverse polarity protection	Yes		
DC switch	Yes		
Input/output SPD(II)	Input SPD(II) Output SPD(II): (S2 version)		
Safety protection	Anti islanding, RCMU, Ground fault monitoring		
Certification	CQC		
Communication	RS485, Wifi / GPRS(optional), Multi-function relay		
Power management unit	According to certification and request		

Anhang 4 / *Annex 4*

9.4 General Data

Parameter	EVVO 50000TL3P	EVVO 60000TL3P	EVVO 70000TL3P-HV
Ambient temperature range	-25℃...+60℃		
Allowable relative humidity range	0…95% no condensing		
Topology	Transformerless		
Degree of protection	IP65		
Max. operating altitude	4000m		
Noise	<60dB		
Weight	68kg	70kg	
Cooling	Fan		
Dimension	737*713*297mm		
Warranty	3/5/7/10 years		

Anhang 5 / *Annex 5*

Technische Daten / *Technical data*:

SOFAR SOLAR Shenzhen SOFAR SOLAR Co., Ltd.

Technical Data - Sofar SOFAR 50000TL, SOFAR 60000TL and SOFAR 70000TL-HV series

Following functions and parameters are implemented and used for conformity with the VDE-AR-N 4110:2018-11. The software is currently in the development phase and will be implemented according to the requirements of the VDE-AR-N 4110:2018-11.

Limits of quasi-steady-state operation

- Voltage range [p.u.] : 0.85 – 1.15
- Frequency range [Hz] : 46.5 – 52.5

Active / reactive power control

The power provision is limited by the maximum apparent current and maximum apparent and active power.

The reactive power is prioritised versus the active power.

A maximum reactive power provision of 48%P_{max} (using Q set-point) or cosφ = 0,8(using cosφ set-point) is possible.

A permanent active power reduction can be applied by setting parameter P_{Qmax}:
The value of P_{Qmax} will then be the new active power limitation which will not be exceeded during operation of the PGU, while P_{Qmax} will be the new reference for the P set-point control. Any signal for a setpoint of 100%P_{Qmax} by the ripple control receiver or other P-parameter setpoint, causes the PGU to inject the new lower P_{max}-value (active power higher than new lower P_{max}-value will never be injected). The reference power for percentage or p.u. in this limited mode is the new lower P_{Qmax}-value.

The power control is therefore based on the following values:

PGU	Max.Current Limit（A）	Apparent Power Limit(kVA)
SOFAR 50000TL	80	50
SOFAR 60000TL	90	60
SOFAR 70000TL-HV	90	70

