






SUMMARY TEST REPORT

Report reference number	PVFR2102WDG0105-10
Date of issue	2021-04-23
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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 250KTL-HV, SOFAR 255KTL-HV.
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Ratings	SOFAR 250KTL-HV	SOFAR 255KTL-HV
Input DC voltage [V]	Max. 1500	
MPP DC voltage range [V]	500-1500	
Input DC current [A]	Max. 12*30	
Isc PV [A]	Max. 12*50	
Output AC voltage [V]	3~/ PE, 800Vac, 50/60Hz	
Rated Output AC current [A]	180,5	184,0
Max. Output AC current [A]	180,5	184,0
Rated Output power [kW]	250	255
Max apparent power [kVA]	250	255

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. 99,3 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.

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		SOFAR Solar Grid-tied Inverter	
Model No:	SOFAR 250KTL-HV	Model No:	SOFAR 255KTL-HV
Max.DC Input Voltage	1500V	Max.DC Input Voltage	1500V
Operating MPPT Voltage Range	500~1500V	Operating MPPT Voltage Range	500~1500V
Max. Input Current	30A*12	Max. Input Current	30A*12
Max. PV Isc	50A*12	Max. PV Isc	50A*12
Rated Grid Voltage	3 / PE,800Vac	Rated Grid Voltage	3 / PE,800Vac
Max. Output Current	180.5A	Max. Output Current	184A
Rated Grid Frequency	50/60Hz	Rated Grid Frequency	50/60Hz
Rated Output Power	250KW	Rated Output Power	255KW
Max. Output Power	250KVA	Max. Output Power	255KVA
Power Factor	1 (adjustable +/-0.8)	Power Factor	1 (adjustable +/-0.8)
Ingress Protection	IP66	Ingress Protection	IP66
Operating Temperature Range	-30°C~+60°C	Operating Temperature Range	-30°C~+60°C
Protective Class	Class I	Protective Class	Class I
Overvoltage Category	AC III, DC II	Overvoltage Category	AC III, DC II
Made in China		Made in China	
Manufacturer : Shenzhen SOFARSOLAR Co., Ltd. Address : 401, Building 4, AnTongDa Industrial Park, District 68, XingDong Community, XinAn Street, BaoAn District, Shenzhen, China VDE0126-1-1, VDE-AR-N4105, G99, IEC61727 IEC62116, AS4777		Manufacturer : Shenzhen SOFARSOLAR Co., Ltd. Address : 401, Building 4, AnTongDa Industrial Park, District 68, XingDong Community, XinAn Street, BaoAn District, Shenzhen, China VDE0126-1-1, VDE-AR-N4105, G99, IEC61727 IEC62116, 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.

