



SUMMARY TEST REPORT

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Report reference number : **PVFR2102WDG0105-4**

Date of issue : 2021-04-19

Total number of pages : 19

Testing laboratory name : **Bureau Veritas Shenzhen Co., Ltd. Dongguan Branch**

Address : No. 96, Guantai Road (Houjie Section), Houjie Town, Dongguan City, Guangdong Province, 523942, People's Republic of China

Applicant's name : **Shenzhen SOFARSOLAR Co., Ltd.**

Address : 401, Building 4, AnTongDa Industrial Park, District 68, XingDong Community, XinAn Street, BaoAn District, Shenzhen, China.

Test specification

Standard..... : According client's requirement

Test Report Form No. : SUMMARY TEST REPORT VER.1

TRF Originator : Bureau Veritas Shenzhen Co., Ltd. Dongguan Branch

Master TRF : Dated 2021-03-26

Test item description..... : **Solar Grid-tied Inverter**

Trademark..... :





Model / Type : SOFAR 20000TL-G2, SOFAR 25000TL-G2,
SOFAR 30000TL-G2, SOFAR 33000TL-G2.

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Ratings	SOFAR 20000TL-G2	SOFAR 25000TL-G2	SOFAR 30000TL-G2	SOFAR 33000TL-G2
Input DC voltage [V]	Max.1100			
MPP DC voltage range [V]	230-960			
Input DC current [A]	24/24	28/28	30/30	30/30
Isc PV [A]	30/30	35/35	37,5/37,5	37,5/37,5
Output AC voltage [V]	400V, 3/N/PE, 50Hz			
Rated Output AC current [A]	28,99	36,23	43,48	47,82
Max. Output AC current [A]	Max. 32	Max. 40	Max. 48	Max. 53
Rated Output power [kW]	20,0	25,0	30,0	33,0
Max Output power [kVA]	22,0	27,5	33,0	36,3



Testing Location	Bureau Veritas Shenzhen Co., Ltd. Dongguan Branch
Address	No. 96, Guantai Road (Houjie Section), Houjie Town, Dongguan City, Guangdong Province, 523942, People's Republic of China
Tested by (name and signature).....	Jack Shi 
Approved by (name and signature).....	Ken Chan 
Manufacturer's name	Shenzhen SOFARSOLAR Co., Ltd.
Manufacturer address	401, Building 4, AnTongDa Industrial Park, District 68, XingDong Community, XinAn Street, BaoAn District, Shenzhen, China.
Factory's name	Dongguan SOFAR SOLAR Co.,Ltd.
Factory address	1F - 6F, Building E, No. 1 JinQi Road, Bihu Industrial Park, Wulian Village, Fenggang Town, Dongguan City.

Document History			
Date	Internal reference	Modification / Change / Status	Revision
2021-04-15	Jack Shi	Initial report was written	0
Supplementary information:			

Test items particulars

Equipment mobility : Permanent connection
 Operating condition : Continuous
 Class of equipment : Class I
 Protection against ingress of water .. : IP65 according to EN 60529
 Mass of equipment [kg] : Approx. 37,0 kg

Test case verdicts

Test case does not apply
 to the test object : N/A
 Test item does meet
 the requirement : P(ass)
 Test item does not meet
 the requirement : F(ail)

Testing

Date of receipt of test item : 2021-03-19
 Date(s) of performance of test : 2021-03-19 to 2021-03-27

General remarks:

The test result presented in this report relate only to the object(s) tested. This report shall not be reproduced in part or in full without the written approval of the issuing testing laboratory.
 "(see Annex #)" refers to additional information appended to the report.
 "(see appended table)" refers to a table appended to the report.
 Throughout this report a comma is used as the decimal separator.