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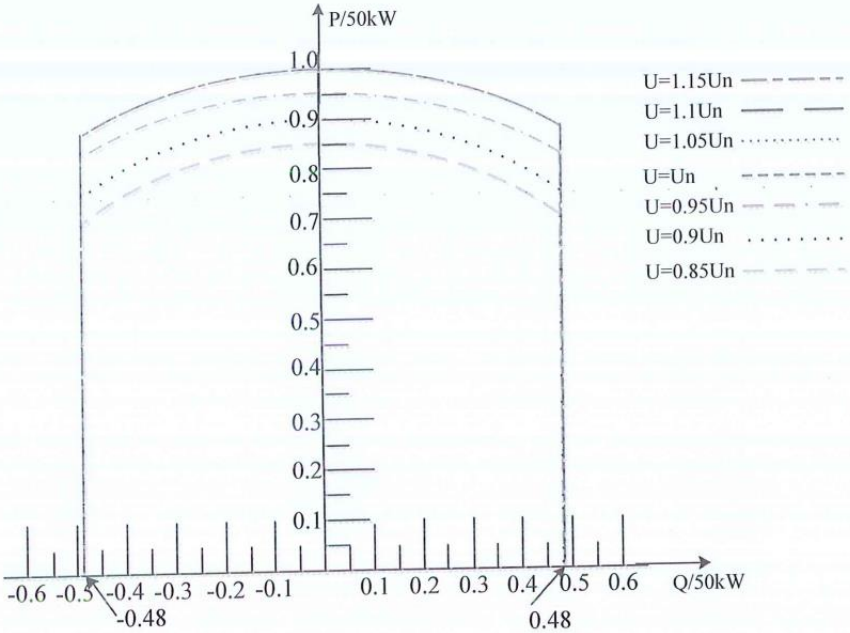
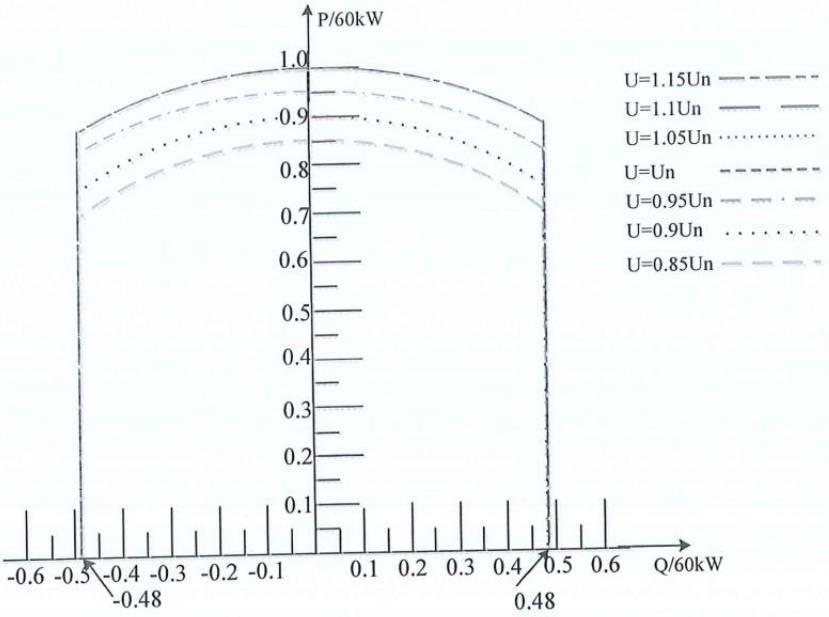
SOFAR SOLAR Shenzhen SOFAR SOLAR Co., Ltd.

PQ-Diagram (SOFAR 50000TL)



PQ-Diagram (SOFAR 60000TL)