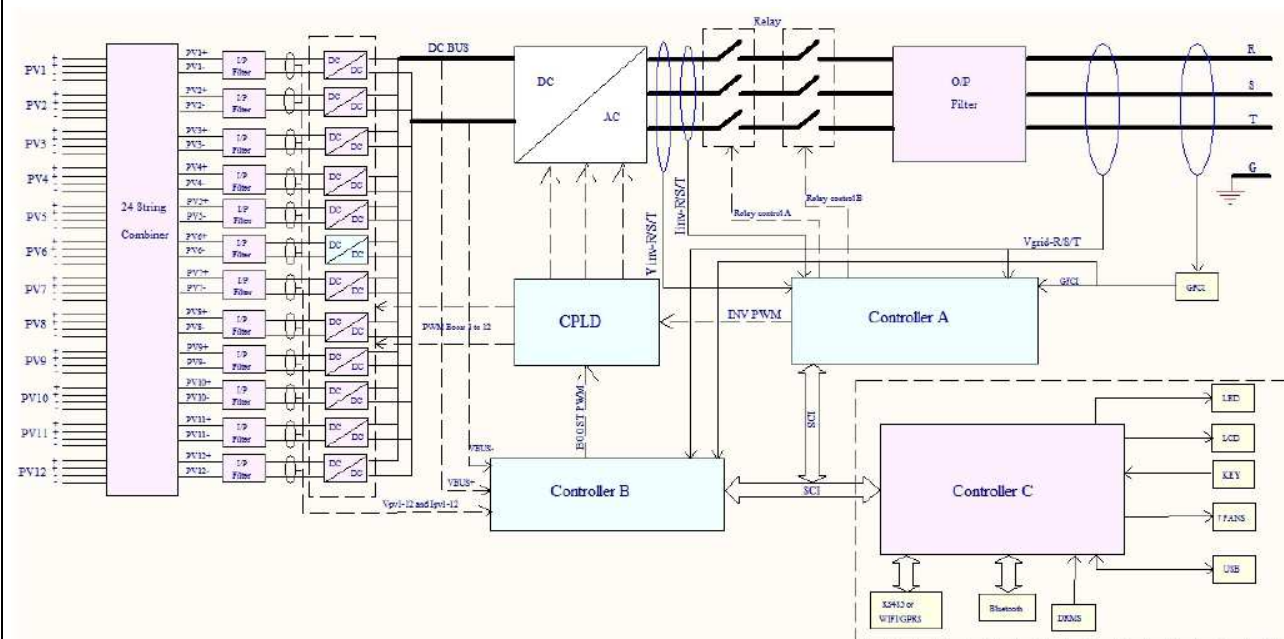


Figure 1-Block diagram

The internal control is redundant built. It consists of master DSP (U30) and slave DSP (U34).

The master DSP (U30) can control the relays, measures voltage, and frequency, AC current with injected DC, array insulation resistance and residual current and the RCMU circuit before each start up.

The slave DSP (U34) is using for sample the grid voltage, frequency, DC voltage, current and residual current, also can open the relays independently and communicate with master DSP (U30) each other.

The grid voltage is measured before the relays. The voltage between polarity is calculated. The voltage signals are sent to both DSP. In addition this signal is used for the frequency measurement.

The unit provides two relays in series in each phase. The relays are tested before each start up. Each DSP switch off each relays.

The current is measured by a current sensor. The AC current signal and the injected DC current signal are sent to the main DSP (U30). The main DSP (U30) tests and calibrates before each start up all current sensors.

The RCMU is located at the AC output. The RCMU is tested before each start up by the main DSP (U30).

While unit working, if a high level residual current occurs, the RCMU will give signal to DSP assuring that unit grid-off from AC mains.

Differences of the models:

The models SOFAR 255KTL-HV and SOFAR 250KTL-HV are completely identical in hardware and output power derated by software.

The product was tested on:

Hardware version: V001

Software version: V000001

Per client requested, all tests were performed on EUT of SOFAR 255KTL-HV.

TECHNOLGY

Nominal output power of the inverter	255,00 kW
Nominal current - I_n	184,00 A
Maximum apparent power of the inverter	255,00 kVA
Power electronics type	<input type="checkbox"/> Assisted switching (Thyristors) <input checked="" type="checkbox"/> Forced switching (IGBT-MLI)
Rated output voltage	800 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	$R_{175Hz}=0,76 \quad \Omega$
	<input type="checkbox"/> Parallel equivalent schema	$X_{175 H}=-1,00 \quad \Omega$

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)	$I_p=333,8 \quad A$
	$I_{k''}=64,0 \quad A$

HARMONIC:

Order	Harmonic current	Order	Harmonic current
	%In		%In
2	0,258	3	0,282
4	0,179	5	0,139
6	0,124	7	0,283
8	0,177	9	0,169
10	0,091	11	0,153
12	0,081	13	0,272
14	0,097	15	0,089
16	0,106	17	0,118
18	0,045	19	0,098
20	0,060	21	0,036
22	0,079	23	0,101
24	0,023	25	0,085
26	0,049	27	0,030
28	0,036	29	0,115
30	0,017	31	0,101
32	0,020	33	0,032
34	0,015	35	0,065
36	0,021	37	0,058
38	0,019	39	0,104
40	0,019	41	0,120
42	0,017	43	0,064
44	0,015	45	0,026
46	0,015	47	0,067
48	0,013	49	0,049
50	0,014	--	--