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Report No. PVFR2102WDG0105-4:

This Test Report consists of the following documents:

1. Test Report
2. Annex No. 1 – Pictures of the unit
3. Annex No. 2 – Test equipment list

Copy of marking plate

SOFAR Solar Grid-tied Inverter

Model No: **SOFAR 20000TL-G2**

Max.DC Input Voltage	1100V
Operating MPPT Voltage Range	230-960V
Max. Input Current	24A/24A
Max. PV Isc	30A/30A
Nominal Grid Voltage	3/N/PE, 400Vac
Max. Output Current	3x32A
Nominal Grid Frequency	50/60Hz
Nominal Output Power	20000W
Max. Output Power	22000VA
Power Factor	>0.99(adjustable +/-0.8)
Ingress Protection	IP65
Operating Temperature Range	-25°C ~ +60°C
Protective Class	Class I

Made in China

Manufacturer : Shenzhen SOFAR SOLAR Co.,Ltd.
Address : 401, Building 4, An TongDa Industrial Park,
District 68, XingDong Community, XinAn Street,
BaoAn District, Shenzhen, China
VDE0126-1-1, VDE-AR-N4105, G99, IEC61727,
IEC62116, UTE C15-712-1, AS4777



SOFAR Solar Grid-tied Inverter

Model No: **SOFAR 25000TL-G2**

Max.DC Input Voltage	1100V
Operating MPPT Voltage Range	230-960V
Max. Input Current	28A/28A
Max. PV Isc	35A/35A
Nominal Grid Voltage	3/N/PE, 400Vac
Max. Output Current	3x40A
Nominal Grid Frequency	50/60Hz
Nominal Output Power	25000W
Max. Output Power	27500VA
Power Factor	>0.99(adjustable +/-0.8)
Ingress Protection	IP65
Operating Temperature Range	-25°C ~ +60°C
Protective Class	Class I

Made in China

Manufacturer : Shenzhen SOFAR SOLAR Co.,Ltd.
Address : 401, Building 4, An TongDa Industrial Park,
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VDE0126-1-1, VDE-AR-N4105, G99, IEC61727,
IEC62116, UTE C15-712-1, AS4777



SOFAR SOLAR Solar Grid-tied Inverter

Model No:	SOFAR 30000TL-G2
Max.DC Input Voltage	1100V
Operating MPPT Voltage Range	230~960V
Max. Input Current	30A/30A
Max. PV Isc	37.5A/37.5A
Nominal Grid Voltage	3/N/PE,400Vac
Max. Output Current	3x48A
Nominal Grid Frequency	50/60Hz
Nominal Output Power	30000W
Max. Output Power	33000VA
Power Factor	>0.99(adjustable+/-0.8)
Ingress Protection	IP65
Operating Temperature Range	-25°C~+60°C
Protective Class	Class I

Made in China

Manufacturer : Shenzhen SOFAR SOLAR Co.,Ltd.
Address : 401, Building 4, An TongDa Industrial Park,
District 68, XingDong Community,XinAn Street,
BaoAn District, Shenzhen, China
VDE0126-1-1,VDE-AR-N4105,G99,IEC61727,
IEC62116,UTE C15-712-1,AS4777



SOFAR SOLAR Solar Grid-tied Inverter

Model No:	SOFAR 33000TL-G2
Max.DC Input Voltage	1100V
Operating MPPT Voltage Range	230~960V
Max. Input Current	30A/30A
Max. PV Isc	37.5A/37.5A
Nominal Grid Voltage	3/N/PE,400Vac
Max. Output Current	3x53A
Nominal Grid Frequency	50/60Hz
Nominal Output Power	33000W
Max. Output Power	36300VA
Power Factor	>0.99(adjustable+/-0.8)
Ingress Protection	IP65
Operating Temperature Range	-25°C~+60°C
Protective Class	Class I

Made in China

Manufacturer : Shenzhen SOFAR SOLAR Co.,Ltd.
Address : 401, Building 4, An TongDa Industrial Park,
District 68, XingDong Community,XinAn Street,
BaoAn District, Shenzhen, China
VDE0126-1-1,VDE-AR-N4105,G99,IEC61727,
IEC62116,UTE C15-712-1,AS4777



General product information:

The Solar converter converts DC voltage into AC voltage.

The DC input of Solar converter can be supplied from PV array.