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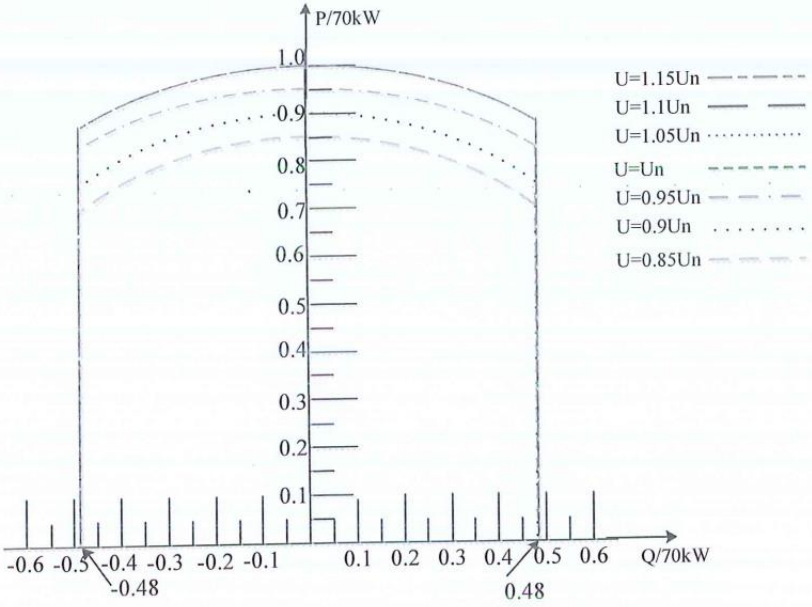
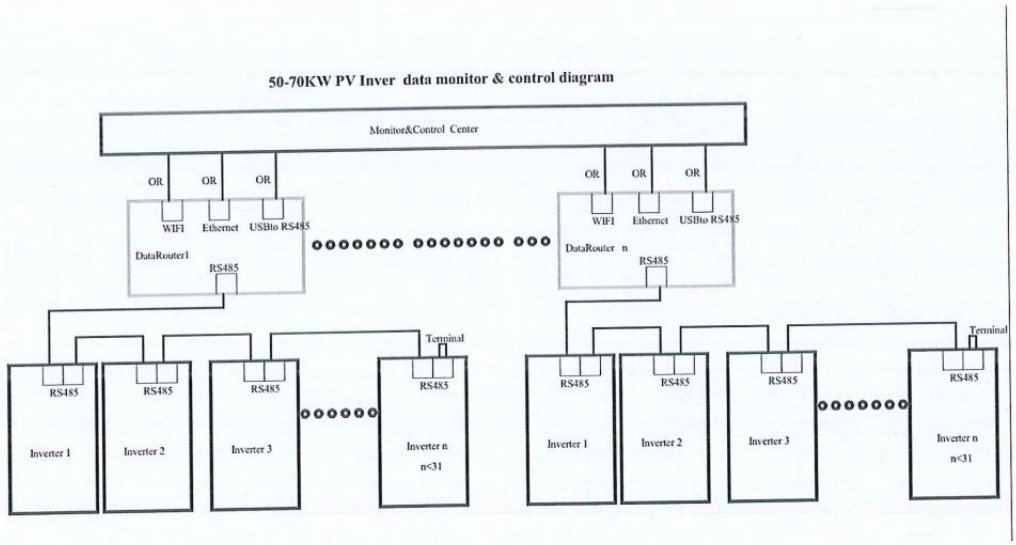
PQ-Diagram (SOFAR 70000TL-HV)



A remote control reciver can be connected to the inverter via RS485 for active / reactive power control.



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- **Active power set-point control**

Parameter name	unit	Setting range	Step size	Description / Comment
Active output percentage	$\%P_n$	0-100%	1	Limit the active output power to a percentage value of nominal active power
Derate Rate	$\%P_n$/min	0-300%	1	Specify the dynamic behaviour at change of active power set point

- **P(f) function**

Parameter name	unit	Setting range	Step size	Description / Comment
Overfrequency derating				
FreqDeratePoint	Hz	40-70	0.01	Active power derate when actual frequency exceeds the frequency point
OverFreq Derate rate	Pm/Δf	0-100%	1	Specify the active power at change of frequency
Overfreq Cut-off Freq	Hz	40-70	0.01	Active power derate to zero when actual frequency exceeds the frequency point
Ovefreq Responce	s	1-60	1	Specify the dynamic behaviour at change of frequency
Wait time before return	s	0-300	1	Active power remains unchanged at this period after frequency return to normal
Power return rate	%Pn/mim	0-100%	1	Specify the active power dynamic behaviour at frequency return to normal
Underfrequency uprating				
Start Freq	Hz	40-70	0.01	Active power uprates when actual frequency less than the frequency point
Stop Freq	Hz	40-70	0.01	Active power uprates to max when actual frequency less than the frequency point
Up rate	%Pn/mim	0-100%	1	Specify the dynamic behaviour at change of frequency
Wait time before return	s	0-300	1	Active power remains unchanged at this period after

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				frequency return to normal
Power return rate	%Pn/mim	0-100%	1	Specify the active power dynamic behaviour at frequency return to normal

- **Q setpoint**

Parameter name	unit	Setting range	Step size	Description / Comment
Q set-point	%Pn	0-48%	1	Limit the reactive output power to a percentage value of nominal active power
Q response time	s	0-60	1	Specify the dynamic behaviour at change of reactive power set point

Note:
The parameter stated above specify the Q set-point control function implemented at the PGU-level. To comply with the requirement of PT1 behaviour on the PGS-level according to VDE-AR-N 4110:2018-11 a PGS controller has to be used.