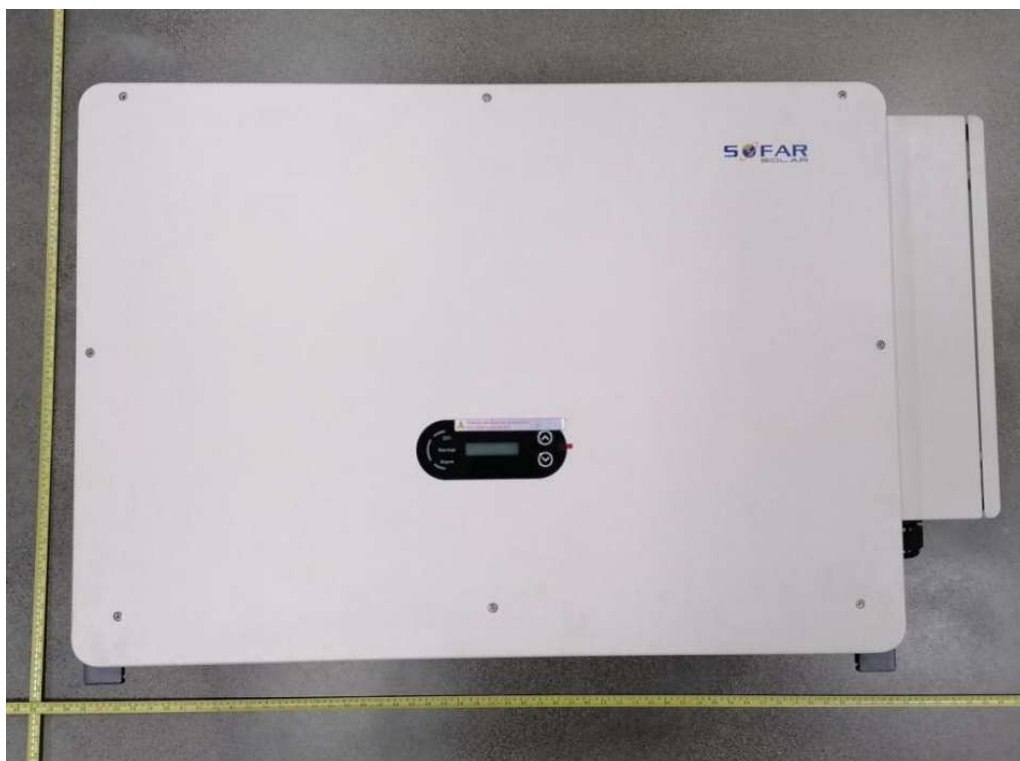
Note:

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

Annex No. 1

Pictures of the unit

Enclosure front view



Enclosure side view-1



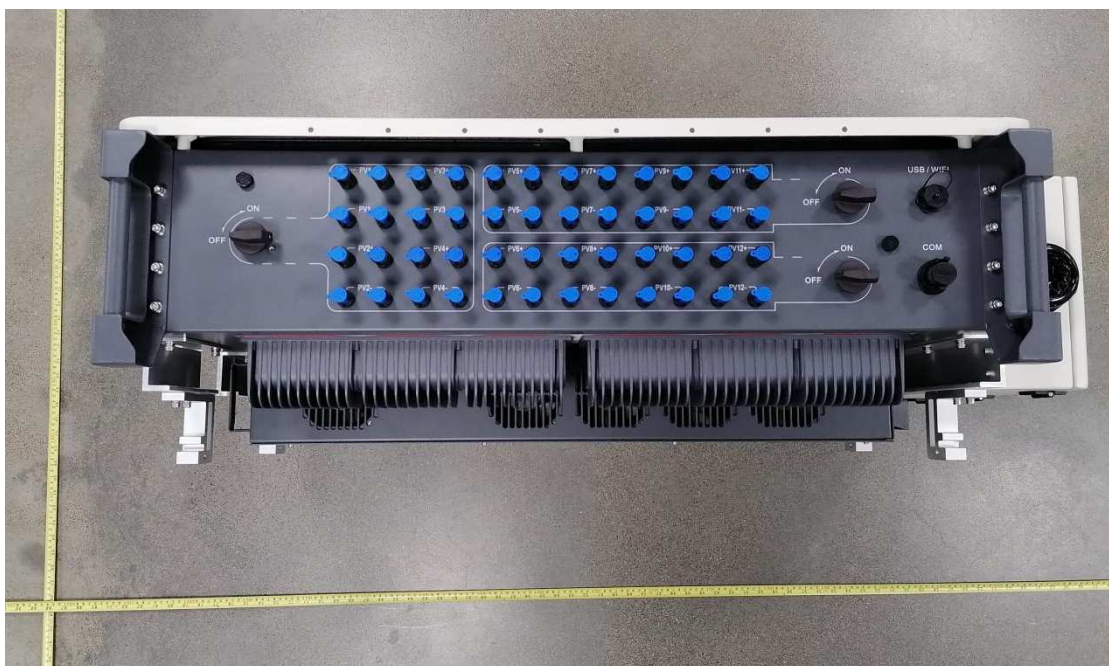
Enclosure side view-2



Enclosure top view



Enclosure bottom view



Enclosure rear view



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