The input and output are protected by Varistors to Earth. The unit is providing EMC filtering at the output toward mains. The unit does not provide galvanic separation from input to output (transformerless). The output is switched off redundant by the high power switching bridge and a two relays. This assures that the opening of the output circuit will also operate in case of one error.

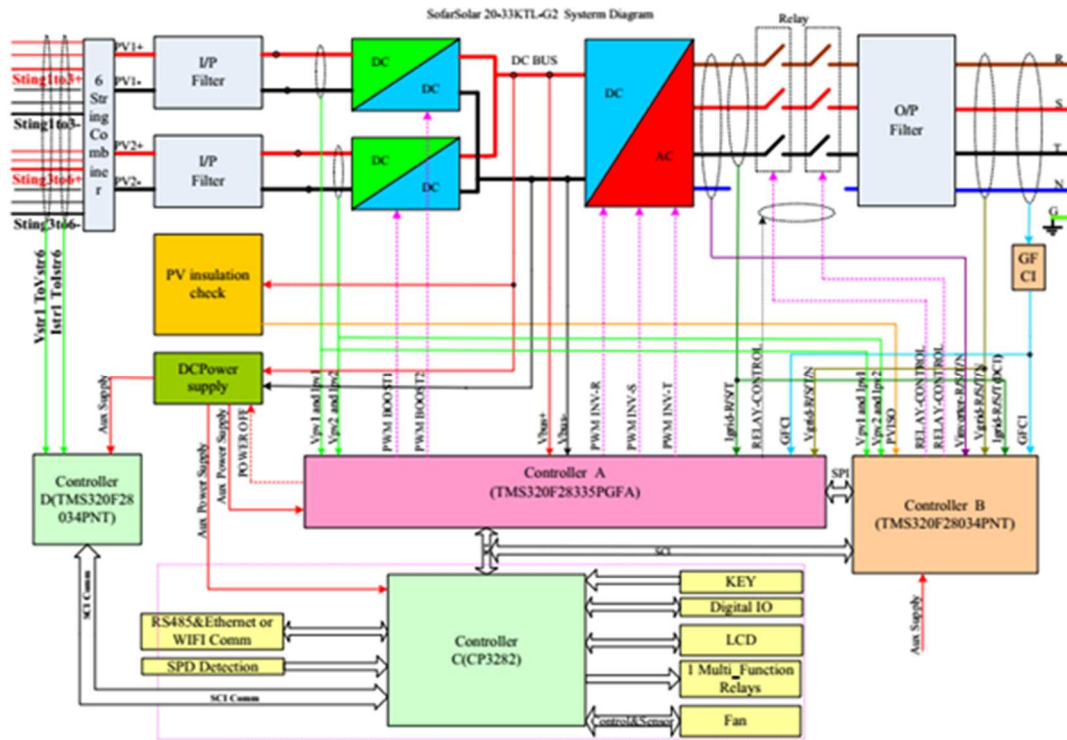


Figure 1-Block diagram

The internal control is redundant built. It consists of Main DSP(UC20) and slave DSP(UC73).

The Main DSP(UC20) can control the relays, measures voltage, and frequency, AC current with injected DC, insulation resistance and residual current, In addition it tests the array insulation resistance and the RCMU circuit before each start up.

The slave DSP(UC73) is using for detect residual current, also can open the relays independently and communicate with Main DSP(UC20).

The unit provides two relays in each phase. When single-fault applied to one relay, alarm an error code in display panel, another redundant relay provides basic insulation maintained between the PV array and the mains. All the relays are tested before start up. Both controllers(Main DSP(UC20), Slave DSP(UC73) can open the relays.

Differences of the models:

The models SOFAR 20000TL-G2, SOFAR 25000TL-G2, SOFAR 30000TL-G2 and SOFAR 33000TL-G2 are almost identical in hardware except the shown in the following table and the output power derated by software.