- **cosφ set-point**

Parameter name	unit	Setting range	Step size	Description / Comment
cosφ set-point		(-1)-(-0.8) / 1-0.8	0.01	Limit the power factor to a constant
Q response time	s	0-60	1	Specify the dynamic behaviour at change of reactive power set point

Note:
The parameter stated above specify the Q set-point control function implemented at the PGU-level. To comply with the requirement of PT1 behaviour on the PGS-level according to VDE-AR-N 4110:2018-11 a PGS controller has to be used.

- **Q(U)**

Parameter name	unit	Setting range	Step size	Description / Comment
High volt start value	%Un	0-200%	1	Generate underexcited reactive power when actual voltage exceeds the point
High volt end value	%Un	0-200%	1	Generate max underexcited reactive power when actual voltage exceeds the point
Low volt start value	%Un	0-200%	1	Generate overexcited reactive power when actual voltage

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				less than the point
Low volt end value	%Un	0-200%	1	Generate max overexcited reactive power when actual voltage less than the point
Lock-in power	%Pn	0-100%	1	Specify the min percentage value of nominal active power to enable the function
Lock-out power	%Pn	0-100%	1	Specify the max percentage value of nominal active power to quit the function
Max reactive power	%Pn	0-100%	1	Specify the max percentage value of reactive power to nominal active power
Q response time	s	0-60	1	Specify the dynamic behaviour at change of reactive power set point

Note:
The Q(U)-characteristic curve can be defined with max. 4 supporting points via a graphical user interface
The parameter stated above specify the Q set-point control function implemented at the PGU-level. To comply with the requirement of PT1 behaviour on the PGS-level according to VDE-AR-N 4110:2018-11 a PGS controller has to be used.

- **Q(P)**

Parameter name	unit	Setting range	Step size	Description / Comment
poini1 active power	%Pn	0-100%	1	Specify the percentage value of nominal active power of point1
power factor1		0-0.8	0.01	Specify power factor of point1
poini2 active power	%Pn	0-100%	1	Specify the percentage value of nominal active power of point2
power factor2		0-0.8	0.01	Specify power factor of point2
Q response time	s	0-60	1	Specify the dynamic behaviour at change of reactive power set point
power factor set	$\cos^*_\psi = \frac{P\text{-}P_2}{P_1\text{-}P_2} * (\cos_{\psi 1} - \cos_{\psi 2}) + \cos_{\psi 2}$			

Note:
The Q with active power limitation characteristic curve can be defined with max. 4 supporting points via a graphical user interface.

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The Q(P) function will be implemented using a PGS controller.

- **Q with voltage limitation function**

Parameter name	unit	Setting range	Step size	Description / Comment
High volt start value	%Un	0-200%	1	Specify the high voltage beginning point that PGU can generate max reactive power
High volt end value	%Un	0-200%	1	Specify the max voltage that PGU can generate max reactive power
Low volt start value	%Un	0-200%	1	Specify the low voltage beginning point that PGU can generate max reactive power
Low volt end value	%Un	0-200%	1	Specify the min voltage that PGU can generate max reactive power

Note:
The Q with voltage limitation characteristic curve can be defined with max. 7 supporting points via a graphical user interface.

Grid protection

Paramerter name	unit	Setting range	Step size	Description
Undervoltage 1st trip limit	V	Phase volage：23-230（50、60K） Line volage：48-480V（70K）	1	1st undervoltage protection point
Undervoltage 2nd trip limit	V	Phase volage：23-230（50、60K） Line volage：48-480V（70K）	1	2nd undervoltage protection point
Overvoltage 1st trip limit	V	Phase volage：230-299（50、60K） Line volage：480-552V（70K）	1	1st overvoltage protection point
Overvoltage 2nd trip limit	V	Phase volage：230-299（50、60K） Line volage：480-552V（70K）	1	2nd overvoltage protection point
Underfrequency trip limit	Hz	40-50	0.01	Underfrequency protection point
Overfrequency trip limit	Hz	50-70	0.01	Overfrequency protection point
Undervoltage reconnection limit	V	Phase volage：80-230V（50、60k） Line volage：167-480V（70k）	0.1	Undervoltage reconnection point