The difference in hardware			
Item	SOFAR 20000TL-G2	SOFAR 25000TL-G2	SOFAR 30000TL-G2 / SOFAR 33000TL-G2
Number of PV terminal	2+2	3+3	
Number of BUS capacitance	8 capacitors: 550V/110 μ F 2 capacitors: 1100V/40 μ F		10 capacitors: 550V/110 μ F 24 capacitors: 1100V/40 μ F
INV inductance	785 μ H	735 μ H	
Combiner board	Not the board	Have the board	
External fan	Not the board	2	3
Relay of output board	6pcs T9VV1K15-12S		3pcs AZSR250-2AE-12D

The product was tested on:

Hardware version: V1.00

Software version: V1.40

Per client requested, all tests were performed on EUT of SOFAR 33000TL-G2.

TECHNOLGY

Nominal output power of the inverter	33,00 kW
Nominal current - I_n	47,82 A
Maximum apparent power of the inverter	36,30 kVA
Power electronics type	<input type="checkbox"/> Assisted switching (Thyristors) <input checked="" type="checkbox"/> Forced switching (IGBT-MLI)
Rated output voltage	230 V
Connection type	<input type="checkbox"/> Single phase <input checked="" type="checkbox"/> Three phase

IMPEDANCE AT 175 Hz

Impedance of the converter at 175 Hz - R and X in ohm, give the values on the LV side (not taken into account of the transformer)	<input checked="" type="checkbox"/> Serial equivalent schema	$R_{175Hz}=0,15 \quad \Omega$
	<input type="checkbox"/> Parallel equivalent schema	$X_{175H}=-0,99 \quad \Omega$

BEHAVIOR IN CASE OF SHORT INVERTER OUTPUT CIRCUIT

Values measured at the output of the aero generator, give the values on the LV side (not taken into account of the transformer)	$I_p=101,5 \quad A$
	$I_{k''}=34,9 \quad A$

HARMONIC:

Order	Harmonic current	Order	Harmonic current
	%In		%In
2	0,142	3	0,303
4	0,125	5	0,311
6	0,028	7	0,573
8	0,062	9	0,100
10	0,045	11	0,356
12	0,016	13	0,255
14	0,019	15	0,086
16	0,008	17	0,111
18	0,009	19	0,089
20	0,010	21	0,044
22	0,008	23	0,078
24	0,006	25	0,069
26	0,004	27	0,033
28	0,005	29	0,054
30	0,005	31	0,060
32	0,005	33	0,042
34	0,006	35	0,056
36	0,004	37	0,041
38	0,004	39	0,022
40	0,004	41	0,040
42	0,004	43	0,044
44	0,004	45	0,019
46	0,008	47	0,046
48	0,007	49	0,036
50	0,004	--	--

Note:

The tests should be based on the limits of the EN 61000-3-12 for more than 16A.



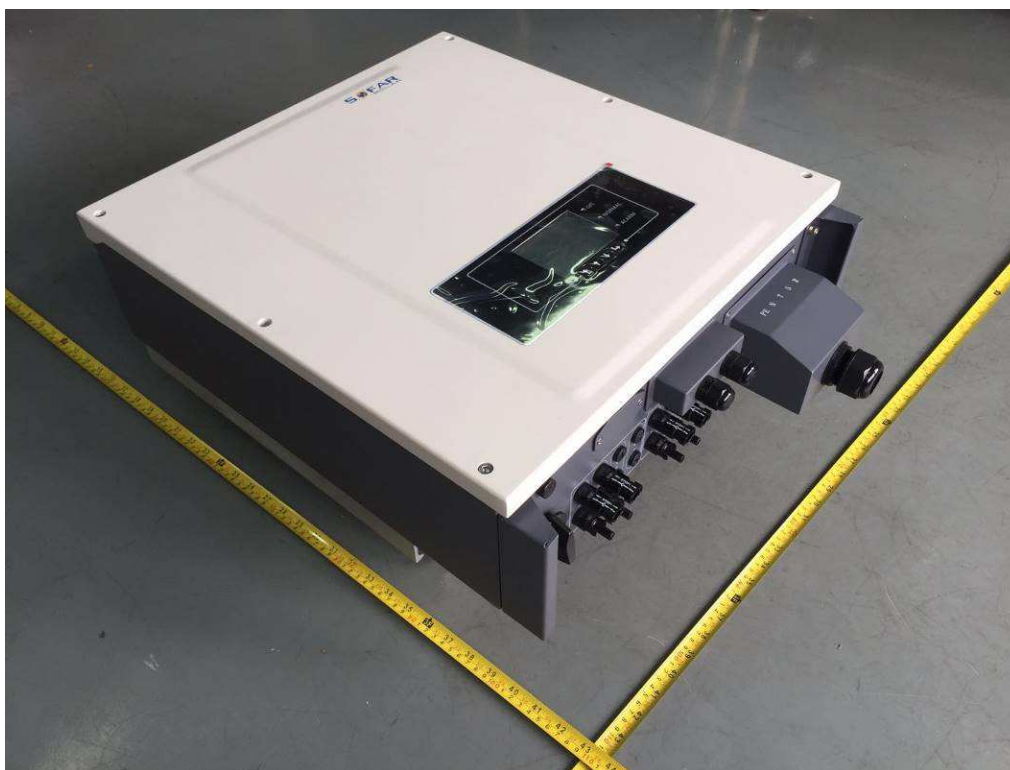
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Annex No. 1

Pictures of the unit

Enclosure front view: SOFAR 20000TL-G2



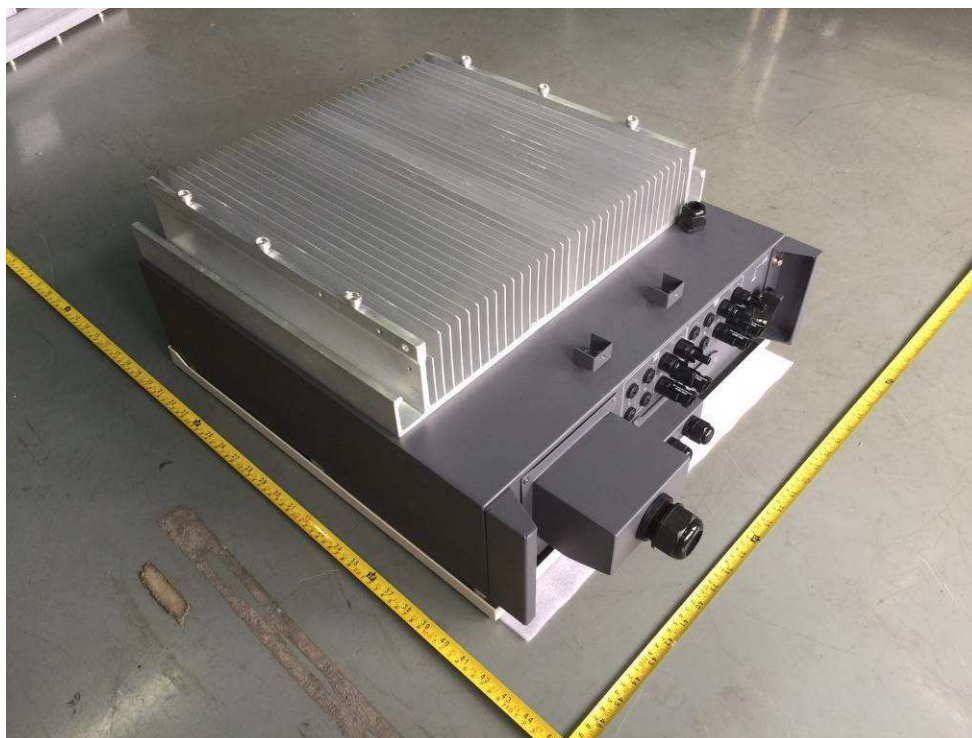
Enclosure rear view: SOFAR 20000TL-G2



Enclosure front view: SOFAR 25000TL-G2



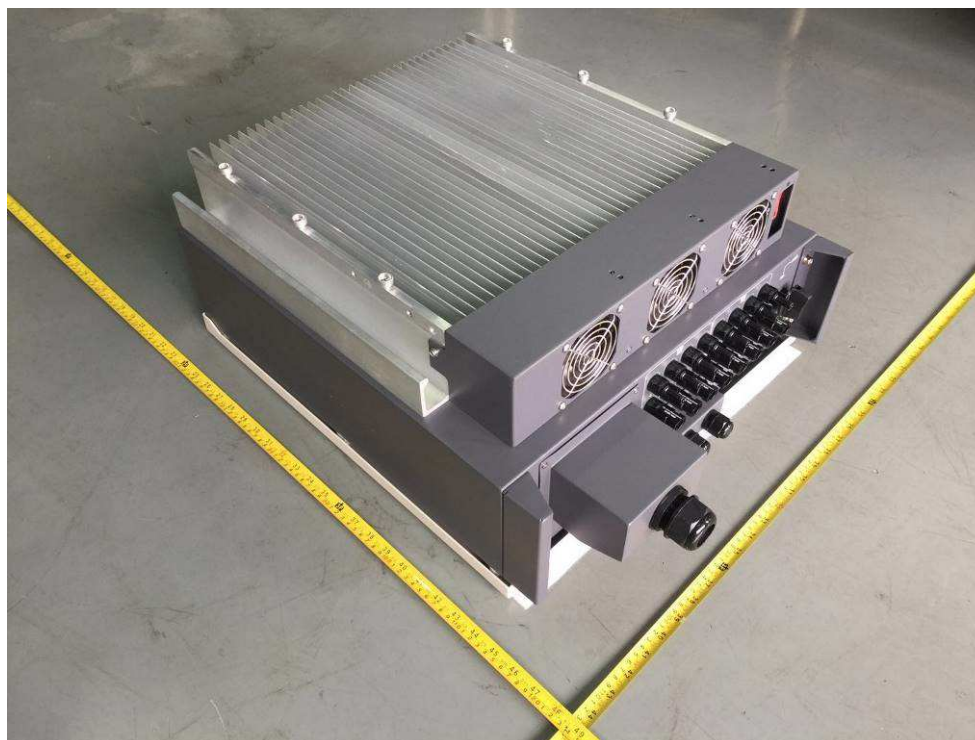
Enclosure rear view: SOFAR 25000TL-G2



Enclosure front view: SOFAR 3000TL-G2, SOFAR 33000TL-G2



Enclosure rear view: SOFAR 3000TL-G2, SOFAR 33000TL-G2



Enclosure terminal view: SOFAR 2000TL-G2



Enclosure terminal view: SOFAR 2500TL-G2



Enclosure terminal view: SOFAR 3000TL-G2, SOFAR 33000TL-G2





Report No. PVFR2102WDG0105-4:

Annex No. 2

Test Equipment list

Dates of performance test: 2021-03-19 to 2021-03-27

Equipment	Internal No.	Manufacturer	Type	Serial No.	Next Calibration date
Power Analyzer	A4080002DG	YOKOGAWA	WT3000	91M210852	Jun, 16, 2021
AC Source	A7040019DG	Chroma	61512	61512000439	Monitored by Power Analyzer
	A7040020DG	Chroma	61512	61512000438	
DC Simulation Power Supply	A7040016DG	Chroma	62150H-1000S	62150EF00490	
	A7040017DG	Chroma	620028	620028EF00120	
RLC Load	A7150027DG	Qunling	ACLT-3803H	93VOO2869	
Eight Channel	A4089017DG	YOKOGAWA	DL850	91N726247	Sep. 23, 2021
Oscilloscope	//	KEYSIGHT	DSOX3014T	MY59243036	Jan. 04, 2022
Oscilloscope probel	A4089008DG	Tektronix	TPP1000	C008230	Aug. 10, 2021
	A4089010DG	Tektronix	TPP1000	C008228	Aug. 10, 2021
	A4089011DG	Tektronix	TPP1000	C008229	Aug. 10, 2021
Current transducer	A1060007DG	YOKOGAWA	CT200	1130700012	Sep. 02, 2021
	A1060008DG	YOKOGAWA	CT200	1130700017	Sep. 02, 2021
	A1060012DG	YOKOGAWA	CT200	1130700018	Sep. 02, 2021