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Underfrequency reconnection limit	Hz	40-50	0.01	Underfrequency reconnection point
Overfrequency reconnection limit	Hz	50-70	0.01	Overfrequency reconnection point

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Dynamic grid support

During a LVRT or HVRT event the positive and negative sequence system of the voltages are monitored and the positive and negative sequence current are controlled. Additionally, a limited dynamic grid support mode also provided, in this case the apparent current will be limited to 5%I_n (active current will be limited to 5%I_n and reactive current to 0) during the grid fault.

Parameter name	unit	Setting range	Step size	Description / Comment
K-factor		0-10	0.1	Reactive current coefficient
ZCM parameter		Enable/Disable		Enable/Disable the zero current through mode
$U_{deadband,sym}$ parameter	%Un	1-99%	1	Specify the area that no support reactive current
After fault active power ramp up parameter	%Pn/min	0-300%	1	Specify the active power dynamic behaviour after fault through

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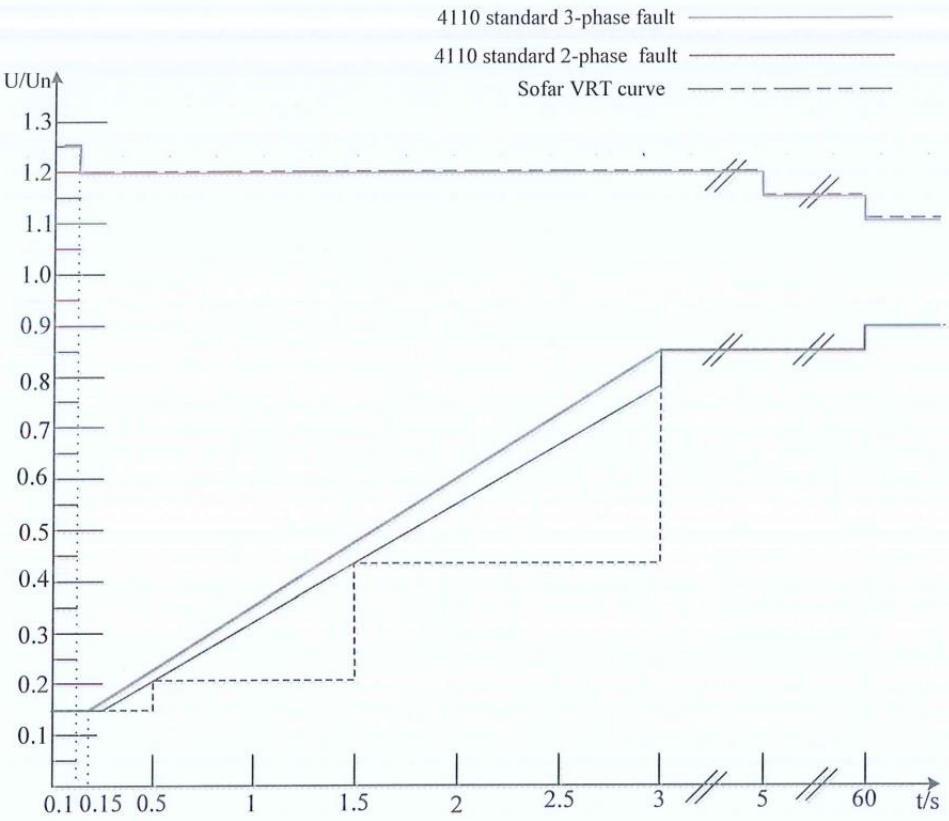
U(t)-diagram



Shenzhen SOFAR SOLAR Co., Ltd.

Shenzhen	23 September 2019	
place	date	Technical manage (stamp, signature)

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Schematisches Übersichtsbild der Erzeugungseinheit /
***Schematic overview circuit diagram of the power generating unit*:**